

FieldQ™ Pneumatic Actuators

Field based intelligence



IPT
technology




EMERSON
Process Management

Combine ALL your actuator and control needs into ONE product...

Emerson Process Management's Valve Automation Division has simplified the automation of rotary valves significantly with an easy to use and intelligent solution. The FieldQ™, with IPT technology™, can dramatically reduce installation costs - eliminating the need to engineer and procure the rack and pinion actuator, solenoid valve, switch box or other accessories separately. The innovative nature of the product is emphasized by various patents for the way controls are integrated into the product, the contactless position sensing and feedback, and



the design of the pneumatic control module. This integrated solution, versus a piecemeal approach, saves time and money by simplifying product selection, installation, start-up, maintenance and upgrades.

The FieldQ™ also offers unrivaled flexibility. It incorporates newly developed intelligent technology to cope with present and future demands, although a flexible modular design enables the unit to be adapted to meet the end user's individual needs. Ideal for both basic and high-end applications, the FieldQ™ provides easy handling and reliability.

Features

Patented Integration of Actuation, Control & Feedback

The installation, commissioning and maintenance of separate components are no longer required - as control and feedback are offered as integrated modules, combined with the actuator.

Compact & Modular Design

Modular construction also ensures flexibility, fast assembly and quick and easy future upgrades.

Push Button Auto-Initialization

Automatic setting of the position indication switches in a matter of a few seconds at the push of a button.

Expands the Reach of your Bus

Digital communications are available for AS-interface, Profibus® DP, Profibus® PA and FOUNDATION™ Fieldbus.

Intelligent Diagnostics

Provides alerts on actuator/valve condition and makes maintenance easier to schedule.

Intelligent Position Tracking

Accurate and reliable position information is provided continuously through the operating stroke for improved process control.

Dual Stroke Adjustment

Provides precise adjustment of both valve end-positions.

Visual Position Indication

Large full scale indication at a glance, which can be turned 90° for in-line and across-line mounting.

Balanced Pinion Design

This design uses seals with low surface pressure, low wear and ultimately low maintenance in high cycle applications.



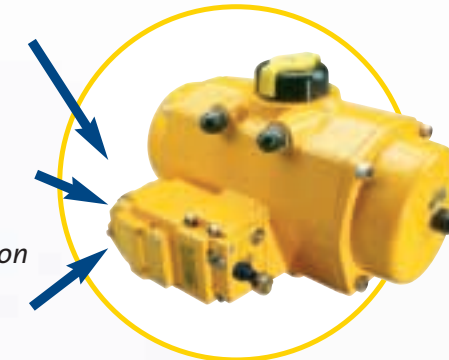
Conventional



Smart



Bus communication



Benefits

Easy

This pre-engineered "PLUG AND PLAY" solution reduces engineering complexity and time by integrating control and feedback with the basic actuator. The push-button auto-initialization allows easy and fast set-up.

Flexible

The flexible functions are delivered through modular and scalable design. The splined inserts and the standardized mounting pads allow direct mounting to a wide range of rotary valves and ensure backwards compatibility.

Reliable

The FieldQ™ actuator is based on proven technology (installed base of over two million units) and designed for superior and safe performance over time with over 1 million open/close cycles of performance.

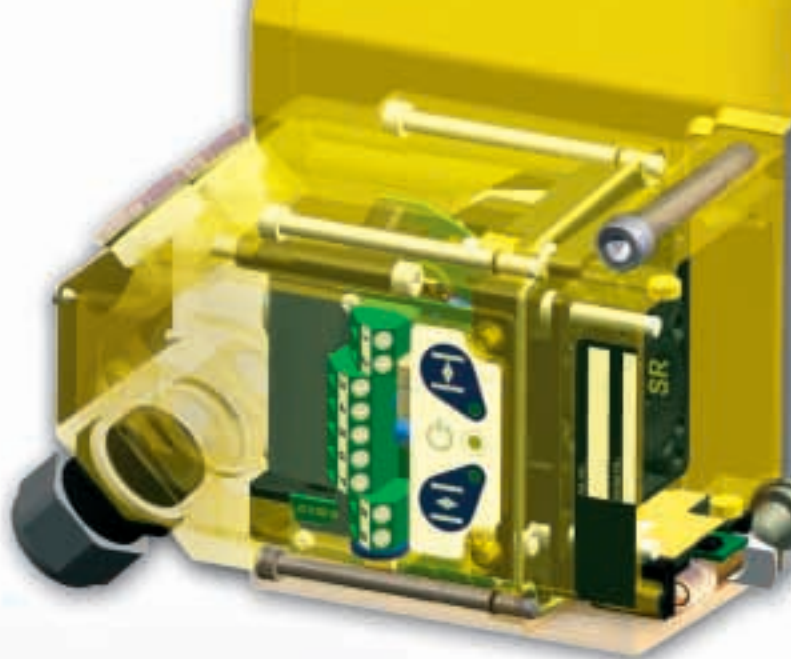
Intelligent

The microprocessor-based modules have built-in function specific electronics using low-power technology. This integrated technology enables bus communication and auto-initialization. On top of this, the FOUNDATION™ Fieldbus and Profibus®-PA modules offer diagnostic capabilities.

Cost-effective

Installed cost savings can be achieved by this pre-engineered, integrated solution. It reduces cost of engineering (no accessory bracket or coupling required) and procurement (single source of supply). The ease of setting up the FieldQ™ reduces cost of installation and commissioning. Inventory cost savings can be achieved due to the modular, scalable design. Through enhanced operating performance and reliability, life-cycle cost savings can be achieved. Life-cycle cost savings can also be achieved because of the reduced need for maintenance and increased plant and process availability.





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Smart Solution to Integrated Control...

Innovative Technology

IPT technology™ allows the integration of controls and feedback in a single product - providing continuous position tracking, with contactless position sensing and feedback (patented by Emerson). In the past, position feedback would be provided by a separate switch box. This has been replaced by an integrated tracker on the actuator's drive shaft which monitors rotary movement continuously, so that position feedback can be communicated to the Function Module and back to the control room. Both Conventional (end point) and Smart (modulating) feedback are available.

Reducing Plant Downtime

As downtime is very expensive (costs could exceed \$100,000 per hour for a chemical or pharmaceutical plant), Emerson recognizes the need to keep plant running for as long as possible and keep installation time to a minimum. The FieldQ™ range has been designed with this in mind.

Easier and faster Installation

The smart, microprocessor-based version with Push Button Auto Initialization provides easier and faster installation and commissioning - ensuring fast start up and the minimum of disruption to operations. LED indication ensures easy set up and provides reassurance that initialization has been successfully completed.

Ultimately, by integrating control and feedback accessories in one product, end users can benefit by standardizing on a single supplier for all their requirements.



Choose the Right Functionality for You...

Function Modules

The Actuator and Pneumatic Control Module can be supplemented with 3 groups of Function Modules, which provide the flexibility to select the right functionality for your application and upgrade to digital communications in the future.

1. Conventional Function Modules

The Conventional Function Modules enable users to install the unit into their existing system without making changes. When the plant is later upgraded, the Function Module makes this transition easy. Conventional Modules can be upgraded with Smart or Bus Modules by simply plugging in the desired module.

2. Smart Function Modules

The Smart Function Modules have the unique feature of Auto-Initialization. This functionality makes limit switch adjustments easy; just push the initialization buttons on the Function Module to set the limit switches. Time consuming switch adjustments are no longer required, which saves time and money.

3. Bus Communication Function Modules

More and more the process industry faces greater demands for plant safety and process control. This means that the need for more and better process information increases, hence the need for digital communication protocols.

Accurate plant information is the key to achieving reduced downtime, yet few pneumatic rack and pinion actuators are capable of providing enhanced diagnostic information. The FieldQ™ is an essential part of Emerson's PlantWeb® digital



plant architecture as an intelligent field device and provides PlantWeb® alerts. The FieldQ™ offers exciting possibilities for diagnostics via FOUNDATION™ Fieldbus, Profibus® PA, in addition to the more basic functions offered by Profibus® DP and AS-i. Driver software for AMS (Asset Management Solutions) and PDM (Process Device Management) systems are available through www.FieldQ.com.

Scalable

Future upgrades to a variety of digital communication protocols or positioner modules can also be achieved by simply replacing the Function Module.

Enclosure

Many field failures are caused by damaged housings of solenoids, switchboxes and exposed coils - by housing all the controls internally within the robust FieldQ™ unit, no vulnerable parts are exposed. The enclosure is rated to IP65 and NEMA 4X, while variations for hazardous areas are available that are certified to meet ATEX, CSA and FM requirements. For easy installation and commissioning, the Function Module can be pre-wired to provide a quick connection. FOUNDATION™ Fieldbus and Profibus® PA Function Modules can be initialized digitally by the bus system. Together with utilizing quick connectors it eliminates the requirement to open the function module for wiring and initializing. This saves time and assures that the function module interior is kept clean.



Pneumatic Control Module

Reliable Design

The patented reliable diaphragm/poppet design offers a high air volume capacity, suitable for the entire FieldQ™ range, without requiring a booster for larger sizes. Most conventional spool type solenoid valves require high air quality air for reliable operation. In the FieldQ™ the innovative poppet valve design, together with the use of static seals, allows the use of standard factory air, saving costs for air filtration. But most important, FieldQ™ provides a reliable, long working life.

Trouble-free Operation of the Actuator

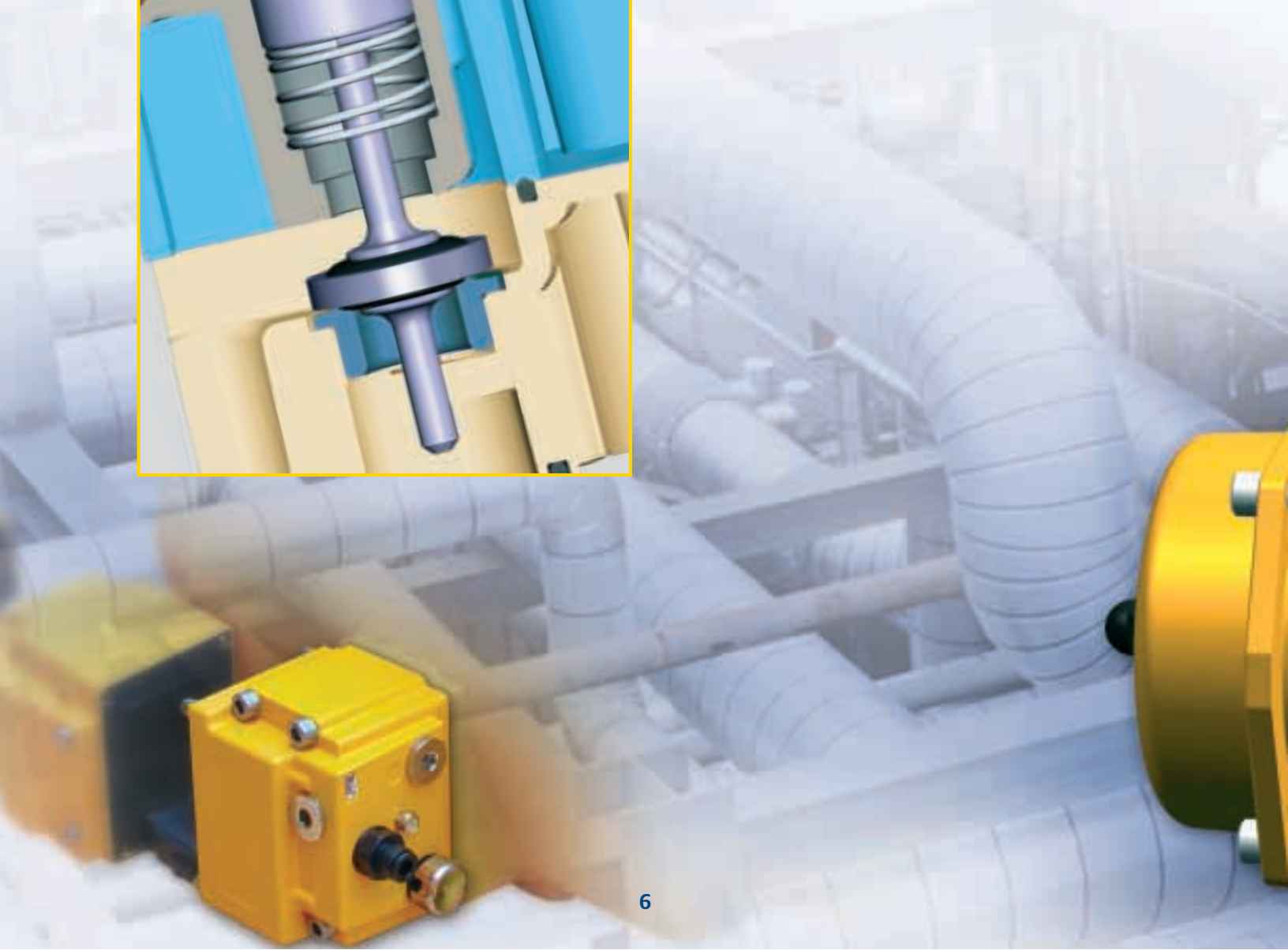
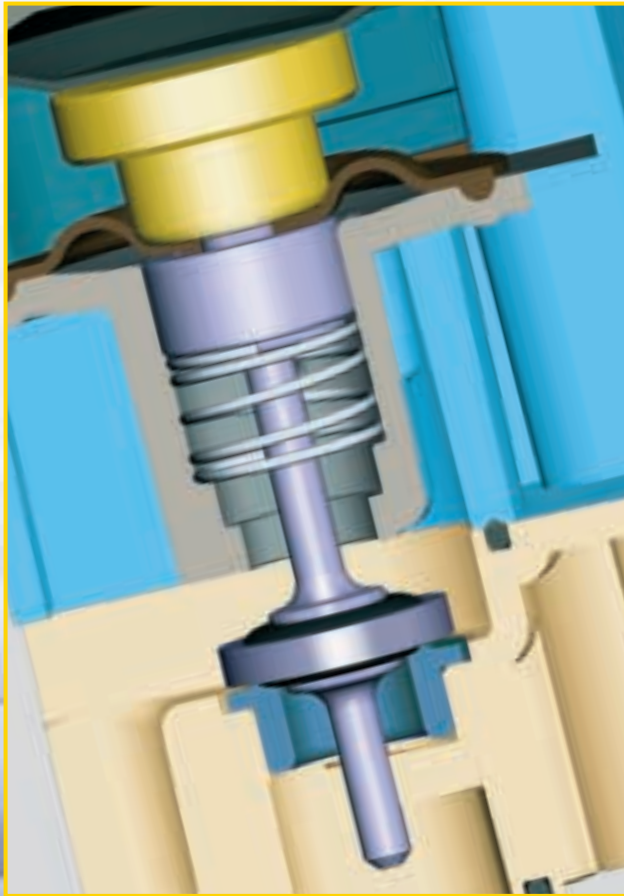
The large diaphragm ensures reliable opening and closing of the poppet and consequently ensures trouble-free operation of the actuator - even at sub-zero temperatures. Moisture in the air has the potential to freeze and block in the case of spool valves, but the FieldQ™ is able to overcome this problem through the use of the diaphragm/poppet design. This concept also enables the use of a low power pilot valve, while still maintaining a fast response time.

Integrated Breather

Other beneficial features include an integrated breather function. This provides protection of the actuator spring chamber. Without this safeguard, in applications where the actuator is located in a corrosive atmosphere, that atmosphere would be sucked into the actuator during the spring stroke and could result in long-term damage and failure.

Integrated Speed Control

Integrated speed control is supplied as an option with single acting versions, while the double acting versions two-way speed control can be achieved by the fitting of standard G1/4" or 1/4" NPT throttles.





Pneumatic Actuator

Durable and Safe

High precision gear cutting methods provide close tolerances and ensure minimum gear backlash. Together with the 3 point guiding system of the pistons, it ensures an extremely long working life. For the ultimate in safety, the FieldQ™ also features an anti-blow out pinion.

Pressure Equipment Directive/ATEX

The actuators have approval of the European Community's Pressure Equipment Directive (PED) and ATEX, which allows Emerson Process Management to affix the CE Mark and provide a Declaration of Conformance to all applicable categories. These include: I, II and SEP (Sound Engineering Practice). The ATEX approval allows the FieldQ™ to be used in explosive hazardous areas up to zone 1.

Wide Torque Coverage

A wide range of actuator sizes covers the most popular torque requirements. Seven sizes are available, from 40 up to 1600Nm (355 to 14100 In.lb.).

Modular spring packages are available for safe maintenance and easy adjustment to a wide variety of supply pressures, while spring return versions are supplied as 'On air failure Closing' or 'On air failure Opening.'

Flexible and Cost-effective Valve Mounting

A double drilling pattern for almost all actuators and a range of inserts are available to enable the actuator to be directly mounted to suitable valves and eliminate the need for a bracket and coupling type mounting kit. The use of direct mounts significantly cuts the cost of the valve/actuator assembly. The standard actuators are fitted with square drive inserts in accordance with ISO 5211 or DIN3337, but a variety of other inserts are also available. Special inserts have over-size or under-size squares, with double-D or round shaft and key forms. Where direct mounts are not possible, as on valves with exposed gland packing, the use of inserts simplifies the design of the mounting kit. Most actuator sizes have two mounting flanges, providing for a greater range of sizing possibilities and often eliminating the need for an adapter flange.

Outstanding Finish

To ensure long-term reliability in aggressive atmospheres, the actuator also features anodized internals and a corrosion resistant finish that has passed a 500 hour salt spray test (in accordance with ASTM B117).



The Benefits of PlantWeb® and FieldQ™

A new Window to Process Control

FieldQ™ Pneumatic Valve Actuators open a window to your process by giving you a view of the final control element's (actuator and valve) position and diagnostics information.

PlantWeb® Integrates Intelligence

FieldQ™ Pneumatic Valve Actuators play an important role in Emerson's PlantWeb® Digital Plant Architecture. PlantWeb® integrates intelligent field devices and modular software, such as AMS and the DeltaV™ digital automation system. All are linked by information-rich FOUNDATION™ fieldbus communication protocol.

Providing Critical Information

Intelligent PlantWeb® field devices, such as the FieldQ™ Pneumatic Valve Actuator, Rosemount® transmitters and Micro Motion® flowmeters, provide critical information not only about the devices but the process as well. Plant personnel can now make better-informed decisions, leading to increased availability, reduced variability, process optimization, increased throughput and enhanced product quality.

Reduce your Expenses

By using the power of intelligent devices, you can dramatically reduce your capital and engineering expenses, as well as ongoing operations and maintenance costs. You now have the opportunity to revolutionize the way you manage your plant.



FieldQ™ Pneumatic Valve Actuator

The FieldQ™ pneumatic valve actuator has been tested by the FieldBus FOUNDATION™ and is registered as having passed the latest interoperability test of the FOUNDATION™.

FieldQ™ contains one Discrete Output (DO), two Discrete Input (DI) and two Analog Input (AI) for ON-OFF applications. The function blocks can be assigned to various parameters including position, temperature, and control, to name a few.

In addition, diagnostics and alerts provided meet the new Emerson PlantWeb® Alerts standards. Applicable diagnostics include: break times, travel times, cycle counts, time in position and various internal electronic health tests.



Access more Information

FieldQ™ Pneumatic Valve Actuators provide much more than Traditional On/Off Positioning

The FieldQ™ Pneumatic Valve Actuator is a core component of the PlantWeb® architecture. FieldQ™ powers PlantWeb® by capturing and delivering diagnostic data for all the components of the final control element. Coupled with AMS (Asset Management Solutions) software, FieldQ™ provides users with an accurate picture of the actuator/valve performance, including valve position indication. Using this information, FieldQ™ diagnoses not only itself, but also the valve to which it is mounted.

AMS software provides the easy-to-use interfaces that let you configure, calibrate, monitor, perform diagnostics and maintain records for virtually any FieldQ™ equipped valve in the plant, all from a single central location or multiple distributed locations as required by your Plant.

FieldQ™ with AMS software lets you compare current operating status of the final control element versus a historical database of performance. The diagnostics provided include:

- Breaktimes
- Traveletimes
- Cycle counts
- Time in position
- Various internal electronic health tests
- Module temperature

Advanced Features:

- PlantWeb® Alerts
- Audit log
- DataSync
- Valve Spec Sheet



AMS



Exploded View FieldQ™

1 Body

The body is made of high quality aluminum alloy, anodized and finished with an epoxy primer and two component polyurethane coating, providing optimum strength and corrosion resistance. The FieldQ™ has passed a 500-hour salt spray test according ASTM B117. The top flange has a NAMUR drilling pattern. Together with an optional NAMUR solenoid adaptation plate the FieldQ™ can be equipped with NAMUR accessories.

2 Visual Position Indicator

Large full-scale position indication at a glance, which can be turned 90° for in-line or across-line mounting.

3 Pinion

The precision-machined anti-blow-out pinion is made of high duty aluminum alloy and hard anodized for optimum performance and durability. The pinion is provided with an insert for low cost, versatile direct valve mounting.

4 Upper Pinion Part

Together with the pinion, the upper pinion part forms a balanced pinion design. Top and bottom diameters are equal which reduces pressure forces on the pinion thrust, radial bearings and the O-ring seals. It is a design with low surface pressure, low wear and, ultimately, low maintenance in high cycle applications.

5 Limit Stop Cam

The large diameter limit stop cam is made of high tensile chrome molybdenum steel for accurate and lasting stroke adjustment.

6 Piston

The large piston rack is precision-machined and chromated for optimum performance and lasting durability. The Nitrile rubber O-ring seals (6A) with the PTFE Guide Band (6B), together with the 3 point guiding system ensure a durable, air tight and smooth operation.

7 Spring Package

Single acting actuators up to size Q350 have spring packages for safe and easy disassembly. The springs (7C) are kept together by the end cap (7A) and the spring retainer (7D) during disassembly, which requires only standard Allen keys.

7A End Cap

Both single acting and double acting actuators have specific end caps to provide the optimum space for their function. Double acting versions have flat end caps which reduce air consumption.

7B End Cap Screws

All external fasteners are stainless steel to ensure a long lasting, air tight and safe operation.

7C Springs

A maximum of three springs are fitted to each end cap of single acting actuators. Six spring set configurations are provided to cover pressures from 3 to 8 barg (43 to 120psig). The FieldQ™ springs are designed and manufactured never to break and are protected from corrosion using a Deltatone® coating.

8 Housing Guide Band

All moving parts are wear-protected by lubrication and specific guide band materials. The wide Nylatron® guide band provides wear protection between housing and piston to extend the actuators life in the most severe and demanding conditions.

9 Pinion Bottom

Pinion seals are positioned as close as possible to the external surface as possible to minimize any crevices for maximum protection against corrosion. The Delrin radial bearing on the pinion bottom is made as wide as possible to minimize friction and ensure a durable and smooth operation.

10 Center Plate

FieldQ™ actuators are all provided with valve flanges according ISO 5211. Most of the sizes have two drilling patterns. Together with the insert it provides low cost and versatile direct valve mounting. For valve mounting according to DIN3337 the glass filled nylon center plate is added to the actuators flange. This provides additional location of the actuator to the mounting bracket.

11 Position Tracking Device

The IPT technology™ allows the integration of controls and feedback in a single product - providing continuous position tracking, with contactless position sensing and feedback (patented by Emerson). In the past, a separate switch box would provide position feedback. This has been replaced by an integrated sensor on the pinion, which monitors the rotary movement continuously so that position feedback can be communicated to the function module and back to the control room. Both Conventional (end point) and Smart (modulating) feedback are available.

12 Pneumatic Control Module

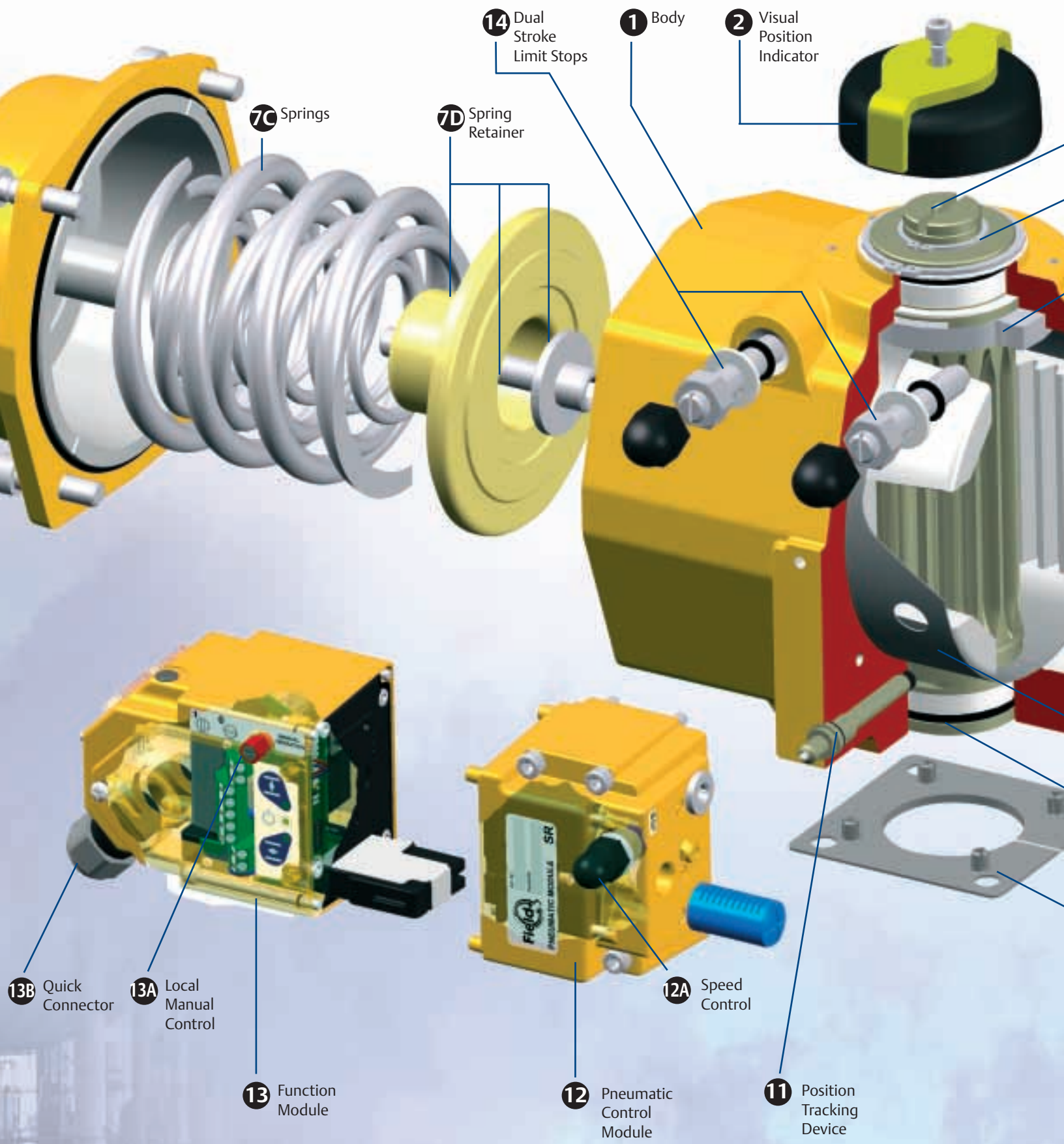
The patented reliable diaphragm/poppet design offers a high air volume capacity. Normal conventional spool or solenoid valves demand a high air quality. This innovative technology allows the use of standard factory air, saving costs for air filtration. But most important, it provides a reliable, long working life. A breather function is standard on single acting versions. This provides protection of the actuator spring chamber in applications where the actuator is located in an aggressive corrosive atmosphere. As an option the pneumatic control module can be equipped with a speed control (12A).

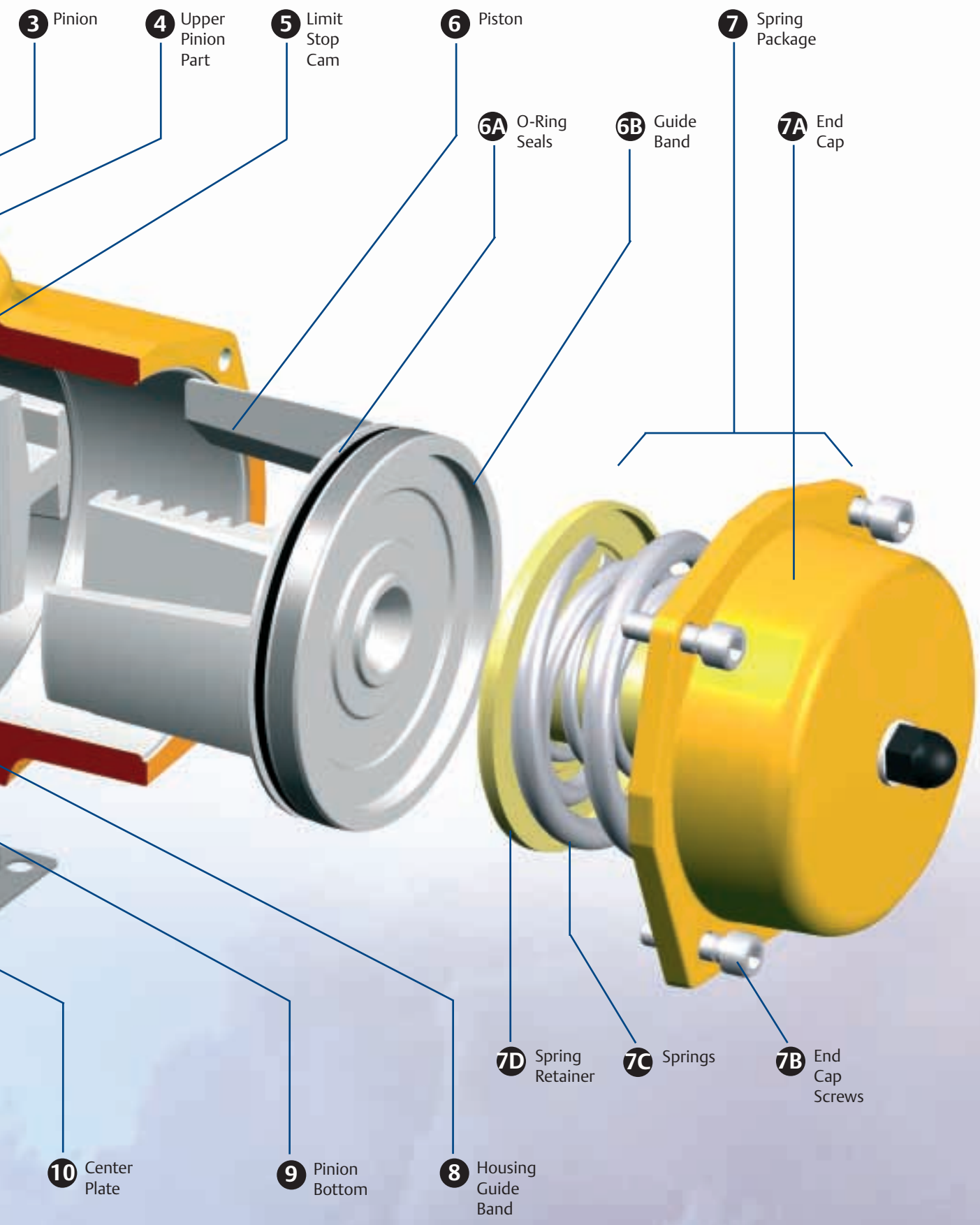
13 Function Module

Function Modules provide the flexibility to select the right functionality for your application. This modular system provides the possibility to upgrade to digital communications in the future. A wide range of Conventional, Smart or Bus communication modules are available. As an option the function modules can be equipped with Local Manual Control (13A) and a variety of glands and quick connectors (13B)

14 Dual Stroke Limit Stops

FieldQ™ actuators are factory set on a rotational travel of 90°±0.5°. Two limit stops are standard, available to adjust either the open and/or closed position. With the dual stroke limit stops, a wide variety of valve applications, like metal seated or high performance valves, can be adjusted accurately to their specific requirements.





Predictive Maintenance

Reduce the Cost of Maintenance on your Equipment

The value that the FieldQ™ Pneumatic Valve Actuator brings to valve maintenance is one of its strongest features. Imagine the maintenance impact by knowing when a final control element will be in need of repair and, if it does need repair, what will need to be repaired.

Running diagnostics on valves equipped with FieldQ™ Pneumatic Valve Actuators enables you to make sound, predictive maintenance decisions.

Integrate and use the technology that FieldQ™ Pneumatic Valve Actuators provides to:

Monitor

Alerts can signal implied or actual problems with the final control element. Scan these alerts continuously and provide immediate feedback to operations while the assembly is controlling the process. An example of this is the Open Breaktime alert. This checks the time taken to between the signal to open and the actual start of the opening stroke, a constant indication of valve break torque and hence the condition of the valve's seat.

Diagnose

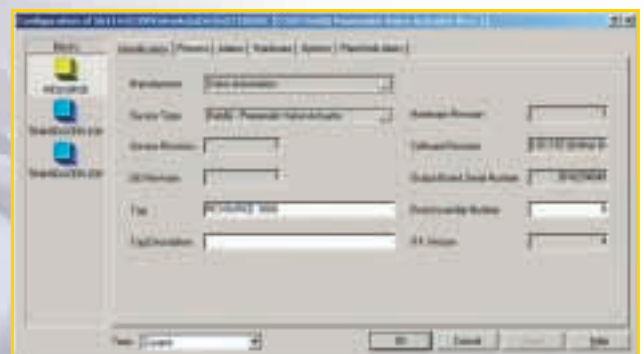
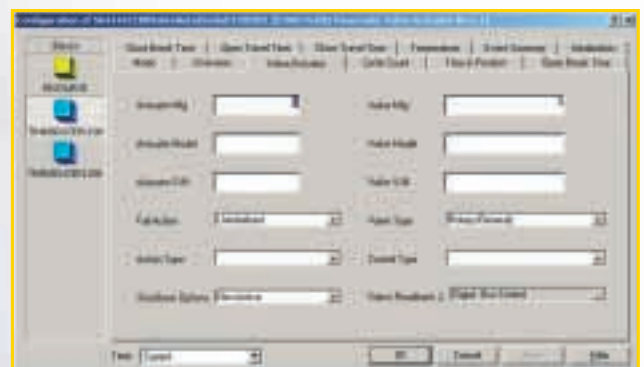
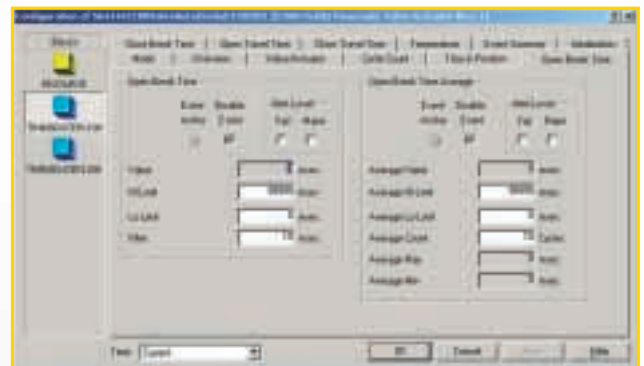
To determine a valve's operating performance and condition, use diagnostics and the monitoring capabilities of the FieldQ™ Pneumatic Valve Actuators. Then schedule maintenance for the least disruptive time.

Document

Save valuable time by using FieldQ™ and current AMS software to track and record changes. A historical record can be generated for maintenance activities such as configuration changes, calibration and diagnostic tests. Each event can be time and date stamped and put into a permanent log. FieldQ™ Pneumatic Valve Actuators ease the burden of documenting maintenance information for ISO certification or regulatory compliance reporting.

Review History

Spot emerging valve repair requirements before they impact performance by comparing current operating status of the valve versus a historical database of performance.



FieldQ™ Applications

FieldQ™ has been developed to meet increasing customer demand for valve automation systems with integrated control accessories and digital communications possibilities. The introduction of FieldQ™ provides customers with an integrated, modular, cost-effective and intelligent pneumatic valve automation package that is suitable for:

- Hazardous areas
- Applications where position sensing and feedback are required
- Applications that have a need for diagnostics and/or digital communications
- Installations requiring a very compact package

This intelligent solution is capable of meeting the tough demands of both the chemical and pharmaceutical industries, where reliability and high performance standards are critical. The highest attention to quality of design and manufacture ensures that the FieldQ™ can withstand temperature extremes, harsh duty and corrosive atmospheres.

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