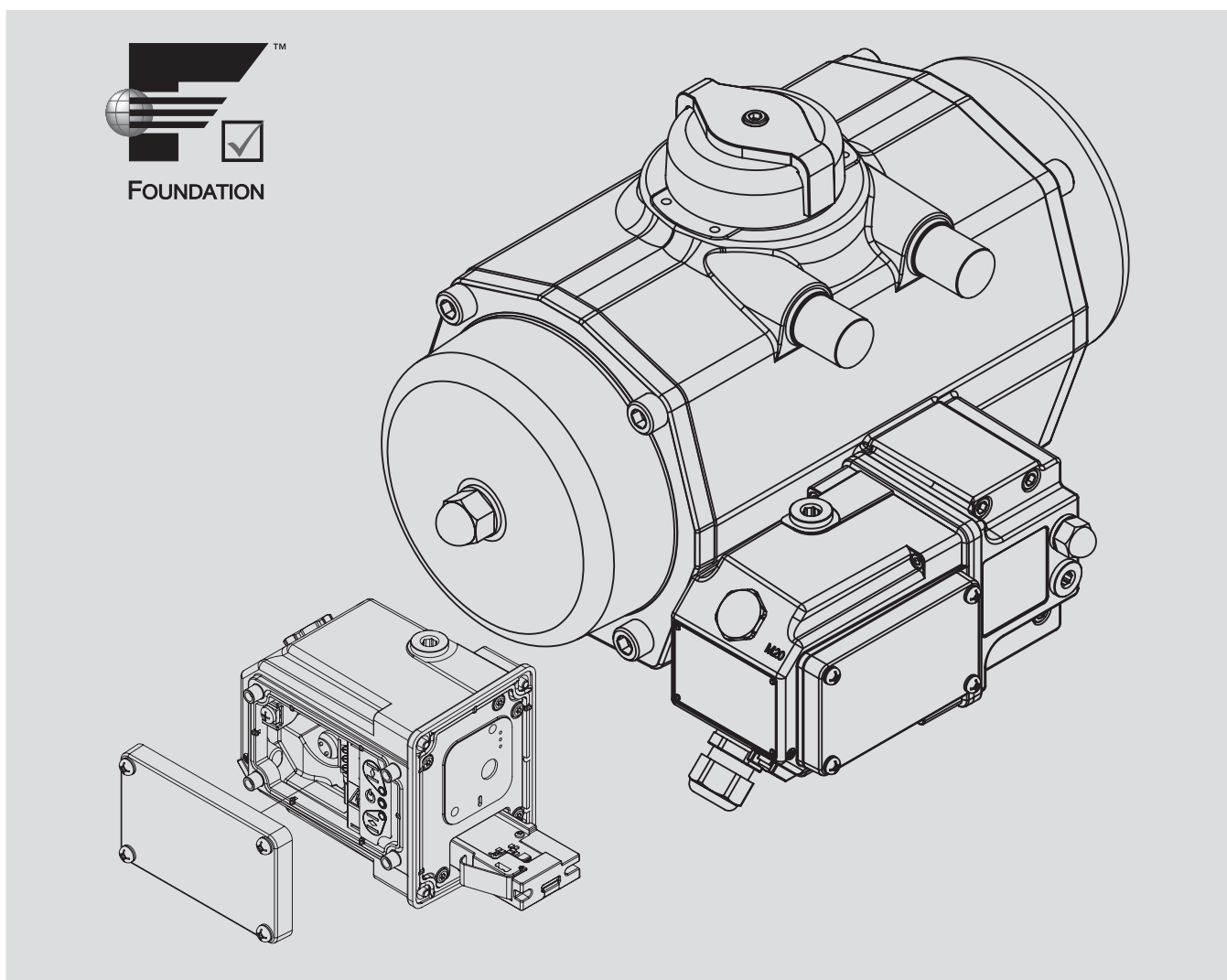


FieldQ Valve Actuator

QC34, Foundation Fieldbus Control Module





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A ESSENTIAL INSTRUCTIONS

READ THIS SECTION BEFORE PROCEEDING!

A1 Before you start

- FieldQ pneumatic actuators must be isolated both pneumatically and electrically before any (dis)assembly is begun.
- It is not permitted to connect a pressure vessel with unreduced media to the FieldQ pneumatic actuator.
- FieldQ 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. See applicable sections of Installation Guide DOC.IG. QC34.1 or installations in hazardous areas.
- Installation, adjustment, putting into service, use, assembly, disassembly and maintenance of the pneumatic actuator must be done by qualified personnel.

A2 Orientation (see fig. A1)

The FieldQ actuator is an integrated concept for the automation of quarter turn valves, dampers or other quarter turn applications. It consists of three basic parts:

1. Pneumatic actuator
2. Pneumatic Module
3. Control Module

A3 Applicable control modules

QC34 - FOUNDATION Fieldbus™

QC34 - FOUNDATION Fieldbus™ Non-Incendive or Non Sparking

QC34 - Foundation Fieldbus™ Intrinsically safe

Check the module label for the right execution.

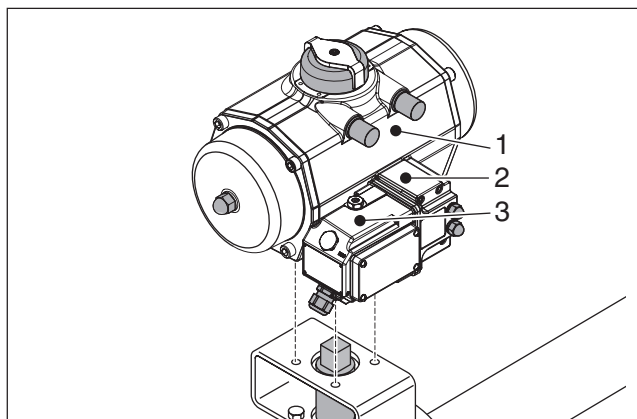


Fig A.1 Orientation

A4 Installation, operation and maintenance reference documents

Before mounting, installing, commissioning or (dis)assembling the actuator consult the following documents:

- All chapters of this Reference manual and
- Installation Guide of the supplied Control Module.
- For installation in hazardous area's: Hazardous Area Control Drawing installation instructions, as shipped with the Control module.

All these items are available from www.FieldQ.com or through your local Valve Automation representative).

A5 Operating medium

- Air or inert gasses.
- Air filtered at 5 micron.
- Dew point 10 K below operating temperature.
- For subzero applications take appropriate measures.

A6 Product integrity

- Assembly or disassembly is only allowed for replacing sealings and guide bands (softparts).
- Under the European Pressure Equipment Directive, conversion of actuators may only be performed by companies or personnel, authorized by Emerson Process Management .

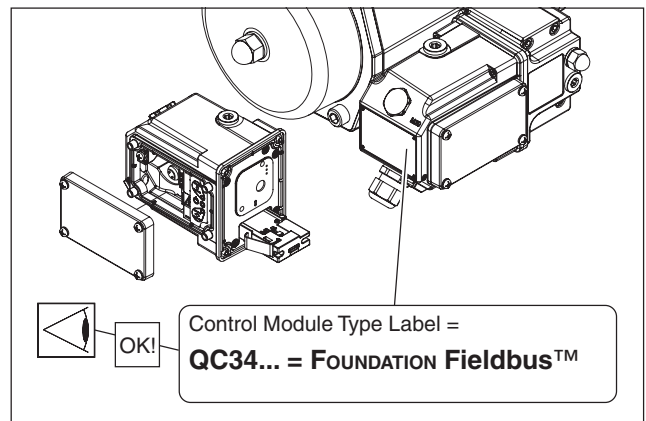


Fig A.2 Module check

A7 Hazardous areas

Improper installation in a hazardous area can cause an explosion.

- Assembly, disassembly and maintenance must be done outside potentially explosive area's
- For information about installation in a hazardous area, refer to the appropriate sections of the Installation Guide, as shipped with the control module.

A8 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.

A9 Prevent moisture entering the actuator

Condensation or moisture that enters the actuator, the pneumatic module 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.
- Seal all conduit openings whether used or not.

A10 Warning ; Magnetic material

- * Do not put the FieldQ in direct contact with magnetic material. This can cause damage or malfunction.

A11 Warning ; Temperature range

- * Do not exceed the temperature limits of the module as specified in this manual or in the Installation Guide DOC.IG.QC34.1. This can cause damage or malfunction.

1 Module Description

1.1 FieldQ™ FOUNDATION Fieldbus™ Control Module

This manual contains installation, operating, and maintenance information for the FieldQ™ FOUNDATION Fieldbus™ module (Figure 1).

Only qualified personnel should install, operate, and maintain this module. If you have any questions concerning these instructions or for information not contained in this instruction manual, contact your local Valve Automation sales office or sales representative for more information.

The FieldQ module is an interoperable, process-controlling, communicating, microprocessor-based, module. In addition to its primary function of controlling the position of the valve, the FieldQ module, using FOUNDATION Fieldbus™ communications protocol, gives easy access to information critical to process operation, as well as process control. You can gain information 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 configuration device, you can obtain information about the health of the module and the actuator and valve control elements. You can also obtain asset information about the module. You can set input and output configuration parameters. Using the FOUNDATION Fieldbus™ protocol, information from the module can be readily integrated into a control system.

The FieldQ module is an assembly in an IP65 / NEMA4X enclosure that provides input and output signals to control and monitor the FieldQ actuator. The module is self-contained providing control and position feedback via the Fieldbus interface.

Figure 1.2 provides a cutaway view of the module with key connection points labeled. Connect to the module by removing the cover, inserting the wiring through the electrical entries and connecting each wire to the proper location on the terminal board. More information about connecting a module can be found in §2.5.

After connecting the module, set the limit switches for the module by running the initialization procedure described in section §4.2.4.

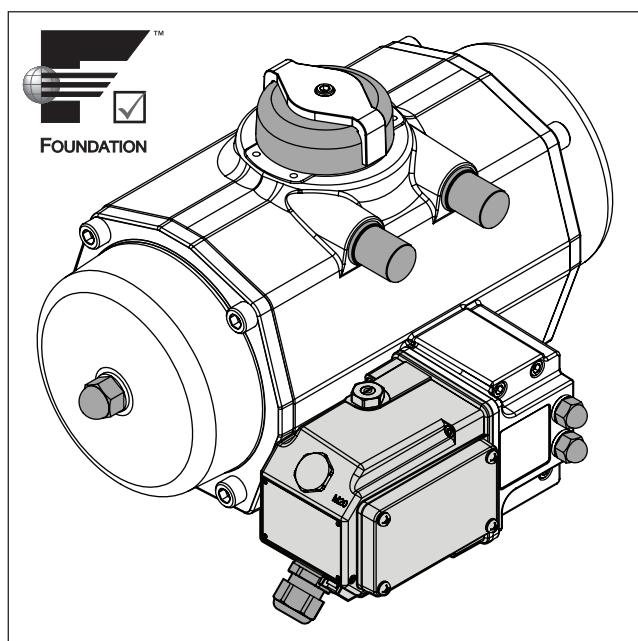


Fig 1.1 FieldQ Foundation Fieldbus™ Module

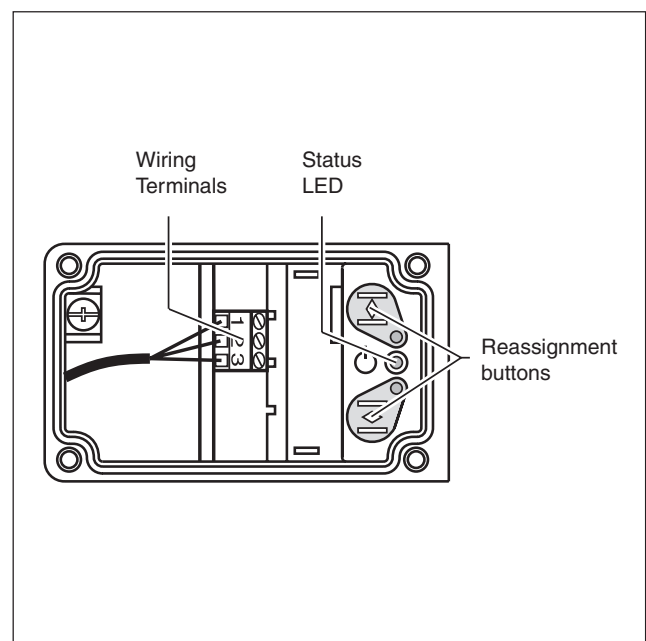


Fig 1.2 Cutaway of the QC34 Control Module

1.2 FOUNDATION Fieldbus™ Communication

The FieldQ QC34 module uses the FOUNDATION Fieldbus™ protocol to communicate with other field devices and the host system. FOUNDATION Fieldbus™ is an all-digital, serial, two-way communication system, which interconnects field equipment such as transmitters, valve controllers, and process controllers. Fieldbus is a local-area network (LAN) for devices used in both process and manufacturing automation with built-in capability to distribute the control application across the network.

The fieldbus environment is the base level group of digital networks in the hierarchy of plant networks. The fieldbus retains the desirable features of analog systems such as:

- A standardized physical interface to the wire
- Bus-powered devices on a single wire pair
- Intrinsic safety options

In addition, use of FOUNDATION Fieldbus™ enables:

- Increased capabilities due to full digital communications
- Reduced wiring and wire terminations due to multiple devices on a single pair of wires
- Increased selection of suppliers due to interoperability
- Reduced loading on control room equipment available by distributing control and input/output functions to field devices
- Speed options for process control and manufacturing applications

For more information on the operation of the FOUNDATION Fieldbus™, refer to your DeltaV documentation and the FOUNDATION Fieldbus™ specifications.

1.3 Device Description and Methods

This manual describes device setup using the Device Descriptions (DD) specified by the FOUNDATION Fieldbus™ protocol. Parameter access and methods are also described in this manual. FOUNDATION Fieldbus™ uses the DD, Function Blocks, and a Capabilities File to achieve interoperability between the module and fieldbus components from other manufacturers in the control systems including hosts and other devices. The DD provides information to describe the data interface to the device while the Capabilities File provides information about the device to enable the creation of a control strategy

without a physical device (off-line configuration).

For fieldbus devices, in addition to providing parameter definitions and other information required by the control system to communicate with the device, the DD may also include methods. Methods can be used for a variety of functions including remote restarting of the control module. Methods are a predetermined sequence of steps using a structured programming language and the interface definition for the module.

How the method prompts and how messages appear is determined by the host system. For information on using methods on the host system, see Appendix E and the appropriate host system documentation.

1.4 Node Address

The default node address of the FieldQ QC34 module is 247 (status = standby).

Use the host system to commission the module and assign it a working address. For information on using the host system for device commissioning and assigning addresses, see the appropriate host system documentation.

1.5 FOUNDATION Fieldbus™ function blocks

Function blocks, within a fieldbus device, perform the various functions required for process control, such as process variable input, output, and control functions such as Proportional/Integral/Derivative (PID) functions. The standard function blocks provide a common structure for defining function block inputs, outputs, control parameters, events, alarms, and modes. Then, function blocks can be combined into a process that can be implemented within a single device or in multiple devices via the fieldbus network.

The following function blocks are implemented in the FieldQ module.

- Resource Block (RB)
- Transducer Block (TB)
- Analog Input (AI) Function Block
- Discrete Output (DO) Function Block
- 2x Discrete Input (DI) Function Block
- PID Function Block

Function Block parameters and usage is described in the host system documentation. Please refer to this documentation for detailed information on function blocks.

1.5.1 Resource Block

The Resource Block contains hardware and electronics information. There are no linkable inputs or outputs to the Resource Block.

1.5.2 Transducer Block

The Transducer Block is the primary interface to the control function of the device. This Transducer Block contains all the parameters necessary to configure the device and set diagnostics parameters.

1.5.3 Analog Input (AI) Block

The Analog Input (AI) function block processes field device measurements and makes this data available to other function blocks.

The AI block supports alarming, signal scaling, signal filtering, signal status calculation, mode control, and simulation. The AI block is widely used for scaling functionality.

1.5.4 Discrete Output (DO) Block

The Discrete Output (DO) function block processes a discrete setpoint then outputs the setpoint to a specified I/O channel to produce an output signal.

The DO function block supports mode control, output tracking, and simulation. There is no process alarm detection in the block. In operation, the DO function block determines its setpoint, sets the output, and, as an option, checks a readback signal from the field device to confirm the physical output operation.

1.5.5 Discrete Input (DI) Block

The Discrete Input (DI) function block processes a single discrete input from a field device and makes it available to other function blocks. The DI function block supports mode control, signal status propagation, and simulation.

1.6 Related Information

1.6.1 FOUNDATION Fieldbus™ Installation and wiring guidelines

FOUNDATION Fieldbus™ Technical Overview (available from the Fieldbus Foundation)

1.6.2 Other Related Information

Other documents containing information related to the FieldQ Control module include:

1.604.02	Control Module data sheet
1.604.021	Diagnostics data sheet
DOC.IG.QC34.1	Installation Guide QC34 Control Module with FOUNDATION Fieldbus™

These documents are free available for download from www.FieldQ.com or contact your local FieldQ representative.

1.7 Specifications, FOUNDATION Fieldbus™ Hardware

Electrical Entry

2 x M20 or 1/2" NPT

Electrical Input, Fieldbus Interface

Voltage Level	: 9 to 32 volts
Nominal Current	: 22 mA, maximum
Reverse Polarity Protection	: Unit is not polarity sensitive
Required external protection	: Restrict the power supply current to <600mA.

Function Blocks Available

Analog Input (AI)
Discrete Input (DI)
Discrete Output (DO)
PID to Proportional/Integral/Derivative

Digital Communication Protocol

Manchester-encoded digital signal that conforms to IEC 1158-2 and ISA 50.02

Operating Ambient Temperature Limits

-20°C to +50° C (-4° F to 122° F)

Electrical connections

Terminal Block
Optional quick connectors

Housing

Material : Aluminum Alloy
Finish : Polyester non-TGIC based powder coating

Enclosure : IP65 / NEMA 4X

2 Installation

2.1 Introduction

The FieldQ FOUNDATION Fieldbus™ Control module is a two-wire device powered by the bus.

For various application guides like installation and wiring guidelines please check:

www.fieldbus.org/About/FoundationTech/Resources/

The following sections provide instructions on pneumatic and electric installations. For instructions on commissioning, see chapter 3.

2.2 Applicable control modules

QC34 - FOUNDATION Fieldbus™

QC34 - FOUNDATION Fieldbus™ Non-Incendive or Non Sparking

QC34 - Foundation Fieldbus™ Intrinsically safe

2.3 Before starting

- * Be sure that the actuator is correctly mounted on the valve before connecting air supply and electrical wiring (see Installation & Operation Manual FieldQ Valve Actuator, DOC.IOM.Q.E)
- * Check the module label for the right execution (see fig. 2.2)
- * Check the type of actuator: single or double acting (see fig. 2.2)

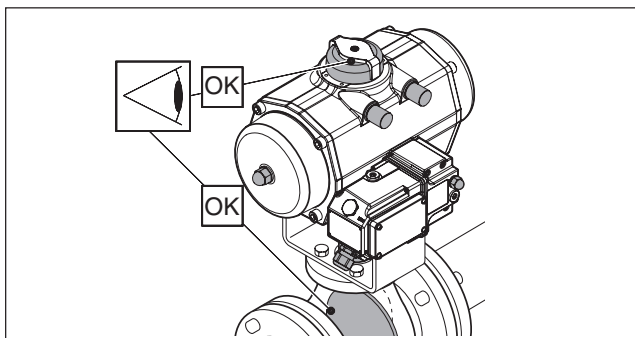


Fig. 2.1: Check proper mounting before connecting air supply and electrical wiring.

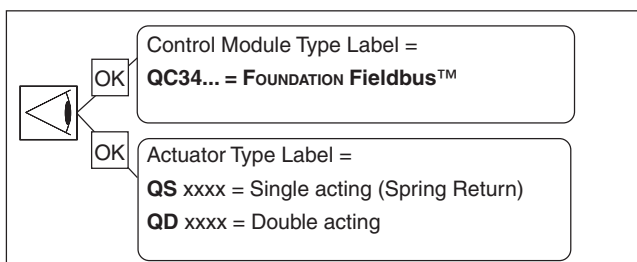


Fig. 2.2 Identification

2.4 Pneumatic connections

IMPORTANT

- * The actuator/valve combination can move after connecting the air supply.
- * Ensure that the pneumatic module and the control module are mounted properly to the actuator to achieve a degree of ingress protection rated IP65/NEMA4X, before connecting the air supply.
- * Check the maximum pressure $P_{max} = 8\text{bar}/116\text{Psi}$
- * Be sure that the minimum required supply pressure for the application is available at the actuator.
- * Condensation or moisture that enters the actuator, the pneumatic module or the control module can damage these components and can result in failures.
- * The venting ports on the pneumatic module (see fig. 3) are equipped as standard with silencers/filters rated IP65/NEMA4X.
- * In case IP65/NEMA4X ingress protection is required, the exhaust ports Ra and Rb and the electrical entries must be fitted with devices rated IP65/NEMA4X or higher.

2.4.1 Operating media

- * Air or inert gases.
- * Air filtered at 5 micron.
- * Dew point 10 K below operating temperature.
- * For subzero applications take appropriate measures.

2.4.2 Single acting (spring return) or Double acting actuator

- 1 Remove the plug from the air supply (Ps).
- 2 Connect air supply to port (Ps).

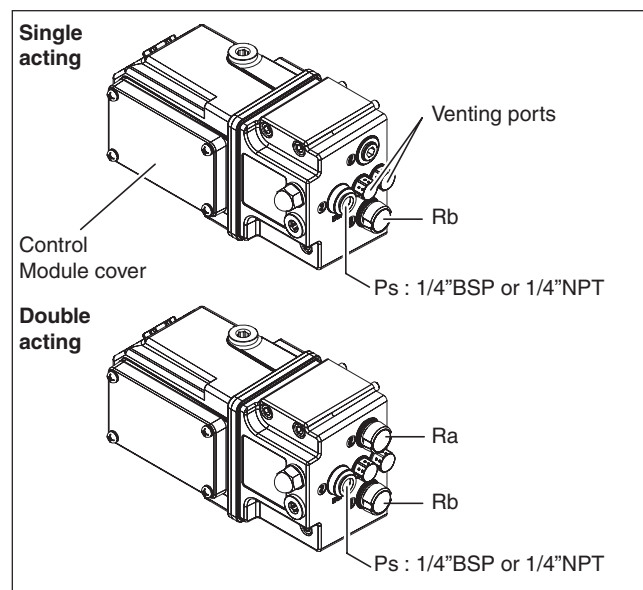


Fig. 2.3: Pneumatic connections

2.5 Electric connections

2.5.1 Electrical Input, Fieldbus Interface

Voltage range *	9 to 32 volts
Maximum current	22 mA
Reverse polarity protection	Unit is not polarity sensitive.
Required external protection	Restrict the power supply current to <600mA.
Environmental conditions :	
Temperature *	-20°C to +50°C (-4°F to +122°F)
Humidity	0 to 85% at 25°C(+77°F) derate to 50% above 40°C (104°F) (non-condensing).
Altitude	Operating full power available up to 2000 meter (6000 feet).
Use	In- and outdoor.

* In case the Control module is used in Hazardous locations, check the Control Drawings as per chapter 4.2 for the applicable temperature or voltage range.

2.5.2 Electrical data of the hazardous area executions

Please check the following Chapters of Installation Guide (DOC.IG.QC34.1) for electrical data in case the control module is used in a Hazardous location:

Non incendive/Non Sparking

- QC34 FF (FNICO) Chapter 10

Intrinsically safe

- QC34 FF Chapter 11

- QC34 FF (FISCO) Chapter 12

2.5.3 Wiring dimensions

Solid wire : 2.5mm² max.

Stranded wire : 0.2-3.3mm² or 24-12 AWG

2.5.4 Tools

Tool for terminals : Screw driver 0.6 x 3.5

Tool for cover screws : Screw driver for cross slotted Phillips screws nr. 2

WARNING:

- * Do not put the Control module and the Pneumatic module in direct contact with magnetic material. This can cause damage or malfunction of the position feedback.
- * If the Control module is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- * If required, mount earth wire (1) between top (2) and bottom (3) ring of earth wire connection (see figure 2.5.2).

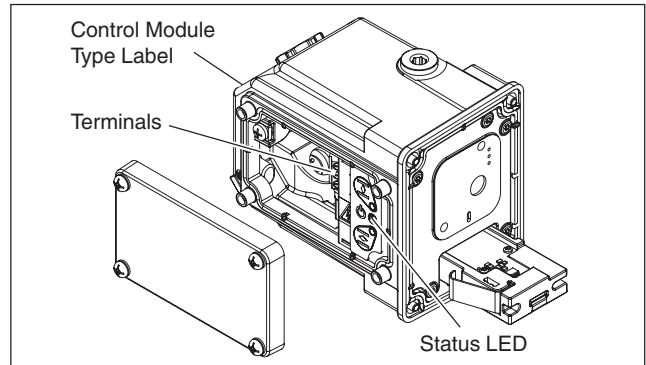


Fig. 2.5.1 Installing wiring

2.5.5 Procedure

- 1 Remove control module cover (see figure 2.5.1)
- 2 Guide the cable(s) through the electrical entry(ies).
 - Use and mount cable glands as required by national or local legislation.
 - When IP65/NEMA4X ingress protection is required, the electrical entries must be fitted with glands rated IP65/NEMA4X or higher.
- 3 Connect the FOUNDATION™ Fieldbus signal to the applicable terminals (see figure 2.5.3).
 - For 7/8" or M12 quick connector pinout, see fig 6.
 - For hazardous area connections, see the control drawings as indicated in chapter 2.5.2.
- 4 Mount the control module cover to the housing (see figure 2.5.1) or continue with chapter 3. Take care that the cover seal is in place to comply to dust and water tightness according IP65 / NEMA4X.

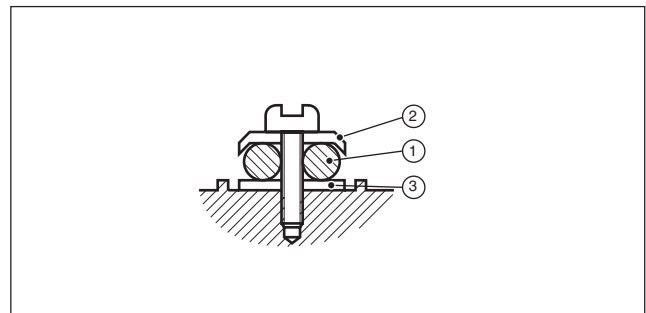


Fig.2.5.2 Earth wire connection

2.5.6 FOUNDATION Fieldbus™ installation and wiring guidelines

For various application guides like installation and wiring guidelines please check:
www.fieldbus.org/About/FoundationTech/Resources/

Electrical Connections

Signal	Internal	Quick connector	
	terminal nr	nr	color
FF signal -	1	2	Blue
Shield	2	4	Green / Yellow
FF signal +	3	1	Brown
		3	Not connected

Fig. 2.5.3 Terminal and quick connector connections

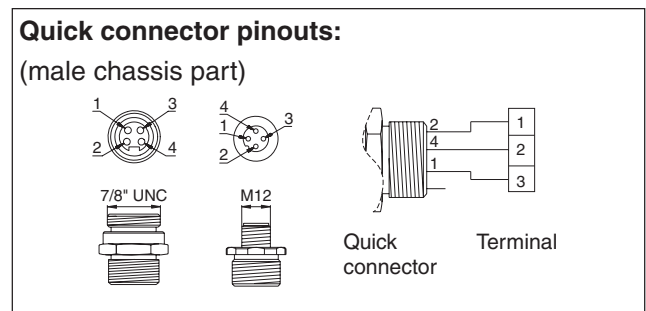


Fig. 2.5.4 Quick connector pinouts

3 Commissioning

In order to commission the QC34 module three steps need to be done in advance:

- 1 Implementation of the device driver in the host system.
- 2 Initialization of the FieldQ QC34 module.
- 3 Function block assignment to channels.

3.1 Implementation of the device driver in the host system.

Two versions of the DD-drivers are available for the QC34 module:

- **QC34 Standard DD Rev 2** - DD files for use with other Foundation FieldBus host systems and tools
- **QC34 PlantWeb DD Rev 2** - DD files tailored specifically for use with Emerson PlantWeb Systems (DeltaV).

These DD drivers are available for download from www.FieldQ.com.

Please, see the documentation of your host system, how to implement these device drivers in your host system.

3.2 Initialization

Initialization finds the end positions of the actuator. Switching will then occur within the end stop offsets from these end positions. This process is done automatically, by the module, however, the user must start it and the unit must be wired according chapter 2. The initialization process can be started in two ways:

1. Initialization using the local buttons (see §3.2.1).
2. Initialization using a bus command (see §3.2.2).

WARNING:

- * During the initialization routine the actuator /valve combination will cycle several times.
- * Before initialization check whether the actuator and valve have the same "Open" and "Closed" positions.
- * Ensure that the valve stroke is not obstructed before the initialization routine is started.

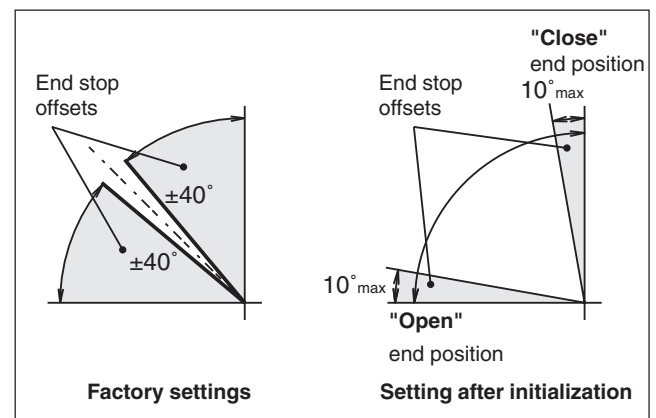


Fig 3.1 Feedback characteristics

3.2.1 Initialization using local buttons

For "Initialization using the local buttons" digital communication is not required, power supply is necessary (9V to 32V DC).

- 1 Push "Open" and "Closed" reassignment buttons at the same time for 4 seconds.
- 2 Status LED will blink.
- 3 Actuator will cycle 2 or 3 times.
- 4 At the end of the routine the Status LED switches to constant on, indicating that the initialization was successful.

Table 3.1 Status LED indications

Status	Status LED action
OK (init successful)	Constant on
Initializing	Blinking (see fig 3.2)
Init error	Flashing (see fig 3.2)
Init default	Flashing (see fig 3.2)
Identification	Flashing for 5 minutes

Table 3.2 Button board functionality

Action	Reassignment buttons
Set to factory default	Push both buttons and hold while powering up. Release buttons when Status LED is solid.
Initialize	While powered up push both buttons until Status LED starts blinking

Remarks:

- If the Status LED is flashing, the auto initialization routine has failed, see §3.4.2.
- If the read out in the PLC or DCS is reversed, see §3.4.3.
- If the device is in operation and after a while the "Open" or "Closed" feedback is lost, see §3.4.4.
- If the initialization can not be started via the push buttons, see §3.4.5.

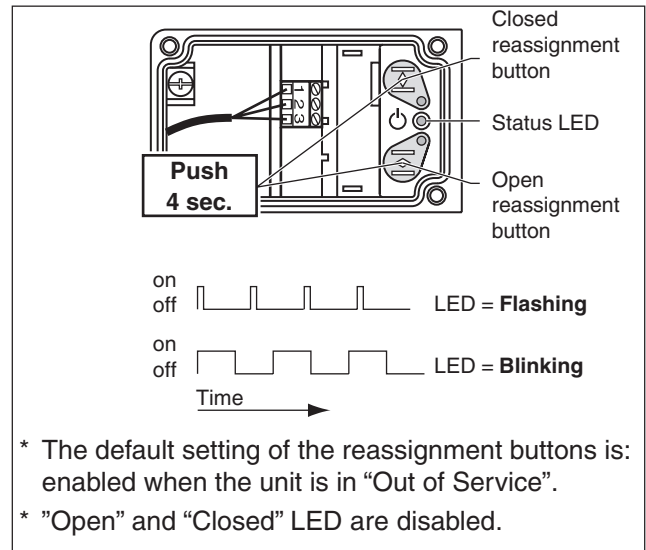


Fig. 3.2 Reassignment buttons (located behind front cover of module).

3.2.2 Initialization using Bus Command

- 1 Set the Transducer Block to “Out of Service”.
- 2 Set sub-parameter “AUTO_INIT_COMMAND” of parameter AUTO_INITIALIZATION to start auto init.
- 3 When the initialization is running, INITIALIZATION_STATUS will indicate running and the Status LED will blink.
- 4 Actuator will cycle two or three times.
- 5 When the initialization is successful, INITIALIZATION_STATUS will indicate successful and the Status LED is on.
- 6 Set the Transducer Block to “Auto”.

Remark:

- If the auto initialization has failed, the status LED on the module is flashing and the status of parameter AUTO_INITIALIZATION will indicate a possible cause, see §3.4.2
- After initializing check if the feedback matches the actual valve position. If the position feedback in the PLC or DCS is reversed, see §3.4.3.
- If readjustment of the positions is needed, without cycling the actuator, see §3.4.4
- If it is not possible to finish the auto-initialization routine, the switch points can be set, according §3.4.3

3.3 Function block assignments

- 1 Set the required Function Block(s) to “Out of Service”.
- 2 Set the required channel number(s). The following are the basic channel assignments that should be used when using the FF QC34 Control Module:
- 3 Assign Channels and signals to the appropriate function blocks (see table 3.3)
- 4 Download the Function Block(s) to the “system”.
- 5 Set the Function Block(s) to “Auto”.

3.3.1 Check functioning

Before function test:

- Check or set “Resource Block” to “Auto”.
 - The unit must be connected to a host system and power must be connected (see chapter 3).
 - The unit must be successfully initialized (Status of Transducer Block AUTO_INITIALIZATION must be successful).
- 1 Set the Transducer Block to “Out of Service”.
 - 2 Set the Function Block to “Out of Service”.
 - 3 Set channel number of the DO Function Block block to 1
 - 4 Download the settings to the system.
 - 4 Set the Function Block to the “Auto” mode.
 - 6 Set parameter "SP_D" to “ open”.
 - 7 Actuator moves to "Open" position.
 - 8 Set parameter "SP_D" to “ closed”.
 - 9 Actuator moves to "Closed" position.
 - 10 Set the Transducer Block to “Auto”.

3.3.2 Recognizing LED

To recognize a particular FieldQ actuator in the plant “Recognizing LED” function can be activated in the Transducer Block . When this function is activated, the status LED will blink for 5 minutes. To start the LED:

- 1 Set “FLASH_LED”-parameter to start.
- 2 Status LED on the unit will blink for 5 minutes.
- 3 After 5 minutes the “FLASH_LED”-parameter will change back to finished.

Table 3.3 Function block assignments

Function block	Signal	Channel
DO	Command to the actuator to open or close	1
DI	Feedback from the actuator indicating open, close, opening or closing	2
	Switch 2 (Open) state from the actuator indicate active or inactive	3
	Switch 1 (Closed) state from the actuator indicate active or inactive	4
AI	Temperature of the electronics (default in°C).	5

3.4 Troubleshooting

3.4.1 “Factory default settings”, using the button board.

To set the control module to its factory default settings, do the following;

- 1 Connect power according chapter 4 and observe that the Status LED is either on or flashing.
- 2 Disconnect the power.
- 3 Press both reassignment buttons.
- 4 Reconnect power.
- 5 Status LED goes on.
- 6 Release the reassignment buttons.
- 7 Observe that the Status LED indicates that the unit is in its “Init Default” state (flashing)

3.4.2 If auto initialization procedure has failed

If the auto initialization has failed, the status LED on the module will flash and the status of the AUTO_INITIALIZATION parameter will indicate a possible cause:

Table 3.4 Status of the initialization procedure:

Error	Solution
Undetermined bad repeatability	Check air-pressure at the actuator and/or actuator sizing.
Running,	
Aborted	Operator: restart
Undetermined	Difference between open and close position too small. Check proper stroking of the actuator/valve unit.
Time Out	It takes too long before end-positions are found. Check air-pressure at the actuator and/or actuator sizing.
Range Error	Difference between open and closed end position is too small. Check air-pressure, check proper valve rotation.
Successful	
No Valid Data	Not initialized, start initialization

To solve this:

- 1 Check table 3.4 and try the suggested solution to solve the problem.
- 2 Check Actuator assembly code (see Installation & Operation Manual FieldQ Valve Actuator, DOC.IOM.Q.E)
- 3 Repeat the initialization procedure (see §3.2).
- 4 When the actuator does not move within 10 seconds, the auto initialization will fail.

To solve this either;

- perform the “default setting” procedure (see §3.4.1) and repeat the initialization procedure (see §3.2), or
- set the limit switch points individually by the bus see (see §3.4.4)

3.4.3 If the position feedback is reversed.

- 1 Go to Transducer block.
- 2 To set the "Open" position;
Set sub parameter OPEN_END_POSITION of parameter CFG_SWITCH_POINTS to: "set to current position".
The "Closed" position will change automatically.
- 3 To set the "Closed" position;
Set sub parameter OPEN_END_POSITION of parameter CFG_SWITCH_POINTS to: "set to current position".
The "Open" position will change automatically.

Note:

- If "Shutdown" is activate (see 4.2.3.3), check if "Action" is still "OK".

3.4.4 If the "Open" or "Closed" feedback is lost.

- 1 Check if the actuator/valve unit is working correctly.
- 2 If it is safe to cycle the actuator, perform the initialization procedure (see §3.2).
- 3 If it is not safe to cycle the actuator, perform the following procedure:
 - 1 Go to Transducer block.
 - 2 In case the "Open" position is lost:
Set sub parameter OPEN_END_POSITION of parameter CFG_SWITCH_POINTS to:
"set to current position".
 - 3 In case the "Closed" position is lost:
Set sub parameter CLOSE_END_POSITION of parameter CFG_SWITCH_POINTS to:
"set to current position".

Note:

- If the problem is persistent, increase the endstop offset (see 4.2.3.2).

3.4.5 If the initialization can not be started via the push buttons.

- 1 Ensure the device is "Out Of Service".
- 2 Ensure that the buttons are enabled in the transducer block (parameter BUTTONBOARD_ENABLE, index 34).
Remark:
Setting the device to default will always enable the push buttons as long as the device is in "Out Of Service" (see §3.4.1).
- 3 Ensure that the unit is not in Shutdown. See Transducer block parameter SHUTDOWN_STATUS, index 32. If the device is in Shutdown see 3.4.6

3.4.6 If the device is in Shutdown

When the device is in Shutdown an internal failure has occurred.

If the internal failure is re-solved, the actuator shutdown status can be manually reset.

- 1 Normally the SHUTDOWN_RESET parameter is inactive. For resetting the shutdown status parameter SHUTDOWN_RESET must be set to Reset.
- 2 When this reset is completed successfully, the SHUTDOWN_STATUS parameter will be FieldQ operational and SHUTDOWN_RESET parameter will return to inactive.

If you do not want to manually reset the device, you can set the device to Auto-Recovery as described in 4.2.3.3.

If the problem persists, please contact your local FieldQ representative.

4 Detailed Configuration

The FieldQ QC34 Module contains the following function blocks:

Block	Index
Resource	1000
Transducer	1100
Discrete Input (DI)	1200
Discrete Input (DI)	1300
Discrete Output (DO)	1400
Analog Input (AI)	1500
PID	1600

See chapter 3, table 3.3, which channel should be assigned to which function block.

This section contains more detailed information for configuring the Resource and Transducer Block parameters to setup the module. Access to each parameter depends upon the host system software. For information on using the host system to modify block parameters, see the appropriate appendix and host system documentation.

- For reading or writing identification parameters open the resource block.
- For reading or writing configuration parameters and alerts open the transducer block.

4.1 Resource block

The Resource Block describes the characteristics of the fieldbus device such as device name and type, manufacturer, serial number, amount of free memory, and free time. There is only one Resource Block in the module.

The parameters for configuring the Resource Block are referenced by group within the following sections.

- 4.1.1 General Resource Block parameters according FOUNDATION FieldBus™ Protocol
- 4.1.2 FieldQ™ specific parameters for Instrument Description
- 4.1.3 FieldQ™ specific parameters which have no influence on the function of the device.

- For complete details of the parameters listed, see table 4.1.
- Refer to the applicable host documentation for procedures to access the referenced parameters.

4.1.1 General Resource Block parameters according FOUNDATION FieldBus™ Protocol

The resource block parameters with index number 1 to 41, are setup according to FOUNDATION FieldBus™ protocol.

- For their default setting and adjustable range, see table 4.1.
- For use of the RESTART parameter see chapter 5.

4.1.2 FieldQ™ specific parameters for Instrument Description

The following parameters are setup specific for the FieldQ™ with FOUNDATION FieldBus™ communication:

Distributor [DISTRIBUTOR],

Index 42

Private Label Distributor. Identifies the company that is responsible for the distribution of this Field Device to customers

Software Revisions [SOFTWARE_REVISION]:

Index 47

States the software revisions of the controller card and the FF interface card

Hardware Revision [HARDWARE_REV],

Index 48

Hardware revision of that hardware in which the Resource Block resides.

Electronics serial number [ELECTRONICS_SN]:

Index 49

Not used on QC34 Module.

Factory serial number [FACTORY_SN]:

Index 50

Serial number of the QC34 Module.

Field serial number [FIELD_SN]:

Index 51

Serial number for the QC34 Module which can be set by the customer.

4.1.3 FieldQ™ specific parameters which have no influence on the function of the device.

The following Recourse block parameter have no direct influence on the operation of the device.

Index No	Name
43	DEV_STRING
44	FB_OPTIONS
45	DIAG_OPTIONS
46	MISC_OPTIONS
52	DETAILED_STATUS For detailed status, see transducer block



Table 4.1 FieldQ™ Resource Block

Index No.	Name	Description	Valid Range	Initial Value	Permission
1	ST_REV	Static data revision. Updated when static data is changed	0 to 65535	0	Read only
2	TAG_DESC	Unique description for the resource block within a system, writable by the host system operator.		spaces	Read / Write
3	STRATEGY	Used by host system administrator to group blocks for easy identification of location.	7 bit ASCII	0	Read / Write
4	ALERT_KEY	Plant unit ID, for host system operator for sorting alarms	1 to 255	0	Read / Write
5	MODE_BLK	The target, actual and permitted modes for the block TARGET ACTUAL PERMITTED NORMAL	OOS, IMAN, AUTO	AUTO	Read / Write
				N/A	Read Only
				ALL	Read / Write
				AUTO	Read / Write
6	BLOCK_ERR	Error status associated with the hardware or software of the resource block 0: Other 1: Block config error (not used) 2: Link configuration error 3: Simulate Active: Based on switch 4: Local override (not used) 5: Device Fail safe set 6: Device needs Maintenance Soon 7: Input failure (not used) 8: Output failure (not used) 9: Memory Failure (FF card) 10: Lost static data (FF card) 11: Lost NV data (FF card) 12: Readback check failed (not used) 13: Device needs Maintenance Now 14: Power-up (not used) 15: Out-of-Service	0 to F	N/A	Read Only
7	RS_STATE	State of the resource 1: Start restart 2: Initialization, actual mode = IMAN 3: Online linking 4: Online, actual mode = Auto 5: Standby 6: Failure	1 to 6	5	Read only
8	TEST_RW	Read write test parameter for interoperability testing	Not applicable	Not applicable	Not applicable
9	DD_RESOURCE	Tag ID string identifying DD resource for info only		spaces	Read only
10	MANUFAC_ID	Manufacturing identification number, used by an interface device to locate DD file for resource. Should show up as Valve automation	0xA2C1	0xA2C1	Read only
11	DEV_TYPE	Manufacturers model number 0xD3A0 = FieldQ – Pneumatic Valve Actuator	0xD3A0	0xD3A0	Read only
12	DEV_REV	Used to locate DD file set to: 2	2	2	Read only
13	DD_REV	Minimum compatible DD revision number associated with this device	2	2	Read only
14	GRANT_DENY	Access control to host computer. GRANT DENY	Valid settings: 0 Program, 1 Tune, 2 Alarm, 3 Local	0x00	Read / Write
15	HARD_TYPES	The types of hardware available as channel numbers on this resource	0 Scalar Input, 1 Scalar output, 2 Discrete Input, 3 Discrete Output		Read only
16	RESTART	Shows current status and allows a manual restart to be initiated, implemented as method with warnings! 1 Run - Normal operation 2 Resource - Restart FF resource keep settings. 3 Defaults - Restart FF resource with default. 4 Processor - Restart FF Resource. 5 Actuator defaults - Restart control module with factory settings 6 Actuator processor - Restart control module, keep settings.	1 to 6	1	Read only

Table 4.1 FieldQ™ Resource Block (Continued)

Index No.	Name	Description	Valid Range	Initial Value	Permission
17	FEATURES	Shows the supported resource block options 0: Unicode strings 1: Reports 2: Faultstate 3: Soft W Lock 4: Out readback	1 to 4	0x1E	Read only
18	FEATURE_SEL	Shows the selected resource block options 0: Unicode strings N/A 1: Reports 2: Faultstate 3: Soft W Lock 4: Out readback	1 to 4	0x1E (ALL)	Read only
19	CYCLE_TYPE	Indicates available function block execution routines 0: Scheduled 1: Completion of Block Execution N/A 2: Manufacturer specific N/A	0 to 2	0	Read only
20	CYCLE_SEL	Indicates selected function block execution routines 0: Scheduled 1: Completion of Block Execution N/A 2: Manufacturer specific N/A	0 to 2	0	Read only
21	MIN_CYCLE_T	Indicates shortest cycle of which the resource is capable	Set by FCS	3200	Read only
22	MEMORY_SIZE	Available memory in empty resource (Mcore).	Set by FCS	0	Read only
23	NV_CYCLE_T	Minimum time interval required to write internal parameters to non-volatile memory. 0 means only external writes	>=0		Read only
24	FREE_SPACE	Memory available for further configuration in FF card	0 to 100%	0	Read only
25	FREE_TIME	Block processing time available to additional blocks	0 to 100%	0	Read only
26	SHED_RCAS	Time duration at which to give up on computer writes to function block RCAs locations.	>=0	640000	Read only
27	SHED_ROUT	Time duration at which to give up on computer writes to function block ROut locations	>=0	640000	Read only
28	FAULT_STATE	Forces output function blocks to the FAULT_STATE condition if active. 1: clear, 2: active	1 to 2	1	Read only
29	SET_FSTATE	Writing a set to this parameter will force FAULT_STATE to be manually initiated 1: off 2: set	1 to 2	1	Read / Write, access controlled by operator
30	CLR_FSTATE	Writing a set to this parameter will force FAULT_STATE to be cleared 1: off 2: clear	1 to 2	1	Read / Write, access controlled by operator
31	MAX_NOTIFY	Absolute Maximum number of unconfirmed notify messages possible.	5	5	Read only
32	LIM_NOTIFY	Selected Maximum number of unconfirmed alert notify messages possible	0 to MAX_NOTIFY	MAX_NOTIFY	Read / Write
33	CONFIRM_TIME	Wait time before re-try. 0 = no retry	>=0	640000	Read / Write
34	WRITE_LOCK	If set no writes accept to clear write lock will be allowed 1: not locked 2: locked	1 to 2	1	Read / Write, access controlled by operator
35	UPDATE_EVT	Alert generated by any change to the static data			
		UNACKNOWLEDGED: 0 undefined, 1 acknowledged, 2 unacknowledged	0 to 2	0	Read / Write
		UPDATE STATE: 0 undefined, 1 Update reported, 2 Update not reported	0 to 2	0	Read only
		TIME STAMP	time	0:00:00	Read only
		STATIC REVISION	N/A	0	Read only
		RELATIVE INDEX	N/A	0	Read only



Table 4.1 FieldQ™ Resource Block (Continued)

Index No.	Name	Description	Valid Range	Initial Value	Permission
36	BLOCK_ALM	The block alarm is used for all configurations, hardware connection failures and system problems in the block. The cause of the alert is entered in the sub-code.			
		UNACKNOWLEDGED: 0 undefined, 1 acknowledged, 2 unacknowledged	0 to 2		Read / Write
		ALARM_STATE 0:Undefined 0 1:Clear- Reported 2:Clear- Not reported 3:Active- Reported 4:Active- Not reported	0 to 4		Read only
		TIME_STAMP	time		Read only
		SUB_CODE = BLOCK_ERR			Read only
		VALUE- A value can be added by the customer for configuring alarms			Read only
37	ALARM_SUM	Status and states of the alarms associated with the block	0: Discrete alarm set when write lock is turned off 7: Block alarm	0	Read only
		CURRENT- current status			
		UNACKNOWLEDGED - states unacknowledged alarms			
		UNREPORTED - states unreported alarms			
	DISABLED - states disabled alarms				
38	ACK_OPTION	When enabled, the device automatically acknowledges alerts sent to the host 1 : Auto Acknowledge Disabled 2 : Auto Acknowledge Enabled	1 to 2	1	Read / Write
39	WRITE_PRI	Priority of the alarm generated by clearing the Write Lock	0 to 15	0	Read / Write
40	WRITE_ALM	Generated if the writelock is cleared			
		UNACKNOWLEDGED: 0 undefined, 1 acknowledged, 2 unacknowledged	0 to 2	0	Read / Write
		ALARM_STATE 0:Undefined 0 1:Clear- Reported 2:Clear- Not reported 3:Active- Reported 4:Active- Not reported	0 to 4	0	Read only
		TIME_STAMP	time	0	Read only
		SUB_CODE - indicates what alarm		0	Read only
		VALUE- A value can be added by the customer for configuring alarms		0	Read only
41	ITK_VER	Indicates the major revision number of the interoperability test case used in certifying this device as interoperable	set by FF	4	Read only
42	DISTRIBUTOR	Private Label Distributor. Identifies the company that is responsible for the distribution of this Field Device to customers		0x564144	Read only
43	DEV_STRING	Currently not used			
44	FB_OPTIONS	Currently not used			
45	DIAG_OPTIONS	Currently not used			
46	MISC_OPTIONS	Currently not used			
47	SOFTWARE_REVISION	Software revisions of FF card and controller card			
		RB_SFTWR_REV_MAJOR	0 to 255	N/A	Read only
		RB_SFTWR_REV_MINOR	0 to 255	N/A	Read only
		RB_SFTWR_REV_BUILD	0 to 255	N/A	Read only
		CTRL_CRD_SWARE_REV interpret MSB.LSB	0 to 255	N/A	Read only

Table 4.1 FieldQ™ Resource Block (Continued)

Index No.	Name	Description	Valid Range	Initial Value	Permission
48	HARDWARE_REV	Revision of hardware	0 to 255	N/A	Read only
49	ELECTRONICS_SN	Set by factory	0 to 255	N/A	Read only
50	FACTORY_SN	Set by factory	N/A	N/A	Read only
51	FIELD_SN	Set by customer	N/A	All spaces	Read / Write
52	DETAILED_STATUS	<p>NV Writes Deferred A high number of writes has been detected to non-volatile memory. To prevent premature failure of the memory, the write operations have been deferred. The data will be saved on a 6 hour cycle. This condition usually exists because a program has been written that writes to function block parameters not normally expected to be written to on a cyclic basis. Any such automated write sequence should be modified to write the parameter(s) only when needed. It is recommended that you limit the number of periodic writes to all static or non-volatile parameters such as HI_HI_LIM, LOW_CUT, SP, TRACK_IN_D, OUT, IO_OPTS, BIAS, STATUS_OPTS, SP_HI_LIM, and so on.</p> <p>Lost Deferred NV Data Device has been power_cycled while non_volatile writes were being deferred to prevent premature memory failure. This has resulted in the loss of static/non-volatile data before it could be saved in non-volatile memory. 1. Check the device configuration for changes in the block parameter values. 2. Reset the device to clear the error. 3. See the help for NV writes Deferred for details of preventing problem again.</p> <p>ROM (Flash) Integrity Error NV Integrity Error Manufacturing Block Integrity Error</p>	N/A	N/A	Read only

4.2 Transducer block

The Transducer Block manages data that moves between a function block and the device input/output (I/O) such as sensors and position switches that provide process data for automated process control. Transducer blocks control access to I/O devices through a device independent interface and manufacturer specific parameters defined for use by function blocks. Transducer blocks also perform functions, such as calibration and linearization, on I/O data to convert it to a device independent representation. The transducer block to function blocks interface is defined as one or more implementation independent channels.

The parameters for configuring the Transducer Block are referenced by group within the following sections.

- For complete details of the parameters listed, see table 4.1.
- Refer to the applicable host documentation for procedures to access the referenced parameters.

- 4.2.1 General Transducer Block parameters according FOUNDATION FieldBus™ Protocol
- 4.2.2 Device position status parameters
- 4.2.3 Device configuration (Switch points and Shutdown).
- 4.2.4 Diagnostic configuration (Timers, Counters).
- 4.2.5 Alerts.

4.2.1 General Transducer Block parameters according FOUNDATION FieldBus™ Protocol

The Transducer Blocks parameters with index number 1 to 24, are setup according the FOUNDATION FieldBus™ protocol. For their default setting and adjustable range, see table 4.2.

4.2.2 Device position status parameters

There are 3 parameter which give information on the position status of the device.

Index No	Name
25	DISCRETE_POSITION
26	OPEN_STATE
27	CLOSE_STATE

For their default setting and adjustable range, see table 4.2.

4.2.3 Device configuration.

The following five parameter are available to configure the QC34 module for normal operation:

Index No	Name
28	AUTO_INITIALIZATION
29	CFG_SWITCH_POINTS
32	SHUTDOWN-CFG
33	ZERO_PWR_COND
34	BUTTONBOARD_ENABLE

4.2.3.1 AUTO_INITIALIZATION

Initialization sets the end positions for the position feedback of the actuator. The initialization procedures are described in detail in chapter 3. For the default setting and adjustable range, see table 4.2. index 28.

4.2.3.2 CFG_SWITCH_POINTS

The FieldQ™ QC34 Control module will be shipped with the default feedback characteristic, as per figure 4.1. This feedback characteristic is operational after initialization (see chapter 3) and is suitable for most applications.

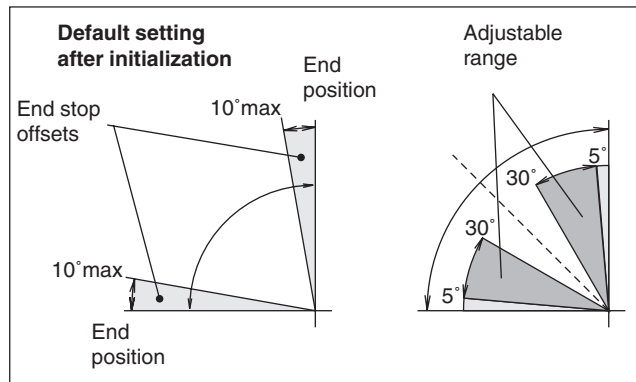


Fig. 4.1 Feedback characteristic

If the default configuration is not sufficient for your application, the switch points can be configured.

For the QC34 Module, there are three topics concerning the configuration of the switch points.

1 Mechanical limit stops.

Normally the mechanical limit stops limit the stroke of the actuator. (To adjust the mechanical limit stops see DOC.IOM.Q.1 chapter 3).

If the mechanical limit stop setting is changed, or the valve does not reach the fully open or closed positions (due to wear in the valve), the Open and Closed end positions have to be re-configured to assure position feedback.

2 "Open" and "Closed" end positions.

There are two procedures to re-configure the end positions:

- 1 If it is safe to cycle the actuator, perform the initialization procedure (see §3.2).
- 2 If it is not safe to cycle the actuator, perform the following re-assignment procedure:

- 1 Go to Transducer block.

- 2 In case the "Open" position needs an update:
Set sub parameter OPEN_END_POSITION of parameter CFG_SWITCH_POINTS to:
"set to current position".

- 3 In case the "Closed" position needs an update:
Set sub parameter CLOSED_END_POSITION of parameter CFG_SWITCH_POINTS to:
"set to current position".

3 "Open" and "Closed" stop offset.

The "Open" or "Closed" offset value is the number of degrees before the end of stroke within which the switches will be activated or deactivated.

Default values for both positions are (see figure 4.1):

- Default offset 10° before end of stroke.
- Adjustable range 5° to 30° before end of stroke

Sub parameters OPEN_STOP_OFFSET and CLOSED_STOP_OFFSET can be used to change the end stop offsets and can be set per ° (degree)

4.2.3.3 SHUTDOWN-CFG

Shutdown configuration controls the behaviour of the FieldQ™ actuator in case of an internal communications failure in the QC34 module. This is independent of the FF communication on the bus line.

This set of parameters can overrule the Failure modes of the basic actuator, as described in the FieldQ™ IOM manual, chapter 2.2 (DOC.IOM.Q1).

1 General working of Shutdown configuration.

Shutdown configuration can work in three configurations, as set by the SHUTDOWN_ENABLE parameter:

- enable, auto recovery
- enable, manual recovery
- disable.

Enable : After an internal failure, the setting of parameter SHUTDOWN_ACTION will be executed.

Auto Recovery : When the internal failure is solved, the actuator will automatically go to its current setpoint position.

Manual Recovery : When the internal failure is solved, the actuator shutdown status must be manually reset.

Normally the SHUTDOWN_RESET parameter is inactive. For resetting the shutdown status this parameter must be set to Reset. When this reset is completed successfully, the SHUTDOWN_STATUS parameter will be FieldQ operational and SHUTDOWN_RESET parameter will return to inactive.

Disable : Shutdown functionality is not operational, the actuator will stay in its last position after an internal failure.

Parameter SHUTDOWN_DELAY_TIME defines a delay time (up to 4 minutes and 15 seconds) between the time the internal failure is detected by transducer block parameter XD_ERROR (I/O Failure) and the time that the unit will go in "Shutdown".

The sequence of events for 2 shutdown configurations is shown in figures 4.3 and 4.4.

2 Factory default Shutdown configuration setting (see figure 4.4):

SHUTD-ENABLE	: Enable, Manual Recovery
SHUTDOWN_ACTION	: Close
SHUTDOWN_DELAY_TIME	: 4 seconds

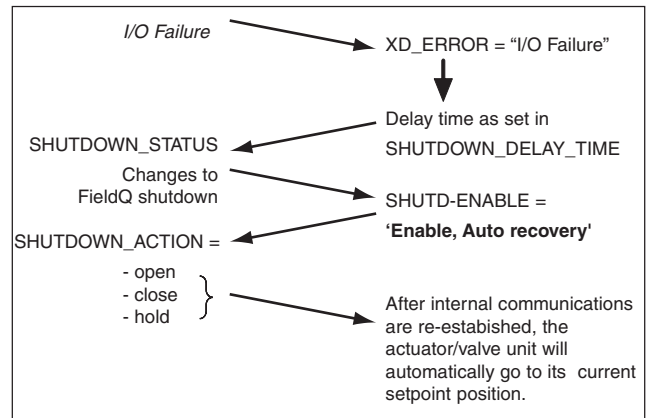


Fig 4.3 Shutdown configuration, Enable, Auto recovery

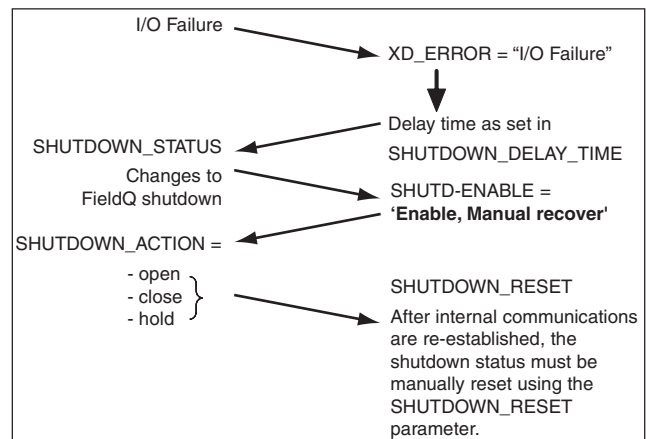


Fig. 4.4 Shutdown configuration, Enable, Manual recovery

Default shutdown configuration

- * Means that 4 seconds after an internal failure is detected, **DOUBLE ACTING AND SPRING RETURN (Single acting)** actuators will go to the closed position, when pressure is available at the actuator, and
- * After the internal communications are re-established, the shutdown status must be reset.

Important

- * If feedback is reversed, the default position in "SHUTDOWN_ACTION" is not automatically reversed

4.2.3.4 ZERO_PWR_COND

This parameter helps identifying whether the device setup matches the actual mechanical configuration of the actuator ;

- Fail-to-Close or Fail-to-Open for single acting actuators.

This parameter indicates the position where the actuator/valve unit will move to, when no power is present (airpressure should be present for DA).

- The value is set during initialization and position re-assignment and is valid for valve applications which close after a clockwise (CW) rotation and the operation of the valve may be Fail-to-Close or Fail-to-Open.
- For applications which close after a counter clockwise (CCW) rotation, the indication will be reversed after initialization. This can be corrected by re-assigning the end positions as described in §3.4.3.

4.2.3.5 BUTTONBOARD_ENABLE

The button board can be set to:

- Enabled when in OOS (factory default)
- Never enabled

4.2.4 Diagnostic configuration

This section describes the counter and timer parameters. The description how to set alerts and generate the recommended actions can be found in §4.2.5.

4.2.4.1 Counters

Four counter parameters are available for counting the cycles of the :

- 1 Control module
- 2 Actuator
- 3 Pneumatic module
- 4 Valve.

The Control (function) Module counter is the master counter and is read only. The other three counters can each be reset independently when required (e.g. replacement).

These counter parameters have :

- a sub parameter which records the cycles.
- a sub parameter to set a limit value.

When one of the set limits is exceeded an alert and a recommended action message will be generated as per table 4.3 and as per alert setting (see §4.2.5).

For the default setting and adjustable range, see table 4.2. index 36, 37, 38 and 39.

4.2.4.2 Timers

There are 3 timers available in this device:

1 Time in position (TIME_IN_POSITION)

- Records the time since the last movement. It is reset to zero when the power is switched off.
- In sub parameter TIME_IN_POSITION_HI_LIM, a limit can be set.

2 Open travel time (OPEN_TRAVEL_TIME)

- Indicates the time between: When pilot valve position is changed and when the Open trip position reached.
- In parameters OPEN_TRAVEL_TIME_HI_LIM and OPEN_TRAVEL_TIME_LO_LIM, high and low limits can be set.
- Parameter OPEN_TRAVEL_TIME_AVG calculates the average stroke time of the last 30 strokes.
- In parameters OPEN_TRAVEL_AVG_HI_LIM and OPEN_TRAVEL_AVG_LO_LIM, high and low limits can be set.

3 Close travel time (CLOSE_TRAVEL_TIME)

- Indicates the time between: When pilot valve position is changed and when the Closed trip position reached.
- In sub parameter CLOSE_TRAVEL_TIME_HI_LIM and CLOSE_TRAVEL_TIME_LO_LIM, high and low limits can be set.
- Parameter CLOSE_TRAVEL_TIME_AVG calculates the average stroke time of the last 30 strokes.
- In parameters CLOSE_TRAVEL_AVG_HI_LIM and CLOSE_TRAVEL_AVG_LO_LIM, high and low limits can be set.

When the limits of the above timers are exceeded, and the alerts are enabled, alerts and recommended action messages will be generated as per table 4.3 and as per alert setting (see §4.2.5).

4.2.5 Alerts

The FieldQ™ QC34 Control module with Foundation Fieldbus™ communication features diagnostic capabilities combined with PlantWeb™ Alerts.

The FieldQ™ QC34 Control module generates a recommended action after :

- An internal error has occurred
- Timer or Counter limits have exceeded.
- The initialization has failed

A full list of Alerts and Recommended Actions, combined with the Alert Default Setting is shown in table 4.3.

4.2.5.1 Alert handling

The Transducer Block will act as a coordinator/collector for (PlantWeb™) alerts.

Although the alerts have default settings (see table 4.3), these levels can be set by the customer to match their requirements.

There are three levels of alerts available:

1 Failed Alerts

A Failure Alert indicates a failure within a device that will make the device or some part of the device non-operational.

This implies that the **device is in need of repair** and must be **fixed immediately**.

This alert has the following five parameters:

- 1 FAILED_ENABLE: Enable the indication and reporting
- 2 FAILED_MASK : Suppress reporting
- 3 FAILED_PRI : Designates the priority
- 4 FAILED_ACTIVE : Displays which of the conditions within the alert is active.
- 5 FAILED_ALM : To report the particular failed condition to the host system.

2 Maintenance Alerts

A Maintenance Alert indicates a condition within a device that, if not attended to in the near future (the type of alert defines the time period for “Near Future”) will make the device or some part of the device non-operational.

This implies that **the device is in need of repair** and must be **fixed as soon as possible**.

This alert has the following five parameters:

- 1 MAINT_ENABLE : Enable the indication and reporting
- 2 MAINT_MASK : Suppress reporting
- 3 MAINT_PRI : Designates the priority
- 4 MAINT_ACTIVE : Displays which of the conditions within the alert is active.
- 5 MAINT_ALM : To report the particular failed condition to the host system.

3 Advisory Alerts

An Advisory Alert indicates a condition within a device that is informational in nature. The alert is used to notify the host that **the device has detected a condition** within the device that is **not critical**, will not cause a failure if left unattended but should be reported to the host for awareness and possible action.

This alert has the following five parameters:

- 1 ADVISE_ENABLE :Enable the indication and reporting
- 2 ADVISE_MASK : Suppress reporting
- 3 ADVISE_PRI : Designates the priority
- 4 ADVISE_ACTIVE : Displays which of the conditions within the alert is active.
- 5 ADVISE_ALM : To report the particular failed condition to the host system.

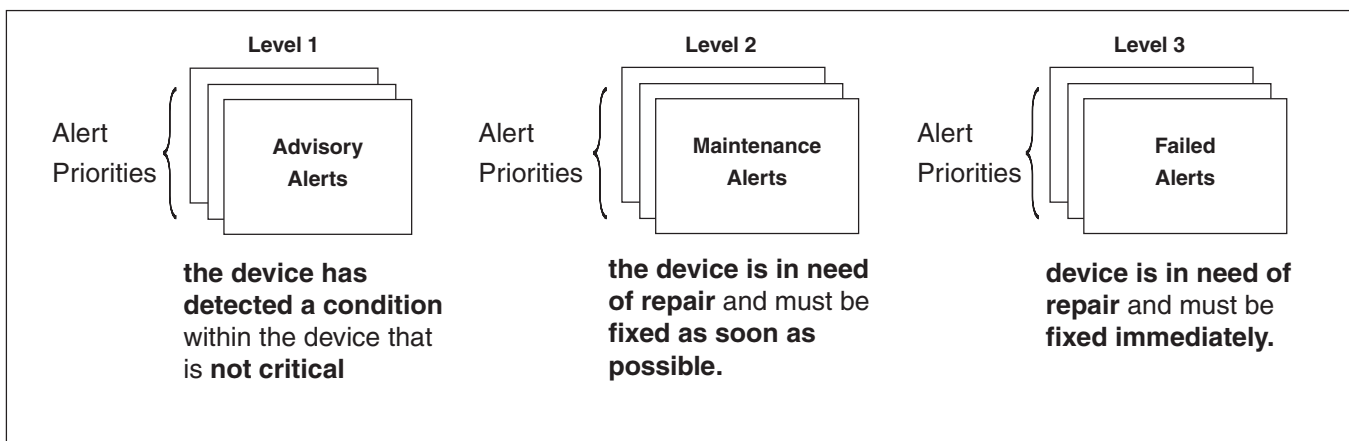


Fig 4.5 Alert levels and priorities

4.2.5.2 Alert parameter description.

1 Alerts - Enabled

These parameters are used to enable the indication and reporting of each corresponding alert. When a alert is disabled, the device shall not detect that particular alert, it shall not be indicated in the (FAILED_ACTIVE, MAINT_ACTIVE or ADVISE_ACTIVE parameters or be reported via respectively **Failed Alerts, Maintenance Alerts or Advisory Alerts**.

If an alert enable parameter is changed to 'disabled' while the alert is active, it shall clear the alert and re-evaluate the alert. (Writable, only affects the applicable condition modified. When set the condition will not be indicated or reported).

2 Alerts - masked:

These parameters will mask any of the failed conditions listed in respectively **Failed Alerts, Maintenance Alerts or Advisory Alerts**.

Setting a bit to true, will cause the corresponding alert to be indicated in the (FAILED_ACTIVE, MAINT_ACTIVE or ADVISE_ACTIVE parameters but it will not be reported to the host via **Failed Alerts, Maintenance Alerts or Advisory Alerts**.

If an alert mask is changed while the alert is active, the alert is cleared and all the conditions are reevaluated. (Writable, only affects the applicable condition modified. When set the condition will be indicated however, it will not be reported).

3 Alerts - Priority:

Designates the priority of the Failed, Maintenance or Advisory Alerts. The default is 2 and the recommended value is between 10 and 15. (Writable, changes the priority of the applicable alert).

4 Alerts - Active:

These parameters displays which of the conditions within the **Failed, Maintenance or Advisory Alerts** is active. When a device detects a condition has become active, it shall set the corresponding bit in the **Failed, Maintenance or Advisory Alerts - Active** parameters. If it is not suppressed, it will be reported using the associated alert parameter. (Read Only)

5 Alert Alarm:

These parameter are used to report the particular failed condition to the host. (Read Only). For parameter structure see table 4.2.



Table 4.2 FieldQ™ Transducer Block					
Index No.	Name	Description	Valid Range	Initial Value	Permission
General Transducer Block parameters					
1	ST_REV	Static data revision. Updated when static data is changed	0 to 65535	0	Read only
2	TAG_DESC	Unique description for the transducer block within a system, writable by the host system operator.		spaces	Read / write
3	STRATEGY	Used by host system administrator to group blocks for easy identification of location.	7 bit ASCII	0	Read / write
4	ALERT_KEY	Plant unit ID, for host system operator for sorting alarms	1 to 255	0	Read / write
5	MODE_BLK	The target, actual and permitted modes for the block			
		TARGET	7: OOS, 3: AUTO	OOS	Read / write
		ACTUAL		N/A	Read Only
		PERMITTED		ALL	Read / write
		NORMAL		AUTO	Read / write
6	BLOCK_ERR	Error status associated with the hardware or software of the resource block (enumeration)	0 to 15	N/A	Read Only
		0: Other			
		1: Block config error (not used)			
		2: Link configuration error			
		3: Simulate Active: Based on switch			
		4: Local override (not used)			
		5: Device Fail safe set			
		6: Device needs Maintenance Soon			
		7: Input failure (not used)			
		8: Output failure (not used)			
		9: Memory Failure (FF card)			
		10: Lost static data (FF card)			
		11: Lost NV data (FF card)			
		12: Readback check failed (not used)			
		13: Device needs Maintenance Now			
14: Power-up (not used)					
15: Out-of-Service					
7	UPDATE_EVT	Alert generated by a change to static data.			Read only
		UNACKNOWLEDGED:			
		0 undefined, 1 acknowledged, 2 unacknowledged			
		ALARM_STATE			
		0: Undefined 0			
		1: Clear- Reported			
		2: Clear- Not reported			
3: Active- Reported					
4: Active- Not reported					
	TIME_STAMP				
	SUB_CODE				
	RELATIVE INDEX				
8	BLOCK_ALM	The block alarm is used for all configurations, hardware connection failures and system problems in the block. The cause of the alert is entered in the sub-code.			
		UNACKNOWLEDGED:			
		0 undefined, 1 acknowledged, 2 unacknowledged			
		ALARM_STATE			
		0: Undefined 0			
		1: Clear- Reported			
		2: Clear- Not reported			
3: Active- Reported					
4: Active- Not reported					
	TIME_STAMP	time			
	SUB_CODE The alarm is stated here(only Device fail - safe set and OOS)				
	VALUE- A value can be added by the customer for configuring alarms				

Table 4.2 FieldQ™ Transducer Block (continued)

Index No.	Name	Description	Valid Range	Initial Value	Permission
General Transducer Block parameters (continued)					
9	TRANSDUCER_DIRECTORY	Array containing the transducer definitions (empty)	0,0	0,0	Read only
10	TRANSDUCER_TYPE	Identifies the type of Transducer Block.	Standard discrete positioner	Standard discrete positioner	Read only
11	XD_ERROR	Extensions to Block Error indicated by the "Other" bit 0 being set (enumeration) 16: unspecified error 17: General error (not used) 18: Calibration error 19: configuration error (not used) 20: Electronics failure 21: Mechanical failure (not used) 22: I/O Failure 23: Data Integrity error (not used) 24: Software error 25: Algorithm error (not used)	0 = no error	0 = no error	Read only
12	COLLECTION_DIRECTORY	A directory that specifies the number, starting indices, and DD Item IDs of the data collections in each transducer within a Transducer Block.	0	0	Read only
13	FINAL_VALUE_D	States the requested valve position and status written by a discrete function block (set point)		2	Read only
		STATUS VALUE requested position 0: close, 1: open	0 to 1	0	Read only
14	ACT_FAIL_ACTION	Defined by Foundation Fieldbus, has no effect on our device! 0: undefined (DA), 1 Self-closing(SA), 2 Self opening(SA)	0 to 3	0	Read / Write
15	ACT_MAN_ID	Actuator manufacturer ID in Foundation Mfg id units. Is: Emerson Process Management Valve Automation Division	0x564144	0x564144	Read only
16	ACT_MODEL_NUM	Actuator model number. Depends where it is mounted. Can be set by customer.		all spaces	Read / Write
17	ACT_SN	Serial number of actuator. Can be set by customer.		all spaces	Read / Write
18	VALVE_MAN_ID	Valve manufacturer ID in Foundation Mfg id units. Can be set by customer.		0	Read / Write
19	VALVE_MODEL_NUM	Indicates available function block execution routines		all spaces	Read / Write
20	VALVE_SN	Serial number of valve. Can be set by customer.		all spaces	Read / Write
21	VALVE_TYPE	Type of valve. Can be set by customer, but it is not used by the device. 0: undefined, 1: Sliding stem, 2: Rotary	0 to 2	2	Read / Write
22	XD_CAL_LOC	The location where device was last initialized. Can be set by customer,		all spaces	Read / Write
23	XD_CAL_DATE	The date the unit was calibrated/initialized. Can be set by customer.			Read / Write
24	XD_CAL_WHO	Person who did the calibration. Can be set by customer.		all spaces	Read / Write

Table 4.2 FieldQ™ Transducer Block (continued)

Index No.	Name	Description	Valid Range	Initial Value	Permission
Device position status parameters					
25	DISCRETE_POSITION	Single signal indicating the current discrete position			
		STATUS			Read only
		VALUE 0 = closed, 1 = open, 2 = Closing (based on not being 0 or 1 and the current position request) 3 = opening (based on not being 0 or 1 and the current position request)	0 to 3	0	Read only
26	OPEN_STATE	Discrete position feedback 0: false, 1: true	true/false	FALSE	
		STATUS (bad when loose IO board comms block err, uncertain sensor error)			Read only
		VALUE 0 false, 1: true	0 to 1	0	Read only
27	CLOSE_STATE	Discrete position feedback 0: false, 1: true	true/false	FALSE	
		STATUS (bad when loose IO board comms - block err, uncertain when sensor bad)			Read only
		VALUE 0 false, 1: true	0 to 1	0	Read only
Device configuration					
28	AUTO_INITIALIZATION	Controls the procedure for finding the endpositions			
		AUTO_INIT_COMMAND - 0: no action, 1: start auto init 2: start Zero point adjustment, 3: stop auto init	0 to 2		Read / Write
		Status of the initialization procedure - Undetermined, bad repeatability -> increase limit stop offset - Running, - Aborted, -> stopped, by user. - Undetermined, difference between open and close too small - Time Out, -> too long before end-positions are found -> check air-pressure and actuator sizing - Range Error -> Difference between open and closed end position is too small. -> check air-pressure, check proper valve rotation. - Successful - No Valid Data. -> value after default (not initialized)		0	Read only
29	CFG_SWITCH_POINTS	Set trippoints from endposition			
		OPEN_END_POSITION use current position as open end position 0: normal, 1: set	0 to 1	0	Read / Write
		CLOSED_END_POSITION use current position as close end position 0: normal, 1: set	0 to 1	0	Read / Write
		OPEN_STOP_OFFSET - distance to endposition (in ° before end position) Can be set per ° (degree)	5° to 30°	10°	Read / Write
		CLOSE_STOP_OFFSET - distance to endposition (in ° before end position) Can be set per ° (degree)	5° to 30°	10°	Read / Write
32	SHUTDOWN_CFG	Configures what actions to take after internal communications are lost.			
		SHUTDOWN_ENABLE - 0: enable auto recovery, 1: enable manual recovery, 2: disable	0 to 2	1	Read / Write
		SHUTDOWN_ACTION - 0: close, 1: open, 2: hold	0 to 2	0	Read / Write
		SHUTDOWN_DELAY_TIME - Time (in sec.) before action will be taken after event has occurred	1 to 255	4	Read / Write
		SHUTDOWN_RESET - Normally 0, unless SHUTDOWN_STATUS is 1 and SHUTDOWN_ENABLE set to manual recovery. Manual recovery will then require this bit to be set to 0	0 to 1	0	Read / Write
		SHUTDOWN_STATUS - Set to 1 when the system is shutdown, else 0	0 to 1	N/A	Read only

Table 4.2 FieldQ™ Transducer Block (continued)

Index No.	Name	Description	Valid Range	Initial Value	Permission
Device configuration (continued)					
33	ZERO_PWR_COND	The position where the valve will move to when no power is present (airpressure should be present for DA) closed, open	closed, open	closed	Read only
34	BUTTONBOARD_ENABLE	Enables and disables the buttonboard for initialization. Set to default will always be possible. Can only be enable when in OOS. When not in OOS it automatically returns to false, to come back to its original setting when in OOS. FF card must change this setting on the sensorboard.	- enable when in OOS - Never in OOS	enable when in OOS	Read / Write
Diagnostic configuration					
36	FM_COUNTER	Counts the end position cycles performed by the control module.			
		FM_CNT_VALUE (read only)	0 - 4294967295	N/A	Read only
		FM_CNT_LIMIT	[2] 0 - 4294967295	1,000,000	Read / Write
37	PM_COUNTER	Counts the end position cycles performed by the pneumatic module			
		PM_CNT_VALUE	0 - 4294967295	N/A	Read / Write
		PM_CNT_LIMIT	[2] 0 - 4294967295	1,000,000	Read / Write
38	ACT_COUNTER	Counts the end position cycles performed by the actuator			
		ACT_CNT_VALUE	0 - 4294967295	N/A	Read / Write
		ACT_CNT_LIMIT	[2] 0 - 4294967295	1,000,000	Read / Write
39	VALVE_COUNTER	Counts the end position cycles performed by the valve			
		VLV_CNT_VALUE	0 - 4294967295	N/A	Read / Write
		VLV_CNT_LIMIT	[2] 0 - 4294967295	1,000,000	Read / Write
40	TIMERS (units are seconds).	TIME_IN_POSITION - Holds the time in current position Reset to zero when power switched off	0 to 4294967295	0	Read only
		TIME_IN_POSITION_HI_LIM - Sets a limit for an alert for the time in position	[2] 0 to 4294967295	0	read.write
		OPEN_TIMERAVEL_TIME Indicates time between: - Pilot position change commanded and - Open trip position reached.	0 to 65536	0	Read only
		OPEN_TRAVEL_TIME_HI_LIM	[2] 0 to 65536	0	Read / Write
		OPEN_TRAVEL_TIME_LO_LIM	[2] 0 to 65536	0	Read / Write
		OPEN_TRAVEL_TIME_AVG (average of 30 strokes)	0 to 65536	0	Read only
		OPEN_TRAVEL_AVG_HI_LIM	[2] 0 to 65536	0	Read / Write
		OPEN_TRAVEL_AVG_LO_LIM	[2] 0 to 65536	0	Read / Write
		CLOSE_TRAVEL_T Indicates time between: - Pilot position change commanded and - Close trip position reached.	0 to 65536	0	Read only
		CLOSE_TRAVEL_TIME_HI_LIM	[2] 0 to 65536	0	Read / Write
		CLOSE_TRAVEL_TIME_LO_LIM	[2] 0 to 65536	0	Read / Write
		CLOSE_TRAVEL_TIME_AVG (average of 30 strokes)	0 to 65536	0	Read only
CLOSE_TRAVEL_AVG_HI_LIM	[2] 0 to 65536	0	Read / Write		
CLOSE_TRAVEL_AVG_LO_LIM	[2] 0 to 65536	0	Read / Write		



Table 4.2 FieldQ™ Transducer Block (continued)

Index No.	Name	Description	Valid Range	Initial Value	Permission
Alerts					
35	INTERNAL_ALERTS	Bad position sensor Bad temperature sensor System temperature exceeded Software error IO card Travel deviation alert Device shutdown Unknown error		N/A	Read only
41	RECOMMENDED_ACTION	Enumerated list of recommended actions of the device, displayed with a device alert (can be multiple, see table below) see table	N/A	0	Read only
42	FAILED_PRI	Designates the alarming priority of the FAILED_ALM. Handling defined by FF. 0: All FAILED alerts disabled 1: All failed alerts suppressed 2: Higher process failed alerts	0 to 15	2	Read / Write
43	FAILED_ENABLE	see alert table	N/A		
44	FAILED_MASK	see alert table			
45	FAILED_ACTIVE	see alert table		N/A	Read only
46	FAILED_ALM	Alarm indicating a failure within a device which makes the device non-operational. UNACKNOWLEDGED: 0: Undefined, 1: Acknowledged, 2: Unacknowledged ALARM_STATE 0:Undefined 0 1:Clear- Reported 2:Clear- Not reported 3:Active- Reported 4:Active- Not reported TIME_STAMP SUBCODE value should match alert as stated under FAILED_ENABLE VALUE			Read only Read only Read only Read only
47	MAINT_PRI	See index 42 FAILED_PRI	0 to 15	2	Read / Write
48	MAINT_ENABLE	see alert table	N/A		
49	MAINT_MASK	see alert table			
50	MAINT_ACTIVE	see alert table			Read only
51	MAINT_ALM	See index 46 FAILED_ALM			
52	ADVISE_PRI	See index 42 FAILED_PRI	0 to 15	2	Read / Write
53	ADVISE_ENABLE	see alert table	N/A		Read / write
54	ADVISE_MASK	see alert table			Read / write
55	ADVISE_ACTIVE	see alert table			Read only
56	ADVISE_ALM	See index 46 FAILED_ALM			
31	INSTRUMENT_TEMP	Indicates the internal temperature of the instrument STATUS VALUE Indicates the internal temperature of the device in degrees Celcius	N/A	N/A	Read only
57	HEALTH_INDEX	Parameter representing the overall health of the device. 100 being perfect and 1 being non-functioning. no alerts -> 100 ADVISE_ACTIVE -> - 10 per advice MAINT_ACTIVE -> - 40 per advice FAIL_ACTIVE -> = 10 (10 also lowest value)	10 to 100	100	Read only
Others					
30	FLASH_LED	For identification blink status led (5 min.) 0: finished 1:start	0 to 1	N/A	Read / Write
58	FF_COMM_STAT	Indicates quality of FF communications FF_COMM_ATTEMPTS - States the number of attempts. When at max, reset to 0 for timed out messages also! FF_COMM_TIME_OUT - States how many of the attempts were timed out	0 to 65535 0 to 65535	0 0	Read only Read only
59	PWA_SIMULATE	Password protected and off when powercycled! If this is set to 2 then all the alert parameters are writable 1: simulate off, 2 simulate enabled	1 and 2	1	Read / Write

Table 4.3 FieldQ™ Alerts & recommended actions

Alerts			Alert default setting					
			Advisory		Maintenance		Fail	
Parameter name	DeltaV text	Recommended actions	enable	mask (show)	enable	mask (show)	enable	mask (show)
Internal alerts								
bad_position_sensor	Bad Position Sensor	Feedback problem, replace Control module when possible	n	n	y	y	n	n
bad_temperature_sensor	Bad Temperature Sensor	Temperature sensor problem, replace Control module when possible	n	n	y	y	n	n
system_temperature_exceeded	System Temperature Exceeded	Take corrective actions to bring temperature within specified range.	n	n	y	y	n	n
software_error	Software Error	Software error has been detected, replace control module when possible.	n	n	y	n	n	n
travel_deviation	Travel Deviation	Lost position, Check air pressure	y	y	n	n	n	n
shutdown_is_set	Shutdown Is Set	Internal communications problem, check shutdown configuration for restart, Replace Control module.	n	n	n	n	y	y
undefined_error	Undefined Error	Error is undefined, replace control module when possible	n	n	y	n	n	n
Counter alerts								
cm_life_exceeded	Control Module Life Cycle Exceeded	Control module life cycle exceeded, replace control module	n	n	y	y	n	n
pm_life_exceeded	Pneumatic Module Life Cycle Exceeded	Pneumatic module life cycle exceeded, replace pneumatic module.	n	n	n	n	n	n
act_life_exceeded	Actuator Life Cycle Exceeded	Actuator life cycle exceeded, replace actuator.	n	n	n	n	n	n
valve_life_exceeded	Valve Life Cycle Exceeded	Valve life cycle exceeded, valve requires maintenance.	n	n	n	n	n	n
Timer alerts								
time_in_position_exceeded	Time in position exceeded	Time in position exceeded, take appropriate action.	n	n	n	n	n	n
open_travel_time_exceeded	Close travel timer exceeded	Open travel timer exceeded, check valve system.	n	n	n	n	n	n
close_travel_time_exceeded	Close travel timer exceeded	Close travel timer exceeded, check valve system.	n	n	n	n	n	n
Initialization alert								
initialization_failed	Initialization Failure	Device failed initialization; Check airpressure, check actuator sizing, check valve system	y	y	n	n	n	n



Table 4.3 FieldQ™ Alerts & recommended actions (continued)

Alerts			Alert default setting					
			Advisory		Maintenance		Fail	
Parameter name	DeltaV text	Recommended actions	enable	mask (show)	enable	mask (show)	enable	mask (show)
Internal IO failure alert								
io_failure	Internal Io Failure	Internal communications are lost, device will act according to shutdown	y	y	n	n	n	n
rb_NV_write_deferred	Output Board NV Memory Failure	NV Write Deferred: A high number of writes has been detected to non-volatile memory. To prevent premature failure of the memory, the write operations have been deferred. The data will be saved about every 3 hours. This condition usually exists because a program has been written that writes to control block parameters not normally expected to be written to on a cyclic basis. Any such automated write sequence should be modified to write the the parameter(s) only when needed. It is recommended that you limit the number of periodic writes to all static or non-volatile parameters such as HI_HI_LIM, LOW_CUT, SP, TRACK_IN_D, OUT, IO_OPTS, BIAS, STATUS_OPTS, SP_HI_LIM, and so on.	n	n	n	n	y	y
PWA_simulate_active	PWA Simulate Active	If PWA simulate mode has been activated. The PWA active parameters can now be written as well as the resource block detailed status parameters and the internal alerts in the Transducer Block where the PWA active alarms originate from.	n	n	n	n	y	y
rb_nv_memory_failure	Output Board NV Memory Failure	Output Board NV Memory Failure: "Non-volatile EEPROM data corruption was detected on the Fieldbus Electronics Board. Default values were loaded into the faulty block. 1. Check the device configuration for changes in the block parameter values. 2. Reset the device to clear the error. 3. Download a Device Configuration. NOTE: If the failure reoccurs it may indicate a faulty EEPROM memory chip.	y	y	n	n	n	n
rb_nv_electronics_failure	Output Board Electronics Failure	Output Board Electronics Failure: The Device has detected a fault with an electrical component on the Fieldbus Electronics Module Assembly. Replace the Device.	y	y	n	n	n	n
diag_opt_PWA_simulate	PWA Simulate							
func_opt_simulate	Simulate Switch	Since the hardware simulate switch may be impractical to access, a software option is being provided.						
misc_opt_base_record	Base Record	When the base record option is enabled, operator can write/read parameters to/from the sensor board that are not available via the FF parameter list.						

5 Operations and Maintenance

5.1 Fault state

The fault state parameter, when active, indicates a loss of communication to an output block, a fault promoted to an output block, or loss of a physical contact. If the fault state is active, the output function blocks perform their **Fault State** actions. Selecting the feature **Fault State** enables the ability to manually set and clear the fault state of the device. Setting the **Set Fault State** parameter to **“Set”** manually places the instrument in the fault state. Setting the **Clear Fault State** parameter to **“Clear”** clears the device fault state if no faults are currently active. You can test the actions the output blocks will perform by manually setting the fault state active.

5.2 Restart method

The following method is provided with the FieldQ Module Device **Description**:

- **Restart**

Method **Description**:

- **Master Reset** - Available via the Resource Block, the Master Reset method is required for restarting the switchbox without removing power. It also allows the user to set data within the switchbox to its default state. In addition to restarting the switchbox, this method also performs switchbox integrity tests to verify that it is acceptable to restart the switchbox. This method is only available via the Resource Block and is described in detail in the detailed setup section (section 4.1).

5.3 Restarting the module

You can restart the module via different mechanisms. Depending on which restart option is used; the communication links, static parameters, etc. may be affected. However, due to the effect that a restart can have on the module, and therefore the process, restarting the module should be used cautiously.

5.3.1 Software restart

There are several Restart options as described below. This can be done via parameter RESTART (index 16) in the Resource block. The following is a brief description for each of the restart options:

- **Resource** - Performing a “Resource”-restart has no observable effect on the module resetting the dynamic variables in the Function Blocks. However, the dynamic variable within the module are reset and this could cause a “bump” in your process.
- **Processor** - Performing a “Restart Processor” has the same effect as removing power from the module and re-applying power. This is typically used to restart the Foundation Fieldbus Interface card should the Interface Card and the Module I/O card get out of sync due to incorrect power application.
- **Defaults** - Performing a “Restart with Defaults” should be done with care. This restart sets the static parameters of the function blocks in the module to their default state. It also disconnects all links within the module. After performing a “Restart with Defaults”, a “Restart Processor” should be performed. Within the FieldQ Series of modules, the “Restart with Defaults” option is the only option that will read certain data from the FieldQ Communications board.
- **Actuator Processor** - Performing a “Actuator Processor”-Restart has the same effect as removing power from the control part of the module and re-applying power. This is typically used to restart the control part of the module.
- **Actuator Defaults** - Performing a “Actuator Defaults”-restart should be done with care. This restart sets the switch point to default (see §3.2).

WARNING

Restarting the FieldQ may cause
loss of control of the process.

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