

REXROTH
 WORLDWIDE HYDRAULICS

Electronic Amplifier Model VT 3000 (Series 3X) for controlling proportional directional valves Euro card format

RA
29 935/12.87
 Replaces: 5.86

Electronic amplifier cards Model VT 3000 is used for controlling proportional valves Model 4 WRZ (sizes 10 - 52) w/3 DREP pilot valve.

They incorporate the following features;

- Voltage stabilizer to provide constant voltage for consistent and stable performance
- 4 internal potentiometer for limiting the maximum input command signal which offers the possibility of up to 4 velocity settings
- 4 internal contact relays that provide the ability to select input signals through a relay circuit without the need for additional external components
- 4 associated LEDs on the face plate to permit fast visual reference of the input relays
- Ramp generator to control acceleration and deceleration rates (signal vs time) providing smooth shock free operation
- Ramp time options of either 1 or 5 seconds.
- Function generator which eliminates valve deadband allowing instantaneous reversal with smooth crossover characteristics
- Pulse width modulated output, which provides a dither effect to reduce hysteresis, and allows high ambient temperature range
- 10 V differential amplifier input which enables interface with programmable controllers, microprocessors, or computers

Matching card holders

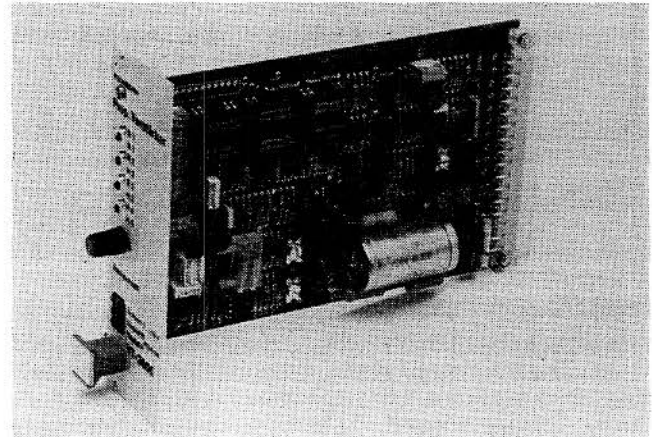
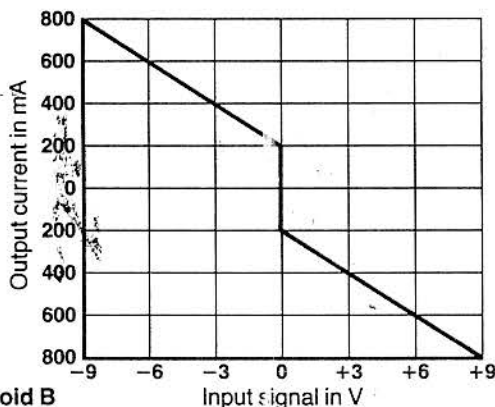
- VT 3002-1X, see RA 29916
single card holder
- VT 1516-1X, see RA 29915
single card holder w/power supply
- VT 1700-1X, see RA 29917
double card holder w/power supply

Card racks

- Single (3u) or double (6u) tier see RA 29725

Output Curve

Solenoid A



R 85/62
VT 3000 S 3X/..E

Technical Data

Power supply voltage Input control voltage

V_{DC} 24 $V_{eff} \pm 10\%$
 $V_{IN} \pm 9V$
 with reference to (M0)

Power requirements Minimum input load Maximum output load

P 30 W
 $R_{IN} \geq 500 \Omega$

Minimum output (Bias) current Maximum output current

R 19.5 Ω
 I_{min} 20 mA
 I_{max} 800 mA

Pulse frequency Fuse (5 mm x 20 mm)

P_{freq} 160 to 180 Hz
 I_s 2.5 Ampere M

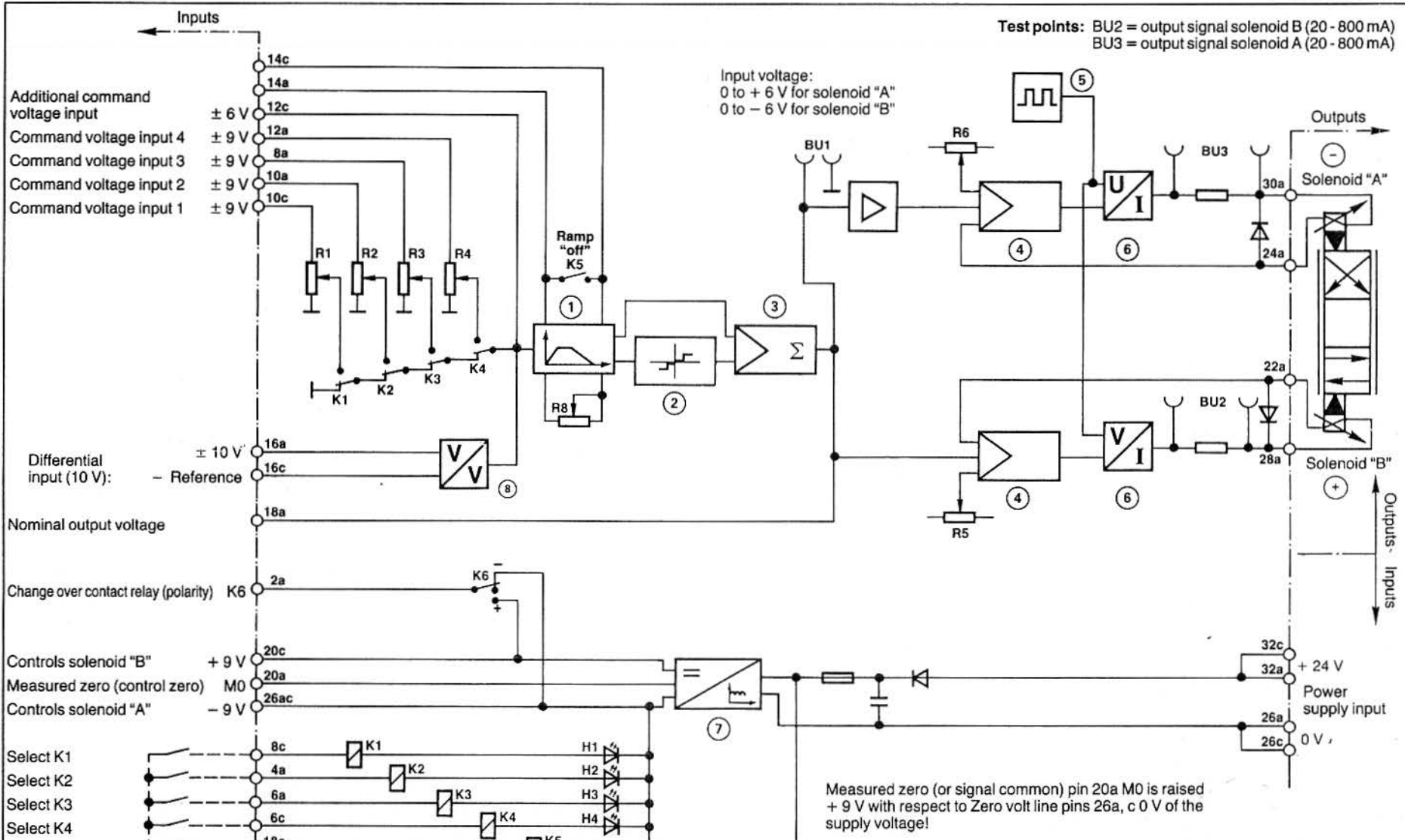
Space requirements:

Conductor side of card 1 division
 Component side of card 7 divisions
 Face plate requirement 8 divisions
 1 div. = 0.200" (5.08 mm) =
 1 TE = 1 HP

Temperature drift Ambient temperature range Weight (approx.)

T_d 0.5% (from I_{max})/°K
 T 32 to 122 °F (0 to 50 °C)
 W 0.33 lb (0.15 kg)

For applications outside these parameters, please consult us!



Input voltage:
0 to + 6 V for solenoid "A"
0 to - 6 V for solenoid "B"

Test points: BU2 = output signal solenoid B (20 - 800 mA)
BU3 = output signal solenoid A (20 - 800 mA)

Additional command voltage input
Command voltage input 4
Command voltage input 3
Command voltage input 2
Command voltage input 1

Differential input (10 V):
- Reference

Nominal output voltage

Change over contact relay (polarity)

Controls solenoid "B"
Measured zero (control zero)
Controls solenoid "A"

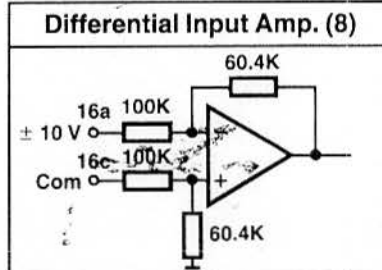
Select K1
Select K2
Select K3
Select K4
Select K5
Select K6

Relay - common supply
+ 24 V

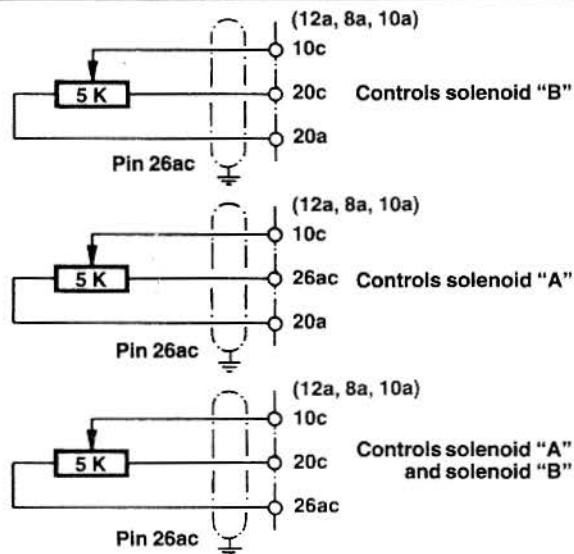
H1 to H4 = LED indicators "contact relay on"
K1 to K4 = Input contact relays
K5 = Ramp "on" or "off"
K6 = C/O contact relay
R1 to R4 = Input command voltage potentiometer

R5 = Minimum (Bias) current sol. "B"
R6 = Minimum (Bias) current sol. "A"
R8 = Ramp time "up" and "down"

- ① Ramp generator
- ② Stepped function generator
- ③ Summing amplifier
- ④ Power amplifier
- ⑤ PWM oscillator
- ⑥ Output stage
- ⑦ Voltage regulator
- ⑧ Differential input amplifier



Measured zero (or signal common) pin 20a M0 is raised + 9 V with respect to Zero volt line pins 26a, c 0 V of the supply voltage!

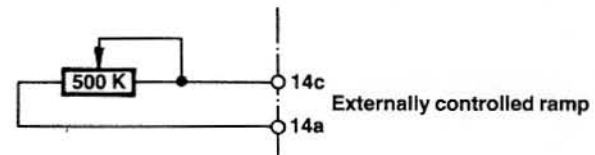
Example of Manual Control with 5 k Ω Potentiometer

Internal Potentiometers

Note:

When internal potentiometers are used without any external potentiometers, terminals 12a, 8a, 10a and 10c, must be connected to either + 9 V (20c) or - 9 V (26ac)!

External Ramp Time Potentiometer



Functional Description

Amplifier cards Model VT 3000 convert an input voltage signal proportionally into output current to power proportional solenoids. Dependent on the amount of current to the solenoid, the force is transmitted to the pilot valve which in turn provides pilot fluid to the main spool of the Model 4 WRZ directional valve.

The input voltage from the power supply on pins 32a and 32c & 26a and 26c powers the card and is also fed thru a voltage regulator (7) which filters, suppresses and smooths the voltage and divides its 18 V output over pins 20c & 26ac with reference potential to "measured zero" on pin 20a. From pins 20c & 20a the ± 9 Volts may be manipulated externally via simple potentiometers (see above), reed switch, dry circuit relays etc., and then used as a command input signal(s) to the amplifier at pins 10c, 10a, 8a, 12a.

The card will also accept a differential analog input via pins 16a & 16c. The differential signal is compared in the differential amplifier (8) and then the differential voltage is output. Pin 16a must have a 0 - 10 volt potential with respect to pin 16c and the signal to both pins must be made or broken simultaneously. In addition a 0 to ± 6 V signal, provided externally can be input at pin 12c.

Six contact relays are mounted on board, these provide switching for the 4 input command signals, ramp "on" and "off", and a change-over relay which will switch polarity (+ 9 V or - 9 V) to pin 2a which may be used at the input pins 10c, 10a, 8a, 12c. In addition LEDs are provided on the face plate to indicate which input contact relay that has been selected. Note that the highest numbered relay has priority. Switches, sensors, or other devices of this type can be used to turn on the contact relays K1 - K6 (see page 2 & 3).

After the inputs and outputs are connected, the input voltage at pins 10c, 10a, 8a, 12a may be adjusted via potentiometer R1 - R4 from the face plate to control the shifting position of the spool (ex. flow through the directional valve) which provides up to four actuator speeds in one direction. Then by simple switching the change-over relay K6 the actuator may have up to 4 speeds in the opposite direction.

The ramp generator (1) distributes a stepped input signal into a slowly increasing output signal over an adjustable period of time. The time or "slope" of the output signal curve may be adjusted for both "up" and "down" ramps. These potentiometers are adjustable from the card face plate and allow signal vs. time ramping of up to 1 or 5 seconds. A clockwise rotation of trim pot will increase the ramp time.

An optional external potentiometer may be connected to allow external adjustment (see above) R8 potentiometer with an external potentiometer acts as limiter. Note, the maximum ramp time of either 1 or 5 seconds can only be achieved over a full voltage range, if a lower command signal < + 9 V is selected then the ramp time will be correspondingly reduced.

The output signal of the ramp generator (1) is passed to the function generator (2) and to the summation amplifier (3). The function generator interpretes the signal, then instantly shifts the spool through its deadband range. A combine signal is then received and outputed to the power amplifier (4). Through modulation of the PMW oscillator (5) a pulse width is generated, which in turn is used to switch the power transistor (6) of the output stage.

The output signal travels through the output stage (6) supplying a current of 20 to 800 mA to the proportional solenoids A or B. Two test points BU2 & BU3 are located on the face plate of the card. The command output level 0 - 6 V may be measured across test points BU1 to ensure the inputs are correct. Likewise the actual current to the solenoids may be easily checked using test points BU2 & BU3. Note, the measurement of these points is made with the meter set on the voltage scale (1 mV = 1 mA, due to the 1 Ω resistor).

Ordering Code

VT 3000 S 3X / E *

32 pin plug-in Euro card design (for installation in Euro magazines or card holders) = S

Further details to be written in clear text

Series 30 to 39 (30 to 39 \triangleq installation and connection dimensions remain unchanged) = 3X

E = English name plate

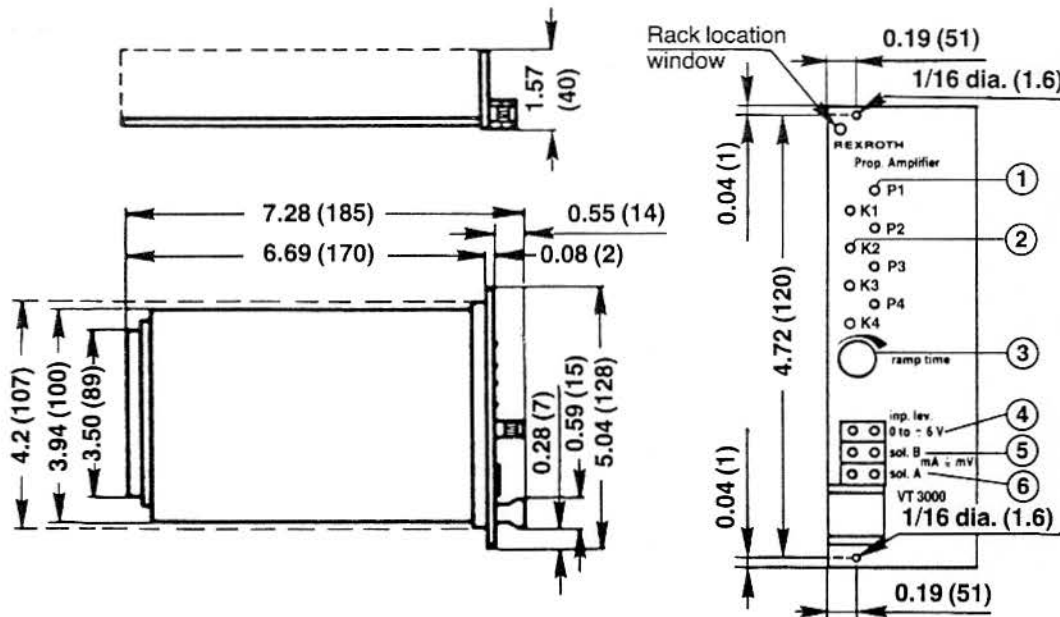
R1 = Ramp time adjustable from 0.03 to 1 sec
R5 = Ramp time adjustable from 0.03 to 5 sec

Additional Information

- Turn off power before connecting or disconnecting the amplifier card
- Measurements should be made with high impedance meter
- Signal common or measured zero (M0) is regulated above 9 V with respect to 0 V input supply voltage, therefore, "M0" may not be connected to "0 V" of power supply voltage, or externally grounded
- Radio transmitters or similar devices may not be used within 3 ft (1 m) of the card
- Shield all control voltage wires, connect the card end of shield to panel ground on the enclosure and leave one end of the shield open
- Do not run the solenoid wires in the vicinity of power wires
- Input and output terminals which are labelled with the suffix "ac" are internally connected, therefore connections may be made to either terminals "a" or "c"
- When using K1 - K6, terminal 28c may be used as the voltage supply line. However, a 24 V DC output may also be used
- If instability occurs, bleed air from the solenoid with electronics deactivated

Unit Dimensions (Dimensions in inches and millimeters)

VT 3000 S 3X



- 1 P1, P2, P3, P4 = Input voltage potentiometer
- 2 K1, K2, K3, K4 = LED indicators for reference of input relays (K1 - K4)
- 3 Ramp time setting
 - From 0.03 to 1 sec \triangleq R1
 - From 0.03 to 5 sec \triangleq R5

- 4 Test point 1 (BU1) = Measurement of input voltage
 - 5 Test point 2 (BU2) = Measurement of solenoid current B
 - 6 Test point 3 (BU3) = Measurement of solenoid current A
- mV \triangleq mA

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