

SIL-PAC™

Valve Automation Solution For Safety Instrumented Systems



BETTIS™


EMERSON™
Process Management

SIL-PAC

- *Suitable for use in SIL 3 Applications*
- *Certifiable to Industry Standards*
- *Increased Flexibility and Reliability*
- *Lower Cost of Acquisition and Ownership*
- *On-Line Testing and Diagnostics*
- *Single Source*



SIL-PAC
CBA-Series



SIL-PAC
G-Series



As a core element of the PlantWeb digital plant architecture, Betts *SIL-PAC* gives you the power to predict.

Safety-Instrumented-Systems: Meant to Protect.

Safety-instrumented systems are intended to afford protection against the risks posed by hazardous processes.

Hazardous processes typically rely upon safety-instrumented systems (SIS) to help protect against upsets or failures that might threaten worker safety, cause environmental concerns, or damage operating equipment.

A safety-instrumented system typically consists of a sensor to monitor the process, a logic device that compares process conditions to predetermined process limits, and a final control element that shuts down or vents the process should conditions reach a trip point.

Will the Final Control Element Work?

All SIS components must work on demand to ensure that the system operates as planned.

The operating integrity of the SIS most often depends upon its final control elements. These elements typically remain in one position until a demand is placed on them. This means they may be unable to perform their task when called upon due to lack of use.

If a final control element fails, the safety-instrumented system may not be able to take the process to the designed safe state.

Ensuring Final Control Element Readiness

Choosing the right components

There are several things to keep in mind when choosing a final control element. The first is the standards that may exist, such as IEC 61508, 61511, and S84.01. Another is being able to evaluate the final control element's ability to perform while it is part of the process. Still another is being able to buy the complete final control element – valve, actuator, and controller – from a known, trusted source with the functionality and technology to meet today's demands.

Relying on the Standards

Components that have been evaluated by an independent third party against industry standards such as IEC 61508 / 61511 and ISA S84.01 provide a higher level of confidence about their ability to perform. Those that have not been evaluated are relying solely on the manufacturers claims for the product.

Evaluating the ability to perform.

Being able to evaluate the final control element's ability to perform by means of periodic testing, while in service helps to better ensure its operation when called upon.

Traditional test methods, however, pose the following typical problems:

- The process often has to be shut down, or the valve bypassed, to allow a full-stroke test of the final control element. Both are time-consuming and costly.
- Partial-stroke testing required a manual device or other method to restrict the movement of the valve.
- If the stroke-limiting device were not removed or disengaged following a test, the SIS would become ineffective should the demand occur.
- Safety valves must be taken "off-line" during a stroke test, which makes them unavailable should an event occur.
- The testing procedure is labor intensive and prone to human error and therefore, costly.

A single package provider.

When you ordered your last final control element for your safety system, were you able to purchase the entire package from one company? Were you able to specify the functionality you desired? If you had any problems with the components not made by the supplier, were you satisfied with the way it was handled? How about the way you were treated? Did the vendor provide one set of reliability data for the entire package? Or were you saddled with data for every piece of the solution including the bolts holding on the mounting plate?

In today's world, you demand more of the final control element, that piece that is such a critical part of the Safety Instrumented Functions (SIF) in your plant. More than just the type of valve, or the material, you want to specify the functionality of the of the complete final control element package. You want to be able to specify the solution for your final control questions.



Bettis SIL-PAC – Valve Automation Solution for Safety Systems

Emerson Process Management's Valve Automation Division introduces Bettis SIL-PAC – Valve Automation Solution for Safety Systems. Incorporating the industry-leading G and CBA-Series Actuators and FIELDVUE® Digital Valve Controller (other options available), with the valve you specify.

Valve Automation Solution for Safety Systems

– The Actuator

Bettis® actuators, proven in safety applications for over 45 years.

The Bettis SIL-PAC solution utilizes Bettis G and CBA-series Scotch Yoke actuators, proven in safety applications for many years. Both actuator families have a Failure Modes and Effects Diagnostics Analysis (FMEDA) report performed by Exida.com™ showing predictive use in SIL 3 applications when a periodic¹ partial stroke test is performed. If you choose not to perform partial stroke testing, then the actuators are still appropriate for use in SIL 2 applications!

But we didn't stop there! Bettis provides families of actuators that are the first in the industry to be certified under the European Union Pressure Equipment Directive (PED97/23/EC) with ATEX certification. The actuators are certified against water ingress to IP 66 & IP67M standards.

The G-series actuators incorporate the industry standard NAMUR/VDI/VDE accessory interface and the MSO or ISO valve mounting standard. With torque ranges from 835 to 678,000 NM (7,388 to 6,000,000 lb-in) you will be able to interface and control most of the valves in the industry.

Safety is further addressed with a modular design that allows for servicing of the actuator in the field without removing the actuator from the valve. As the safety industry changes and new standards such as IEC 61511 are adopted, Bettis will continue to lead the way.

Other actuators from Valve Automation can be used as part of the SIL-PAC family. Consult Factory for availability and conditions.

¹ Periodic is defined as test frequency greater than 10 times the demand rate.

² The partial-stroke test procedure or sequence can be completed automatically, thereby avoiding errors and possible nuisance trips. HOWEVER, FOR SAFETY REASONS A QUALIFIED OPERATOR IS REQUIRED TO INITIATE THE TEST.

– The Controller

Emerson's Fisher FIELDVUE DVC6000 ESD... industry leading reliability and intelligence

As a core element of the PlantWeb digital plant architecture, the Fisher FIELDVUE DVC gives you the power to predict. As with all PlantWeb technologies, the DVC6000's microprocessor-based intelligence delivers predictive, diagnostic data both on operational values as well as device health, making predictive maintenance a reality.

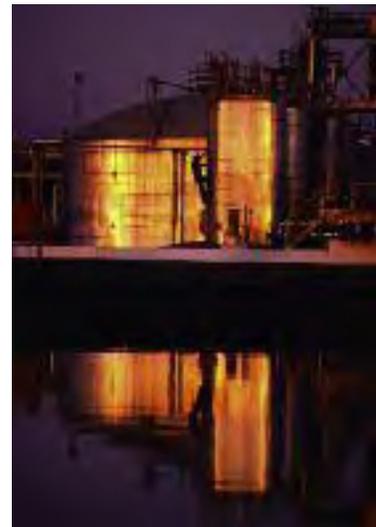


While the device is online, providing the final control function you demand, the FIELDVUE DVC is also continuously monitoring the condition of the final control solution. It is constantly monitoring supply pressure, pressure values to the actuator, and valve position to verify proper working order. Thanks to time and date stamping of these values, you gain the additional advantage of historical trend analysis AND easier compliance with statutory reporting requirements.

Certified by TÜV Germany for use in SIL 3 applications, the FIELDVUE DVC makes testing practical and convenient. Partial stroke testing can be done while the valve is online, without shutting down the process. For example, a FIELDVUE-generated valve signature test provides insight into valve packing friction, air path leakage, valve sticking, actuator spring rate and bench set.

By comparing current values to previously captured values, you can diagnostically forecast performance degradation and take action before you have a problem. Also, you can gain maintenance efficiency by allowing maintenance personnel to focus on what needs attention instead of searching for problems. Historical data analysis allows for better, predictive maintenance scheduling instead of costly reactive maintenance.

Test personnel can conveniently communicate with the device 3 ways: through the PlantWeb architecture using Emerson's ValveLink software on a personal computer or workstation, remotely at the device through a handheld communicator or directly through a convenient push-button test initiation directly mounted to the device.



– The Valve: Your Choice

The Bettis SIL-PAC can be mounted on the valve that best meets your requirements.

How can we make the statement that the Bettis *SIL-PAC* allows you to select the valve that best meets your needs? By being valve neutral. That's right, Bettis *SIL-PAC* is independent of any valve company. By being valve neutral and utilizing our Valve Automation Centers (VAC) and Local Business Partners (LBP), we can supply almost any valve as part of your solution, or no valve at all.

When you order a Bettis *SIL-PAC* Valve Automation Solution with the valve, you get the Bettis *SIL-PAC* Final Control Solution. Depending on the valve, you can get the failure rate (Lambda) data, documentation, and support for the entire package through your local VAC or LBP someone you already know.

When you request a Final Control Solution, you can specify the valve for the solution as follows:

- You can specify the valve, right down to the make and model.
- You can provide the valve specifications/performance requirements, provide a list of approved vendors, and let us acquire the valve.
- You can specify the valve specifications/performance requirements and let us acquire the valve.

– The Options: To complete the package

Reliability and affordability, now add flexibility to the package.

Don't think that what you see is all that you get. The Bettis *SIL-PAC* allows for a complete, integrated, valve automation solution so we have offer options to complete the package:

Solenoid – A solenoid can be added as a primary or redundant shutdown option. When controlled independently of the DVC, the final control element can be called upon to perform its shutdown function via the solenoid and/or the DVC. While Bettis *SIL-PAC* is shutting down, it can monitor and records key information about the shutdown for use later. Bettis *SIL-PAC* uses solenoids from ASCO as standard, however, we can include solenoid valves from any vendor.

Local Test and/or shutdown Switches – A local switch can be added to the solution to provide the ability to start the partial stroke test while at the final control element. Data from the test is stored in the device memory for recall later using AMS ValveLink.

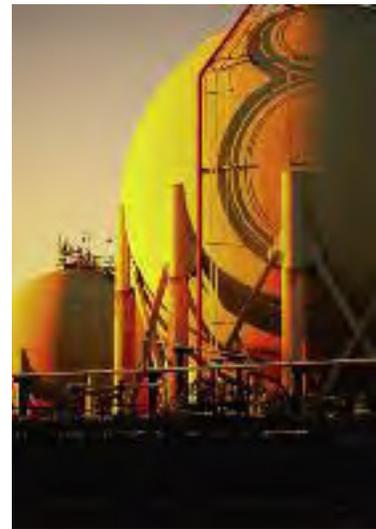
A switch/button can also be provided, with interlocks, to shutdown *SIL-PAC* locally.

Services – As part of the Bettis *SIL-PAC* valve automation solution we will mount *SIL-PAC* to any valve and calibrate and configure the complete package to your specifications. Concerned with what happens when *SIL-PAC* shows up on your loading dock, and what you need to help ensure the solution is installed and setup correctly in your plant? Bettis can help with our Startup Services option. When this option is included, we will provide personnel, on-site at your facility to help setup your solution as part of your startup process. This service includes configuration and calibration as required, diagnostic baselines, wiring checks, and other services necessary to help ensure Bettis *SIL-PAC* is setup and configured to work with your Safety Instrumented system.

Tools – With the Bettis *SIL-PAC*, you can also choose to include the industry's premier Valve Analysis Software from Fisher... **AMS ValveLink**. This option includes the AMS ValveLink application, HART Modem, Line Conditioner, and licenses as required. It can also be packaged with a HART multiplexer to connect all your final control safety elements together independent of your plant process control system.

We can also provide the industry's premier handheld for HART devices, the 275 HART Communicator from Rosemount, allowing you to work on *SIL-PAC* locally.

Other – Along with the above, *SIL-PAC* can be supplied with other options you specify, including manual reset, local enclosures, quick exhaust components, and more. Let us know what you require and we will see what we can do.



SIL-PAC

Valve Automation Solution

Processes typically rely upon safety-instrumented systems (SIS) to help protect against upsets or failures that might threaten worker safety, cause environmental concerns, or damage operating equipment.

A Safety-Instrumented System (SIS) typically consists of a sensor to monitor the process, a logic device that compares process conditions to predetermined process limits, and a final control element that shuts down or vents the process should conditions reach a trip point.

All SIS components must work on demand and the operating integrity of the SIS most often depends upon its Final Control Elements. These elements typically remain in one position, for months or years, until a demand is placed on them. Without proper testing, the probability of this component failing when called upon increases over time.

Emerson Process Management's Valve Automation Division introduces Bettis SIL-PAC – Valve Automation Solution for Safety Systems. Incorporating the reliability of the industry leading G and CBA-Series Actuators with the diagnostics and functionality of the Fisher FIELDVUE® Digital Valve Controller for ESD. Then we add options, test it to your specifications and you've got the Industry's leading Valve Automation Solution for your Safety System. Add a valve and you've got the industry's leading Final Control Solution for your Safety System

SIL-PAC Benefits

- On-line Testing
- Certifiable to Industry Standards
- Lower Acquisition Costs
- Lower Cost of Ownership
- Reduced Labor Requirements
- Increased Flexibility
- Increased Safety and Reliability
- Single Source
- Functionality You Want



Actuator

- Bettis G (shown) & CBA Scotch Yoke Actuators Proven in Safety Applications
- Suitable For Use in SIL 3 applications
- First to be PED97/23/EC & ATEX Certified
- Water Ingress Certified to IP 66/67M
- Torque Ranges 835 to 678,000 NM
— 7,388 to 6,000,000 lb-in
- Modular Design
- Other Actuators from Valve Automation Available, Consult Factory

Options

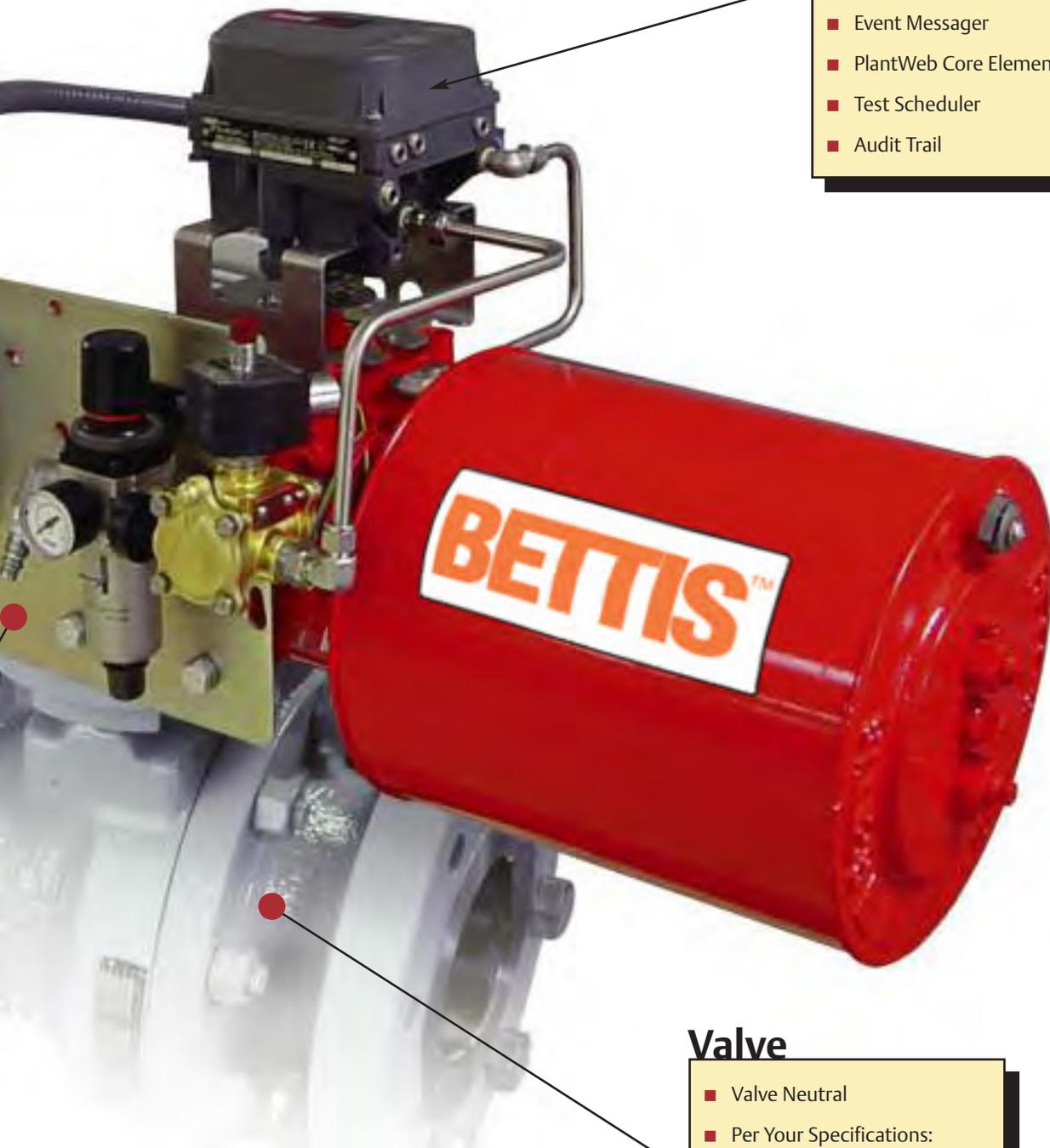
- Local Test Switch
- Additional/Redundant Solenoids
- Pressure Regulator
- Relief Valve
- Local Shutdown
- Manual Reset

SIL-PAC Features

- Complete Integrated Solution
 - Actuator, Controller, Valve, Options, Certifications, Testing
- Certifications to Industry Standards
- Documentation/Audit Trail
- One Source
- Package Warranty

Fisher DVC6000 ESD

- Certified (TÜV) to SIL 3
- On-line Partial Stroke Test
- Full Diagnostics
- Status Monitor
- HART Communications
- Event Messenger
- PlantWeb Core Element
- Test Scheduler
- Audit Trail



Valve

- Valve Neutral
- Per Your Specifications:
 - Valve Make/Model or
 - Valve Requirements w/Approved List or
 - Valve Requirements Only

Greater Safety at Less Cost

Bettis SIL-PAC brings money-saving advantages to SIS design, implementation and operation.

We start with **Lower Acquisition Costs** for you. You can now buy the complete solution from one vendor, with the reliability, functionality, and support you require.

Lower Cost of Ownership – By employing the test capabilities of Bettis SIL-PAC, the frequency of bypass valve testing is reduced. Time between shutdowns for full testing can be increased. Automated testing eliminates expensive, pneumatic panels typically required by manual test procedures. The test capabilities provided by Bettis SIL-PAC can also increase the amount of time between plant shutdowns for full functional testing.

By using the same controller that is on your control valves, the costs of training, support and inventory are reduced.

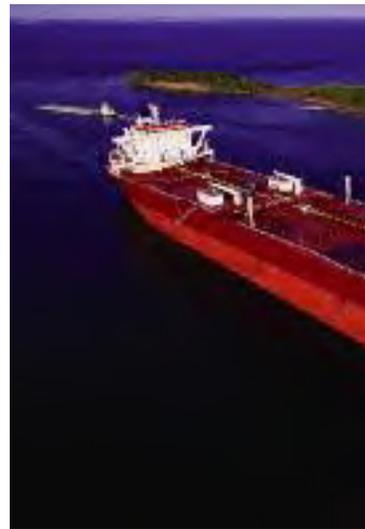
Reduced Labor Requirements – By supplying a complete integrated, package, solution, labor required for assembly is greatly lowered. You also get one set of failure rate data for the complete solution³ thereby lowering safety analysis costs. And, you have only one supplier to work with when you are ready to buy, when you need support, when you decide to upgrade or replace your solution.

Bettis SIL-PAC Valve Automation Solutions for Safety Systems from Emerson Positively Impacts Plant Costs and Safety.

From lower acquisition costs to plant and, especially, personnel safety, SIL-PAC plays an important role.

Bettis SIL-PAC provides:

- lower acquisition costs
- proven reliability
- more flexibility
- improved personnel safety
- increased availability
- lower cost of ownership
- certifications to industry standards



³ Assuming use of approved components. Use of other components may mean different coverage for safety calculations.

Certification and Documentation

Successful product evaluation by a third-party authority leads to a thorough review of components for safety-instrumented systems.

A third-party certifying authority provides functional safety assessments of components intended for safety-instrumented systems.

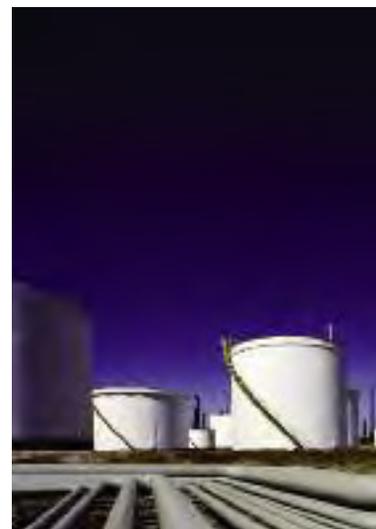
By evaluating products per IEC and ISA standards, the certification process allows you to better select a product for use in your specified safety application.

A certificate is issued along with a report explaining how the product was analyzed and what application criteria must be met for the product to retain its certification.

With the report, system analysts and designers can better understand how a product contributes to meeting your required risk reduction (SIL) level.

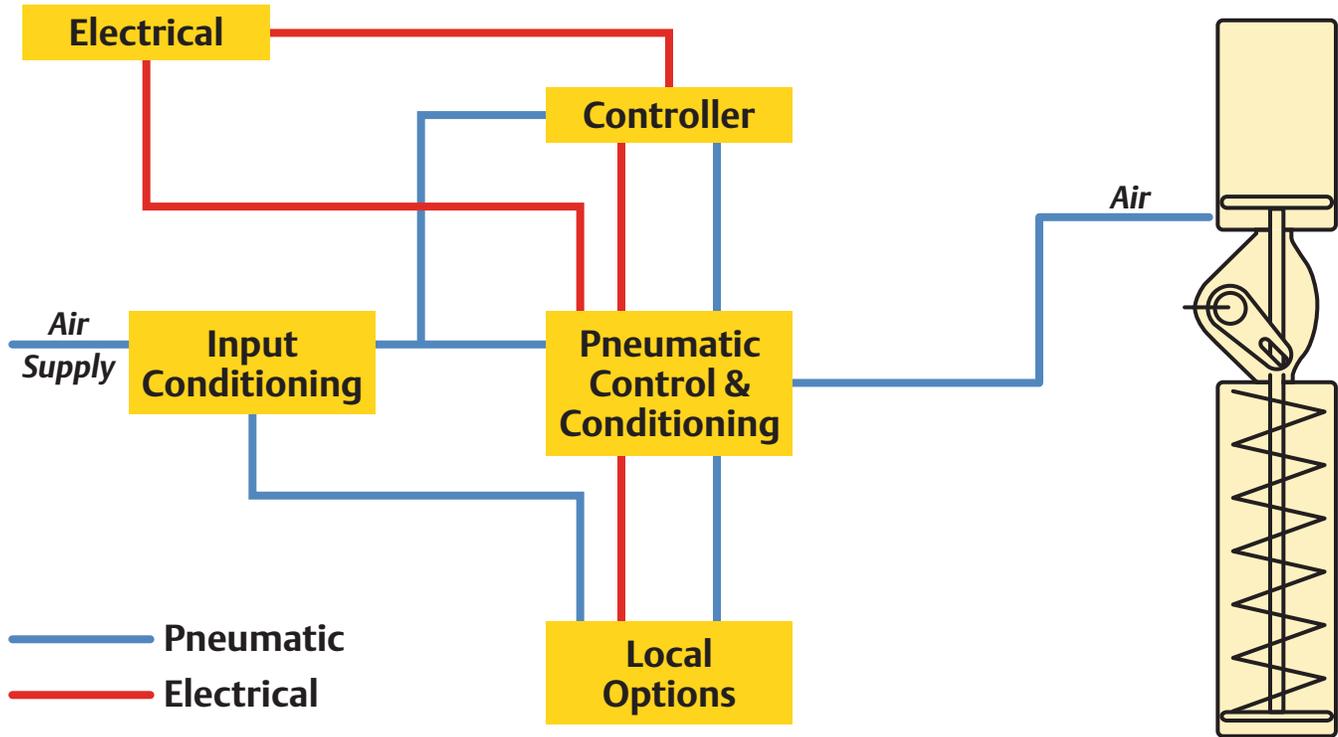
All certificates and reports are available. To obtain a copy, contact your local sales office listed on the back page of this brochure. Securing an approval report is a simple step in helping to assure that your safety-instrumented system reaches the required risk reduction level.

Emerson Process Management offers an extensive lineup of instruments and final control elements for safety instrumented systems. For additional information, contact the Emerson Process Management sales representative or sales office nearest you, or visit www.EmersonProcess.com.



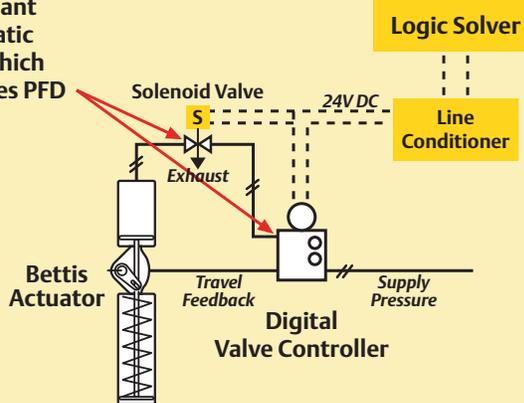
Configurations

General



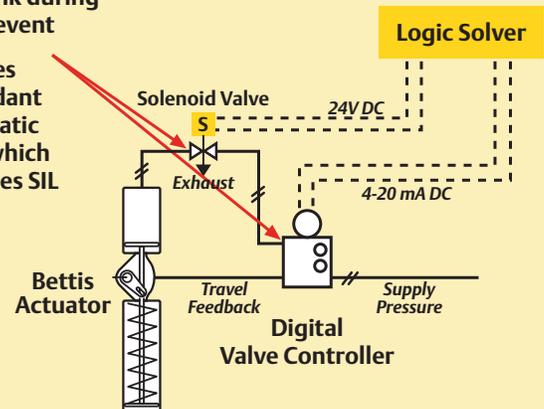
Multi-Drop Mode

- Provides Redundant Pneumatic Path, which improves PFD



Point to Point Mode

- Communication available to AMS Valvelink during safety event
- Provides Redundant Pneumatic Path, which increases SIL



*** Solenoid valve and FIELDVUE digital valve controller are powered separately

Model Information

Two Packages to Choose

FSB-VAS-100
SIL-PAC by Bettis, Valve Automation Solution
(without Valve)

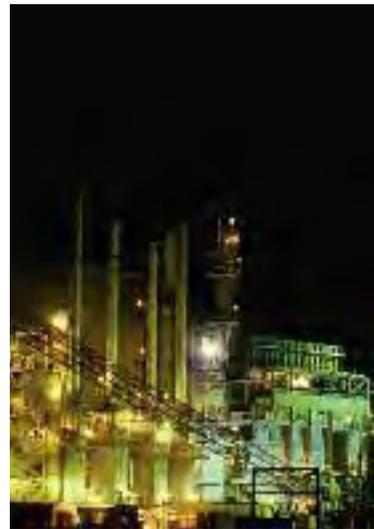
FSB-FCS-100
SIL-PAC by Bettis, Final Control Solution
(includes Valve)

Solution Supplied With Solution ID Number
Unique To Your Application

Options & Configurations

Determined By Your Requirements.

Dependent On:
*Close Time, Open Time, Partial Stroke Coverage,
Valve Size, Control Options (DVC, mechanical, others),
Local Options, Pneumatic Supply, Reset Options
Sizes, Interlocks, and Whatever Else You Require*





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