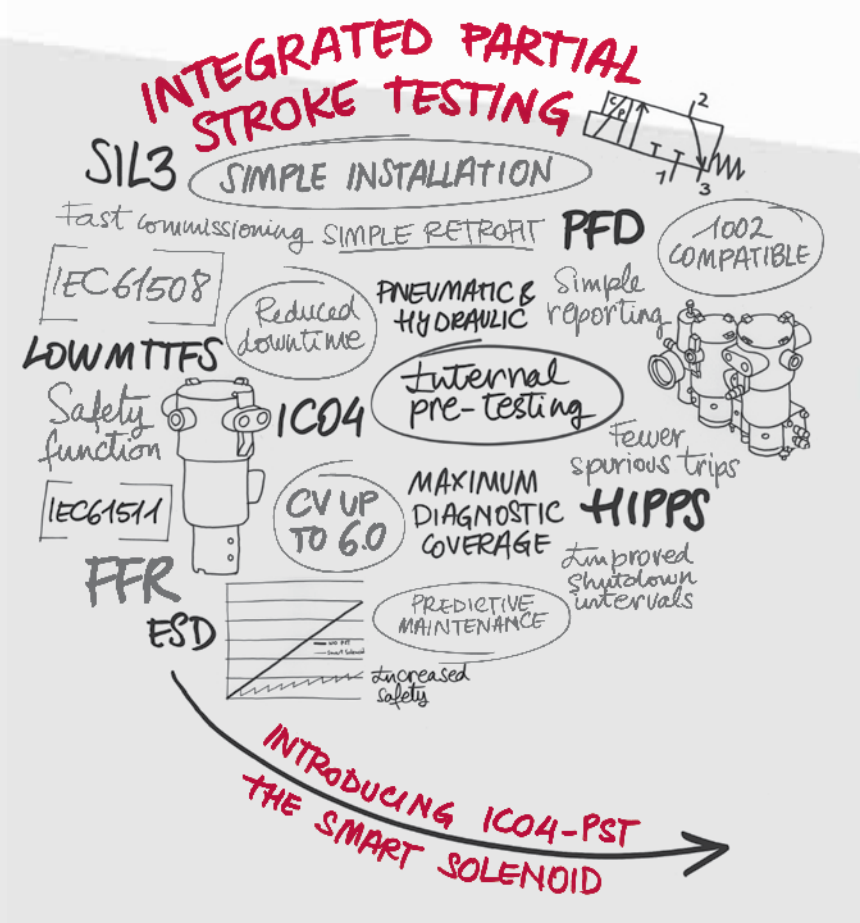


ICO4-PST solenoid valve



Engineering
GREAT Solutions

The Smart Solenoid
for Integrated Partial
Stroke Testing

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Engineering GREAT solutions through people, products, innovation and service

IMI Precision Engineering is a world-leader in fluid and motion control. Building close, collaborative relationships with our customers, we gain a deep understanding of their engineering needs and then mobilise our resources and expertise to deliver distinctive products and solutions.

Wherever precision, speed and engineering reliability are essential, our global footprint, problem-solving capability and portfolio of high performance products enables us to deliver GREAT solutions which help customers tackle the world's most demanding engineering challenges.

> **Reliability**

We deliver and support our high quality products through our global service network.

> **High performance products**

Calling on a world-class portfolio of fluid and motion control products including IMI Norgren, IMI Buschjost, IMI FAS, IMI Herion and IMI Maxseal. We can supply these singly, or combined in powerful customised solutions to improve performance and productivity.

> **Partnership & Problem Solving**

We get closer to our customers to understand their exact challenges.

Setting the standard for safety, reliability and performance

IMI Precision Engineering has over 80 years experience in providing oil, gas and chemical solutions that are proven in safety, reliability and durability, in the most extreme environmental and operating conditions around the globe.

With world-class product ranges including IMI Norgren, IMI Buschjost, IMI Herion and IMI Maxseal, our products are designed to work effectively in aggressive environments and extreme temperatures and meet international standards such as:

- > ATEX
- > TÜV
- > TRCU
- > INMETRO
- > CSA
- > KOSHA
- > DVGW
- > FM AND UL
- > NEMA



At the heart of our offering to the Energy sector are stainless-steel solenoid valves and air preparation equipment (filters, regulators and filter-regulators), pneumatic and hydraulic pressure switches, I/P and E/P convertors, 2/2 way and 3/2 way process valves and Redundant Valve Manifold (RVM) systems.

Our work with leading national and international oil and gas companies and global suppliers means that we talk our customers' language, and can bring specialised experience about legislation, standards and specifications.



Production



Transportation



Refining



Petrochemical



Chemical



Power Generation

Partial Stroke Testing (PST) – The compromises

Partial stroke testing, or PST, has been an established technique in the oil & gas industry to help prove the functionality of final element assemblies used in safety systems for many years now. This allows the operator to demonstrate that Emergency Shutdown Valves will work to a minimum performance level when required, and operate on demand.



The Compromises

The first PST were mechanical, but technology quickly developed to meet the changing demands of the industry, which was looking for more intelligent systems able to provide diagnostic capability in addition to a simple partial stroke test. This led to the development of smart systems.

All current PST systems including Positioners, suffer from at least one of the following compromises:

- > Limited diagnostic coverage from the inability to test solenoid valves
- > Compatible only with pneumatic actuators
- > Increase in the number of safe failures thus increasing the risk of spurious trips
- > Unable to test the valve at the designed operating speed
- > Requiring additional electronic units to be fitted and engineered

Drawing on over 3 years technical market research with key players in the global oil & gas industry, we have developed the new ICO4-PST Smart Solenoid Valve for integrated partial stroke testing.

The ICO4-PST allows the operator to address all the requirements of PST without compromise and is based on the market leading IMI Maxseal ICO4 high performance solenoid valve which brings peace of mind to plant operators with regard to the functional safety of emergency shutdown systems.

ICO4-PST represents a step change in engineering offering levels of safety and reliability never seen before.



The problem with current PST solutions

There are two main types of intelligent system suitable for Partial Stroke Testing. These are Positioners and Electronic Systems. Both offer different approaches but each of these involves a series of compromises in order to achieve the goal.

Positioners

Positioners are currently the most common type of intelligent PST system in use and are derived from control valve positioner technologies. They were the quickest development path available as they already had the technology built in to reliably move a valve to a given position. In fact these made for relatively simple systems as the device could easily be configured to give any desired percentage of partial stroke.

With the addition of an ESD function, these devices became part of the control system for the actuator and therefore could be used to effectively create a redundant ESD operation when used with a solenoid valve.

There are a number of manufacturers of positioner systems and all use a similar fundamental approach to partial stroke testing. However, as time progressed, the compromises created by these systems became more apparent as other technologies were developed.

- > Requires reconfiguration of pneumatic control
- > Limited flow rates
- > Reduced Diagnostic Coverage
- > Does not test the valve at the designed operating speed
- > High safe failure rates
- > Not compatible with all valve types
- > Difficult to install, commission and service

Electronic systems

As the industry sought PST systems to alleviate the issues with Positioners, many manufacturers turned to electronic systems that were able to perform a partial stroke in a similar manner to that required in an emergency. Many of these systems use electronic control boxes that are fitted close to the actuator and connect the power supply to the solenoid valve. To perform the test, these systems de-energise the solenoid valve and monitor the valve position and/or instrument pressure to determine the success of the test.

Electronic systems can deliver a high level of diagnostics while limiting many of the issues associated with the positioners. However, even these systems are not entirely free of problems.

- > Additional equipment required - The most common is an electronic control box
- > Spurious trip risk
- > Solenoid valve selection resulting in poor SIL performance
- > Difficult to service
- > Costly

Each technology clearly has its strengths, but it's also acknowledged that neither option currently offers a wholly satisfactory or reliable solution.

Introducing ICO4-PST

The first smart solenoid valve with fully integrated partial stroke testing

Working closely with customers in the global oil and gas industry, we see the need for a no compromise solution for partial stroke testing. It is clear that the best way to eliminate the compromises of positioner systems is to use the control mechanism of the electronic solution; whilst the best way to eliminate the compromises of the electronic solution is to employ the packaging of the positioner system. Now add to this the benefits of using a high integrity solenoid valve and we are left with a clear path – namely, the integration of the PST control electronics into the termination housing of a high integrity solenoid valve.

The ICO4-PST is the first fully integrated partial stroke testing solution with the control system built into the market leading IMI Maxseal ICO4 high integrity solenoid valve. With the lowest safe and dangerous failure rates of any intelligent PST system on the market and always providing the highest possible Diagnostic Coverage, the best possible SIL performance is guaranteed.

- > No dedicated PST device required therefore significantly reduces engineering requirements
- > High level diagnostics with position, pressure and time monitoring
- > Simple Pass/Fail reporting
- > Dual override mechanism eliminates possibility of over-stroke
- > Compatible with valve speeds from 2 to 120 seconds
- > SIL 3 certified as 1oo1
- > -40°C ... +60°C
- > Local testing using HART 475 communicator, remote testing via HART

The only solenoid valve with integrated PST control electronics

Compatible with hydraulic actuators

Compatible with Redundant Valve Manifold

Ideal for retrofit

Simplifies engineering process



ICO4-PST

The flexible solution

Another product of our innovation and technical excellence, the ICO4-PST is reliable and flexible, and can be designed to your specification. Manifold options are available depending specific environmental and application requirements.

- > Solenoid configurations
 - > 1oo1, 1oo2, 2oo2, 2oo3
- > High flow rate Cv up to 6.0
 - > Reduces requirements for QEVs, pilot valves & boosters
- > Actuator Types
 - > Pneumatic, hydraulic
 - > Spring return, double acting
 - > Quarter turn, linear
- > Valves
 - > Ball, butterfly, gate, globe, HIPPS
- > Valve Speeds
 - > 2s to 120s
- > Operating temperature range
 - > -40°C ... +60°C
- > Retrofit
 - > Ideal for retrofit applications due to engineering simplicity



*Fully flexible
manifold options
available*



IMI Precision Engineering operates four global centres of technical excellence and a sales and service network in 75 countries, as well as manufacturing capability in the USA, Germany, China, UK, Switzerland, Czech Republic, Mexico and Brazil.

For information on all IMI Precision Engineering companies visit www.imi-precision.com

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