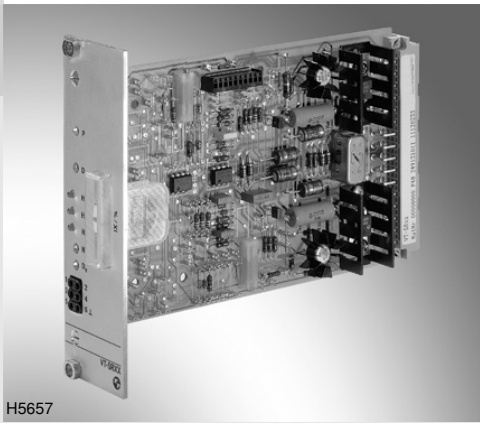
Electrical amplifiers for controlling high-response valves with servo-valve pilot control

RE 30209/03.08 1/6
Replaces: 07.04

Types VT-SR41 to VT-SR43


H5657

Component series 1X

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Information on available spare parts:
www.boschrexroth.com/spc

Features

Amplifiers VT-SR41 to VT-SR43 are suitable for controlling high-response valves (flow control valves) with servo-valve pilot control and electrical position feedback (cartridge valves, type .WRC…2X).

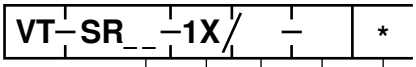
- Regulator for valve current
- Controller for main spool position
- Dither signal generator
- Push-pull output stage
- Oscillator/demodulator
- Enable circuit with relay
- Measuring instrument for indication of the servo-valve current
- Reverse polarity protection for voltage supply

Optional extensions:

- PID-controller [1] with controller changeover feature
- Relay with isolated changeover contact (28 V / 2 A)
- Voltage regulator ±15 V for supplying the controller and position transducer electronics

[1] The D-component acts only on the actual value (velocity feedback).

Ordering code



Amplifier for high-response valves (flow control valves) with servo-valve pilot control
Type .WRC 32…2X **= 41**
Type .WRC 40…2X **= 42**
Type .WRC 50…2X **= 43**

Component series 10 to 19 **= 1X**
(10 to 19: unchanged technical data and pinout)

Further details in clear text [1)]

2 = For valves with 2/2 directional function
3 = For valves with 3/2 directional function

0 = Without ±15 V voltage regulator
1 = With ±15 V voltage regulator

[1)] E.g. with/without PID-controller, with/without back-up relay K3

Controller data must be specified for the additional PID-controller.

Accessories (separate order)

Card holder

– Type VT 3002-2X/32, see RE 29928
Single card holder without power supply unit

Power supply unit

– Type VT-NE31-1X, see RE 29929
Compact power supply unit 115/230 VAC → ±24 VDC, 7 VA

Function

Amplifiers VT-SR41 to VT-SR43 operate with a push-pull output stage with bipolar transistors. The output of this output stage can be cut in and out with an enable circuit (relay K2). The enable is signaled by LED “H2“ on the front panel. The switching voltage of all relays is set to 0 V or $+U_B$ by means of jumpers J12 and J13 (factory setting: $+U_B$).

The output stage consists of an I-controller with connected dither signal generator. The amplitude of the dither signal can be adjusted by means of R7. The pilot stage (current command value) is controlled via a PD-controller. The actual value fed back is indicated by the instrument on the front panel.

The oscillator/demodulator serves to acquire the spool position. It is designed as a plug-on printed-circuit board, the parameters of which are adapted to the relevant valve type.

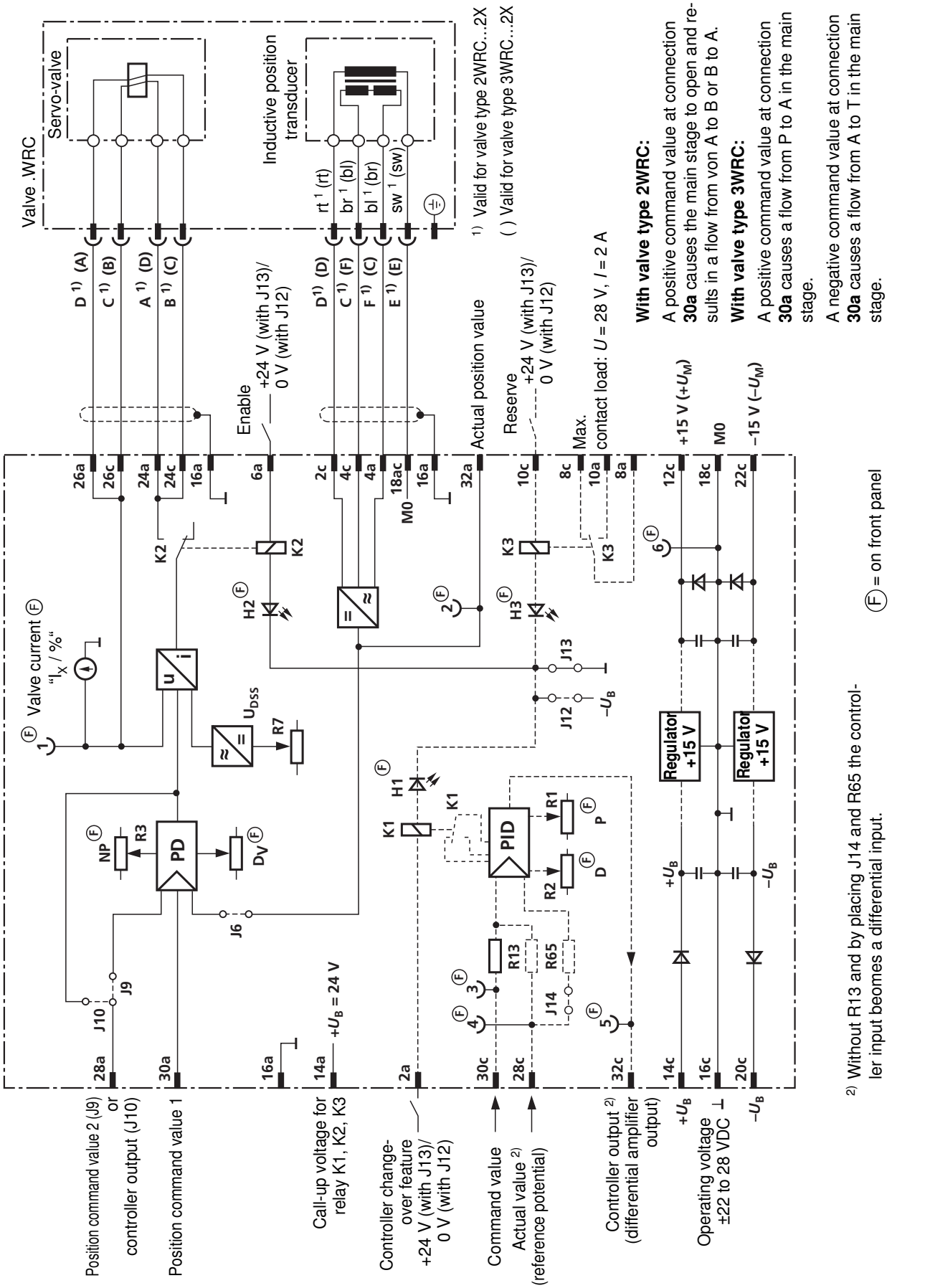
The PD-controller receives the position command value and the actual position value, with the D-component being effective **exclusively** on the actual value (velocity feedback).

The zero point can be adjusted by means of R3 (“NP“) on the front panel.

The required symmetrical operating voltage $\pm U_B$ is protected against polarity reversal. If the printed-circuit board does not include a voltage regulator for supplying the controller and the position transducer electronics, an additional, stabilized auxiliary voltage $\pm U_M$ must be made available. The auxiliary voltage connection is protected against polarity reversal up to a maximum current of 1 A.

Optionally, the amplifier can be fitted with a PID-controller (D-component acts **only** on the actual value) with PI-component that can be changed over and a back-up relay with isolated changeover contact. This controller can be used for superimposing a further control loop (e.g. for closed-loop drive control). The P- and D-component can be adjusted on the front panel. The state of the controller is signaled by LED “H1“, that of the relay by LED “H3“ (LEDs are ON when the relays have picked up). The component placement of the PID-controller is customer-specific and must therefore be specified in clear text in the order. A special type designation is assigned to these amplifiers before shipment. The back-up relay can be loaded up to 28 V and 2 A.

Block circuit diagram / pinout



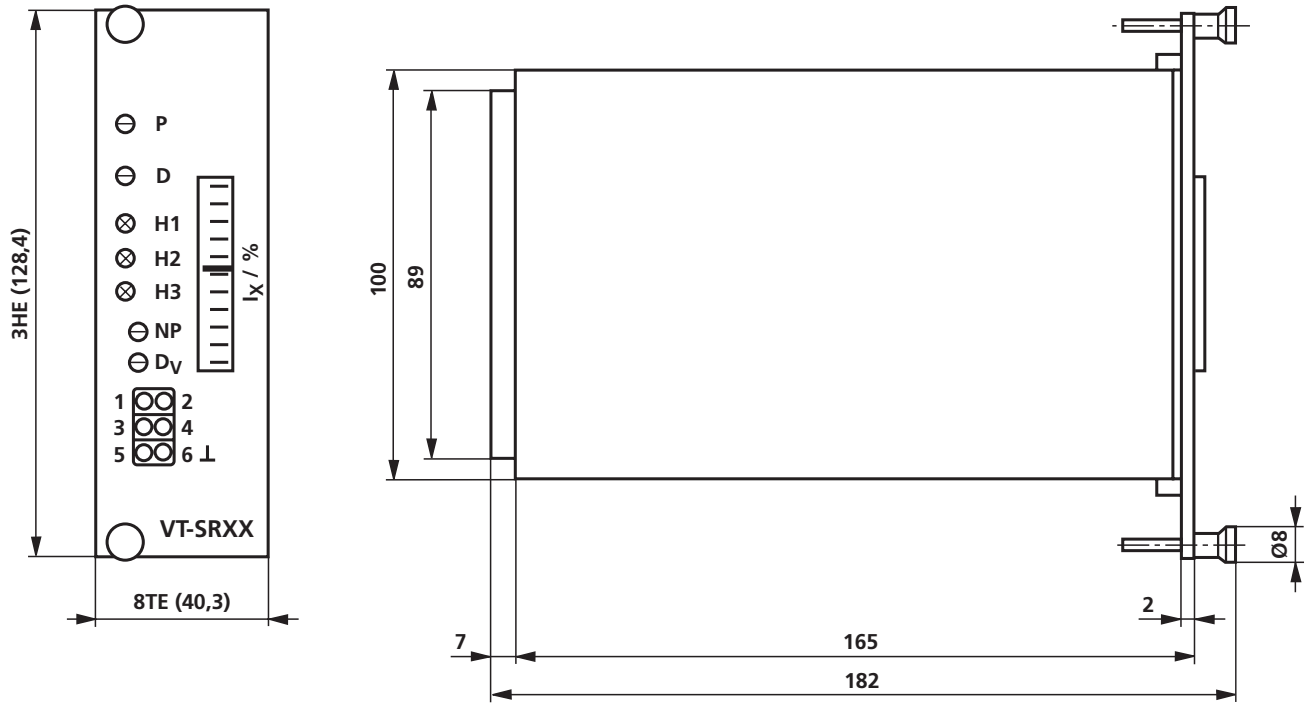
2) Without R13 and by placing J14 and R65 the controller input beomes a differential input.

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

Operating voltages:	With voltage regulator	U_B	±24 VDC
	Upper limit value	$u_B(t)_{max}$	±28 VDC
	Lower limit value	$u_B(t)_{min}$	±22 VDC
	Without 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) at U_B= ±24 V [1]		I	< 150 mA
Inputs:	Command value 1 (main spool position)	U_i	0 to ±10 V (R_i = 50 kΩ)
	Command value 2 (main spool position) with J9	U_i	0 to ±10 V (R_i = 50 kΩ)
	Actual value (main spool position)	U_i	0 to ±10 V (R_i = 50 kΩ)
	Enable	U_i	+24 V (with J13); 0 V (with J12), R_i = 700 Ω (relay circuit)
	Controller changeover feature	U_i	+24 V (with J13); 0 V (with J12), R_i = 700 Ω (relay circuit)
	Back-up relay	U_i	+24 V (with J13); 0 V (with J12), R_i = 700 Ω (relay circuit)
Outputs:	Regulated output voltage [1]	U_M	±15 V ±2 %; 150 mA
	Valve current	I_{max}	±60 mA / ±100 mA (depending on valve size)
	Valve current command value (with J10)	U_o	–10 V ≙ +60 mA / +100 mA (measurement output)
	Relay call-up voltage	U	+24 V (+U_B)
Dither signal		f	380 Hz ±5 % (I_{SS} = 0.42 mA)
Oscillator frequency		f	5 kHz
Relay data:	Nominal voltage	U	+26 V
	Response voltage	U	> 13 V
	Release voltage	U	1.3 V to 6.5 V
	Switching time	t	< 4 ms
	Coil resistance (at 25 °C)	R	700 Ω
Type of connection			32-pin male connector, DIN 41612, form D
Card dimensions			Euro-card 100 x 160 mm, DIN 41494
Front panel dimensions:	Height		3 HE (128.4 mm)
	Width soldering side		1 TE (5.08 mm)
	With component side		7 TE
Permissible ambient temperature range		J	0 to +50 °C
Storage temperature range		J	–20 to +70 °C
Weight		m	0.3 kg

[1] Variant **with** voltage regulator

Unit dimensions (dimensions in mm)



Engineering / maintenance notes / supplementary information

- The amplifier card may only be plugged or withdrawn when disconnected from the power supply!
- Use only relays with gold-plated contacts for passing on command values (small voltages, small currents)!
- For switching card relays (enable, controller changeover, reserve) use only contacts with a load carrying capacity of ca. 40 V; 50 mA.
- Always shield command and actual value cables; connect the shield to ground (⊥) on the card side and leave the other end open!
- Do not lay signal cables near power cables!
- Recommendation: 1. Shield also solenoid cables (connect one end to ⊥)!
  2. Up to 50 m length, use cable type LiYCY 1.5 mm^2 ; for greater lengths, please consult us!
- **Attention:** Relay K2 may only be switched off, when the servo-valve is adjusted by means of a trimming potentiometer to ensure that the main stage of the WRC valve brings the actuator to a safe end position!
  If the servo-valve is not appropriately adjusted, the position of the main stage control spool is not defined when relay K2 is switched off!

Note: Electrical signals (e.g. actual value) brought out via control electronics must not be used for switching safety-relevant machine functions!
(See also European standard “Safety requirements for fluid power systems and components - hydraulics“, EN 928.)

Notes

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