SP300
Pneumatic Positioner

Description

The SP300 series is a microprocessor based positioner range that provides fast and accurate positioning of linear and rotary pneumatic actuated control valves. The instrument produces a pneumatic pressure output to accurately position the valve according to the input signal from external controller (4÷20 mA) or from a bus network (Hart, Foundation Fieldbus, Profibus PA).

SP300 are compact and easy to maintain and operate. Local calibration and parameter setting can be done without the need for external devices.

Position Feedback (Fig. B)

The position of the valve is accurately measured using a magnetic sensor based on the “Hall effect", eliminating the need for feedback levers and potentiometers. This non contact feedback arrangement provides many advantages including improved reliability, safer operation, better accuracy and dead band because there are less moving parts subject to wear.

Operation

Output Module (Fig. A)

The main parts of the output module are: pilot, servo, Hall effect sensor and output control circuit.

The instrument CPU sends an electronic setpoint signal to the control circuit. The control circuit receives an actual valve position feedback signal from a Hall Effect sensor. By comparing the two signals the control circuit applies a voltage to the baffle (piezo) for the right valve positioning.

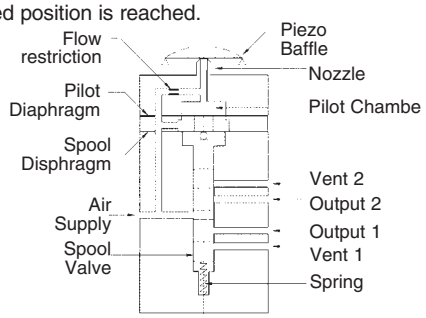
The pneumatic section is based on the well known nozzle-baffle and spool valve technology.

A piezoelectric disk is used as baffle in the pilot stage. The baffle is deflected upon receiving the voltage according to the required position change. A small variation of the air flow through the nozzle causes a change of pressure in the pilot chamber (pilot pressure).

Because pilot pressure is too low, with no flow capacity, it has to be therefore boosted. This is done in the servo section which acts as a transducer. The servo section has one diaphragm in the pilot chamber, and another smaller diaphragm in the spool chamber. The pilot pressure applies a force to the pilot side diaphragm which, at steady state, will be equal to the force that the spool valve applies to the smaller diaphragm.

When a change in position is required, pilot pressure increases or decreases as explained for the pilot stage. A change in pilot pressure forces the spool valve up or down changing the output 1 and the output 2 pressure until the desired position is reached.

Fig A
Magnetic Sensor



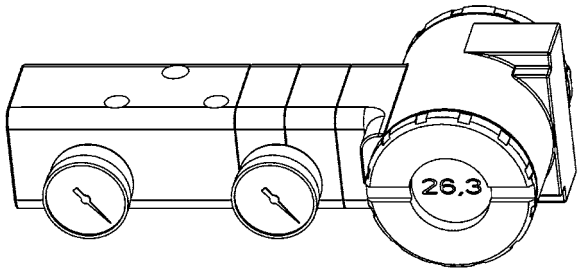
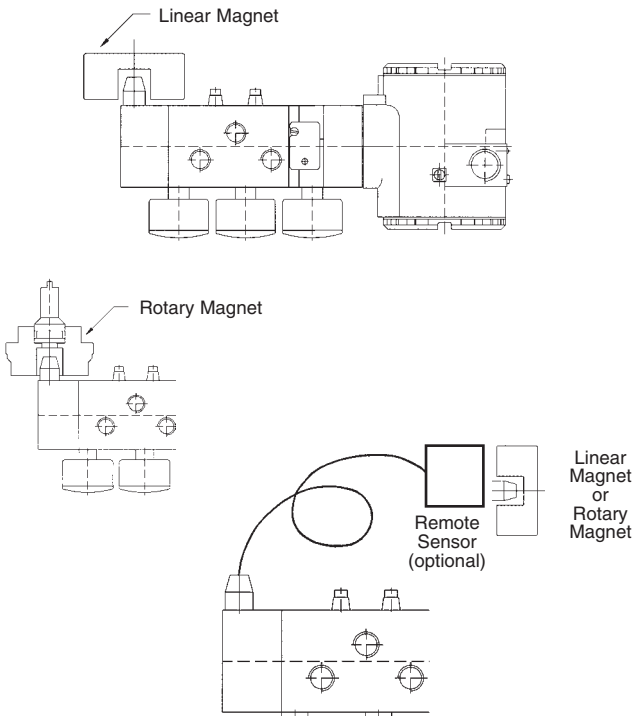


Fig B Magnetic Sensor



The mounting arrangement for linear actuators complies with IEC534-6

The mounting arrangement for rotary actuators complies with VDI/VDE3845

The “Hall effect" sensor can be remotely mounted upto 65 ft from the instrument. This is particularly useful for applications subject to high ambient temperatures or heavy vibration.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.
In the interests of development and improvement of the product, we reserve the right to change the specification.

SP300 Pneumatic Positioner

Models & Protocols

The communication protocols of all SP300 are industry standard, which means they are easily interfaced with the control system and therefore reduce installation and maintenance costs.

SP 301 4 to 20 mA + HART® Valve Positioner

The SP301 microprocessor based pneumatic valve positioner operating in a current loop system. It produces a pressure output as required to position a control valve according to a 4 to 20mA input signal. The communications of the SP301 are based on the HART® protocol. Calibration and setting of parameters can be carried out via local adjustment or using portable equipment as a PDA with HART interface or with a PC including HART® software.

SP 302 Foundation Fieldbus Valve Positioner

The SP302 is a Foundation Fieldbus device. It is a microprocessor based pneumatic valve positioner operating in a Fieldbus system.
The SP302 produces a pressure output as required to position a control valve according to an input received over the Fieldbus network.
Calibration and setting of parameters can be carried out via local adjustment or using a remote configurator (es. Syscon)

SP 303 PROFIBUS PA Valve Positioner

The SP303 is a Profibus PA device. It is a microprocessor based pneumatic valve positioner operating in a Fieldbus system.
The SP303 produces a pressure output as required to position a control valve according to an input received over the Fieldbus network.
Calibration and setting of parameters can be carried out via local adjustment or using a remote configurator (es. PDM Simatic)

Specific Technical Features

SP 301
Communication Protocol HART® (is superimposed on the current signal)
Input Signal Two-wire, 4 to 20 mA controlled according to NAMUR NE43 Specification, with superimposed digital communication (HART® Protocol)
Power Supplied by the 4 to 20 mA current. No external supply required.
Voltage drop 11 Vdc max / 20 mA (equivalent to 550 W)
Mininum current 3.8 mA
Reverse Polarity Protection Is provided to prevent internal circuit damage in the event of reversal of the 4 to 20 mA supply signal.

SP 302
Communication Protocol Foundation™ Fieldbus.
Input Signal Digital only. Foundation™ Fieldbus, complies with IEC 1158-2 (H1): 31.25 Kbit/s and voltage mode with bus power.
Voltage drop Bus powered: 9 to 32 Vdc. Quiscent current consumption 12 mA
Function Blocs:

RES	- Resource	TRD	- Transducer
DSP	- Display transducer	DIAG	- Diagnostics Transducer
PID	- PID Control	EPID	- Enhanced PID
AO	- Analog Output	ARTH	- Arithmetic
INTG	- Integrator	ISEL	- Input Selector
CHAR	- Signal Characterizer	SPLT	- Splitter
AALM	- Analog Alarm	SPG	- Set Ramp Generator
TIME	- Timer	LLAG	- Lead-Lag
OSDL	- Output Selector / Dynamic limiter	CT	- Constant

SP 303
Communication Protocol PROFIBUS PA.
Input Signal Digital only. PROFIBUS PA, commplies with IEC 1158-2 (H1): 31.25 Kbit/s and voltage mode with bus power.
Power Supply Bus powered: 9 to 32 Vdc / Quiescent current consumption 12mA.
Output impedance (from 7.8 to 39 kHz).
Function Blocs: PHY - Physical, TRD - Transducer, DSP - Display, AO - Analog Output

Common Technical Features

Functional Specifications
Travel
Linear Motion: 1/8" (3 to 100 mm)
Rotary Motion: 3 to 120° Rotation angle
Output Signal
Output to actuator 0 to 100 psig supply air pressure.
Single or double action.
Pressure Supply
1.4 to 7 barg (20 to 100 psig).
Free of oil, dust and water.
Indication
41/2-digit LCD indicator and 5 alphanumeric characters.
Hazardous Location Certification
Explosion proof, weather proof and intrinsically safe from ATEX, CSA, FM.

Temperature Limits

Operation: -40 to 185°F (-40 to 85°C)		
Storage: -40 to 194°F (-40 to 90°C)		
Display: 14 to 140°F (-10 to 60°C) operation -40 to 185°F (-40 to 85°C) without damage.		
Humidity Limits	**Turn-on Time**	**Update Time**
0 to 100% RH.	Approx. 10 seconds	Approx. 0.2 seconds

Flow Characterization
Linear, Equal Percentage, Quick Opening, 16 freely selectable points. Through software or locally adjustable.
Gain
Through software or locally adjustable.
Travel Time
Through software or locally adjustable.
Actual Position Sensing
Magnet sensor (non contact) via Hall effect.

Performance Specifications

Sensitivity / Resolution	**Repeatability**	**Hysteresis**
≤ 0.1 % F.S.	≤ 0.1 % F.S.	< 0.1 %

F.S. (Full Scale)
Consumption
0.25 Nm3/h (0.15 SCFM) at 1.4 barg (20 psig) supply.
0.70 Nm3/h (0.40 SCFM) at 5.6 barg (80 psig) supply.
Output Capacity
46.7 Nm3/h (28 SCFM) at 5.6 barg (80 psig) supply.
Ambient Temperature Effect
0.8% / 20°C (68°F) of span.
Supply Pressure Effect
Negligible.
Vibration Effect

± 0.3% / g of span during the following conditions:
5 to 15 Hz at 4 mm (1/8") constant displacement;
15 to 150 Hz at 2g;
150 to 2000 Hz at 1g.
Reference SAMA PMC 31.1 1980, Sec. 5.3, Condition 3, Steady State.

Electro-Magnet Interference Effect
Designed to comply with IEC 61326: 2000.

Physical Specifications

Electrical Connections	1/2" - 14 NPT, Pg 13,5 or M20 x 1,5.
Pneumatic Connections	Supply and output: 1/4" - 18 NPT.
	Gauge: 1/8" 27 NPT.

Material of construction
Injected low copper aluminium with polyester painting or 316 stainless steel housing, with Buna N 'O'rings on cover (NEMA 4x, IP 67)

Weight

Without display and mounting bracket:	Std. body 2.7 kg (6 lbs)
	SS body 5.8 kg (12.8 lbs)
Add, for digital display:	0.1 kg (0.22 lbs)

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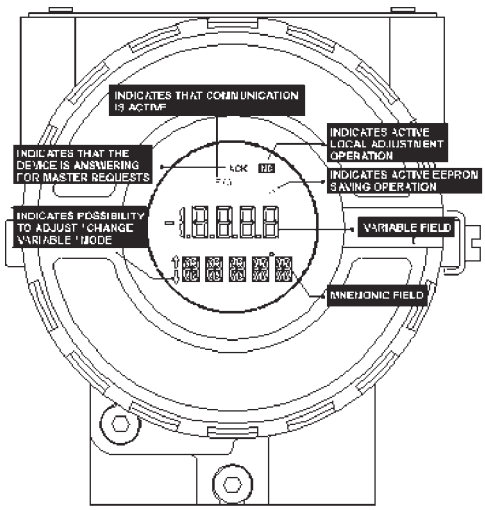
Local Display Drawing

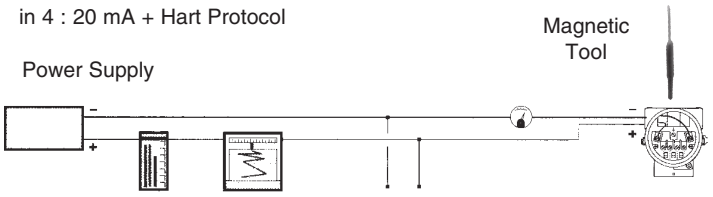
all SP300 positioners are fitted with a digital indicator that allows you to:

- read the parameters
- set the parameters
- read the diagnostic messages
- read measured values

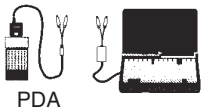


Configuration / Connection Diagram

in 4 : 20 mA + Hart Protocol

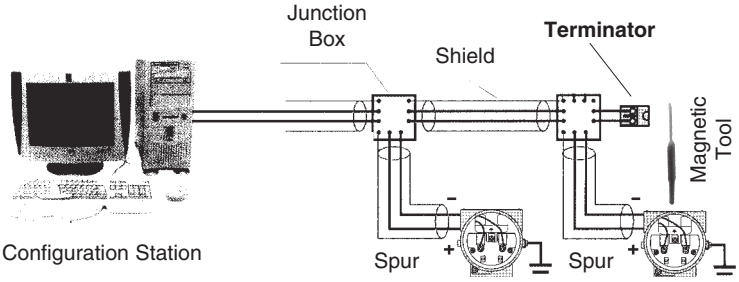


For proper operation, the portable equipment requires a minimum load of 250 Ohms between the power supply and transmitter



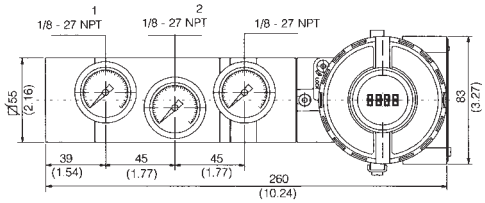
Configuration / Connection Diagram

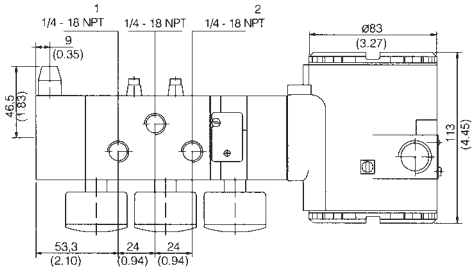
In Foundation Fieldbus or Profibus PA configuration

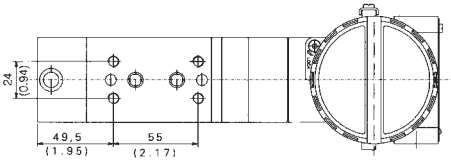


Dimensions

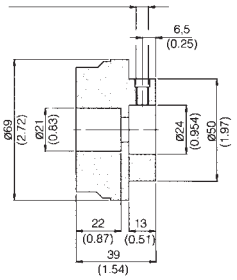
Valve Positioner





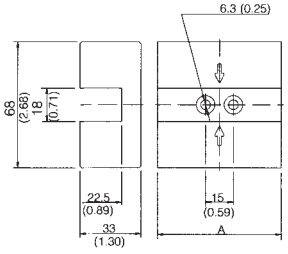


Rotary Magnet



Linear Magnet

Travel	Dimension A
Up to 15 mm	44 mm
Up to 30 mm	50 mm
Up to 50 mm	109 mm
Up to 100 mm	185 mm



SP300 Pneumatic Positioner

SP30 Positioner with digital display

Sufffix	Protocol
1	4 - 20 mA + Hart
2	Foundation Fieldbus
*3	Profibus PA

Suffix	Bracket Mounting Kit **
0	Without kit
*1	With kit (bracket + magnet)

Suffix	Electrical Connections
*0	1/2- 14 NPT
A	M20 x 1,5
B	PG 13,5 DIN

Suffix	Type of Actuator **
*1	Rotary - Single Action
2	Rotary - Double Action
*3	Linear - Single Action
4	Linear - Double Action
5	Other Specify

Suffix	Indication Gauge
0	Without Gauge
1	With Gauge - input
2	With Gauge - Output 1
*3	With 2 Gauges - input and Output 1
4	With 2 Gauges - Output 1 and 2
5	With 3 Gauges
Z	Other Specify

Suffix	Options
H1	316 SST Housing and body
R1	Remote sensor
I2	Explosion Proof (ATEX)
I4	Intrinsically Safe (ATEX)
J1	Tag on label
SZ	Specify special application

SP301	1	0	3	3	I2

Note 1: Positioners are always Explosion Proof. Intrinsically Safe. FM and CSA certified: 12-13-14-15suffix are for label identification.

Typical positioner model:
4-20 mA signal+HART protocol - 1/2" NPT electrical connection - single action linear valve -2 gauges - digital indicator - Explosion Proof (ATEX) label
Stock Code 3700590

* Standard ** No approval available

KMS Bracket / Magnet Kit

Suffix	Bracket Kit
0	Without Positioner Bracket
1	Universal Rotary
2	Universal Linear (Yoke and Pillar)
*3	Linear Spirax Sarco Valves
4	Rotary Spirax Sarco Valves
Z	Other - Specify

Suffix	Magnet
0	Rotary
*1	Linear Up to 15 mm
*2	Linear Up to 30 mm
*3	Linear Up to 50 mm
4	Linear Up to 100 mm
Z	Other - Specify

Suffix	Mounting Bracket Material
*C	Carbon Steel Bracket
I	316 Stainless Steel Bracket
Z	Other - Specify

Suffix	Optional Item
SYZ	Specify Actuator Model / Company

KMS	3	2	I	000

Typical Kit model: Stainless Steel bracket for Spirax Sarco linear valve - magnet for up to 30 mm valve stroke - Yoke & Pillar mounting, right side, Stock Code 3700500

* Standard