BARIQ Valves Manufacturer
مصنع صمامات بارق للصناعة

VISION رؤيـــة 2030
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

BARIQ Pressure Independent Control Valve (PICV)
MODEL BRQ-9000 HF

Product Description

BARIQ BRQ-9000HF Pressure Independent Control Valve (PICV) is a 3-in-1 solution that combines a differential pressure controller, a full authority modulating control valve, and a presettable flow limiter.

It is designed for use in chilled and hot water HVAC applications, such as Air Handling Units (AHUs), Fan Coil Units (FCUs), and heat exchangers. The valve ensures stable flow independent of system pressure fluctuations, providing accurate control, improved energy efficiency, and simplified commissioning without the need for additional balancing valves.

The BRQ-9000HF series for DN65 to DN100 is manufactured from ductile iron with epoxy coating, stainless steel internals, and EPDM seals, making it suitable for continuous operation in demanding hydronic systems.

Manufacturing Standard

- Design & Manufacturing: ISO 7005-2, ISO 7268
- Testing & Performance: EN 1349 (Leakage Class IV)
- Materials: EN-GJS-400-15 (Body), Stainless Steel (Stem/Trim), EPDM (Seals)

Technical Overview

- Pressure Rating: PN16 (Max. 16 bar)
- Differential Pressure Range: 30 – 400 kPa
- Temperature Range: 1°C to 110°C
- Leakage Rate: Class IV (≤0.01% of Qmax)

Medium

Chilled Water	For cooling systems
Hot Water	For heating systems (within temperature limits)
Glycol-Water Mixture	Up to 50% glycol

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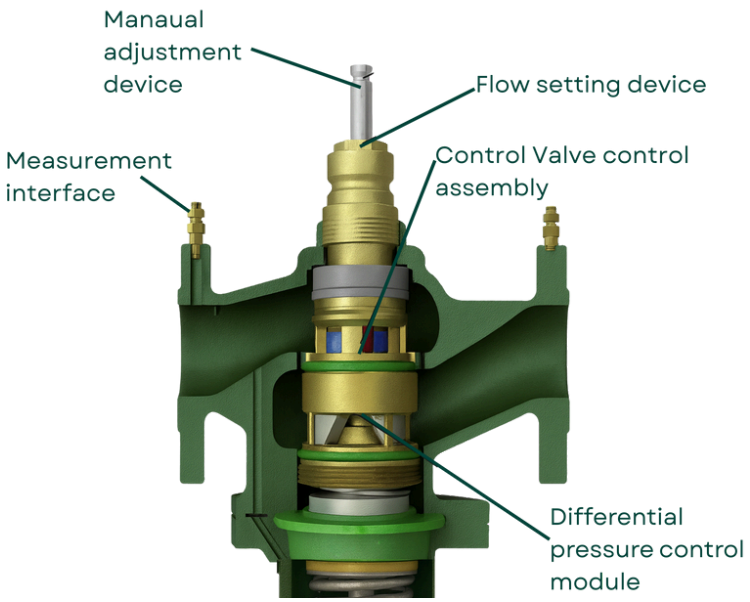
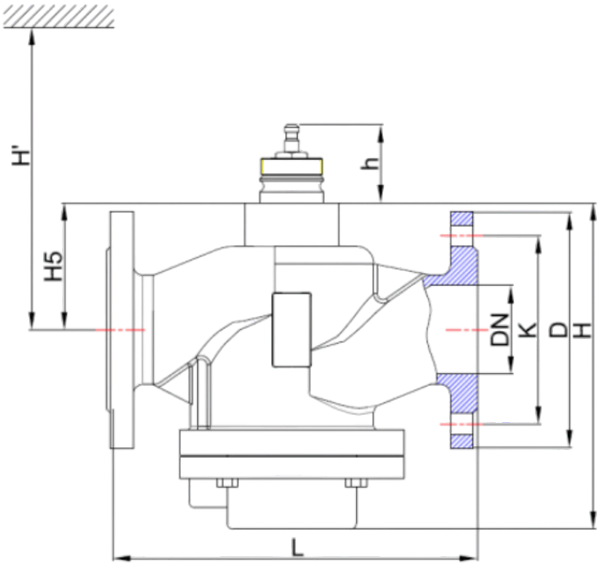
BRQ-9000HF MATERIAL AND DIMENSIONS





Material Specification		
Part	**Material**	**Standard / Notes**
Body	Ductile Iron (Nodular Cast Iron)	EN-GJS-400-15 / ASTM A536, FBE coating ≥300 µm
Bonnet / Cover	Ductile Iron	Same as body, epoxy coated
Stem	Stainless Steel	AISI 304 / AISI 316
Trim (internal parts)	Brass / Stainless Steel / PPS	High strength corrosion-resistant
Seat / Disc	PTFE reinforced / Stainless Steel	Replaceable, tight shut-off
Seals (O-rings)	EPDM	EN 681-1, suitable for chilled & hot water
Spring (DP control)	Stainless Steel	Corrosion resistant
Test plugs (optional)	Brass with self-sealing cap	G 1/4″ P/T plugs
Bolts & Nuts (flanges)	Carbon Steel / Stainless Steel	ISO 7005-2 Flange PN16

Dimensions

Size (DN)	Length (L) mm	Flange D (mm)	Flange K (mm)	Bolts (No. × Size)	Height H (mm)	Weight (kg)
DN65	290	185	145	4 × M16	578	25
DN80	310	200	160	8 × M16	582	32
DN100	350	220	180	8 × M16 / 8 × M20	756	43

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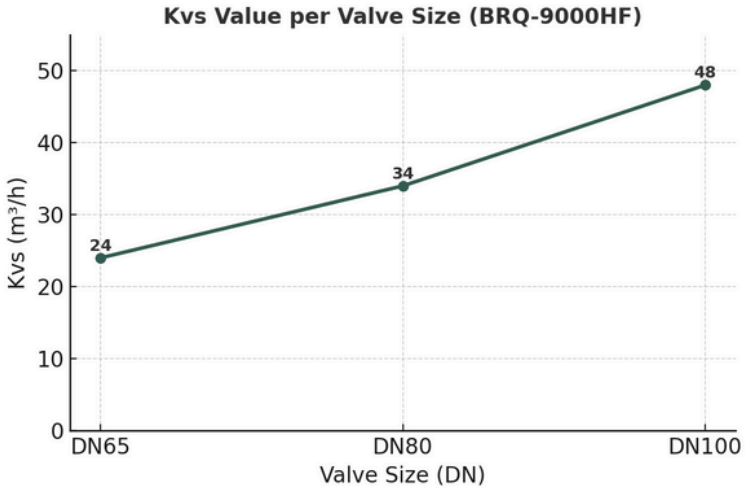
BRQ-9000 HF Technical data

Technical Information

Parameter	Value
Size Range	DN65, DN80, DN100
Design Pressure	PN16 (1600 kPa)
Max. Working Pressure	16 bar (as per ISO 7005)
Differential Pressure	30 – 400 kPa
Temperature Range	1°C to 110°C
Connection Type	Flanged (ISO 7005-2, PN16)
Leakage Rate	Class IV (≤0.01% of Qmax), EN 1349
Stroke	≥ 6.5 mm
Body Material	Ductile Iron (EN-GJS-400-15 / ASTM A536), FBE coating ≥300 µm
Internal Parts	Stainless Steel / Brass / PPS
Seals	EPDM (O-rings, EN 681-1)
Compliance	EN 12266 (Leakage & Testing Standards)
Actuation Type	Manual / Motorized (Compatible with BRQ ACT-13 series actuators)
Maintenance	Maintenance-free design

Flow Data

Size DN	PN	Qmin (m3/h)	Qmax (m3/h)	Δp range [kPa]	Kvs value
65	16	5.9	24.0	30..400	24
80	16	9.2	34.0	30..400	34
100	16	13.0	48.0	30..400	48



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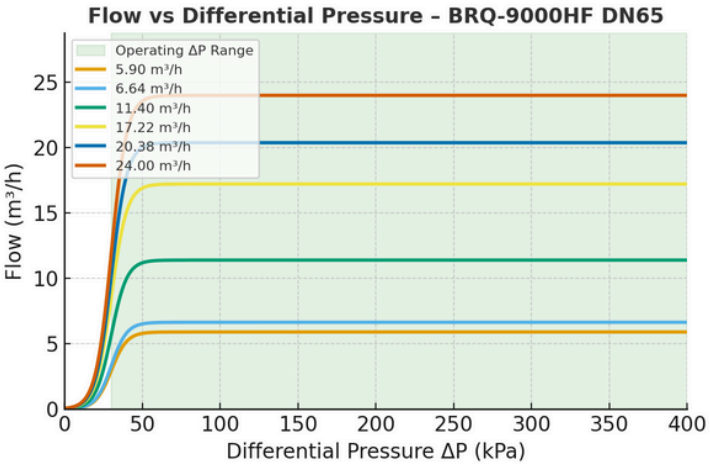
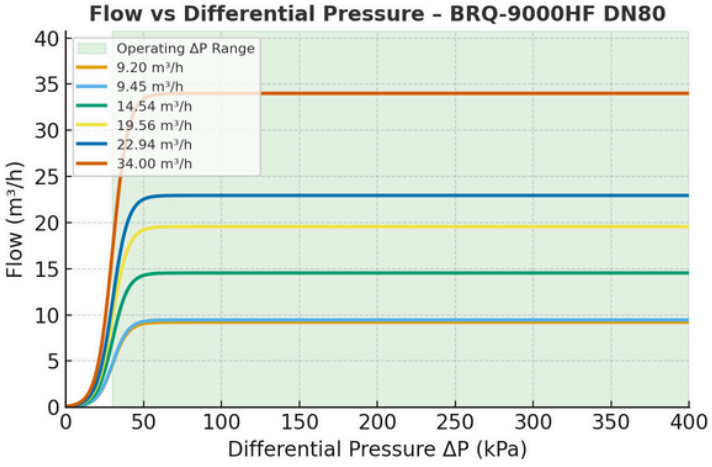
Flow VS Minimum differential pressure

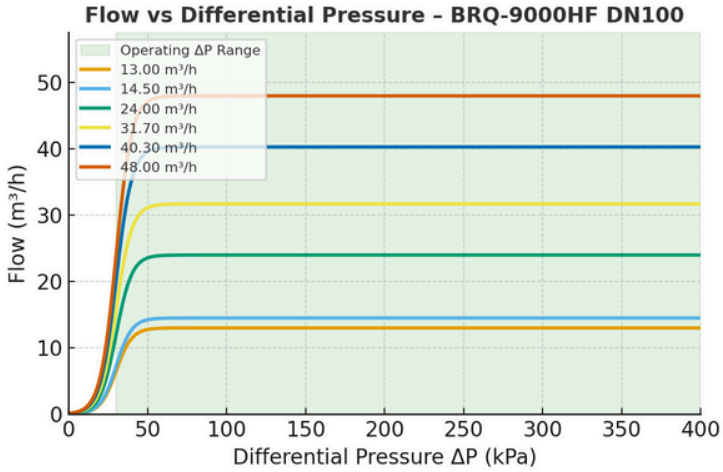
BRQ-9000HF DN 65



BRQ-9000HFDN 80



BRQ-9000HF DN 100



These graphs illustrate the relationship between the preset flow rate and the minimum differential pressure (ΔPmin)required for the BRQ-9000HF PICV to operate accurately.

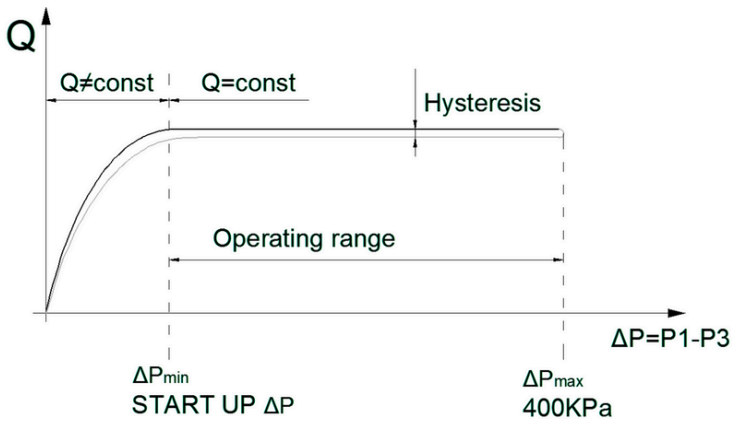
Operating Notes

1. ΔPmin = 30 kPa
   - The pressure drop across the valve must be ≥30 kPa for the preset flow to be maintained.
   - Below this limit, the valve enters a static balancing zone with reduced accuracy.
2. ΔPmax = 400 kPa
   - The differential pressure shall not exceed 400 kPa.
   - Exceeding this limit can cause mechanical stress, internal leakage, or damage.
3. Stable Flow Control
   - Once ΔP ≥ 30 kPa, the valve maintains constant flow at the preset value, independent of system pressure fluctuations.

Operating Principle within ΔP Range

When the differential pressure across the valve (P1–P3) rises above the minimum value (ΔPmin), the integrated differential pressure controller becomes active. In this operating range, the valve maintains a constant flow rate, independent of system pressure variations, ensuring stable hydronic performance.

If the pressure drop falls below ΔPmin, the valve no longer regulates flow accurately and behaves as a static balancing valve. At higher differential pressures (up to ΔPmax), the valve continues to maintain constant flow within its specified tolerance, with minor hysteresis effects at the upper range.



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BRQ 9000HF Technical data

BRQ 9000HF PICV Presetting Table

- Note:

The presetting flow rates are based on the minimum differential pressure requirement (30 kPa depending on valve size). Actual flow may vary slightly depending on installation and site conditions. Ensure that the available differential pressure is within the operating range (30–400 kPa) to maintain stable and accurate control.

Preset	DN65 (L/H) (ΔPmin=30 kPa)	DN80 (L/H) (ΔPmin=30 kPa)	DN100(L/H)(ΔPmin=30 kPa)
1.5	5,900	9,200	13,000
2	6,640	9,450	14,500
4	11,400	14,540	24,000
6	17,220	19,560	31,700
8	20,380	22,940	40,300
10	24,000	34,000	48,000

Sizing Method

The required volumetric flow rate for selecting the PICV can be determined from the heat demand and the temperature difference between supply and return water:

Formula:

$Q\ (m^3/h) = Rv\ (kW) \div (1.16 \times \Delta T\ (°C))$

Where:

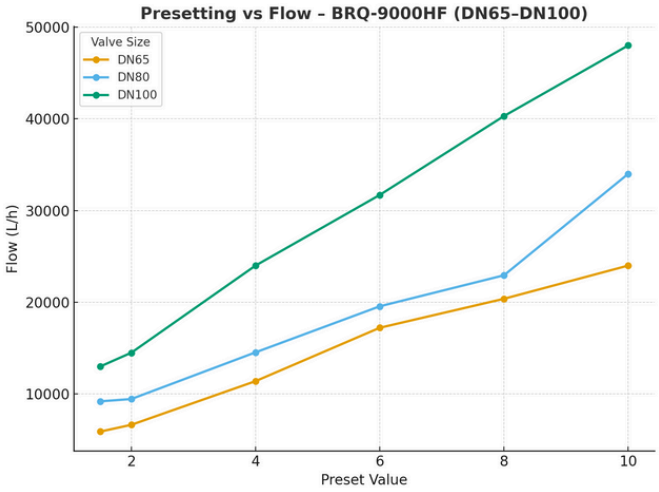
- Rv = Heat demand in kW
- ΔT = Temperature difference (supply minus return) in °C
- 1.16 = Constant (specific heat × density of water)

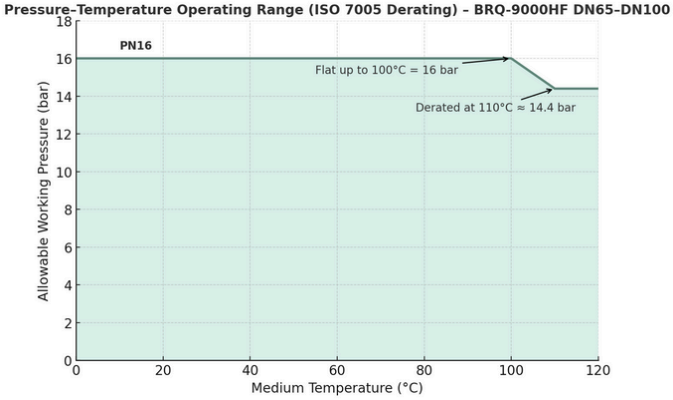
Note: For glycol mixtures, replace 1.16 with a corrected factor (typically 1.20–1.30 depending on glycol percentage and temperature).

Example (DN80 target):

- Heat demand: Rv = 200 kW
- Temperature difference: ΔT = 6 °C
- Flow rate: $Q = 200 \div (1.16 \times 6) = 28.74\ m^3/h$

From BRQ-9000HF range: DN80 has Qmax = 34 m^3/h. Recommended operating band is 70–85% of Qmax = 23.8–28.9 m^3/h → DN80 is suitable.





Selection Guideline

- Select PICV to operate at about 80% of its maximum flow rate to allow spare capacity.
- Ensure available differential pressure across the valve ≥ 30 kPa (operating window 30–400 kPa).
- Recommended operating ranges:
- DN65: 16.8–20.4 m^3/h (of Qmax 24)
- DN80: 23.8–28.9 m^3/h (of Qmax 34)
- DN100: 33.6–40.8 m^3/h (of Qmax 48)

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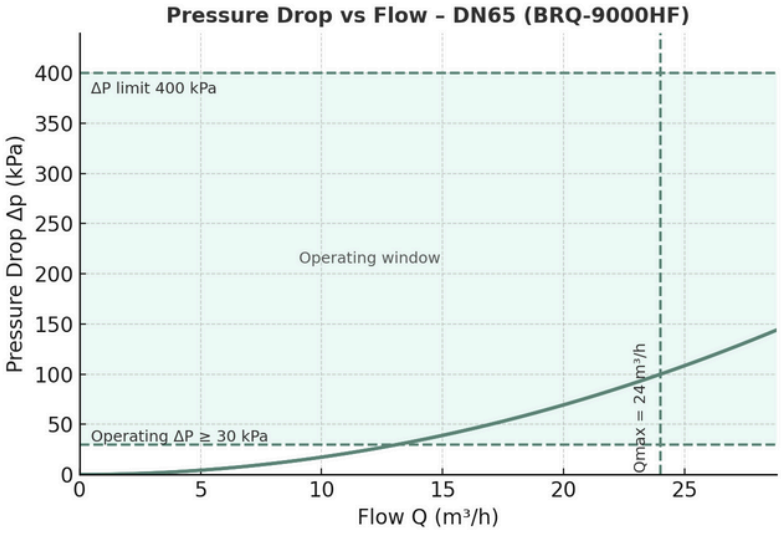
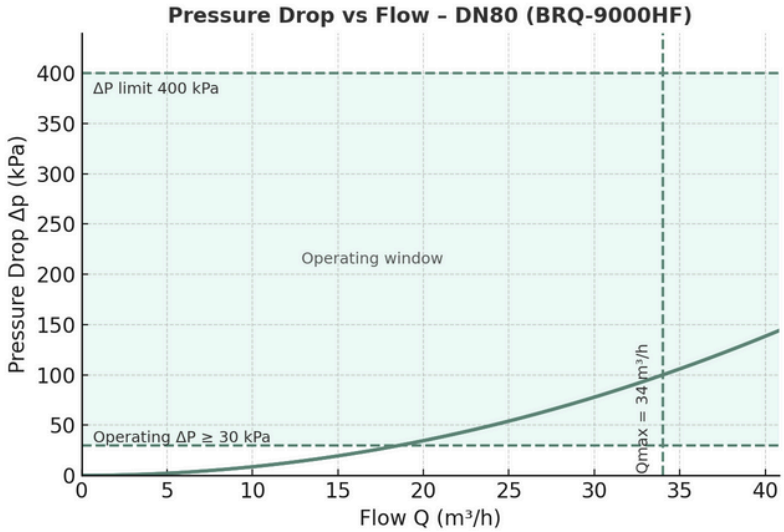
BRQ-9000 HF Technical data

Pressure Drop vs Flow Rate

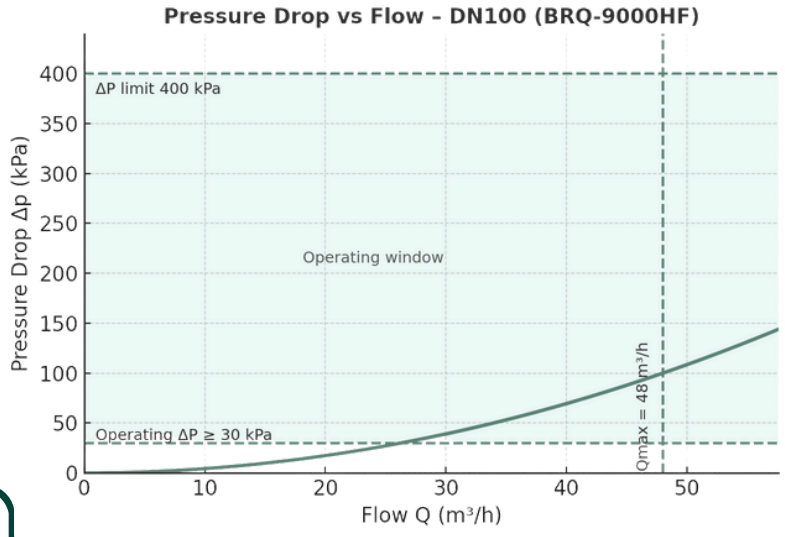
BRQ-9000HF DN 65



BRQ-9000HF DN 80



BRQ-9000HF DN 100



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Functional Principle

BRQ-9000HF PICV combines three integrated functions in a single valve:

1.Presetting adjusting mechanism
A dial for setting the maximum volumetric flow.
Ensures the flow does not exceed the preset value regardless of system variations.

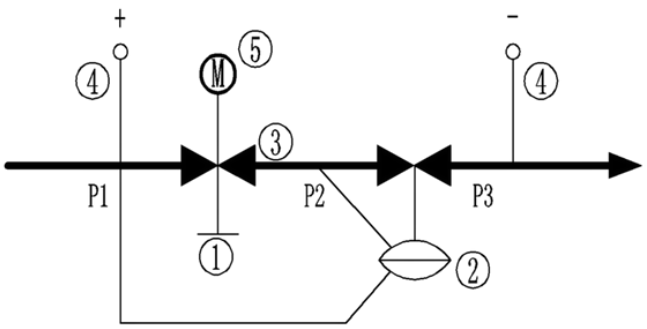
2.Differential pressure controller
Maintains a constant differential pressure (ΔP) across the control valve (P1–P2).
Guarantees stable and accurate flow even with changes in pump speed or other valves.

3.Modulating control valve
Provides precise regulation of the volumetric flow.
Operated by an actuator to control room/zone temperature.

4.Pressure test plugs (P/T plugs)
Allow direct measurement of pressure and temperature at the valve.

5.Actuator
Receives control signals and adjusts the valve opening to match the required flow.

6.Energy Efficiency
Reduces pumping energy by maintaining stable flow under varying system pressures.
Contributes to overall system optimization and lower operating costs.



The main components of the valve are:
① Presetting adjusting mechanism
② Differential pressure controlle
③ Modulating control valve
④ Pressure test plugs (P/T plugs)
⑤ Actuator

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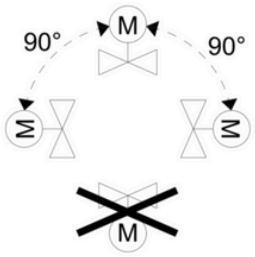
Installation

- Preferably mount the valves at the return, as the temperature is lower there andthe strain on the stem sealing gland is lower.
- Mount a dirt filter or dirt trap before the valve to ensure proper functioning, and a long service life of the valve.
- Remove dirt, welding beads, etc. from the valves and pipes.
- Do not insulate the actuator bracket, as air circulation must be ensured.
- The valve should not be installed in places prone to knock, and impact and vibration, the ambient temperature is 2°C to 50°C. In addition, it should not be installed in an environment with steam, water jet or water dripping.

Mounting positions



Commissioning & Operation Instructions

- The valve may only be operated after ensuring that both the actuator and valve are correctly assembled.
- During flushing or pressure testing of the system, the valve must remain open, as sudden pressure impacts can damage closed valves.
- The maximum differential pressure (ΔPmax) across the valve's control path must not exceed 400 kPa. Exceeding this limit may cause damage to the valve when in the closed position.
- Commissioning must always be carried out with the actuator properly installed and securely fitted.
- Ensure that the actuator stem and valve stem remain firmly connected in all operating positions.

Valve Operation:

Valve Stem Position	Valve Opening Status
Retracts	Closes
Extends	Opens

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Operating Instructions – Engineering Hints

1) Presetting & Flow

Calculate design flow rate:
$Q\ (m^3/h)$ = Heat Demand (kW) ÷ [1.16 × ΔT (°C)]
(use correction factor 1.20–1.30 for glycol solutions).
Select the preset value just above the design flow to ensure accuracy.
Recommended operating band: 70–85% of Qmax for each valve size.
After commissioning, lock the preset dial to avoid accidental adjustments.

2) Differential Pressure (ΔP)

Ensure differential pressure across the valve is ≥30 kPa (operating window 30–400 kPa).
During commissioning, gradually reduce pump head until the farthest branch maintains ΔP ≈ 30 kPa → most energy-efficient point.
Do not exceed ΔPmax = 400 kPa; use bypass or adjust VFD pump curve if needed.

3) Verification via P/T Plugs

Install a Y-strainer upstream and use P/T measurement ports to check ΔP.
Confirm stable readings when all circuits are fully open.
If ΔP < 30 kPa: check isolation valves, filters, or increase pump pressure.

4) Actuator & Control

Actuator input: 0–10 VDC or 4–20 mA, with manual override available.
Confirm direction (open/close) matches BMS signal.
Perform full stroke test after presetting to ensure no mechanical obstruction.

5) System Hygiene & Installation

Install filter (mesh 0.6–1.0 mm) upstream; clean it after 48–72 hours of initial operation.
Provide short straight pipe inlet if possible for stable measurement.
Vent air from system; trapped air causes flow oscillation and unstable control.

6) Glycol & Fluid Properties

For glycol mixtures:
Replace 1.16 with corrected constant (≈1.20–1.30).
Confirm EPDM seal compatibility and temperature range.
Maintain water quality to reduce pressure loss and ensure accuracy.

7) Noise & Stability

Noise indicates excess ΔP or local cavitation: reduce pump head or adjust preset.
Avoid long-term operation below 15% of Qmax, as control accuracy decreases.

8) Quick Checks (On-Site)

If measured flow (Qmeas) is higher than required:
Decrease preset or reduce ΔP (pump adjustment).
If Qmeas is lower:
Clean strainer,
Verify isolation valves are open,
Increase pump ΔP gradually.
Quick check formula:
$Q \approx Kvs \times \sqrt{(\Delta P \div 100\ kPa)}$
(for estimation only; PICV limits flow once ΔP ≥ 30 kPa).

9) Safety & Limits

Pressure class: PN16
Temperature range: 1–110 °C (derating at upper end per ISO 7005 curve).
Do not exceed ΔPmax = 400 kPa across the valve.
Ensure correct flow direction and use insulation/protection where necessary.

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Maintenance

When carrying out service work on the valve or actuator, always follow these safety instructions:

- Switch off the pump and disconnect the power supply.
- Close the shut-off valves in the piping network.
- Fully release pressure from the piping system and allow the pipes to cool down completely.
- Disconnect electrical connections only if necessary.

Before proceeding, ensure that the actuator is removed correctly. Perform the required valve maintenance, then reinstall the actuator properly to guarantee safe commissioning of the system.

Sealing Gland

- Stem seals can be replaced without removing the valve body, provided there is no damage or wear on the stem surface.
- If the stem itself is found to be damaged, the entire valve must be replaced.

Disposal

- Due to the variety of materials used in the valve, it must be disassembled before disposal.
- Certain components may require special handling in compliance with environmental regulations or ecological best practices.
- Disposal must always follow local legislation and current environmental standards.

⚠ Safety Precautions

- Do not operate the valve outside the rated pressure and temperature limits.
- Avoid hammering or applying mechanical stress on the valve body during installation.
- Do not operate the valve without a properly fitted actuator (for PICV applications).

Spare Parts

- Stem seals are available as spare parts and can be replaced without removing the valve body.
- Compatible actuators (On/Off or Modulating) are available upon request.
- Only original spare parts should be used to maintain performance and warranty validity.

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