



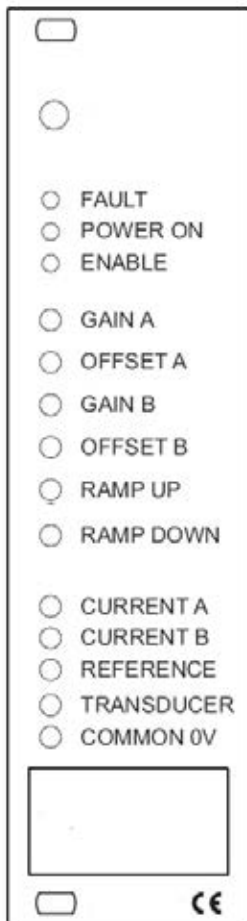
## Amplifier for proportional valves PEK WAR

### FEATURES

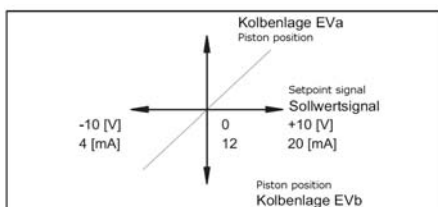
- Amplifier in Euroboard format
- Control of proportional valves with up to 2 coils in closed loop
- Linear control with minimal hysteresis

### SPECIFICATIONS

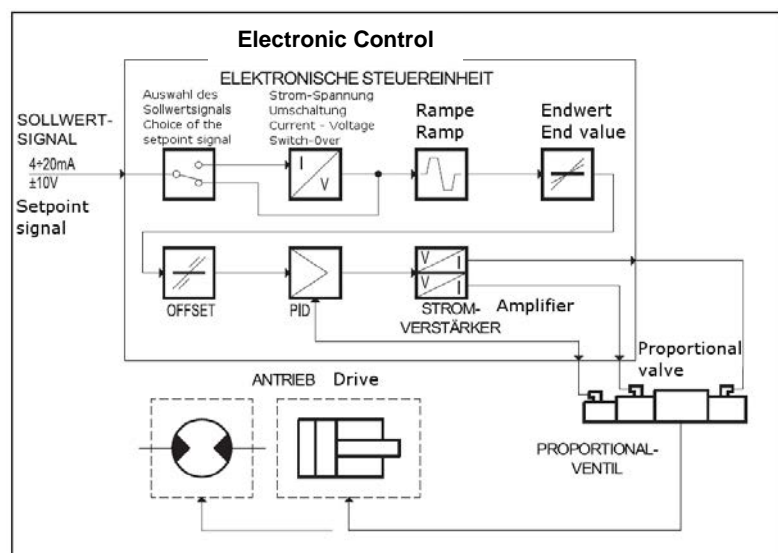
Electric supply:	DC 22 - 30 VDC (rectified and filtered, small ripple)
Power:	45 W (terminals 2a/2c - 4a/4c)
Output:	max. 1,8 A
Setpoint signal:	
- Voltage	+/- 10 V
- Current	4 up to 20 mA (by using a potentiometer $R > 200 \Omega$ )
Input impedance of the Setpoint signal:	
- Voltage	10 k $\Omega$
- Current	250 $\Omega$
Board format:	Euro board 100 x 160 x 35
Board connector:	DIN 41612-D 32 drill
Ambient temperature:	0 up to 50° C
Electro-magnetic capability (EMC):	
- Output	according to CEI EN 61000-6-4
- capability	according to CEI EN 61000-6-2 according to standards 2004/108/CEE
Protection:	Over-voltage and inverse polarity protection fuse (3,15 A)
Weight:	0,27 kg



The diagram shows the curve of the position of the piston in function of the setpoint signal.



### Block diagram



The amplifier PEK WAR is an electronic control unit in Euroboard format and is used to control proportional valves with two inductors and transducer. It carries out the control of the position of the valve piston as a function of the input setpoint signal, so it allows a linear control and a minimal hysteresis. On the front panel are LED's to indicate the operating status of the amplifier and a potentiometer resp. sockets to adjust the amplifier to the valve application.

## 1. CONTROLS AND INDICATORS

### 1.1 - FAULT (fault display)

The red LED indicates the operational status of the transducer:

OFF - Normal

ON - failures in the transducer or cable failure.

In "FAULT" mode, the amplifier is disabled, so that the solenoids are de-energized and the valve is spring-centered in the normal position. The green LED "ENABLE" disappears and the loop (via relay on amplifier) between the terminals 6a and 6c is interrupted.

### 1.2 - POWER ON (power supply)

The yellow LED provides feedback on the power supply of the trigger electronics:

ON - Supply voltage ok

OFF - no or inadequate power supply or fuse has tripped.

### 1.3 - ENABLE (release)

A signal voltage (22-30 VDC) at terminal 24c releases the final stage. The output stage release is confirmed by the illumination of the green LED "ENABLE" and a closing of the loop (via relay on amplifier) between 6a and 6c.

The green LED indicates:

ON - amplifier released

OFF - amplifier not released

### 1.4 - GAIN A / B GAIN

(gain setting for solenoid current A and B)

The potentiometer "GAIN", determines the ratio between solenoid input setpoint and solenoid current of the amplifier. The maximum current of the amplifier is limited to 1.8A.

Standard setting, see Item 4.

By turning clockwise the solenoid current and thereby the flow rate is increased within the hydraulic limitations.

### 1.5 - OFFSET A / B OFFSET

(Adjust offset for solenoid current A and B)

The potentiometer "OFFSET A" and "OFFSET B" allows the setting of an offset current e.g. to minimize coverage in the valve. If the input signal exceeds a threshold value of + resp. - 150mV (12mA or + / -0.12 mA), the amplifier puts out the adjusted offset current. This is done - depending on the polarity of the input signal - for solenoids A OR B. If the input signal lies in the range of 150mV 0V ... +150 mV (11.88 mA 12.12 mA ... 12mA) the solenoid current for solenoid A AND B is 25mA.

The adjustment range is 0 to 0.9 A.

By turning clockwise, the current value is increased.

A change in the OFFSET setting affects the GAIN setting.

### 1.6 - RAMP UP / RAMP DOWN (ramp module)

The potentiometers "RAMP UP" and "RAMP DOWN" determine the rise and fall times of the setpoint signal of a setpoint change at the entry of the ramp module. The ramp times are effective for solenoids A and B.

The adjustment range lies between 0.03 to 7 seconds.

The ramp function can be disabled via a signal voltage (22-30 VDC) to terminal 16a. In this case, the ramp time is generally 10 ms.

By turning clockwise the ramp time is increased.

## 2 - SIGNAL MEASUREMENT

### 2.1 - CURRENT A / CURRENT B

(Test point for solenoids current A and B)

This is the voltage signal reference point "COMMON 0V". The conversion factor is  $1VCC = 1A$ .

### 2.2 - REFERENCE (test point for controller input)

Inverted reference signal after the ramp module. The following is valid when using a current input signal:  $4mA = +10V$  and  $-10V = 20mA$

### 2.3 - TRANSDUCER (test point for signal of the transducer)

Direct readout of signal of the transducer signal with voltage of + / -4.8 V (tolerance 200mV)

### 2.4 - COMMON 0 V (reference potential)

Reference potential for test sockets 2.1 - 2.3

## 3 - INSTALLATION

The amplifier is suitable for rack mounting or for mounting in a PCB holder with an interface type DIN 41 612 - Form D 32nd

Wiring recommendation: supply of the amplifier and connection to the solenoid coil with cable cross section of 1 to 2.5 mm<sup>2</sup> run. The cross section depends on the length of the cable. For signal lines use shielded, grounded cables at the drive electronics.

### NOTE 1

To meet the EMC requirements, it is important that the electrical wiring is conform to the block diagram .

In general, the valve and the connecting cable to the amplifier are to be operated far from interference sources such as power lines, electric motors, inverters and electrical switching equipment.

In rooms with special electromagnetic interference sources, a complete shielding of the cable may be needed.

### 3.1 - Supply

The amplifier requires a supply voltage of 22-30 VDC and has a power consumption of up to 45 W (terminals 2a/2c - 4a/4c).

### 3.2 - Electrical protection devices

The amplifier is equipped with an over-voltage and inverse polarity protection.

The power circuits are protected by a quick fuse of 3.15 A F. Position on printed board, see Dimensions, page 4.

### 3.3 - Setpoint signal

The amplifier is designed for input setpoint values in the form of voltage signals (-10V ... +10 V) or current signals (4 .. 20mA). Details on WIRING DIAGRAM see page 4  
Assignment of setpoint values, see page 1

If the setpoint signal is transferred by a potentiometer, please verify that its resistance value is bigger than 200Ω.

### 4 - STANDARD SETTING

The amplifier is preset:

- "GAIN A": setpoint signal +10 V (or 20 mA) corresponds to the maximum opening of the valve and approximately -5V at test point "TRANSDUCER".
- "GAIN B": setpoint signal -10V (or 4 mA) corresponds to the maximum opening of the valve and +5 V at test point "TRANSDUCER".

The open circuit controlling the GAIN A and B corresponds to setting of a magnetic current of approximately 1A at max. setpoint signal.

- "OFFSET A" and "OFFSET B": zero.
- "RAMP UP" and "RAMP DOWN" means, at minimum.
- SW1 in position V
- SW2 in position S
- SW3 in position AC
- S1 in position N
- Dither (PWM) = 200 Hz

### 5 - ADJUSTMENTS TO FRONT PANEL

The following adjustments can be made via the front panel:

#### a) Setting the OFFSET

(Note: the procedure is the same for the solenoids A and B)

- Set the potentiometer "GAIN A" and "GAIN B" to the minimum value.
- Set the setpoint to:
  - +10 V (or 20 mA) for solenoid A or
  - 10V (or 4 mA) for solenoid B
- Turn the potentiometer on "OFFSET A" and "OFFSET B", that the valve is adjusted to the desired initial value (See valve description).

#### b) Setting the GAIN

(Note: the procedure is the same for the solenoids A and B)

- Put the setpoint signal to:
  - +10 V (or 20 mA) for solenoid A or
  - 10V (or 4 mA) for solenoid B
- Turn the corresponding potentiometer "GAIN A" or "GAIN B" to the desired maximum value to adjust the controlled variable (hydraulic parameter).

#### c) Setting of the ramp of the RAMP module

- Turn the potentiometer "RAMP UP" and "RAMP DOWN" so that with a change of the setpoint signal the desired delay in the response of the valve is achieved.

### 6 - ADJUSTMENTS TO BOARD

In the dimensional drawing (see page 4) four different switch groups are named: SW 1 - SW 2 - SW 3 and S1. These serve to parameterize the amplifier.

Before using the switches the amplifier has to be unplugged from the power supply. All switches of a group must have the same switching position.

SELECTION of voltage or current signal as input setpoint value:

- (Group SW1, three separate switches)
- For the voltage signal please set V
  - For the current signal please set I

SELECTION OF THE SINGLE POLE OR DIFFERENTIAL setpoint signal (Group SW 2, only one switch)

- for the single-phase setpoint signal (terminal 12c connected to ground) please adjust S. The position of S is used when the setpoint signal is generated by the amplifier via a potentiometer (wiper at 12a). See page 4
- For the differential setpoint signal please adjust D. This is used when the setpoint signal comes from an analogue output module of a PLC or CNC.

CHOICE OPEN OR CLOSED LOOP

- (SW group 3, two single switches)
- For the closed-loop set AC
  - For open-loop (controlled use), set AA

SELECTION INVERSION

of the actual-value-signal

(Group S1, only one switch)

- For direct acting valves type P4WR please choose N
- For pilot operated valves please choose D

In case of transducer failures, it is possible to run an operation with an open control chain – please choose AA at SW 3. In this state, the LED ENABLE is illuminated, the loop (via relay on amplifier) between the terminals 6a and 6c is interrupted and the FAULT LED is illuminated to indicate an error.

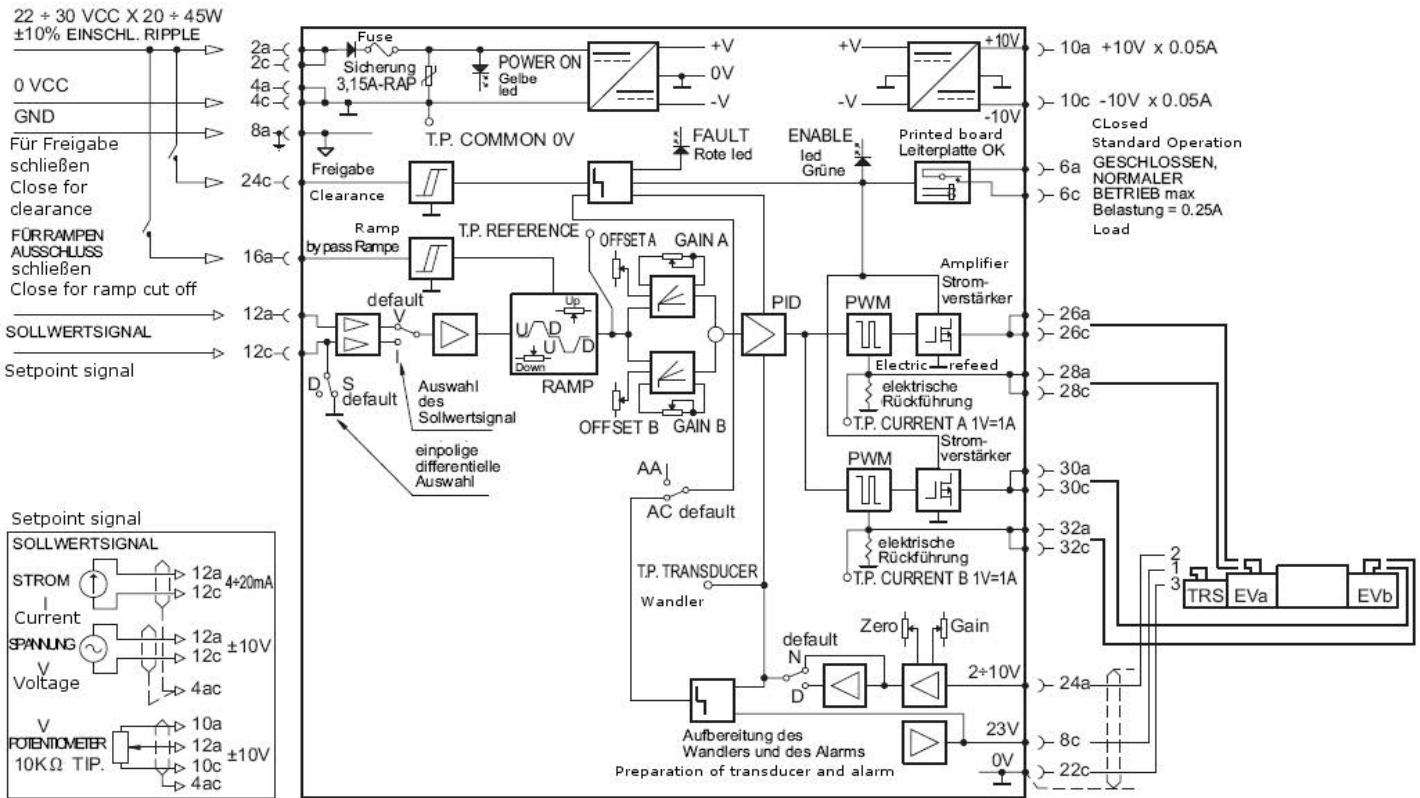
CONTROL OF THE FREQUENCY DITHER

Over the potentiometer PT7 the dither frequency can be specified. The setting range lies between 80 and 1600Hz. The dither signal is used to minimize the valve hysteresis and has to be optimized during setting in motion. By turning clockwise, the frequency is increased.

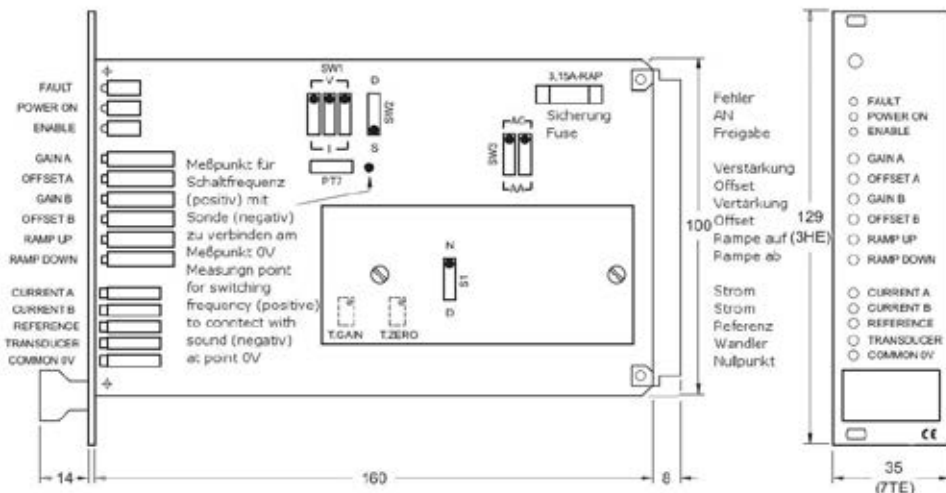
**Standard models**  
**PEK-WAR-D1XX**  
 Other types on request

**Part No.**  
**3493264**

**BLOCK DIAGRAM**



**DIMENSIONS**



Annotation  
 The technical information in this brochure are relating to the operating conditions and applications. At deviant applications and/or operating conditions please contact the technical dept. Technical information are subject to technical modifications.

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