
Elactis SA
Switzerland

Phone +41 22 364 65 85
Fax : +41 22 364 65 87
E-mail : info@elactis.com
Web : http://www.elactis.com

Elactis
Electronics for Actuators and Integrated Systems

SOLENOID VALVE DRIVER¹

ADRV0001A



Preliminary

¹ This datasheet is a preliminary description. Values and functions may change without notice.
© 2007 Elactis SA. All rights reserved.

Features

- Wide input voltage range
- Power saving
- Limited heating
- Full protection against coil discharge



Description

The ADRV0001A is a small interface electronics integrated into EN 175301-803A type connector that increases the performance of a monostable solenoid valve. It allows charging the solenoid with full power for a limited time, then reduces the power to a low value to limit heating of the coil. It comes in different finish to accommodate to all customer solutions.

Ordering description

ADRV0001ACCXXYYZZ

CC: Cable length

CC value	00	01	05	10	20	50	99
To power supply side	Screw on cable	100mm cable	500mm cable	1m cable	2m cable	5m cable	10m cable

XX: input voltage range and diagnostics

XX value	01	02	11	12	21	22
Vcc min [V]	10	4.5	10	4.5	10	4.5
Vcc max [V]	27	12	27	12	27	12
LED	no	no	yellow	yellow	diagnostics	diagnostics

YY: Pull in power to hold power ratio

YY value	04	10	18
P max: P hold	4	10	18

ZZ: Pull-in time

ZZ value	05	10	15	99
Pull-in time [ms]	50	100	150	1000

Other values available upon request

Electrical Specifications, ADRV0001ACC01YYZZ version

Parameter	Minimum	Maximum	unit
Supply Voltage	XX=_1	10	V
	XX=_2	4.5	
Maximum pulse current		2.5	A
Max continuous current		0.5	A
	XX=_1	10	Ohm
	XX=_2	6	
Pull in time	ZZ=05	40	ms
	ZZ=10	85	
	ZZ=15	130	
	ZZ=99	950	
Current consumption	2	8	mA
Power efficiency during hold	83	97	%
Operating frequency	0	50	Hz
Duty cycle, production version	0	100	%
ESD protection	23 (IEC 61000-4-2 level 4)		kV
Reverse voltage protection		- 30	V
Protection against coil discharge		diode	
Operating temperature range	0	70	°C

If your application is out of the specifications listed above, do not hesitate to contact Elactis. We can then customize the driver to meet your most demanding needs.

Working principle

The ADRV0001A can be used with any monostable solenoid valve. For best performances it should be used with a coil rated voltage less than the power supply voltage. The ADRV0001A generates a special PWM signal which has the following characteristics:

- The supply voltage is connected to the solenoid during the Pull in time.
- A high frequency PWM signal generates a holding current with high power efficiency with the specified power ratio.
- The solenoid is discharged into a diode as soon as the supply voltage is reduced below the specified threshold level. Therefore the solenoid is not affected by residual voltages or current on the power supply line.
- An optional LED can be configured for diagnostics. This LED indicates the presence or the absence of the coil. The table below gives the meaning of the LED:

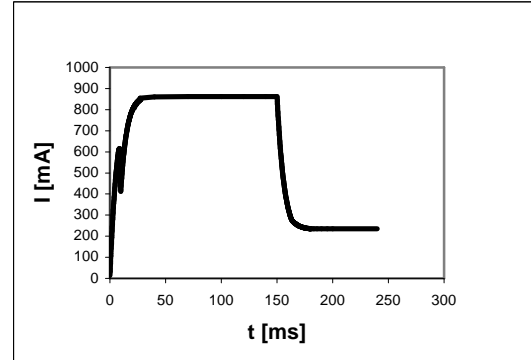


Figure 1: Typical current consumption using the ADRV0001ACC240415 with a 23 Ohm solenoid at 24V supply voltage.

LED Status	Meaning
Continuous Yellow	Valve switched on
Blinking a 1Hz	Valve is absent
Blinking a 2Hz	Short-cut

Applications

The ADRV0001A can be used for a large variety of applications. The simplest is **heat reduction**. In applications where the coil must be powered for a long time it will heat up with the following disadvantages:

- the coil might reach temperatures beyond 60°C which creates a risk of injury
- high temperature may influence the fluid's properties
- coil will prematurely wear out
- plastic and rubber components may deteriorate
- coil heating limits the useful external temperature range

The ADRV001A is a high efficiency driver which will dissipate very little power in the electronics. The holding power is a function of the coil resistance and the input voltage. The power in the valve is approximately reduced by the ratio between the pull in power and the hold power.

The ADRV0001A allows for a **wide range of input voltages**. It is useful to extend the operating voltage range of a solenoid. One must take care that the solenoid still operates at the lowest specified voltages. Due to the decreased power consumption the coil heating due to different voltages will not be a problem. Note however, that the holding power is strongly dependent on the supply voltage. The increased power during the inrush phase might also reduce the lifetime of the valve. See the ADRV0002A for a more advanced version.

The ADRV0001A has an **integrated protection feature**. The client does not need to worry about induced reverse voltages or residual voltages on the cable. The driver closes automatically at voltages below the minimum operating voltage and eliminates the coil discharge voltage.

The ADRV0001A adapts to your power needs. In many applications the **performance of the valve** is limited by the solenoid power. You may increase the plunger stroke, the applied pressure range or the orifice size. To do this, select a lower resistance coil and use it with the driver. Warning: always consult with the valve manufacturer before exceeding the rated pressure.

The ADRV0001A is useful for **battery applications**. It limits the inrush power to a limited time then maintains the valve in a low power mode. The holding power is a function of the battery voltage therefore the version must be chosen such that the holding power is sufficient for the lowest operating voltages. See the ADRV0002A for a more advanced version.

Application examples

Transportation: door locking systems. Use it to compensate for the wide operating temperature and the fluctuating power supply.

Inkjet industry: inlet valve for ink tank. The reduced heating prevents the ink to dry on the valve seat. It also adds extra force to open the valve against the ink's viscosity.

Machine miniaturization: Due to reduced heating the valve needs less ventilation therefore it can be put into a smaller closed box.

Recommendation for design

One of the advantages of the ADRV0001A is that it can absorb many fluctuations of electrical and environmental parameters. It is always recommended to use a coil with lower resistance than for designs without the driver. Use 10% to 50% lower resistance than without the driver. This will allow for a more reliable operation of the valve and eliminate problems linked to friction or sticking of the valve.

Mechanical drawing

EN 175301-803 type A connector (ex - DIN43650 A). Connector aspect and material can be subject to changes.

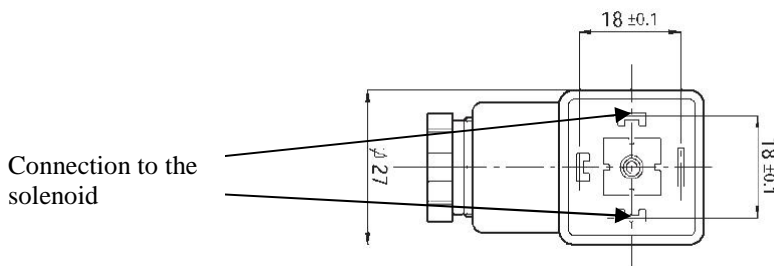
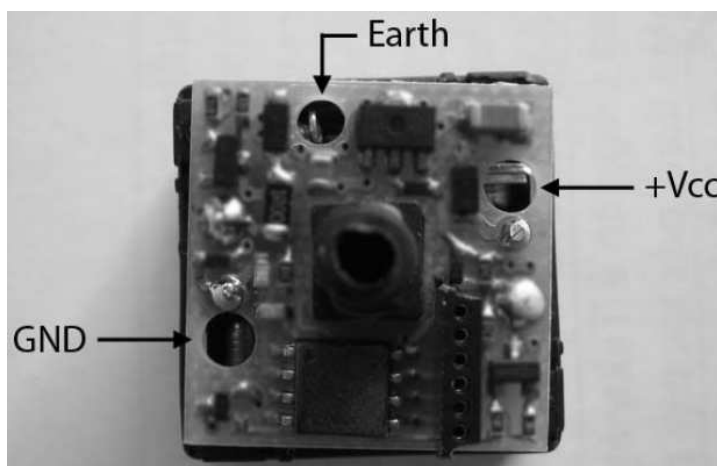


Figure 2: Drawing of the connector

Connection schematic



History records

Rev.	Change	Date
01	Creation	10.04.07
02	Update	15.08.07
03	Update	08.10.07
04	Update	10.12.07
05	Added the ZZ = 99 version	05.12.08
06	Change ordering code to same as ADRV0002A, add LED and diagnostics, adapt values	