Pressure Independent Control Valve

Model VY4511A_ _ _ _

■ General

The model VY4511A_ _ _ _ pressure independent control valve (PICV) with automatic, differential pressure independent flow control is a valve combination consisting of a flow regulator and a regulating valve. The nominal value of the flow regulator can be set with the help of an easily accessible handwheel. The regulating valve can be equipped with a temperature controller or a manual head (connection thread M 30 x 1.5).

The PICV is designed to be installed in heating and cooling systems with closed circuits (like central and surface heating systems, fan coil units, chilled ceilings, fan convectors etc.) for automatic flow control (hydronic balancing). It can also be used for the control of another variable (e.g. room temperature) by modifying the flow rate with the help of actuators, thermostats or temperature controllers.

The VY4511A_ _ _ _ is used in combination with the dedicated actuator model MY45_ _ _ _ _ _ _.

■ Features

- Max. operating pressure: 25 bar (2500 kPa)
- Max. closing pressure: 6 bar (600 kPa) in the direction of flow
- Closing pressure (actuator): 90 – 150 N
- Maximum flowrate within the control range is adjustable
- Has an almost linear characteristic line within the effective valve lift
- Constant high valve authority

Safety Instructions

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual nearby for quick reference.

■ Usage Restrictions

As an electromagnetic wave equipment for office use (Class A), this equipment is intended to use in other than home area. Sellers or users need to take note of this.
This product is targeted for general air conditioning.
Do not use this product in a situation where human life may be affected. Azbil Corporation will not bear any responsibility for the results produced by the operators.

■ Recommended Design Life

It is recommended that this product be used within the recommended design life.
The recommended design life is the period during which you can use the product safely and reliably based on the design specifications.
If the product is used beyond this period, its failure ratio may increase due to time-related deterioration of parts, etc.
The recommended design life during which the product can operate reliably with the lowest failure ratio and least deterioration over time is estimated scientifically based on acceleration tests, endurance tests, etc., taking into consideration the operating environment, conditions, and frequency of use as basic parameters.
The recommended design life of this product is 10 years.
The recommended design life assumes that maintenance, such as replacement of the limited life parts, is carried out properly.
Refer to the section on maintenance in this manual.

■ Warnings and Cautions

⚠ WARNING	Alerts users that improper handling may cause death or serious injury.
⚠ CAUTION	Alerts users that improper handling may cause minor injury or material loss.

■ Signs

	Notifies users that specific actions are prohibited to prevent possible danger. The symbol inside ⃠ graphically indicates the prohibited action. (For example, the sign on the left means that disassembly is prohibited.)
	Instructs users to carry out a specific obligatory action to prevent possible danger. The symbol inside ● graphically indicates the actual action to be carried out. (For example, the sign on the left indicates general instructions.)

⚠ CAUTION	
	Do not freeze this product. Doing so may damage the valve body and cause leakage.
	When piping this product, be sure there is no foreign matter in the pipes. If foreign matter remains in the pipes, the product may break down.
	Install and use this product according to the specifications stated in this manual. Failure to do so may cause device failure.
	Do not screw a pipe excessively far into this product. Doing so may damage the inside of the valve and cause leakage outside of the valve, or may cause malfunction.
	After installation, make sure no fluid leaks from the valve-pipe connections. Improper piping may cause fluid leakage outside of the valve.
	Do not put a load or weight on this product. Doing so may damage the product.
	Do not carelessly touch this product when it is used to control hot water. Doing so may result in burns, because the product reaches a high temperature.
	Do not loosen or touch the port for pressure measurement. Doing so may result in burns, because the hot water in the valve may spurt out.

■ Model Numbers

Base number	Test port	Valve rating	-	Connection	Valve size	Description
VY45						Pressure independent control valve
	1					With test port
		1				Maximum operating pressure: PN25
			A			Fixed
				0		Female/female thread
					015	DN15 (Rp 1/2), Kv=2.1
					020	DN20 (Rp 3/4), Kv=3.1
					025	DN25 (Rp 1), Kv=4.1
					032	DN32 (Rp 1 1/4), Kv=8.4

■ Specifications

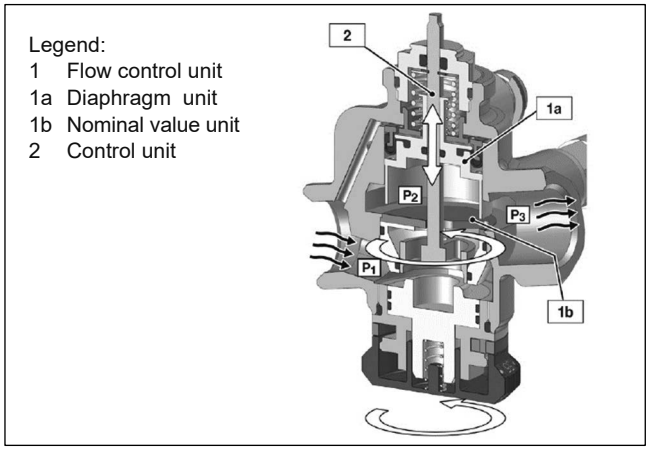
Item		Specification			
Model		Pressure independent control valve			
Body pressure rating		Maximum operating pressure: 2500 kPa			
End connection		Thread			
Model number		VY4511A0015	VY4511A0020	VY4511A0025	VY4511A0032
Nominal size		DN15 (Rp 1/2)	DN20 (Rp 3/4)	DN25 (Rp 1)	DN32 (Rp 1 1/4)
Kv		2.1	3.1	4.1	8.4
Close-off ratings [kPa]		600	600	600	600
Valve lift [mm]		4	4	4	4
Control range (min.-max.) [l/h]		200 – 1300	250 – 1800	400 – 2500	600 – 4800
Differential pressure p1–p3 (min.-max.) [kPa]		16 – 600	18 – 600	20 – 600	23 – 600
Weight		0.62	1.09	1.31	2.40
Applicable fluid		Water / water and ethylene / propylene glycol mixtures (max. 50%), pH value: 6.5-10 according to VDI 2035 / ÖNORM 5195, Not suitable for steam, oily and aggressive fluids.			
Allowable fluid temperature		-10 – 120 °C (Non-freezing, not using actuator.) 0 – 100 °C (Non-freezing, with MY4500G) 0 – 120 °C (Non-freezing, with MY4550C, MY4560C)			
Flow characteristic		Linear			
Seat leakage		IEC 60534-4:2009 / JIS B 2005-4:2012 / DIN EN 1349-4:2010 Class IV			
Materials	Body	Dezincification resistant brass			
	Seals	EPDM (Ethylene Propylene Diene Monomer) rubber			
	Stem	Stainless steel			
Ambient temperature	Operating	0 – 50 °C (Limited by model MY45_ _ _ _ _ _ _ actuator.)			
	Transport / Storage	-20°C – +55°C			
Ambient relative humidity	Operating	≤ 85% (Non-condensate, limited by model MY45_ _ _ _ _ _ _ actuator.)			
	Transport / Storage	≤ 95%			
Other storage condition		Keep dry and free from dust. Protect from UV rays and direct sunlight. Do not store together with solvents, chemicals, acids, fuels and similar.			
Actuator connection thread		M 30 x 1.5			
Actuator closing dimension [mm]		11.8			
Actuator closing pressure [N]		90 – 150			
Actuator lower lift position [mm]		≤ 11.3			
Actuator upper lift position [mm]		≥ 14.6 (30 – 210 l/h) ≥ 15.8			
Installation location		Indoor use Note: Salt air, corrosive gas, flammable gas, and organic solvent must be avoided.			
Factory preset position		Closed			

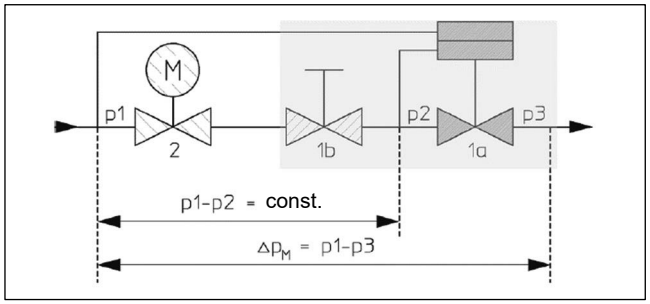
■ Maintenance space

Install this product in a place where wiring, configuration, and replacement can be done, leaving enough space around the product so that such work can be carried out after installation.

■ Function

The required flow rate can be set at the handwheel (see page 3 at the bottom). The nominal value setting can be secured by engaging the handwheel and by inserting the locking ring, which is lead sealable. During low demand periods, regulation can be carried out with the help of an actuator or a temperature controller, which can be screwed onto the valve.





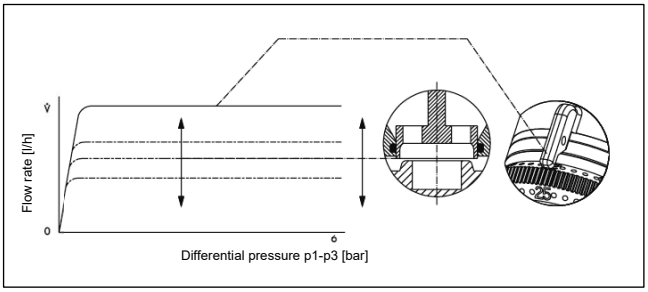
The illustrated section of the VY4511A_ _ _ _ pressure independent control valve shows three pressure ranges.

“p1” is the inlet pressure, “p3” the outlet pressure of the valve. “p2” is the pressure actuating the integrated diaphragm unit (pos. 1a) which maintains the differential pressure “p1”–“p2” at a constant level via the regulating unit (pos. 2) which is activated through the actuator and via the nominal value unit (pos. 1b) which can be set to a maximum flow rate.

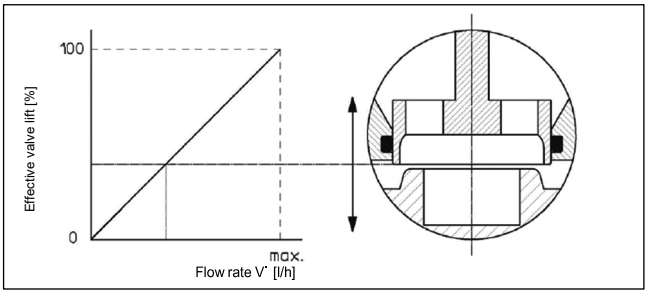
Even where high differential pressure variations “p1”–“p3” occur, for instance if sections of the system are activated or inactivated, the differential pressure “p1”–“p2” is kept at a constant level. This way, the valve authority of 100% is maintained (a = 1). Even during low demand periods with steady control (for instance in combination with 0 – 10 V actuators), the valve authority of the VY45 within the effective valve lift amounts to 100 % (a = 1).

■ Advantages

- constant high valve authority
- small sizes
- presetting of the nominal values even with mounted actuator
- optical display of the set nominal value even with mounted actuator
- excellent optical display of the presetting in any installation position
- nominal values can be read off in l/h without conversion
- presetting is secured by engaging the handwheel
- presetting can be locked and lead sealed with the help of the locking ring
- almost linear characteristic line if actuator driven
- high valve lift, even with small presetting values
- soft sealing valve disc

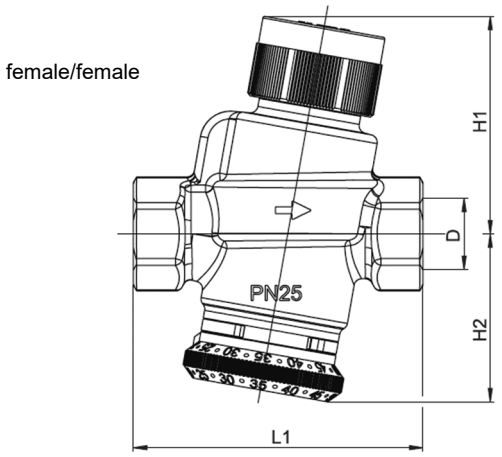


The maximum flow rate (V) within the control range is set with the help of the handwheel. During low demand periods, room temperature control may, for instance, be carried out with the help of actuators and room thermostats.



The PICV has an almost linear characteristic line within the effective valve lift. This is advantageous when using actuators (electrothermal or electromotive) which also have a linear stroke behaviour across the control voltage. In general, the valve can also be combined with a temperature controller.

■ Dimensions



DN	L_1	H_1	H_2	D
15	76	57	44	Rp 1/2
20	91	63.8	48.5	Rp 3/4
25	101	61.8	50.5	Rp 1
32	130	71.4	70.3	Rp 1 1/4

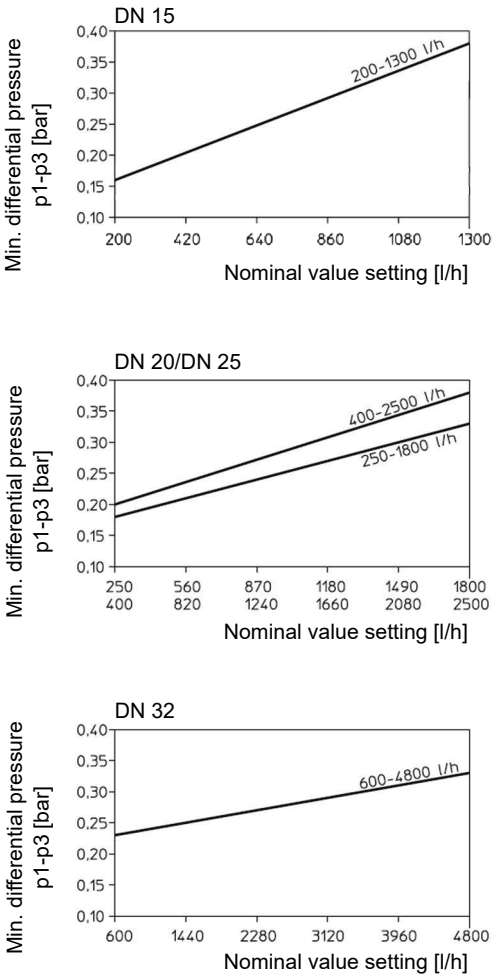
■ Actuators

The model VY4511A_ _ _ _ pressure independent control valves can be combined with the MY45_ _ _ _ _ _ _ actuators (M 30 x 1.5). When using actuators with piston strokes smaller than 4 mm, the following must be observed:

Due to the smaller piston strokes, the maximum possible flow rates will not be reached when combining these actuators with the valves.

Min. differential pressure p1–p3 for the valve design:

The minimum required differential pressure p1–p3 across the valve can be obtained from the below chart:

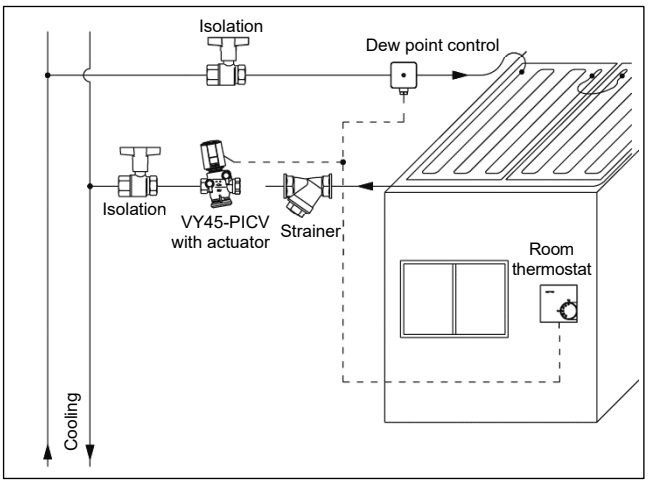


Explanation of chart:

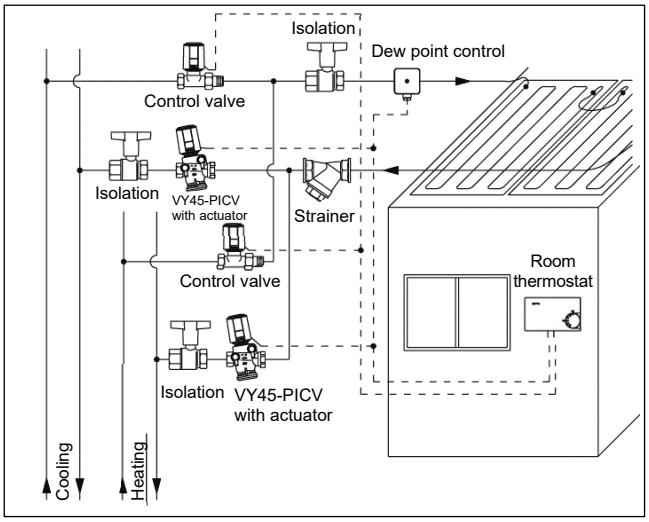
As for valves with integrated flow control, the required minimum differential pressure changes depending on the nominal value setting. The mathematical interrelationship is considered in the chart.

■ Installation

- The direction of flow must conform to the arrow on the valve body.
- The valve may be installed in any position (electric actuators must not be installed in a vertical downward position, the data sheets of the actuators must be observed).
- Do not use any greasing agents or oil for the installation, as these can destroy the seals. Any dirt particles or grease or oil residues must be flushed out of the pipework before the valve is installed.
- Any tension which could be transferred through the pipework must be avoided.
- When choosing the operating fluid, the latest technical status must be considered (e.g. VDI 2035).
- To remove foreign substances inside the pipes, install a strainer on the inflow side of each valve (see VDI 2035). In case that the strainers cannot be installed on the inflow side of each valve, install it on the pipe diverting sections (sections diverting from main piping system to sub piping system).
- Do not install the product nearby a steam coil, pressurized hot-water coil, or any high heat source. High temperature radiation might cause malfunction of its actuator.
- Do not mount the valve on a pipe where water hammer occurs, or where solid objects including slug may accumulate.
- Install a bypass pipe and gate valves on the inflow, outflow, and bypass sides. Also, install a strainer with a No. 40 (or more) mesh screen on the inflow side.
- When installing the valve on the piping, do not allow any object, such as particles, to get inside the pipe or valve. The valve may not fully close, or the valve seat may be damaged by a foreign object stuck inside, causing fluid leakage.
- When piping, do not apply too much sealing material, such as solidifying liquid and tape, to the pipe connection sections so that these materials flow into the valve. Valve cannot fully closes, or the valve seat may get damaged causing fluid leakage, due to the sealing material jammed inside the valve.
- After installation, check all installation points for leaks.
- Before activating the valve and actuator, flush the pipes at the maximum flow rate to remove all foreign matter. Fully open the valve to flush out any foreign matter.
- The correction factors of the manufacturers of the antifreeze liquids must be considered when setting the flow rate.



System illustration: Two pipe system

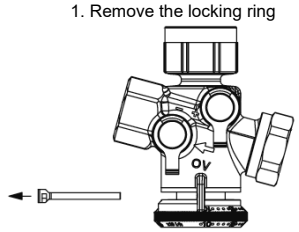


System illustration: Four pipe system

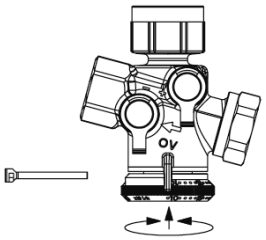
■ Setting of the flow rate

The maximum flow rate can be set with the help of the protected presetting at the handwheel.

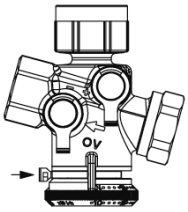
1. Remove the locking ring



2. Push the handwheel and carry out presetting



3. Let the handwheel snap back into the cogs and fit the locking ring.



Note: Flowrate must be set to the same value on both the handwheel and the DIP switch.

■ Heat insulation

Do not apply heat insulation to the joint surface.

■ Disposal

Dispose of this product as industrial waste in accordance with your local regulations.

Do not reuse all or any part of the product.

■ Related documents

AB-7643 Electromotive Actuator for Pressure Independent Control Valve Model MY4550C_ _ _ _ / MY4560C_ _ _ _ Specifications/Instructions

AB-7644 Electrothermal Actuator (two point) for Pressure Independent Control Valve Model MY4500G_ _ _ _ Specifications/Instructions

Refer also to the following documents that are included with the product.

AX-381E Pressure Independent Control Valve Installation instructions

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Specifications are subject to change without notice.

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