

Part number:



**HYDROMA**

HYDRAULICKÉ SYSTÉMY

**HIDROMA**  
SYSTEMS

UKŁADY HYDRAULICZNE

**HYDROMA**

ГИДРАВЛИЧЕСКИЕ СИСТЕМЫ

# VPOL Electronic regulator for single solenoid proportional control valves (open loop)



## TECHNICAL SPECIFICATIONS

Supply voltage ( $V_{sup}$ ):	10.5 + 30 VDC
External potentiometer supply:	4.6 VDC - max 10 mA
Input reference signal range:	0+10 VDC (opz. 0+20 mA)
Max output current:	2.5 A
Max power:	75 W
Ramp time adjustment:	0.1 + 10 sec
Indirect current measure:	1V = 1A
Input reference impedance (0+10 V):	20 kOhm
Input reference impedance (0+20 mA):	270 Ohm
PWM frequency:	50 ÷ 250 Hz
Enable/Disable optional signal:	+Valim
Working temperature:	-10 °C + +60 °C
Weight:	200 g
Overall dimensions:	79 x 36 x 77 mm

## 1 - DESCRIPTION

VPOL electronic regulator is designed for single solenoid proportional valve open ring control.

Solenoid current is proportional to reference signal, is independent from solenoid impedance variation and voltage supply variation.

Output current is PWM and it has a frequency of 120Hz. Current range (offset and gain) and PWM frequency can be easily modified to improve the valve performance (see chapter 4).

## 2 - WORKING CONDITIONS

### 2.1 Supply voltage

Supply voltage range starts from 10.5  $V_{dc}$  to 30  $V_{dc}$ . If you obtain card supply from 220V<sub>AC</sub> you must straighten and filter this tension until voltage value is included into indicated supply voltage range.

### 2.2 Electric protections

Card is protected against supply overtension and polarity inversion, and the PWM output is protected against the short-circuit.

### 2.3 Input reference signal

Reference signal can come from a PLC (voltage signal from 0 to 10V<sub>dc</sub>) or external potentiometer. You can supply an external potentiometer directly from the card, connecting your potentiometer to terminal 1 and terminal 4.

If you do not want use a voltage input, you can use a special version of VPOL with current input (from 0 to 20 mA) for more information see codification section.

### 2.4 Solenoid type

VPOL card can control every type of proportional valve solenoid. It is only necessary to verify the card supply voltage, because the voltage value must be enough to generate a working nominal current into the solenoid.

### 3 - SIGNALLING LEDS

#### 3.1 - SUPPLY: Voltage supply

Green LED, when is ON indicate that VPOL is ON and the voltage supply is correct.

#### 3.2 - SIGNAL: Reference signal

Red LED, his brighth is proportional to input reference signal.

#### 3.3- OUTPUT: Output current

Yellow LED, his brighth is proportional to the output current into the solenoid.

### 4 - REGULATION COMMAND

#### 4.1 Minimum current (I MIN or Offset)

By I MIN trimmer you can regulate solenoid polarization current. This trimmer must be regulated with reference input signal at lowest value. You must increase the potentiometer until the valve will be near the opening threshold. If you set an I MIN too low value you will lose a fine regulation.

#### 4.2 Maximun current (I MAX or Gain)

By I MAX trimmer you can regulate maximum current into the solenoid. This trimmer must be regulated with reference input signal at maximum value. You must increase the potentiometer until the valve will be completely opened. If you set an I MAX too high value you will lose a fine regulation.

#### 4.3 Ramp (RAMP)

By RAMP trimmers you can regulate rise and fall ramps. Ramps time varies from 0.1 to 10 seconds. If you close P1 jumper (inside the card) you disable both ramps.

#### 4.4 Current measure

If you put voltmeter probe into the frontal panel measure point, you can indirectly mesaure solenoid current. Current/volage ratio is 1 Ampere every 1 Volt this means that if you measure 0.7V the current into the solenoid is 0.7A. The precision of this measure is 3%.

#### 4.5 PWM frequency

Output current is PWM, through PWM frequency fine regulation you can reduce proportional valve hysteresis: Default PWM frequency is 120Hz.

You can modify this value by an internal trimmer (you must open frontal panel). PWM frequency range is from 50 Hz to 250 Hz.

If you want know the best PWM frequency value you can ask to proportional valve manufacturer.

Usually 120Hz is a correct value.

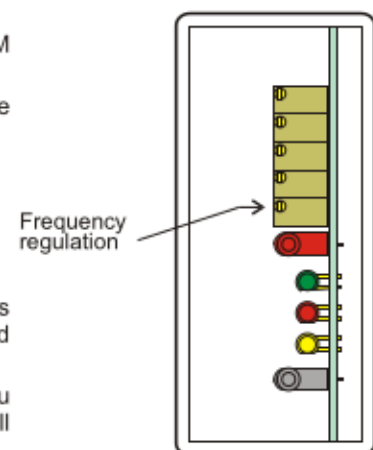
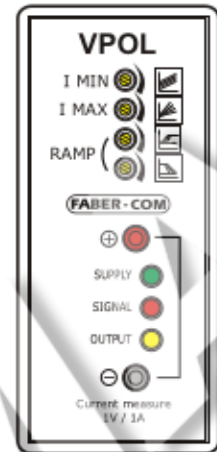
#### 4.6 Enable/Disable input (P2, P3, P4)

On soldering side there are three jumper: P2, P3, P4.

If you close P2, P3 and P4 jumper you can enable terminal 8, the function of this terminal is enable/disable card. P2, P3 and P4 jumper default configuration is all opened and enable/disable signal input is not used.

If you close P3 and P4 and open P2, terminal 8 is used as ENABLE, this means that you must connect terminal 8 to power supply if you want enable the card, otherwise the card will be disable and the output current will be kept to I MIN.

If you open P3 and P4 and close P2, terminal 8 is used as DISABLE, this mean that you must connect terminal 8 to power supply if you want keep output current to I MIN, otherwise the card will work normally.



## 5 - CALIBRATION

### 5.1 Minimum current and maximum current adjustment

To improve the proportional valve sensitivity, you must regulate I<sub>MIN</sub> and I<sub>MAX</sub> to obtain a correct solenoid current range. The proportional valve must always work from opening threshold to complete opened position. For a correct calibration follow the next instructions:

- 1) Bring I<sub>MIN</sub> and I<sub>MAX</sub> potentiometer to lowest position (unscrew in anticlockwise sense).
- 2) Bring the input reference signal to maximum value;
- 3) Rotate I<sub>MIN</sub> trimmer in clockwise sense to bring the proportional valve on opening threshold (at the start of actuator movement).
- 4) Rotate I<sub>MAX</sub> trimmer to bring the proportional valve to maximum opening position.

Adjust I<sub>MIN</sub> calibration with reference input signal at lowest value, and then adjust I<sub>MAX</sub> calibration with reference input signal at highest value.

### 5.2 Ramp regulation

"Rise ramp time" is the time of transition from zero to highest value of output signal and "fall ramp time" is the time of transition from maximum value to zero of output signal while input signal varying instantly from low to high or vice versa.

Ramp time range is from 0.1 to 10 seconds. Rise ramp time and fall ramp time are independent. Is possible desable ramp function closing P1 jumper.

Ramp function is used for soften proportional valve answer when input signal has sudden variation.

ATTENTION: if you use a too high time ramp you could worsen proportional valve performance.

## 6 - WARNING

If you want disable the card (for example: when a switch is opening) you do not never interrupt the connection from card to solenoid, but you must use DISABLE function on terminal 8. Solenoid must be always directly connected to VPOL card.

If you want completely turn off the solenoid output, you must turn off the card interrupting the supply (remember that if you use disable input solenoid current is kept to I<sub>MIN</sub>).

ATTENTION: when you turn on the VPOL, the card is not immediatly ready to work, because answer time on card switching on is proportional to ramps time.

## 7 - ALTERNATIVE PACKAGES

### - "Opened" version (VPOLM)

VPOL card in "opened" version has resinated components, this version has not an OCTAL base, but it has an extractable connector with screw terminals.

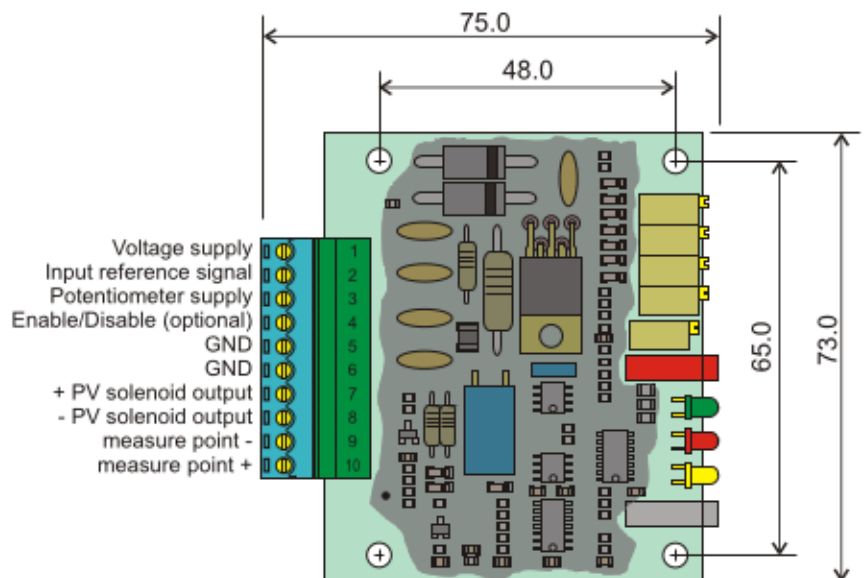
You can fix the card on a pannel through 4 fixing holes (Ø4mm).

### - "Panel mounted" version (VPP2)

VPOL card in "panel mounted" version has an integrated potentiometer, a sticker with graduated scale and screw terminals.

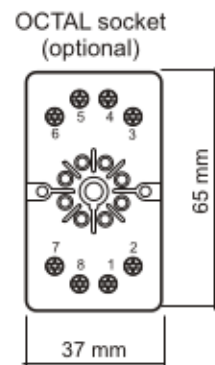
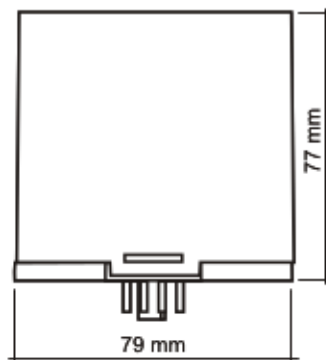
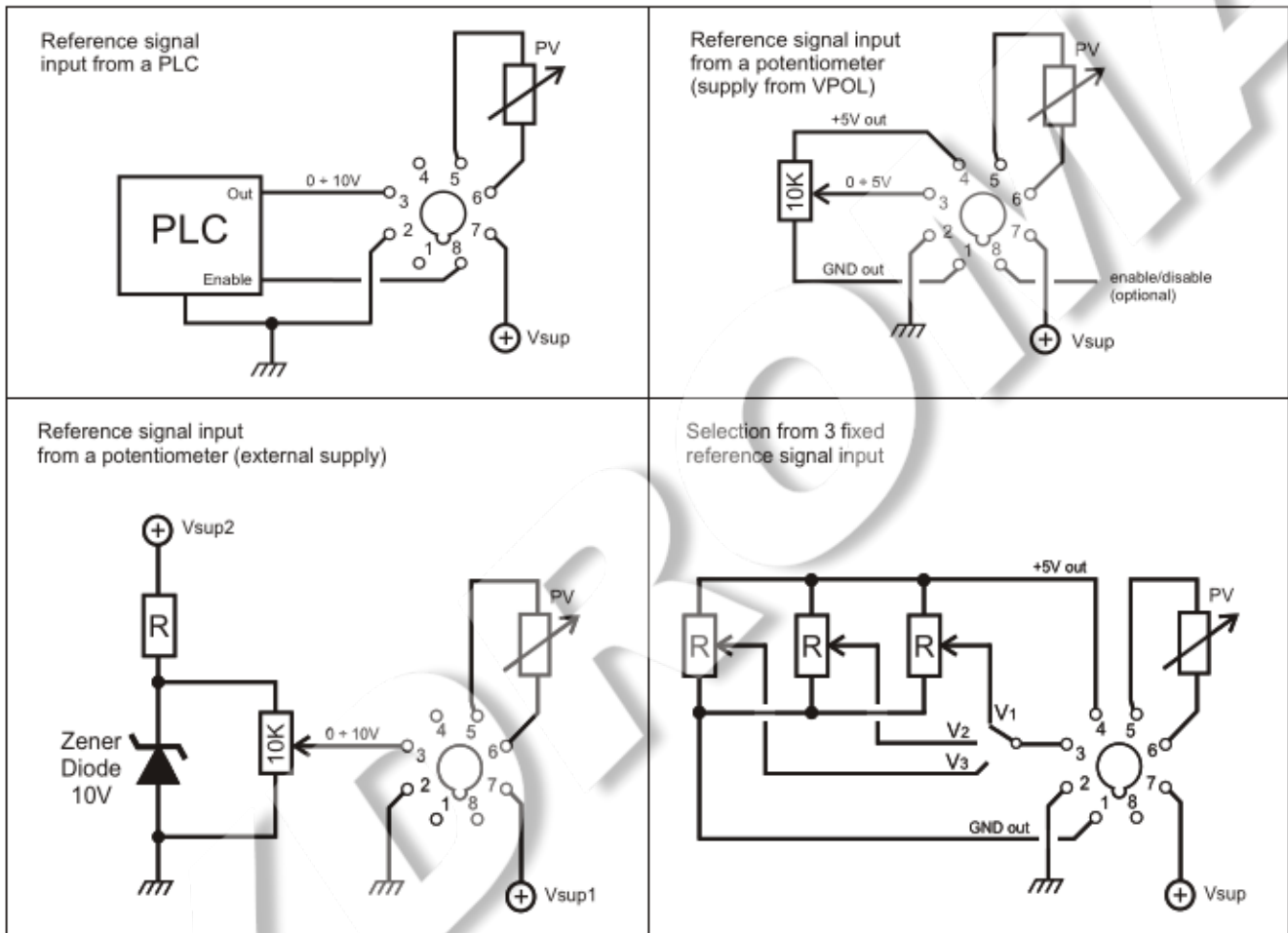
You can fix the card on a pannel through 2 fixing holes (Ø4mm).

"Panel mounted" version is also available with IP67 integrated potentiometer.





CONNECTION EXAMPLES



ORDERING CODE

PVPOL	0+10 V reference input signal	Closed OCTAL housing (socket not included)
PVPOLC	0+20 mA reference input signal	
PVPOLM	0+10 V reference input signal	Open version with screw connector
PVPOLMC	0+20 mA reference input signal	
PVPP2	"Panel mounted" version with integrated potentiometer (potentiometer is also available in IP67 version)	
A2007700030	OCTAL socket for DIN guides	