

The Drive & Control Company

**Rexroth**  
**Bosch Group**

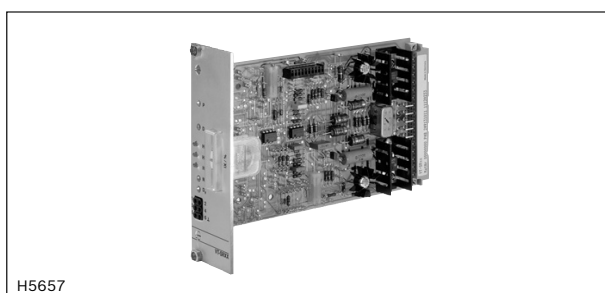
## Valve amplifier for high-response valves with servo valve pilot control

Type VT-SR31 to VT-SR38

**RE 29931**

Edition: 2013-07

Replaces: 12.10



- ▶ Component series 1X
- ▶ Analog, euro-card format
- ▶ Suitable for actuation of high-response valves (flow control valves) with servo valve pilot control and electric position feedback (cartridge valves, type .WRC...1X)

### Features

- ▶ Controller for valve flow
- ▶ Controller for main control spool position
- ▶ Dither signal generator
- ▶ Push-pull output stage
- ▶ Oscillator/demodulator
- ▶ Enable circuit mit relay
- ▶ Measuring instrument for display of servo valve flow
- ▶ Reverse polarity protection for voltage supply

Optional extensions:

- ▶ PID controller <sup>1)</sup> with controller change-over
- ▶ Relay with potential-free changeover contact (28 V/0.5 A)
- ▶ Voltage regulator  $\pm 15$  V for supply of controller and position transducer electronics

<sup>1)</sup> The D share only affects the actual value (velocity feedback).

### Contents

Features	1
Ordering codes	2
Function	3
Block diagram/pin assignment	4
Technical data	5
Dimensions	6
Project planning/maintenance instructions/ additional information	6

Bosch Rexroth AG, RE 29931, edition: 2013-07

Knowledge is POWER – Motion Force Control is our Business

HYQUIP Limited New Brunswick Street Horwich Bolton Lancashire BL6 7JB UK

2/6 **VT-SR31 to VT-SR38** | Valve amplifier

## Ordering codes

01	02	03	04	05
VT-SR ...	-	1X	/	-

01	Amplifier for high-response valves (flow control valves) with servo valve pilot control	
	Type .WRC 32...1X	... <b>31</b>
	Type .WRC 40...1X	... <b>32</b>
	Type .WRC 50...1X	... <b>33</b>
	Type .WRC 63...1X	... <b>34</b>
	Type .WRC 80...1X	... <b>35</b>
	Type .WRC 100...1X	... <b>36</b>
	Type .WRC 125...1X	... <b>37</b>
	Type .WRC 160...1X	... <b>38</b>
02	Component series 10 to 19 (10 to 19: Unchanged technical data and pin assignment)	<b>1X</b>
03	Without $\pm 15$ V voltage regulator	<b>0</b>
	With $\pm 15$ V voltage regulator	<b>1</b>
04	For valves with 2/2-way function	<b>2</b>
	For valves with 3/2-way function	<b>3</b>
05	Further details in the plain text <sup>1)</sup>	<b>no code</b>

### Accessories (separate order)

#### Card holder

- ▶ Type VT 3002-1-2X/32D, see data sheet 29928  
single card holder without power supply unit

#### Power supply unit

- ▶ Type VT-NE31-1X, see data sheet 29929  
Compact power supply unit 115/230 VAC →  $\pm 24$  VDC, 6 W

<sup>1)</sup> E.g. with/without PID controller, with/without backup relay K3

The controller characteristics for the additional PID controller need to be specified.

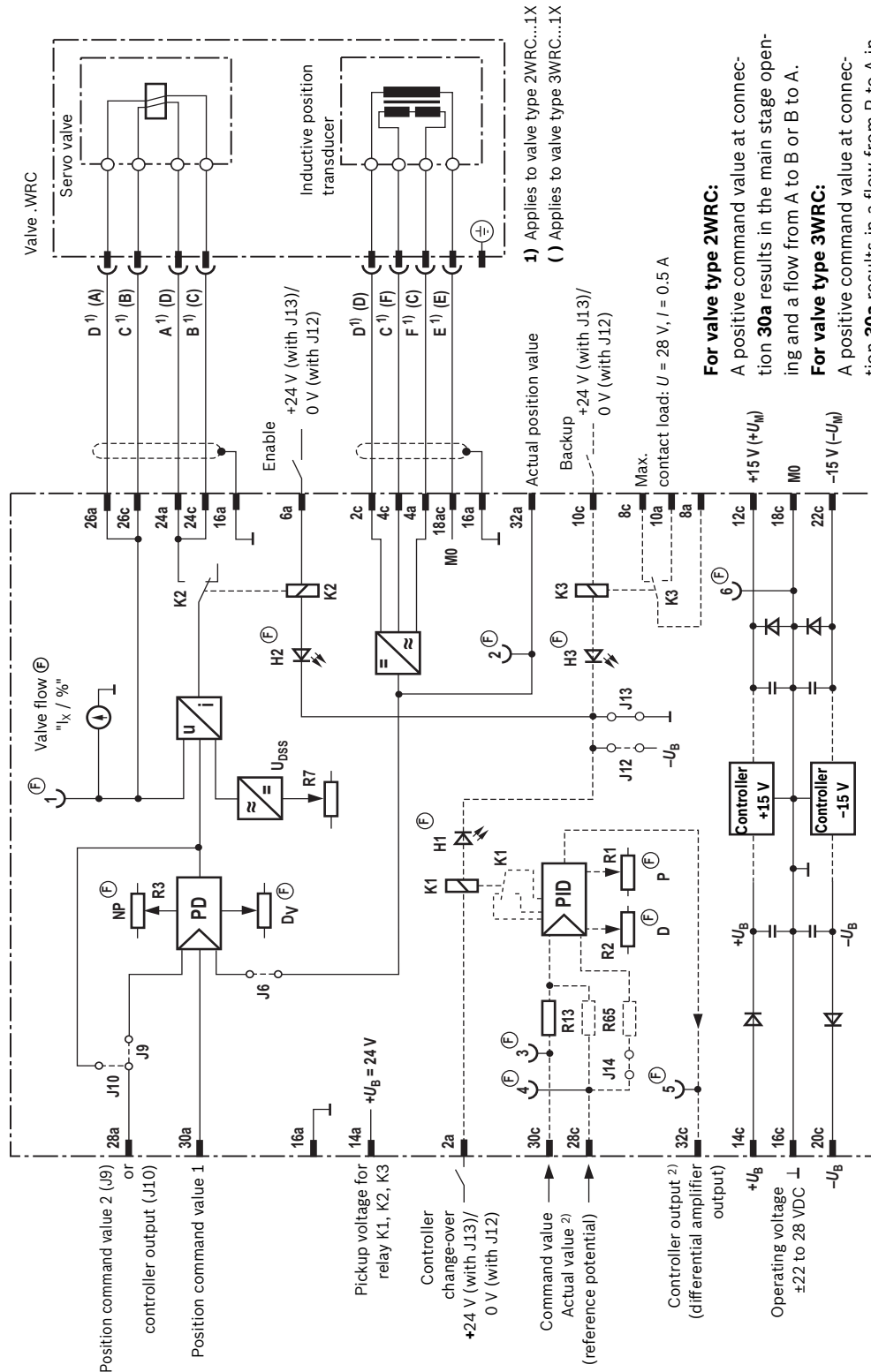
## Function

The amplifiers VT-SR31 to VT-SR38 operate with a push-pull output stage with bipolar transistors. The output of this output stage can be connected or disconnected by means of an enable circuit (relay K2). The enable is indicated by the LED "H2" on the front plate being illuminated. The switching voltage of all relays is defined by means of bridges J12 and J13 to either 0 V or  $+U_B$  (factory  $+U_B$ ). The output stage consists of an I controller with connected dither signal generator. The amplitude of the dither signal is set by means of R7. The actuation of the pre-stage (command current value) is made via a PD controller. The actual current value returned is simultaneously displayed by the instrument on the front plate. The oscillator/demodulator senses the spool valve position. It is designed as pluggable board the parameters of which are adapted to the respective valve type. The PD controller is supplied the position command value and the position command value and the actual position value with the D share of the controller **only** affecting the actual value (velocity feedback). The zero point can be set via R3 ("NP") from the front plate.

The required symmetric operating voltage  $\pm U_B$  is protected against reversed polarity. If the board does not have any voltage regulators for supply of the controller and position transducer electronics, an additional stabilized auxiliary voltage  $\pm U_M$  has to be provided. The auxiliary voltage port is protected against reversed polarity up to a maximum current of 1 A.

As an option, the amplifier can be equipped with a PID controller (D share **only** affects the actual value) with a switchable PI share and a backup relay with potential-free changeover contact. This controller can be used to superimpose a further control loop (e.g. for drive control). The P and D share can be set at the front plate. The controller switching status is indicated by the LED "H1", the relay at LED "H3" (LEDs illuminated if relays are applied). The PID controller fitting is customer-specific and therefore has to be specified in the order in plain text. These amplifiers receive a special type designation upon delivery. The backup relay is loadable up to 28 V and 0.5 A.

## Block diagram/pin assignment



2) Without R13 and by fitting J14 and R65 the controller input is transformed into a differential input.

(F) = on front plate

### For valve type 2WRC:

A positive command value at connection 30a results in the main stage opening and a flow from A to B or B to A.

### For valve type 3WRC:

A positive command value at connection 30a results in a flow from P to A in the main stage.

A negative command value at connection 30a results in a flow from A to T in the main stage.

1) Applies to valve type 2WRC...1X  
 ( ) Applies to valve type 3WRC...1X

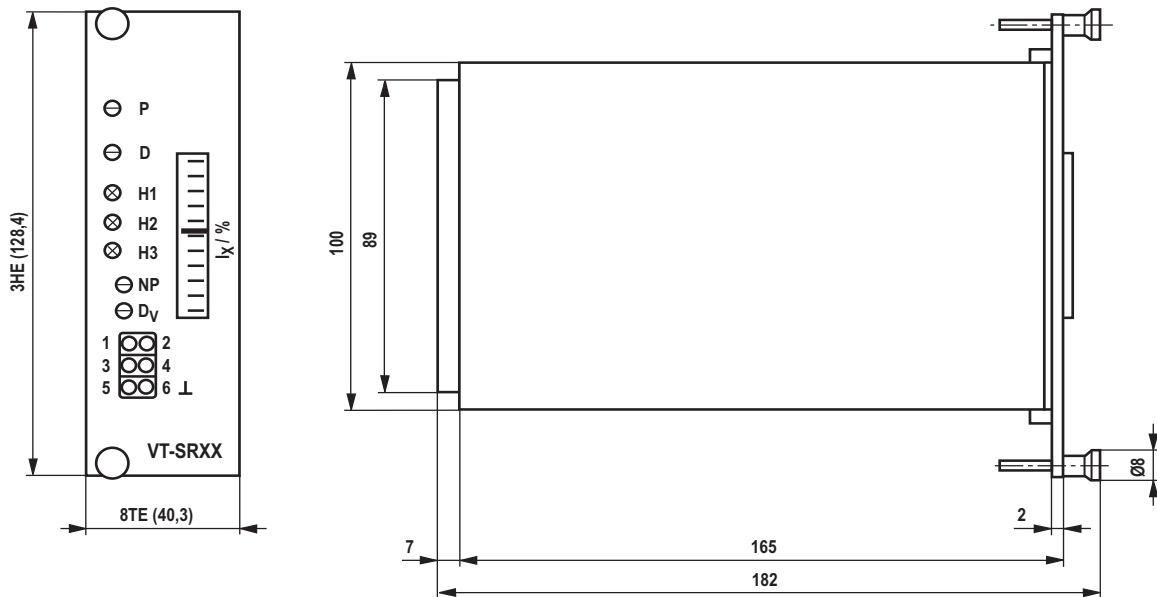
## Technical data (for applications outside these values, please consult us!)

Operating voltages:	<b>With</b> voltage regulator	$U_B$	±24 VDC
	Upper limit value	$u_B(t)_{max}$	±28 VDC
	Lower limit value	$u_B(t)_{min}$	±22 VDC
	<b>Without</b> voltage regulator	$U_B; U_M$	±24 VDC; ±15.0 VDC
	Upper limit values	$u_B(t)_{max}; u_M(t)_{max}$	±28 VDC; ±15.2 VDC
	Lower limit values	$u_B(t)_{min}; u_M(t)_{min}$	±22 VDC; ±14.8 VDC
Current consumption (without valve) when $U_B = \pm 24 \text{ V}^{1)}$			$I$ < 150 mA
Inputs	Command value 1 (main control spool position)	$U_e$	0 to ±10 V ( $R_e = 50 \text{ k}\Omega$ )
	Command value 2 (main control spool position) with J9	$U_e$	0 to ±10 V ( $R_e = 50 \text{ k}\Omega$ )
	Actual value (main control spool position)	$U_e$	0 to ±10 V ( $R_e = 50 \text{ k}\Omega$ )
	Enable	$U_e$	+24 V (with J13); 0 V (with J12), $R_e = 700 \Omega$ (relay circuit)
	Controller change-over	$U_e$	+24 V (with J13); 0 V (with J12), $R_e = 700 \Omega$ (relay circuit)
	Backup relay	$U_e$	+24 V (with J13); 0 V (with J12), $R_e = 700 \Omega$ (relay circuit)
Outputs	Regulated output voltage <sup>1)</sup>	$U_M$	±15 V ± 2%; 150mA
	Valve flow	$I_{max}$	±60 mA
	Valve flow command value (with J10)	$U_A$	±10 V ± 60 mA (measuring output at Pin 28a)
	Relay call-up voltage	$U$	+24 V (+ $U_B$ )
Dither signal		$f$	340 Hz ± 5% ( $I_{SS} = 3 \text{ mA}$ )
Oscillator frequency		$f$	5 kHz
Relay data	Nominal voltage	$U$	+26 V
	Response voltage	$U$	> 13 V
	Step-back voltage	$U$	1.3 V to 6.5 V
	Switching time	$t$	< 4 ms
	Coil resistance (for 25 °C)	$R$	700 $\Omega$
	Contact load	$I$	0.5 A
Type of connection		32-pole male multipoint connector, DIN 41612, design D	
Card dimensions		Euro-card 100 x 160 mm, DIN 41494	
Front dimensions	Height	3 HE (128.4 mm)	
	Width soldering side	1 TE (5.08 mm)	
	Component side width	7 TE	
Adm. ambient temperature range		$J$	0 to +50 °C
Storage temperature range		$J$	-20 to +70 °C
Weight		$m$	0.3 kg

<sup>1)</sup> For design **with** voltage regulator

6/6 VT-SR31 to VT-SR38 | Valve amplifier

## Dimensions (dimensions in mm)



## Project planning/maintenance instructions/additional information

- ▶ The amplifier card may only be unplugged and plugged when de-energized.
- ▶ Command values may only be switched via relays with gold-plated contacts (low voltage, low currents).
- ▶ Card relays may only be switched (enable, controller change-over, reserve) using contacts with a load capacity of approx. 40 V; 50 mA.
- ▶ Always shield command and actual value cables; connect shielding to ground (⊥) on the card-side, open at one side.
- ▶ Do not lay signal lines close to power lines.
- ▶ Recommendation: 1. Also shield the solenoid conductors (to ⊥ on one side).  
2. Up to 50 m length, use cable type LiYCY 1.5 mm<sup>2</sup>, for longer lengths please ask.

### Notice:

The K2 relay may only be de-activated if the servo valve is trimmed so that main stage of the WRC valve moves the actuator into a secure end position.  
With non-trimmed servo valves, the position of the control spool in the main stage is not defined when relay K2 is off.