

CERTIFICATE OF CONFORMITY



1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**

2. **Certificate No:** FM16US0367X
3. **Equipment:** Bettis Q-Series, QC54 FOUNDATION Fieldbus and
(Type Reference and Name) QC40 AS-i Actuator Control Modules
4. **Name of Listing Company:** Emerson Process Management Valve Automation inc.
5. **Address of Listing Company:** 19200 Northwest Freeway
Houston, Texas
USA

6. The examination and test results are recorded in confidential report number:

3057440 dated 5th October 2017

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

FM Class 3600:2011, FM Class 3610:2015, FM Class 3611:2004, FM Class 3810:2005,
ANSI/IEC 60529:2004, ANSI/ISA-60079-0:2013, ANSI/ISA-60079-11:2014,
ANSI/ISA-61010-1:2004, NEMA 250:2003

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

Certificate issued by:


J. E. Marquedant
VP, Manager, Electrical Systems

26 November 2018
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

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10. Equipment Ratings:

In type of protection intrinsically safe apparatus, the actuator control module (Bettis Q-Series, QC54) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, in accordance with manufacturer's Control Drawing; intrinsically safe apparatus with fieldbus intrinsically safe concept wiring for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia with fieldbus intrinsically safe concept wiring for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia for use in Zone 20, Group IIC, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia with fieldbus intrinsically safe concept wiring for use in Zone 20, Group IIC, in accordance with manufacturer's Control Drawing, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -20 °C to +50 °C, indoor and outdoor (Type 4X; IP66) environments.

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC54) equipment is certified to the following classification(s).

Nonincendive equipment for use in Class I, Division 2, Groups A, B, C and D; nonincendive dust-protected enclosure equipment for use in Class II, Division 2, Groups E, F and G, Class III, Division 2; nonincendive for use in Class I, Zone 2, Group IIC, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -20 °C to +50 °C, indoor and outdoor (Type 4X; IP66) environments.

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC40) equipment is certified to the following classification(s).

Nonincendive equipment for use in Class I, Division 2, Groups A, B, C and D; nonincendive dust-protected enclosure equipment for use in Class II, Division 2, Groups E, F and G, Class III, Division 2; nonincendive for use in Class I, Zone 2, Group IIC, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -25 °C to +60 °C, indoor and outdoor (Type 4X; IP66) environments.

11. The marking of the equipment shall include:

In type of protection intrinsically safe apparatus, the actuator control module (Bettis Q-Series, QC54) equipment is labelled with the following marking(s).

Intrinsically Safe

Class I, II, III, Division 1, Groups A, B, C, D, E, F, G T4

Class I, Zone 0, AEx ia IIC T4 Ga

Zone 20, AEx ia IIC T80 °C Da

Ta = -20 °C to +50 °C

Type 4X; IP66

Installation per Dwg. DOC.IG.BQC54.1; FISCO Field Device

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

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In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC54) equipment is labelled with the following marking(s).

Class I, II, III, Division 2, Groups A, B, C, D, E, F, G T4

Class I, Zone 2, Group IIC T4

Ta = -20 °C to +50 °C

Type 4X; IP66

WARNING – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC40) equipment is labelled with the following marking(s).

Class I, II, III, Division 2, Groups A, B, C, D, E, F, G T4

Class I, Zone 2, Group IIC T4

Ta = -25 °C to +60 °C

Type 4X; IP66

WARNING – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2

12. **Description of Equipment:**

General – The Bettis Q-Series QC54 FOUNDATION Fieldbus and QC40 AS-i are designed for industrial and hazardous (classified) location applications. Each are intended to be used as a universal single or double acting actuator control module for air or inert gasses operating media. The Bettis Q modules are interoperable, process-controlling, communicating, microprocessor-based modules. In addition to their primary function of controlling the position of the valve, the Bettis Q modules, using FOUNDATION Fieldbus™ communications protocol or AS-i type communications, respectively, provides easy access to information critical to process operation, as well as process control. Information is delivered to the end-user from the principal component of the process, the control valve itself, by using a personal computer or operator's console within the control room.

Using a compatible Fieldbus or AS-i (Spec. 3.0) configuration device, information about the condition of the module and the actuator and valve control elements can be obtained, as well as asset information about the module. Input and output configuration parameters can be specifically set by the end-user. Using the FOUNDATION Fieldbus™ or AS-i type protocol, information from the module can be readily integrated into a control system.

The Bettis Q modules are an actuator assembly in a watertight/dust-tight corrosion resistant enclosure that provides input and output signals to control and monitor the Bettis Q actuator. The modules are self-contained providing control and position feedback via the Fieldbus interface or AS-Interface when mounted on pneumatic actuators used for valve control.

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Construction – The actuator control modules are constructed of a single chamber aluminum housing with metric or NPT threaded hubs and a threaded mating lockable module cover with or without an inspection display window and a side compartment and rectangular cover assembly which is equipped with four thru-holes for securement to the main enclosure via Allen (hexagonal socket) screws. The main enclosure terminal compartment houses the main electronics cartridge and a sensor bracket cartridge. The side compartment of the enclosure houses the optional one or two piezo pneumatic pilot valve cartridges. The base chassis includes a lid lock. For the housing design, by unscrewing the main housing cover, the connection terminals to the signal and supply circuit are accessible. Visible are the red light-emitting diode, yellow light-emitting diode and green light-emitting diode to indicate different operating states or AS-i slave operating states of “close”, “status”, and “open” of the actuator/valve combination, respectively.

Furthermore, there are two M20 x 1.5 metric or a combination of 3/4 inch NPT (top) and 1/2 inch NPT (bottom) cable entries in the bottom of the housing; one of which is sealed with a certified cable gland, where applicable, or rigid conduit, and the other is sealed with a certified blanking plug. Also provided in the bottom of the housing are an optional local manual control and additional local manual control for “Fail in Last Position”. The base chassis of the housing is equipped with an internal and external earthing terminal. The pneumatic pilot valve cover is equipped with one or two 1/4 inch BSP or 1/4 inch NPT threaded exhaust ports, for single acting or double acting control, respectively, and a 1/4 inch BSP or 1/4 inch NPT threaded air supply port intended for use with air or inert gasses only, as well as one or two optional speed control throttles.

The main electronics cartridge assembly of the Bettis Q-Series QC54 FOUNDATION Fieldbus consists of a hornet (RAI FOUNDATION Fieldbus Communication) printed circuit board, an FFCC (Power FOUNDATION Fieldbus Control Connect) printed circuit board, a button (LED) printed circuit board, and wiring and screw terminals. The sensor bracket cartridge assembly consists of a sensor (Sensing) printed circuit board and a four-position connector. The pneumatic pilot valve cartridge assembly consists of one or two certified piezo pneumatic pilot valve components, each paired with two flying lead wires. The signal and supply circuits are electrically isolated from elements that may be earthed, while the metal elements of the actuator control modules are electrically connected to earth terminals.

The main electronics cartridge assembly of the Bettis Q-Series QC40 AS-i consists of an AS-i Electronics (Actuator Sensor Interface) printed circuit board, wiring and screw terminals. The switch cartridge assemblies consist of one or two mechanical golden contact switches or one or two NAMUR level proximity switches, each paired with two flying lead wires. The signal and supply circuits are electrically isolated from elements that may be earthed, while the metal elements of the actuator control modules are electrically connected to earth terminals.

For more specifics concerning construction and description details of the actuator control module, reference the manufacturer’s sales literature and specification sheets.

Ratings – The equipment is certified to the following ratings.

The ambient operating temperature range of the QC54 FOUNDATION Fieldbus actuator control module is -20 °C to +50 °C in types of protection intrinsically safe apparatus, and nonincendive dust-protected enclosure equipment, when properly mounted and installed.

The ambient operating temperature range of the QC40 AS-i actuator control module is -25 °C to +60 °C in type of protection nonincendive dust-protected enclosure equipment, when properly mounted and installed.

The maximum supply pressure range is 0.2 to 0.8 MPa (29 to 116 psi).

The equipment is designated for installation transient overvoltages up to levels of Overvoltage Category II and environmentally classified as Pollution Degree 2.

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In type of protection intrinsically safe apparatus, the barrier protected actuator control module (Bettis Q-Series, QC54) equipment is connected to a certified intrinsically safe linear circuit with the following maximum entity parameter values.

Power Supply and Signal Circuit, J1 Bus Connector (Terminals 1, 3) is:
 $V_{max}(U_i) = 30$ VDC, $I_{max}(I_i) = 380$ mA, $C_i = 5$ nF, $L_i = 10$ μ H, $P_i = 1.5$ W

In type of protection intrinsically safe apparatus, the barrier protected actuator control module (Bettis Q-Series, QC54) equipment is connected to a certified intrinsically safe linear circuit in accordance with fieldbus intrinsically safe concept with the following maximum FISCO parameter values.

Power Supply and Signal Circuit, J1 Bus Connector (Terminals 1, 3) is:
 $V_{max}(U_i) = 17.5$ VDC, $I_{max}(I_i) = 380$ mA, $C_i = 5$ nF, $L_i = 10$ μ H, $P_i = 5.32$ W

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC54) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Power Supply and Signal Circuit (Terminals 1, 3) are:
 $V_{max}(U_i) = 9-32$ VDC, $I_{max}(I_i) = 18$ mA

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC40) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Power Supply and Signal Circuit (Terminals 1, 3) are:
 $V_{max}(U_i) = 24-31.6$ VDC, $I_{max}(I_i) = 34-140$ mA

$I_{min}(I_i) = 34$ mA maximum at 26.5 V (pilot valves off)
 $I_{nom}(I_i) = 85$ mA maximum at 26.5 V (one pilot valve activated)
 $I_{max}(I_i) = 125$ mA maximum at 26.5 V (one pilot valve application)
 $I_{max}(I_i) = 140$ mA maximum at 26.5 V (two pilot valves application)

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC40) equipment is limited to the following nominal digital communication output supply values.

2-Wire NAMUR Proximity Switch Circuit (Cartridge Terminals 2, 3 and 5, 6) are:
 $V_{oc}(U_o) = 8$ VDC, $I_{sc}(I_o) = 3$ mA

2-Wire Potential-Free Contact Switch Circuit (Cartridge Terminals 2, 3 and 5, 6) are:
 $V_{oc}(U_o) = 10.4$ VDC, $I_{sc}(I_o) = 12.8$ mA

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Model Codes – The equipment is identified with the following model code structure.

In type of protection intrinsically safe apparatus, the actuator control module (Bettis Q-Series, QC54) equipment is designated with the following model code(s).

Bettis Q QC54.abcdef, FOUNDATION Fieldbus Actuator Control Module.

- a = Conduit Connection: M or U
- b = Protection Method: F1
- c = Control Module Switch Type: S
- d = Module Action: D, F or S
- e = Future Expansion: K
- f = Language Code: 1

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC54) equipment is designated with the following model code(s).

Bettis Q QC54.abcdef, FOUNDATION Fieldbus Actuator Control Module.

- a = Conduit Connection: M or U
- b = Protection Method: F4
- c = Control Module Switch Type: S
- d = Module Action: D, F or S
- e = Future Expansion: K
- f = Language Code: 1

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC40) equipment is designated with the following model code(s).

Bettis Q QC40.abcdef, AS-i Actuator Control Module.

- a = Conduit Connection: M or U
- b = Protection Method: F4
- c = Control Module Switch Type: G or N
- d = Module Action: D, F or S
- e = Future Expansion: K
- f = Language Code: 1

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13. **Specific Conditions of Use:**

In type of protection intrinsically safe apparatus, the actuator control module (Bettis Q-Series, QC54) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0 and Zone 20 Approvals, the actuator/valve is suitable for non-flammable process connections free of condensation or moisture to Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, and Class I, Zone 0, Group IIC and Zone 20, Group IIIC, hazardous (classified) locations.
2. Maximum permissible supply pressure is 8 bar (116 psi).
3. Potential Electrostatic Charge Hazard – Use only damp cloth when cleaning or wiping. Do not use solvent.
4. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
5. For mechanical installation of the module, see installation instruction leaflet DOC.IG.BQC54.1, as shipped with the module.
6. The actuator control module equipment shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application, including a tool removable cover.

In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC54) equipment is designated with the following specific conditions of use.

1. For Division 2 Approvals, the actuator/valve is suitable for non-flammable process connections free of condensation or moisture to Class I, Division 2, Groups A, B, C and D, Class II, Division 2, Groups E, F and G, Class III, Division 2, hazardous (classified) locations.
2. Maximum permissible supply pressure is 8 bar (116 psi).
3. Potential Electrostatic Charge Hazard – Use only damp cloth when cleaning or wiping. Do not use solvent.
4. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
5. The installer shall provide transient over-voltage protection external to the equipment such that the voltage at the supply terminal of the equipment does not exceed 140 % of the voltage rating of the equipment.
6. For mechanical installation of the module, see installation instruction leaflet DOC.IG.BQC54.1, as shipped with the module.
7. The actuator control module equipment shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application, including a tool removable cover.

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In type of protection nonincendive dust-protected enclosure equipment, the actuator control module (Bettis Q-Series, QC40) equipment is designated with the following specific conditions of use.

1. For Division 2 Approvals, the actuator/valve is suitable for non-flammable process connections free of condensation or moisture to Class I, Division 2, Groups A, B, C and D, Class II, Division 2, Groups E, F and G, Class III, Division 2, hazardous (classified) locations.
2. Maximum permissible supply pressure is 8 bar (116 psi).
3. Potential Electrostatic Charge Hazard – Use only damp cloth when cleaning or wiping. Do not use solvent.
4. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
5. The installer shall provide transient over-voltage protection external to the equipment such that the voltage at the supply terminal of the equipment does not exceed 140 % of the voltage rating of the equipment.
6. For mechanical installation of the module, see installation instruction leaflet DOC.IG.BQC40.1, as shipped with the module.
7. The actuator control module equipment shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application, including a tool removable cover.

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

15. **Schedule Drawings:**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History:**

Details of the supplements to this certificate are described below:

Date	Description
5 th October 2017	Original Issue.
26 th November 2018	<u>Supplement 1:</u> Report Reference: - RR215311 Dated of 26 th November 2018 Description of the Change: updated label to reflect new design control location. Updated product model code. Transfer of Company from Emerson Process Management, Valve Automation, EL-O-Matic BV to Emerson Process Management Valve Automation Inc.

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