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PROPORTIONAL LINEAR ACTUATOR FOR FLOWMATIC®

Code 145019

OPERATING MANUAL

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This document replaces all versions with an older release date. This version is not updated automatically. Subject to change.

The original operating instructions were composed in German. Operating instructions in other languages have been translated from German.

We reserve the right to make changes and improvements to our products and the related technical data in this publication, at any time and without prior notice. The website www.caleffi.com always has the most up-to-date version of the document, which should be used for technical verifications.

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1 Notes on these operating instructions



NOTE

If you have any questions that cannot be clarified with these operating instructions, you can obtain further information from your Caleffi contact person.

1.1 Validity of the operating instructions

These operating instructions are an integral part of the actuator 145019 The document is valid for the actuators specified above with revision number 2.10 and higher.

1.2 Display elements



NOTE Notes provide you with important information.

You can find the following display elements in these instructions:

- List point
- Step or measure for avoiding danger

2 Safety

IMPORTANT READ CAREFULLY BEFORE USE RETAIN FOR LATER REFERENCE

2.1 Explanation of safety instructions and warnings

The basic safety information includes general instructions for the safe use of the actuator with valve or instructions to maintain its safe condition.

Action-related warnings of residual risks are indicated prior to performing dangerous actions.

Presentation and structure of warnings

The warnings are action-related and are structured as follows.



CAUTION

Type and source of danger!

Potential consequences when the danger occurs or the warning is not observed.

Measures to avoid the danger.

Warnings are classified according to the severity of the hazard. The hazard levels and their corresponding signal words and warning symbols are described below:



WARNING

Indicates a hazard of medium risk which can result in death or serious bodily injury if not avoided.



CAUTION

Indicates a hazard of low risk which can result in minor or medium bodily injury if not avoided.





CAUTION

Indicates a hazard which can result in material damage or malfunctions if not avoided.

2.2 Basic safety instructions

Safety in the workplace depends on the attention, care and rationality of all the persons involved. To prevent damage and injury, read and follow the safety instructions below, the safety instructions in the documentation on using the components and the applicable local regulations.

Sharp edges and corners

There is a risk of skin abrasions and cutting injuries due to sharp edges and corners such as those on cast iron bodies, the male threads of the valves and individual parts of the actuators.

- Proceed with care.
- ► Wear protective gloves.

Toppling, falling and ejected parts

Severe injury and substantial damage to property due to:

- Toppling or falling valve or actuator parts
- Ejected parts in the event of impermissible pressure increases (bursting components)
- Impermissible drop in pressure (e.g. when using tensioning devices)
- Secure the protected area against access by unauthorized persons.
- Secure parts to prevent toppling and falling.
- ▶ Do not exceed the maximum valve operating pressure.

Pressurized liquids

There is a risk of severe burns and injuries caused by liquid jets due to incorrect connections.

- ▶ Do not exceed the maximum valve operating pressure.
- Check all connections before filling the system.
- Secure the protected area against access by unauthorized persons.

Hot and cold surfaces

There is a risk of severe burns or hypothermia from contact with hot or cold surfaces on the valves and pipelines.

Before starting work, wait until the temperature of the pipelines and valves is between roughly 10 to 40 °C.

Muscoloskeletal disorders

There is a risk of severe of musculoskeletal disorders (e.g. back injuries) due to incorrect posture or excessive exertion (e.g. due to weight loads).

Proceed with care.



2.3 Responsibilities of the Operator

The actuator and valve must be operated only when in a technically sound and safe condition. The operator must observe the following points:

- Ensure that the operating instructions are available to all persons who perform work on the actuator and valve.
- Ensure that all persons have read and understood the operating instructions before working on the actuator and valve.
- Ensure the required ambient conditions and clearances at the mounting location.
- Ensure that mounting, installation and commissioning are carried out only by a fitter or specialist electrician, according to the tasks. See paragraph "Who is permitted to perform which tasks?", Page 7.
- Inform your Caleffi contact person in the event of damage to the actuator and/or valve.
- Ensure that personnel receive the personal protective equipment (PPE) stipulated in the specific country and use this equipment at all times.

2.4 Qualification of personnel

Fitter

The fitter is familiar with heating, ventilation and air conditioning systems. Based on his or her technical training and appropriate knowledge and experience, he or she is familiar with the described actuator and valve. The fitter knows the applicable regulations, can assess his or her assigned tasks and identify potential dangers.

Electrical specialist

The electrical specialist is a person who is familiar with the described actuator. Based on his or her professional training, knowledge and experience, he or she has a very good understanding of the fields of cable, wire and laying systems and a good knowledge of the areas of electrical engineering and electrical machines and actuators. The electrical specialist knows the applicable regulations, can assess work assigned to him or her and identify possible dangers.

Who is permitted to perform which tasks?

Task	Fitter	Electrical specialist
Mounting		
Assembling the valve	Х	
Assembling the actuator	Х	
Commissioning		
Electrical connection		Х
Adapting actuator functions		Х
Faults and remedial measures	5	
Searching for and correcting	Х	Х
faults		
Decommissioning, disassem	bly and disposal	
Taking the actuator out of oper-		Х
ation		
Disassembling the actuator	x	
Disassembling the valve	x	
Disposal	x	



2.5 Intended use

- The actuator with valve is designed to the control the flow or precise mixture of liquids for heating, ventilation and air conditioning systems.
- Operate the actuator only with one of the specified valves and the original valve accessories.
- The actuator with valve is intended only for industrial and commercial use; never operate the actuator with valve in the private sphere or in households.
- Only operate the actuator with valve indoors.
- Maintain the specified ambient conditions during operation, transport and storage.
- Use a suitable operating medium.
- Only operate the actuator with valve in its original condition. Modifications to the actuator and/or valve may result in unforeseeable dangers and are thus prohibited.



3 Description

The 145019 actuators a re used for 3-point, 2-point or continuous closed-loop control systems in zone post-treatment devices for heating, ventilation and air conditioning systems.

3.1 Product identification

The type plate is attached on the underside of the actuator housing.



- 1 Item number
- 2 Technical data (nominal voltage, power consumption, etc.)
- 3 Serial number/revision number
- 4 Year and month of construction (mm/yyyy)
- 5 Symbols, graphics (CE marks, protection class, etc.)



NOTE

Information on the type of valve can be found on the cast body of the valve.



3.2 Actuator

3.2.1 Device variants

145019 Small actuator for valves with connection M30x1.5 with position feedback signal

3.2.2 Structure



- 2 Plug/port for manual adjustment
- 3 Housing
- 4 Position indicator
- 5 Union nut



6 Manual adjustment (only when disconnected from the power supply) The receptacle for a hex key (4 mm) is located under the plug. The hex key is not included in the scope of delivery.



3.2.3 Technical specifications

AC 24 V ± 10 %; 50/60 Hz; DC 24 V ± 10 %
3.7 VA (AC 24 V); 1.7 W (DC 24 V)
Max. 8 A <1ms; <0.064A²s*
Idle mode: 0.7 VA (AC); 0.3 W (DC)
Nominal: 2.5 VA (AC 24 V); 1.3 W (DC 24 V)
3-point signal (open/stop/closed), min. switch-on time 2 s, invertible
2-point signal (open/closed), invertible
Continuous control, DC 0(2)10 V; Re = 100 k Ω , invertible
Built-in cable
1.5 5 x 0.5 mm ²
< 18 dB (A)
4 mm max.
22 s/mm
nominal 150 N
DC 010 V, 5 mA for 0100 % nominalstroke
Can be switched on
050 °C
085 % r.h., non-condensing
2
IP54 only with the appropriate installation position
III
360°
Maintenance-free
250 g

* The power supply unit is designed based on the sizing value. The power supply unit must be short-circuit-proof.



Dimensions



Other properties

Position indicator	Stroke range scale
Manual adjustment	Only when disconnected from the power supply
	Socket for hexagon key under the cover plug on the actuator cover, 4 mm key socket
Valve exercise	Can be switched on
Characteristic curve compensation	Can be switched on



4 Scope of delivery, transportation and storage

Scope of delivery

The actuator can be supplied in different configurations with a valve and valve accessories or as an individual part.

The maximum scope of delivery includes:

- 145019 actuators
- mounting instructions

Transport

- ▶ Transport the actuator, valve including valve accessories in suitable packaging.
- ► Avoid shocks and mechanical damage.
- ► Do not throw or drop the product.
- ► Maintain the specified ambient temperature of -25..+60 °C and ambient humidity of 0..85 % r.h. non-condensing.

Storage

- Only store the actuator, valve including valve accessories indoors.
- Avoid shocks and mechanical damage.
- Maintain the specified ambient temperature of -20..+60 °C and ambient humidity of 0..85 % r.h. non-condensing.



Mounting 5

5.1 Mounting conditions

- Any protective caps on the valve gates should be removed before assembling the valves.
- No grease or oil may be used during assembly because these could destroy the valve seals.
- The pipeline system and the interior of the fitting must be free of foreign objects, particles of dirt, and grease and oil residues. Rinse them out if necessary.
- There must be no tension between the fixture and the pipeline connection.
- To avoid eddy formations in the valve body, the valve should be installed in a straight section of the pipe. A distance of 10 times the nominal diameter is recommended between the valve flange and manifold or other similar parts.
- The installation location is to be selected so that the ambient temperature at the actuator is kept between 0 °C and +50 °C.
- If the operating medium is contaminated, a strainer must be installed in the supply pipe. For maintenance purposes, we recommend to install shut-off valves both upstream and downstream of the valve or plant section.
- When carrying out installation, the permissible maximum differential pressure Δp must be observed.
- Observe the direction of flow arrow on the valve body. Inverting the direction of flow impairs control behavior.
- No differential pressure must occur on the valve body. Close the gate valve and turn off pumps.

1





- Any actuator installation positions in which the cabling runs downward are permitted.
- CAUTION! Do not operate the actuator without a valve.
- ▶ 3 Set the actuator onto the threaded connection on the valve.
- Tighten the union nut by hand.
- 3 4 CAUTION! Do not use a pipe wrench. This may damage the actuator and valve.



2

6 Connecting the actuator and putting it into operation

6.1 Circuit diagrams

- Proportional control



- 2-point control



- 3-point control





6.2 Commissioning



CAUTION

Temporary peak loads of up to 8 A may occur when switching on the actuator. Ensure suitability of switching components (e.g. controller connection) to ensure proper functioning and to avoid malfunctions and damage.



NOTE

The actuation direction can be changed by switching the supply lines to terminals 2 and 3 on the actuator or by setting DIP switch 3.



NOTE

When the unit is remounted, you must adapt the valves again by performing a reinitialization.



- Carry out the electrical connection of the actuator as a fixed installation.
- ▶ 2 3 Remove the inspection cover.
- Refer to the circuit diagram.
- ▶ 5 6 Adapt the actuator functions with switches 1 to 6 (see page 16).
- ▶ **7** After the mounting and commissioning work is complete, fit the inspection cover.
- After the supply voltage is switched on for the first time, an automatic initialization run is performed. The actuator first travels to the upper end position and then to the lower end position. The actuator will not respond to the control signal until the initialization run is complete.



6.3 Adapting actuator functions

Actuator functions

The actuator functions are adjusted using switches (A) 1 to 6 under the terminal cover.

		-
Function switch position ON	Switch (A)	Function switch position OFF
Reinitialization ON->OFF/OFF ->ON		Reinitialization ON->OFF/OFF ->ON
No function		No function
	CJ I	
Equal percentage characteristic		Linear characteristic curve / /
	4	
Actuating direction and position feed-		Actuating direction and position feed-
back 100 0 %		back 0 100 %
	5	
DC 2 10 V		DC 0 10 V
Valve exercise on		Valve exercise off

Switch 1: Valve exercise

If plant specifications permit, the valve exercise feature may be activated during commissioning.

Valve exercise prevents the cone from jamming when the valve is not moved for a long period of inactivity, e.g. for heating systems during the summer.

If valve exercise is activated, the valve cone is raised for a few seconds when there is no movement for 21 days.

Default setting: off

Switch 2: sets the control range for the continuous actuating signal to DC 0..10 V or DC 2..10 V

Default setting: DC 0..10 V

Switch 3: sets the actuating direction and position feedback for a control voltage of DC 10 V to "valve open" valve closed" .

Default setting: 0..100 %; "valve open"

Switch 4: characteristic curve compensation

Sets the valve characteristic curve to linear or equal percentage

Changing the switch position triggers an initialization run.

Default setting: linear

Switch 6: Reinitialization

When the unit is remounted, you must adapt the valves again by performing a reinitialization.

You can do this by moving switch 6 from "OFF" to "ON" or from "ON" to "OFF".

The LED (under the connection cover) flashes during initialization.



7 Maintenance

Maintenance

The actuator does not require maintenance.

Cleaning

The actuator does not require cleaning.

8 Faults and remedial measures



WARNING

Hot and cold surfaces!

If a hardware or software error occurs, there may be unexpected movements and the valve may open. There is a risk of severe burns or hypothermia from contact with hot or cold surfaces on the valves and pipelines.

► Wear protective gloves

Error	Cause	Re	medy
No actuator control in	Power failure		Identify and correct the cause.
automatic mode	Actuator is incorrectly con- nected		Check and correct the connection.
	Short circuit due to incorrect connection		Check and correct the connection.
Actuator runs unstably	Voltage drop because the electrical connection line is too long and/or the cross sec- tion is too small		Measure the operating voltage. Recalculate and replace the connec- tion lines.
	Mains fluctuations greater than the permitted tolerance		Improve the mains conditions.
Actuator stops intermittently	Supply line has a loose con- nection		Check and tighten the connections on the terminal strip.
Actuator does not move or does not correctly move to	Valve jams		Ensure that the valve moves freely or replace the valve.
the valve position speci- fied by the input signal;	Differential pressure is too high		Set the differential pressure cor- rectly.
open	Main board is defective		Contact your Caleffi contact person.

LED states

LED flashes green in 1 s cycle	Initialization is running or
	initialization was not completed successfully
LED lights up green permanently	Initialization was successfully completed, control operation
LED lights up red permanently	Blockage, intervention necessary
	Trigger initialization or briefly interrupt power supply



9 Repair

At the installation location, the valve/actuator combination can only be repaired by replacing the valve or actuator.

10 Decommissioning, Removal and Disposal

10.1 Manual adjustment



CAUTION

Manual adjustment may only be performed when the actuator is installed.

- Disconnect the actuator from the voltage supply.
- ► Open the cover plug.
- A hexagon key (key socket 4 mm) can be used to move the actuator into any position.





CAUTION

If you manually adjust the spindle position until the slip clutch engages in the upper or lower end position, you must turn back the hexagon key by half a turn.

•	

NOTE

An initialization run must be performed after a manual adjustment.

This occurs during operation when a valve end position is reached as part of normal operation. You can perform this initialization manually by activating switch 6. See chapter 6.3 "Adapting actuator functions", page 16.

10.2 Decommissioning and dismounting the actuator



WARNING Hot and cold surfaces!

If a hardware or software error occurs, there may be unexpected movements and the valve may open. There is a risk of severe burns or hypothermia from contact with hot or cold surfaces on the valves and pipelines.

Wear protective gloves



10.2.1 Disassemble actuator from valve



- Move the actuator to the top position using a control signal.
- ▶ 2 Disconnect the actuator from the power supply and remove all electrical lines.
- ▶ 3 Loosen the union nut.
- Remove the actuator from the valve.
- ▶ 3 4 NOTICE: Do not use a pipe wrench. The actuator and valve may be damaged.

10.3 Removing the valve

- ▶ No differential pressure must occur on the valve body. Close the gate valve and turn off pumps.
- ► Loosen the screw fittings between the pipeline and the valve connections.
- ▶ Remove the valve from the pipeline.

10.4 Note on disposal

In accordance with the applicable laws and directives of the European Union countries, the product should not be disposed of with household waste. This ensures environmental protection and sustainable recycling or raw materials. Commercial users should contact their supplier and observe the conditions of the purchase agreement. This device may not be disposed of together with other commercial waste.

11 Contact persons

Orders and questions

If you want to submit an order, have questions or require technical information, please contact your Caleffi contact person.

Repair service

If your device has a defect, firstly contact your Caleffi contact person to clarify how to proceed. Repair queries must include a delivery note in which the defect is clearly described and which contains a contact address for any further issues. The package must have sufficient postage paid and is to be sent to:

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