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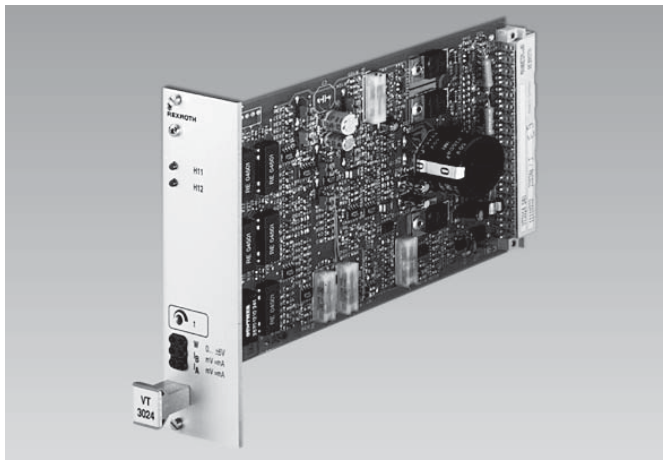
Find the *Bosch Rexroth VT3024 S35 R1* at our website: *Click HERE*

**RE 29 934/07.03**

Replaces: 02.96

# Electrical amplifier for the control of proportional valves without electrical position feedback Type VT 3024

Series 3X




H/A 4149/94

TypE VT 3024-3X

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## Features

- The amplifier VT 3024 is suitable for the control of pilot operated proportional directional valves (type 4WRZ) and direct operated proportional pressure valves (type DBEP6 and 3DREP6) without electrical position feedback.
- Differential input
- Step function generator
- Ramp generator
- 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:**

- Type VT 3002-2X/32, see RE 29 928
  Single card holder without power supply

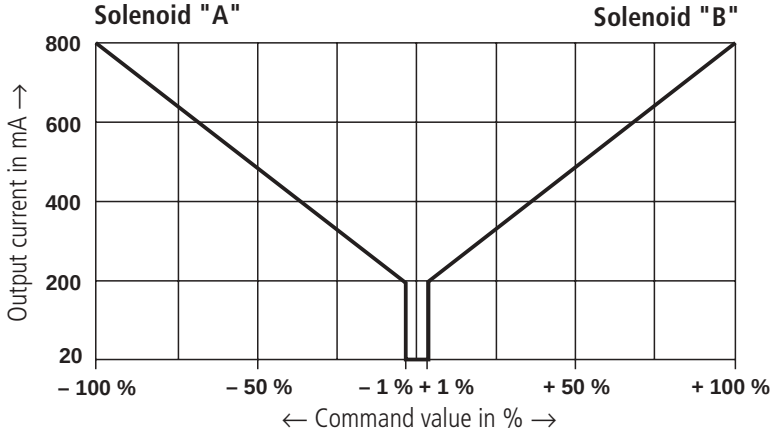
**Power supply:**

- Type VT 19 083-1X, see RE 29 929
  Power supply NE30; 115/230 VAC - 24 VDC, 70 VA

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## Output Curve



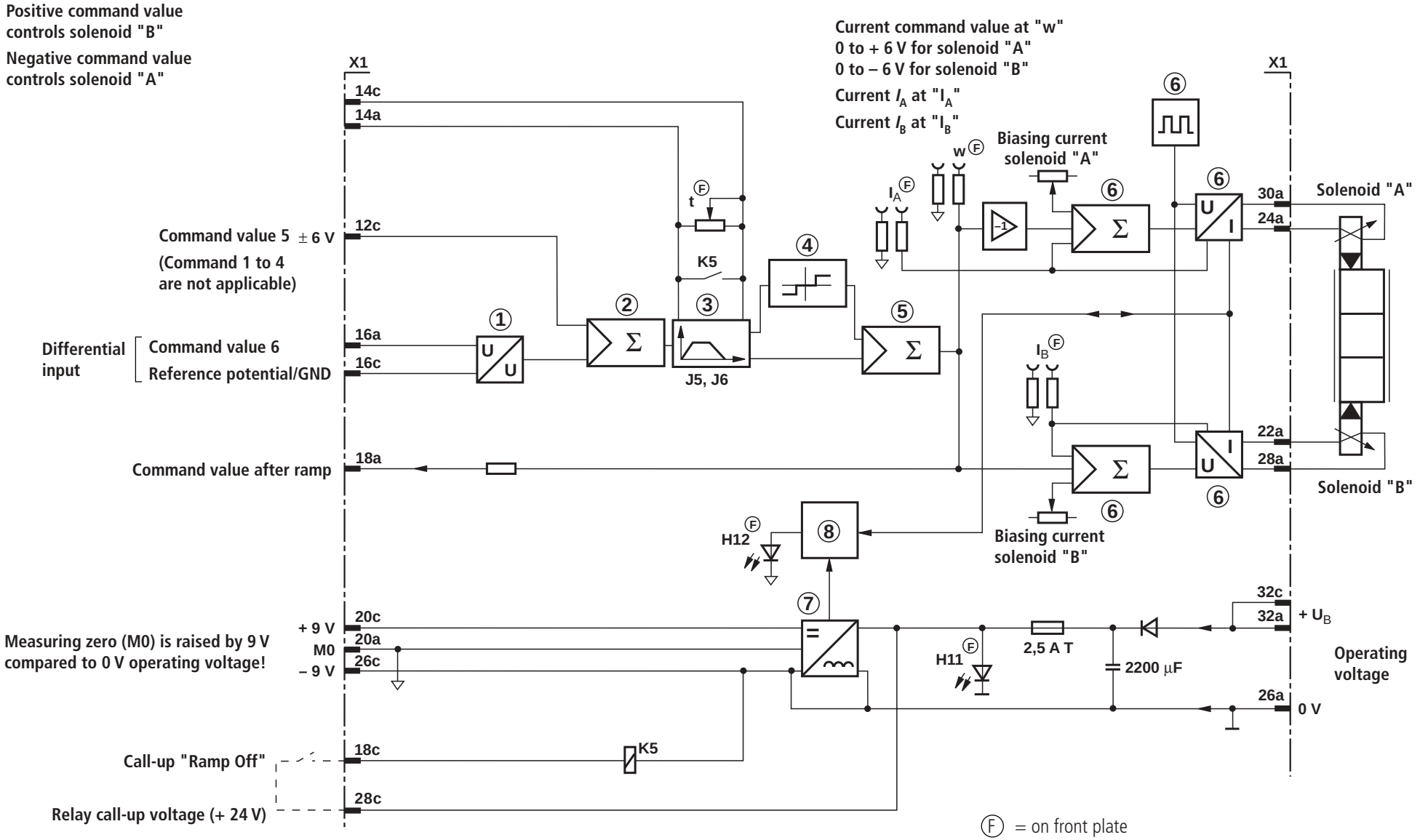

## **Technical data** (For applications outside these stated values, please consult us!)

| | | |
|---|---|---|
| Operating voltage [1] | $U_B$ | 24 VDC + 60 % – 5 % |
| Function range<br>– upper limit value<br>– lower limit value | <br>$u_B(t)_{max}$<br>$u_B(t)_{min}$ | <br>39 V<br>22 V |
| Power consumption | $I$ | < 1 A (with loading current) |
| Fuse | $I_S$ | 2,5 A T |
| Inputs<br>– Command value 5<br>– Command value input 6 (Differential input) | <br>$U_e$<br>$U_e$ | <br>± 6 V (reference potential is M0)<br>0 to ± 10 V; $R_e$ = 100 kΩ |
| Relay data<br>– Nominal voltage<br>– Threshold voltage<br>– Return voltage<br>– Coil resistance | <br>$U$<br>$U$<br>$U$<br>$R$ | <br>Operating voltage $U_B$<br>16,8 V<br>2,4 V<br>2150 Ω |
| Ramp time (setting range) | $t$ | 30 ms to approx. 1 s or 5 s |
| Controlled voltage | $U$ | ± 9 V ± 1 %; 50 mA externally loadable |
| Solenoid current<br>– Biasing current<br>– Pulse frequency of output stages | $I_{max}$<br>$I$<br>$f$ | 800 mA; $R_{(20)}$ = 19,5 Ω<br>20 mA ± 25 %<br>170 Hz ± 10 % |
| Test points<br>– Command value $w$<br>– Actual current value $I_A$, $I_B$ | <br>$U$<br>$U_A$, $U_B$ | <br>± 6 V; $R_i$ = 5 kΩ<br>0 to 800 mV equivalent 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<br>– Height<br>– Width soldering side<br>– Width component side | <br><br><br> | <br>3 HE (128,4 mm)<br>1 TE (5,08 mm)<br>7 TE |
| Permissible operating temperature range<br>Storage temperature range | $\vartheta$<br>$\vartheta$ | 0 to 50 °C to DIN/IEC 68-2, T1, T2, T14 and T30 [2]<br>– 25 to 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 | $m$ | 0,13 kg |

[1] To guarantee the maximum solenoid current for the 19,5Ω-solenoid in the complete solenoid temperature range the operating voltage must be at least 28 VDC!

[2] Further details on request!

# Block Circuit Diagram / Terminal Connection VT 3024-3X



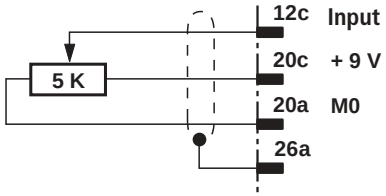

**H11** = "Power on"
**H12** = "Ready for operation"
**K5** = Call-up "Ramp Off"
**t** = Ramp time

**1** Differential input
**2**; **5** Summator
**3** Ramp generator
**4** Step function

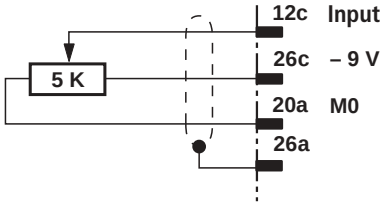
**6** Current amplifier with pulse generator
**7** Power supply
**8** Monitorings

The command value voltage is given through the control voltages ± 9 V of the power supply [7] or via an external command value potentiometer. For the input "command value 5" ± 6 V = ± 100 % is valid [1].

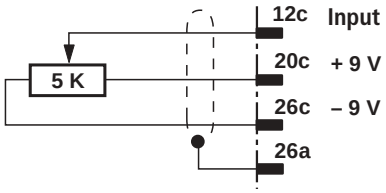
External command value potentiometer




**Control solenoid "B"**




**Control solenoid "A"**



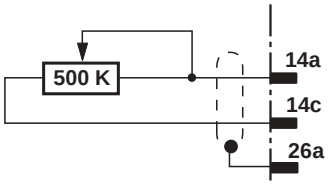

**Control solenoid "A" + "B"**

The command value 6 is a differential input (0 to ± 10 V). If the command value is presented by a separate electronics with a different reference potential, this input must be used. When switching off or on the command value voltage it must be taken care that both signal lines are either separated from or connected to the input.

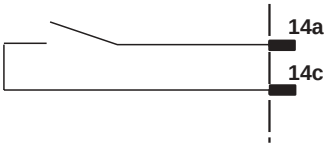
The command values are summated with the corect value and sign before they are connected further [2].

The added ramp generator [3] produces a ramp-like output signal from the jump-like presented input signal. The time constant can be set with the potentiometer "t". The ramp time given refers to a command value jump of 100 % and can be - according to setting through the selection via jumbers - approximately 1 s or 5 s. If a command value smaller than 100 % is switched onto the input of the ramp generator the ramp time is shortened appropriately.

External ramp time potentiometer and ramp "Off"




**Ramp "controllable"**
time: min. = 0 Ω
time: max. = 500 kΩ




**Ramp "On/Off"**

**Note:**
When using an external ramp 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 in parallel to the internal potentiometer!

By switching the relay K5 with 24 VDC (smoothed) or through an external bridge the ramp time is set to its minimum value (approx. 30 ms).

The output signal of the ramp generator [3] goes parallel to the summator [5] and the step function generator [4]. The step function generator produces with command value voltages of > ± 1 % a polarity-dependent constant jump signal which is added to the output signal of the ramp generator. This jump function causes the rapid travelling across the overlapping area of the valve.

The output signal of the summator [5] is the command current value and is led to the two current output stages [6] and to the test point "w" on the frontplate 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", and a negative signal controls the output stage for solenoid "A". When the command value signal is smaller than ± 1 % (step function still ineffective) a pilot current of 20 mA flows through both solenoids. The actual values of the currents through both solenoids can be measured separately at the sockets $I_A$ (solenoid "A") and $I_B$ (solenoid "B"). Here a current of 800 mA corresponds to a voltage of 800 mA.

LED H11 lights up when the system is powered up.

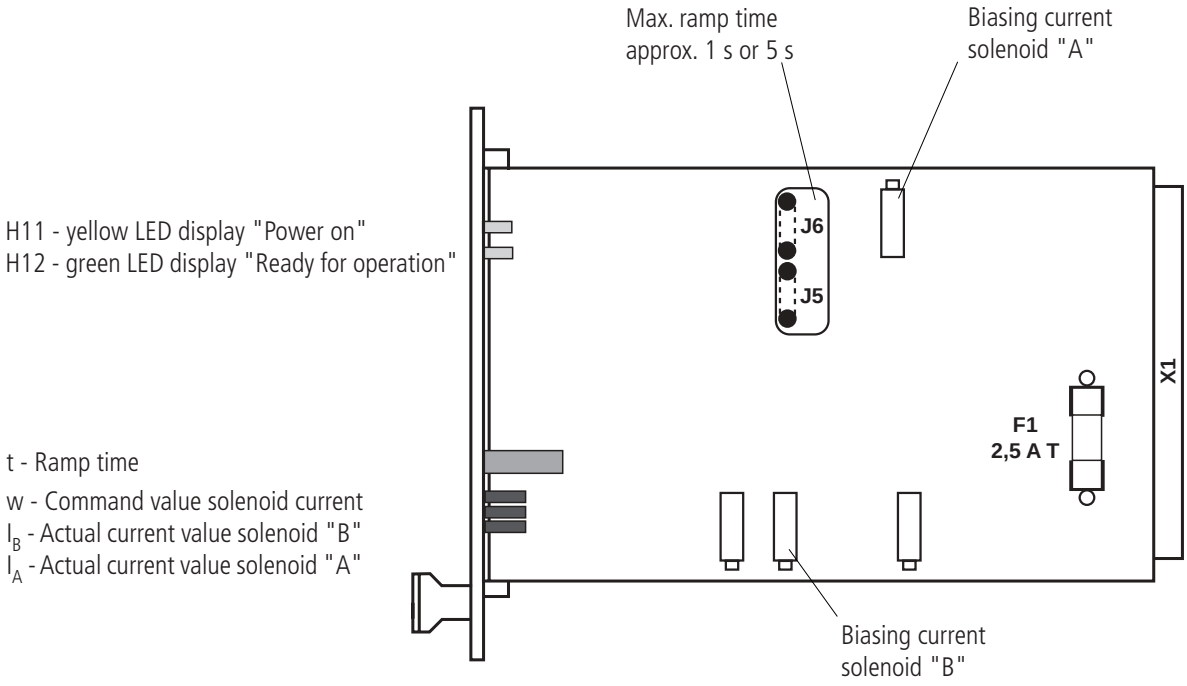
LED H12 ("Ready for operation") lights up to indicate trouble-free operation as long as:
– the internal power supply (± 9 V) is functioning properly
– there is no short-circuit in the solenoid lines

In the event of a fault, both output stages are immediately deenergized and the signal "Ready for operation" (LED H12) is cancelled. Once the fault has been cleared, the amplifier card is immediately operable and LED H12 lights up again.

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

[ ] = Allocation in block circuit diagram

## Display / Setting Elements VT 3024-3X




**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 unpluged when switched off!
- Do not use plugs with free wheel diodes or LED displays when connecting the solenoids!
- Only carry out measurements on the cards with instruments $R_i > 100\ k\Omega$!
- 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 **is equivalent to** 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 screen command value lines; connect screen to 0 V operating voltage on the card side, other side remains open (danger of earth loops)!
  Recommendation: Also screen solenoid lines!
  Use cable type LiYCY 1,5 $mm^2$ for solenoid lines of up to 50 m in length. For longer lengths please consult us!
- Minimum distance to arial lines, radio sources and radar equipment must be at least 1m!
- Do not lay solenoid and signal lines near power lines!
- Because of the loading current of the smoothing capacitor on the card pilot fuses must be slow!
- **Warning:** When using the **differential input both inputs** must always be switched on or off **simultaneously**!

## Ordering code

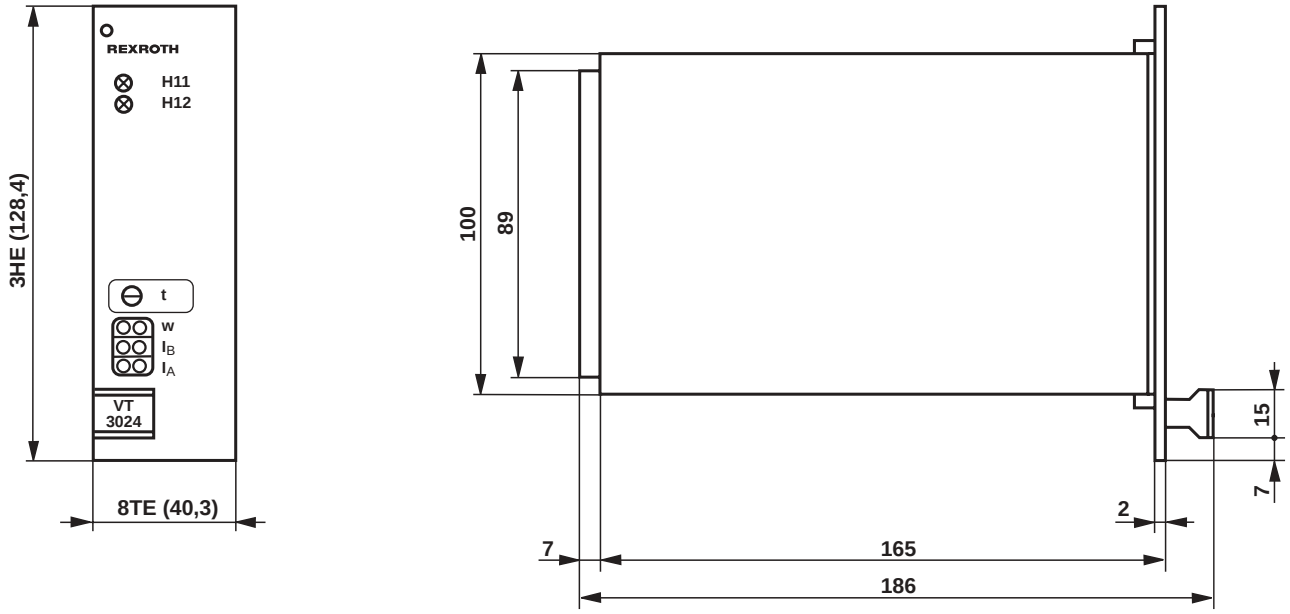
**VT 3024 – 3X / ***

Amplifier for proportional valves without electrical position feedback

Series 30 to 39 **= 3X**
(Series 30 to 39: technical data and terminal connections unchanged)

Further details in clear text

## Unit dimensions (Dimensions in mm)




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