

Instruction Manual

Electrical Actuator Unit Type EA 11/ 21/ 31/ 42



Translation of the original instructions

Disclaimer

The technical data are not binding. They neither constitute expressly warranted characteristics nor guaranteed properties nor a guaranteed durability. They are subject to modification. Our General Terms of Sale apply.

Observe instruction manual

The instruction manual is part of the product and an important element within the safety concept.

- ▶ Read and observe instruction manual.
- ▶ Always have instruction manual available by the product.
- ▶ Give instruction manual to all subsequent users of the product.

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1 Intended use

The electrical actuators EA 11/21/31/42 are intended for mounting on a valve and for connection to a control system.

The electrical actuators EA 11/21/31/42 are intended to activate valves with pivoting movements up to 180° (e. g. ball valves and butterfly valves).




The product is not intended for any types of use other than those described here. Failure to follow the instructions in this manual shall lead to the termination of the manufacturer's liability for the above mentioned products.

2 Regarding this document



This document contains all necessary information for the installation, operation and service of the product.

2.1 Safety Instructions and Warnings

This instruction manual contains warning notices that shall prevent you from death, injuries or material damages. Always read and observe these warning notices!

Warning symbol	Meaning
 CAUTION	Imminent danger! Failure to observe these warnings could result in death or very serious injuries. ► Measurements to avoid the danger.
 WARNING	Possible imminent danger! Failure to observe these warnings could result in very serious injuries. ► Measurements to avoid the danger.
 WARNING	Dangerous situation! Failure to observe these warnings could result in small injuries. ► Measurements to avoid the danger.
CAUTION	Dangerous situation! Failure to observe these warnings could result in material damages. ► Measurements to avoid the danger.

Further symbols and labels

Symbol	Meaning
	Notes: Especially important information.
	Call for action: Here, you have to do something.

2.2 Other related documents

Document	Document number
Georg Fischer planning fundamentals industry	GMST 5989
Assembly instructions accessories complete	GFDO 6319

- These documents can be obtained from your local representative of GF Piping Systems or at www.gfps.com

2.3 Product variants and types described

- Type EA11 24V AC/ DC and 100 – 230V AC
- Type EA21 24V AC/ DC and 100 – 230V AC
- Type EA31 24V AC/ DC and 100 – 230V AC
- Type EA42 24V AC/ DC and 100 – 230V AC

3 Safety and responsibility

- ▶ Only use product as intended, see intended use.
- ▶ Do not use any damaged or faulty product. Throw out any damaged product immediately.
- ▶ Product and accessories should only be operated by people who have the necessary training, knowledge or experience.
- ▶ Regularly train personnel on all locally accepted regulations on occupational safety and environmental protection, especially on pressure-retaining pipelines.
- ▶ Make sure that all personnel know, understand and follow the instruction manual and the instructions contained therein.
- ▶ Follow the instruction manual of the manual valve. It is an integral part of this electrical actuator manual.
- ▶ Take precautions against electrostatic hazards.

**WARNING****Only work with cover removed in exceptional cases!**

Danger of injury and/or damage to property.

- ▶ Branch off feed and control voltage connections beforehand.
- ▶ Only carry out adjustments on live parts with specially insulated tools.

**WARNING****Voltage too high!**

Danger of injury and/or damage to property.

- ▶ Only use recommended power sources.
- ▶ Make sure that 24V devices are only connected to voltages that meet the requirements of an protective extra low-voltage circuit (SELV).

4 Transport and storage

- ▶ Transport and/or store product in unopened original packaging.
- ▶ Protect product from dust, heat and moisture.
- ▶ Ensure that the product has not been damaged neither by mechanical nor thermal influences.
- ▶ Check product before assembly for transport damage.

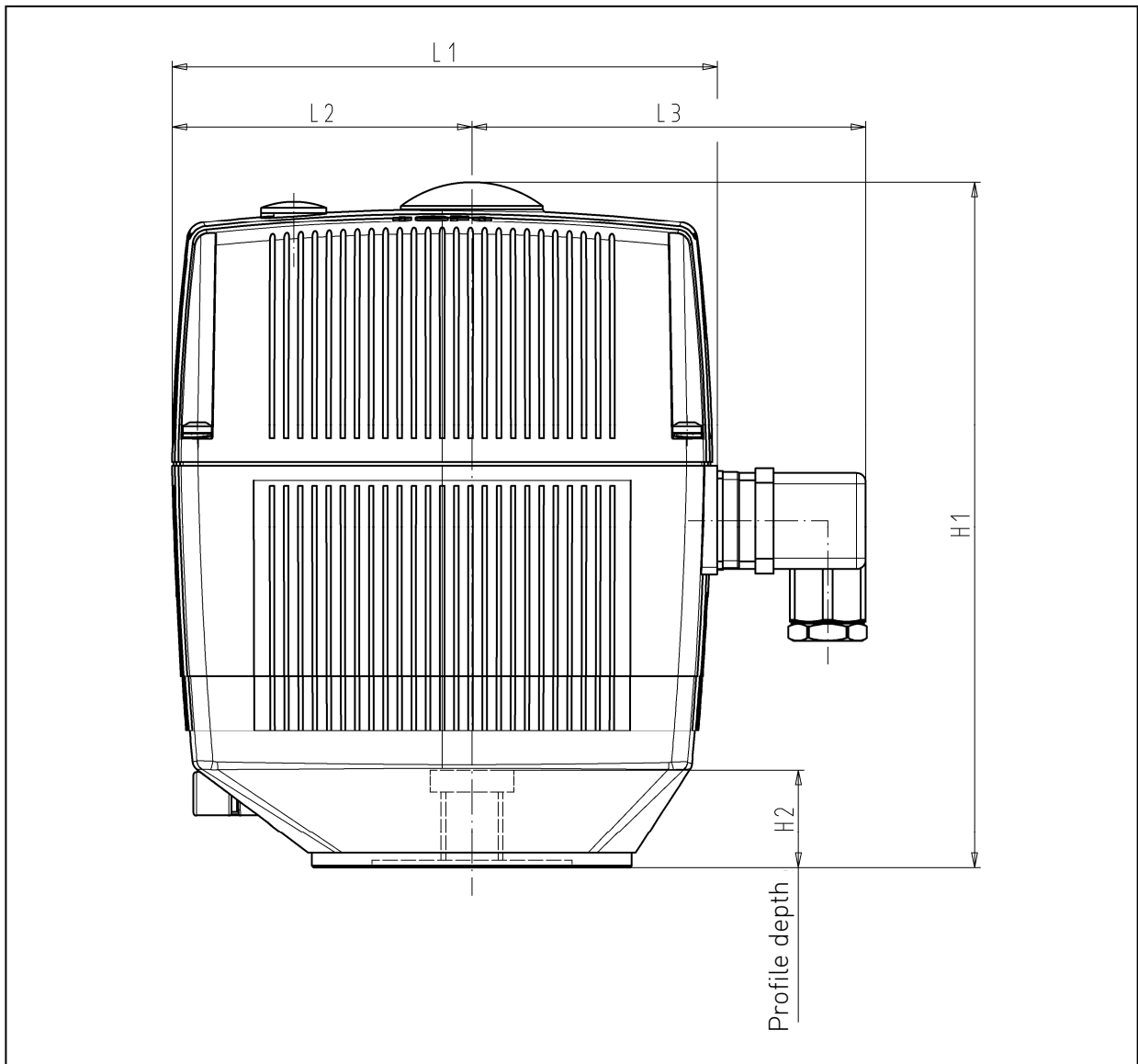
5 Technical data

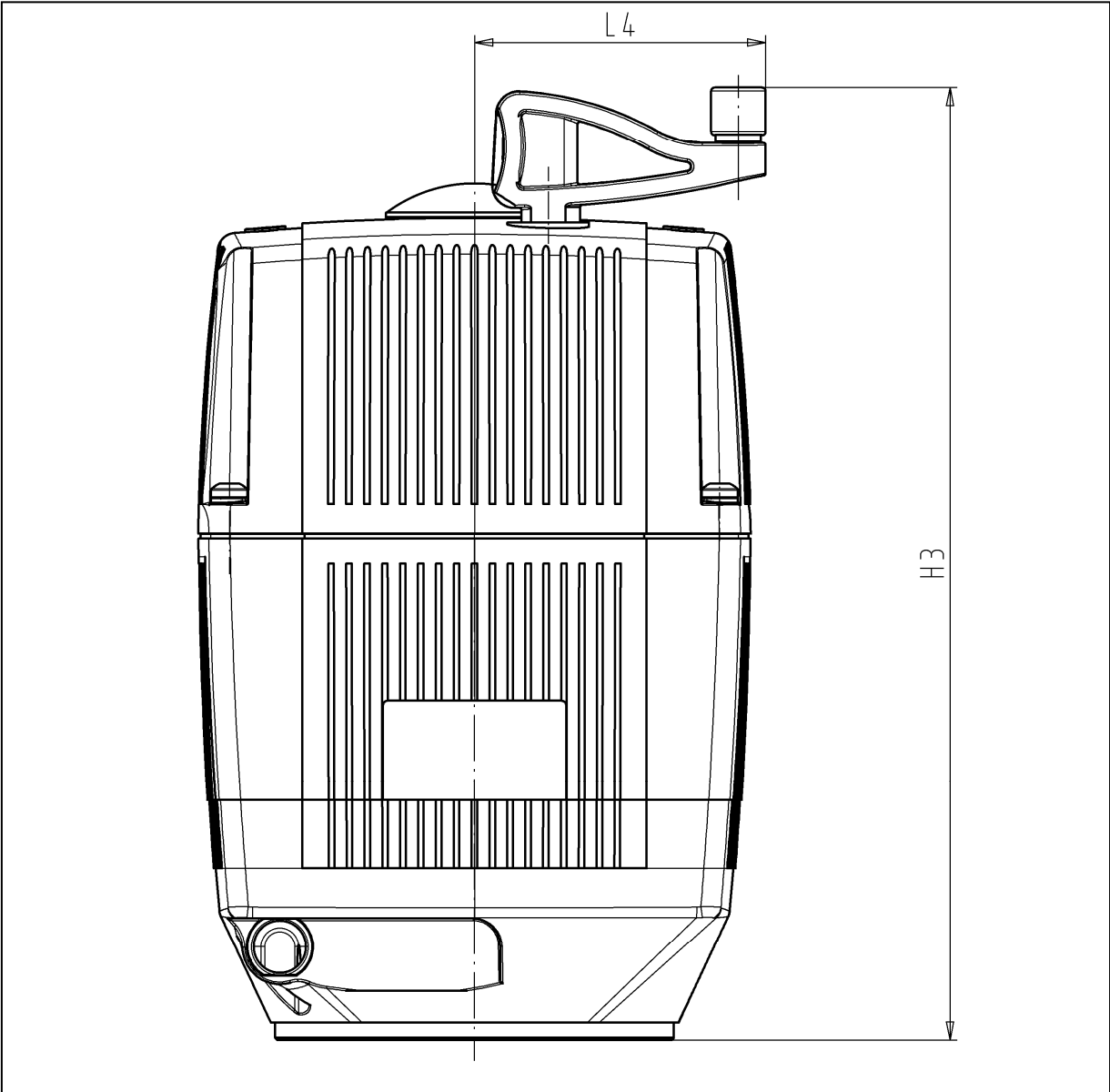
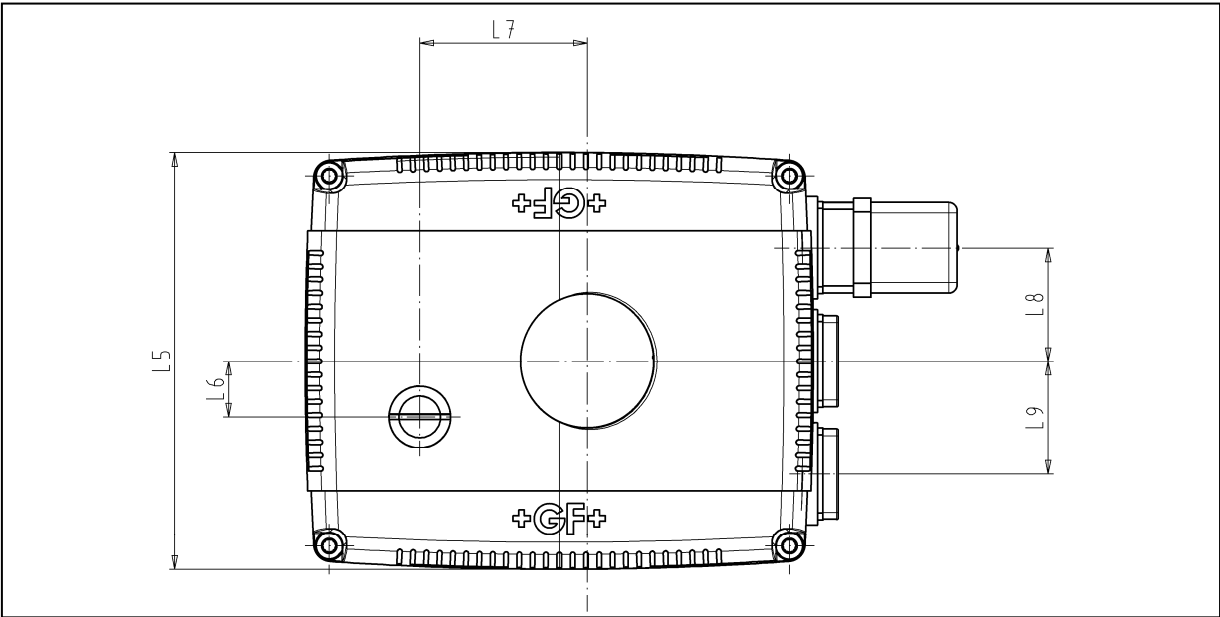
	EA11	EA21	EA31	EA42
Nominal torque Mdn	10 Nm	10 Nm	60 Nm	100 Nm
Peak torque	20 Nm	20 Nm	120 Nm	250 Nm
Control time	5 s/90° at Mdn	5s/90° at Mdn	15s/90° at Mdn	25s/90° at Mdn
L/W/H	129/122/138	150/122/167	150/122/190	150/122/208
Flange interface/ shaft	F05/ Spline with adapter	F05/ Spline WS11/ 14	F07/ WS17	F07/ WS22
Actuating cycles at 20°C and Mdn	150,000	250,000	100,000	75,000
Nominal output at 24V AC/DC at 100 – 230 V AC	22 VA 40 VA	22 VA 40 VA	32 VA 40 VA	40 VA 60 VA
Duty cycle (ED)	40% at 25° C/15 min	100% reduced duty cycle for UL certification	50%	35%
Actuating angle	max. 180°, set to 90°			
Housing material	PP glass fibre reinforced , flame-retardant, external rust proof screws			
Position indicator	optical integrated			
Manual emergency override	integrated			
Rated voltage	100 – 230V, 50/60 Hz 24 = /24V, 50/60 Hz			
Rated voltage tolerance	+/- 10%			
Input impedance	230V, 100k Ω 24V, 4.7k Ω			

	EA11	EA21	EA31	EA42
Weight	1.857 kg	2.193 kg	3.536 kg	4.995 kg
Ambient temperature	-10° to + 45° C	-10° to + 50° C	-10° to + 50° C	-10° to + 50° C
Electrical connection	Connector plug 3 P+E as per EN 175301-803 (formerly DIN 43650), additional cable entry for PG11	Connector plug 3 P+ E as per DIN EN 175301-803 Cable screw connection M20x1.5 as per ISO 724		
Overload protection	Current/time-dependent (resetting)	Current/time-dependent (resetting), temperature-dependent. The overload protection of the engine is dimensioned in such a way that engine and supply board are protected. As soon as the load is in the torque range, the actuator continues to run.		
Permitted humidity	max. 80% to 31° C, reducing in a straight line to 50% relative humidity at 40° C	max. 90% relative humidity, non-condensing		
Protection class	IP65 as per EN60529, UL/CSA: use in internal rooms IP67 as per EN60529: use of cable glands and vertical assembly			
Overvoltage category as per DIN EN 61010-1	II			
Height above sea level (UL/CSA)	< 2000m			
Degree of contamination as per DIN EN 61010-1	2			

5.1 Dimensions

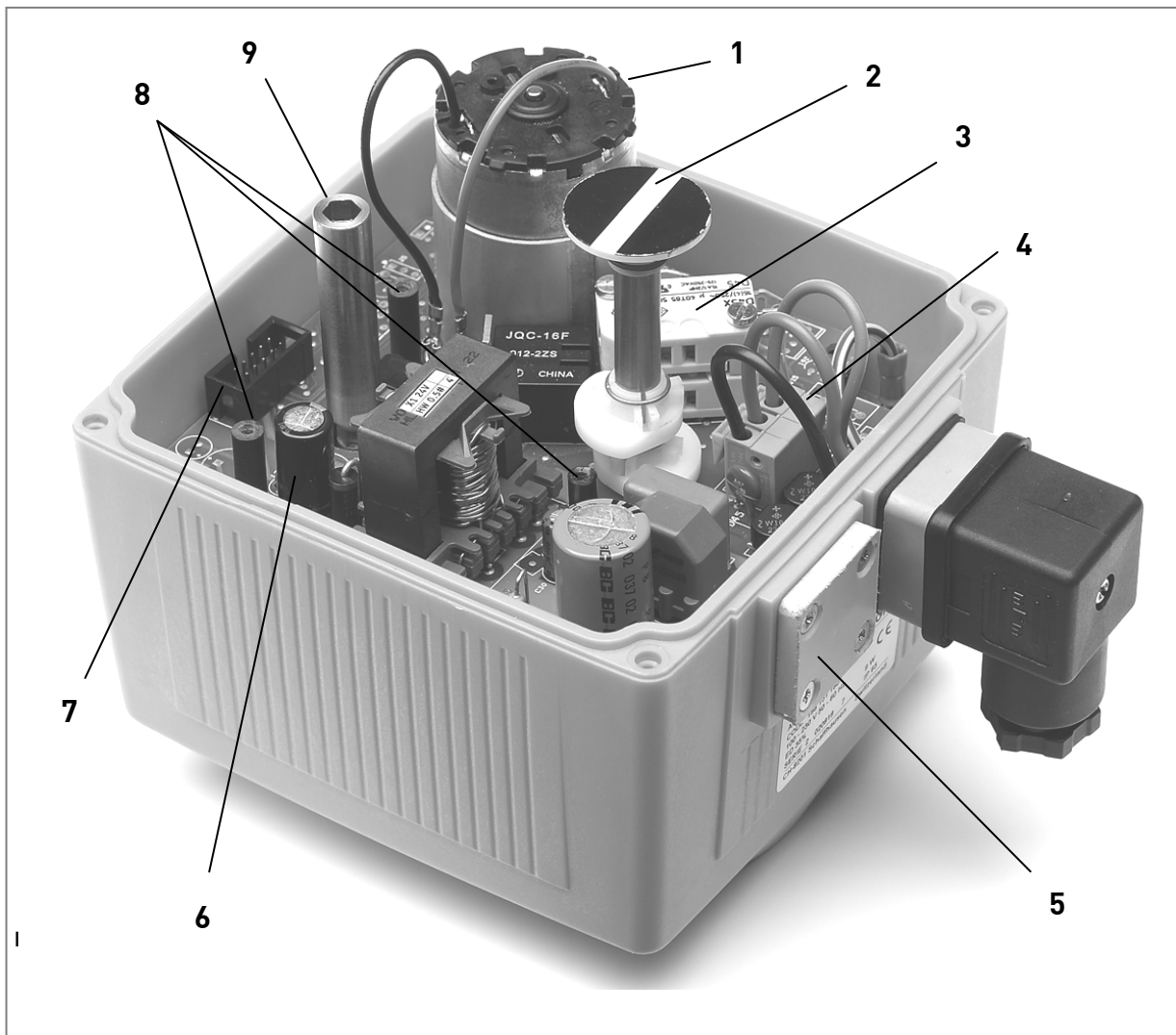
	L1	L2	L3	L4	L5	L6	L7	L8	L9	H1	H2	H3
EA11	130	82.5	88	64.3	122	16	49	33	-	137.5	20	159.5
EA21	150	82.5	108	64.3	122	16	49	33	33	167	20	188.5
EA31	150	82.5	108	64.3	122	16	49	33	33	190	25	211.5
EA42	150	82.5	108	64.3	122	16	49	33	33	208	25	229.5





6 Design and function

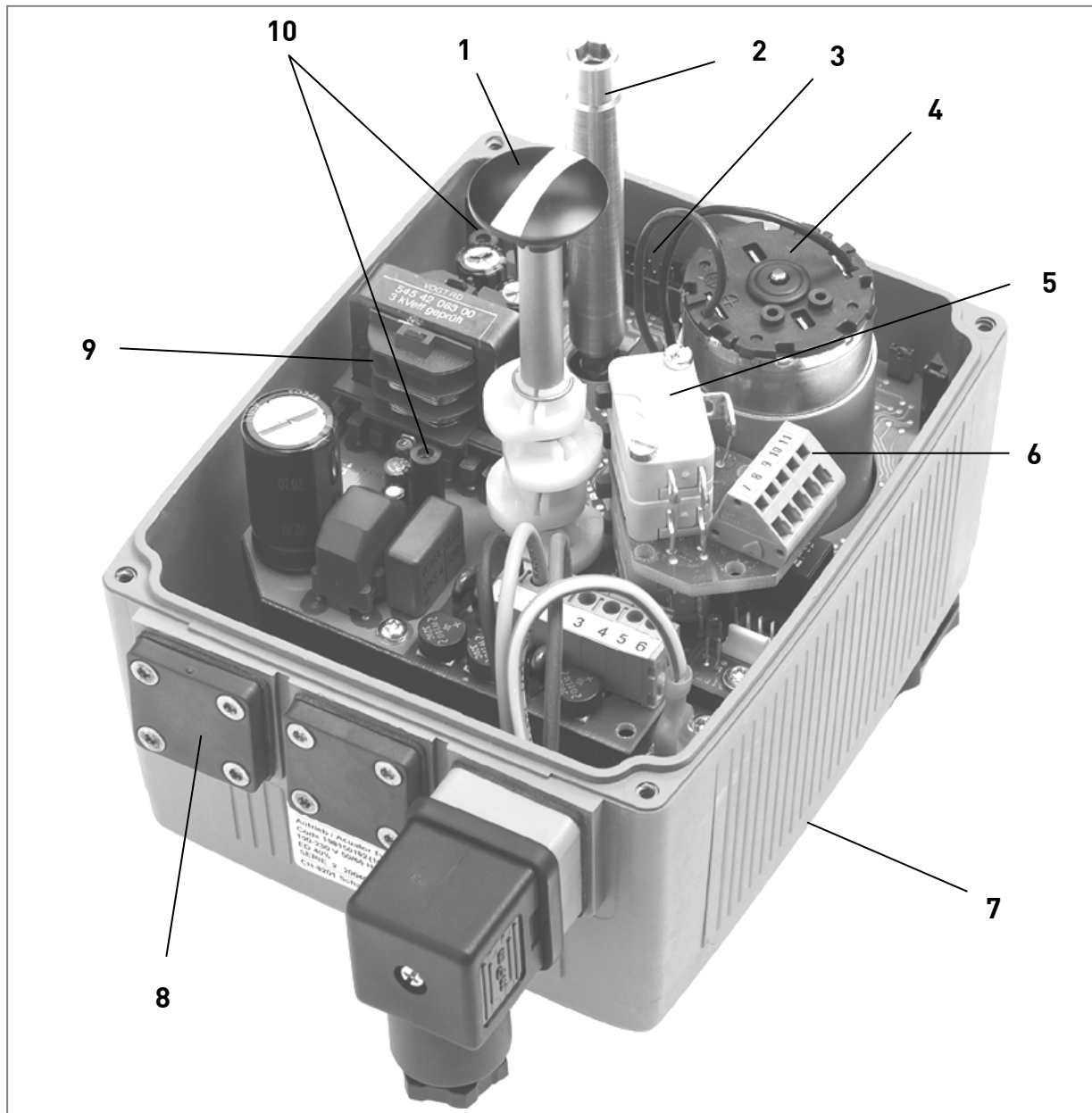
6.1 Design EA11



Pos.	Name	Pos.	Name
1	Direct current motor	6	Wide power supply range, without fitted contact protection
2	Position indicator	7	Plug X1 for accessories
3	Limit switches S1 and S2	8	Assembly bolts for accessories
4	Connection terminal for external connections max. 1.5mm ²	9	Shaft for manual emergency override
5	Connection option for accessories		

For special applications, the actuator may also be fitted with accessories, see section Accessories.

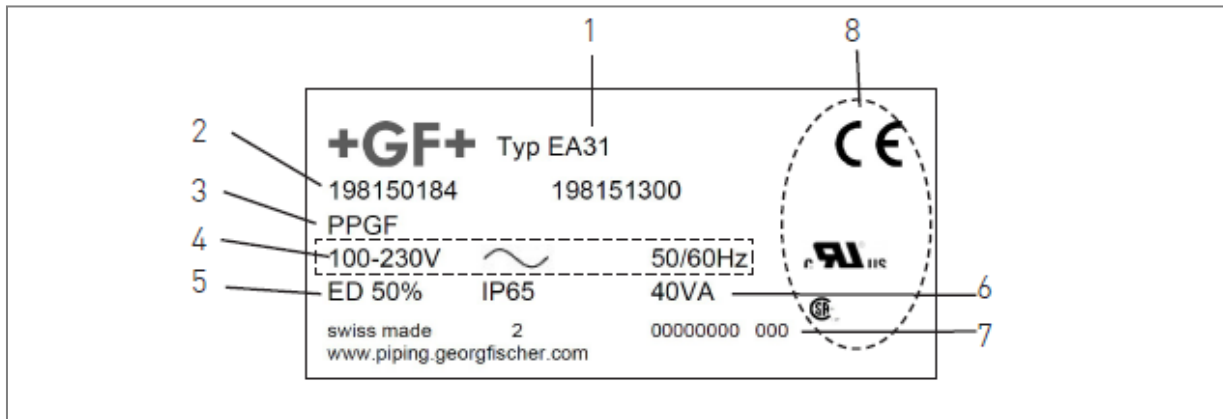
6.2 Design EA21/31/42



Pos.	Name	Pos.	Name
1	Visual position indicator	6	Connection terminal for external connections max. 1.5mm ²
2	Shaft for manual emergency override	7	Modular gearbox
3	Plug X1 for accessories	8	Connection option for accessories
4	Direct current motor	9	Multi-voltage power supply unit, without fitted contact protection
5	Limit switches S1 and S2	10	Assembly bolts for accessories

For special applications, the actuator may also be fitted with accessories, see section Accessories.

6.3 Identification



1	Type label (e. g. EA31)	5	Duty cycle/protection type
2	Order number	6	Nominal output
3	Housing material	7	Serial number
4	Voltage type	8	Approvals & CE-mark

6.4 Position indicator

The position indicator displays the valve position. The valve position can be read on the fitted cover.

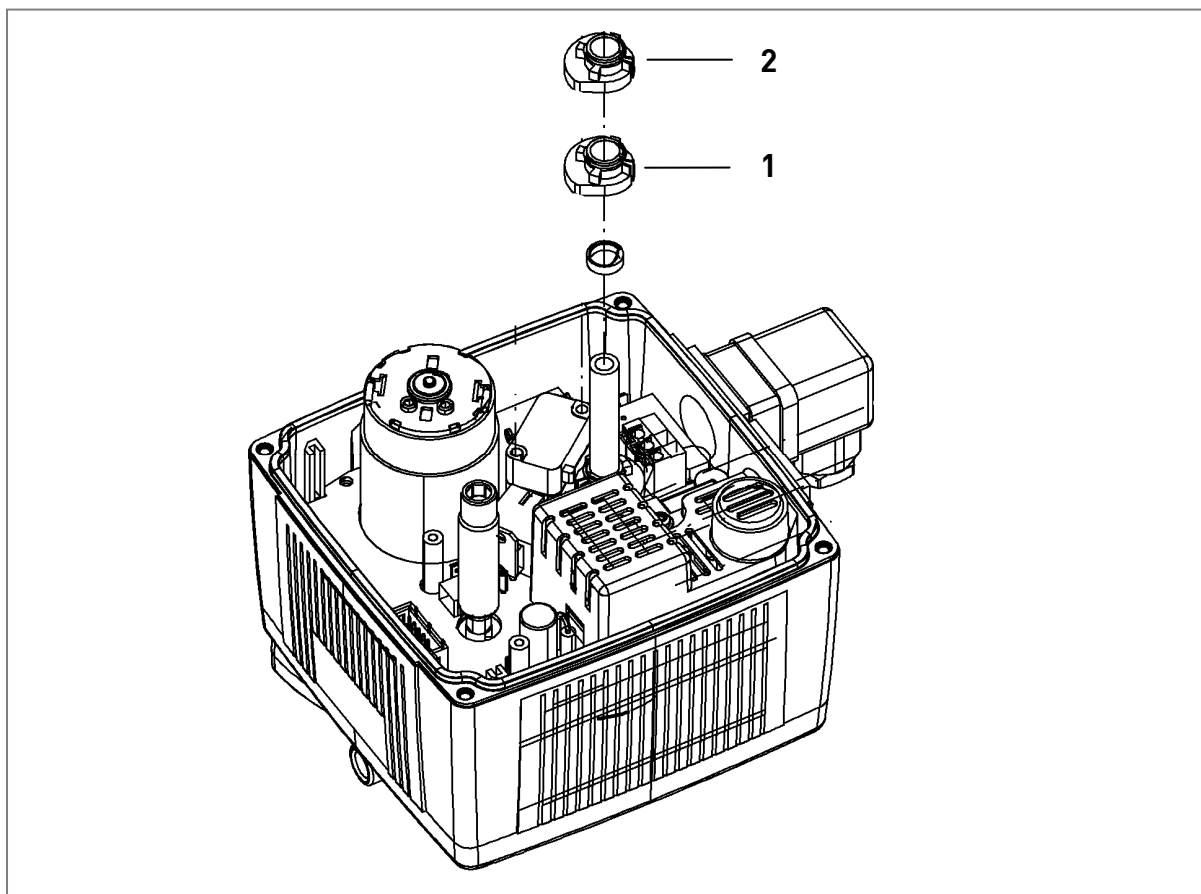
i *GF actuators are always delivered in the "Open" position.*

When the cover is fitted, the following image can be seen:

	2-way	3-way horizontal	3-way vertical
Image			
"Closed" position	C	B – C	A – C
"Open" position	A-B	A – C	B – C

6.5 Operating mode on standard operation/ limit switch allocation

The actuator moves from the "Closed" position to the "Open" position by applying live voltage to the nominally open "S1" terminal. By applying live voltage to the normally closed "S2" terminal, the actuator will move from the "Open" position to the "Closed" position. Remember only to apply live voltage to one terminal at a time. The final positions are defined by the two limit switches S1 and S2.



1	Switching cam that is set to limit switch S1, position "Open"	2	Switching cam that is set to limit switch S2, position "Closed"
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6.5.1 Overload protection

The supply unit of the EA21/31/42 has an overload protection that protects the direct current motor and the supply board from overheating. The overload protection is activated as soon as the load exceeds the torque range. The actuator continues to run as soon as the load is within the torque range and the temperature has gone down.

6.5.2 Safety position

In case of power failure, the actuator stays in its current position. If the actuator is fitted with the accessory "fail-safe return unit", it can automatically return to a safety position after a power failure.

7 Installation



WARNING

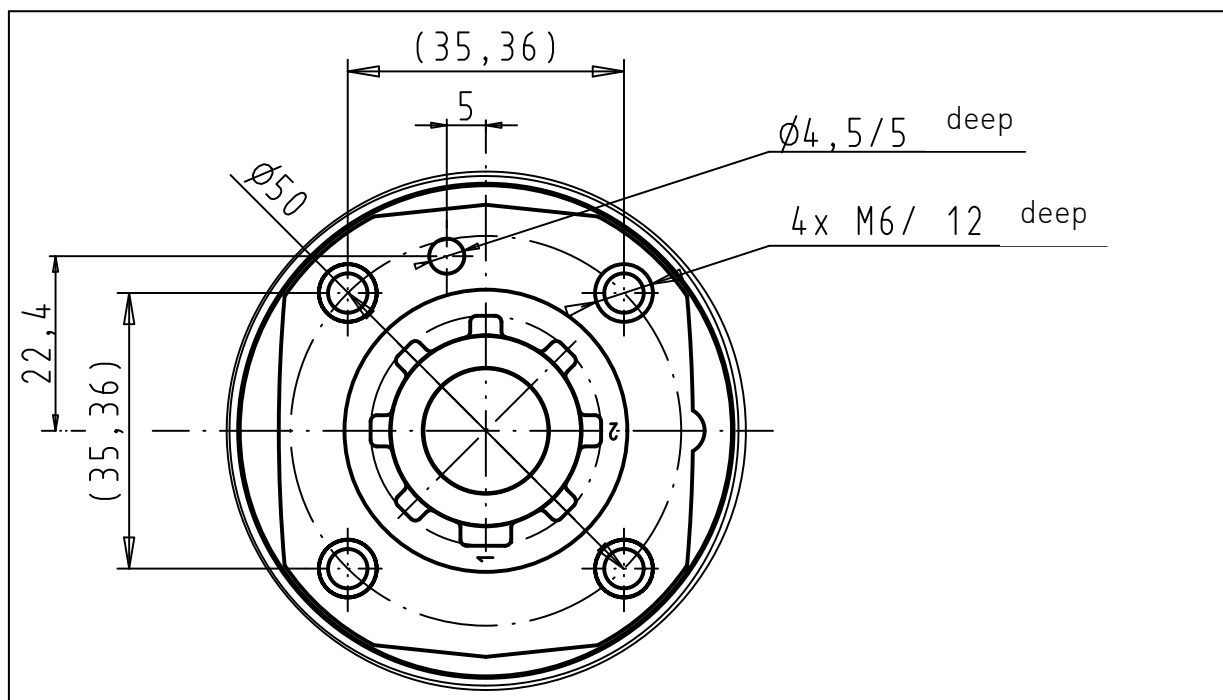
Too high current peaks the first time the actuator is switched on by charging the mains capacitor!

Danger of injury and/or malfunction.

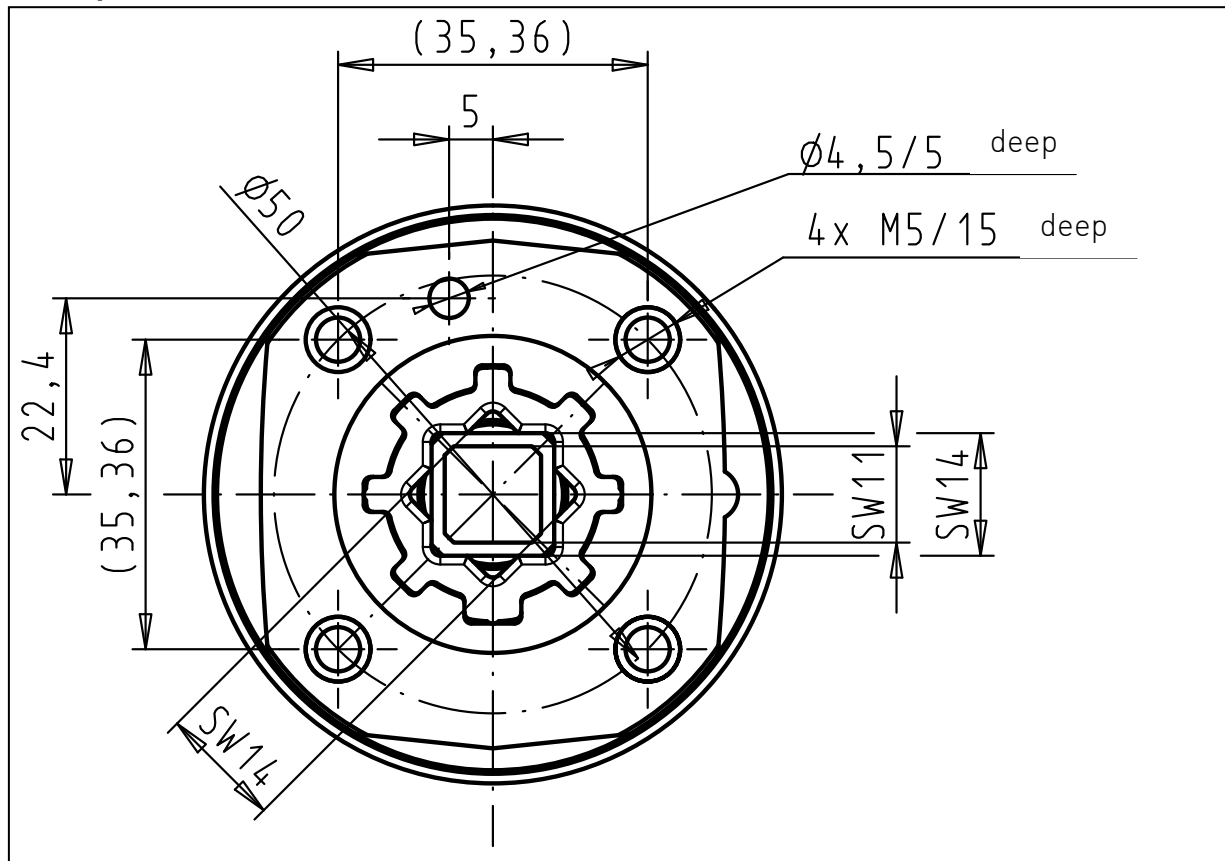
- ▶ Connect and operate actuator as per connection diagram, see Section 7.2 Connection diagram

7.1 Interfaces

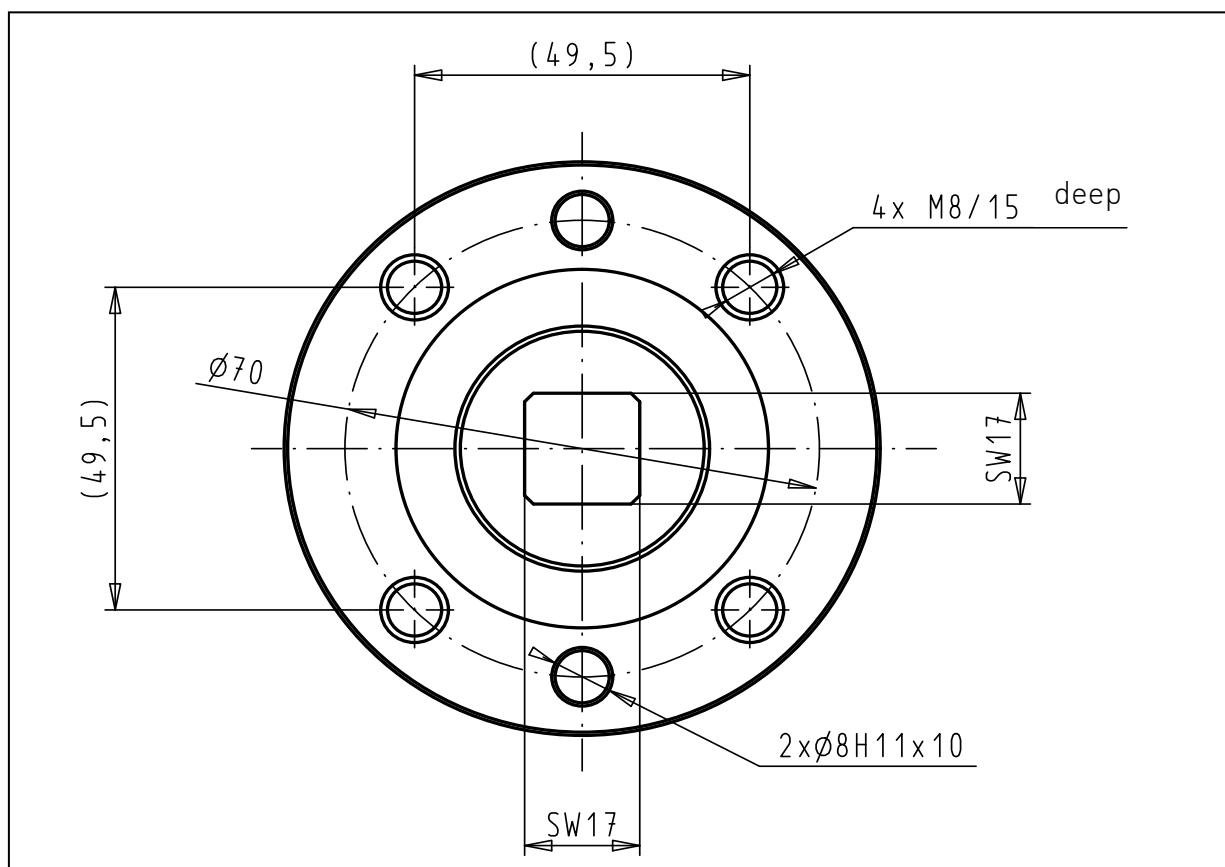
EA 11/ F05



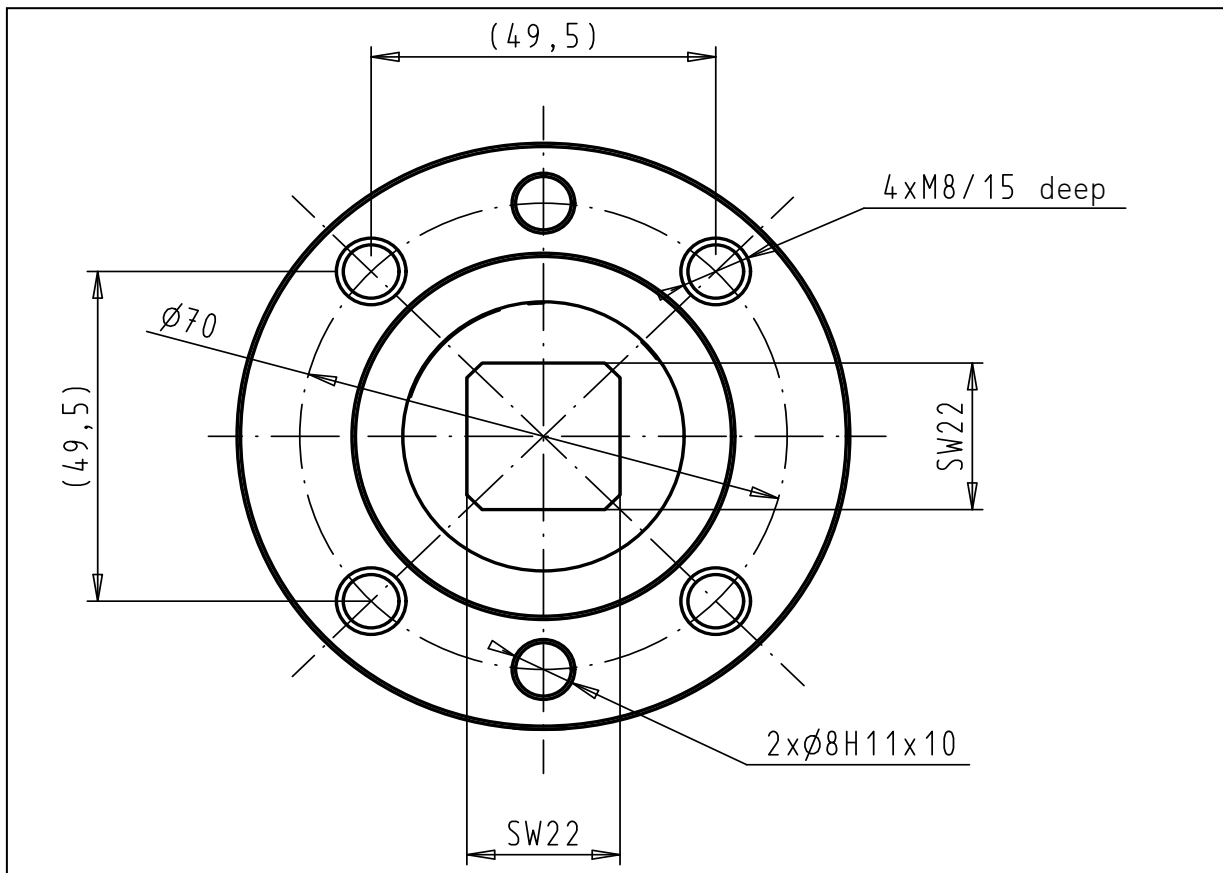
EA 21/F05



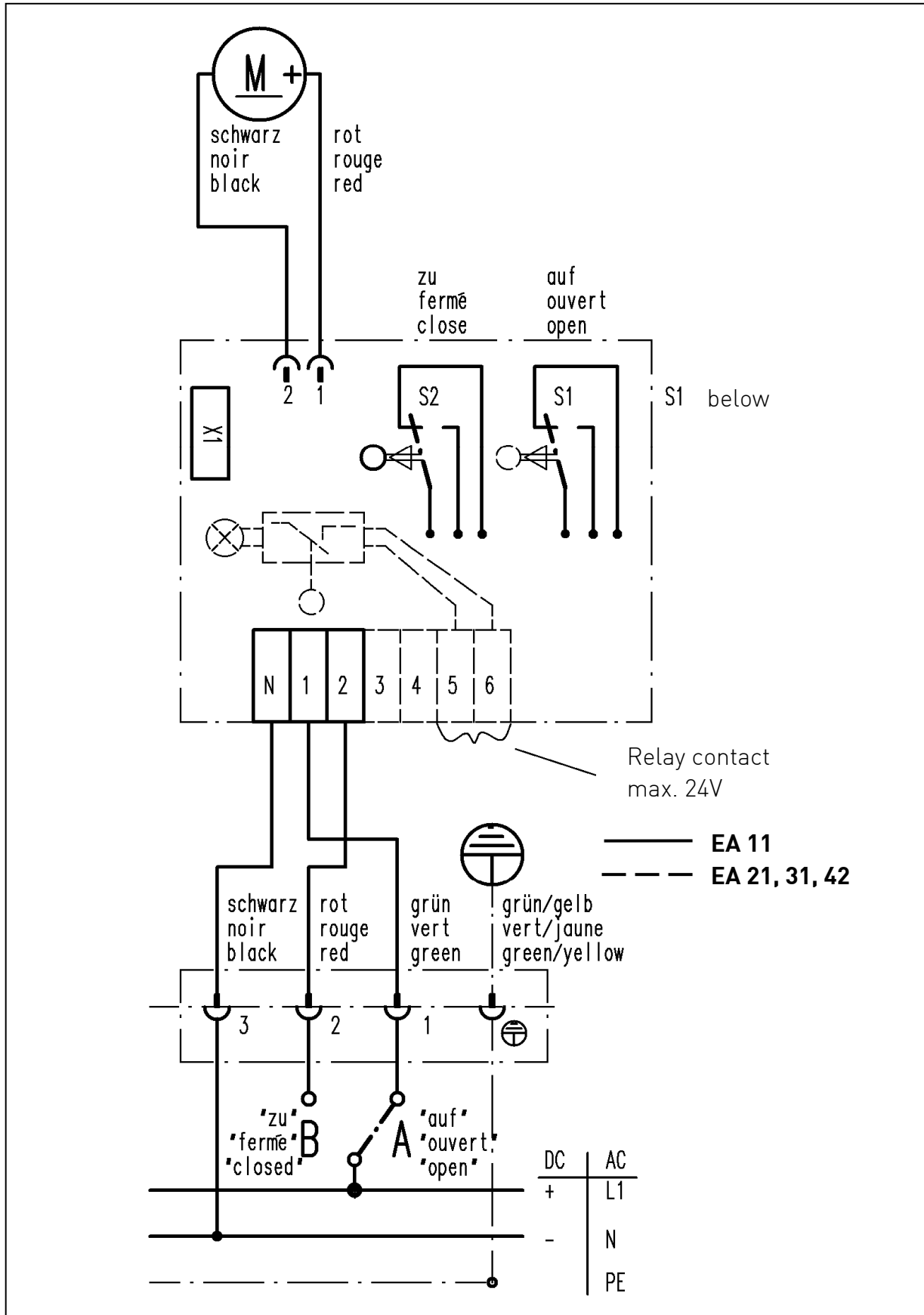
EA 31/F07



EA 42/F07






7.2 Connection diagram EA11/ 21 /31/ 42



7.3 Assembly actuator with valve

The electrical actuator can be assembled on the following valves with the appropriate coupling piece and suitable adapter:

	EA11	EA21	EA31	EA42
				
2-way ball valve to DN 50 e. g. ball valve type 546 DN10-DN50	✓	✓	-	-
2-way ball valve to DN 100 e. g. ball valve type 546 DN65-DN100	-	-	✓	-
3-way ball valve to DN 50 e. g. ball valve type 543	-	✓	-	-
Butterfly valves e. g. butterfly valve type 567/568	-	-	✓	✓

Valve Type	2-way ball valve							3-way ball valve				Butterfly valve			
	546							543				567	568		
+ Actuator EA	11	21 DN10 – DN50 31 DN65 – DN100						21				31 to DN150 42 of DN200			
= Type	107	130	131	132	133	134	135	175	176	177	178	140	141	142	143
Observation	metric	metric	metric	metric	ANSI	BS	JIS	horizontal	horizontal	horizontal	vertical	Wafer	Lug	Lug ANSI	Lug JIS
PVC-U	x	x			x	x	x	x			x	x	x	x	x
PVC-C	x	x			x	x	x	x				x	x	x	x
ABS	x	x			x	x	x	x				x	x	x	x
PP-H	x		x		x	x	x		x			x	x	x	x
PP-N															
PVDF	x			x	x	x	x			x		x	x	x	x


- ▶ In addition to this manual, please also follow the specifications of the valve manufacturer.
- ▶ Before assembling actuator on valve, see assembly instructions for the intermediate parts
- ▶ Before installation, compare technical data of the actuator with the control and the valve. Only install actuator if the data matches.
- ▶ Before installation, check plugs and terminals for possible damage.
- ▶ Make sure that no damaged parts are used.
- ▶ Have installation and assembly only carried out by specialist staff.
- ▶ If actuator for system requires the protection class IP67:
 - Use cable gland connections.
 - Mount actuator vertically.
- ▶ If device is directly controlled:
 - Fit a circuit-breaker on site.
 - Do not connect grounding conductor.

Requirements

- Cross section of the power lines max. 1.5 mm².
- Fuse size: > 6 A.

- ▶ Ensure that actuator is only connected to voltages that meet the requirements on a protective extra low voltage circuit (PELV).
- ▶ Connect actuator, see Section 7.2 Connection diagram
- ▶ To prevent water getting into actuator, ensure that cable plug is not pointing upwards.
- ▶ If temperatures under -10°C plus water condensation are to be expected: fit "heating element" accessory.

7.4 Adjusting limit switches

 *The two end positions in the actuator have been factory set to 90°. A readjustment may be required after assembly by the customer.*

- ▶ Disconnect actuator from voltage.
- ▶ Open cover. To do so, loosen the 4 screws.
- ▶ Position both switching cams S1 and S2 (Fig. see Section 6.5) in such a way to each other that the angle of rotation is less than 90°.
- ▶ Connect actuator to voltage and let it rotate until a limit switch is activated.
- ▶ Adjust limit switch until the desired end position is set.
- ▶ Repeat procedure as required until desired end positions are set.
- ▶ Fit cover and fasten with the 4 screws.

8 Operation



WARNING

Too high current peaks the first time the actuator is switched on by charging the mains capacitor!

Danger of injury and/or malfunction.

- ▶ Connect and operate actuator as per connection diagram, see Section 7.2 Connection diagram

- ▶ Before commissioning the system, carry out a functional test of the product.

8.1 Functional test



WARNING

Working with actuator cover removed!

Danger of injury and/or damage to property.

- ▶ Disconnect connections of the feed and control voltage.
- ▶ Only carry out adjustments on live parts with specially insulated tools.

Before actuator is connected to mains voltage:

- ▶ Make sure that main voltage matches details on type label
- ▶ Make sure that actuator is connected properly
- ▶ Check fuse: > 6 A
- ▶ Check that valve position matches position indicator of the actuator.
- ▶ Make sure that actuator and valve are connected correctly and tightly.



Using the manual emergency override, the actuator can also open or close the valve without mains voltage, see Section 10.1

8.2 Using manual emergency override

The integrated manual emergency override is used to move the actuator manually to another position. The integrated manual emergency override allows the actuator to continue operating temporarily if there is no power.

- ▶ if the actuator constantly or frequently fails: change actuator.

8.2.1 Preparation



- ▶ Remove crank handle **1** from the holder.
- ▶ Remove cover screw **2** with crank handle **1**.
- ▶ Insert crank handle in hexagonal bolt under the opening.

8.2.2 Procedure



WARNING

Actuator unintentionally restarting!

Danger of injury due to opening or closing of the valve through connection terminals powered on again.

- ▶ Remove connector plug during manual operation.
 - ▶ Disconnect actuator elsewhere.
- ▶ Press crank handle as far as it will go.
Micro-switch that disconnects the actuator is activated.
 - ▶ To power the actuator on again: let crank handle go.
 - ▶ To open or to close valve: turn crank handle.

Direction of rotation	Function
Clockwise (CW)	close
Counter clockwise (CCW)	open

Type	Number of rotations	Angle
EA11	9	90°
EA21	9	90°
EA31	27	90°
EA42	41	90°

**WARNING****Damage to the actuator by short circuit or corrosion!**

Moisture and/or dirt in the actuator.

- ▶ Make sure that no water has got into the actuator.
- ▶ Screw cover screw **2** after using the manual emergency override back into the actuator.

- ▶ Take crank handle **1** away.
- ▶ Screw cover screw **2** on again. Beforehand make sure that no water has entered the actuator.
- ▶ Put crank handle **1** back into holder.

8.3 Ready to operate (only EA21 – 42)

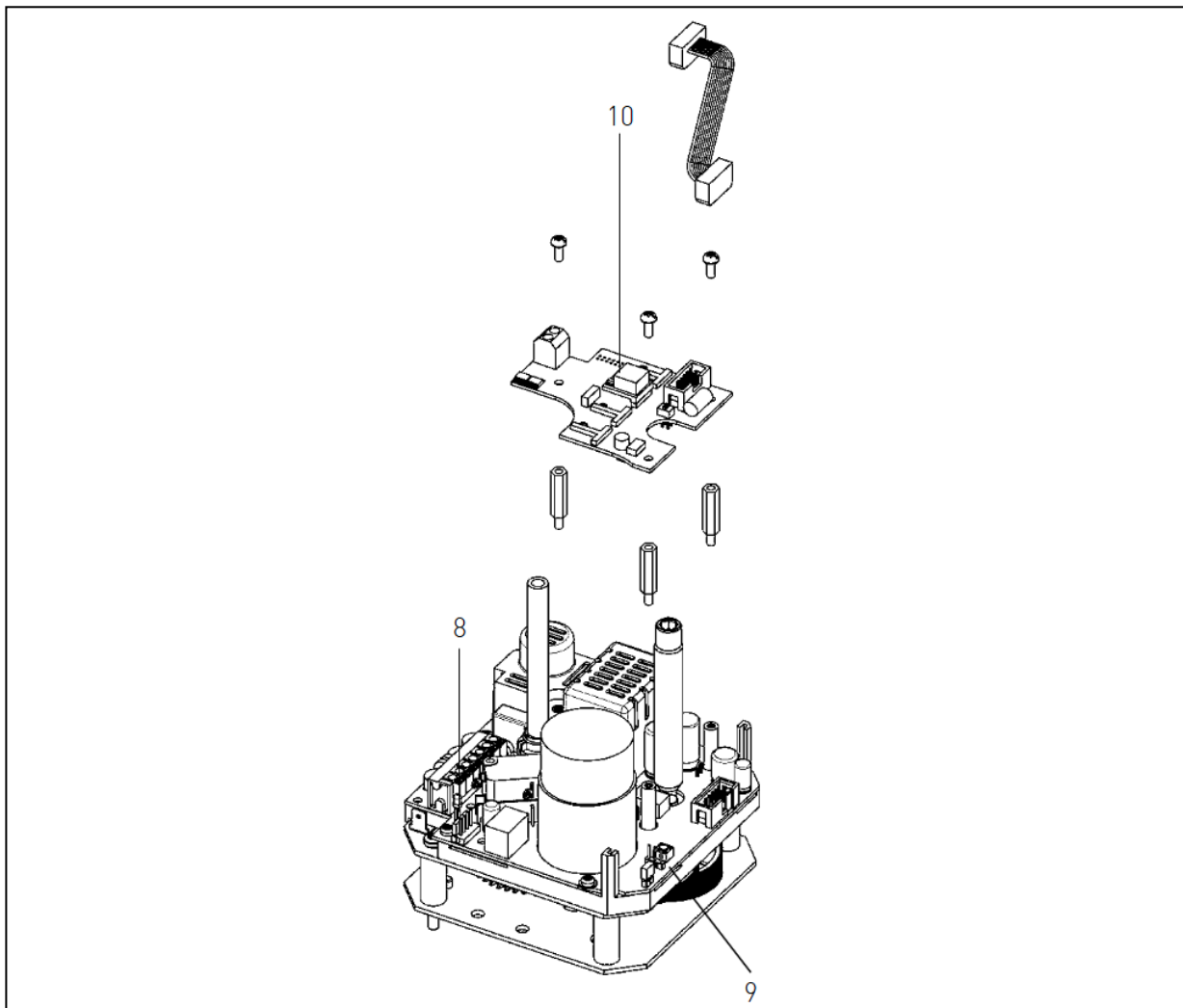


The EA 21/ 31/ 42 has a temperature monitor (ready for operation monitor).

- ▶ Make sure that actuator is properly connected, see section 7.2 Connection diagram.

8.4 Error signal

8.4.1 Display fault signal



In the case of a fault report

- the red LED **8** on the main board lights up. If the monitoring print is installed, the particular LED lights up red on the BCD switch **10**, if its set value is exceeded.
- the ready to operate signal does not apply (terminal 5,6 no passage).

8.4.2 Remove fault report

- ▶ Check cause of fault
- ▶ If necessary, carry out relevant maintenance, see Section 10 fault repair

i *Repair the fault either while the supply voltage is still connected or while the actuator is briefly disconnected from the mains voltage. (Not effective in cycle monitoring).*

- ▶ To repair, activate the reset switch **9** on motherboard.

9 Maintenance



WARNING

Defective product quality through use of spare parts, not provided by GF Piping Systems!

Danger of injury.

- ▶ Only use the listed spare parts, see section Spare parts list.

- ▶ Set maintenance intervals as per the conditions of use (e. g. actuating cycles, medium, ambient temperature).
- ▶ As part of the regular system inspection, carry out the following maintenance activities.

Maintenance interval	Maintenance activity
regular	<ul style="list-style-type: none"> ▶ Check that cover of the manual emergency override is correctly fitted. If necessary, fit cover. ▶ Check that housing cover of the actuator is fitted with 4 screws. If necessary, complete screws.
regular	<ul style="list-style-type: none"> ▶ Check if grating noises are coming from the actuator. Replace actuator, see assembly instructions on the structure valve with actuator
regular	<ul style="list-style-type: none"> ▶ Check that position display matches signal of the control. If necessary, adjust limit switch, see Section adjust limit switches.

For questions regarding the maintenance of the product, please contact your GF Piping Systems representative.

10 Troubleshooting list

Problem	Possible cause	Solution
Actuator does not react	No mains voltage available.	Check voltage source.
	Internal wiring fault	Correct wiring of the actuator, see Section 7
	Switching cams S1 and S2 set wrong	Adjust limit switch, see Section 7.2
	Motor locked	Use manual emergency override, see Section 10.1
Actuator only runs in one direction	Limit switch faulty	Use manual emergency override, see Section 10.1
Overload protection is activated	Valve is dirty	Clean valve, see manual on the valve
	Duty cycle too high	Extend cycle time with accessories "Actuating cycle extension"
	Too high ambient temperature	If possible, reduce ambient temperature
Valve closes or does not open fully	Switching cam S1 and/or S2 not adjusted	Adjust limit switch, see Section 7.2
	Valve stem twisted	Replace valve stem

i *If an end position is not reached, the actuator switches off automatically after 2 minutes and displays a fault report.*

11 Spare parts list

Name	Code
Actuator EA11 100–230 V~	198 150 180
Actuator EA11 24 AC/DC	198 150 181
Actuator EA21 100–230 V~	198 150 182
Actuator EA21 24 V=/~	198 150 183
Actuator EA31 100–230 V~	198 150 184
Actuator EA31 24 V=/~	198 150 185
Actuator EA42 100–230 V~	198 150 186
Actuator EA42 24 V=/~	198 150 187
Manual emergency key	198 151 307
Manual emergency cover (lock screw)	198 000 503

12 Accessories

Name	Function	Code	EA11	EA21-42
Fail-safe return unit	In a power cut, the fail-safe return unit can be used to control a preset safe position.	199 190 085	x	x
Heating element	Prevents formation of condensate in the actuator	199 190 086	x	x
Battery set		198 151 317	x	x
Kit 2 additional* limit switches AgNi	Position feedback for the actuator with two mechanical limit switches	199 190 092	x	x
Kit 2 additional* limit switches Au		199 190 093		x
Kit 2 additional limit switches NPN		199 190 096		x

Name	Function	Code	EA11	EA21-42
Kit 2 additional limit switches PNP		199 190 095		x
Assembly set 4 limit switches		199 190 097		x
Middle position		199 190 094		x
Monitoring print		199 190 079		x
Position detection		199 190 084		x
Positioner type PE25		199 190 100		x
Test adapter kit for RS232 interface		198 151 426	x	
AS Interface module ASEV 2400	Connection to an AS-i network (supply in combination with limit switch kit)	199 190 562	x	x
Set of plugs	For the connection of accessories	198 000 502	x	x
Adapter SW 14 for F05	Modification for valves with F05 interface	198 204 057	x	EA21
Adapter SW 11 for F04	Modification for valves with F04 interface	198 000 587	x	EA21
Reducing bush WS11 for F05	Adjustment for valves with F05 interface and width across flat 11	198 803 145	x	EA21
Heating element and fail-safe return unit	Combined board of heating element and fail-safe return unit	199 190 087	x	x

13 CE Declaration of incorporation

CE declaration of incorporation for incomplete machines (Machinery directive 2006/42/EC, Annex II B) and CE declaration of conformity as per EMV- and low voltage directive (2004/108/CE), (2006/95/CE)

Manufacturer:

Georg Fischer Piping Systems Ltd., Ebnatstrasse 111, 8201 Schaffhausen / Switzerland

Person authorised to compile technical documentation:

Georg Fischer Piping Systems Ltd., R&D Manager,
Ebnatstrasse 111, 8201 Schaffhausen / Switzerland

We hereby confirm that the following incomplete machine

Electrical actuator

Type: EA11, EA21, EA31, EA42

Variants: 24V AC/DC, 100-230V AC

Article numbers: 198 150 180, 198 150 181, 198 150 182, 198 150 183, 198 150 184, 198 150 185, 198 150 186, 198 150 187

fulfils all the basic requirements of the machine directive 2006/42/EC, as far as the scope of delivery allows.

We further declare that the special technical documentation has been compiled in accordance with Annex VII, Section B of this directive. We shall forward this, if requested, to the competent authorities via the aforementioned authorised person.

Commissioning is prohibited until it has been established that the entire machine, into which the aforementioned incomplete machine is to be incorporated, meets the provisions of the machine directive 2006/42/EC.

The incomplete machine also meets the requirements of the following European directives and the national legal provisions implementing them and the relevant harmonised standards below:

- Electromagnetic compatibility – Directive EMV (2004/108/CE)
- Low voltage directive (2006/95/CE)
- EN 15714-2 (Electrical actuators for industrial valves)
- ISO 5211 (actuator interface)
- EN 60068-2-6 (vibration tests)
- VDE 0843 section 20 (EMV requirements)



Name: Antonio De Agostini

Position: R&D Manager

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Date: 2013-08-09

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700.278.082
GFDO_6323_1_2_4_6 (08.13)
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CH-8201 Schaffhausen/Switzerland, 2013
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