Cloud capable and communicating valve actuator for adjusting flow in commercial HVAC applications.

- Failsafe
- Power Supply AC/DC 24 V
- Used for CCV and LGCCV assemblies.
- Ethernet 10/100 Mbit/s, TCP/IP, integrated web server
- Conversion of sensor signals
- Communication via BACnet/IP, Modbus TCP and Ethernet to Belimo Cloud

Technical data

Electrical data	Power supply	24 VAC/DC, 50/60 Hz
	Nominal voltage range	AC 19.2…28.8 V, (±20%) DC 21.6… 28.8 V, (-10%/+20%)
	Power consumption, running	14 W
	Power consumption, holding	8.5 W
	Transformer sizing	21 VA (class 2 power source)
	Electrical connections	for power and control: 3ft, 18 GA appliance cables, with 1/2" conduit connector for communication: RJ245 socket, w/boot
	Overload protection	electronic throughout 0° to 90° degree rotation
Functional data	Position indication	reflective visual indicator (snap on)
	Communicative control	Cloud: (call for "clientAPI") BACnet/IP: (see "PICS" statement) Modbus TCP: (see "Modbus Register")
	Position signal 'S1'	2-10 VDC (For local hybrid control use S1)
	Universal sensor Input	two universal sensor inputs (S1 and S2) • Contact closure • Passive, 0…50KΩ (select type and value) • Analog (Active), 0-10 or 2-10 VDC (select)
	Feedback output U	2-10 VDC, 0.5 mA max., VDC variable
	Direction of rotation (Motor)	reversible with switch
	Direction of rotation (Failsafe)	reversible with switch
	Power off position (PoP)	adjustable with dial under cover, ZTH, PC-Tool, 0 to 100% in 10% increments (default 0%)
	Bridge time (PF)	0-10 seconds (default 2s), time delay until failsafe activates
	Pre-charge time (PF)	5 to 26 seconds
	Manual override	external push button
	Angle of rotation	90°
	Angle of rotation adaption	manual, with press of Adaption LED
	Running time (Motor)	150 sec (default), variable (70 to 220 sec)
	Running time (Failsafe)	<35 seconds / 90° (@32°…122°F [0…50°C])
	Position indication	reflective visual indicator (snap-on)
	Ambient temperature range	-22°F to 122°F [-30°C to 50°C]
	Storage temperature range	-40°F to 176°F [-40°C to 80°C]
	Humidity	5 to 95% RH non condensing (EN 60730-1)
Safety	Quality standard	ISO 9001
	Protection class IEC/EN	III safety extra-low voltage (selv)
	Protection class UL	UL Class 2 supply
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14

Housing	NEMA 1
Housing material	UL94-5VA
Rated voltage supply / control	0.8 kV
Control pollution degree	3
Agency listings	cULus acc. to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EEC and 2006/95/EC
Noise level (Motor)	≤53 dB(A)
Noise level (Failsafe)	≤61 dB(A)
Servicing	maintenance free
Weight	3.7 lbs [1.68 kg]

Weight

| Terminology	PoP = **P**ower **O**ff **P**osition, the desired failsafe position in the event of power loss.
	PF = **P**ower **F**ail

Product Features

Pre-charge time (start-up)

When the failsafe actuator is new from Belimo, or the application has experienced a long duration power loss, the failsafe actuators require a pre-charging time. This time is used for charging the capacitors to a minimum voltage level. This ensures that, in the event of an electricity interruption, the actuator can move from its current position into the preset emergency Power Off Position (POP).

The duration of the pre-charging time depends mainly on following factors:
– Duration of the electricity interruption
– PF delay time (bridging time)
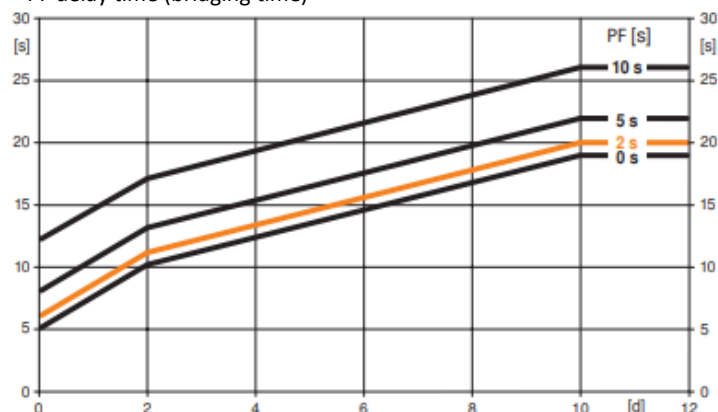
Typical pre-charging time:
[d] = Power interruption in days
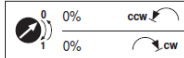[s] = Pre-charging time in seconds
PF[s] = Bridging time
Calculation example: Given an electricity interruption of 3 days and a bridging time (PF) set at 5 s, the actuator requires a pre-charging time of 14 s after the electricity has been reconnected (see graphic).

PF [s]	[d]				
	0	**1**	**2**	**7**	**≥10**
0	5	8	10	15	19
2	6	9	11	16	20
5	8	11	13	18	22
10	12	15	17	22	26
			[s]		

Product Features

Application	For proportional modulation of valves in HVAC systems. The actuator is controlled via the Belimo Cloud, BACnet/IP or Modbus TCP and drives to the position defined by the control variable. Multiple data points can be written and read via the control interface. Local control mode: The actuator receives an analog control signal from a conventional controller and drives to the control position. In addition, using the Belimo Cloud, BACnet/IP or Modbus TCP, various data points can be read and with the exception of the control signal written to the actuator. This Belimo Cloud connected valve actuator has two universal sensor inputs ready for your innovative HVAC applications. The two universal sensor inputs (passive, active, or contact) serve as an analog/digital converter for the digital transmission of the sensor value to a higher level system. Selecting the sensor type is accomplished via connection to the integrated web server (RJ45 connection to the web browser) or directly via the Belimo Cloud. The actuators performance and sensor data is recorded locally with 13 months of storage. This data can be used for analytical purposes, downloaded via csv files, or used in your HVAC application.
Operation	The AKRB actuators use a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode. The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The AKRB series provides 90° of rotation and a visual indicator indicates position of the actuator. When reaching the valve or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.
Converter for sensors	Connection option for two sensors (passive, active, or contact). The actuator serves as an analogue/digital converter for the transmission of the sensor signal to the higher level system.
Communication	The parameterization can be carried out through the integrated web server (RJ45 connection to the web browser), by communicative means or via the Cloud. Additional information regarding the integrated web server can be found in the separate documentation.
Position signal inversion	Signal inversion in cases of control with an analogue positioning signal. The inversion causes the reversal of the standard behavior, i.e. for control signal 0%, the actuator is opened to Max and for control signal 100%, the actuator would close.
Data recording	The recorded data (integrated data recording for 13 months) can be used for analytical purposes. Download the csv files via the built-in web browser.
Adjustable angle of rotation	Not available with this model.
Delivery state (capacitors)	The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20 s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.
Actuator parameters	The factory settings cover the most common applications. Individual parameters can be modified with the Belimo Service Tool, ZTH. In addition the ZTH is used as a gateway to a PC for the PC-Tool.
Direct mounting	Simple direct mounting on the valve via CCV valve linkage interface.
Manual override	Manual override by push-button keeps the gear is disengaged for as long as the button is pressed.

High functional reliability	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
Home position	The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaption, which is when the operating range and position feedback adjust themselves to the mechanical setting range. The actuator then moves into the position defined by the direction of rotation switch and desired positioning signal.
Adaption and synchronization	An adaption can be triggered manually by pressing the "Adaption" button or with the PC-Tool. Both mechanical end stops are detected during the adaption (entire setting range). A range of settings can be adapted using the PC-Tool (see MFT-P documentation).
Power Off Position (PoP) dial setting	The «power fail setting position» rotary knob can be used to adjust the desired emergency setting position (POP) between 0 and 100% in 10% increments. The rotary knob refers only to the adapted angle of rotation range between 30 and 95°. No set Min or Max values are observed. In the event of a power interruption, the actuator will move into the selected emergency setting position (POP), taking into account the bridging time that has been set. Settings: The rotary knob must be set to the «Tool» position for retroactive settings of the emergency setting position (POP) with the Belimo service tool MFT-P. Once the rotary knob is set back to the range 0…100%, the manually set value will have positioning authority.
Bridging time	Electricity interruptions can be bridged up to a maximum of 10 s. In the event of an electricity interruption, the actuator will remain stationary in accordance with the set bridging time. If the electricity interruption is greater than the set bridging time, then the actuator will move into the selected emergency setting position (POP). The factory bridging time set is 2 s. This can be modified on site in operation with the use of the Belimo service tool MFT-P (PC-Tool). Settings: The rotary knob must not be set to the "Tool" position! For retroactive adjustments of the bridging time with the Belimo service tool MFT-P or with the ZTH EU adjustment and diagnostic device only the values need to be entered.

Electrical installation

Notes
- Connection via class 2 transformer.
- Parallel connection of additional actuators is possible (power and control).
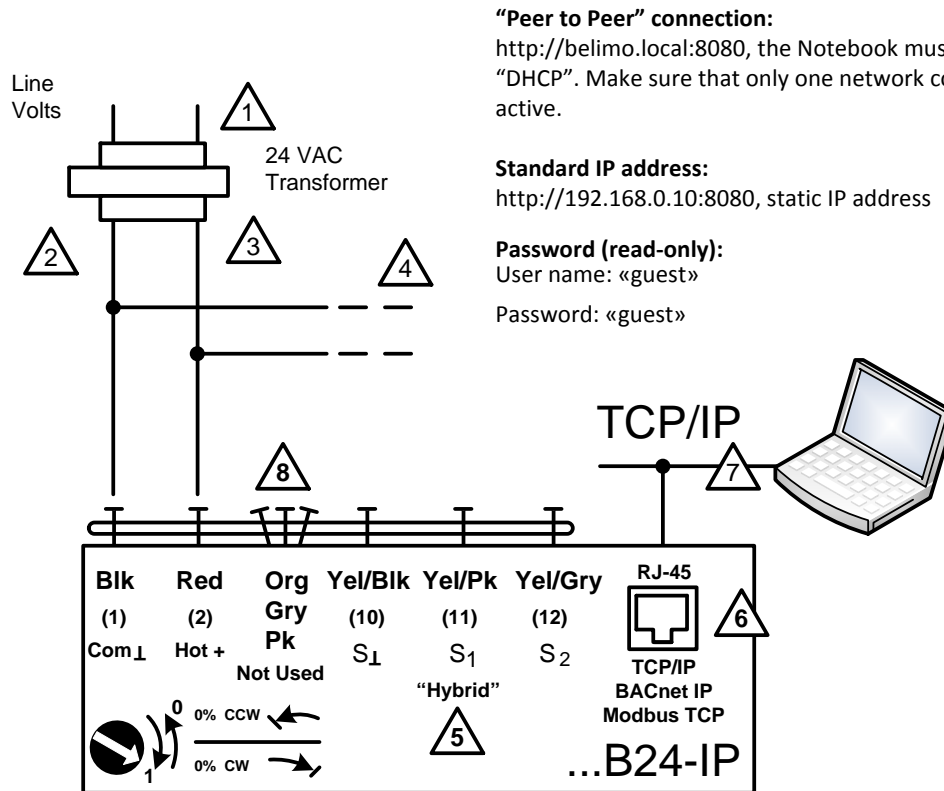- Limit of **ONE** actuator per control shaft!

⚠ **Additional notes**

1. Provide overload protection and disconnect as required.
2. CAUTION Equipment Damage! Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. Additional actuators may be wired in parallel. Ensure sufficient power supply VA is available.
5. For "Local Control" via 2-10VDC the S1 sensor must be used and configured as 'Active Sensor'.
6. Connection to Intranet / Internet via RJ45 socket
7. Connection of a notebook for initial parameterization and/or manual control via RJ45 connection. Optional direct connection via RJ45 for direct access to integrated webserver and stored data.
8. "Not Used": All cable conductors that are not used must be isolated from surrounding surfaces, by wire nut, electrical tape, or other method.

Wiring diagrams

Initial Ethernet Connection and Set-up

"Peer to Peer" connection:
http://belimo.local:8080, the Notebook must be set to "DHCP". Make sure that only one network connection is active.

Standard IP address:
http://192.168.0.10:8080, static IP address

Password (read-only):
User name: «guest»

Password: «guest»

Electrical installation

Notes
- Connection via class 2 transformer.
- Parallel connection of additional actuators is possible (power and control).
- Limit of **ONE** actuator per control shaft!
- The wiring diagrams show connections for the first sensor on terminal S1, while the second sensor can be identically on terminal S2.
- Different sensor types can be used with each sensor input. For example, active 2-10 on S1 and NTC1000 on S2.
- For "hybrid" operation, analog input and digital communication, S1 is used as the analog input and must be configured as 'active sensor'.

Additional notes
1. Provide overload protection and disconnect as required.
2. CAUTION Equipment Damage! Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. Additional actuators may be wired in parallel. Ensure sufficient power supply VA is available.
5. For "Local Control" via 2-10VDC the S1 sensor must be used and configured as 'Active Sensor'.
6. Connection to Intranet / Internet via RJ45 socket
7. Connection of a notebook for initial parameterization and/or manual control via RJ45 connection. Optional direct connection via RJ45 for direct access to integrated webserver and stored data.
8. Addition of sensors is optional.
9. Configure the actuator sensor input according to the sensor type and value. The connections for the first sensor on terminal S1, while the second sensor can be connected identically on terminal S2. Simultaneous use of different sensor types is possible. For example: a contact closure on S1 and a VDC sensor on S2.
10. "Not Used": All cable conductors that are not used must be isolated from surrounding surfaces, by wire nut, electrical tape, or other method.
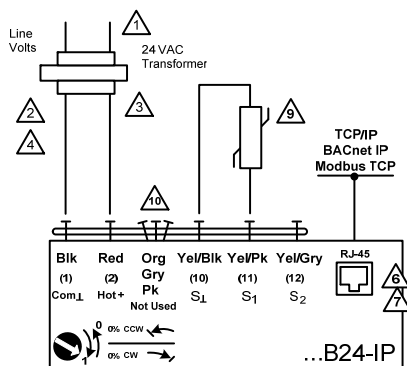
Local analog control or analog override with Belimo Cloud (TCP/IP), BACnet IP, or Modbus TCP connection.
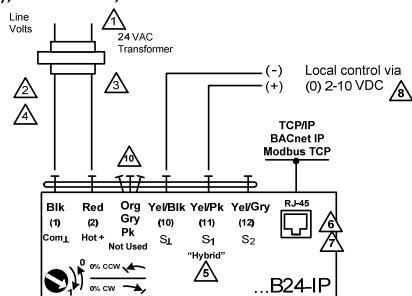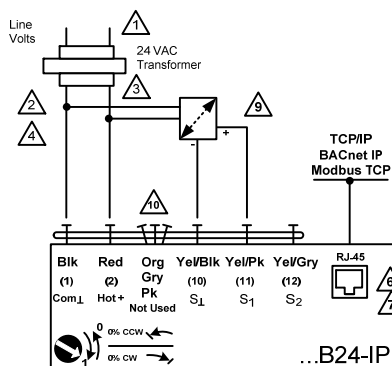

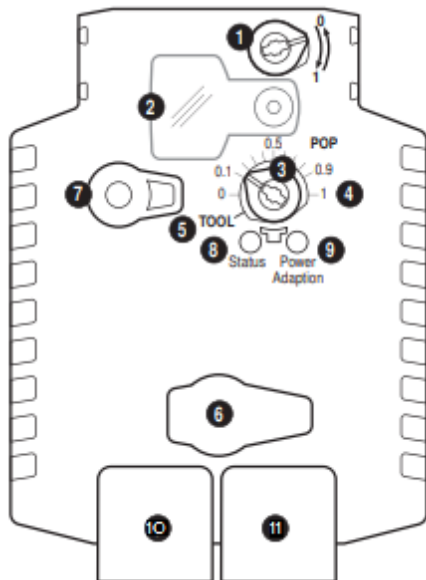Connection of contact closure sensor
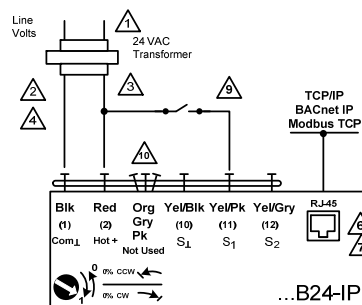
Connection of passive sensor

Connection of active sensor
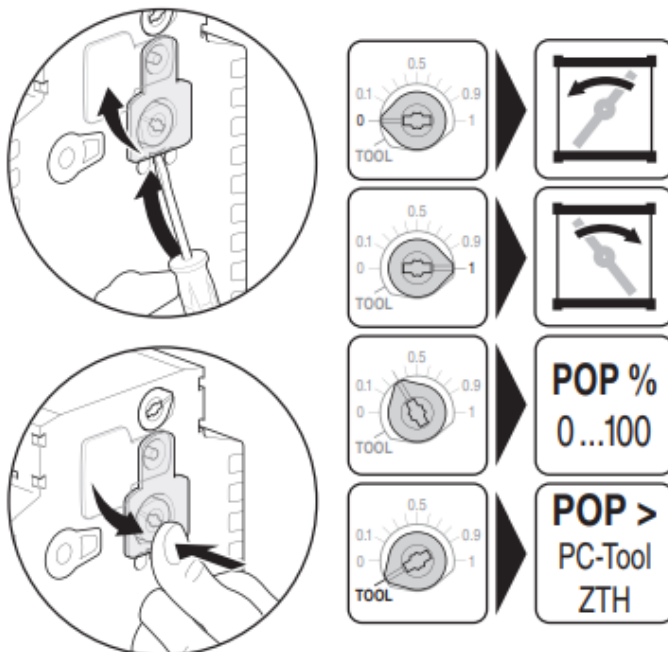
Feature overview

1. Direction of rotation switch
   Switch: Changes the direction of rotation

2. PoP cover that lifts and slides for access.
3. PoP dial for manual 0 to 100% adjustment of PoP
4. PoP scale, 0 to 1 = 0 to 100%
5. When setting the PoP electronically the dial must be set to this position.
   Connect the ZTH and or PC-Tool via the service port and make your changes.
6. Service socket for connection of ZTH.
7. Manual override

LED displays		Meaning / function
❽ yellow	**❾ green**	
Off	On	Operation OK / without fault
Off	Flashing	POP function active
On	Off	Fault
Off	Off	Not in operation
On	On	Adaptation procedure running
Flashing	On	Communication with programming tool

9. Power / Adaption button
   Triggers an angle of rotation adaption, then standard mode.
10. Power and Control cable
11. Ethernet port, RJ45

Setting Power off position (PoP)

Dimensions (inch [mm])

Dimensions