

Calculation and Selection - Control Valve

Initial data

10.00 m³/h	Estimated water flow rate	7.00 bar	Pressure before the control valve
110 °C	Maximum water temperature at the installation place	0.70 bar	Permissible pressure drop on the control valve
1.00 bar	Pressure drop on the controlled section	0.30 bar	Pressure loss on other elements of the controlled section excluding pressure loss on the valve

Calculation results

$[10.00 \text{ m}^3/\text{h}] / [0.70 \text{ bar}]^{0.5} = 11.95 \text{ [m}^3/\text{h}]$	Required Kv value
$0.00000005 * [110 \text{ °C}]^{3.658} = 1.47 \text{ [bar]}$	Absolute saturation vapor pressure of water at temperature 110°C
$0.2 * (7.00 + 1 - 1.47) = 1.31 \text{ [bar]}$	Lower limit without cavitation pressure loss at the valve
$0.6 * (7.00 + 1 - 1.47) = 3.92 \text{ [bar]}$	Upper limit without cavitation pressure loss at the valve
$0.70 \text{ [bar]} \leq 1.31 \text{ [bar]}$	There will be no cavitation on the valve
$([G \text{ 10.00 m}^3/\text{h}] / [Kvs \text{ 40 m}^3/\text{h}])^2 = 0.06 \text{ [bar]}$	Pressure drop across the fully open valve at a given flow rate of the heat carrier
$[1.00 \text{ bar}] * 1.2 = 1.20 \text{ [bar]}$	The maximum possible pressure drop across the valve, taking into account 20% reserve
$[10.00 \text{ m}^3/\text{h}] / \{3600 * 3.14 * ((DN50) * 0.001)^2 * 0.25\} = 1.4 \text{ [m/s]}$	The flow rate is within normal limits $V < 3.0 \text{ [m/s]}$

Selection result : Control valve threaded

Belimo : H4 B

Switzerland

DN 50 [mm]	Nominal valve diameter
Kvs 40 [m³/h]	Flow coefficient
PN 16 [bar]	Nominal pressure
logarithmic	Flow characteristic
dT -10 ... 120°C	Operating temperature
bronze	Body material
60 %	The percentage of the opening of the valve gate at which $Kv=11.95 \text{ [m}^3/\text{h}]$, and the pressure loss on the valve will be 0.70 [bar] when passing the calculated flow rate $10.00 \text{ [m}^3/\text{h}]$



Selection result : Electric actuator

Belimo : NV24A-TPC, NV230A-TPC

3.0 [bar]	Maximum pressure difference between the inlet and outlet ports of a valve at which the electric actuator can close the valve
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NV24A-TPC ::: Control signal [three-point] : Force [1000 N] : IP54
Stroke [20 mm] : Speed [7.5 sec/mm] : Limit switches [not provided]
Supply voltage [24V AC/DC | +/50/60 Hz | 3 VA]

NV230A-TPC ::: Control signal [three-point] : Force [1000 N] : IP54
Stroke [20 mm] : Speed [7.5 sec/mm] : Limit switches [not provided]
Supply voltage [230V AC | 50/60 Hz | 4.5 VA]

