

Characterised control valve, Internal thread
2-way, 3-way

- For open and closed cold and warm water systems
- For modulating water-side control of air handling units and heating systems
- Air bubble-tight

Type overview

Type	Valve []	DN []	kvs [m³/h]	Rp ["]	PN []	n(gl) []	Sv min. []
R2025-25-S2	2-way	25	25	1	40	3.2	100
R2032-25-S3	2-way	32	25	1 1/4	25	3.2	100
R20 - -S	2-way			1 1/	25	3.2	100
R2050-58-S4	2-way	50	58	2	25	3.2	100
R2050-70-S4	2-way	50	70	2	25	3.2	100
R2065-150-S4	2-way	65	150	2 1/2	25	3.2	100
R2080-150-S4	2-way	80	150	3	25	3.2	100
R3032-25-S3	3-way	32	25	1 1/4	25	3.2	100
R3040-40-S4	3-way	40	40	1 1/2	25	3.2	100
R3050-58-S4	3-way	50	58	2	25	3.2	100

Technical data

Functional data	Media	
	Media	Cold and warm water, water with glycol up to max. 50% vol.
	Medium temperature	-10...120°C DN25...50 -18...100°C DN65...80
	Medium temperature note	The allowed media temperature can be limited, depending on the type of actuator. Limitations can be found in the respective data sheets of the actuators.
	& OR VLQJ SUHV VXUH "SV	1400kPa DN25...50 700kPa DN65...80
	Dif I H U H Q W L D O S U H V V X U H	350kPa [DN25...50 200kPa DN65...80
	Differential pressure note	200kPa for low-noise operation
	Leakage rate	2-way: Leakage rate A, air bubble-tight (EN 12266-1) 3-way: Control path A - AB: Leakage rate A, air bubble-tight (EN 12266-1), Bypass B - AB: Leakage class I (EN 1349 and EN 60534-4) approx. 1...2% of the kvs value
	Flow rate	3-way: Bypass B - AB: 70% of kvs value
	Flow characteristic	2-way: Equal percentage (VDI/ VDE 2178), optimised in the opening range 3-way: Control path A - AB: equal percentage (VDI/ VDE 2178, optimised in the opening range, Bypass B - AB: linear (VDI/ VDE 2178)
	Pipe connectors	Internal thread according to ISO 7-1
	Angle of rotation	90°
	Installation position	Upright to horizontal (in relation to the stem)
	Maintenance	Maintenance-free
Materials	Housing	Brass body nickel-plated
	Closing element	Stainless steel
	Stem	Stainless steel
	Stem seal	O-ring EPDM
	Valve seat	PTFE, O-ring EPDM
	Characterising disc	TEFZEL ' 1 : Stainless steel R2025-25-S2: no characterizing disc

Sizing diagram for Characterised Control Valves

Legend

ΔP_{max}
 Maximum permitted pressure difference for long service life across control path A-AB referred to the whole range of opening.
 ΔP_{max} for low-noise operation
 ΔP_{v100}
 pressure difference with Ball Valve fully open
 \dot{V}_{100}
 Nominal flow rate at ΔP_{v100}

Formula for Kvs

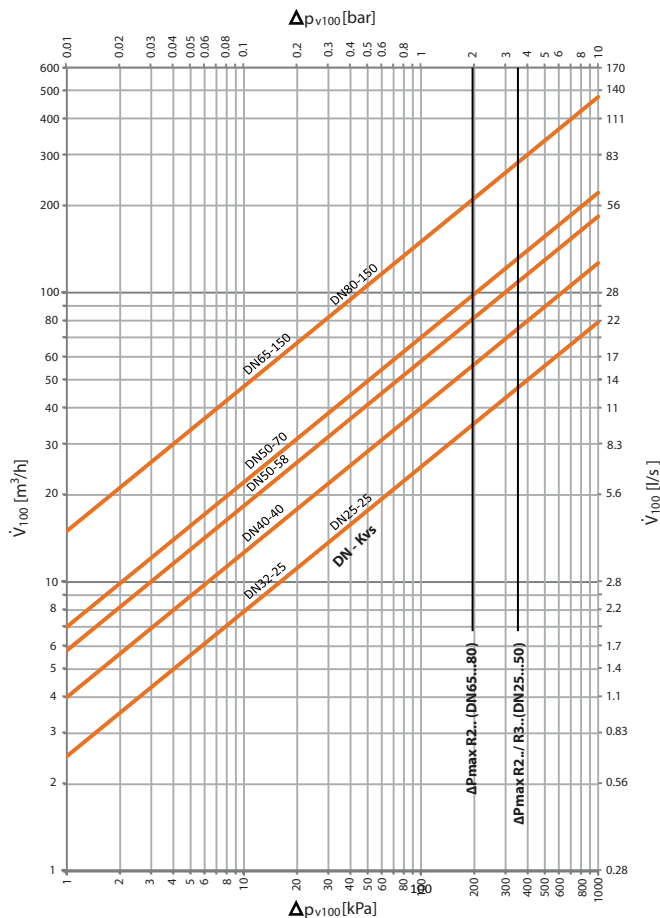
$$Kvs = \sqrt{\frac{\dot{V}_{100}}{\frac{\Delta P_{v100}}{100}}}$$

\dot{V}_{100} [m³/h]
 ΔP_{v100} [kPa]

Definition of Close-off pressure

ΔPs

Differential pressure at which the actuator can still seal the valve tightly allowing for the appropriate leakage rate.



Actuator selection

Connection	Internal thread						
	25	25	40	58	70	150	150
Kvs[m ³ /h]	25	25	40	58	70	150	150
DN[mm]	25	32	40	50	50	65	80
2-way	R2025-25-S2	R2032-25-S3	-	R2050-58-S4	R2050-70-S4	R2065-150-S4	R2080-150-S4
3-way	-	R3032-25-S3	R3040-40-S4	R3050-58-S4	-	-	-

Modulating	DC (0)2...10V (-SR) or DC 0.5...10V (-SZ)		
	LR24A-SR(-SZ)	NR24A-SR(-SZ)	SR24A-SR(-SZ)
Fail-Safe	LRF24A-SR	NRF24A-SR	SRF24A-SR
Fast Running	LRQ24A-SR	NRQ24A-SR	SRQ24A-SR

Safety notes



- The valve has been designed for use in stationary heating, ventilation and air-conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- The valve does not contain any parts that can be replaced or repaired by the user.
- The valve may not be disposed of as household refuse. All locally valid regulations and requirements must be observed.
- When determining the flow rate characteristic of controlled devices, the recognised directives must be observed.

Product features

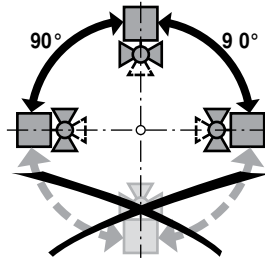
- Mode of operation** The characterised control valve is adjusted by a rotary actuator. The actuator is controlled by a commercially available modulating or 3-point control system and moves the ball of the valve – the throttling device – to the position dictated by the positioning signal. Open the characterised control valve counterclockwise and close it clockwise.
- Flow characteristic** Equal percentage flow control is ensured by the integrated characterising disc.

Accessories

	Description	Type
Mechanical accessories	Pipe connector to ballvalves DN 25 Rp 1"	ZR2325
	Pipe connector to ballvalves DN 32 Rp 1 1/4"	ZR2332
	Pipe connector to ballvalves DN 40 Rp 1 1/2"	ZR2340
	Pipe connector to ballvalves DN 50 Rp 2"	ZR2350

Installation notes

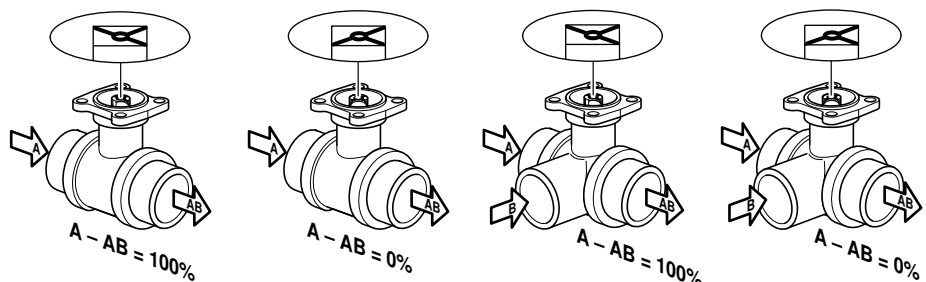
Recommended installation positions The ball valve can be installed upright to horizontal. The ball valve may not be installed in a hanging position, i.e. with the stem pointing downwards.



Water quality requirements The water quality requirements specified in VDI 2035 must be adhered to. Belimo valves are regulating devices. For the valves to function correctly in the long term, they must be kept free from particle debris (e.g. welding beads during installation work). The installation of suitable strainer is recommended.

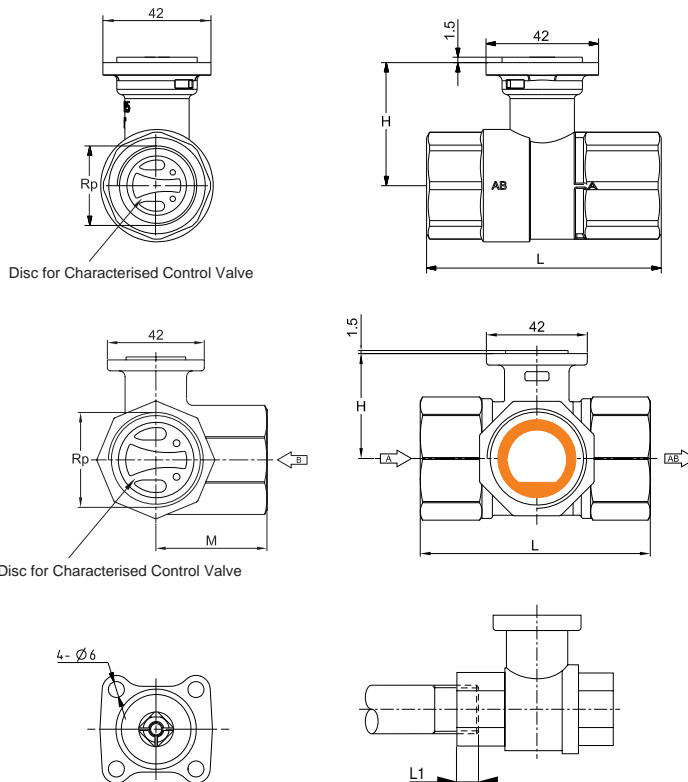
Maintenance Ball valves and rotary actuators are maintenance-free. Before any kind of service work is carried out on the actuator, it is essential to isolate the rotary actuator from the power supply (by unplugging the electrical cable). Any pumps in the part of the piping system concerned must also be switched off and the appropriate slide valves closed (allow everything to cool down first if necessary and reduce the system pressure to ambient pressure level). The system must not be returned to service until the ball valve and the rotary actuator have been properly reassembled in accordance with the instructions and the pipeline has been refilled in the proper manner.

Flow direction The direction of flow, specified by an arrow on the housing, is to be complied with, since otherwise the ball valve could become damaged. Please ensure that the ball is in the correct position (marking on the spindle).



Dimensions [mm]

Dimensional drawings



L1: Maximum screwing depth.
The actuator dimensions can be found on the respective actuator data sheet.

Type	Valve []	DN []	Rp ["]	L [mm]	L1 [mm]	H [mm]	M [mm]	Weight approx. [kg]
R2025-25-S2*	2-way	25	1	87	16	46	-	0.54
R2032-25-S3	2-way	32	1 1/4	105	19	50.5	-	0.77
R2050-58-S4	2-way	50	2	142	22	68	-	2.5
R2050-70-S4	2-way	50	2	142	22	68	-	2.5
R2065-150-S4	2-way	65	2 1/2	153	27	68	-	3.7
R2080-150-S4	2-way	80	3	160	30	68	-	4.1
R3032-25-S3	3-way	32	1 1/4	105	19	50.5	56	0.99
R3040-40-S4	3-way	40	1 1/2	122	19	62	66.5	1.8
R3050-58-S4	3-way	50	2	142	22	68	79	1.8

*no characterising disc for R2025-25-S2

Modulating rotary actuator for ball valves

- Torque motor 5 Nm
- Nominal voltage AC/DC 24 V
- Control modulating 2...10 V
- Position feedback 2...10 V


Technical data

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 19.2...28.8 V
	Power consumption in operation	1.5 W
	Power consumption in rest position	0.4 W
	Power consumption for wire sizing	3 VA
	Connection supply / control	Cable 1 m, 4 x 0.75 mm ²
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	5 Nm
	Operating range Y	2...10 V
	Input Impedance	100 kΩ
	Position feedback U	2...10 V
	Position feedback U note	Max. 1 mA
	Position accuracy	±5%
	Manual override	with push-button, can be locked
	Running time motor	90 s / 90°
	Sound power level, motor	35 dB(A)
	Position indication	Mechanically, pluggable
Safety	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
	Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2
	Enclosure	UL Enclosure Type 2
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Certification UL	cULus according to UL60730-1A, UL60730-2-14 and CAN/CSA E60730-1:02
	Certification UL note	The UL marking on the actuator depends on the production site, the device is UL-compliant in any case
	Mode of operation	Type 1
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...50 °C
Storage temperature	-40...80 °C	
Ambient humidity	Max. 95% r.H., non-condensing	
Servicing	maintenance-free	
Weight	Weight	0.48 kg

Safety notes


- This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Outdoor application: only possible in case that no (sea) water, snow, ice, insolation or aggressive gases interfere directly with the actuator and that is ensured that the ambient conditions remain at any time within the thresholds according to the data sheet.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- The switch for changing the direction of rotation may only be operated by authorised specialists. The direction of rotation must not in particular be reversed in a frost protection circuit.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- Cables must not be removed from the device.
- The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features

Mode of operation	The actuator is connected with a standard modulating signal of 0...10 V and drives to the position defined by the positioning signal. Measuring voltage U serves for the electrical display of the valve position 0.5...100% and as slave control signal for other actuators.
Simple direct mounting	Straightforward direct mounting on the ball valve with only one central screw. The assembly tool is integrated in the plug-in position indication. The mounting orientation in relation to the ball valve can be selected in 90° steps.
Manual override	Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).
Adjustable angle of rotation	Adjustable angle of rotation with mechanical end stops.
High functional reliability	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

Accessories

	Description	Type
Electrical accessories	Auxiliary switch 1 x SPDT add-on	S1A
	Auxiliary switch 2 x SPDT add-on	S2A
	Feedback potentiometer 140 Ω add-on	P140A
	Feedback potentiometer 200 Ω add-on	P200A
	Feedback potentiometer 500 Ω add-on	P500A
	Feedback potentiometer 1 kΩ add-on	P1000A
	Feedback potentiometer 2.8 kΩ add-on	P2800A
	Feedback potentiometer 5 kΩ add-on	P5000A
	Feedback potentiometer 10 kΩ add-on	P10000A

Electrical installation

Notes

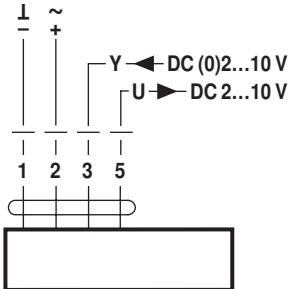
- Connection via safety isolating transformer.
- Parallel connection of other actuators possible. Observe the performance data.
- Direction of rotation switch is covered. Factory setting: Direction of rotation Y2.

Electrical installation

Wiring diagrams

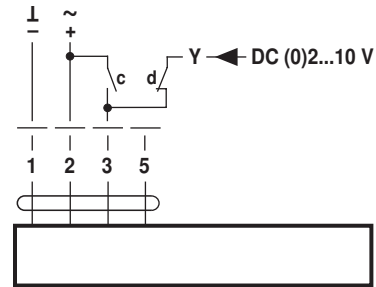
AC/DC 24 V, modulating

Override control (frost protection circuit)



Cable colours:

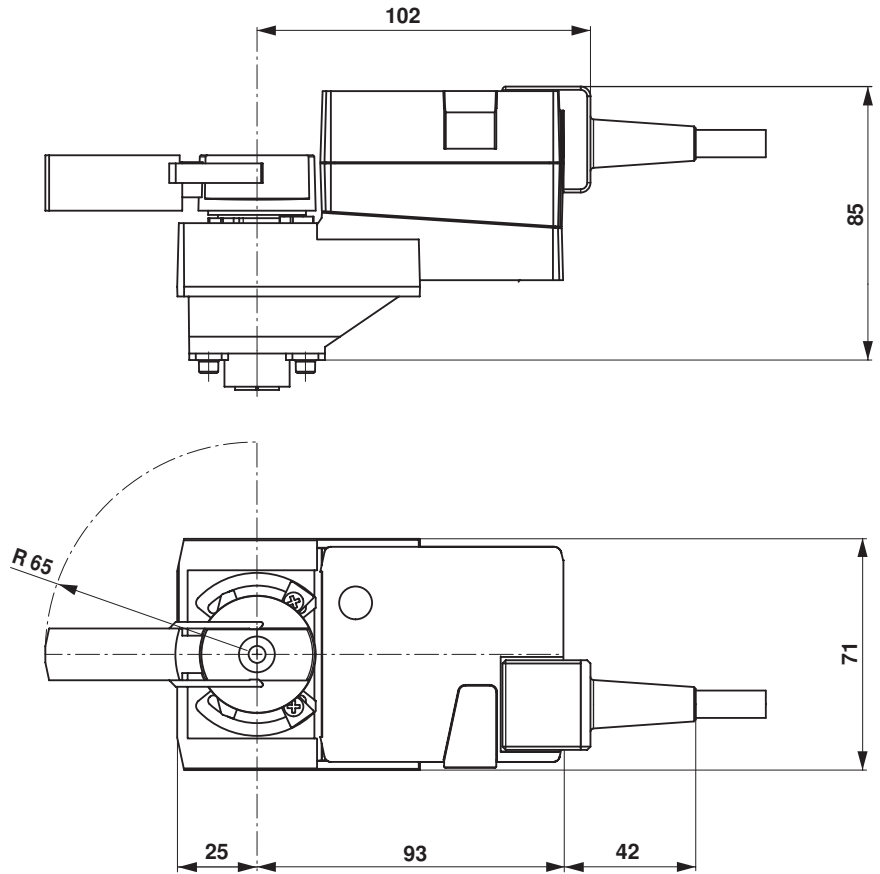
- 1 = black
- 2 = red
- 3 = white
- 5 = orange



c	d	Symbol
		A - AB = 100%
		A - AB = 0%
		DC (0)2...10 V

Dimensions [mm]

Dimensional drawings



Further documentation

- The complete product range for water applications
- Data sheets for ball valves
- Installation instructions for actuators and/or ball valves
- General notes for project planning