

Introduction

This electronic control it's been developed to drive a double solenoid proportional valve without integrated position transducer. The device is enclosed in a "UNDECAL" plastic container with 11 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.

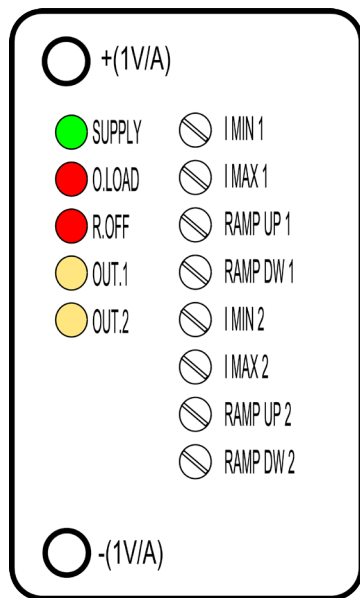
The integrated current feedback allows a fine control versus solenoid temperature variations. The circuit also integrates a short-circuit protection, which is signaled by its overloaded LED (O. LOAD) and protection for supply voltage inversion. The green LED (SUPPLY) signals power supply presence, the 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 (3) to supply voltage (the red LED "R.OFF" lights).

You can drive the valve(s) wiring a 5 K Ohm or 10 K Ohm, potentiometer between pin 10 (+5V) and pin 8 (0V) with the tap on pin 9 (ref.) or giving a reference set point between pin 9 (Ref.1) or pin 2 (Ref.2) and 0V pin 2 (-).

Control panel



Control	Description
SUPPLY	Supply present
O.LOAD	Overload protection
R.OFF	Rise/fall ramp OFF
OUT.1	Output-solenoid 1 ON
OUT.2	Output-solenoid 2 ON
I MIN 1	OUT1 minimum current calibration
I MAX 1	OUT1 maximum current calibration
RAMP UP 1	OUT1 Rise ramp calibration
RAMP DW 1	OUT1 Fall ramp calibration
I MIN 2	OUT2 minimum current calibration
I MAX 2	OUT2 maximum current calibration
RAMP UP 2	OUT2 Rise ramp calibration
RAMP DW 2	OUT2 Fall ramp calibration
+ (1V/A)	Voltmeter sockets for current measurement (1Volt = 1Ampere)
- (1V/A)	

Electric 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 set point to midway (remember that you are using a double valve system). Turn on the card, check if the green 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 midway.

Electrical connection for potentiometer control

PIN	Description
1	Supply (-)
2	Output selector (0V -> OUT1, +V -> OUT2)
3	Ramp control (0V -> Ramp ON, +V Ramp OFF)
4	Shield
5	Solenoid common (-)
6	Solenoid 1 (+)
7	Solenoid 2 (+)
8	Potentiometer 0V
9	Potentiometer tap
10	Potentiometer +5V
11	Supply (+)

Electrical connection for reference signal control

PIN	Description
1	Supply (-)
2	Output selector (0V -> OUT1, +V -> OUT2) *note1
3	Ramp control (0V -> Ramp ON, +V Ramp OFF)
4	Shield
5	Solenoid common (-)
6	Solenoid 1 (+)
7	Solenoid 2 (+)
8	No connection
9	External reference
10	No connection
11	Supply (+)

*Note1: in case of +5V/-5V input control signal, pin 2 works as output enable, in all other case pin 2 works as output selector.

Current calibration

Turn the external potentiometer or the external reference set point to the minimum value that lights up the yellow LED (OUT1 ON) and turn the trimmer I MIN until you obtain the minimum current required to drive the solenoid and open valve cursor(see valve datasheet).

Turn the external potentiometer or the external reference set point 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.

Repeat the above operations for OUT 2 selecting Pin 2 ON (+V)

Ramps setup

If start and stop ramps are needed, disconnect the input pin 3 (red LED R.OFF turns off) and utilize the trimmer R.UP (1 and 2), R.DW (1 and 2) to fix the rise and fall time needed.

If you don't need ramps, simply short pin 3, Ramp Control, to +V (pin 11), the red led R. 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. Dip switch 1-2-3 fixes the various frequency.

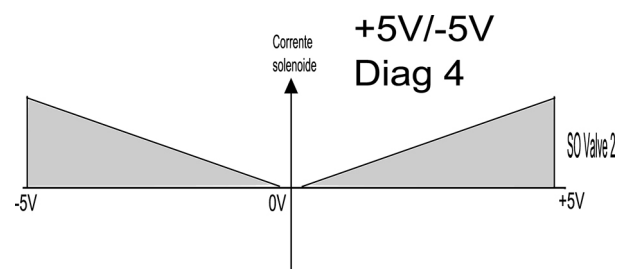
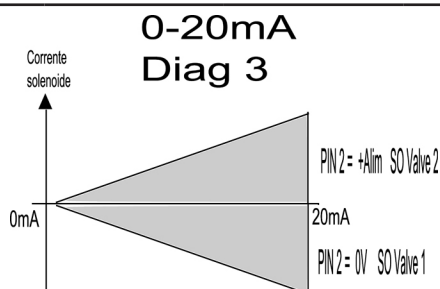
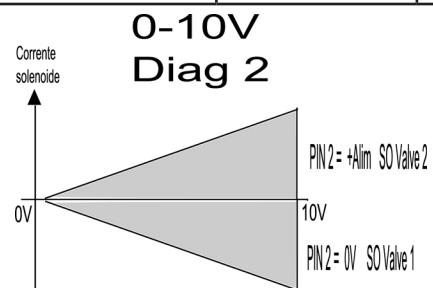
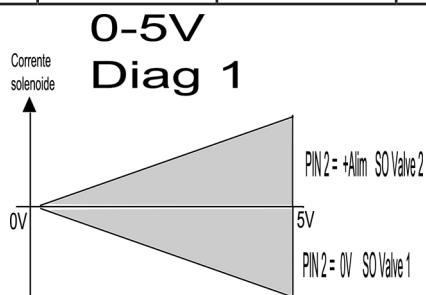
1	2	3	Freq dither
OFF	OFF	OFF	80Hz
ON	OFF	OFF	90Hz
OFF	ON	OFF	100Hz
ON	ON	OFF	110Hz
OFF	OFF	ON	120HZ
ON	OFF	ON	140Hz
OFF	ON	ON	160Hz
ON	ON	ON	180Hz

Dip-switch 4 fixes the the dither level percentage.

DIP4	% dither
OFF	MAX
ON	MIN

Dip-switch 6-7-8-12 setup the reference input type and the functionality of the input PIN 2.

DIP6	DIP7	DIP8	DIP12	Reference input	PIN 2	See image
OFF	OFF	OFF	OFF	0-5V or potentiometer	OUT selector	DIAG 1
OFF	OFF	ON	OFF	0-10V	OUT selector	DIAG 2
ON	OFF	OFF	OFF	0-20mA	OUT selector	DIAG 3
OFF	ON	OFF	ON	+5V 0 -5V	OUT enable	DIAG 4

**Working**

Once you have ended the above setup, the system is ready to control the valves.

Giving a set point to the input (~200mV 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	
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	2
---	---	---	---	---

Hydrover product

Product ID

Product series

61 series - Electronic controls

