MANNESMANN REXROTH

Electronic amplifier for the control of proportional valves without position control Model VT 3006, Series 3X

RA 29 926/06.98

Replaces: 02.96

The amplifier VT 3006-3X is suitable for the control of pilot operated proportional directional valves (WRZ, Series 6X and older) and direct operated pressure valves (DBEP6, 3DREP6, Series 1X) without position feedback.

Characteristics:

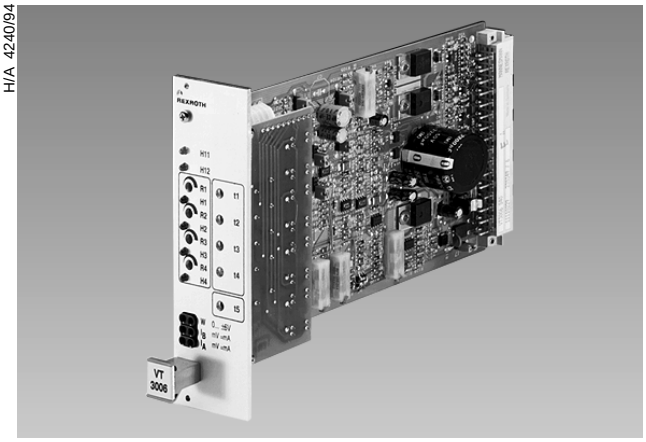
- Four command values adjustable with potentiometers
- Four command value call-ups with LED display
- Differential input
- Step function generator
- Ramp generator with five ramp times
- Two pulsed current output stages
- Polarity protection for the voltage supply

Note:
When supplied the amplifiers have a ramp time of 5 s.
(Setting of the ramp time of 1 s see page 5)

Card Holder:

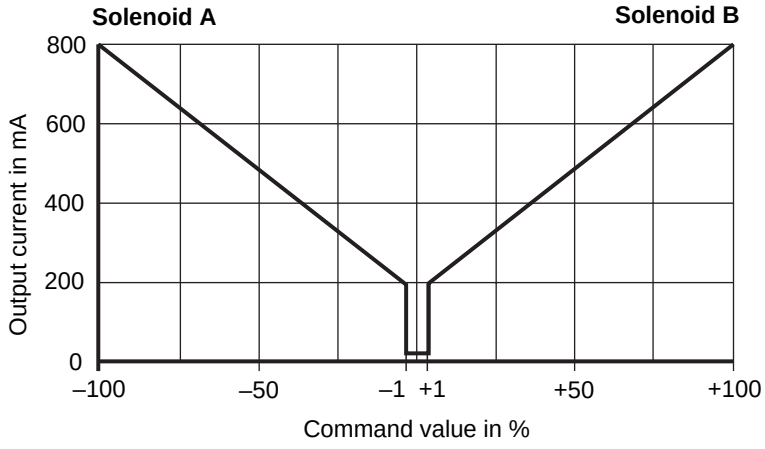
- CH32C-1X, see RA 29 921
- VT 3002-2X/32, see RA 29 928

H/A 4240/94



VT 3006-3X

Output curve



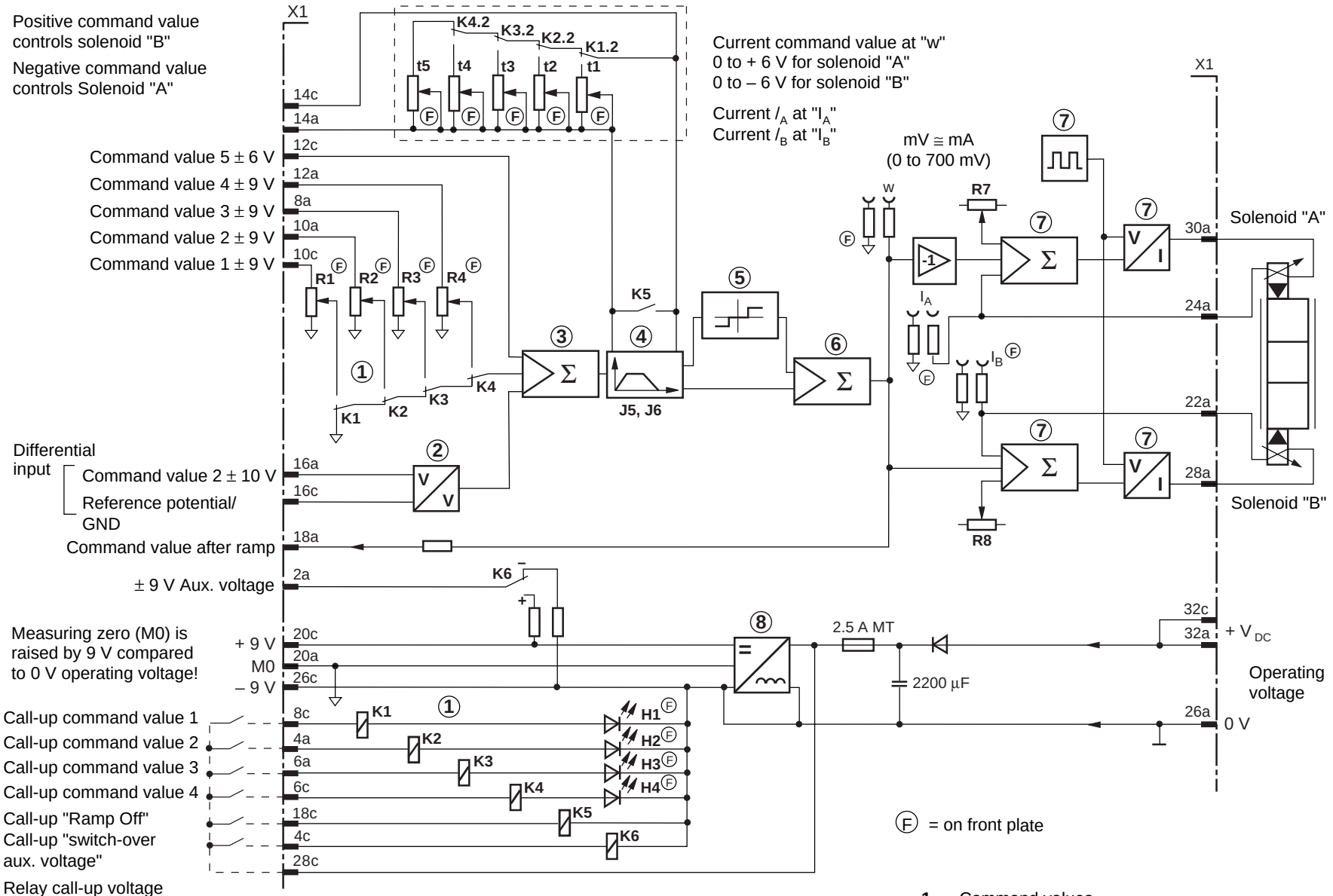
Technical data (For application outside these parameters please consult us!)

Operating voltage [1])	V_{DC}	24 VDC; + 60 %; – 5 %
Function range		
– upper limit value (momentary value)	$V_{DC}(t)_{max}$	39 V
– lower limit value (momentary value)	$V_{DC}(t)_{min}$	22 V
Power consumption	I	< 1 A (with loading current)
Fuse	I_S	2.5 A time lag, M5 x 20
Inputs		
– Command values 1 to 4	V_e	± 9 V (reference potential is M0)
– Command value 5	V_e	± 6 V (reference potential is M0)
– Command value input 6 (Differential input)	V_e	0 to ±10 V; R_e = 100 kΩ
Relay data		
– Nominal voltage	V	Operating voltage V_{DC}
– Threshold voltage	V	16.8 V
– Return voltage	V	2.4 V
– Coil resistance	R	2150 Ω
Ramp time (setting range)	t	30 ms to ca. 1 s or 5 s
Controlled voltage	V	± 9 V ± 1 %; 50 mA externally loadable
Solenoid current	I_{max}	800 mA; $R_{(20)}$ = 19.5 Ω
– Pilot current	I	20 mA ± 25 %
– Pulse frequency of output stages	f	170 Hz ± 10 %
Test points		
– Command value w	V	± 6 V; R_i = 5 kΩ
– Actual current value I_A, I_B	V_A, V_B	0 to 800 mV ≙ 0 to 800 mA
Type of connection		32-pin terminal strip, DIN 41 612, type D
Card dimensions		Euro-card 100 x 160 mm, DIN 41 494
Front plate dimensions		
– Height		3 U, 5.06 in (128.4 mm)
– Width soldering side		1 HP, 0.20 in (5.08 mm) = 1 division
– Width component side		7 HP = 7 divisions
Permissible operating temperature	t	+32 … +122 °F (0 … 50 °C) to DIN/IEC 68-2, T1, T2, T14 and T30 [2])
Storage temperature range	t	–13 … +185 °F (– 25 … 85 °C) [2])
Disturbance resistance		Class 3 to DIN/VDE 843 T2 and T4 [2])
Mechanical loadability		to DIN/IEC 68-2, T6, T24 and T27 [2])
Weight	m	0.33 lbs (0.15 kg)

[1]) To guarantee the maximum solenoid current for the 19.5 Ω solenoid in the highest solenoid temperature range the operating voltage must be at least 28 VDC !

[2]) For further details, please consult us !

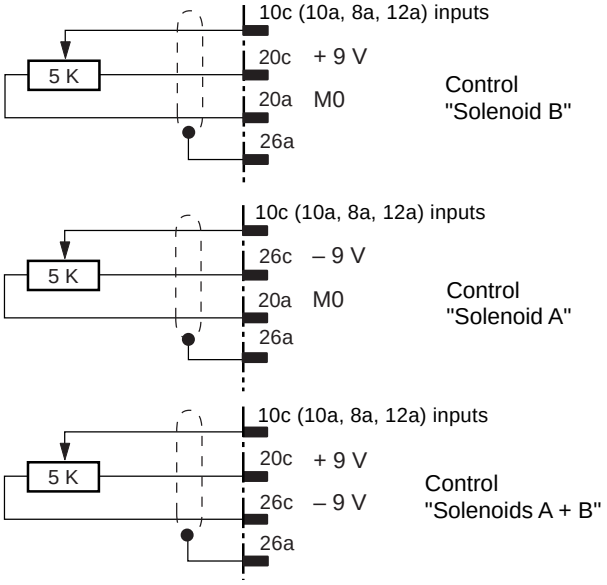
Block circuit diagram / terminal connection VT 3006 – 3X



Function description

With the command value inputs 1 to 4 command values can be called up [1] by operating the corresponding relays (K1 to K4). The command value voltage is either given directly through the controlled voltages ±9 V of the power supply [8] or via an external command value potentiometer. For these inputs ± 9 V is ± 100%[1]). If these four command value inputs are directly connected to the controlled voltages ±9 V, four different command values can be set at the potentiometers R1 to R4. When using external command value potentiometers at these inputs the internal potentiometers also function as limiters when these are not set to maximum. Clockwise increases the command value.

External command value potentiometer



Which command value is called up is indicated by the LEDs H1 to H4. If more than one command value is called up simultaneously, the input with the highest number has priority. Example: If command value 1 and command value 3 are activated simultaneously, the command value 3 becomes effective.

An auxiliary output on the card provides a supply voltage for the command value call-ups which can be switched over from +9 V to –9 V with the relay K6 [1]).

Each one of the four command call-up values has an adjustable ramp time allocated (t1 to t4). If no command value is called up the ramp time t5 becomes effective. Clockwise increases ramp time.

All relays on the card are switched with 24 VDC (smoothed).

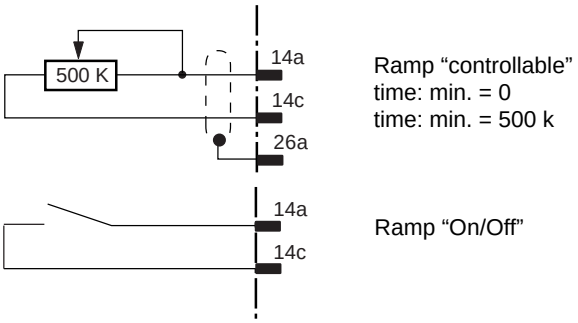
Additionally, the direct command value input 5 is available for the input voltage 0 to ±6 V. Valid is ± 6 V = ± 100 % [1]).

The command value input 6 is a differential input (0 to ± 10 V) [2]). When using external electronics, this differential input must be used. When switching on or off the command value, both signal lines should be separated from or connected to the input.

All command values are summed with the correct value and sign before they are connected further.[3].

The added ramp generator [4] produces a ramp-like output signal from the jump-like given input signal. The time constant can be set with the potentiometers "t1" to "t5". The ramp time given refers to a command value jump of 100% and can be - according to the setting through the selection via jumpers - approximately 1 s or 5 s. If a command value jump smaller than 100% is switched to the input of the ramp generator the ramp time shortens appropriately.

External time potentiometer and ramp "OFF"



Note:
When using an external time potentiometer the internal potentiometer for the ramp time must be set at maximum. The maximum ramp time decreases because the resistance of the external potentiometer is connected parallel to the internal potentiometer!

By switching the relay K5 or through an external bridge the ramp time is set to its minimum value (approx. 30 ms).

The output signal of the ramp generator [4]runs parallel to the summator [6] and the step function generator [5]. The step function generator produces a polarity-dependent constant step signal with the command value voltages which is added to the output signal of the ramp generator. This step function causes the rapid travelling across the overlapping area of the valve.

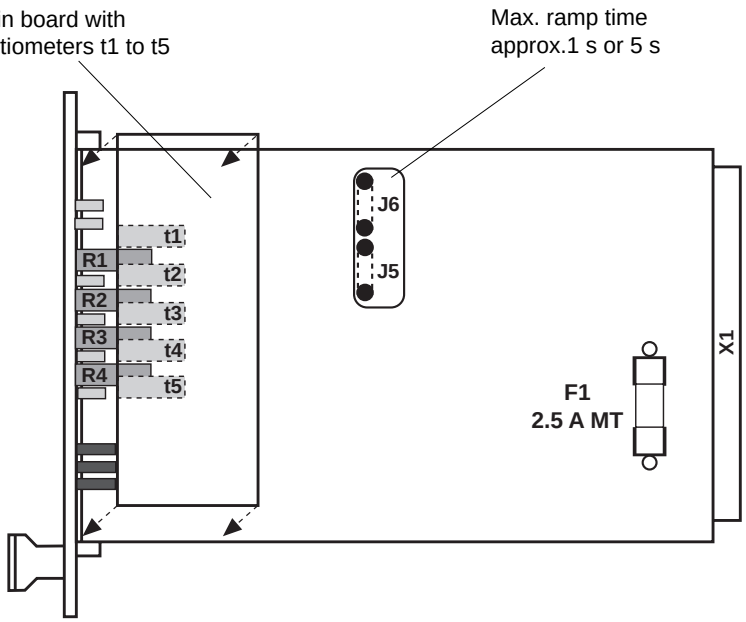
The output signal of the summation [6] is the command current value and is led to the two current output stages [7] and to the test point "w" on the front plate of the card. A voltage of 6 V at the command value test point corresponds to a command value of 100%. A positive command value signal at the input of the amplifier controls the output stage for solenoid B, a negative command value signal the output stage for solenoid A. If the command value signal is smaller than ±1% (step function still ineffective) a pilot current of 20mA flows through both solenoids. The actual values of the currents through the two solenoids can be measured separately at the test points I_A (solenoid A) and I_B (solenoid B). Here a current of 800 mA corresponds to a voltage of 800 mV.

[1]) = Reference potential for the command values 1 to 5 is M0 (measuring zero).

[2]) = Reference potential for the differential input should be grounded to 0 V at source end.

[ ] = Allocation in block circuit diagram

Display / setting elements VT 3006 – 3X



H11 - yellow LED display "power on"
H12 - green LED display "no fault"
R1 / H1 - Command value 1 with LED display
R2 / H2 - Command value 2 with LED display
R3 / H3 - Command value 3 with LED display
R4 / H4 - Command value 4 with LED display

w - Command value solenoid current
I_B - Actual current value solenoid B
I_A - Actual current value solenoid A

Meaning of the jumpers on the card for the settings
(Label on the back of the frontplate)

ramp time	Jx = bridge	bridge plugged in
● 5 s J5 J6	Jx = open	bridge open
○ 1 s J5 J6	● = delivery state	delivery condition

Ramp time

Note: The loss of unused jumpers can be avoided by plugging the jumpers into only one pin.

Project / maintenance instructions / additional information

– The amplifier card may only be plugged in or unplugged when power is off!

– Do not use plugs with fly back diodes or LED displays when connecting the solenoids!

– Only carry out measurements on the cards with instruments R_i > 100 kΩ!

– Measuring zero (M0) is raised by + 9 V compared to 0 V operating voltage and is **not potentially separated** , i.e. –9 V controlled voltage ≙ 0 V operating voltage . Therefore do **not** connect measuring zero (M0) to 0 V operating voltage!

– When switching command values use relays with gold contacts (small voltages , small currents)!

– When switching card relays only use contacts with a loadability of approx. 40 V, 50 mA!
When controlling externally the control voltage may have a maximum residual ripple of 10%!

– Always shield command value lines; connect screen to 0 V operating voltage on the card side, other side remains open (danger of earth loops)!
Recommendation: Also shield solenoid lines!
Use cable type stranded 16 AWG (LiYCY 1.5 mm^2) for solenoid lines of up to 50 m in length.

– Minimum distance to aerial lines, radio sources and radar equipment must be at least 1 m!

– Do not lay solenoid and signal lines near power lines!

– Because of loading current for the smoothing capacitor on the card, fuse should be time lag!

– Warning**:** When using the differential input, both inputs must always be switched on or off simultaneously!
(Use DPDT dry contacts)

– When using the differential input, an isolated analog common should be grounded to 0 V from the card's power source, at one point on the source end.

Ordering code

VT 3006 – 3X/ *

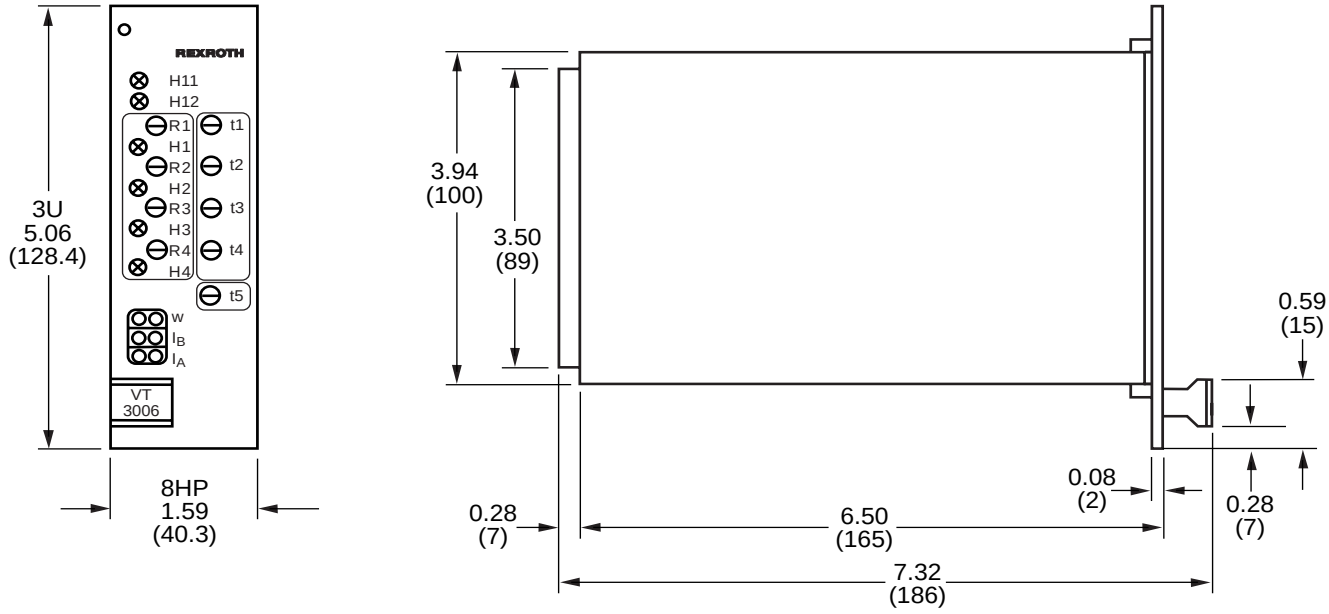
Amplifier for proportional valves without position control

Series 30 to 39
(Series 30 to 39: technical data and terminal connections unchanged)

= 3X

Further details in clear text

Unit dimensions: dimensions in inches (millimeters)



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