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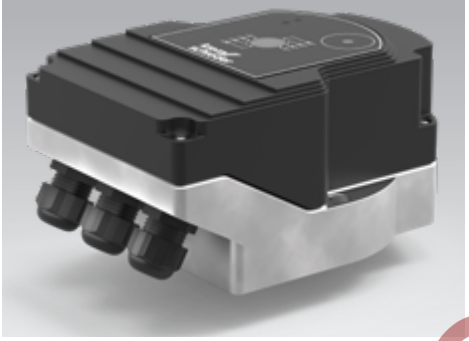
krom//schroder

(D) (GB) (F) (NL) (I) (E) (DK) (S) (N) (P) (GR)
(TR) (CZ) (PL) (RUS) (H) → www.docuthek.com

Operating instructions Actuator IC 40



Cert. version 06.19

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Safety

Please read and keep in a safe place

Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations and standards in force. These instructions can also be found at www.docuthek.com.

Explanation of symbols

•, 1, 2, 3 ... = Action
▷ = Instruction

Liability

We will not be held liable for damage resulting from non-observance of the instructions and non-compliant use.

Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:

⚠ DANGER
Indicates potentially fatal situations.

⚠ WARNING
Indicates possible danger to life and limb.

! CAUTION
Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

Conversion, spare parts

All technical changes are prohibited. Only use OEM spare parts..

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Checking the usage

Intended use

Actuator IC 40

It is designed for all applications that require precise, controlled rotary movement between 0° and 90°. The combination of actuator IC 40 and control element is designed to adjust volumes of gas and air on various appliances and flue gas lines. IC 40 is adjusted and commissioned using the BCSoft V4.x programming software.

This function is only guaranteed when used within the specified limits – see page 8 (Technical data). Any other use is considered as non-compliant.

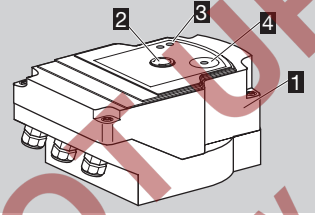
GB

Type code

Code	Description
IC 40	Actuator
S	Emergency closing function
A	Mains voltage: 100 – 230 V AC, 50/60 Hz
	Torque:
2	2.5 Nm
3	3 Nm
A	4 – 20 mA analogue input
D	Digital input
R10[1)]	1 kΩ feedback potentiometer

1) Optional

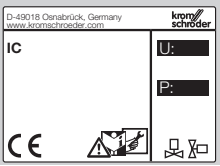
Part designations



1 Housing cover
2 Position indicator
3 Red and blue LEDs
4 Optical interface

Type label

Mains voltage, electrical power rating, enclosure, ambient temperature, torque and installation position – see type label.



Combination of actuator with butterfly valve

Type	IC 40 + butterfly valve BV..
IBG	IC 40 + BVG (for gas)
IBGF	IC 40 + BVGF (for gas, clearance-free valve)
IBA	IC 40 + BVA (for air)
IBAF	IC 40 + BVAF (for air, clearance-free valve)
IBH	IC 40 + BVH (for hot air and flue gas)
IBHS	IC 40S + BVHS (for hot air and flue gas, with emergency closing function)

! CAUTION

The emergency closing function should be used only for the intended function. If the emergency closing function is used for controlled shut-down or for intermittent switching of the burner, this will reduce the service life of the butterfly valve and actuator. Such applications do not correspond to the intended use.

Combination of actuator with linear flow control

Type	IC 40 + linear flow control
IFC 1	IC 40 + linear flow control VFC, size 1
IFC 3	IC 40 + linear flow control VFC, size 3

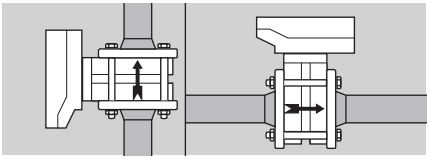
Installation

! CAUTION

Please observe the following to ensure that the actuator is not damaged:

– Do not store or install the unit in the open air.
– The device must not be installed in a public place. It must be accessible to authorized personnel only. Unauthorized personnel could make changes which could cause the system to become unsafe or dangerous.
– Dropping the device can cause permanent damage. In this event, replace the entire device and associated modules before use.

▷ Installation in the vertical or horizontal position, not upside down.



▷ For the assembly of actuator and butterfly valve, and for installation in the pipework, see www.docuthek.com → Thermal Solutions → Products → 03 Valves and butterfly valves → Butterfly valves BV.. operating instructions or Linear flow controls IFC, VFC operating instructions.

▷ Do not insulate the actuator with thermal insulation.

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Wiring

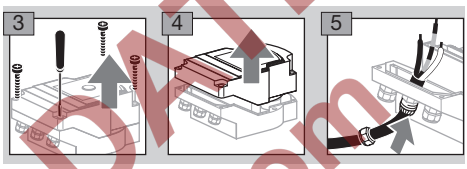
⚠ WARNING

Electric shocks can be fatal!

– Before working on electrically live components, ensure they are disconnected from the power supply.
– It must be possible to isolate the actuator from the power supply. Provide a double pole switch.

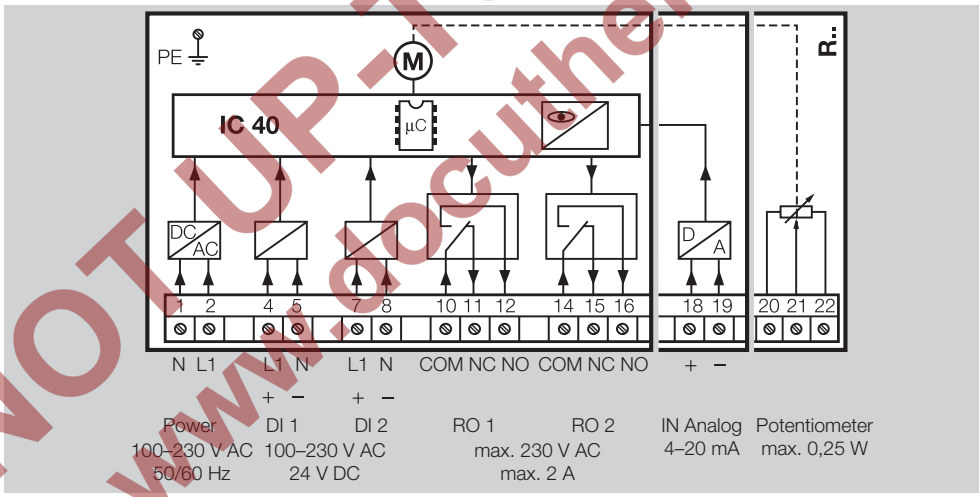
▷ Install supply and signal lines separately.
▷ Conductors which have not been connected (spare conductors) must be insulated at their ends.
▷ Cables should be installed well away from high-voltage lines of other devices.
▷ Observe EMC Directive for installation of signal lines.
▷ If the power supply is susceptible to frequent voltage peaks, we recommend that an electric filter be used.
▷ Use temperature-resistant supply cables (≥ 90°C and min. 1 – 1.5 mm² or AWG 14 – 18).
▷ Use cables with wire end ferrules.
▷ Cable cross-section: max. 2.5 mm².
▷ For information on assignment of the inputs and outputs, see www.docuthek.com → Thermal Solutions → Products → 03 Valves and butterfly valves → Actuators IC ... → Technical Information IC 40.

1 Disconnect the system from the electrical power supply.
2 Shut off the gas supply.
▷ Before opening the unit, the fitter should ground himself.

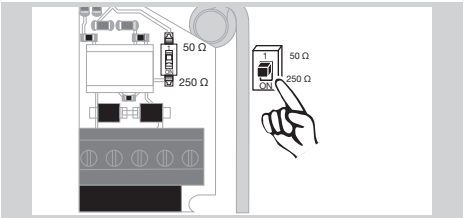


6 Wire as shown on the connection diagram.
▷ Do not connect power supply and digital inputs to different phases of a three-phase current system.

Connection diagram



7 Assign inputs according to application.
▷ The load impedance of the 4 – 20 mA input can be modified using the switch on the main circuit board.



▷ Digital input DI 1/DI 2: in the case of 24 V DC, check the polarity.
▷ Analogue input IN Analog: 4 – 20 mA, check the polarity.
▷ For further information on the inputs, see page 8 (Technical data).

8 Assign outputs according to application.
▷ Digital outputs RO 1 and RO 2: signalling contacts designed as relay change-over contacts.
▷ For further information on the outputs, contact current and relay contacts, see page 8 (Technical data).

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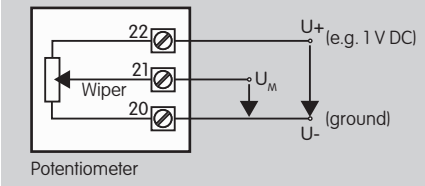
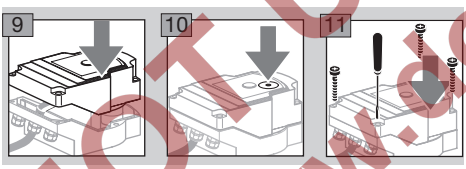
Feedback

- ▷ A feedback potentiometer offers the option of monitoring the current position of the actuator.
- ▷ The potentiometer is an optional feature. It is installed at the factory and cannot be retrofitted.
- ▷ The potentiometer must be utilized as a voltage divider. The change in position of the potentiometer wiper (which corresponds to the actuator position) can be measured as a changing voltage between U- and U_M.



Potentiometer

- ▷ Other circuit layouts produce measurement results that are inaccurate and do not remain stable over a long period of time or are non-reproducible. They also reduce the service life of the feedback potentiometer.
- ▷ The available range (resolution) depends on the parameterization of the setting range.
- ▷ The potentiometer is only suitable for connection of SELV and PELV.
- ▷ Max. power = 0.25 W, max. voltage = 15 V.
- ▷ Follow the reverse procedure when reassembling.
- ▷ Carefully align the optical waveguides on the circuit board with the marking on the housing cover (circle).



- ▷ Re-tighten the cover screws in order to ensure that the housing cover is grounded.
- ▷ A PC or notebook, the BCSoft V4.x programming software and an opto-adapter PCO 200 or PCO 300 are required for commissioning.
- ▷ The opto-adapter establishes a connection between the PC and the actuator.

BCSoft

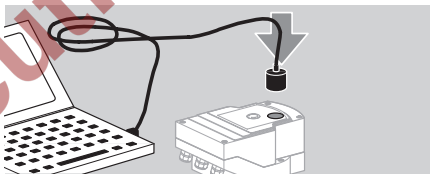
- ▷ The current software and operating instructions can be downloaded from www.docuthek.com. To do so, registration in the DOCUTHEK is required.
- ▷ BCSoft V4.x allows you to select the type of control, the operating mode, running times, opening angles and intermediate positions.
- ▷ Various operating modes, which may be modified, are stored in the actuator.
- ▷ The actuator can also be controlled “by hand” using BCSoft.
- ▷ Service technicians can call up statistical data using BCSoft.
- ▷ For detailed information on control, Manual mode and statistics, see www.docuthek.com → Thermal Solutions → Products → 03 Valves and butterfly valves → Actuators IC ... → Technical Information IC 40.

Establishing a connection to a PC

- ▷ Up-to-date antivirus software must be installed on the PC used for parameterization.

There are two ways of establishing a connection to a PC:

- ▷ **Opto-adapter PCO 200:** cable connection via USB interface.
- ▷ **Opto-adapter PCO 300:** wireless connection using Bluetooth.
- ▷ Follow the instructions provided in the enclosed operating instructions of the corresponding opto-adapter for installation of the driver and connection establishment.
- ▷ Operating instructions PCO 200 and PCO 300 (D, GB), see www.docuthek.com → Thermal Solutions → Products → 03 Valves and butterfly valves → Actuators IC 20, IC 40, IC 50 → PCO ...
- • Place the sensor in the centre of the marking (circle) provided for this purpose.



- ▷ The film on the marking must be clean and undamaged.
- ▷ When connecting to BCSoft, a connection to the IC 40 is established from the PC/notebook.
- ▷ If a connection fails to be established, the procedure can be repeated by pressing function key F3.
- ▷ The opto-adapter is to be removed again following successful parameterization.

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Commissioning

LED display

Blue LED	Red LED	Operating state
Moderately flashing[2)]	Off	Zero position check
Slow flashing[3)]	Slow flashing[3)]	Calibration
Lit	Off	Device in Standby mode
Moderately flashing[2)]	Off	Device in motion
Fast flashing[1)]	Off	Manual mode
Fast flashing[1)]	Off	Moving in Manual mode
Lit	Flashing depending on fault message	Fault
Flashing alternately for 2 s[1)]		Parameters accepted

[1)] Fast flashing: 5 x per second. [2)] Moderately flashing: 3 x per second. [3)] Slow flashing: 1 x per second.

Calibrating the zero position using BCSoft

1. After automatic identification via BCSoft, select the IC 40 in the "Devices" window by double-clicking on it. The individual program options are displayed.
2. Select the "Commissioning.." program option.
3. Select the butterfly valve fitted in the "Actuator mounted on" menu item.

BVH, BVHS

4. Select "Start calibration".

▷ The slow flashing blue and red LEDs indicate that the actuator is moving.

▷ The setting process for the valve's zero/closed position takes place automatically.

▷ When the blue LED is lit continuously, calibration is completed.

BVG, BVGF, BVA, VFC ...

4. Select "Start calibration".

▷ The control element moves to the zero/closed position.

- Move the actuator manually using the "OPEN" and "CLOSE" buttons.

▷ The current position can be entered as the zero/closed position by clicking on "Accept zero position".

▷ When the blue LED is lit continuously, calibration is completed.

BVH, BVHS, BVG, BVGF, BVA, BVAF, VFC ...

5. After the calibration process has been completed, check the selected operating mode or select a new operating mode for the application.

▷ The setting up of the parameters and assignment of the inputs and outputs must be co-ordinated.

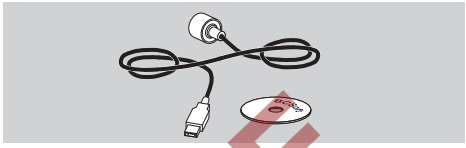
! CAUTION

The selected operating mode is responsible for the setting properties of the device!

Accessories

Opto-adapter PCO 200

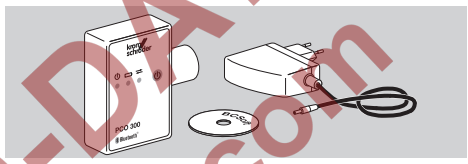
Cable connection via USB interface.



BCSoft CD-ROM included
Order No.: 74960625

Opto-adapter PCO 300

Wireless connection using Bluetooth.



BCSoft CD-ROM included
Order No.: 74960617

BCSoft

For BCSoft software and operating instructions, see www.docuthek.com → Thermal Solutions → Products → 03 Valves and butterfly valves → Actuators IC 20, IC 40, IC 50 → BCSoft V4.x.

▷ In order to be able to download the software, registration in the DOCUTHEK is required.

▷ Actuators IC 40 up to construction stage C can only be parameterized with BCSoft version 3.x.x, as from construction stage D, they can only be parameterized with the current BCSoft version 4.x.x.

▷ To transfer a parameter set from an actuator up to and including construction stage C to an actuator of construction stage D or later, the parameter set in the old device must be read using the current BCSoft version 3.x.x and saved to a xxx.EPC parameter file. Read the xxx.EPC parameter file into the current BCSoft version 4.x.x and transfer it to an actuator of construction stage D or later.

▷ Parameter sets which consist of various parameter files (xxx.EPK, xxx.EPA and xxx.EPB) must be converted into the latest xxx.EPC file format using the current BCSoft version 3.x.x before they can be read using the current BCSoft version 4.x.x into an IC 40 of construction stage D or later.

M20 plastic cable gland with pressure equalization element

To avoid the formation of condensation, a cable gland with pressure equalization element can be used instead of the standard cable gland. The cable gland is designed to ventilate the device, without allowing water to enter.
Order No.: 74924686

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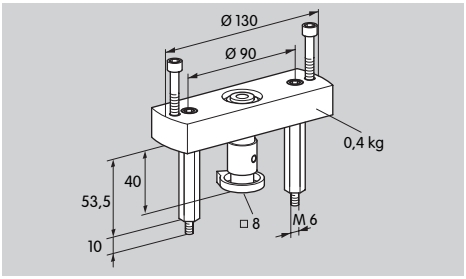
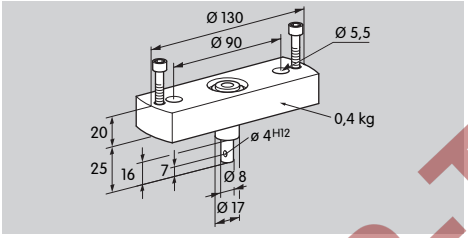
Adapter set for butterfly valve DKL, DKG



Order No.: 74921672

“Single application” attachment set

This attachment set is required if the actuator is mounted onto control elements other than DKL, DKG, BV.. or VFC.



Order No.: 74921671

Maintenance

Actuators IC 40 suffer little wear and require little servicing. We recommend a function check once a year.
If the “Service note” option has been activated in BCSoft, a warning signal is issued as standard once one or several of the set limit values has/have been reached and exceeded. The warning limits are preset as follows and can be adapted if necessary:
3 million cycles (0 – 90 – 0°/0 – 100 – 0%),
3 million relay switching operations,
5 million changes of direction.
If a service note is active, it can only be acknowledged via BCSoft. In doing so, the current date will be entered as the acknowledgement date in the device history.

Assistance in the event of warnings and faults

- Read the warning, error and fault messages in the BCSoft diagnostic system.

⚠ WARNING

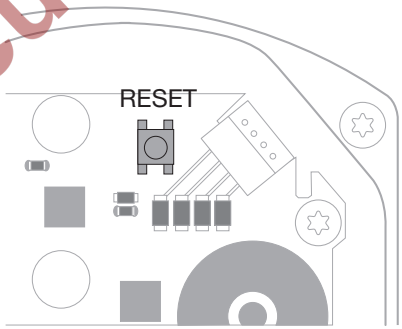
To avoid harm to persons and damage to the unit, please observe the following:

– Electric shocks can be fatal! Before working on electrically live components, ensure they are disconnected from the power supply.
– Never remove the circuit board!
– Unauthorized repairs or incorrect electrical connections may cause the control element to open resulting in defects.

? **Warning and fault**
! **Cause**
• **Remedy**

There are three ways of resetting/ acknowledging warnings and faults:

– Reset using BCSoft
– Reset by disconnecting the mains voltage and switching it on again
– Reset by pressing the Reset button in the device (Attention: in the case of electrically live parts, this may only be carried out by authorized personnel)



? **Red LED lights up and blue LED flashes? (fault/device error)**
! Flashes once: internal fault.
• Carry out reset → the actuator is recalibrated.
• If it is not possible to remedy the fault, send the actuator to the manufacturer.
! Flashes twice: zero position check, reference switch does not close.
• Carry out reset → the actuator is recalibrated.
• If it is not possible to remedy the fault, send the actuator to the manufacturer.
! Flashes 3 times: zero position check, reference switch does not open.
• Carry out reset → the actuator is recalibrated.
• If it is not possible to remedy the fault, send the actuator to the manufacturer.

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! Flashes 6 times: saving error for adjustable parameters.
• Carry out reset.
• If it is not possible to remedy the fault, send the actuator to the manufacturer.
! Flashes 7 times: saving error: factory default parameters.
• Carry out reset.
• If it is not possible to remedy the fault, send the actuator to the manufacturer.
! Flashes 8 times: saving error: user calibration.
• Carry out reset.
• If it is not possible to remedy the fault, send the actuator to the manufacturer.
! Flashes 9 times: low voltage.
• Check actuator mains voltage supply.
• If it is not possible to remedy the fault, send the actuator to the manufacturer.

? Blue LED lights up in accordance with operating state, red LED flashes? (warning)
! Flashes once: internal temperature > 90°C. Ambient temperature too high.
• Reduce ambient/medium temperature.
! Flashes twice: drift > 5%. Control element mechanically offset or moving against its mechanical stop.
• Check control element opens and closes without restrictions.
• Carry out reset → the actuator is recalibrated.
! Flashes 3 times: drift > 10%. Control element mechanically offset or moving against its mechanical stop.
• Check control element opens and closes without restrictions.
• Carry out reset → the actuator is recalibrated.
• Adjust the closed position.
• Carry out reset → the actuator is recalibrated.
! Flashes 4 times/5 times: control element blocked, large mechanical offset, internal error, actuator offset.
• Check control element opens and closes without restrictions.
• Carry out reset → the actuator is recalibrated.
! Flashes 6 times: analogue input AI < 4 mA.
• Check analogue input signal.
! Flashes 7 times: service note: maximum number of OPEN/CLOSE cycles exceeded.
• Carry out reset using BCSoft.
! Flashes 8 times: service note: maximum number of changes in direction of rotation exceeded.
• Carry out reset using BCSoft.
! Flashes 9 times: service note: relay output RO 1 or RO 2 switched too often.
• Carry out reset using BCSoft.

? The drive shaft does not move?
! No permanent voltage supply to the unit.
• Check supply voltage.
! No signal at the unit.
• Check signal.
! Signal at incorrect input.
• Check correct assignment: DI 1/DI 2.
! Signal voltage incorrect.
• Check signal voltage, see page 8 (Technical data).
! Selected operating mode does not correspond with signal specifications.
• Adjust the unit or signals.

? Blue LED does not light – but the control element opens?
! LED defective.
• Remove the unit and return it to the manufacturer for inspection.

? No LED lights – unit is not functioning?
! No voltage supply to the unit.
• Check supply voltage.
! Unit defective.
• Remove the unit and return it to the manufacturer.

? Red and blue LEDs flash?
! Calibration of the closed position is active.
• Wait for the calibration process to finish.
• If the calibration process is not completed successfully, cancel it and check control element opens and closes without restrictions

? No reaction despite input signal?
! The selected operating mode is not reading this input – incorrectly parameterized.
• Set the parameters for the operating mode/input in BCSoft to suit your requirements.

? No output signal?
! Minimum and maximum current values not observed.
• Check/adjust the current value.
! The function is not activated in the software.
• Set the parameters in the software to suit your requirements.
! Change-over relay terminals incorrectly assigned.
• Check electrical wiring.

? The drive shaft does not move as required?
! The selected operating mode reads the inputs differently to expectations.
• Set the parameters for the operating mode in BCSoft to suit your requirements.

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? The drive shaft moves constantly?
! Current signal fluctuates.
• Check control loop, if possible attenuate it.
• Increase the hysteresis and filtering in BCSoft.
! 3-point step signal commands too many changes of direction.
! Check/adjust the 3-point step controller.

? No communication possible between PC and IC 40?
! Incorrect interface used on the PC.
• Set the interface to the correct configuration using BCSoft – see page 5 (Commissioning).
! Opto-adapter not positioned correctly.
• Position the magnetic head of the opto-adapter in the circle provided.
! Optical waveguide bent.
• Carefully align the optical waveguides on the circuit board with the marking on the housing cover (circle).
! Housing cover not correctly secured.
• Close the housing and tighten all the screws.
! Film on the marking on cover (circle) dirty or damaged.
• Clean the film; if it is damaged, replace the cover.
! Opto-adapter defective.
• Check the adapter using the BCSoft test function.
• Replace the opto-adapter.

? The parameters cannot be set in the software?
! No writing access granted.
• Enter passcode for writing access (see BCSoft operating instructions).

? Unit does not react to signal change – the blue LED flashes quickly?
! The unit is in Manual mode.
• Deactivate Manual mode in BCSoft or disconnect device from the mains.

? The motor and drive shaft of the actuator no longer function as required?
! The gear is defective.
• Remove the unit and return it to the manufacturer.
! The selected nominal valve size is too big and has reduced the service life of the mechanical components due to excessive stress.
• Check the system design.
• Adjust the valve size and/or actuator.
! Gear load is too great.
• Check the torque – see page 8 (Technical data).

? Feedback potentiometer indicates incorrect values?
! Connections on the terminal strip mixed up.
• Check the contact assignment on the terminal strip.
! Incorrect potentiometer utilization.
• Utilize the potentiometer as a voltage divider.
! The windings in the potentiometer are defective.
• Remove the unit and return it to the manufacturer for inspection.

? Software problem and/or problem with settings?
! Software version obsolete.
• The current software and operating instructions can be downloaded from www.docuthek.com, see page 5 (Accessories).

? Is it not possible for the fault to be eliminated with the measures described above?
• Remove the unit and return it to the manufacturer for inspection.

Technical data

Purpose of control: operating control, electric actuator.

Ambient conditions
Icing, condensation and dew in the unit are not permitted.
Avoid direct sunlight or radiation from red-hot surfaces on the unit. Note the maximum medium and ambient temperatures.
Avoid corrosive influences, e.g. salty ambient air or SO_2.
The unit may only be stored/installed in enclosed rooms/buildings.
Independently mounted control.
Pollution degree: 3 (outside of enclosure)/ 2 (within enclosure).
Enclosure:
IC 40: IP 54, in conjunction with BVH: IP 65,
IC 40: Nema 2, in conjunction with BVG, BVA or BVH: Nema 3.
Safety class: I.
Ambient temperature:
-20 to +60°C, no condensation permitted.
Storage temperature: -20 to +40°C.
Max. installation altitude: 2000 m AMSL.
Transport temperature = ambient temperature.

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Mechanical data

Angle of rotation: 0 – 90°, setting accuracy < 0.05°. Holding torque = torque as long as mains voltage is applied.

Type	Running time [s/90°] 50 Hz/60 Hz	Torque [Nm] 50 Hz	60 Hz
IC 40	4.5 – 76.5	2.5	2.5
IC 40S	4.5 – 76.5	3	3

On the IC 40, the running time and torque are independent of the mains frequency. The running time can be freely programmed between the limits of 4.5 and 76.5 s.

Electrical data

Mains voltage: 100 – 230 V AC, ±10%, 50/60 Hz, the actuator automatically adjusts to the respective mains voltage.
Power consumption: 10.5 W/21 VA at 230 V AC,
9 W/16.5 VA at 120 V AC.
Switch-on peak current: max. 10 A for max. 5 ms.
Screw terminals using the elevator principles for cables up to 4 mm^2 (single core cables) and for cables up to 2.5 mm^2 with wire end ferrules.
Rated impulse voltage: 4000 V.
Impedance protected motor.
2 digital inputs:
24 V DC or 100 – 230 V AC each.
Current requirement of digital inputs:
24 V DC: approx. 5 mA eff.
230 V AC: approx. 3 mA eff.
1 analogue input (optional):
4 – 20 mA (load impedance switchable from 50 Ω to 250 Ω).
Potentiometer (optional): 1 kΩ ± 20%, linearity tolerance: ± 2%, max. capacity: 0.25 W, conductive plastic element.
Tap wiper at high resistance, see page 4 (Feedback).
2 digital outputs:
Signalling contacts designed as relay changeover contacts. Contact current of digital outputs: min. 5 mA (resistive) and max. 2 A (resistive).
Duty cycle: 100%.
Type of action to EN 60730: type 1C.
Software class A.
Overvoltage category III.
Electrical connection:
Line entrance: 3 x M20 plastic cable glands.

Designed lifetime

The following specifications on the designed lifetime of the actuator relate to typical applications with butterfly valves BVA, BVH and VCG.
Mechanical switching cycles (0° – 90° – 0°/0% – 100% – 0%):
IC 40 with VFC: 5 million cycles
IC 40 with BVA/BVG: 5 million cycles
IC 40 with BVAF/BVGF: 5 million cycles
IC 40 with BVH/BVHx: 3 million cycles

Typical number of operating cycles of the digital outputs RO 1 and RO 2:

Switching current	Switching cycles
5 mA	5,000,000
2 A	250,000

Logistics

Transport

Protect the unit from external forces (blows, shocks, vibration).
Transport temperature: see page 8 (Technical data).
Transport is subject to the ambient conditions described.
Report any transport damage on the unit or packaging without delay.
Check that the delivery is complete, see page 2 (Part designations).

Storage

Storage temperature: see page 8 (Technical data).
Storage is subject to the ambient conditions described.
Storage time: 6 months before using for the first time.

Certification

Declaration of conformity

CE

We, the manufacturer, hereby declare that the product IC 40 complies with the requirements of the following Directives and Standards:
Directives:
– 2014/35/EU
– 2014/30/EU
Standards:
– EN 60730-2-14
Elster GmbH

Scan of the Declaration of conformity (D, GB) – see www.docuthek.com

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Eurasian Customs Union

The product IC 40 meets the technical specifications of the Eurasian Customs Union.

ANSI/CSA approved

Canadian Standards Association – ANSI/UL 429 and CSA C22.2

UL listed

Underwriters Laboratories – UL 60730-1 “Automatic Electrical Controls for Household and Similar Use”, UL 60730-2-14 “Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electric Actuators”, File No. E4436.

REACH Regulation

The device contains substances of very high concern which are listed in the Candidate List of the European REACH Regulation No. 1907/2006. See Reach list HTS at www.docuthek.com.

RoHS compliant

China RoHS

rective on the restriction of the use of hazardous substances (RoHS) in China. Scan of the Disclosure Table China RoHS2, see certificates at www.docuthek.com.

Disposal

Devices with electronic components:

WEEE Directive 2012/19/EU – Waste Electrical and Electronic Equipment Directive

At the end of the product life (number of operating cycles reached), dispose of the packaging and product in a corresponding recycling centre. Do not dispose of the unit with the usual domestic refuse. Do not burn the product. On request, old units may be returned carriage paid to the manufacturer in accordance with the relevant waste legislation requirements.

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Contact

If you have any technical questions, please contact your local branch office/agent. The addresses are available on the Internet or from Elster GmbH.

We reserve the right to make technical modifications in the interests of progress.

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