Easytork Solenoid Valve Design Features

ESV is a four-way, two-position (5/2) valve. There are two pressure ports, two exhaust ports, and a common air supply port. In addition to standard 5/2 valve, ESV has one air reservoir ports.

Interchangeable Coils

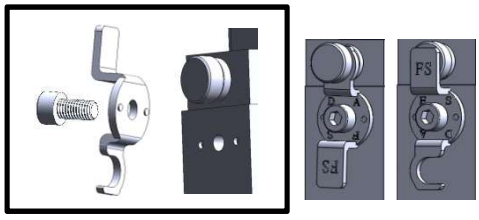
Standard, Ex-Proof and ATEX EX coil type utilizes the same ESV body, so coils are interchangeable. Easytork offers the flexibility of purchasing the valve body and coils separately to minimize inventory. No spacer required for any degree of coil mounting (0˚, 90˚, 180˚, or 270˚).

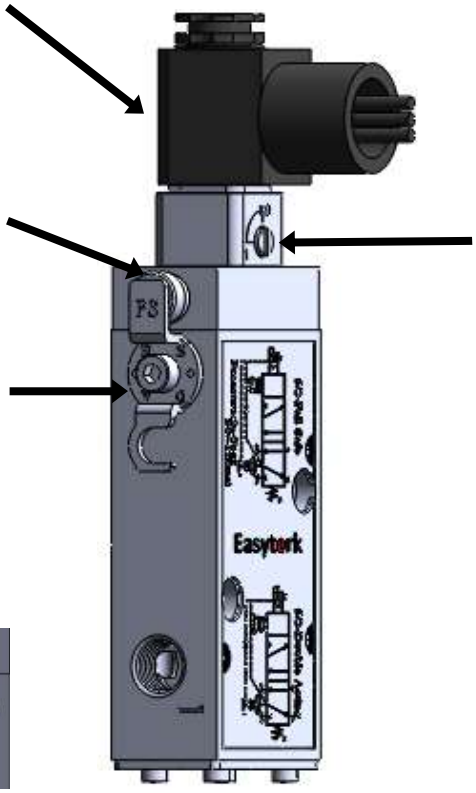
Double-Acting / Fail-Safe Pilot

ESV can convert EVA between FS and DA functions with easy hand operated switch for two selectable internal air passages to solenoid pilot.

Switch Anti-Tampering Device

ESV design incorporates a lock to prevent third parties from accidentally changing the ESV's functionality. In the event there is no main air supply and manual override is required, the lock can be switched back to double-acting to run manual override.





Manual Override in All Situations

Detent-style manual override screw to "lock-and-hold" the valve in open or close position upon power outage. The normal position for the switch is "0". A 90˚ rotation of the switch in the counter clockwise direction to "I" will manually override the solenoid and lock the solenoid in the disengaged position until the switch is returned to its original position.

In the event of air failure, de-energize the coil and select the valve to 5/2 double-acting mode to manually override the valve.

Versions

ESV is available in standard or chemical resistant version, in either standard temp. or low temp. version.

Low Power Operators

Low power operators are available to 0.7 watts (30mm version) and 1.1 watts (22mm version). 24 VDC voltage with 2.0 watts is standard for standard type coil.

Wide Temperature Range

Low temperature coil with silicone based seals are available for operation at -40˚C (-40˚F).

Products Certified To

CSA - (C22.2 and UL STD 429).

Factory Mutual - Explosion Proof Environments.

ATEX - Explosion Proof Environments.

CE - EMF and Low Voltage Directives.

No Solenoid Burnout

Air pilot is internally supplied when air pressure is from 2 to 10 bar (30 to 150 psi).

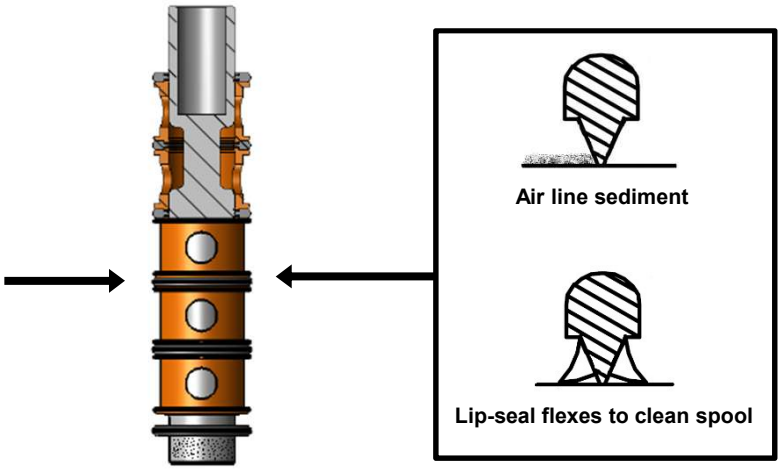
The coil is hermetically sealed.

Environmental Air Never Enters

In fail-safe version, environment air never enters ESV through vacuum associated with spring-return actuators.

Sediment Free Tapered Lip-Seal

ESV utilizes bi-directional tapered lip-seal that wipes air line sediment and keeps spool surface clean. This design also eliminates sticking problems and avoids spiral twist.



Easytork Solenoid Valve (“ESV”)

Easytork recommends the ESV for interface with the EVA. The ESV directly controls the actuator to be either double-acting or fail-safe (ESD-close or ESD-open) without needing external piping. NAMUR interface allows another solenoid valve in the market to be installed, but external pilot and air pipings are required for fail-safe.

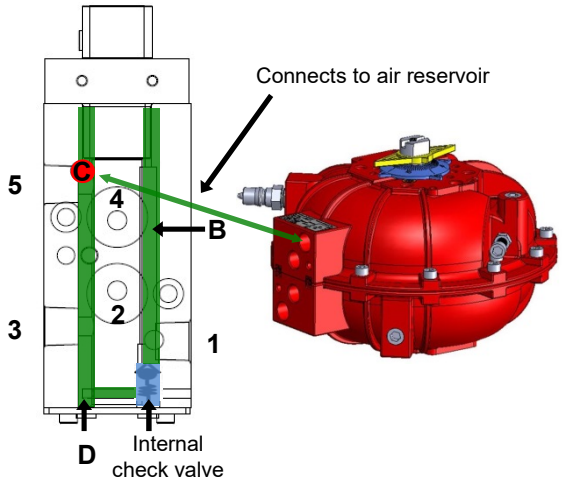
The ESV is fundamentally no different than other spool type solenoid valves except for additional drilling.

Manual override available when there is no electricity and/or no supply air.

ESV is available in standard or chemical resistant version, in either standard temp. or low temp. version. In fail-safe, environment air never enters ESV through vacuum associated with spring-return actuators.

Basic Design Overview

The ESV redirects the spool valve’s main supply air from port 1 to through hole “D”. The ESV expands upon a typical spool solenoid valve design by drilling two through holes in the body of the solenoid valve (“B” and “D”) and drilling one additional port (“C”) to interface the actuator’s air reservoir. Through hole “D” is connected to the spool valve chamber.



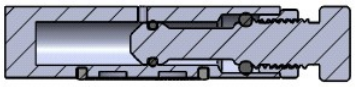
Step-by-Step

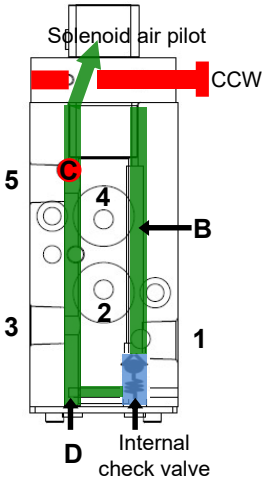
1. The supply air delivered through port 1 is simultaneously channeled through the internal check valve and through hole “B”.
2. Supply air is channeled to through hole “D” after passing through the internal check valve.
3. Through hole “D” is connected with the spool valve and functions like a regular solenoid valve. Simultaneously, supply air from through hole “D” passes through port “C” which charges the air reservoir.

Configuration Overview – Double-Acting or Fail-Safe

By rotating the switch on the ESV, users can alter the source to the air pilot within the solenoid valve. One option is for the air pilot source to be from the main supply air port “1”, the other option is through the air reservoir port “C”.

Double-Acting Configuration





Air failure only (with electricity):

- The solenoid air pilot does not sense discontinued air supply via through hole “D” (connected to air reservoir, which will always have air). Solenoid valve is still “On”. No position change.

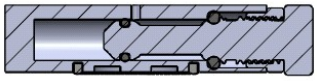
Electrical failure only (with air supply):

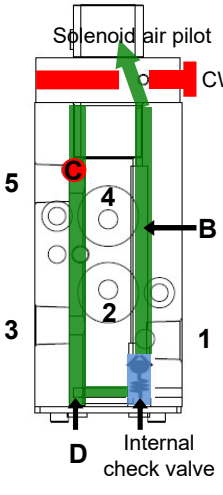
- Armature returns to original position switching the solenoid “Off”.

Manual override:

- Manual override available in electrical and/or air failure.

Fail-Safe Configuration





Air failure only (with electricity):

- The solenoid air pilot senses discontinued air supply via through hole “B” switching the solenoid “Off”.
- The air reservoir maintains its pressure (check valve). Air from reservoir flows into the solenoid valve via port “C” and through hole “D” turning actuator to fail-safe position.

Electrical failure only (with air supply):

- Armature returns to original position switching the solenoid “Off”. No output torque decay.

Manual override:

- Manual override available in electrical and/or air failure.

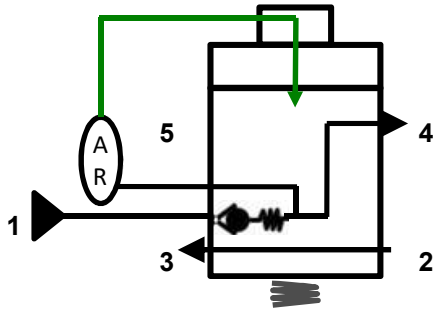
Patents: ESV

China = 2264921, Taiwan = M425965, other countries pending

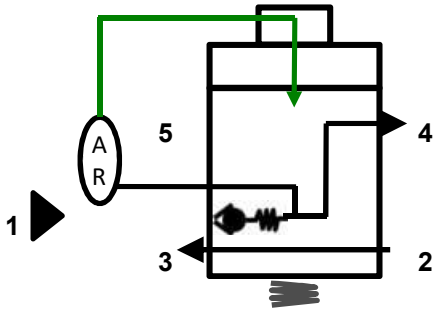
Easytork Solenoid Valve Operation

Double-Acting Air Flow Path

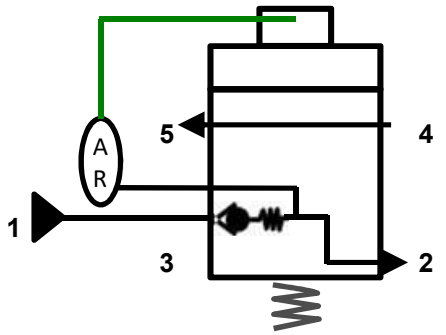
Electricity / Main Air



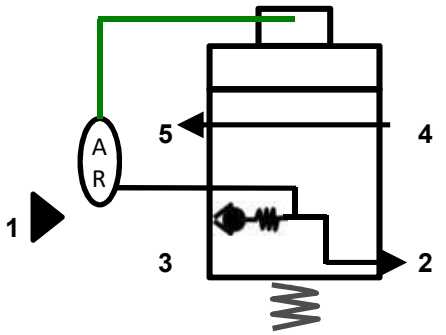
Electricity / No Main Air



No Electricity / Main Air

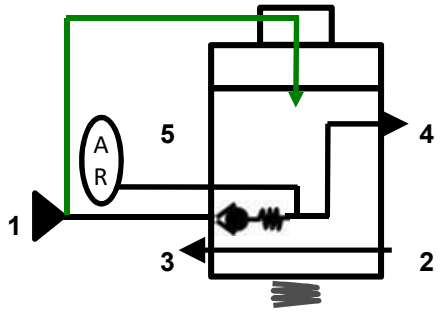


No Electricity / No Main Air

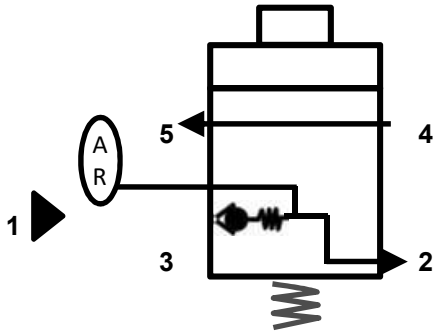


Fail-Safe Air Flow Path

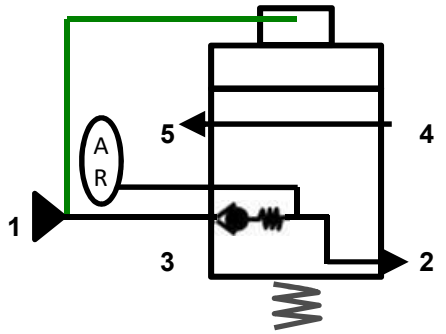
Electricity / Main Air



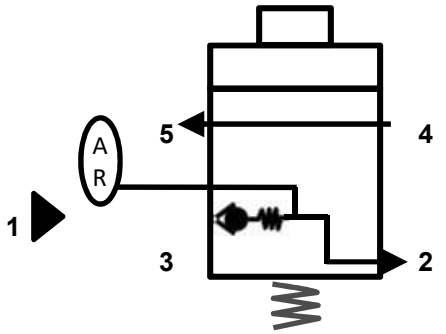
Electricity / No Main Air



No Electricity / Main Air



No Electricity / No Main Air



ESV Internal Air Pilot

ESV Spool Chamber

EVA Air Reservoir

Main Air Supply

ESV Internal Check Valve

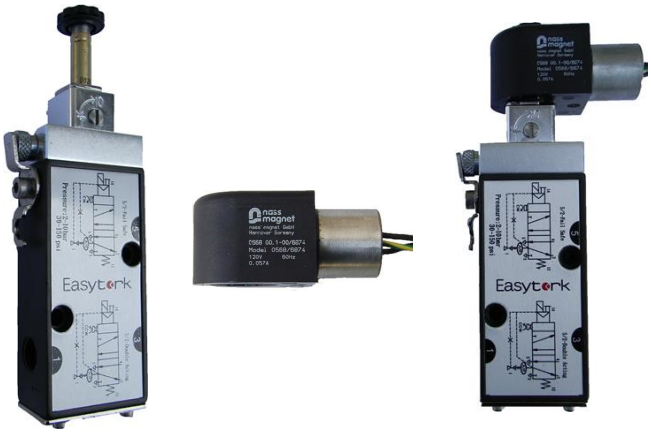
Coil Options

Standard, Ex-Proof and ATEX EX coils utilize the same ESV body, so coils are interchangeable. Easytork offers the flexibility of purchasing the valve body and coils separately to minimize inventory. No spacer required for any degree of coil mounting (0˚, 90˚, 180˚, or 270˚).

Standard Series

Same ESV body for standard, Ex-Proof, and ATEX EX coil.

Ex-Proof Series



Same ESV body for standard, Ex-Proof, and ATEX EX coil.

ATEX EX Series

Same ESV body for standard, Ex-Proof, and ATEX EX coil.

Intrinsically-Safe Series

I/S ESV body only good for I/S coil.

Low Temperature Series

Low temp. ESV body only good for low temp. coil.

Low Power Series

Low power ESV body only good for low power coil.

Technical Data

ESV Specifications

Technical Specification		
Operating pressure [1] [2]		2 - 10 bar (30 - 150 psi)
Operating medium		Air (dry or lubricated)
Flow l/min (Cv)	Port size: 1/4"	1000 l/min (Cv = 1.0)
ESV body standard temp. range (NBR) [3]		-20°C to 80°C (-4°F to 176°F)

Note (1): For Intrinsically-Safe and Low Power version, 2 - 8 bar (30 - 120 psi).
Note (2): If required, consult factory for minimum pressure setting for over 2 bar (30 psi).
Note (3): Temperature range for all series besides Low Temperature version. Refers only to ESV body temperature rating. Coil temperature rating is separate, refer to coil specifications.

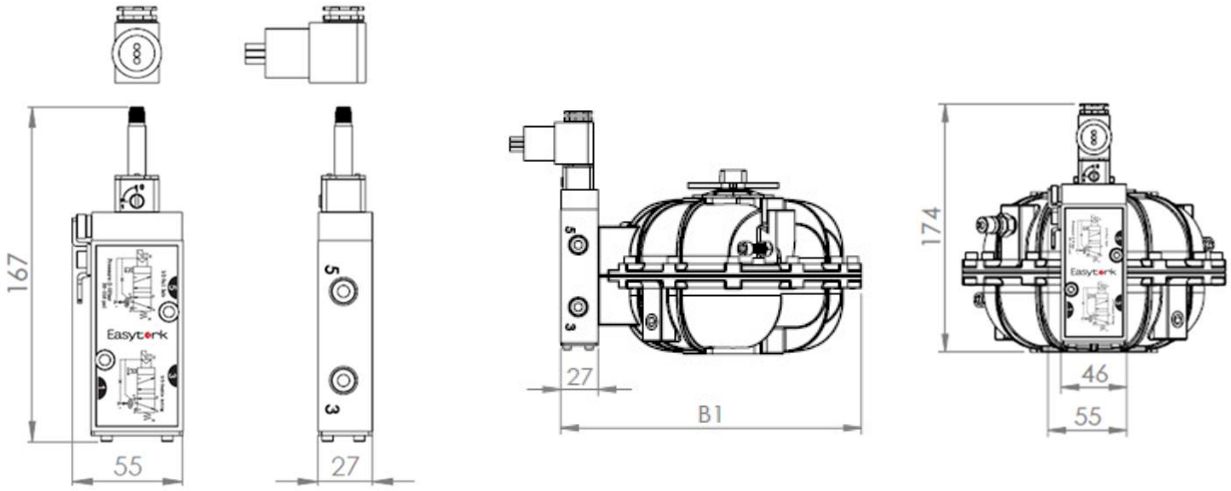
Coil Specifications

Coil	Connection	Note	Width (mm)
Standard	DIN 43650 industrial form B connection or 1/2" conduit with 18" leads	NEMA 4X	22
Explosion Proof	1/2" conduit with 24" leads	NEMA 4, 4X, 7C, 7D, 9 CSA & FM Approved CL. I; Zone1 Ex m II T4; AEx m II CL. I; Div.1; GR. A, B, C, D CL. II; GR. E, F, G CL. III T4 Ta=-20°C to +60°C	36
ATEX EX	3m cable & strain relief	Ex m II T5 PTB 03 ATEX 2018 X Ex II 2 G EEx m II T5 Ex II 2 D IP65 T95°C	22
Intrinsically-Safe	EN175301-803-A/ISO4400	Exia CL. I; GR. A, B, C, D CL. II; GR. E, F, G CL. III; Div. 1;T5	30
Low Temperature	DIN 43650 industrial form B connection or 1/2" conduit with 18" leads	NEMA 4X	22
Low Power (1.1W)	DIN 43650 industrial form B connection or 1/2" conduit with 18" leads	NEMA 4X	22
Low Power (0.7W)	EN175301-803-A/ISO4400	NEMA 4X	30

Coil	Voltage Tolerance	Ambient Temp.	Duty Cycle	Voltage	Frequency (Hz)	Output	Max. Pressure
Standard	+/- 10%	-20°C to 50°C (-4°F to 122°F)	100%	24 DC 110 AC 110 AC 230 AC 230 AC	- 50 60 50 60	2.0 W 4.1 VA 3.3 VA 3.9 VA 3.2 VA	10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi)
Explosion Proof	+/- 10%	-20°C to 60°C (-4°F to 140°F)	100%	24 DC 120 AC 230 AC	- 60 50	4.6 W 6.8 VA 7.5 VA	10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi)
ATEX EX	+/- 10%	-20°C to 50°C (-4°F to 122°F)	100%	24 DC 110 AC 230 AC	- 50/60 50/60	5.0 W 3.8 VA 5.1 VA	10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi)
Intrinsically-Safe (Barrier not included)		-40°C to 50°C (-40°F to 122°F)	100%	24 DC Current > 37 mA	-		8 bar (120 psi)
Low Temperature	+/- 10%	-40°C to 50°C (-40°F to 122°F)	100%	24 DC 110 AC 110 AC 230 AC 230 AC	- 50 60 50 60	2.0 W 4.1 VA 3.3 VA 3.9 VA 3.2 VA	10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi) 10 bar (150 psi)
Low Power (1.1W, 22mm coil)	+/- 10%	-20°C to 50°C (-4°F to 122°F)	100%	24 DC	-	1.1 W	8 bar (120 psi)
Low Power (0.7W, 30mm coil)	+/- 10%	-20°C to 50°C (-4°F to 122°F)	100%	24 DC	-	0.7 W	8 bar (120 psi)

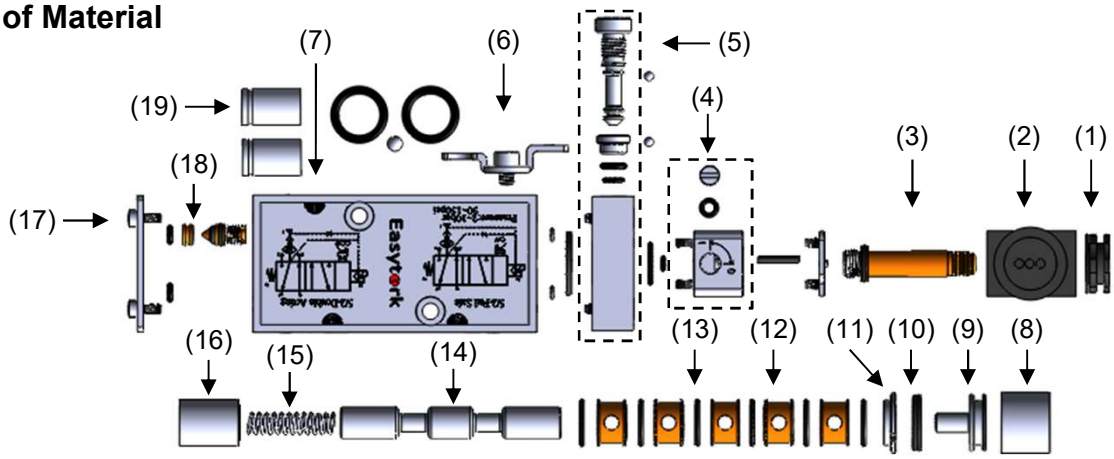
Technical Data

ESV Dimensions



Note: Figures in drawings in mm.

Bill of Material



Ref No	Description	Standard Version	Chemical Version	Quantity
1	Coil retention nut	Polyamide 6.6	Polyamide 6.6	1
2	Solenoid body	Polyamide 6.6	Polyamide 6.6	1
3	Solenoid stem	Brass	Stainless steel (SS303)	1 set
4	Pilot / manual override	Composite	Composite	1 set
5	DA / FS switch system	Aluminum	Stainless steel (SS303)	1 set
6	Anti-tamper system	Nickel-plated steel	Stainless steel (SS303)	1 set
7	Valve body*	Aluminum	Stainless steel (SS303)	1
8	Piston sleeve*	Aluminum	Aluminum	1
9	Piston	Aluminum	Aluminum	1
10	Piston seal*	NBR (1) / silicone (2)	NBR (1) / silicone (2)	1
11	Retainer	Aluminum	Aluminum	1
12	Spacer	Brass	Brass	5
13	Lip seal*	NBR (1) / silicone (2)	NBR (1) / silicone (2)	6
14	Spool*	Aluminum	Aluminum	1
15	Spring	Stainless steel (SS304)	Stainless steel (SS304)	1
16	Sleeve	Aluminum	Aluminum	1
17	All bolting	Stainless steel (SS304)	Stainless steel (SS304)	1 lot
18	Internal check valve	Brass w/ stainless steel spring	Brass w/ stainless steel spring	1
19	Air reservoir sleeve	Composite w/ silicone O-rings	Composite w/ silicone O-rings	1 lot

Note (*): Items marked with an asterisk require thin film of lubricant.
Note (1): Standard temperature. Paired with all coil types besides low temperature coil.
Note (2): Low temperature. Paired with only low temperature coil.