V221

Balanced, Two-way Plug Valve
Cast Iron, PN 16 (232 psi)

F-20-1

2001-10-10

- V221 is a flanged plug valve, designed for control of large flows in heating and air conditioning installations. The plug is balanced whereby only a low actuating force is required.
- V221 is available in sizes DN 65 (2½"), DN 80 (3"), DN 100 (4"), DN 125 (5"), and DN 150 (6").
- The valve has two connections for flow measurement.

APPLICATIONS

V221 can be used in a large number of HVAC applications, including heating and air conditioning installations.

For use in other applications, please contact your nearest TAC sales office.

The valve can be used on the following types of fluids:

- Hot water and deaerated cooling water.
- Deaerated water with glycol-type freeze protection agents (max. 50 % glycol), and brines.

TECHNICAL DATA

Valve type ..... 2-way balanced plug valve
Pressure rating ..... PN 16 (232 psi)
Flow characteristic ..... see figure 2
Rangeability 30
Leakage ..... max. 0,1% of K_V (C_V)
Δp_m ..... max. 250 kPa (36 psi) water
Fluid temperature max. 150 °C (302 °F), min. +1 °C (34 °F)
Flange type ..... according to SS 335 and ISO 2084
Suitable mating weld flange, with collar ..... SS 2033
Materials:
Body ..... cast iron
Bonnet and trim ..... bronze
Stem ..... stainless steel
Seals ..... EPDM rubber, PTFE

Packing box ..... standard Type T
Special packing box for max. 50% glycol ..... Type Q

Remarks

The rangeability is the ratio of K_V to K_{Vmin} (C_V to C_{Vmin}).

K_V (C_V) is the valve flow at the max. lift and a pressure drop of 100 kPa across the valve.

K_{Vmin} (C_{Vmin}) is the minimum controllable flow at a pressure drop of 100 kPa, within the flow range where the characteristic meets the requirements on characteristic slope according to IEC 534-1.

h is the lift of the valve in mm.

Δp_m is max. pressure drop across a fully open valve.

Size DN	Size in.	K_V m³/h	Cvs	h mm	h in.	Part number	$K_{V\,min}$ m³/h	$C_{V\,min}$
65	2½	63	74	31.5	1.24	721-2154-000	2.2	2.6
80	3	100	117	41	1.61	721-2158-000	3.0	3.5
100	4	160	187	41	1.61	721-2162-000	5.6	6.6
125	5	250	292	41	1.61	721-2166-000	7.5	8.8
150	6	360	421	41	1.61	721-2170-000	12.0	14.0

FUNCTION AND FLOW CHARACTERISTIC

In the lower end position the plug seals against its seat and the valve is fully closed. In the plug there is a duct which balances the pressure drop across the valve. The required actuating force is therefore not affected by the pressure drop, but only by the friction forces caused by the seals.

As the valve moves upwards the plug slides on a guide rod which stabilizes the movement of the plug.

The flow characteristic initially is logarithmic (Eq%–equal percentage) but then gradually changes into a linear characteristic, see figure 2.

The valve is equipped with measuring nipples, which enable measurement of the pressure drop across the valve.

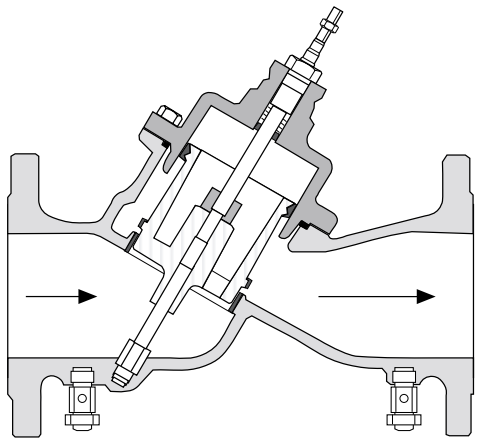

Figure 1

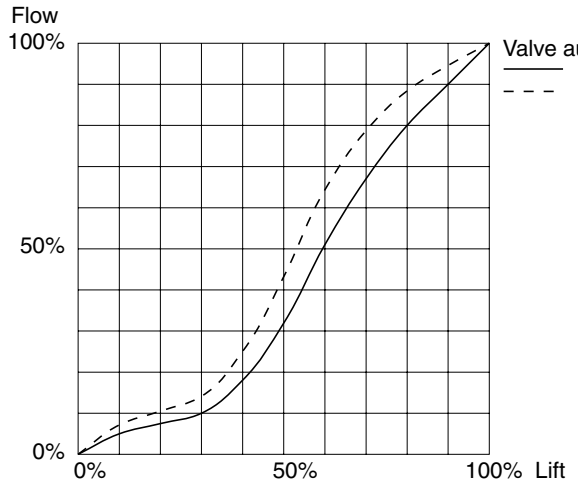

Figure 2

ACTUATOR SELECTION

The recommended actuator is TAC Forta M800.

Size		M800	
DN	in.	Δp_c kPa	Δp_c psi
65	2½	1000	145
80	3	1000	145
100	4	1000	145
125	5	1000	145
150	6	1000	145

Δp_c = Max. close-off pressure across the valve.

INSTALLATION

The valve is to be installed in the line so that the direction of flow coincides with the arrow on the valve body.

Whenever possible, the valve should be installed in the return line, to avoid exposing the valve to unnecessarily high temperatures. The valve must not be mounted with the actuator under the valve.

To prevent dirt from getting caught between plug and seat, it is recommended to install a strainer upstream of the valve. Also flush and rinse the piping system before installation of the valve.

A. Typical installation without local circulating pump.

To provide good function the pressure drop across the valve should be no less than half of the available pressure (Δp). This corresponds to a valve authority of 50%.

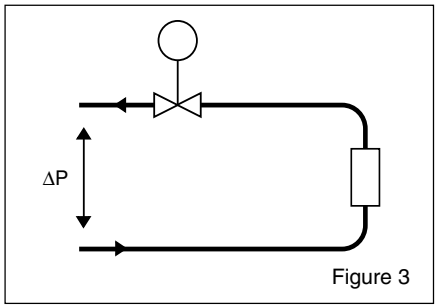

Figure 3

B. Typical installation with local circulating pump.

The K_V (C_V) value of the valve to be selected so that the entire available pressure drop (Δp) falls across the control valve.

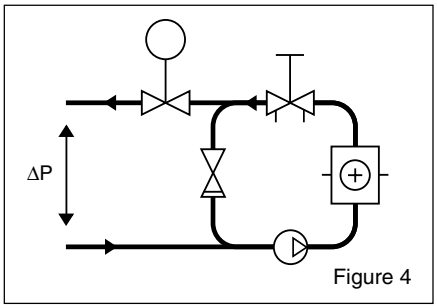

Figure 4

PRESSURE DROP DIAGRAM

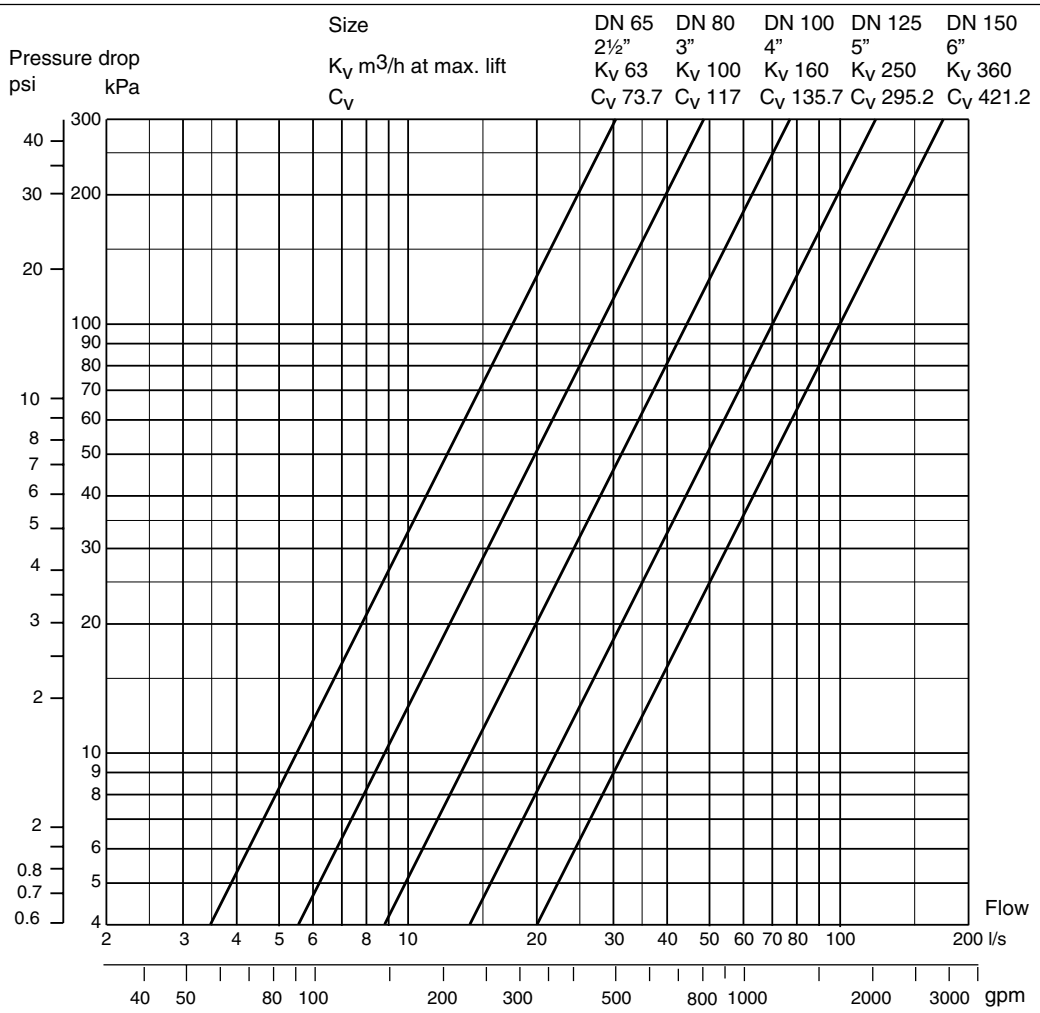

Figure 5

CAVITATION

Cavitation takes place in a valve when the velocity of the flow between the plug and seat increases to the extent that gas bubbles are created in the water.

When, after the plug and seat, the velocity decreases, the gas bubbles collapse (implode), generating considerable noise and causing considerable wear on the valve.

By means of the cavitation diagram shown in figure 6, you can check if risk of cavitation exists, with the working conditions in the pertinent installation.

Proceed as follows:

Using the static pressure before the valve, for example 350 kPa (50 psi), plot a horizontal line to the line for the temperature of the liquid, for example 120 °C (248 °F).

From the intersection point, plot a vertical line downwards and read off the max. permissible pressure drop across the valve, 125 kPa (18 psi).

If the computed pressure drop exceeds the value read from the diagram there is risk of cavitation.

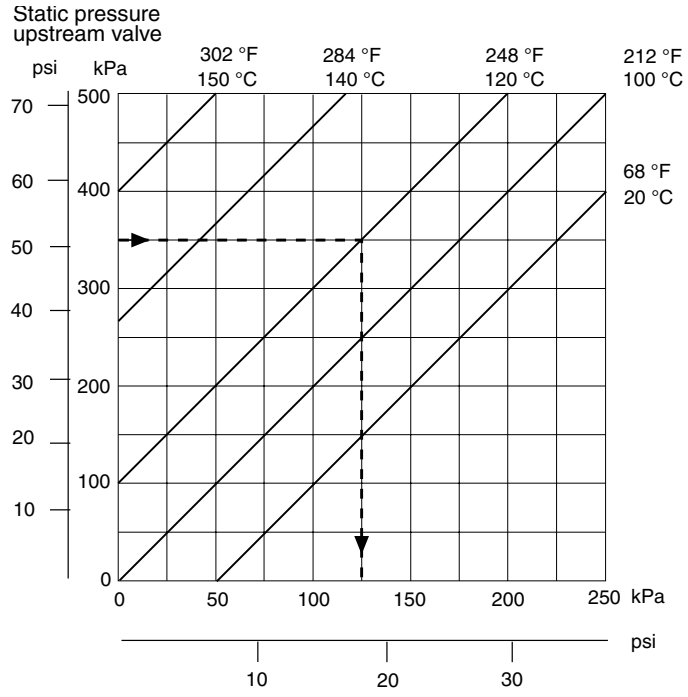

Figure 6

MEASUREMENTS AND WEIGHTS

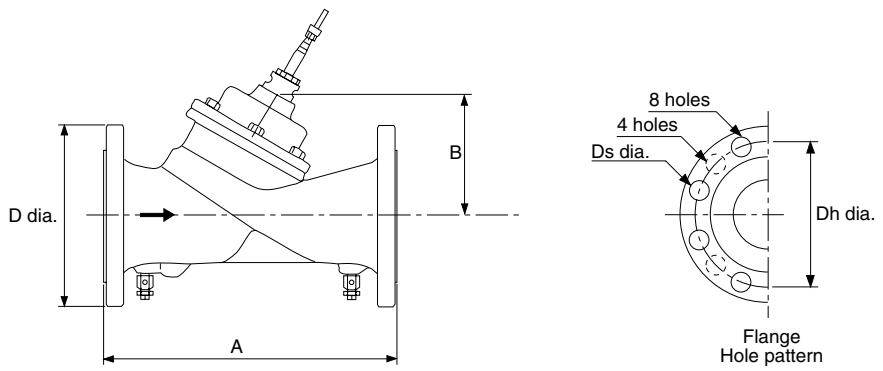

Figure 7

Size		Dimensions										Weight		
		A		B		D		Dh		Ds		No. of		
DN	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	holes	kg	lb
65	2½	290	11.4	119	4.7	185	7.3	145	5.7	18	0.7	4	13,8	30.4
80	3	310	12.2	142,5	5.6	200	7.8	160	6.3	18	0.7	8	18,8	41.4
100	4	350	13.8	150	5.9	220	8.7	180	7.1	18	0.7	8	23,8	52.5
125	5	400	15.7	162	6.4	250	9.8	210	8.3	18	0.7	8	33,8	74.5
150	6	480	18.9	177	7.0	285	11.2	240	9.5	22	0.9	8	45,4	100.1

SPARE PARTS

Standard packing box
Type T: max 180 °C (356 °F)
Part number: 080-2064-005.

Special packing box for max. 50% glycol
Type Q: –20 to +30 °C: (–4 to 86 °F)
Part number: 080-4724-005.