FieldQ Valve Actuator
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A  Before you start

• FieldQ Series actuators must be isolated both pneumatically and electrically before (dis)assembly.
• It is not permitted to connect a pressure vessel with unreduced media to the FieldQ Series pneumatic actuator.
• FieldQ Series actuators must not be connected to an air supply greater than 8 bar g or 120 psig
• This manual does not provide instructions for installations in hazardous areas.
• Installation, adjustment, putting into service, use, assembly, disassembly and maintenance of the pneumatic actuator must be done by qualified personnel.

A1  Orientation (see fig. A1)

The FieldQ Series actuator is an integrated concept for the automation of quarter turn valves, dampers or other quarter turn applications. It can consists of three basic parts:
1. Pneumatic actuator
2. Pneumatic Module or NAMUR Plate
3. Control Module

A2  Installation, operation and maintenance reference documents

Before mounting, installing, commissioning or (dis)assembling the actuator consult the following documents:
- All chapters of this manual and
- Installation Guide of the supplied Control Module.
- For installation in hazardous area’s:
  The applicable section of the Installation Guide, as shipped with the Control Module.
- For Control Modules with bus communication there may be an additional Reference Manual with more detailed information.

A3  Operating medium

• Air or inert gasses:
  - Filtered to 50 micron (5 micron for QC54).
  - Check the Installation Guide as shipped with the module for the applicable air quality.
• Maximum pressure, 8 bar g / 120 psig
• Dew point 10 K below operating temperature.
• For subzero applications take appropriate measures.

A4  Product integrity

• Assembly or disassembly is only allowed for replacing seals and guide bands (soft parts).
A5 Hazardous areas

Improper installation in a hazardous area can cause an explosion.

• Assembly, disassembly and maintenance must be done in safe area’s without a potential explosion hazard.
• For information about installation in a hazardous area, refer to the appropriate sections of the Installation Guide, as shipped with the control module.

A6 Warning; Moving parts

Applying pressure to the actuator or Applying a control signal to the Control Module, may cause the actuator/valve assembly to operate.

A7 Prevent moisture entering the actuator

Condensation or moisture that enters the actuator or the Control Module can damage these components and can result in failures. Therefore:
• Try not to mount the actuator with the conduit openings or the air entries, pointing upward.
• Ensure integrity of gaskets and o-rings.
• Install drip loops in conduit or cable. When needed use Filter/Regulators with correct filter specification.
• Seal all conduit openings whether used or not.

A8 Warehouse storage

• FieldQ Series Actuators and Control Modules should be stored in a clean, dry warehouse, free from excessive vibration and rapid temperature changes.
• Actuators should not be stored on any floor surface.

A9 On site storage

• FieldQ Series Actuators and Control Modules should be stored in a clean, dry warehouse, free from excessive vibration and rapid temperature changes.
• Ensure all actuator covers are in place and securely fastened.
• Replace plastic conduit plugs with appropriate pipe plugs.

Failure to follow proper storage guidelines will void warranty.

A10 Lifting instructions

• Use lifting equipment as required by national or local legislation.

Table A1 Weight of Actuators with control modules

<table>
<thead>
<tr>
<th>ACTUATOR TYPE</th>
<th>Double acting</th>
<th>Spring Return</th>
<th>Double acting</th>
<th>Spring Return</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in kg.</td>
<td>in lb</td>
<td>in kg.</td>
<td>in lb</td>
</tr>
<tr>
<td>Q40</td>
<td>3.9</td>
<td>4.5</td>
<td>8.6</td>
<td>9.9</td>
</tr>
<tr>
<td>Q65</td>
<td>4.5</td>
<td>5.7</td>
<td>9.9</td>
<td>12.6</td>
</tr>
<tr>
<td>Q100</td>
<td>5.2</td>
<td>6.7</td>
<td>11.5</td>
<td>14.8</td>
</tr>
<tr>
<td>Q150</td>
<td>6.9</td>
<td>9</td>
<td>15.2</td>
<td>19.8</td>
</tr>
<tr>
<td>Q200</td>
<td>7.9</td>
<td>11.2</td>
<td>17.4</td>
<td>24.7</td>
</tr>
<tr>
<td>Q350</td>
<td>12.5</td>
<td>19</td>
<td>27.6</td>
<td>41.9</td>
</tr>
<tr>
<td>Q600</td>
<td>21.5</td>
<td>29.7</td>
<td>47.4</td>
<td>65.5</td>
</tr>
<tr>
<td>Q950</td>
<td>28.5</td>
<td>40.7</td>
<td>62.8</td>
<td>89.7</td>
</tr>
<tr>
<td>Q1600</td>
<td>44.8</td>
<td>67.9</td>
<td>98.8</td>
<td>149.7</td>
</tr>
</tbody>
</table>

• It is strongly recommended to use lifting straps to lift the actuator/valve assembly.
• If an actuator/valve assembly should be lifted, it is strongly recommended to connect the lifting straps in such way that the actuator and valve is supported.
1 Introduction

1.1 Orientation (see fig. 1.1)

The FieldQ Series actuator is an integrated concept for the automation of quarter turn valves, dampers or other quarter turn applications.

Fig 1.1 Introduction

1. Pneumatic actuator
2. Visual Position Indication
3. Stroke adjustment bolts
4. Control Module
5. Entries for optional manual control
6. Exhaunts
7. Supply air entry
8. Entries for optional speed control
2 Installation

2.1 Before you start

In case of an air or electrical failure, it is important to know the behavior of the actuator. Before mounting the actuator on a valve consult the following paragraph’s.

2.2 Failure modes

2.2.1 Valve rotation

Valves are normally manufactured so that:
- the valve is closed after a clock wise rotation (viewed from above).
- the valve is open after a counter clock wise rotation (viewed from above).

Fig. 2.2.1

2.2.2 Position after a failure

The position of the actuator after a failure depends on the:
- Operating principles (see §2.3)
- Assembly code (see §2.4)
- Kind of failure

Table 2.1 Position after a failure

<table>
<thead>
<tr>
<th>Principle of operation</th>
<th>Assembly code</th>
<th>Kind of failure</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Double acting actuator</strong></td>
<td></td>
<td>Pressure</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply voltage</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>CW</td>
<td>Pressure</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply voltage</td>
<td>Open</td>
</tr>
<tr>
<td><strong>Single acting actuator (Spring Return)</strong></td>
<td></td>
<td>Pressure</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply voltage</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>CW</td>
<td>Pressure</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply voltage</td>
<td>Open</td>
</tr>
</tbody>
</table>

Table 2.2 Position after a failure with a Double acting module with Fail-In-Last-Position function

<table>
<thead>
<tr>
<th>Principle of operation</th>
<th>Assembly code</th>
<th>Kind of failure</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Double acting actuator</strong></td>
<td></td>
<td>Pressure</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply voltage</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>CW</td>
<td>Pressure</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply voltage</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>Pressure</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal</td>
<td>not defined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply voltage</td>
<td>Open</td>
</tr>
</tbody>
</table>
2.3 Operating principle

2.3.1 Double acting actuators

⚠ IMPORTANT

The operating principle, as explained here, is applicable for actuators with assembly code CW (direct acting).
- The outward stroke will move the valve to the “Open” position.
- The inward stroke will move the valve to the “Closed” position.

For assembly codes CC the operating principle is reversed (reverse acting):

See paragraph 2.4 for more information about actuator assembly codes

* Electric control signals can be connected in the Control Module (QC; see documentation supplied with the Control Module). The Control Module is equipped with a pilot valve which controls a 5/2 spool valve.
* Connect air supply to air inlet (Ps).

Outward stroke

1 Send control signal “Open” to the Control Module.
2 Pilot valve 1 will be activated and the 5/2 spool valve will pressurize the central air chamber.
3 The piston will move outwards to the “Open” position.
4 The Control Module indicates the “Open” position and activates feedback signal “Open”.

[Diagram]

Fig. 2.3.1

Inward stroke

1 Send control signal “Close” to the Control Module.
2 Pilot valve 1 will be deactivated and the 5/2 spool valve will pressurize the end cap air chambers.
3 The piston will move inwards to the “Closed” position.
4 The Control Module indicates the “Closed” position and activates feedback signal “Closed”.

Optional controls:

LMC Local Manual Control
SC Speed Control throttles

⚠ IMPORTANT:

In case of an electric control signal failure, the actuator will move to its “Closed” position.
2.3.2 Double acting actuators with Fail In Last Position function

IMPORTANT

The operating principle, as explained here, is applicable for actuators with assembly code CW (direct acting).
- The outward stroke will move the valve to the “Open” position.
- The inward stroke will move the valve to the “Closed” position.

For assembly codes CC the operating principle is reversed (reverse acting):

See paragraph 2.4 for more information about actuator assembly codes

* Electric control signals can be connected in the Control Module (QC; see documentation supplied with the Control Module). The Control Module is equipped with a pilot valve which controls a 5/2 spool valve.
* Connect air supply to air inlet (Ps).

Outward stroke

1. Send control signal “Open” to the Control Module to activate Pilot valve 1 and de-activate Pilot valve 2.
2. The 5/2 spool valve will pressurize the central air chamber.
3. The piston will move outwards to the “Open” position.
4. The Control Module indicates the “Open” position and activates feedback signal “Open”.

Inward stroke

1. Send control signal “Close” to the Control Module to activate Pilot valve 2 and de-activate Pilot valve 1.
2. The 5/2 spool valve will pressurize the end cap air chambers.
3. The piston will move inwards to the “Closed” position.
4. The Control Module indicates the “Closed” position and activates feedback signal “Closed”.

Optional controls:

LMC  Local Manual Control
SC  Speed Control throttles

Fig. 2.3.3

Fig. 2.3.4
## 2.3.2 Single acting (spring return) actuators

### IMPORTANT

The operating principle, as explained here, is applicable for actuators with assembly code CW (direct acting).
- The outward stroke will move the valve to the “Open” position.
- The inward stroke will move the valve to the “Closed” position.

For assembly code CC the operating principle is reversed (reverse acting):

### Outward stroke

1. Send control signal “Open” to the Control Module.
2. Pilot valve 1 will be activated and the 3/2 spool valve will pressurize the central air chamber.
3. The piston will move outwards to the “Open” position
4. The Control Module indicates the “Open” position and activates feedback signal “Open”.

### Inward stroke

1. Send control signal “Close” to the Control Module.
2. Pilot valve 1 will be deactivated and the 3/2 spool valve will vent the central air chamber
3. The springs will move the pistons inwards to the “Closed” position
4. The Control Module indicates the “Closed” position and activates feedback signal “Closed”.

### Optional controls:

- **LMC** Local Manual Control
- **SCS** Speed Control throttles
2.3.3 Position feedback

FieldQ Series patented, position sensing system

The FieldQ Series actuator (1) has a patented, contactless position sensing system. This system consists of a position probe (2) which rides on a special curve (4) in the pinion bottom.

The curve is shaped in such a way that the position probe moves linearly and proportionally to the rotation of the actuator pinion.

The linear movement of the position probe is used, inside the control module (3) to operate the limit switches.

WARNING:

Do not put the Control module in direct contact with magnetic material. This can cause damage or malfunction of the position feedback.

Installation of the FieldQ Series modules

For installation instructions of the modules see chapter 4.

Installation Guides - Control modules

Each Control Module is shipped with an Installation Guide, which contains more information on the pneumatic and electrical installation and operation of the Module. Additionally, these Installation Guides can be downloaded from emerson.com/fieldq
2.4 Actuator assembly codes

2.4.1 Double acting assembly codes

**Standard assembly code:**

(= Clock Wise Rotation)  
Visual indicator mounted:  
(= for In line position indication)

**Optional assembly code:**

(= Counter Clock Wise Rotation)  
Visual indicator mounted:  
(= for In line position indication)

**Optional assembly code:**

(= Clock Wise Rotation)  
Visual indicator mounted:  
(= for Cross line position indication)

**Optional assembly code:**

(= Counter Clock Wise Rotation)  
Visual indicator mounted:  
(= for Cross line position indication)

A = Pilot valve operated in Control Module
B = Pilot valve not operated in Control Module

- Central air chamber (1) pressurized
- End cap air chambers (2) pressurized

All views are from above. Pistons are shown in inner position
2.4.2 Single acting (Spring Return) assembly codes

**Standard assembly code:**

(= Clock Wise Rotation / Spring to Close)

**Visual indicator mounted:**

(= for In line position indication)

**Optional assembly code:**

(= Counter Clock Wise Rotation / Spring to Open)

**Visual indicator mounted:**

(= for Cross line position indication)

A = Pilot valve operated in Control Module
B = Pilot valve not operated in Control Module

All views are from above. Pistons are shown in inner position.

- Central air chamber (1) pressurized
- Spring stroke (2)
2.5 Valve Installation

**WARNING!**
Actuator must be isolated both pneumatically and electrically before (dis)assembly. Before mounting or (dis)assembling the actuator consult the relevant sections of this manual.

Remove handle nut, handle, lock washer, etc. from valve if required.

**CAUTION!**
- Before mounting the actuator on the valve be sure that both the actuator and the valve have the same position.
- When mounting do not hit with hammer on pinion top.

**CAUTION!**
Be sure that the insert is mounted at 90° or 45°.

It is possible to mount the insert turned 22.5°. This way the valve will not open or close the right way.

**IMPORTANT!**
- When mounting the actuator across the pipeline, the NAMUR slot at the pinion top is turned 90° and does not reflect the position of the valve blade.
- When mounting NAMUR (VDI/VDE3845) switch boxes or positioners take care that these devices can be and will be set to reflect the actual limit positions.
2.6  Recommended tubing sizes

<table>
<thead>
<tr>
<th>Actuator Model no.</th>
<th>Runs up to 1.2 mtr / 4 ft.</th>
<th>Runs over 1.2 mtr. / 4 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-40, 65</td>
<td>6 mm / 1/4&quot;</td>
<td>6 mm / 1/4&quot;</td>
</tr>
<tr>
<td>Q-100, 150, 200, 350</td>
<td>6 mm / 1/4&quot;</td>
<td>8 mm ~ 5/16&quot;</td>
</tr>
<tr>
<td>600, 950, Q1600</td>
<td>8 mm / 1/4&quot;</td>
<td>10 mm ~ 3/8&quot;</td>
</tr>
</tbody>
</table>

2.7  Air consumption per stroke at atmospheric pressure

<table>
<thead>
<tr>
<th>Air chamber</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>- at 1 atm (litres)</td>
<td></td>
</tr>
<tr>
<td>Central air chamber</td>
<td>Q40 0.16 Q65 0.33 Q100 0.35 Q150 0.84 Q200 0.8 Q350 1.8 Q600 2.9 Q950 4.7 Q1600 7.3</td>
</tr>
<tr>
<td>End cap air chambers</td>
<td>0.22 Q40 0.36 Q65 0.49 Q100 0.78 Q150 1.9 Q200 3.1 Q350 4.9 Q600 8.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air chamber</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>- at 1 atm (cu./in.)</td>
<td></td>
</tr>
<tr>
<td>Central air chamber</td>
<td>Q40 10 Q65 20 Q100 21 Q150 51 Q200 49 Q350 110 Q600 177 Q950 287 Q1600 445</td>
</tr>
<tr>
<td>End cap air chambers</td>
<td>Q40 13 Q65 22 Q100 30 Q150 48 Q200 61 Q350 116 Q600 189 Q950 299 Q1600 488</td>
</tr>
</tbody>
</table>
3 Mechanical stroke adjustment

The factory setting of the stroke is $90^\circ \pm 0.5^\circ$.

If required the stroke can be adjusted by means of two stroke adjustment bolts.

### 3.1 Adjusting the “Open” position

1. Connect supply pressure and control wiring according the instructions shipped with the Control Module.
2. Remove the nut caps (A).

Repeat next steps 4 to 8 until desired setting is achieved:

4. Send the actuator/valve assembly to the “Open” position (see instructions shipped with the Control Module).
5. Check whether the position of the valve is correct. The position indication knob (C) indicates the valve position.

If the position is not correct, proceed with the following steps:

6. Send the actuator/valve assembly to the “Closed” (opposite) position (see instructions shipped with the Control Module).
7. Turn the limit stop bolts (see table 3.1):
   - Turning in reduces the stroke:
   - Turning out increase the stroke:
8. Send the actuator/valve assembly to the “Open” position (see instructions shipped with the Control Module).
9. Check whether the position of the valve is correct.

When the “Open” position is correct proceed with adjusting the “Closed” Position.

### 3.2 Adjusting the “Closed” position

1. Execute steps 4 to 8 of §3.1 but now for the “Closed” position.
2. Mount the nut caps (A).
3.3 Adjusting the end position with no electrical wiring connected.

If the Control Module is equipped with the optional Pneumatic Manual Override (A), only supply pressure needs to be connected to cycle the actuator. For more information on how to use the “Pneumatic Manual Override” see chapter 6.

REMARK:
In case of air leakage over the limit stop bolts, turn the lock nut of the limit stop bolts tighter, until leakage stops.

<table>
<thead>
<tr>
<th>Actuator Size</th>
<th>Angular displacement</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q40</td>
<td>3.0 °</td>
<td>W10 mm SD1.2 mm</td>
</tr>
<tr>
<td>Q65</td>
<td>3.6 °</td>
<td>W13 mm SD1.2 mm</td>
</tr>
<tr>
<td>Q100</td>
<td>2.7 °</td>
<td>W13 mm SD1.2 mm</td>
</tr>
<tr>
<td>Q150</td>
<td>2.7 °</td>
<td>W17 mm SD1.5 mm</td>
</tr>
<tr>
<td>Q200</td>
<td>2.3 °</td>
<td>W17 mm SD1.5 mm</td>
</tr>
<tr>
<td>Q350</td>
<td>2.7 °</td>
<td>W19 mm SD1.5 mm</td>
</tr>
<tr>
<td>Q600</td>
<td>2.7 °</td>
<td>W24 mm W10 mm</td>
</tr>
<tr>
<td>Q950</td>
<td>2.5 °</td>
<td>W24 mm W10 mm</td>
</tr>
<tr>
<td>Q1600</td>
<td>2.7 °</td>
<td>W30 mm W10 mm</td>
</tr>
</tbody>
</table>

W = Wrench  
SD = Screwdriver
4 Removing and mounting of the FieldQ Series Modules

4.1 Removing the FieldQ modules

1. To prevent warping of the modules and damage the threads:
   - First loosen the all screws 1/4 to 1/2 turns.
   - The screws can now be removed completely.
2. Prevent damage to the position probe (5) to guarantee accurate position feedback.

4.2 Mounting the FieldQ modules

1. Take care that the following mating surfaces are clean.
   - Between the actuator housing and the Pneumatic Module (or NAMUR plate).
   - Between the Pneumatic Module and the Control Module.
2. To align the position probe (5) properly to the Control Module:
   - First mount the Pneumatic Module.
   - Then mount the Control Module.
3. Press the O-rings (8) and seals (4, 7 & 9) firmly their mating grooves to keep them in place during mounting.
4. Prevent damage to the position probe (5) to guarantee accurate position feedback.
5. When fastening the module turn each screw two to three turns at a time, in sequence, to assure an air tight connection.

4.3 Tightening moments

The Control Module and Pneumatic module should be fastened by using the allen keys as indicated and applying the following tightening moments:

- Phillips head size 2: 1.8 to 2.2 Nm (16 - 19.5 In.lbs)
- Allen Key No 5: 6.1 to 6.6 Nm (54 - 58.4 In.lbs)

4.4 Connecting air supply

To connect air supply see the Installation Guide shipped with the control module.

**TIP**

Grease the O-rings and seals before mounting. This makes them sticky and prevents that these O-rings and seals fall away during mounting.
5 Speed control option

WARNING
FieldQ Series actuators must be isolated both pneumatically and electrically before any (dis)assembly is begun.

The FieldQ Series can be supplied with a Speed Control option. One throttle is required for Spring Return actuators and up to two for Double Acting actuators.

The speed control throttle controls the air flow in and out of an air chamber and as such limits the speed of the “Opening” and “Closing” stroke simultaneously

5.1 Mounting Speed Control throttle(s):

1. Remove the plug(s) at the side of the module and turn in the throttle (1).
2. Spring Return actuators: Use the top entry only.
3. Double acting actuators: Use both bottom and top entries.
   - For standard actuators, the top entry will throttle the closing stroke.
   - For standard actuators, the bottom entry will throttle the opening stroke.
   - For reverse acting actuators, the opposite strokes will be throttled.

5.2 Adjusting Speed Control throttle(s):

1. Remove the nut cap (2).
2. Clockwise rotation of the adjustment screw reduces the speed.
3. Counter clockwise rotation of the adjustment screw increases the speed.
4. Replace the nut cap.
6 Manual Control option

WARNING
FieldQ Series actuators must be isolated both pneumatically and electrically before (dis)assembly.

For commissioning, emergency or maintenance purposes, the FieldQ Series can be supplied with one or two Manual Control options. These can operate the pilot valve(s) inside the module and as such operate the actuator, when there is air pressure available, but no control signal or power supply.

6.1 Mounting Manual Control

1 To add a Manual Control, remove the plug(s) in front of the module and turn in the Manual Control.
   - For normal operation the module should be fitted with one Manual Control.
   - For Double Acting with a Fail-in-Last-Position function, two Manual Control can be fitted.

6.2 Manual Control operation

1 The Manual Control has a “Push & Lock” function:
   - To operate the Manual Control, use a screwdriver, push to activate and release to de-activate the pilot valves.
   - If required turn it 45°, to lock it in position and keep the actuator in its operated state.

2 In case of a Fail in Last Position configuration with two manual controls:
   - The manual control on the right side (default location) will pressurize the central air chamber and cause the actuator to rotate counter clockwise. For reverse acting FieldQ Series actuators (Assembly code CC) the actuator will rotate clockwise.
   - The manual control on the left side (Location for 2nd Manual Control) will pressurize the end cap air chambers and cause the actuator to rotate clockwise. For reverse acting FieldQ Series actuators (Assembly code CC) the actuator will rotate counter clockwise.
   - In order to operate one of the manual control, be sure the opposite manual control is de-activated and unlocked.

3 It is possible to rotate the screw multiple cycles. The unit will than toggle every 90° between “locked” (1) and “unlocked” (0).
## 7 Trouble shooting FieldQ Series

### 7.1 Mechanical problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible error</th>
<th>Solution</th>
<th>Where to find</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback position and actual position are not the same.</td>
<td>Actuator and valve are mounted 90° rotated in relation to each other.</td>
<td>Remove actuator from valve. Check assembly code of actuator. Put both valve and actuator in “Closed” position. Mount actuator on valve.</td>
<td>Chapter 1 and 2 of DOC.IOM.BQ.E</td>
</tr>
<tr>
<td>Valve is in “Closed” position, actuator is in “Open” position and will not move anymore.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valve does not reach the completely “Closed” or “Open” position.</td>
<td>Limit stop screws are not set correctly.</td>
<td>Readjust the limit stop screws</td>
<td>Chapter 3 of DOC.IOM.BQ.E</td>
</tr>
<tr>
<td></td>
<td>Insert is not mounted properly</td>
<td>Mount the insert in the right position. Remark: Rotate insert for one cam = 22.5°</td>
<td>Chapter 2, §2.5 of DOC.IOM.BQ.E</td>
</tr>
<tr>
<td></td>
<td>Pressure to low</td>
<td>Apply pressure as per sizing</td>
<td>Data sheets DA = BQ1.602.01. SR = BQ1.602.02 or BQ1.602.03</td>
</tr>
<tr>
<td></td>
<td>Sizing is wrong</td>
<td>Check valve torque data with actuator torque data</td>
<td></td>
</tr>
<tr>
<td>Actuator rotates, valve does not.</td>
<td>No coupling between actuator shaft and valve spindle.</td>
<td>Install a coupling between actuator shaft and valve spindle.</td>
<td>Chapter 2 of DOC.IOM.BQ.E</td>
</tr>
</tbody>
</table>

### 7.2 Pneumatic problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible error</th>
<th>Solution</th>
<th>Where to find</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator does not react to electrical control signal.</td>
<td>There is no supply pressure at the actuator.</td>
<td>Supply the right pressure to the actuator.</td>
<td>See supplied documentation of the Control Module.</td>
</tr>
<tr>
<td></td>
<td>Supply pressure is connected to one to the exhausts.</td>
<td>Connect supply pressure to port “Ps”.</td>
<td>See supplied documentation of the Control Module.</td>
</tr>
<tr>
<td>Actuator does not react good to electrical control signal.</td>
<td>There is sufficient supply air pressure but insufficient supply air capacity.</td>
<td>Take care the supply air tubing has the right dimensions.</td>
<td>See chapter 2, §2.6 of DOC.IOM.BQ.E</td>
</tr>
<tr>
<td></td>
<td>Control Module is not mounted properly.</td>
<td>Mount the “Control Module” in the right way to the “Pneumatic Control Module”.</td>
<td>See chapter 4, of DOC.IOM.BQ.E</td>
</tr>
<tr>
<td></td>
<td>Speed control (if present) blocks air flow.</td>
<td>Turn the speed control more open. Select 1 size larger actuator</td>
<td>See chapter 5 of DOC.IOM.BQ.E</td>
</tr>
<tr>
<td></td>
<td>Manual override (if present) on the Control Module is locke</td>
<td>Unlock manual override on the Control Module.</td>
<td>See chapter 6 of DOC.IOM.BQ.E</td>
</tr>
<tr>
<td>Double acting actuator will only move to “open” position.</td>
<td>Control module has wrong pneumatic cartridge.</td>
<td>Replace pneumatic cartridge for version suitable for double acting actuators.</td>
<td>See DOC.QC4.PNC.1</td>
</tr>
</tbody>
</table>
### 7.3 Electrical problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible error</th>
<th>Solution</th>
<th>Where to find</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator does not react to control signals</td>
<td>Control wiring, Power supply wiring or feedback wiring are not right connected.</td>
<td>Connect all wiring in the right way.</td>
<td>See documentation shipped with the Control Module. (DOC.IG.BQCxx)</td>
</tr>
<tr>
<td></td>
<td>The power supply voltage is not the same as the voltage of the applicable Control Module.</td>
<td>Connect the right power supply voltage.</td>
<td>See documentation shipped with the Control Module. (DOC.IG.BQCxx)</td>
</tr>
<tr>
<td>Actuator does not react consistent.</td>
<td>Initialization was not completed in the right way.</td>
<td>Execute the initialization procedure or set feedback signal manually</td>
<td>See documentation shipped with the Control Module. (DOC.IG.BQCxx)</td>
</tr>
<tr>
<td></td>
<td>Sizing is wrong</td>
<td>Re size the actuator to the valve</td>
<td>Data sheets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DA = BQ1.602.01.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SR = BQ1.602.02 or</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BQ1.602.03</td>
</tr>
<tr>
<td>There are problems with position feedback after sending the actuator to either the “Open” or “Closed” position.</td>
<td>The wiring of the feedback signals may be switched.</td>
<td>Connect the feedback wiring in the right way.</td>
<td>See documentation shipped with the Control Module. (DOC.IG.BQCxx)</td>
</tr>
</tbody>
</table>
8 Maintenance

CAUTION:
Actuator must be isolated both pneumatically and electrically before any (dis)assembly is begun. Before mounting or (dis)assembling the actuator consult the relevant sections of this manual.

IMPORTANT
Under the European Pressure Equipment Directive, conversion of actuators may only be performed by companies or personnel, authorized by Emerson.

8.1 General
All FieldQ Series actuators are supplied with sufficient lubrication for their normal working life. If required, recommended lubrication for all standard actuators is a Castrol LMX, FINA Cera WR2 or equivalent. Periodic checks should be performed to make certain that all fasteners remain tight.

Depending upon the conditions under which the actuator must work such as extended duty, or abnormal operating conditions, periodic replacement of internal seals is recommended. Repair kits containing all necessary seals and instructions can be obtained through authorized FieldQ Series distributors.

NOTE:
This product is only intended for use in large-scale fixed installations excluded from the scope of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2)

8.2 Single acting / Spring Return actuators
On spring return actuators, the springs can be replaced.

SPRINGS SHOULD ALWAYS BE REPLACED IN COMPLETE SETS.
Spring kits are available through authorized FieldQ Series distributors.

8.3 FieldQ Series recommended spare parts
All soft seals, bearings, and nonreusable parts are included in the FieldQ Series recommended spare parts kit.

The spare parts kit is identical for both the double acting and the spring return models. For the spring return models we recommend a set of spare springs for each different model in addition to the recommended spare parts kit. Keep in mind that, when necessary, springs are to be replaced in complete sets.

The following spare parts kits are available:
1 Repair kit for FieldQ Series actuator and all modules, available per actuator size.
2 Module seals kit, suitable for all module variations.

8.4 Position tracking device kits
The position tracking device takes care of the mechanical part of the feedback signal. In case the position tracking device malfunctions, spares are available. Position tracking device kits are available per actuators size and contain all necessary seals and lubricants. They can be obtained through authorized FieldQ Series distributors.

8.5 Conversion kits
When the action of an actuator needs to be changed from spring return to double acting or visa versa, conversion kits can be utilized. Two kinds of conversion kits are available:
1 Single acting (spring return) Conversion kits, to make a spring return actuator.
2 Double acting Conversion kits, to make a double acting actuator.

8.6 High Temp and Low Temp Conversion kits
For the FieldQ actuators with the NAMUR plate, special conversion kits are available to make the FieldQ suitable for High temperature or Low temperature applications. There are no “High temp” or “Low temp” conversion kits available for FieldQ actuators with modules.
9 Disassembly

9.1 Before starting

9.1.1 Caution! Never disassemble a valve that is under pressure!

Caution! Ball valves and plug valves can trap pressurized media in the cavity. Isolate the piping system in which the actuator valve assembly is mounted and relieve any pressure on the valve.

9.1.1 / 9.1.2

Prevent damage to the position probe (A) to guarantee accurate position feedback.
9.2 Removing end caps all types QD and QS 40 to QS 350

9.2.1 Be careful not to damage the endcap (A) and B-port (B) O-rings.

9.2.2 / 9.2.3 Caution! If the actuator is a “spring return” model, uniformly loosen all endcaps screws, 1/4 - 1/2 turns at a time, in sequence, to relieve pre-load of the springs.

On all actuators with springs use caution when removing endcaps.
9.3 Removing end caps type QS 600 to 1600

9.3.1 Be careful not to damage the endcap (A) and B-port (B) O-rings.

**Caution!** If the actuator is a “spring return” model, loosen endcap screws in sequence as shown, 1/4 - 1/2 turns at a time, to relieve preload of the springs.

On all actuators with springs use caution when removing endcaps.
9.4 Removing limit stop bolts, pistons and pinion assembly.

9.4.1 Remove limit stop bolts.

![Diagram of removing limit stop bolts]

9.4.2 Remove the two pistons by using an adaptor fitted in a vice.

![Diagram of removing pistons]

Place the actuator on top of the adaptor (either the square end or the insert shape end). Turn the complete actuator and the pistons will come out.

9.4.3 Before removing the pinion be sure the position probe is removed (see chapter 1.1)

Remove spring clip from pinion top and remove pinion.

For removing the circlip, circlip pliers are required.
9.4.4
Remove spring clip from upper pinion part and remove upper pinion part through bore of housing.

For removing the circlip, circlip pliers are required.

9.4.5
Removing the insert requires an extraction tool. Please contact your local FieldQ Series representative for more information about this extraction tool.
10 Reassembly

10.1 Reassembly guide band and pinion assembly

Before reassembly check the requested assembly code (see chapter 2.7).

10.1.1 Apply grease to the parts as per table 10.1 and figure 10.1.1

<table>
<thead>
<tr>
<th>Table 10.1 Grease instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
</tr>
<tr>
<td>O-rings</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Housing</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>Pistons</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>Pinion</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>Upper pinion part</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>Housing guideband</td>
</tr>
<tr>
<td>13</td>
</tr>
<tr>
<td>Piston Guidebands</td>
</tr>
<tr>
<td>14</td>
</tr>
</tbody>
</table>

Important:
Do not grease the middle part of the piston bore (15) and the outer diameter of the housing guideband.

Take care that half the gear depth is full with grease.
10.1.2
1. Mount the upper pinion part (A),
2. Mount the stroke adjustment cam (B) and housing guide band (C).

Keep the stroke adjustment cam in position while mounting the pinion.

The two circlips have one side with bevelled edges (E) which must go DOWN onto the thrust washer, the square edge side (F) must face UPWARDS.

10.1.3
Mount the pinion.

For fastening the circlips, circlip pliers are required.

Use limit stop screws (3) as a reference to position limit stop cam (1) and pinion (2) as shown. See indication dot in the Pinion top slot. Views are from above.

The position of the pinion and the limit stop cam, as shown, is the position where the pistons are in the inward position (see next paragraph).
10.2 Reassemble the pistons

10.2.1 / 10.2.2
1 Check required assembly code.
2 Apply a light film of grease to the bore of the housing.
3 Ensure that O-rings (1) and guide bands (2) are kept in place during assembly.
4 Align the pinion so that the teeth on the pinion will "pickup" the pistons rack teeth when turning the top of the pinion:
   - clockwise (CW) for assembly code CW or
   - counter clockwise (CCW) for assembly code CC

   Turn the pinion gently to guide the guide band into the housing, taking care not to damage the guide band.

10.2.3
1 Ensure that smooth movement and 90 degree operation can occur without moving the pistons out of the actuator body.
2 Ensure that the slot on the pinion top is:
   - exactly perpendicular (code CW) or
   - in line (code CC) with the actuators centre line.
3 If not, turn the pistons outward until they disengage from the pinion. Shift one tooth of the pinion, reassemble and check again.
10.3 Reassembly end caps, all types QD and QS 40 to QS 350

10.3.1 When replacing springs in a spring return actuator, ensure that the springs are replaced in their identical position in the spring pack from where they were removed. Before assembling the springs and endcaps, make sure that the pistons are inwards.

10.3.2 Put some grease on the endcap O-ring before mounting.

10.3.3 Ensure that endcap O-rings (1) and airport O-rings (2) are in place on both sides.

Put some grease on the airport O-rings (2), so they and stay in place while mounting.
10.4 Reassembly end caps single acting actuators QS 600 to QS 1600

10.4.1
When replacing springs in a spring return actuator, ensure that the springs are replaced in their identical position in the endcap from where they were removed.
Before assembling the springs and endcaps, make sure that the pistons are inwards.

10.4.2
Ensure that endcap O-rings (a) and airport O-rings (b) are in place on both sides.

Engage the bolts with the tapped holes in the actuator body by forcing down slightly on the cap. Tighten each bolt in small and equal turns.

Table 10.3 Tightening torque FieldQ Series end-cap bolts

<table>
<thead>
<tr>
<th>Actuator Type</th>
<th>Cap Bolt Size</th>
<th>Hexagon Key size</th>
<th>Tightening Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nm</td>
</tr>
<tr>
<td>40</td>
<td>M5</td>
<td>4mm</td>
<td>1,7</td>
</tr>
<tr>
<td>65</td>
<td>M6</td>
<td>5mm</td>
<td>3,2</td>
</tr>
<tr>
<td>100</td>
<td>M6</td>
<td>5mm</td>
<td>3,2</td>
</tr>
<tr>
<td>200</td>
<td>M8</td>
<td>6mm</td>
<td>7,1</td>
</tr>
<tr>
<td>350</td>
<td>M10</td>
<td>8mm</td>
<td>14</td>
</tr>
<tr>
<td>600</td>
<td>M12</td>
<td>10mm</td>
<td>44,2</td>
</tr>
<tr>
<td>950</td>
<td>M12</td>
<td>10mm</td>
<td>44,2</td>
</tr>
<tr>
<td>1600</td>
<td>M14</td>
<td>12mm</td>
<td>70,6</td>
</tr>
</tbody>
</table>
10.5 Mounting and setting of limit stops

Setting of limit stops

Closed position
1. Move actuator to the “Closed” position\(^{(1)}\).
2. Turn the “Closed” limit stop screw in until it blocks.
3. Move actuator to the “Open” position\(^{(1)}\).
4. Turn the “Closed” limit stop screw in as shown in table 2.5.2

Open position
1. Repeat the steps 1 to 4 as described for the “Closed” position but now for the “Open” position.

\(^{(1)}\) Apply pressure to port A or B

REMARK
This procedure does not apply for setting the exact end positions of a “FieldQ Series mounted on a valve”.
To set the end positions of a FieldQ Series mounted on a valve, do as described above, check the valve position and adjust where necessary.

Table 3.1 Angular Displacement & Tools

<table>
<thead>
<tr>
<th>Actuator Size</th>
<th>Angular displacement</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q40</td>
<td>3.0 °</td>
<td>W10 mm SD1.2 mm</td>
</tr>
<tr>
<td>Q65</td>
<td>3.6 °</td>
<td>W13 mm SD1.2 mm</td>
</tr>
<tr>
<td>Q100</td>
<td>2.7 °</td>
<td>W13 mm SD1.2 mm</td>
</tr>
<tr>
<td>Q150</td>
<td>2.7 °</td>
<td>W17 mm SD1.5 mm</td>
</tr>
<tr>
<td>Q200</td>
<td>2.3 °</td>
<td>W17 mm SD1.5 mm</td>
</tr>
<tr>
<td>Q350</td>
<td>2.7 °</td>
<td>W19 mm SD1.5 mm</td>
</tr>
<tr>
<td>Q600</td>
<td>2.7 °</td>
<td>W24 mm W10 mm</td>
</tr>
<tr>
<td>Q950</td>
<td>2.5 °</td>
<td>W24 mm W10 mm</td>
</tr>
<tr>
<td>Q1600</td>
<td>2.7 °</td>
<td>W30 mm W10 mm</td>
</tr>
</tbody>
</table>

W = Wrench
SD = Screwdriver
10.6 Final assembly and airtightness test

10.6.1
Plug the IPT device hole (1) with a M12x1.5 plug. Apply pressure (max. 8 barg / 116 PSI) to ports (2) and (3). Use some soapsuds at the indicated points.

Applying pressure to the actuator will cause the actuator/valve assembly to operate.

In case of leakage around:
1. The limit stop bolts (and/or the spring-package-bolt at spring return models):
   - Turn the lock nut of the bolts tighter, until leakage stops.
2. The endcaps:
   - Disassemble the endcaps, replace O-rings and reassemble the endcaps.
3. The pinion top or bottom and A- or B-port:
   - Disassemble the complete actuator, replace O-rings and reassemble the actuator.

10.6.2
Take care that the position probe and the mounting hole is clean. Apply Castrol CLS grease to the tip (1) to ensure proper functioning.

10.6.3
Check the position of the inner part of the position indication knob. When mounted to the pinion top, the projection of the inner part will fit in the groove on the pinion top.
To disassemble the inner part, press as shown.

For assembly of the Control modules see Chapter 4
11 FieldQ Series Parts

11.1 Exploded view FieldQ Series (base actuator)
### 11.2 Bill Of Material

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Qty.</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Body</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Washer</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Circlip</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Circlip</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Indicator insert</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Indicator knob</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Indicator arrow</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Screw</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Guide band (housing)</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>Piston</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>O-ring</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>Guide band (piston)</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>End cap screws</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>End cap QD</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>O-ring</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>4</td>
<td>Nut cover</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>4</td>
<td>Nut</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>4</td>
<td>Washer</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>O-ring</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>Limit stop screw</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>O-ring</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>O-ring seal IPT port</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Qty.</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>3</td>
<td>Screw</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>NAMUR plate</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>O-ring</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>O-ring</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>1</td>
<td>O-ring</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>Pinion</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>2</td>
<td>Bearing ring</td>
<td>1</td>
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<td>Middle spring</td>
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<td>2</td>
<td>Inner spring</td>
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<td>Center plate</td>
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**Notes**

1. Included in repair kits.
2. Options
11.3 Exploded view FieldQ Series (Control module)

NOTES
1. Included in seal kit for the modules.
2. Items shown are for Modules QC41, QC42 and QC43.
3. Items 2 and 3 are different for QC40 (ASI) and QC54 (FF).
4. For further details on the control modules please check the maintenance manuals as available for each control module from www.emerson.com/fieldq.

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<th>Description</th>
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<td>1</td>
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<tr>
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<td>3</td>
<td>Module fastening screws and washers</td>
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<td>1/2</td>
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<td>Exhaust blind plug (0x DA, 1x SR)</td>
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<td>IPT device</td>
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<td>O-ring seal IPT port (1)</td>
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</tbody>
</table>
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