

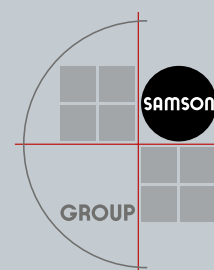
Positioners



Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	



Where Innovation is Tradition



Competence in valve engineering

Founded in 1907, SAMSON has since become a worldwide leader in the manufacture of expertly engineered control valves, positioners and other valve accessories for all industrial processes.

Noted manufacturers of special valves, such as AIR TORQUE, CERA SYSTEM, LEUSCH, RINGO VÁLVULAS, PFEIFFER, SAMSOMATIC, STARLINE and VETEC, are members of the SAMSON GROUP.

With over 50 largely independent subsidiaries and more than 220 representatives as well as engineering and sales offices, SAMSON is on hand to provide competent customer service all over the world.

SAMSON provides you with valve engineering and customer service from a single source:

- We support you in planning new installations or overhauling and expanding existing plants.
- We assist you in selecting and configuring the right equipment to suit your control requirements.
- We are close at hand to support your life cycle management, from installation and start-up to maintenance and service.



At SAMSON, we can draw on more than 100 years of experience and expertise in control valve engineering. In 1957, we launched the first pneumatic positioner onto the German market. Since then, we have enhanced and perfected our positioners, their attachment and their interaction with a wide variety of valve models and valve accessories.

The SMART VALVE INTEGRATION CENTER (SVIC), founded in 2009 at our headquarters in Frankfurt, works in close cooperation with the R&D and test facilities departments to provide the foundations for optimal integration of smart SAMSON devices into process control, engineering and asset management systems.

The center performs integration tests of smart devices as well as system tests according to customer specifications in cooperation with control system manufacturers. We pass on the knowledge we acquire to our customers in hands-on training seminars.

The components used are tested concerning their start-up and interoperability on plant setups in laboratory conditions. Additionally, application-specific solutions and field device improvements are developed.



Development from analog to digital

1935 – A solenoid valve and a temperature controller are the first electrical devices developed by SAMSON.

1957 – The first pneumatic positioner, STP 402, is launched onto the German market.

1973 – SAMSON introduces an i/p and p/i converter functioning as the linking element between pneumatics and electronics.

1974 – Production of the first electro-pneumatic positioner, the Type 3762, starts.

1986 – SAMSON participates in a joint project set up by different industrial companies to define a fieldbus for automation later to become PROFIBUS.

1987 – Integral positioner attachment with internal air routing is introduced. It sets a benchmark in control valve engineering that operators still benefit from today.

1989 – The world's first prototype of a fieldbus positioner is presented at INTERKAMA and the ISA show (Philadelphia, USA).



STP 703



i/p converter



Type 3762



1995 – Production of the digital Type 3780 Positioner with HART® communication starts.

1999 – TROVIS-VIEW, a user interface designed to configure and operate various electronic SAMSON products, is introduced.

2000 – The Type 3787 Positioner with FOUNDATION™ fieldbus communication helps strengthen our sales activities in North America, Asia and the Middle East.

2001 – The Series 3730 Positioners with hybrid technology and integrated valve diagnostics are presented at INTERKAMA.

2001 – A leakage sensor to monitor seat leakage is introduced.

2004 – The Series 3730 Positioners are certified in accordance with IEC 61508 for use in safety-instrumented systems up to SIL 3.

2006 – New versions with partial stroke testing for safety-instrumented systems are added to the Series 3730.

2006 – Production of flameproof Series 3731 Positioners starts.

2008 – The enhanced EXPERTplus valve diagnostics allow extensive diagnostic functions to be added to the Series 3730 and 3731.

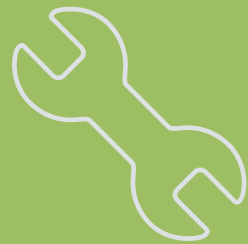
2011 – Type 3730-4 is the first PROFIBUS field unit in which the ID number can be adapted. This allows PROFIBUS-PA field devices to be replaced without having to shut down the control system.

2011 – Type 3730-6 with HART® communication sets new standards in predictive valve diagnostics with its integrated pressure sensors.

2012 – The SAMSON GROUP is partner of the 75th NAMUR general meeting, which highlights modern final control elements in the automation of processes.

2015 – The new TROVIS SAFE series is added to SAMSON's range of positioners. The positioners marketed under the registered trademark TROVIS SAFE have been optimized for use with on/off valves in safety-instrumented systems and are certified to comply with SIL requirements.

TROVIS SAFE



Easy installation

Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

Positioner attachment is a complex matter since various mounting interfaces, actuator motions and manufacturer-specific applications exist.

The wide range of high-grade mounting kits allows our positioners to be mounted on many different linear and rotary actuators by various manufacturers.

Besides the standard mounting kits (IEC 60534-1, VDI/VDE 3847, VDI/VDE 3845) and SAMSON's integral attachment, mounting kits for actuators by other manufacturers are available. They all share the same benefits: they are simple to mount, particularly rugged and durable. The mounting kits modified by SAMSON to meet customer requirements also guarantee problem-free operation of the positioners.

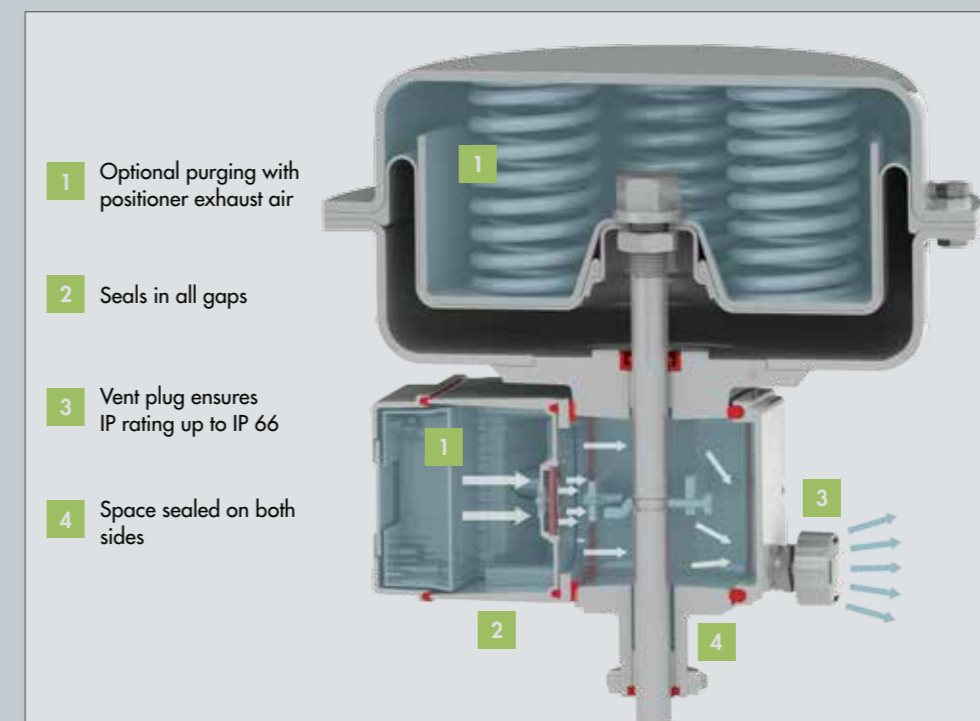
Positioners	Type						Series		TROVIS SAFE	
	3730-0	3766	3767	4763	4765	3725	3730	3731	3730-6	3731-3
Attachment to linear actuators										
SAMSON integral attachment	■	■	■			■	■	■	■	■
IEC 60534-6-1	■	■	■	■	■	■	■	■	■	■
VDI/VDE 3847	■						■		■	
Attachment to rotary actuators										
VDI/VDE 3845		■	■			■	■	■	■	■
Signal processing	Analog						Digital			

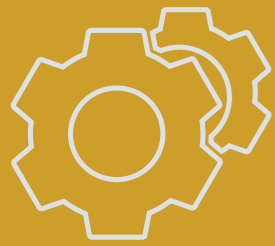


A closer look at SAMSON integral attachment

Integral attachment introduced by SAMSON is the best solution for small and medium-sized actuators as far as safety, cost-effectiveness, quality and a long service life are concerned. A rugged, compact valve unit is created by directly attaching the positioner to the actuator yoke. All moving parts are enclosed and the travel linkage is protected against unintentional adjustments during transportation, installation and operation.

An additional benefit is provided by the internal air routing within the actuator yoke. As a result, no expensive external hook-up between the positioner and actuator is required. On top of this, the purging of the actuator yoke with positioner exhaust air protects the travel linkage from climatic conditions and corrosive ambient air often present in industrial environments.





Options for more performance



Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

Control valves are subject to numerous requirements which vary considerably depending on the application and site of installation. In cases where the standard positioner version cannot meet the control demands, SAMSON positioners can be fitted with an extensive range of accessories. The integration of additional com-

ponents into the positioner housing minimizes the need to mount accessories as well as the complexity of the required hook-up. As a result, the cost of installation is reduced while the operational reliability of the valve is increased.

Positioners	Type						Series		TROVIS SAFE	
	3730-0	3766	3767	4763	4765	3725	3730	3731	3730-6	3731-3
Options										
Software limit switches							■ ^{1) 2)}	■ ¹⁾	■ ²⁾	■
Inductive limit switch		■	■				■		■	
Fault alarm output							■ ^{1) 2)}	■ ¹⁾	■ ²⁾	■
Solenoid valve		■	■				■ ¹⁾		■	
Forced venting							■ ¹⁾	■	■	■
Binary input							■ ¹⁾	■	■	■
Analog position transmitter							■ ¹⁾	■ ¹⁾	■	■
Leakage sensor							■ ¹⁾		■	
External position sensor							■ ¹⁾		■	
Analog input for external travel sensor							■ ¹⁾			
Signal processing	Analog						Digital			

¹⁾ Not for all versions. See list at the back.

²⁾ Standard

A closer look at options

Software limit switches – These switches signalize that the valve has reached one of the two adjustable limits, e.g. OPEN or CLOSED position or an intermediate position.

Inductive limit switch – This switch indicates the end position even after a power failure in a safety-instrumented system.

Fault alarm output – Alarms generated by the EXPERTplus valve diagnostics are issued at the fault alarm output as a condensed state.

Solenoid valve and forced venting – These options guarantee emergency venting of the actuator in compliance with IEC 61508 up to SIL 3. As a result, the control valve is moved to the fail-safe position determined by the actuator.

Binary input – Certain diagnostic functions can be started by the binary input, e.g. data logging or partial stroke testing or the valve is moved to the fail-safe position.

Analog position transmitter – The analog position transmitter provides a 4 to 20 mA signal for position feedback indicating the current travel or opening angle of the actuator.

Leakage sensor – This sensor enables positioners with integrated diagnostics to detect seat leakage and trigger an alarm after a limit violation.

External position sensor – This sensor allows the positioner to be mounted away from the valve (e.g. on a wall). It can be used when the external conditions are unsuitable for the positioner, e.g. extremely high temperatures or increased vibrations at the valve.

Analog input (4 to 20 mA) – The analog input allows conventional linear or angle position sensors issuing a 4 to 20 mA signal to be connected to the positioners.



Explosion protection

Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

The formation of an explosive atmosphere cannot be ruled out in most chemical and petrochemical processes. In this case, the plant components must meet special explosion protection requirements. This also applies to positioners used in hazardous areas. For the use in explosive atmospheres, we offer positioners with intrinsic safety (Ex i), in non-sparking (Ex nA) design and in flameproof enclosures (Ex d).

It is possible to operate SAMSON positioners on site using their rotary pushbutton without posing any risk. Despite the increased requirements placed on the housing, this also applies to positioners in flameproof enclosures. They are designed to withstand an internal explosion without

igniting the explosive atmosphere outside. Various installation methods make it easier to wire the positioner:

- Direct cable entry with terminal compartment in flameproof enclosure (Ex d)
- Indirect cable entry with terminal compartment designed for increased safety (Ex e)
- Conduit system with factory-sealed terminal compartment

Positioners	Type						Series		TROVIS SAFE	
	3730-0	3766	3767	4763	4765	3725	3730	3731	3730-6	3731-3
Intrinsic safety	■	■ ¹⁾	■	■	■ ¹⁾	■	■		■	
Non-sparking equipment	■	■ ¹⁾	■	■	■ ¹⁾		■		■	
Flameproof enclosure	■ ²⁾	■ ³⁾	■ ²⁾	■ ²⁾	■ ³⁾		■ ^{2) 4)}	■	■ ²⁾	■
Signal processing	Analog						Digital			

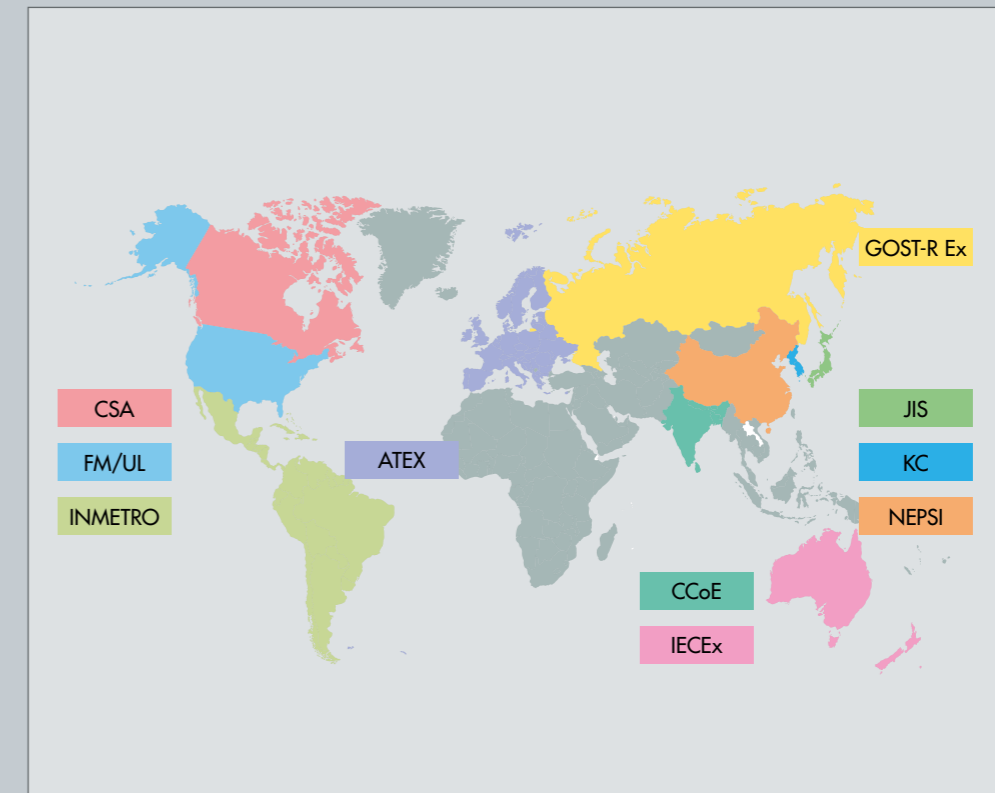
¹⁾ Purely pneumatic positioner
²⁾ Flameproof enclosure in combination with Type 3770 Field Barrier
³⁾ Flameproof enclosure in combination with Type 6116 i/p Converter
⁴⁾ Not for all versions. See list at the back.

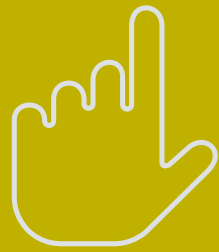


A closer look at international certification

Positioners cannot be operated in explosive atmospheres unless they have been tested and certified by a notified body. International rules on explosion protection are similar. However, national regulations still differ. SAMSON positioners have the globally accepted IECEx certification. The

high level of safety provided by the positioners is also certified by various national and international authorities responsible for markets in North and South America, Asia, Europe, Australia and New Zealand.





Intuitive operation

Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

At SAMSON, we focus on the user: automatic start-up and a proven operating structure in all our digital positioners as well as numerous details, such as initialization at the push of a button, convenient operation using one rotary pushbutton, a display that is easy to read and whose reading direction can be turned by 180°, contribute to making start-up and operation easier for the user.

Our positioners are easily adapted to the control task at hand – either on site by selecting codes on the display or, in Series 3730 and 3731 Positioners with diagnostics, on a computer using our TROVIS-VIEW software.

Positioners	Type										TROVIS SAFE	
	3725	3730-1	3730-2	3730-3	3730-4	3730-5	3730-6	3731-3	3731-5	3730-6		3731-3
Start-up												
Automatic initialization	■	■	■	■	■	■	■	■	■	■	■	■
Autotuning	■	■	■	■	■	■	■	■	■	■	■	■
Monitoring	■	■	■	■	■	■	■	■	■	■	■	■
Operating elements												
Initialization key			■	■	■	■	■			■		
Display	■	■	■	■	■	■	■	■	■	■	■	■
Rotary pushbutton		■	■	■	■	■	■	■	■	■	■	■
Capacitive keys	■											
TROVIS-VIEW			■	■	■	■	■	■	■	■	■	■
Signal processing	Digital											



A closer look at the TROVIS-VIEW software

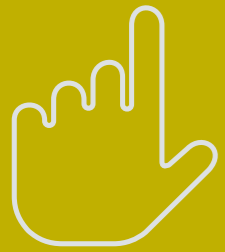
TROVIS-VIEW provides a uniform user interface that allows users to configure and parameterize various SAMSON devices using device-specific database modules.

Function and parameter settings can be saved to files, archived and transmitted to the positioner over an interface adapter. In online mode, process data of the connected positioner and the device status can be displayed according to a color code system as defined in NAMUR Recommendation NE 107. Extensive docu-

mentation to monitor the valve's condition is achieved by logging positioner data. For example, the Trend-Viewer function tracks process data over time.

A start-up wizard is included in the software for almost all Series 3730 Positioners which guides the user through the process of setting up the positioner step by step.





Comprehensive system integration



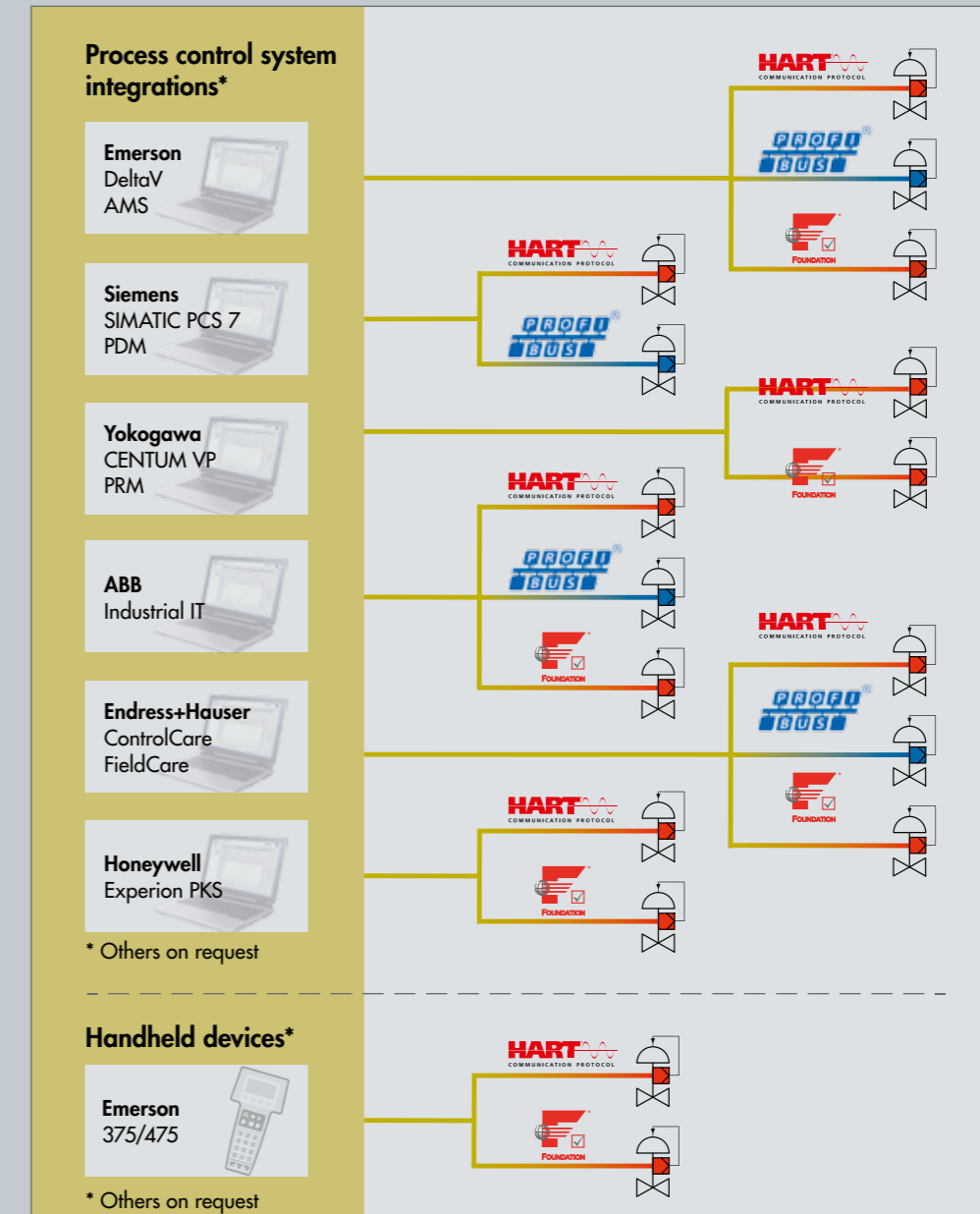
Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

Full integration of the control valve into process control and asset management systems allows the full use of the positioner functions, such as status logging and diagnostics. In addition, this manufacturer-independent integration enables the control valve to be configured and started up from a central location.

Our Series 3730 and 3731 Positioners support standard digital interfaces and protocols, such as HART®, PROFIBUS® PA and FOUNDATION™ fieldbus. Numerous device integration files for engineering tools and systems are available for downloading.

Positioners	Type										TROVIS SAFE	
	3725	3730-1	3730-2	3730-3	3730-4	3730-5	3730-6	3731-3	3731-5	3730-6	3731-3	
Communication interface												
HART®				■			■	■		■	■	
PROFIBUS® PA					■							
FOUNDATION™ fieldbus						■			■			
SAMSON SSP interface			■	■	■	■	■	■	■	■	■	■
Integration using												
Device Type Manager (DTM)				■	■	■	■	■	■	■	■	■
Device Description (eDD, eEDD)				■	■	■	■	■	■	■	■	■
GSD files					■							
Signal processing	Digital											

A closer look at protocols and integrations supported by SAMSON





Predictive maintenance

Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

Due to the increasing automation of plants, positioners are not only used on valves for throttling service but on valves for on/off applications as well. All SAMSON positioners can handle classic analog control loops. TROVIS SAFE positioners can also perform discrete analysis of the set point as well as partial stroke tests, which makes them particularly suitable for mounting on on/off valves.

The EXPERTplus valve diagnostics are integrated into all positioner versions. They record, save and analyze data on the valve condition. Critical valve conditions can be detected by performing tests online while the process is running as well as offline to provide predictive maintenance. The condensed state is issued at the fault alarm output. Detailed test results and their analysis can be reviewed using our TROVIS-VIEW software or using HART®, PROFIBUS® PA or FOUNDATION™ fieldbus protocols.

Positioners	Type										TROVIS SAFE	
	3725	3730-1	3730-2	3730-3	3730-4	3730-5	3730-6	3731-3	3731-5	3730-6		3731-3
EXPERTplus valve diagnostics			■	■	■	■	■	■	■	■	■	■
Initialization result			■	■	■	■	■	■	■	■	■	■
Measured process values			■	■	■	■	■	■	■	■	■	■
Status messages, condensed state, logging			■	■	■	■	■	■	■	■	■	■
Tests to monitor operation in the running process			■	■	■	■	■	■	■	■	■	■
Tests to analyze the condition of the entire control valve			■	■	■	■	■	■	■	■	■	■
On/off analysis/partial stroke test										■	■	
Signal processing	Digital											



A closer look at monitoring functions and diagnostic tests

Monitoring functions keep track of the valve while the process is running without disturbing it. Data are assessed by the continuous logging and analysis of key process data, such as valve position, set point deviation, control signal and travel:

- **Valve signature/hysteresis test** – All diagnostic tests involving the signal pressure are based on the valve signature or hysteresis test. These tests include detection of air leakage in the pneumatics or an excessively high or low supply pressure.
- **End position trend** – This function allows an alternating zero point or a creeping zero shift due to seat and plug wear or dirt between the seat and plug to be detected.
- **Statistical analysis** – The statistical analysis of process data pinpoints a changed manipulated variable range, external or internal leakage and an incorrect attachment of the positioner.
- **Data logger** – Process conditions can be monitored and documented by event-triggered data logging.
- **Leakage detection** – The use of an optional leakage sensor allows the detection of seat leakage inside the valve.

■ **Diagnostics for on/off valves** – The diagnostics of the TROVIS SAFE positioners provide information on the valve end positions, transit times (increasing/decreasing) and breakaway times (increasing/decreasing).

Diagnostic tests are performed to obtain data on the condition of the entire control valve. These tests can only partly be performed while the process is running as the valve is moved according to the test procedure and does not follow the set point. These tests provide information on the dynamic control response under process conditions:

- **Static characteristic** – This test determines the valve dead band and provides information on the friction hysteresis.
- **Partial stroke test** – This test in TROVIS SAFE positioners checks the ability of shut-off valves installed in safety-instrumented systems to move and assesses their dynamic control response.
- **Full stroke test** – In contrast to the partial stroke test, the valve is moved through its entire travel range in this test to assess its dynamic control response.





Safety and reliability

Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

SAMSON has added the new TROVIS SAFE series to its range of positioners specially for use in safety-instrumented systems. The SIL-certified TROVIS SAFE positioners include partial stroke testing. All diagnostic parameters necessary for on/off valves are ready configured.

In safety-instrumented systems, the control valve acts as a safety valve by opening or shutting off the pipeline in an emergency. High demands are placed on functional safety as outlined in the IEC 61508 and IEC 61511 (SIL) standards.

Smart positioners with diagnostics can be used to enhance or even replace the functions of solenoid valves mounted on shut-off valve assemblies. They also increase the reliability, e.g. by automatically performing regular partial stroke tests. Especially for valves in on/off service, we have added an on/off application to new positioner versions.

Observing the requirements of IEC 61511 and the required hardware fault tolerance, our positioners with partial stroke testing capabilities can be used in safety-instrumented systems up to SIL 2 (single device, HFT = 0) and SIL 3 (redundant configuration, HFT = 1).

Positioners	Type										TROVIS SAFE	
	3725	3730-1	3730-2	3730-3	3730-4	3730-5	3730-6	3731-3	3731-5	3730-6		3731-3
Fail-safe action triggered by power supply		■	■	■	■	■	■	■	■	■	■	■
Fail-safe action triggered by solenoid valve			■	■	■	■	■			■		
Fail-safe action triggered by forced venting							■			■		
Signal processing	Digital											



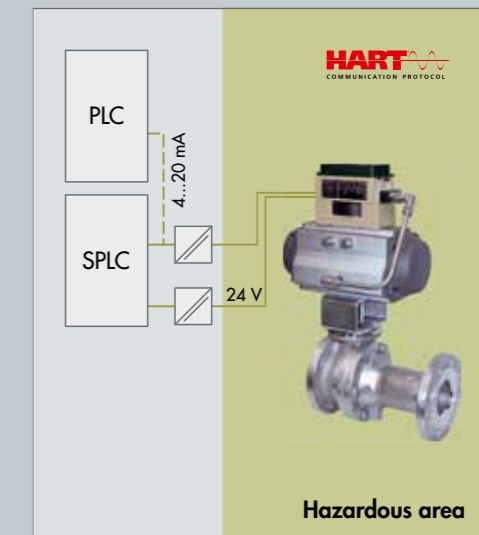
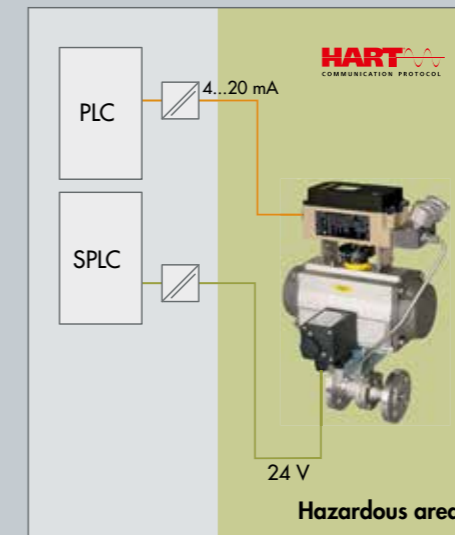
In detail: setup of a safety-instrumented system with TROVIS SAFE positioner

Actuator, positioner with partial stroke testing function and external solenoid valve

The solenoid valve takes on the safety function in this setup. In the event of a power failure, the actuator is vented and the valve moved to its fail-safe position. The positioner plays an important role in ensuring the availability of the valve on demand. By testing the valve while the process is running, malfunctions can be detected and the plant availability increased. A regularly performed partial stroke test can prevent the valve from seizing up in its operating position.

Actuator and positioner with partial stroke testing function

TROVIS SAFE positioners that come with emergency venting have a shutdown function according to IEC 61508. As a result, they can take on the safety function as well as testing the valve's proper functioning. The actuator is vented at an input signal of 0 mA, 3.8 mA or 4.4 mA depending on the version. The TROVIS SAFE positioner options including a solenoid valve or forced venting are suitable for use in safety-instrumented systems as well. The use of positioners with one of these options eliminates the need for an external solenoid valve.



Positioner models

Types 4763 and 4765 – These positioners with pneumatic or electric input signal have a simple and compact design, making them particularly insensitive to vibration. The positioners use a flapper/nozzle system, which operates according to the force-balance principle. They can be applied for both normal and split-range operation.



Type 3766 – The pneumatic positioner is a true classic among our positioners. It has a low air consumption and uses a linear characteristic. It has a fast and precise control response with a low hysteresis.



Type 3767 – The electropneumatic positioner is identical to the Type 3766, except for the dependable i/p converter. Positioner features, such as a low load and the ingeniously simple drop of silicone oil to dampen vibrations in the i/p converter, have contributed to the continual success of our electropneumatic positioners.



Type 3725 – This positioner is a basic digital positioner for processes with high control demands that do not require communication with a process control system or valve diagnostics.

The positioner with a deliberately simple design is operated using capacitive keys. Navigation within the menu on the display has been adopted from other proven SAMSON products, e.g. Series 3730 Positioners.

A non-contact sensor system tracks the valve position and guarantees precise control. Autotuning to calibrate the parameters to the valve is performed during automated initialization of the positioner.

The positioner housing is made of UV-resistant plastic.



Positioner models

Series 3730 – These positioners share the same platform: housing, travel linkage and pneumatic components are identical. Accordingly, these positioners have the same high air output capacity. The versions within this series have varying electronic components and, as a result, different features for ease of operation, functions, communication and diagnostics.

While the Type 3730-0 gets by without a microprocessor and is reduced to the essential functions, the Type 3730-1 and higher models use digital signal processing for automatic start-up. These positioners save users the trial-and-error tuning of zero and span as well as the time-consuming adaptation to the actuator size and the friction properties of the valve.

The latest version in this positioner series, Type 3730-6, is fitted with pressure sensors and has the latest valve diagnostics.

TROVIS SAFE

Identical in design to the Type 3730-6, the TROVIS SAFE 3730-6 Positioners are optimized for use with on/off valves in safety-instrumented systems and certified to comply with SIL requirements.



Series 3731 – These positioners with flameproof enclosure have largely the same components inside and use the same hybrid technology as the corresponding positioners of the Series 3730. They are based on the same model platform, which allows favorable integral attachment, and use the same mounting kits for linear and rotary actuators.

The main difference lies in the flameproof enclosure used for Series 3731 Positioners. Despite the enclosure, the positioners can still be operated on site using a rotary pushbutton. The readings, which can be turned to suit the mounting position, can be viewed on the large display.

The separate terminal compartment allows for easy, direct or indirect connection to cable or conduit systems without affecting the explosion protection of the flameproof enclosure.

TROVIS SAFE

Identical in design to the Type 3731-3, the TROVIS SAFE 3731-3 Positioners are optimized for use with on/off valves in safety-instrumented systems and certified to comply with SIL requirements.

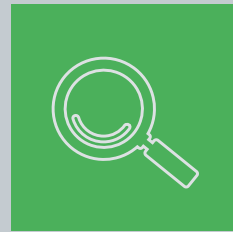
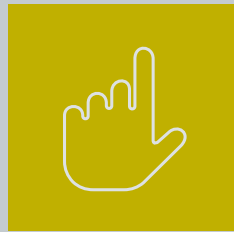
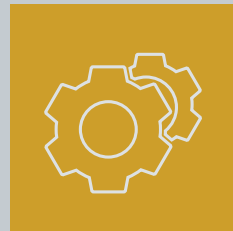
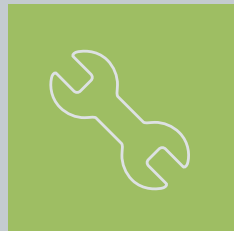




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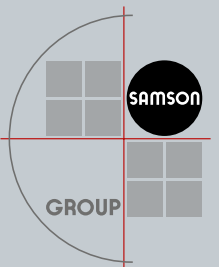
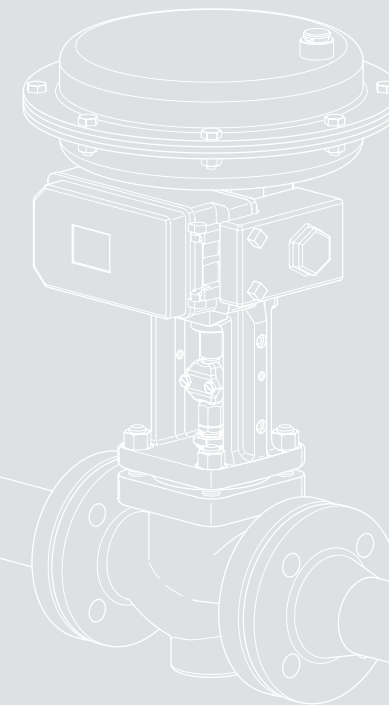


Positioners – Overview



- Attachment to linear and rotary actuators
- Options
- Explosion protection
- Operation – Start-up and operating elements
- Diagnostics
- Safety-instrumented systems according to IEC 61508/IEC 61511









Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	



Overview

■ Standard □ Option

Attachment	
Options	
Explosion protection	
Operation	
Diagnostics	
Safety	

							Type								TROVIS SAFE		
	3766	3767	4763	4765	3725	3730-0	3730-1	3730-2	3730-3	3730-4	3730-5	3730-6	3731-3	3731-5	3730-6	3731-3	
Input/output signal	p/p	i/p	i/p	p/p	i/p	i/p	i/p	i/p	i/p	i/p	i/p	i/p	i/p	i/p	i/p	i/p	
Attachment to linear actuators																	
- SAMSON integral attachment	■	■			■	■	■	■	■	■	■	■	■	■	■	■	
- IEC 60534-6-1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
- VDI/VDE 3847						■	■	■	■	■	■	■			■		
Attachment to rotary actuators																	
- VDI/VDE 3845	■	■			■		■	■	■	■	■	■	■	■	■	■	
Options																	
- Software limit switches							■	■	■			■	□		■	□	
- Inductive limit switch	□	□					□	□	□	□	□	□			□		
- Fault alarm output								■	■			■	□		■	□	
- Solenoid valve	□	□							□	□	□	□			□		
- Forced venting												□	□	□	□	□	
- Binary input								□	□	■ □	■ □	□	□	□	□	□	
- Analog position transmitter								□	□			□	□		□	□	
- Leakage sensor								□	□		□	□			□		
- External position sensor								□	□	□	□	□			□		
- Analog input for ext. travel sensor									□								
Explosion protection																	
- Intrinsic safety	■	□	□	■	□	□	□	□	□	□	□	□			□		
- Non-sparking equipment	■	□	□	■		□	□	□	□	□	□	□			□		
- Flameproof enclosure	□ ¹⁾	□ ²⁾	□ ²⁾	□ ¹⁾			□ ²⁾	□ ²⁾	□ ²⁾			□ ²⁾	■	■	□ ²⁾	■	
Operation																	
- Automatic initialization					■		■	■	■	■	■	■	■	■	■	■	
- Autotuning					■		■	■	■	■	■	■	■	■	■	■	
- Monitoring					■		■	■	■	■	■	■	■	■	■	■	
- Initialization key								■	■	■	■	■	■	■	■	■	
- Display					■		■	■	■	■	■	■	■	■	■	■	
- DIP switches						■											
- Rotary pushbutton							■	■	■	■	■	■	■	■	■	■	
- Capacitive keys					■												
- TROVIS-VIEW								■	■	■	■	■	■	■	■	■	
- Communication interface																	
Diagnostics																	
- EXPERTplus								■	■	■	■	■	■	■	■	■	
Safety																	
- Emergency shutdown							■	■	■	■	■	■	■	■	■	■	

¹⁾ With Type 6116 ²⁾ With Type 3770