

Power amplifier for proportional valves

Features

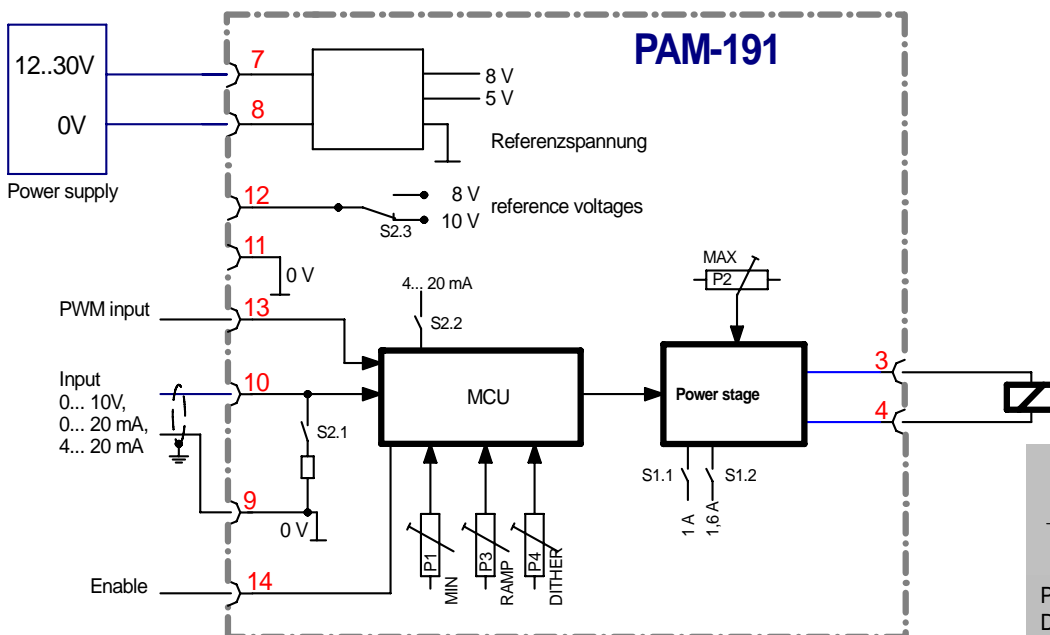
- **Power amplifier for proportional valves with one solenoid**
- **Input signals: 0... 10 V, 0... 20 mA and 4... 20 mA**
- **PWM Input**
- **Short-circuit firmly**
- **Reference voltages selectable**
- **MIN-, MAX-, RAMP- and DITHER-adjustment via potentiometer**
- **Internal: digital control concept**
- **Snap-On modul-case**



Technical Data

Supply voltages	[V]	12..30
Current consumption	[A]	0,1 + solenoid current
Fuse	[A]	3
Input signal analogue	[V] [mA]	0... 10 (30 kOhm) 0... 20 (250 Ohm)
PWM input	[mA] [V]	4... 20 (250 Ohm) 12... 24 (50... 2000 Hz)
Reference voltages	[V]	8/10V (10 mA) internally selectable
Adjustments		
MIN	[%]	0... 60 (0 = preadjusted)
MAX	[A] [A] [A]	1,2... 2,6 (0,6... 1,3)* 0,7... 1,6 (0,35... 0,8)* 0,4... 1,2 (0,2... 0,6)*
RAMP	[s]	0,05... 5 (0,05 = preadjusted)
DITHER	[Hz] [%]	80* 0..15 (0 = preadjusted)
Housing		Snap-On Module EN 50022
Protection class	[IP]	20
Temperature range	[°C]	-20..55
Humidity	[%]	<90 (not condensing)
Dimensions	[mm]	120 x 100 x 23
Connections		4 x 4pol. Screw terminals removable
EMC		EN 61000-6-2: 8/2002 EN 61000-6-3: 6/2005

Block diagram



* S1 Version, no Dither, PWM = 100 Hz

Ordering code:

PAM-191-30
PAM-191-S1-30 (PWM freq= 100Hz,
output current 0,5, 0,8 and 1,3 A

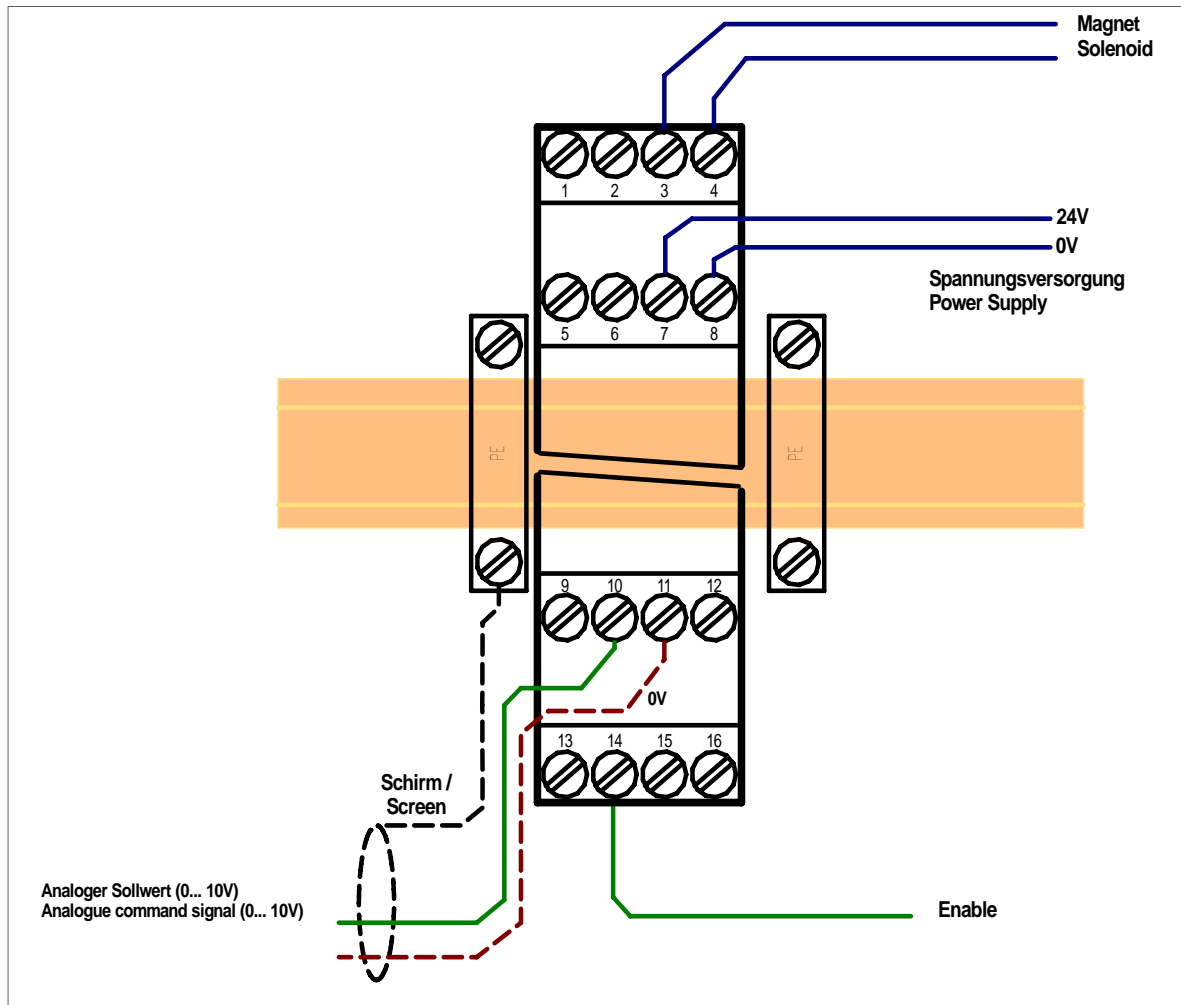
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Typical wiring (PAM-191)



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 potentiometer

Front:

- P1** = MIN
- P2** = MAX
- P3** = RAMP
- P4** = DITHER

Elements inside the module:

Input signal selection

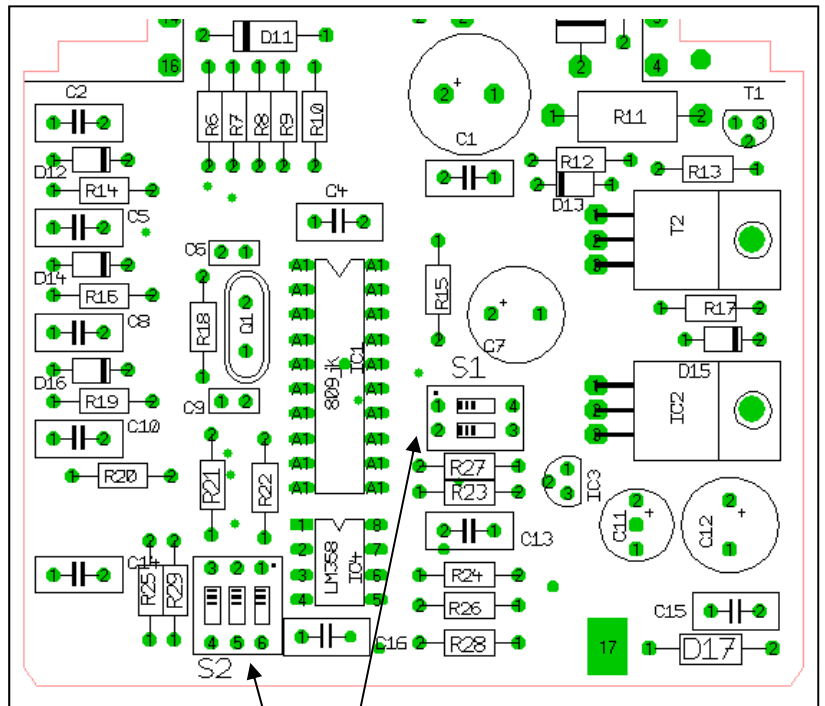
- S2.1:** OFF= voltages (0... 10 V)
ON = current (0... 20 mA)
- S2.2:** OFF= 0... 20 mA / 0... 10 V
ON = 4... 20 mA

Reference change-over

- S2.3:** OFF= 10 V
ON = 8 V

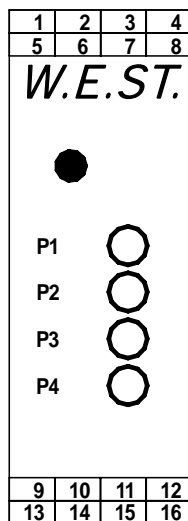
Solenoid current selection:
(both switches)

- S1.1** = ON, **S1.2** = OFF (bis 1,0 A)
- S1.1** = OFF, **S1.2** = ON (bis 1,6 A)
- S1.1** = ON, **S1.2** = ON (bis 2,6 A)

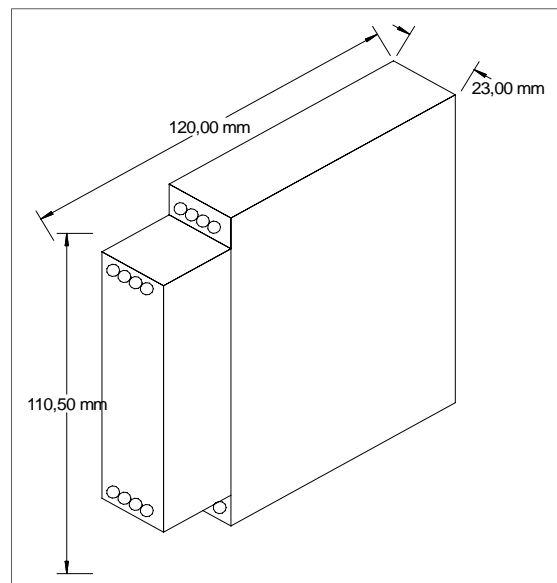


DIL switches

Front:



Dimension



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. The presetting is 1 A.
Pre-set an input signal of 100 %. By turning of the MAX-potentiometers anti-clockwise the maximum output current is reduced.
Caution: It is to be guaranteed that the maximum output current does not climb over the rated current of the valve. With the DIL switches S1.1 and S1.2 the maximum output current can be subdivided into the ranges 1 A, 1,6 A and 2,6 A.
- MIN:** Zero- / deadband adjustment. The MIN-adjustment should be carried out after the MAX-adjustment. The presetting is 0 (potentiometer fully anti-clockwise). According to valve adjustments of approx. 10 % to 35 % of the rated current are necessary.
Pre-set for this purpose a small input signal of approx. 3 % to 5 %. You increase the MIN value (clockwise) continuously until the drive shows the wanted reaction, from there you reduce the value (anti-clockwise) to the reaction (for example minimum pressure) the wanted value takes.
Caution: By changing of the MAX-adjustment also the MIN-adjustment changes.
- RAMP:** The ramp time is preset on approx. 50 ms (smallest value). It is prolonged by turning clockwise apart from approx. 5 s. All ramp times are identical.
- DITHER:** The dither amplitude is adjustable. Preset is 0 (potentiometer fully anti-clockwise). With the adjustment of the dither (rotate clockwise) the valve hysteresis can be reduced clearly.
The correct adjustment is if the dither amplitude is as high as possible, but does not yet become noticeable with a vibrating at the drive.
Caution: A too high dither amplitude can lead to an increased attrition.

General behaviour:

- Power on:** After the power on the input signal is checked (4... 20 mA) and than the system is activated . When ENABLE is active (ENABLE directly connected with the supply voltages) the output current is activated by an internally defined ramp (smooth starting) in order to drive onto the demand value with the adjusted ramp time.
- 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 valve current is deactivated immediately.
- 4... 20 mA:** To switch over the analogue input from 0... 10 V to 0... 20 mA or 4... 20 mA, the bipolar DIL switch S2 is used. S2.2 is for the 4... 20 mA recognition and S2.1 for the general voltage- / current changeover.
Only S2.1 = ON switches the input over to ± 20 mA.
Only S2.2 = ON switches the input to 1... 5 V
S2.1 and S2.2 = ON switch the input over to 4... 20 mA
- LED:**
- ON** = amplifier is working.
 - OFF** = no power supply or no ENABLE signal
 - FLASH** = (normal flashing) input current monitoring 4... 20 mA, current less than 2 mA
 - FLASH** = (short flashing every 4 s) problems with the closed loop current control. No correct wiring to the solenoids or the solenoid current can not be controlled.
A failure is also detected if a current higher than the possible current is adjusted (typical failure with 24 V solenoids: **Solving:** reducing of the max. current via DIL switch and/or P2 (max potentiometer).