Power amplifier for proportional valves

Features

- **Power amplifier for pro-portional valves with two solenoids**

- **Input signals: ±10 V, ±5 V and 4… 20 mA**

- **8 V reference voltages**

- **MIN-, MAX-, RAMP– and DITHER-adjustment via potentiometer**

- **Internal digital control concept**

- **Max current switchable: 1,0 A, 1,6 A or 2,6 A**

- **Low cost Snap-On module**

Technical data

| Supply voltages	[VDC]	12..30
Current consumption	[A]	0,1 + solenoid current
Fuse	[A]	3 A medium lag
Input signal	[V]	± 10 , 0… 10 (50 kOhm)
	[V]	± 5 (50 kOhm)
	[mA]	4… 20 (390 Ohm)l
Reference voltages	[V]	8 (10 mA)
Adjustments		
MIN	[%]	0… 50
MAX	[A]	1, 1.6 or 2.6 via DIL
	[%]	40… 100 via potentiometer
RAMP	[s]	0,100… 15
DITHER	[Hz]	120
	[%]	0… 17,5 in 2,5 steps
Housing		Snap-On Module EN 50022
Protection class	[IP]	20
Temperature range	[°C]	-25… 60
Humidity	[%]	<90 (not condensing)
Dimensions	[mm]	H=120 ,L=100, T=23
Connections		4 x 4pol. screw terminals
EMC		EN 50082-2 EN 50081-1

Block diagram
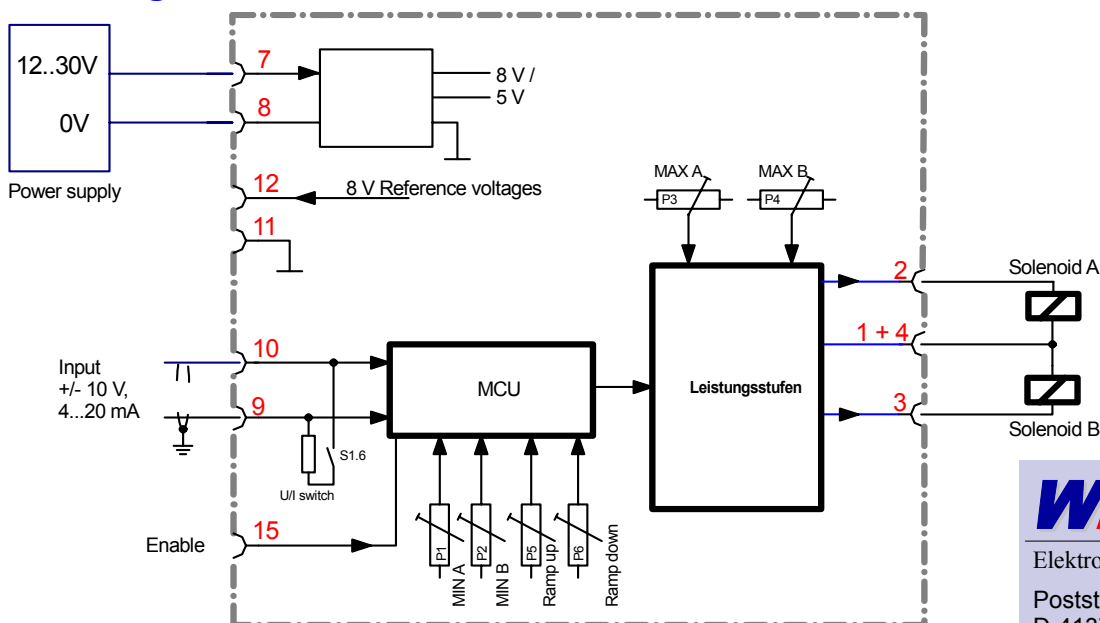
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Ordering code: **PAM-192-30**

Typical wiring (PAM-192)
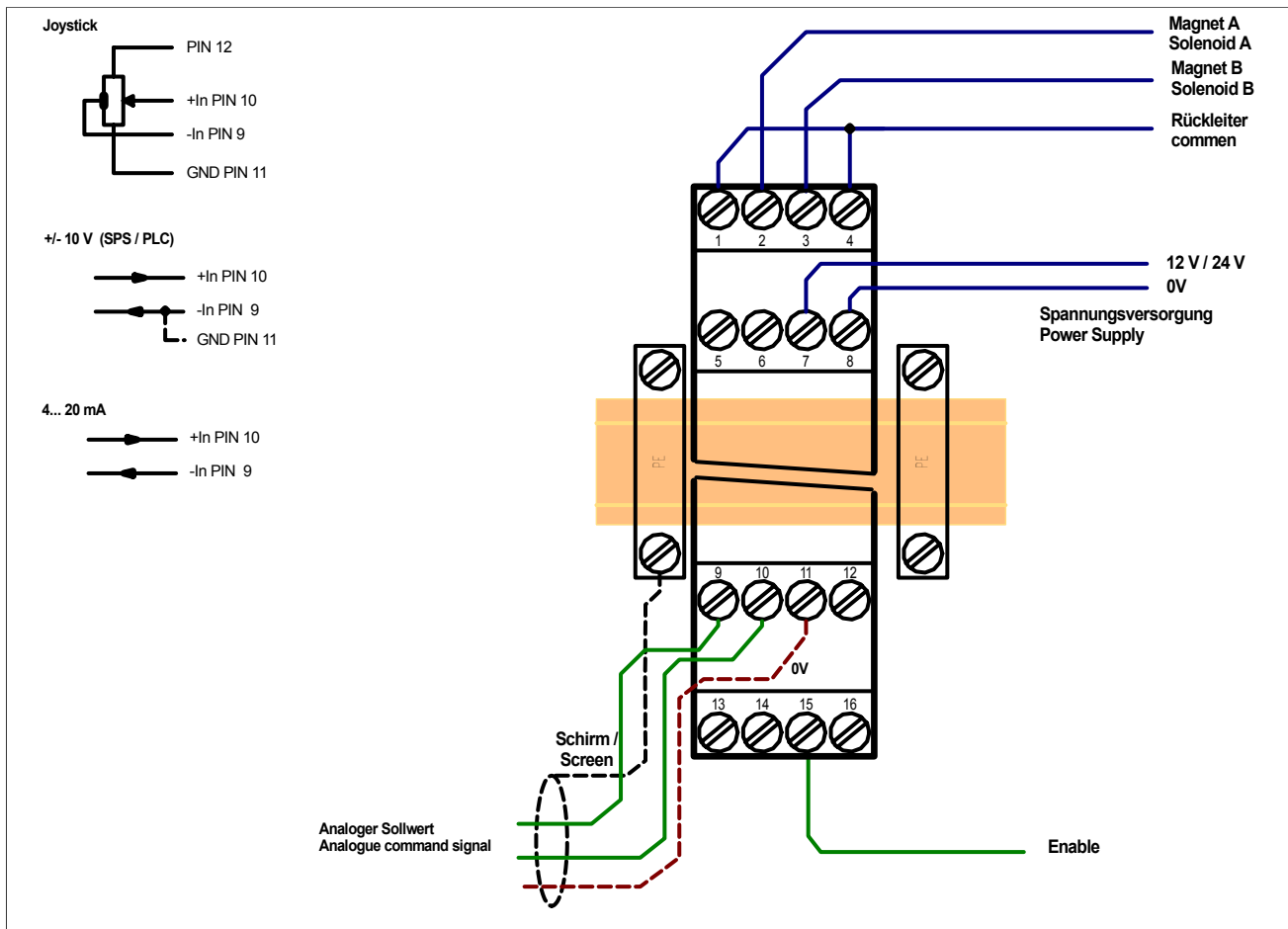
Caution: the enable input of version 30 has been changed from PIN 14 to PIN 15.

Conditions for wiring and installation:

- Only experienced people should work with this unit.
- Electrical cabinet and internal arrangement have to meet EMC standards.
- Power supply has to meet the EMC standards.
- Relays and solenoids operating from the same power supply have to be damped by surge protection elements.
- Screened wiring of analogue signals are **mandatory**.
- Screened wiring of digital signals are recommended in case of high EMI.
- The DIN rail must have good connection to PE.
- The screens must be connected to PE (DIN rail with PE clamps).
- Local requirements for screening should always be taken in consideration. It is recommended to connect the screen at both ends.
- Do not install this unit in areas with high EMI (i.e. motor cables, AC/DC commutator motors, frequency converters...).
- Do not install the analogue and logical wiring together with power cables.
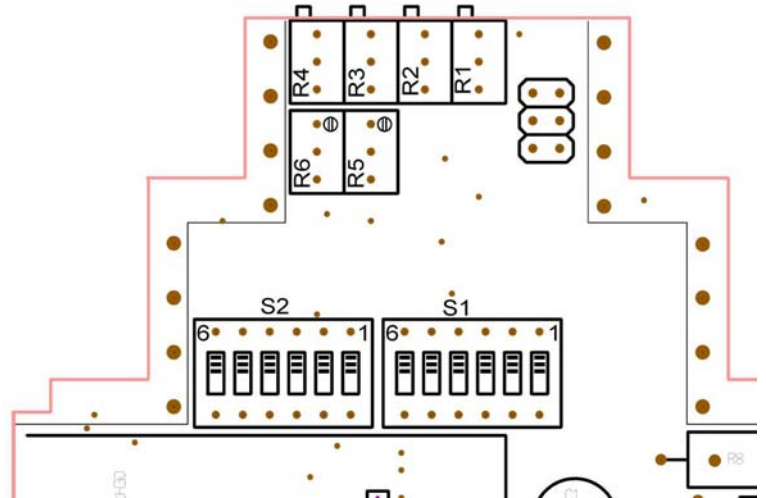
Location of the potentiometers

Front:

MINA   (R1, set in factory = 0)
MINB   (R2, set in factory = 0)
MAXA   (R3, set in factory = nominal current)
MAXB   (R4, set in factory = nominal current)

Elements inside the module (please open):

R5 = RAMP up   (R5, set in factory = min)
R6 = RAMP down   (R6, set in factory = min)

DIL S1

S1.1	S1.2	
OFF	OFF	1 A (set in factory)
ON	OFF	1,6 A
OFF	ON	2,6 A

S1.3	S1.4	S1.5	S1.6	Input
OFF	OFF	OFF	OFF	±10 V (set in factory)
ON	OFF	OFF	OFF	± 5 V
ON	OFF	ON	ON	4… 20 mA für ± 100%

DIL S2

Dither frequency / PWM frequency			
S2.1	**S2.5**	**S2.6**	**Dither**
OFF	OFF	ON	120 Hz (PWM = 2.6 kHz)
ON	OFF	ON	250 Hz (Dither = OFF)

S2.2	S2.3	S2.4	Dither amplitude (S2.1 = OFF)
OFF	OFF	OFF	0 % (set in factory)
OFF	OFF	ON	2,5 %
OFF	ON	OFF	5 %
OFF	ON	ON	7,5 %
ON	OFF	OFF	10 %
ON	OFF	ON	12,5 %
ON	ON	OFF	15 %
ON	ON	ON	17,5 %

Start-Up:

Application with typical proportional valves.
Because of the type these valves have relatively great tolerances in comparison to the electronics. The adjustment can vary from valve to valve.

MAX: Maximal current adjustment (P3 and P4). The maximal output current can be set between approx. 35% and 100% of the preadjusted nominal current range.

MIN: Zero-/deadband compensation (P1 and P2). The MIN-adjustment should be carried out after the MAX-adjustment. The presetting is 0 (fully anti-clockwise). According to the valve adjustments of approx. 0 % to 75 % of the nominal current are necessary.
                  Pre-set a small input signal of approx. 3 % to 5 %. You increase the MIN value (turn clockwise) continuously until the drive moves, from there you reduce the value (anti-clockwise) until the drive came to standstill again.
                  Caution: By changing of the MAX-adjustment also the MIN-adjustment changes.
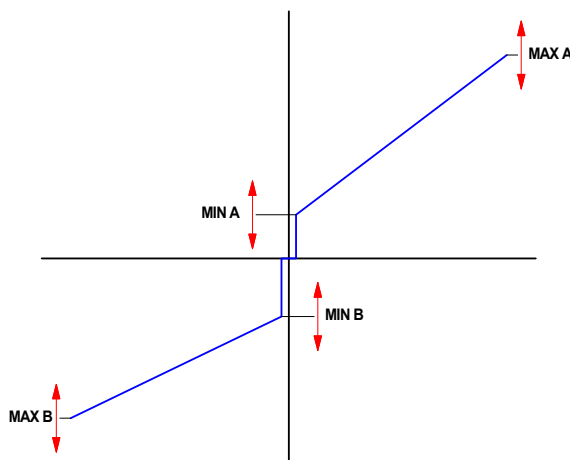
RAMP: The ramp time is preset on approx. 25 ms (P5 and P6 = smallest value). It is prolonged by turning clockwise apart from approx. 15 s. One UP and DOWN ramp can be set.
                  Caution: in case of long ramp times and additionally short stroke times (stroke time < ramp time) a behaviour difficult to understand is possible, because all movements can be carried out very delayed.

DITHER: The dither amplitude can be set via DIL switch S2. The frequency as well as the amplitude can be set. The correct data can be seen in the data sheets of many valves.
                  Caution: A too high dither amplitude can lead to an increased attrition.

General behaviour:

Power ON: After power on the input signal is checked (4… 20 mA) and the system is activated. When ENABLE is active (ENABLE directly connected with the supply voltage) the output current is activated by an internally defined ramp (smooth starting) in order to drive onto the demand value with the pre-set ramp time.

Switching inputs:

ENABLE: With this switching-input the internal signal processing and the final stage are enabled. While activating the input the valve current will be driven over the pre-set ramp. During the deactivation the current is disconnected immediately.

LEDs
GREEN (Ready) ON = System ready