Instruction Manual

Electrical Actuator Unit
Type EA 11

GEORG FISCHER  +GF+
The technical data is not binding and not an expressly warranted characteristic of the goods. It is subject to change. Please consult our General Conditions of Supply.
Table of Contents

1. Introduction/General Information 60
2. Manufacturer’s Declaration 60
3. Intended Use 61
4. Safety Tips
   4.1 Due Care Required of the Operator
   4.2 Special Hazards
   4.3 Transport and Storage
5. Actuator Design 64
   5.1 Wiring Diagram for Standard Version
6. Valve Design 66
   6.1 Mounting on the Ball Valve 107
   6.2 Overview of Ball Valve System Type 107
7. Setting Up the Actuator/Valve 70
   7.1 Emergency Manual Override
8. Technical Specifications for EA 11 72
9. Mounting and Connecting the Supplementary Kits
   9.1 Heating Element
   9.2 Fail-safe Return
   9.3 Additional Limit Switches
10. Fastening Plate 82
11. Troubleshooting 83
12. Subcomponents/Spare Parts 84
1. Introduction

This instruction manual contains all the pertinent information on the design, installation and operation of the electrical actuator type EA 11.

General Information

Hazard notices

Hazard notices are used in this manual to warn you of possible injuries or damages to property. Please read and abide by these warnings at all times!

Warning symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>🟠</td>
<td>Imminent acute danger! Failure to comply could result in death or extremely serious injury.</td>
</tr>
<tr>
<td>⚠️</td>
<td>Possible acute danger! Failure to comply could result in serious injury.</td>
</tr>
<tr>
<td>🟡</td>
<td>Dangerous situation! Failure to comply could lead to injury or damage to property.</td>
</tr>
</tbody>
</table>

2. EC Manufacturer’s Declaration

The manufacturer, Georg Fischer Piping Systems Ltd, CH-8201 Schaffhausen, declares that the electrical actuator EA 11 is not a ready-to-use machine in the sense of the EC Machine Directive and cannot therefore meet all the requirements of this directive.
Operation of these actuators is prohibited until conformity of the entire system into which the valve and the actuator have been installed is established according to the EC Directives listed below.

Applicable EC Directives:

72/23 EEC  EC Low Voltage Directive
89/336 EEC  EC Directive on Electromagnetic Compatibility

Modifications to the actuator which have an effect on the technical data given in this instruction manual and its intended use, i.e. significantly alter the actuator, render this manufacturer’s declaration null and void.

3. Intended Use

When mounted on a valve and connected to a system control, the purpose of this actuator is to

- actuate valves with 90° pivoting (ball valves and butterfly valves),
- indicate the previously calibrated end positions of the valve via electrical signal to the system control (accessory), and
- provided that the actuator data corresponds to the electrical control and the valve and
- in case of interruption in the supply voltage, warrant that the actuator/valve remains in the current position. Please use emergency manual override or install fail-safe return.

The actuator is not intended for uses other than those listed here. If the instructions contained in this manual are not observed, the manufacturer is excluded from all liability for the above mentioned products.
4. Safety Tips

4.1 Due care required of the operator

The actuator described herein was designed and manufactured with consideration to the respective harmonized European standards. It corresponds to the latest technology and the technical specifications contained under Section 8.

Safety on the job can, however, only be realized if the operator warrants that
- the actuator is only used as indicated under Section 3,
- he is familiar with this instruction manual and the manual of the corresponding valve and adheres to the instructions contained therein and
- he has taken the necessary measures against electrostatic influence.

4.2 Special hazards

Under normal conditions, the actuator may only be operated with the cover closed. If work is performed on the actuator with the cover removed, the supply and control voltage must first be disconnected. Adjustments, which need to be done in the energized state, should be carried out with special insulated tools.

In addition, the operating instructions of the manual valve must be observed. They are an integral component of this manual.
4.3 Transport and storage

The actuators must be handled, transported and stored with care. Please note the following points:

- The actuators should be transported and/or stored in their original unopened packaging.
- The actuators must be protected from harmful physical influences such as dust, heat (humidity).
- It is important that the connections are neither damaged by mechanical nor thermal influences.
- Prior to installation, the actuators should be inspected for transport damages. Damaged actuators must not be installed.

⚠️ Warning
5. Actuator Design

The standard version of the EA 11 electrical actuator consists of the following elements: gear unit, direct current motor, electrical board, and components for end position limiting.

For special applications, the actuator can be equipped additionally with various supplementary kits (see Section 9).

1. Limit switches S1 and S2
2. Direct current motor
3. Optical position indicator
4. Plug for accessories
5. Terminal strip for external connections max. 1.5 mm²
6. Electrical supply unit, without protection against accidental contact
7. Shaft for emergency manual override
8. Connections for DIN plug or cable gland
9. Assembly bolt for accessories
5.1 Wiring Diagram for Standard Version

Position indicator

<table>
<thead>
<tr>
<th>3/2-way</th>
<th>2/2-way</th>
</tr>
</thead>
<tbody>
<tr>
<td>horizontal</td>
<td>vertical</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B–C</td>
<td>C closed</td>
</tr>
<tr>
<td>A–C</td>
<td>A–B open</td>
</tr>
</tbody>
</table>

Installation note
If the actuator is connected direct to the power-supply, it is necessary to install a switch-disconnector between the actuator and the power-supply (do not disconnect the earthcable!).
To avoid water flowing into the actuator it is necessary that the cable insertion is not upturned.
6. Valve Design

The EA 11 electrical actuator can be mounted on ball valves type 546, DN10–50, by using the correct coupling piece and selecting a suitable adapter plate with clamps. The actuators are supplied ex works in the «open» position. See Section 6.1 for the individual assembly components required for the ball valve type 107. Both end positions in the actuator have been preset in the factory. It is necessary to readjust these after installation at the customer (see Section 7).

How to assemble (see Fig. 6.1)

Screw the adapter plate with the fixed clamps tightly onto the actuator (note the cam positions).

Mount the multifunctional module on the ball valve.
1 Housing
2 Housing cover
3 Indexing disk* with switching cams 3a
4 Screws
5 Connector plug 3P + E per DIN EN 175301-803* (formerly DIN 43650)

* only for MF module version with pre-assembled microswitches

Remove housing cover (2).

The MF module can be mounted on the ball valve type 546 in the opened or closed position.
Spigot is asymmetrical.

The spigot position must be identical with one of the two illustrations.

A Stem position for closed ball valve

B Stem position for open ball valve

Place the MF module on the ball valve

Make sure the contours match!

Note the square (a) and round (b) contours as well as the position of the asymmetrical recesses (c) of the stem.

Tighten the 4 pre-assembled screws (Torx). The MF module is now firmly connected with the ball valve.

Insert the coupling and the coupling piece* in the multifunctional module.

Fasten the actuator with the adapter plate to the multifunctional housing using the provided clamps.

*coupling piece only for DN10–25

⚠️ Actuator and valve must have the same position, «open» or «closed».
6.1 Ball Valve Type 107

- Actuator Type EA 11
- Coupling piece
- Adapter plate
- PT-Schr KA 4x16
- Clamp
- Allen screws
- Coupling
- Screws
- Multifunctional module (without microswitches)
- Ball valve type 546
6.2 Overview of Ball Valve System
Type 107

1 Actuator type EA 11
2 Coupling piece DN10–25
3 Adapter plate DN10–50
4 Multifunctional module DN10–50
5 Ball valve type 546 DN10–50

Note: Screw saving
The actuator fixing screws are assured with «Locitite 243» or equivalent.

Note: Mounting of coupling and coupling piece
First plug the coupling piece into the actuator. Then fix the adapter plate with four screws on the actuator. Next push the coupling into the coupling piece.
The coupling with the mounted coupling piece does not fit through the hole of the adapter plate!
7. Setting Up the Actuator

Attention
Check the following before connecting the actuator to the mains:
- Does the mains voltage correspond to the specifications given on the typeplate
- Has the actuator been connected correctly
  (see Section 5.1)

Adjustments
If a complete valve is supplied by Georg Fischer, no further adjustments are required.
After installation by the customer or after repair work, the end positions should be checked and if necessary adjusted.

Limit switch allocation
Switch S1 (bottom) opens at «open» position
Switch S2 (top) opens at «closed» position

Procedure
Set both switching cams (1) to S1* and S2* so that the rotating angle is less than 90°.
Let the actuator turn until a limit switch is activated. By adjusting the respective switching cam, the end position can be set since the actuator follows the cam.

* S1: «open», bottom
  S2: «closed», top
7.1 Emergency Manual Override

Assembly and function

Assembly

Pull the crank (1) out of the retainer

Remove cover screw (2) with the crank (1)

Insert the crank in the hexagon shaft* under the opening

* see illustration, page 60, no. 7

Function

Push the crank down to the stop.
With nine revolutions, the ball is rotated by 90° .

Direction of rotation:
Clockwise = CW = close
Counterclockwise = CCW = open

⚠ Note the «open» and «closed» position on the optical indicator.

⚠ Disconnect the connector plug. If that is not possible, pull the crank rapidly out of the opening.
## 8. Technical Specifications
### Actuator EA 11

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>100–230 V, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>24 V AC/DC, 50/60 Hz</td>
</tr>
<tr>
<td>Rated voltage tolerance</td>
<td>± 10%</td>
</tr>
<tr>
<td>Rated output</td>
<td>22 VA at 24 V AC/DC</td>
</tr>
<tr>
<td></td>
<td>40 VA at 100–230 V AC</td>
</tr>
<tr>
<td>Electric impedance</td>
<td>230V, 100k</td>
</tr>
<tr>
<td></td>
<td>24V, 4k7</td>
</tr>
<tr>
<td>Altitude</td>
<td>&lt; 2000 m</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 65 per EN 60529</td>
</tr>
<tr>
<td></td>
<td>Ul/Csa: Indoor use</td>
</tr>
<tr>
<td>Duty cycle</td>
<td>40% at 25 °C / 15 min</td>
</tr>
<tr>
<td>Overload protection</td>
<td>current/time dependent (resetting)</td>
</tr>
<tr>
<td>Electrical connections</td>
<td>Connector plug 3 P+E per</td>
</tr>
<tr>
<td></td>
<td>DIN EN 175301-803</td>
</tr>
<tr>
<td></td>
<td>(formerly DIN 43650)</td>
</tr>
<tr>
<td></td>
<td>additional cable entry point for PG 11</td>
</tr>
<tr>
<td>Control time</td>
<td>5 s / 90° at Mdn</td>
</tr>
<tr>
<td>Actuating angle</td>
<td>max. 270°, set to 90°</td>
</tr>
<tr>
<td>Nominal torque</td>
<td>10 Nm</td>
</tr>
<tr>
<td>Peak torque</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>–10 °C to +45 °C</td>
</tr>
<tr>
<td>Allowable humidity</td>
<td>max. 80% up to 31 °C</td>
</tr>
<tr>
<td>Pollution grade</td>
<td>2</td>
</tr>
<tr>
<td>Overvoltage-category</td>
<td>II</td>
</tr>
<tr>
<td>Housing materials</td>
<td>PP fiberglass reinforced, flame retardant,</td>
</tr>
<tr>
<td></td>
<td>external stainless steel screws</td>
</tr>
<tr>
<td>Position indicator</td>
<td>optical, integrated</td>
</tr>
<tr>
<td>Emergency manual override</td>
<td>integrated</td>
</tr>
</tbody>
</table>

1. Overload protection of the motor is dimensioned so that the motor and the power supply board are protected. As soon as the load is in the torque range, the actuator runs again.

2. For temperatures below –10 °C as well as condensation, the heating element no. 198 190 086 should be built in. See Section 9.11.

3. Protection rating IP67 for use of cable glands and vertical installation.

4. Linear decreasing to 50% relative humidity with 40 °C.

5. Per EN 61010-1
9. Mounting and Connecting
Supplementary Kits

9.1 Heating element

<table>
<thead>
<tr>
<th>Description</th>
<th>Technical data</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating element</td>
<td>24 V=</td>
<td>199 190 086</td>
</tr>
</tbody>
</table>

Wiring diagram

The heating element is mounted on the base board and is connected electrically via a flat cable (X1). The temperature is measured with a temperature sensor, which is mounted on this element, and between approx. 0–5 °C the heating element is switched on or off, respectively.
Heating element kit

LED shines = normal operation

LED shines = heating operation
Mounting the heating element (board)

⚠ Disconnect the actuator from the supply voltage.

Take the board out of its packaging and check for damages.

⚠ Do not touch the board itself. Electrostatic discharge can damage the components.

Screw the three distance bolts (1) into the assembly bolts.

⚠ Screw hand-tight.

Fasten the board (3) to the distance bolts with the screws (2).

Plug the flat cable into the X1 connector.

Reconnect to supply voltage. The heating element may not heat at temperatures over +5 °C.
9.2 Fail-safe Return

The fail-safe return unit is mounted on the base board and is connected electrically via a flat cable. If the supply voltage is interrupted, the electronics will switch to the storage battery automatically after 5 sec. With a touch control, the function «Go to the CLOSED or OPEN position» can be selected.

Position 1/2: CLOSED, position ON: OPEN (always both, see at left). The storage battery is charged continuously. Full recharging takes approximately 15 hours.
Fail-safe return kit

LED shines = normal operation

LED shines = accu operation
Mounting the fail-safe return (board)

- Disconnect the actuator from the supply voltage.
- Take the board out of its packaging and check for damages.
- Do not touch the board itself. Electrostatic discharge can damage the components.
- Screw the three distance bolts (1) into the assembly bolts.
- Screw hand-tight.
- Fasten the board (3) to the distance bolts with the screws (2).
- Plug the flat cable into the X1 connector.
- Reconnect to supply voltage.

Rechargeable battery
Connect the battery via the second plug or cable gland to the terminals 16 and 17 (4).

Attention must be given to the polarity. Charge the battery for at least 12 hours.
### 9.3 Additional 2 Limit Switches

<table>
<thead>
<tr>
<th>Description</th>
<th>Technical data</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kit with 2 additional limit switches Ag, Ni</td>
<td>250 V~, 6 A</td>
<td>199 190 092</td>
</tr>
</tbody>
</table>

If the limit switch kit is mounted in the factory, the switches are wired as opener according to the diagram. It is possible for the customer to convert to closer by rewiring. (8 → 7 and 10 → 9).
Limit switches kit
Mounting the limit switches

⚠ Disconnect the device from the supply voltage.

Remove the screws from the limit switch S2 and S1.

Mount the limit switch kit (1) on S1 and S2 as shown.

Tighten with the new, longer screws.

Mount the additional switching cams (2) as well as the spacer rings.

Setting the limit switch position

Reconnect to the supply voltage.

The switching cams can be adjusted with a screwdriver size 2.

⚠ An instrument (e.g. ohm meter) must be used for setting the switching position.

Move the actuator to the two end positions and set the respective switching points.

Connect limit switches (disconnect the device from the supply voltage).

Close the actuator with the housing cover and connect to the supply voltage.
10. Fastening Plate

With the fastening plate for the ball valve type 546, forces are absorbed which could occur during valve operation (e.g. initial breakaway torque). In implementing the fastening plate, working forces are not transmitted to the piping system.

In piping systems which are subject to temperature fluctuations, longitudinal or bending forces occur if thermal expansion is hindered. So as not to impair valve functioning, these forces must be absorbed by the appropriate fixed points in front of or behind the valve.

The fastening plate is available in two sizes for the dimension range DN 10 to DN 50. Two screws to fasten on the ball valve are included in the scope of delivery.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>d 16–32</th>
<th>d 40–63</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>106</td>
<td>149</td>
</tr>
<tr>
<td>L2</td>
<td>92</td>
<td>134</td>
</tr>
<tr>
<td>L3</td>
<td>62</td>
<td>104</td>
</tr>
<tr>
<td>L4</td>
<td>41</td>
<td>62</td>
</tr>
<tr>
<td>L5</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>H1</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>H2</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>D</td>
<td>6.5</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Fastening screws: M6x14, M8x18
# 11. Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor does not run</td>
<td>No mains voltage (K1, 2, 3I)</td>
<td>Error at customer side</td>
</tr>
<tr>
<td>Internal wiring error</td>
<td></td>
<td>Check wiring of actuator</td>
</tr>
<tr>
<td>Switching cams S1 and S2 incorrectly set</td>
<td>See Point 4</td>
<td></td>
</tr>
<tr>
<td>Motor blocked</td>
<td></td>
<td>Use emergency manual override, check valve, replace motor</td>
</tr>
<tr>
<td>Motor only runs in one direction</td>
<td>Change-over relay does not work</td>
<td>Replace base board</td>
</tr>
<tr>
<td>Overload protection reacts (self resetting)</td>
<td>Friction torque of valve too high</td>
<td>Clean and lubricate valve</td>
</tr>
<tr>
<td>Motor defective</td>
<td></td>
<td>Replace motor</td>
</tr>
<tr>
<td>Duty cycle too high</td>
<td></td>
<td>Increase cycle time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduce ambient temperature</td>
</tr>
<tr>
<td>Valve does not close or open correctly</td>
<td>Switching cams S1 and/or S2 not adjusted</td>
<td>See Point 7</td>
</tr>
</tbody>
</table>

For service please contact the specialist at your Georg Fischer sales company.
# 12. Subassemblies/Spare Parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator EA11</td>
<td>100–230 V~</td>
</tr>
<tr>
<td>Actuator EA11</td>
<td>24 V~/~</td>
</tr>
<tr>
<td>Base circuit board</td>
<td>100–230 V~</td>
</tr>
<tr>
<td>Base circuit board</td>
<td>24 V~/~</td>
</tr>
<tr>
<td>Limit switch kit Ag, Ni</td>
<td></td>
</tr>
<tr>
<td>Fail-safe return with battery</td>
<td></td>
</tr>
<tr>
<td>Heating element</td>
<td></td>
</tr>
<tr>
<td>Heating element + fail-safe return with battery</td>
<td>199 190 087</td>
</tr>
<tr>
<td>Battery kit</td>
<td></td>
</tr>
<tr>
<td>Plug complete</td>
<td></td>
</tr>
<tr>
<td>Crank</td>
<td></td>
</tr>
<tr>
<td>Cover Screw kit</td>
<td></td>
</tr>
</tbody>
</table>

## Multifunctional module without limit switches (empty)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 10/15</td>
<td>167 482 680</td>
</tr>
<tr>
<td>DN 20/25</td>
<td>167 482 681</td>
</tr>
<tr>
<td>DN 32/40</td>
<td>167 482 682</td>
</tr>
<tr>
<td>DN 50</td>
<td>167 482 683</td>
</tr>
</tbody>
</table>

## Adapter plate incl. coupling

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 10/15</td>
<td>198 150 556</td>
</tr>
<tr>
<td>DN 20/25</td>
<td>198 150 557</td>
</tr>
<tr>
<td>DN 32/40</td>
<td>198 150 558</td>
</tr>
<tr>
<td>DN 50</td>
<td>198 150 559</td>
</tr>
</tbody>
</table>

Ball valve type 546 see separate datasheet