

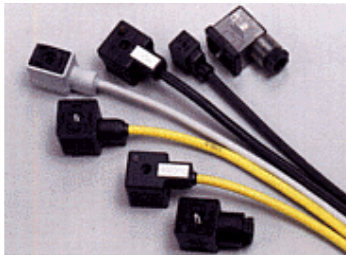
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Elactis
Electronics for Actuators and Integrated Systems

SOLENOID VALVE PROTECTOR^{1 2}

ASVPV0001



Preliminary

¹ The Solenoid Valve Protector uses a patent pending circuitry.

² This datasheet is a preliminary description. Values and functions may change without notice

Features

- Full electronic protection
- Fast turn-off of the valve
- No influence on the valve performances due to the driving electronics

Description

The ASVP0001 combines both the advantages of a rapid current decay and gives full protection to the control electronics. The ASVP0001 is a protection interface between modern command and solenoid valves. It gives full protection of the control electronics against adverse voltages produced by the

solenoid and in the meantime it enhances the valve's response time during the turn-off stage.

Applications

All solenoid valves should be protected by some electronics. The ASVP0001 can be used with all solenoids within its specifications but it is especially recommended in the following cases:

- Existence of a residual voltage (for example inductance in a cable)
- Precise closing time: the turn-off response time will become very precise and independent of the electronics that drives the valve.
- Leakage when using a diode
- High flow 3/2 valves

Specifications

Parameter	Minimum	Maximum	unit
Power Supply	10	27	V
Maximum rated current		0.35	A
Supply current		5	mA
Reverse voltage protection	30V		
Maximum coil energy		100	mJ
Temperature	0	70	°C
Voltage loss between input and output		1	V

Environmental: IP65 optional

Working principle

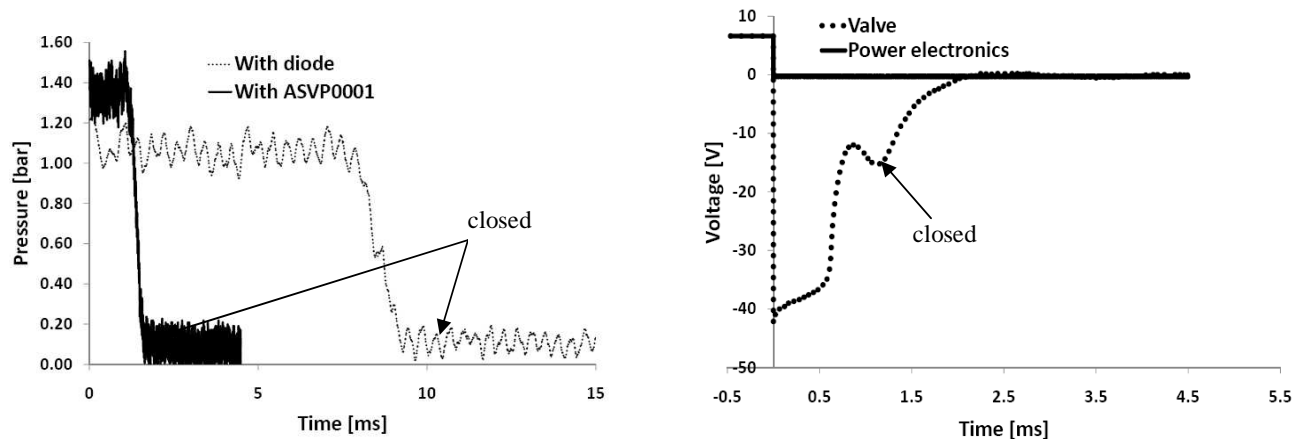


Figure 1 a) Pneumatic response time (closing signal at $t=0\text{ms}$) of a 3 way valve using the ASVP0001 (red) and the same valve with a diode protection (blue) during the closing. b) Using the ASVP0001 the electrical response time to close the valve is reduced to 0.9ms (in blue). In the meantime the driving electronics is protected against the negative voltage (see the purple line).

Integrating solenoids into any machine must be done carefully. The discharge of the coil at turn-off can harm the control device. If the valve is driven by a relay or other floating output device (such as a transistor) at turn off the energy of the coil will be dissipated into the air or in the switch. The generated negative voltage may harm the device. For example, if the switching is done by a transistor the negative voltage will rise until the transistor goes into avalanche mode and dissipates the current. This may progressively destroy the switch.

A protection diode parallel to the coil will protect the drive electronics. A Zener diode or a varistor will limit the voltage to a preset level. However the voltage will still go below zero which may generate unwanted perturbation on sensitive electronics. Therefore the best protection is the use of a switching diode.

However the protection diode will slow down the current decay. This has three very important side effects on the valve performances.

- The response time at turn-off is significantly reduced. A typical 15mm footprint valve has a electronic turn-off response time using a relay of <2ms. The same with a protection diode will increase to over 10ms.
- Leakage in two way valves. Most solenoid valves use the fact that the mechanical response time of a plunger is

larger than the time to switch off the current. If a diode is present this is not the case. In the presence of a diode the plunger will close with less efficiency which results in improper closing and leakage.

- Three way valves may not close at all. Most of the three way solenoid valve configurations use the fact that the gasket moves fast between the two seats that link the A port to the pressure and to the exhaust. This is indeed the case when the valve is not protected by a diode. The acceleration is induced by the net force of the springs with no contribution of the coil. However when the coil is discharged slowly the plunger will move with nearly zero speed and the gasket may stuck in between the two seats generating a short cut between the pressure port and the exhaust. This in general will prevent the valve to close.

The *ASVP0001* combines the diode to protect the input and the varistor to accelerate the valve and takes all the advantages of different electronic protections. It ensures a repeatable performance of the valve independent of the driving electronics.

Ordering Information ASVP0001CCLLIP

CC	Connector type to valve	LL	Cable length	IP	IP protection level
01	EN175301-803 (DIN 43650) type A	00	No cable	00	No protection
02	EN175301-803 (DIN 43650) type B	10	1 m	51	IP 51
03	EN175301-803 (DIN 43650) type C	20	2 m	65	IP 65
04	M8 3 pole	03	300 mm		
05	M8 4 pole				
06	Wire AWG 24				

History records

Rev.	Change	Date
01	Creation	21.05.07
02	Update	15.08.07