MANNESMANN REXROTH

Electrical amplifier for the control of proportional valves with electrical position feedback Model VT 5001, VT 5002, VT 5004 and VT 5010, Series 2X Model VT 5003, Series 4X

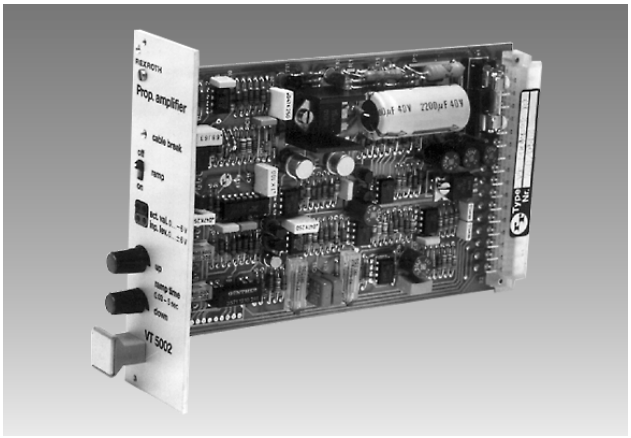
RA 29 945/06.98

Replaces: 11.97

Amplifier model VT 5001 to VT 5004 and VT 5010 are used for controlling directional proportional valves with electrical position feedback (directional valves, pressure valves and flow control valves; models 4WRE..A, DBETR and 2FRE).

Features:
- Differential input
- Smoothing circuit
- Voltage stabilizer
- Self pulsing output stage
- Oscillator and demodulator for inductive positional feedback
- PID regulator
- 1 relay for ramp "off"
- Ramp generator
- Cable break detector with LED indicator

Card holder:
- CH 32 C-1X, see RA 29 921
- VT 3002-2X/32; see RA 29 928

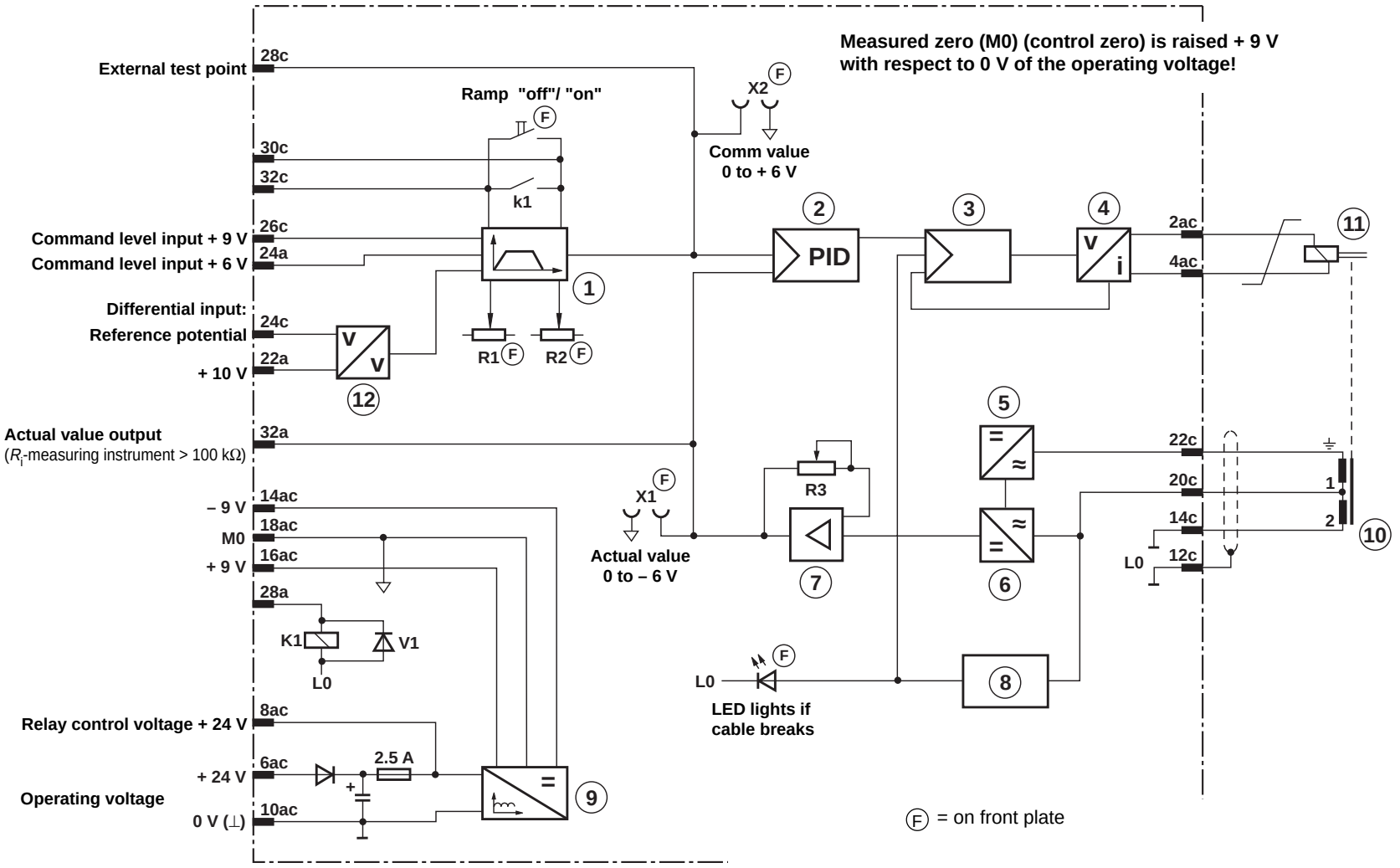


R 85/4
VT 5002 S 2X

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

Operating voltage		V_{DC}	24 VDC + 40 % – 5 %
Operating range:			
– upper limiting value		$V_{DC}(t)_{max}$	35 V
– lower limiting value		$V_{DC}(t)_{min}$	22 V
Power consumption			<50 VA
Power requirement		I	<2 A
Fuse		I	2.5 A M time lag, M5 X 20
Differential input (command value)		V_e	+ 10 V
Ramp time (setting range)		t	30 ms to approx. 1 s or 5 s (each ± 20 %)
Outputs:			
– Output stage			
• Solenoid current/ resistance	VT 5001	I_{max}	1.8 A ± 20 %; $R_{(20)}$ = 5.4 Ω
	VT 5002	I_{max}	2.2 A ± 20 %; $R_{(20)}$ = 10 Ω
	VT 5003	I_{max}	2.2 A ± 20 %; $R_{(20)}$ = 10 Ω
	VT 5004	I_{max}	2.2 A ± 20 %; $R_{(20)}$ = 10 Ω
	VT 5010	I_{max}	2.2 A ± 20 %; $R_{(20)}$ = 10 Ω
• Clock frequency		f	0.5 to 3 kHz
– Driver for the inductive position transducer			
• Oscillator frequency		f	2.5 kHz ± 10 %
– Regulated voltage		V	± 9 V with raised zero; ± 25 mA externally loadable
– Measuring sockets			
• Command value		V	+ 6 V (max. load = 5 mA)
• Actual value		V	– 6 V (max. load = 5 mA)
Type of connection			32-pin blade connector, DIN 41 612, form D
Card dimension			Euro-card 100 x 160 mm, DIN 41 494
Front panel dimensions:			
– Height			3 U 5.06 inches (128.4 mm)
– Width solder side			1 HP 0.2 inches (5.08 mm)
– Width component side			7 HP
Permissible operating temperature range		t	+ 32 to + 122 °F (0 to 50 °C)
Storage temperature range		t	– 13 to + 185 °F (– 25 to + 85 °C)
Weight		m	0.33 lbs (0.15 kg)

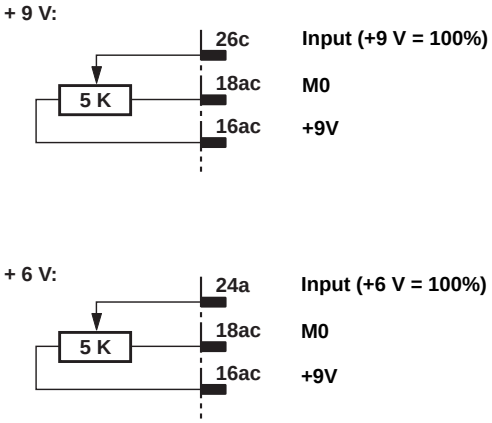
Block circuit diagram / pin allocation



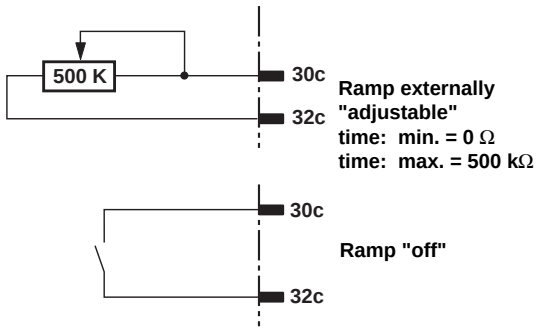
R1 = Ramp time "up"
R2 = Ramp time "down"
R3 = Gain
k1 = Relay select

1 Ramp generator
2 PID regulator
3 Current regulator
4 Power amplifier
5 Oscillator
6 Demodulator
7 Limiting amplifier
8 Cable break detection
9 Power supply
10 Inductive positional transducer
11 Solenoid
12 Differential amplifier

External command value potentiometers



External time potentiometer



Note:
When using an external time potentiometer, the internal ramp time potentiometer must be set to maximum!

Description of function

Amplifier model VT 5001, VT 5002, VT 5003, VT 5004 and VT 5010 have 9 V and 6 V inputs, referred to potential M0, and a differential input (pin 22a and 24c).

The +9 V input can be connected directly to the measured +9 V of the power section (9), or to an external potentiometer wiper.

If the command level voltage is from an external source, then the differential (12) input must be used (0 to +10 V). When using the differential amplifier input, it is important to note that both connections must be made and broken simultaneously if switched.

The ramp generator (1) converts a stepped input signal into an increasing output signal. The rise time (gradient) of the output signal is set via potentiometers R1 and R2.

The ramp time stated (1 or 5 s), can only be achieved over the full voltage range (from 0 to +6 V measured at the command level test points).

If a lower command level, than ±9 V, is selected at any input to the ramp generator (1), then the ramp time will be correspondingly reduced.

The output signal from the ramp generator (1) is then passed to the PID regulator (2), which then compares this to the feedback signal.

Oscillator (5) converts a DC signal to an AC voltage, which is fed to the inductive positional transducer (10).

The signal returned to the amplifier, from the inductive transducer, depends on the position of the valve spool.

This signal is then converted to a DC signal in the demodulator, proportional to the spool position.

The level of feed back can be varied by altering the gain of the limiting amplifier (7). As the signal from the limiting amplifier is fed back to the PID regulator, the solenoid stroke can be varied by R3.

The PID regulator (2) and the self modulating output stages, which consist of the current regulator (3) and the power amplifier (4), are specially optimized for use with suitable valve models.

The PID regulator (2), sends out a signal, dependent on the difference between the command and feedback levels to control the self modulating output stages. The power amplifier (4) controls the maximum current to the solenoid coil (11).

The cable break detector (8) monitors the cables to the inductive positional transducer (10), and, in the event of a break, cuts off the current regulator (3). At the same time, an LED on the front panel lights to indicate "cable break".

Ordering code

VT 50_ _	S	/	E	*

Amplifier for proportional valves
Model 4WRE 6 .A **= 01**
Model 4WRE 10 .A **= 02**
Model DBETR **= 03**
Model 2FRE 10 and 2FRE 16 **= 04**
Model 2FRE 6 **= 10**

32 pin plug to DIN 41 612, Form D **= S**

R1 = Ramp time 1 s
R5 = Ramp time 5 s

2X = Series 20 to 29 (for VT 5001, VT 5002, VT 5004 and VT 5010)
(20 to 29: technical data and pin allocation unchanged)
4X = **only for VT 5003** → Series 40 to 49
(40 to 49: technical data and pin allocation unchanged)

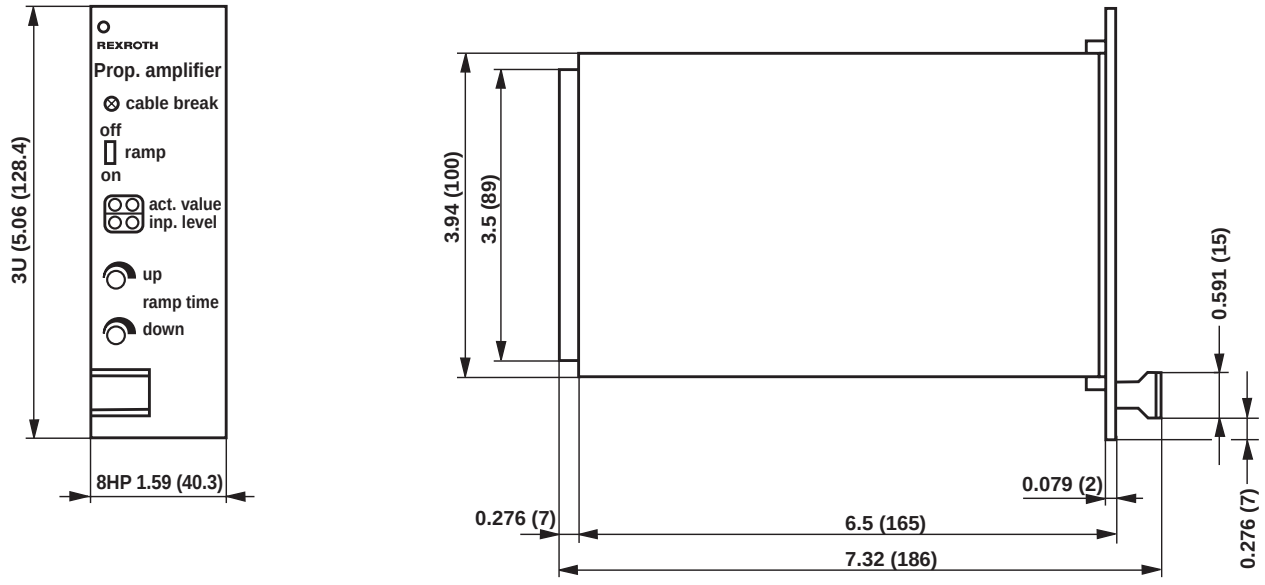
E = English front plate

Further details in clear text

Project / maintenance notes / additional information

- The amplifier may only be unplugged when switched off!
- Measurements to be made with a high resistance meter of R_i > 100 kΩ!
- Measured zero (M0) is raised + 9 V with respect to 0 V of the operating voltage and not potential-segregated ie.(-9 V) controlled voltage ≙ 0 V operating voltage. Therefore do **not** connect measuring zero (M0) with 0 V of the operating voltage!
- Use relays with dry circuit contacts to pass on command values (small voltages, small currents)!
- Card relays may only be switched with contacts of a load-carrying ability of 40 V, 50 mA.
  With external control voltage, residual ripple content must be < 10 %!
- Always shield command value and feedback cables; leaving the shield open on one end, connect the other to 0V operating voltage on the card side.
  Recommendation: Also shield solenoid cables !
  For lengths up to 150 ft (50 m) use standed 16 AWG (LiYCY 1.5 mm^2).For greater lengths, please consult us!
- Radio transmitters,aerial and radar equipment may not be placed within 3 ft (1 m) of this card!
- Do not lay solenoid and signal cables close to power lines!
- **Note:** When using differential input, both inputs must be switched on or off simultaneously!

Unit dimensions: dimensions in inches (millimeters)



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