## Technical data sheet

**PRKCA-BAC-S2-T-250**

### Rotary actuator fail-safe for butterfly valves
- Torque motor 160 Nm (parametrised for D6250W/WL)
- Nominal voltage AC 24...240 V / DC 24...125 V
- Control modulating, communicative, hybrid
- with 2 integrated auxiliary switches
- Conversion of sensor signals
- Communication via BACnet MS/TP, Modbus RTU, Belimo-MP-Bus or conventional control

### Technical data

<table>
<thead>
<tr>
<th><strong>Electrical data</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>AC 24...240 V / DC 24...125 V</td>
</tr>
<tr>
<td>Nominal voltage frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Nominal voltage range</td>
<td>AC 19.2...264 V / DC 19.2...137.5 V</td>
</tr>
<tr>
<td>Power consumption in operation</td>
<td>52 W</td>
</tr>
<tr>
<td>Power consumption in rest position</td>
<td>9 W</td>
</tr>
<tr>
<td>Power consumption for wire sizing</td>
<td>with 24 V 54 VA / with 230 V 68 VA</td>
</tr>
<tr>
<td>Power consumption for wire sizing note</td>
<td>Imax 20 A @ 5 ms</td>
</tr>
<tr>
<td>Auxiliary switch</td>
<td>2 x SPDT, 1 x 10° / 1 x 0°...90° (ex works 85°)</td>
</tr>
<tr>
<td>Switching capacity auxiliary switch</td>
<td>1 mA...3 A (0.5 A inductive), AC 250 V</td>
</tr>
<tr>
<td>Connection supply</td>
<td>Terminals 2.5 mm²</td>
</tr>
<tr>
<td>Connection protective earth</td>
<td>earth terminal</td>
</tr>
<tr>
<td>Connection control</td>
<td>Terminals 1.5 mm²</td>
</tr>
<tr>
<td>Connection auxiliary switch</td>
<td>Terminals 2.5 mm²</td>
</tr>
<tr>
<td>Parallel operation</td>
<td>Yes (note the performance data)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Functional data</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque motor</td>
<td>160 Nm (parametrised for D6250W/WL)</td>
</tr>
<tr>
<td>Communicative control</td>
<td>BACnet MS/TP, Modbus RTU, MP-Bus</td>
</tr>
<tr>
<td>Operating range Y</td>
<td>2...10 V</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>100 kΩ</td>
</tr>
<tr>
<td>Operating range Y variable</td>
<td>0.5...10 V / 4...20 mA</td>
</tr>
<tr>
<td>Position feedback U</td>
<td>2...10 V</td>
</tr>
<tr>
<td>Position feedback U note</td>
<td>Max. 0.5 mA</td>
</tr>
<tr>
<td>Position feedback U variable</td>
<td>0.5...10 V</td>
</tr>
<tr>
<td>Setting fail-safe position</td>
<td>0...100%, adjustable with Belimo Assistant App (ex works 0%)</td>
</tr>
<tr>
<td>Bridging time (PF) variable</td>
<td>0...10 s, adjustable with Belimo Assistant App (ex works 2 s)</td>
</tr>
<tr>
<td>Position accuracy</td>
<td>±5%</td>
</tr>
<tr>
<td>Manual override</td>
<td>hand lever</td>
</tr>
<tr>
<td>Running time motor</td>
<td>35 s / 90°</td>
</tr>
<tr>
<td>Running time motor variable</td>
<td>30...120 s</td>
</tr>
<tr>
<td>Running time fail-safe</td>
<td>30 s / 90°</td>
</tr>
<tr>
<td>Sound power level, motor</td>
<td>68 dB(A)</td>
</tr>
<tr>
<td>Sound power level, fail-safe</td>
<td>61 dB(A)</td>
</tr>
<tr>
<td>Position indication</td>
<td>Mechanically (integrated)</td>
</tr>
</tbody>
</table>

| **Safety** |  |
| Protection class IEC/EN | I protective earth (PE) |
| Protection class UL | I protective earth (PE) |
| Degree of protection IEC/EN | IP66/67 |
| Degree of protection NEMA/UL | NEMA 4X |
| Enclosure | UL Enclosure Type 4X |
| EMC | CE according to 2014/30/EU |
| Low voltage directive | CE according to 2014/35/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 |

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Safety

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.AA

Rated impulse voltage supply
4 kV

Rated impulse voltage control
0.8 kV

Rated impulse voltage auxiliary switch
2.5 kV

Control pollution degree
3

Ambient temperature
-30...50°C

Storage temperature
-40...80°C

Ambient humidity
Max. 100% r.H.

Servicing
maintenance-free

Mechanical data

Connection flange
F07 (F05 only with accessory)

Weight
8.5 kg

Terms

Abbreviations
POP = Power off position / fail-safe position
CPO = Controlled power off / controlled fail-safe
PF = Power fail delay time / bridging time

Product features

Fields of application
The actuator is particularly suitable for utilisation in outdoor applications and is protected against the following weather conditions:
- UV radiation
- Dirt / Dust
- Rain / Snow
- Air humidity

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.
- Caution: Power supply voltage!
- The device has a protective earthing. Incorrect connection of the protective earth can lead to hazards due to electrical shock.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- Apart from the connection box, 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.
- 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.
- The two switches integrated in the actuator are to be operated either on power supply voltage or at safety extra-low voltage. The combination power supply voltage/safety extra-low voltage is not permitted.
Pre-charging time (start up)

The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of a power failure, the actuator can move at any time from its current position into the preset fail-safe position.

The duration of the pre-charging time depends mainly on following factors:
- Duration of the power failure
- PF delay time (bridging time)

Typical pre-charging time

<table>
<thead>
<tr>
<th>[d]</th>
<th>[s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>≥10</td>
<td>19</td>
</tr>
</tbody>
</table>

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).

Delivery condition (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.

Converter for sensors
Connection option for two sensors (passive, active or switching contacts). In this way, the analogue sensor signal can be easily digitised and transferred to the bus systems BACnet or Modbus.

Parametrisable actuators
The factory settings cover the most common applications. The Belimo Assistant App is required for parametrisation via Near Field Communication (NFC) and simplifies commissioning. Moreover, it provides a variety of diagnostic options. The ZTH EU service tool provides a selection of both diagnostic and setting options.

Combination analogue - communicative (hybrid mode)
With conventional control by means of an analogue positioning signal, BACnet or Modbus can be used for the communicative position feedback.

Simple direct mounting
Simple direct mounting on the butterfly valve. The mounting orientation in relation to the butterfly valve can be selected in 90° (angle) increments.

Manual override
The valve can be manually operated using a hand crank. Unlocking is carried out manually by removing the hand crank.

Internal heating
An internal heater prevents condensation buildup. Thanks to the integrated temperature and humidity sensor, the built-in heater automatically switches on/off.

High functional reliability
The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

Setting fail-safe position (POP)
The desired fail-safe position can be set 0...100% with the “Belimo Assistant App” or ZTH EU. The setting always refers to the adapted angle of rotation range. In the event of a power failure, the actuator will move into the selected fail-safe position.
Bridging time

Electrical interruptions can be bridged up to a maximum of 10 s. In the event of a power failure, the actuator will remain stationary in accordance with the set bridging time. If the power failure is greater than the set bridging time, then the actuator will move into the selected fail-safe position. The pre-programmed bridging time is set to 2 s. This can be modified on site in operation with the use of the “Belimo Assistant App”.

Flexible signalization

The actuator has one auxiliary switch with a fixed setting (10°) and one adjustable auxiliary switch (0...90°).

Accessories

<table>
<thead>
<tr>
<th>Gateways</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway MP zu BACnet MS/TP</td>
<td>UK24BAC</td>
<td></td>
</tr>
<tr>
<td>Gateway MP to Modbus RTU</td>
<td>UK24MOD</td>
<td></td>
</tr>
<tr>
<td>Gateway MP to LonWorks</td>
<td>UK24LON</td>
<td></td>
</tr>
<tr>
<td>Gateway MP to KNX</td>
<td>UK24EIB</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical accessories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin service socket for Belimo device</td>
<td>ZK1-GEN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duct/Immersion Temperature Sensor 50 mm x 6 mm Pt1000</td>
<td>01DT-1BH</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 50 mm x 6 mm Ni1000</td>
<td>01DT-1CH</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 100 mm x 6 mm Pt1000</td>
<td>01DT-1BL</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 100 mm x 6 mm Ni1000</td>
<td>01DT-1CL</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 150 mm x 6 mm Pt1000</td>
<td>01DT-1BN</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 150 mm x 6 mm Ni1000</td>
<td>01DT-1CN</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 200 mm x 6 mm Pt1000</td>
<td>01DT-1BP</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 200 mm x 6 mm Ni1000</td>
<td>01DT-1CP</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 300 mm x 6 mm Pt1000</td>
<td>01DT-1BR</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 300 mm x 6 mm Ni1000</td>
<td>01DT-1CR</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 450 mm x 6 mm Pt1000</td>
<td>01DT-1BT</td>
</tr>
<tr>
<td>Duct/Immersion Temperature Sensor 450 mm x 6 mm Ni1000</td>
<td>01DT-1CT</td>
</tr>
</tbody>
</table>

Electrical installation

Notes
- Caution: Power supply voltage!
- Parallel connection of other actuators possible. Observe the performance data.
- The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS485 regulations.

Wiring diagrams

AC 24...240 V / DC 24...125 V Modulating control
Rotation actuator fail-safe, modulating, communicative, hybrid, AC 24...240 V / DC 24...125 V, 160 Nm, Running time motor 35 s

Electrical installation

Connection auxiliary switch

Power supply must not be connected to the signal terminals!

Follow-up control (position-dependent)
Functions for devices with specific parameters (Parametrisation necessary)

Control open/close

Control 3-point

Control 4...20 mA

Positioner SG..

Note
Maximum output power «+ 24VDC out» 1.2 W @ 50 mA!
A separate safety transformer must be used for higher performance!
Connection on the MP-Bus

MP-Bus Network topology

There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).
Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

Connection BACnet MS/TP / Modbus RTU
Connection BACnet MS/TP / Modbus RTU with analog setpoint (hybrid mode)

Connection of passive sensors (BACnet MS/TP / Modbus RTU)

Connection of active sensors (BACnet MS/TP / Modbus RTU)

Switching contact connection (BACnet MS/TP / Modbus RTU)

Possible input voltage range:
DC 0...10 V (resolution 5 mV)
For example, to capture:
- Active temperature sensors
- Flow sensors
- Pressure / differential pressure sensors

Requirements for switching contact:
The switching contact must be able to accurately switch a current of 10 mA @ 24 V.
For example, to capture:
- Flow monitors
- Operation / malfunction messages of chillers
Operating controls and indicators

Auxiliary switch settings

1 Gear disengagement
Opening the manual override cover and adjusting the hand crank.
Manual override is possible.

2 Manual override control
Turn the hand crank until the desired switching position A is indicated and then remove the crank.

3 Auxiliary switch
For the auxiliary switch position settings, carry out points 1 to 4 successively.
Opening the auxiliary switch adjustment cover and adjusting the hand crank.
Turn the crank until the arrow points to the vertical line.

4 Terminals
Connect continuity tester to S4 + S5 or to S4 + S6.
If the auxiliary switch should switch in the opposite direction, rotate the hand crank by 180°.

5 Push-button and LED display green

- Off: No power supply or malfunction
- On: In operation
- Press button: Triggers test run, followed by standard mode

6 Push-button and LED display yellow

- Off: Standard mode
- On: Test run active
- Flickering: BACnet / Modbus communication active
- Flashing: Request for addressing from MP master
- Press button: Confirmation of the MP addressing
**NFC connection**

Belimo equipment marked with the NFC logo can be operated with the Belimo Assistant App.

**Requirement:**
- NFC- or Bluetooth-capable smartphone
- Belimo Assistant App (Google Play & Apple AppStore)

Align NFC-capable smartphone on the actuator so that both NFC antennas are superposed.

Connect Bluetooth-enabled smartphone via the Bluetooth-to-NFC Converter ZIP-BT-NFC to the actuator. Technical data and operation instructions are shown in the ZIP-BT-NFC data sheet.

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**Service Tools connection**

The actuator can be configured by the ZTH EU via the service socket.
Rotary actuator fail-safe, modulating, communicative, hybrid, AC 24...240 V / DC 24...125 V, 160 Nm, Running time motor 35 s

Dimensions [mm]

Dimensional drawings

Further documentation

- Tool connections
- Description Protocol Implementation Conformance Statement PICS
- Description Modbus register
- Overview MP Cooperation Partners
- Introduction to MP-Bus Technology
- MP Glossary
- The complete product range for water applications
- Data sheets for butterfly valves
- Installation instructions for actuators and/or butterfly valves
- General notes for project planning