GF Piping Systems

Installation and Operation Manual

Electrical Actuator EA04 – 20 Nm

Original instruction manual

Observe instruction manual

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

- Read and follow the instruction manual.
- Always keep the instruction manual available at the product.
- Pass on the instruction manual to all subsequent users of the product.

Contents

1 Structure of quarter turn electric valve actuators

The range of electric actuators are simply a gearbox, a motor and a complex electronic circuit board containing a small computer chip, and are designed so that in normal circumstances there are no internal adjustments that need to be made and that as all electrical connections are external and the connecting plugs are supplied with the actuator, there is no need to remove the actuator's cover to connect them. Inside the actuator there are no terminal strips, dip switches or jumpers that are usually common in this type of product. The actuator is a maintenance free product.

Therefore removing the actuator's cover may invalidate the warranty. If you feel you need to remove the cover, please check with the manufacturers' agent BEFORE removing the cover.

2 Principle of operation

The standard function of the electric valve actuator is power open, power close. It stays put on mains power failure. On receipt of a continuous power signal, the motor runs and via a planetary gearbox system, rotates the output shaft. The motor is stopped by internal cams, fitted to the output shaft, striking micro-switches which cuts power to the motor. When a subsequent continuous reversing signal is received, the motor will turn in the opposite direction, reversing the direction of rotation of the output shaft. The actuator can be jog controlled by switching the power on to start and off to stop. Be aware that during the 'off' period the anti-condensation heater is de-energised. As we provide anti-condensation protection, damage caused by condensation is not covered by the manufacturers' warranty.

Uniquely the actuator can have this standard functionality changed by installing user friendly plug and play kits, to create failsafe, modulating and failsafe modulating functionality.

3 Safety instructions

⚠ WARNING

Damage caused by non-compliance to these instructions will not be covered by our warranty. It is essential therefore that you read these instructions BEFORE installing or connecting the actuator.

⚠ WARNING

The actuator operate with the use of live electricity. It is recommended that only qualified electricians or people instructed in accordance with electrical engineering, and familiar with local health and safety directives, be involved in the connection of these actuators. It is strongly recommended that each actuator has its own independent fused power supply system to protect it against the influence of other electrical devices connected to the system.

4 Warranty information

4.1 Warranty information

The actuator is fully tested and set at the factory, they will not normally require adjustment on site.

NOTE

The actuator range is guaranteed for 12 months from date of despatch from the manufacturer against all types of manufacturing and material defects. Actuators that have failed due to faulty materials will be replaced without charge. The guarantee is limited to the replacement of the actuator only, as decided by our service department and no third party costs (e.g. labour costs for removal/ replacement, production down time, etc.) howsoever arising, will be entertained. Transport costs involved in the return and replacement are chargeable.

NOTE

The guarantee is only valid if the actuator has been installed, operated and maintained strictly in accordance with these instructions, and that the actuator has NOT been disassembled, self-repaired, incorrectly re-assembled, suffered damage caused by shocks or mal-operation, been supplied with inappropriate power supplies, used in conditions outside its specifications or working conditions, or suffered damage by practices not in accordance with sound engineering practice or common sense.

NOTE

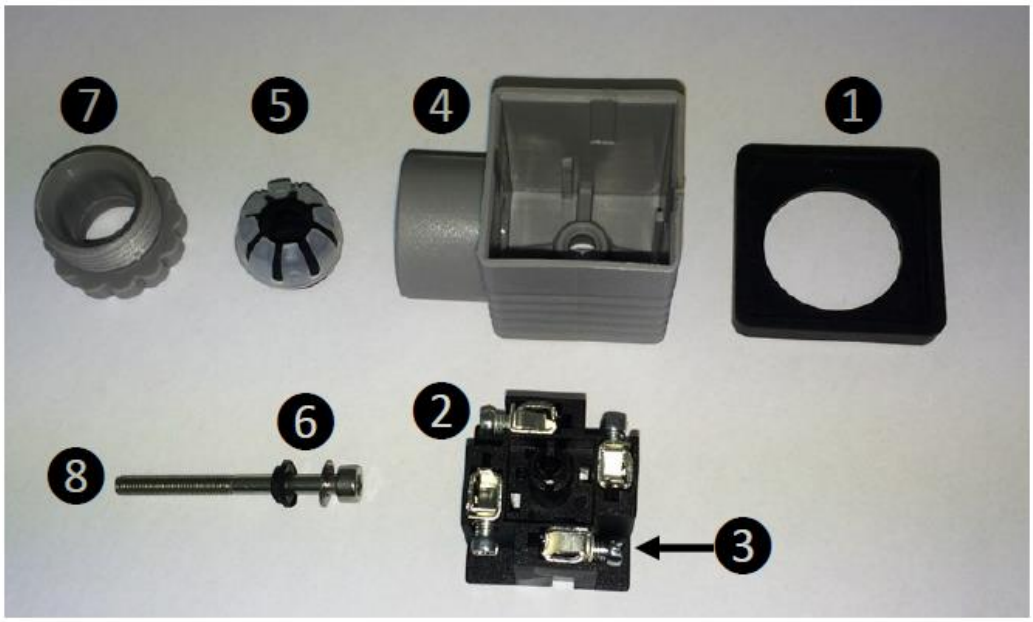
Where a customer has failed to maintain his credit account (where applicable) within our terms, our guarantee will be suspended for and until the payments have been brought in line, and that this suspension will not prolong the guarantee period by the length of the delayed payment that caused the suspension of the guarantee.

4.2 Replacements for „faulty“ actuators

- Goods must be examined immediately upon arrival and any loss or damage notified to us and the carrier (if applicable) in writing, within 24 hours of receipt, otherwise no claim will be entertained.
- Goods can not be returned without our prior consent.
- Where a ‘failed’ actuator cannot be resolved by phone, any replacement actuator must be ordered using an official Purchase Order and the replacement actuator will be invoiced. Upon receipt and testing by us of the ‘failed’ actuator, the invoice for the replacement actuator will stand if we show that the ‘failure’ was caused by incorrect operation, connection, or non-adherence to these instructions, but will be credited should the manufacturer or his agent decide that the failure be due to faulty materials or workmanship. Where a returned ‘failed’ actuator works, and is returned to the customer,

the replacement actuator can only be returned if it is in unused, prime, re-sellable condition.

5 External electrical connectors



Item	Detail
1	Gasket/ seal.
2	Terminal strip
3	Cable securing screws x 4
4	Housing
5	Grommet
6	Water & seal
7	Gland nut
8	Securing screw

Large connector		**Small connector**	
EN175301-803		EN175301-803	
Min cable Ø	Max cable Ø	Min cable Ø	Max cable Ø
8 mm	10.5 mm	5 mm	6 mm

NOTE

Electrical connectors (DIN plugs) - no need to remove the actuator cover to connect

BEFORE connecting, ensure the voltage to be applied is within the range shown on the actuator's ID label. All connections are made using the supplied external DIN plugs. There is no need to remove the cover to connect electrically - removing the cover may invalidate the warranty.

Always check with the manufacturer's agent BEFORE removing the cover as they will give you information relevant to removing and replacing the actuator's cover. The grey plug is for the external power signals, the black plug is for volt free (dry contact) end of travel confirmation. The wiring of the DIN plugs is not the same - always check the externally affixed wiring diagram BEFORE making the connections as damage caused by incorrect wiring is not covered by the warranty.

6 Wiring diagrams for all models

We recommend a fused independent supply for each actuator and it is very important that the power supply earth connection is made to prevent the current-free voltage on the non-live pin preventing the actuator working. This current-free voltage disappears as soon as the motor runs, but in non-earthed systems it has been identified as stopping the actuator from working.

The position confirmation switches are volt free and can have a different voltage applied than the power supply voltage e.g. 220V/1ph power supply, 24VDC for position confirmation. See notes at the bottom of this page regarding use of the volt fee contacts (end of travel confirmation).

BSR-DPS failsafe modulation actuator

Combination of failsafe & modulating kits above: Uses battery failsafe system and digital positioner plug and play function conversion kits to provide fail to safe position function on loss of external power in a modulating application.

NOTE

External power supply/command signals, and power supply sizing

The electric actuator is designed to have continuous (not pulsed) external power applied at all times. It's internal thermostatic anti-condensation heater uses the external power to function, so switching off the power at end of travel switches this protection off. Damage caused by the effects of condensation is not covered by our warranty as we provide protection against it as standard. It is imperative that the power supply has sufficient capacity to drive the actuator. Ensure that safety factor of 3 is used to cover inrush on start-up, and for increased draw over time as the brushed DC motor wears.

NOTE

Another issue with using the end of travel confirmation signals to switch off the command signals is that as they are set around 5 degrees ahead of the final motor stop position (fully open, or fully closed), if used to switch off the power, the valve will not reach the final motor stop positions.

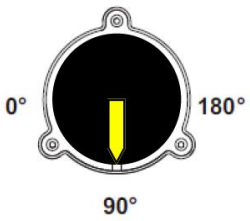
7 Explanation of the different actuator function options

Power to open, power to close: Stays put on mains power failure.

This is the base from which all the function variants are created - all versions start as an on-off actuator. On receipt of a continuous power signal, the motor runs and via a planetary gearbox system, rotates the output shaft. The motor is stopped by internal cams, fitted to the output shaft, striking micro-switches which cuts power to the motor. When a subsequent continuous signal is received, the motor will turn in the opposite direction, reversing the direction of rotation of the output shaft. The actuator can be jog controlled by switching the power on to start and off to stop. The J3C actuator's on-off function can be changed by fitting the quick and easy to install function conversion kits, designed by J+J. This will create either a failsafe electric actuator using an industrial internal rechargeable battery, or a modulating electric actuator with a digital positioning system. Fitting both kits creates a failsafe modulating electric actuator.

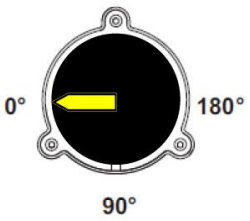
8 Direction of rotation & visual position indication

Open counter-clockwise



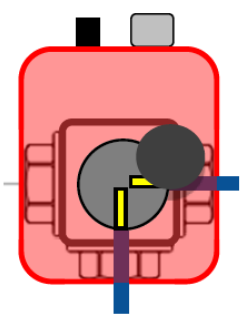
Open

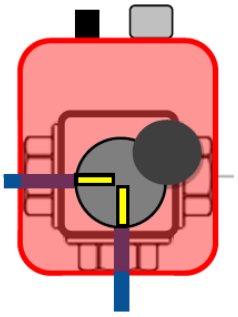
Closes clockwise



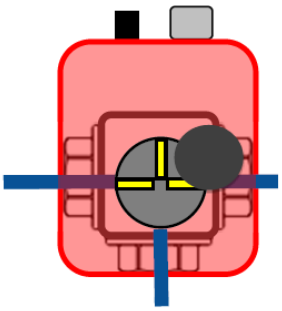
Closed

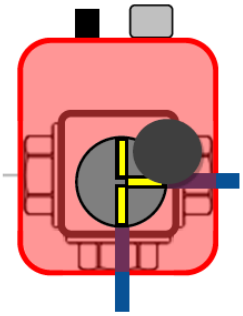
8.1 Visual position indication (3 way valves)



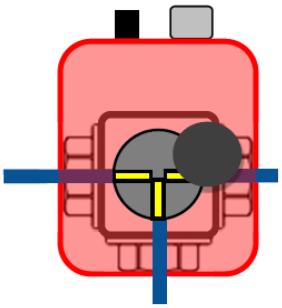


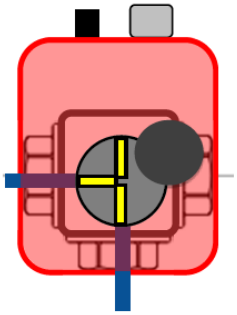
Typical flow arrangement for L port DIVERTING 3 way ball valves. Other flow paths are available.





Typical flow arrangement for T port DIVERTING 3 way ball valves. Other flow paths are available.

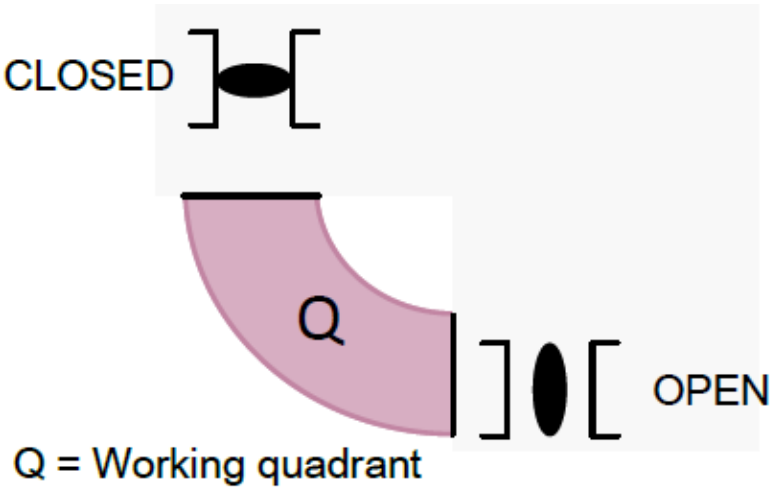




Typical flow arrangement for T port MIXING 3 way ball valves. Other flow paths are available.

ACTUATOR OPEN ACTUATOR CLOSED

8.2 Standard working quadrant



The actuator operates in the 0° to 90° quadrant shown in the diagram to the left. If the actuator is operated manually and returned into automatic mode whilst the actuator's indicator is outside the work-ing quadrant, on the first automatic movement the actuator will rotate until it activates the correct finish position relative to the command signal - the actuator may rotate well beyond its normal 90° rotation to reset its position. This extended rotation is normal in these circumstances.

8.3 Adjusting the worling quadrant

Should the required working angle be different to the standard factory set 0° to 90°, it is possible to adjust internal cams to extend the motor running time and therefore increase the working angle (say to 180° for bottom entry 3 way ball valves), but we recommend contacting a manufacturer's agent to secure advice on how to correctly and safely make these adjustments. Detailed instructions are available on request.

8.4 Multi-colour led status light

Actuator without power, LED off

Actuator with power, LED on

Continuous multi-colour led visual feedback to the user

The LED light is a standard feature in the actuator -and it serves 3 main functions:

1) When on/ lit, it advises users that the actuator has external power applied to it.

2) When continuously lit, the actuator is functional and awaits external commands to operate

3) If the LED blinks, there may be a problem that is preventing the J3C from working. The sequence and colour of the blinks gives the user an indication of cause.

See tables below for all the LED sequences.

ON-OFF VERSION

No	Actuator Status (On-off version)	Time LED is lit	J3C-S LED Sequence
1	Actuator without external power	Continuous	
2	Actuator in manual mode	200 mSecs	
3	Actuator opening	200 mSecs	OPEN
4	Actuator closing	200 mSecs	CLOSED
5	Torque limiter activated when opening	200 mSecs	
6	Torque limiter activated when closing	200 mSecs	

FAILSAFE VERSION

No	Actuator Status (Failsafe version)	Time LED is lit	J3C-S LED Sequence
1	Actuator without external power	Continuous	
2	Actuator in manual mode	200 mSecs	
3	Actuator opening under external power	200 mSecs	OPEN
4	Actuator closing under external power	200 mSecs	CLOSED
5	Torque limiter activated when opening	200 mSecs	
6	Torque limiter activated when closing	200 mSecs	
7	Actuator closing under battery power	200mSecs	
8	Actuator opening under battery power	200mSecs	
9	Battery power low, needs re-charging	200mSecs	

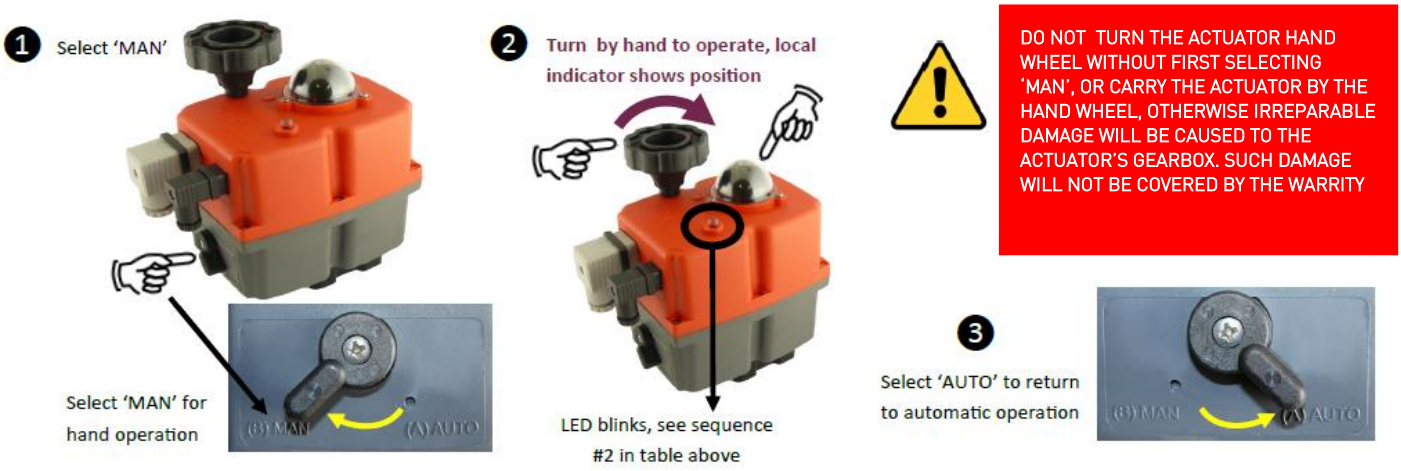
MODULATING VERSION

No	Actuator Status (Modulating)	Time LED is lit	J3C-S LED Sequence
1	Actuator without external power	Continuous	
2	Actuator in manual mode	200 mSecs	
3	Actuator opening by control signal	200 mSecs	OPEN
4	Actuator closing by control signal	200 mSecs	CLOSED
5	Torque limiter activated when opening	200 mSecs	
6	Torque limiter activated when closing	200 mSecs	

NOTE

- Failsafe modulating will use the modulating LED sequences unless the battery back up is activated.
- The torque limiter is de-activated when the battery back-up is activated
- A PINK LED indicates a connectivity issue, this will typically be incorrect DIN plug wiring, or a polarity issue.
- An unlisted LED colour or sequence can also indicate a connectivity or polarity issue.

9 Manual override



Selecting 'MAN' by moving the selector lever from 'AUTO' disengages the output drive, but the motor continues to run. After a short time the actuator realises the end of travel cam has not been reached, the motor is running with no load which indicates the valve is not jammed—therefore the actuator is in manual mode. The motor then stops and the LED sequence #2 above starts to advise the user that the actuator is in 'MAN'.

⚠ WARNING

As a safety measure, the actuator will not respond to external command signals whilst in manual mode. On returning the selector lever to 'AUTO' the LED returns to being solidly lit, and the actuator will respect whatever command signal is being applied at the time the selector lever is returned to 'AUTO'.

10 Electronic torque limiter

The actuator has an electronic torque limiter (ETL) to protect the internal gears from mechanical damage should the valve become blocked or jammed. The ETL constantly measures the motor current and using a complex algorithm in the on-board chip, senses the rise in motor current seen at the point of blockage and cuts the power to the motor. At this point it blinks the LED with sequence 5 or 6 in the table above, and also sends the actuator in the reverse direction of the block to relax the gearbox to allow the manual override to be used if required.

The ETL is not designed to be used where it is being constantly activated (for example as a mechanical stop), it is designed as a safety device. If the ETL is acti-vating frequently it indicates that either there is a problem with the valve, or the actuator is undersized for the application. Over use will eventually

⚠ WARNING

The ETL is deactivated when the BSR Battery Back-up system is activated so that the safety failsafe system has the maximum power availa-ble to achieve the failsafe position. Should the valve block during a battery operated movement the gearbox is likely to fail mechanically. Such damage is not covered by the warranty.

10.1 Mounting the actuator to ¼ turn valves

J3C Actuators have mounting facilities in accordance with ISO:5211 and DIN:3337 allowing them, in many cases, to mount directly onto similarly compliant valves without the need for a mounting kit (bracket and drive adaptor/ connector). The main advantages of direct mounting the actuators is to greatly assist in ensuring concentricity of the actuator output drive with the valve stem which eliminates side loadings (which result in increased wear on the valve stem and seals), reducing the effects of backlash in the drive train as there are fewer parts connected, and allowing valves to be part dismantled for installation into the pipe without disturbing the valve to actuator connection.

NOTE

The drive being inserted into the actuator's female output drive must NOT be longer than the maximum depth of the female drive when the assembly is bolted together. Resulting damage to the actuator and assembled components due to this assembly error will not be covered by our warranty.

Model	Max troque Nm	Run & Reseat torque Nm	ISO5211	Qutput star drive x depth	Optional star output	Special execution
20	25	20	F03, F04 & F05	14 x 15	9, 11	

11 Mounting orientation

OK

OK

PROHIBITED

Do not install the actuator below the horizontal and never below the valve.

12 Weatherproof rating

The actuator electric actuators have an ingress protection rating of IP67, which gives them total protection against almost all kinds of weather and allows the actuator to be submerged under less than 1m of water for no more than 30 minutes. However, it cannot withstand being hosed down or pressure washed, or deluged in water.

If the actuator is to be exposed to hosing down or pressure washing, a plastic bag must be put over the actuator to protect it from the direct hosing down. Even in these circumstances, do not pressure wash the plastic bag close up.

13 Recycle at end of life

Although electric actuators are currently excluded from mandatory WEEE recycling, J+J is committed to the protection of the environment.

Please remember at end of life to dispose of responsibly and if the facilities are available, recycle.

14 EC declaration of incorporation

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

Manufacturer:

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

Person authorized 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: EA04-20 Nm

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

Article numbers: 198 151 492, 198 151 489

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 authorized 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, implementing national legal provisions, and relevant harmonized standards:

- Electromagnetic compatibility – Directive EMV (2014/30/EG)
- Low voltage directive (2006/95/EG)
- EN 15714-2 (Electrical actuators for industrial valves)
- ISO 5211 (actuator interface)
- EN 60068-2-6 (vibration tests)
- VDE 0843 section 20 (EMV requirements)

Georg Fischer Piping Systems Ltd

Name: Bastian Lübke

Position: R&D Manager

Date: 2016-12-01

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