Introduction

This electronic control it's been developed to drive a solenoid proportional valve without integrated position transducer. The device is enclosed in a "OCTAL" plastic container with 8 pin standard circular connector (the typical circular relays connector).
The output stage operates in PWM high-frequency modulation and produces a sinusoidal dither signal whose value can be varied between 80 and 220Hz to fit most existing valve cursors.
The integrated current feedback allows a fine control versus solenoid temperature variations. The circuit also integrates a short-circuit protection, which is signaled by its overloaded LED (O. LOAD) and protection for supply voltage inversion.
The green LED (SUPPLY) signals power supply presence, the two yellow LED (OUT A e OUT B) indicate the driving of the solenoid.
Minimum current (I.MIN), Maximum current (I.MAX), Rise ramp (R.UP) and Fall ramp (R.DW) can be calibrated with the trimmer on frontal panel.
Ramps can be excluded shorting input RAMP CONTROL (8) to supply voltage (the red LED "R.OFF" lights).
You can drive the valve wiring a 5 K Ohm or 10 K Ohm, potentiometer between pin 4 (+5V) and pin 1 (0V) with the tap on pin 3 (ref.) or giving a voltage (or current) reference between pin 3 (Ref.) and 0V pin 1 (-).

Electrical wiring

Wiring the card following the electric diagram and don't apply supply. Turn all the trimmer counterclockwise almost for ten turns, set the external potentiometer tap or the reference to zero. Turn on the card, check if the greed led lights up and the yellow led stay off (no driving to the valve(s)). If not as described above, check wiring and if the external pot. tap is really turned to 0V.

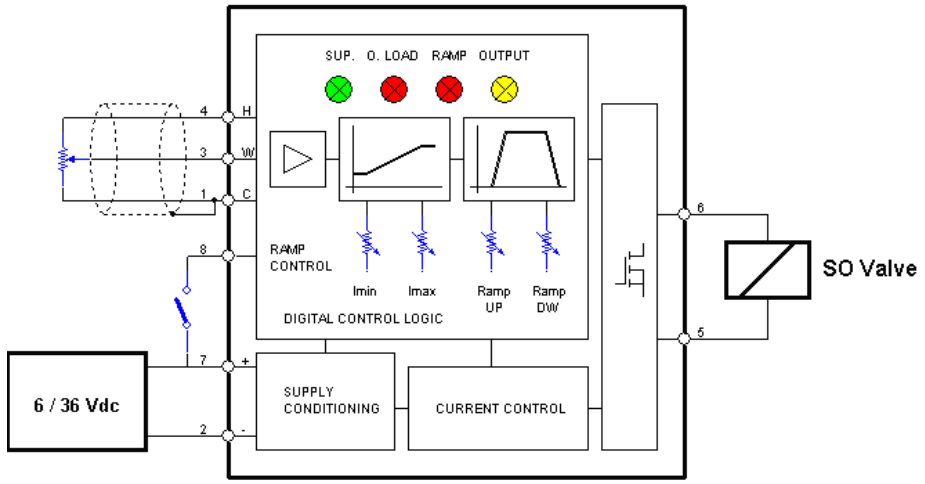

Diagram 1

1. Pot. 0V
2. Supply -
3. Pot. tap
4. Pot. +5V
5. Solenoid -
6. Solenoid +
7. Supply +
8. Ramp control

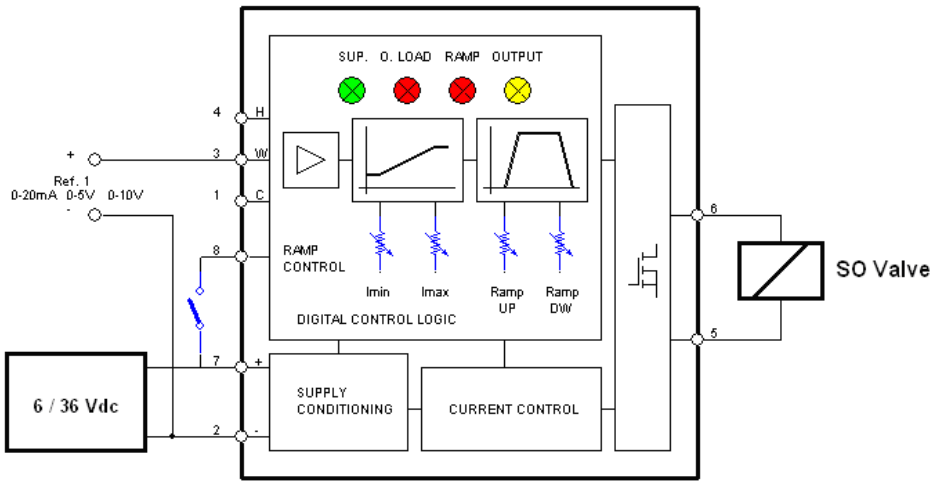

Diagram 2

1.
2. Supply -
3. Reference (V or I)
4.
5. Solenoid -
6. Solenoid +
7. Supply +
8. Ramp control

Current calibration

Turn the external potentiometer or the external reference to the minimum value that lights up the yellow led (OUT A on) and turn the trimmer I MIN until you obtain the minimum current required to drive the solenoid (see valve datasheet).
Turn the external potentiometer or the external reference to its maximum value and then turn the trimmer I MAX until you obtain the maximum current required by the solenoid (see valve datasheet). Current value can be read inserting a voltmeter's tips in the red and black socket on PROPEL panel. You will read 1 VDC = 1Amp.

Ramps setup

If start and stop ramps are needed, disconnect the input on pin 8 (red led RAMP OFF turns off) and utilize the trimmer R.UP, R.DW to fix the rise and fall time needed. If you don't need ramps, simply short pin 8, Ramp Control, to +V (pin 7), the red led RAMP OFF turns on and the ramps will be disabled.

Dip-Switch setup

As you can see in the table below, the dither frequency can be fixed from 80Hz to 220Hz, refer to the solenoid datasheet to know the best dither frequency to use. Dip switch 1-2-3 fixes the various frequency.

1	2	3	Dither
OFF	OFF	OFF	80 Hz
OFF	OFF	ON	100 Hz
OFF	ON	OFF	120 Hz
OFF	ON	ON	140 Hz
ON	OFF	OFF	160 Hz
ON	OFF	ON	180 Hz
ON	ON	OFF	200 Hz
ON	ON	ON	220 Hz

Dip-switch 5 fixes the maximum output current allowable for the valve (OFF->1A, ON->2A)

Dip-switch -6-7-8 setup the input configuration, see the table below for the various possibilities:

6	7	8	Input (Pin 3)
OFF	OFF	OFF	0-5 V, Potenz. (diagram 1)
OFF	OFF	ON	0-10 V (diagram 2)
ON	OFF	OFF	0-20 mA (diagram 2)

Normal operation

Once you have ended the above setup, the system is ready to control the valves. Giving a set point to the input (~500mV when you use the potentiometer) the current flows to the solenoid starting from the minimum current, fixed with the trimmer I MIN, to the maximum current, fixed with the trimmer I MAX, when the set point is at maximum value.
Of course the current to the valves will rise or fall with the time imposed by the ramps, if you disabled the ramps, the current will change immediately.

Technical data

Nominal Operating Voltage..... 12 ÷ 28 VDC
Max Operating Voltage..... 36 VDC
Nominal Power 48W
Nominal current .....2,8A (12V) - 1,4A (24V)
Supply to external potentiometer..... +5V
Minimum current swing (I min.) .....0 ÷ 50%
Maximum current swing (I max.) .....I Min ÷ 100%
Ramp time swing (R. up. – R. Dw.) ..... 0 ÷ 10 sec.
Working temperature .....-20 ÷ +80 °C
Potentiometric input ADC resolution..... 10 bit

Ordering code

H	6	1	0	1

Hydrover product

Product series
61 series - Electronic controls

Product ID