Rexroth
Bosch Group

Analog Amplifier Card VT-VRPA2-.-1X/V0/T.

RE 30119-B/03.04

Commissioning instructions

Contents

1 Applications

VT-VRPA2-x-1X/V0/Tx analog amplifier cards are used to generate, link or normalize command value signals with subsequent gain of the signals thus generated.

Depending on the version, the amplifier card can only be used in connection with the following proportional directional valves (hydraulic valves):

- 4WRE6-2X (VT-VRPA2-1-... only)
- 4WRE10-2X (VT-VRPA2-2-... only)

With the help of digital command value call-ups and ramp time call-ups (option T5) the card can also be controlled, for example, from a PLC.

Options

Generally, the standard version (VT-VRPA2-.../V0/...) is available with the following options:

- VT-VRPA2.../T1: Amplifier card with one adjustable ramp time
- VT-VRPA2.../T5: Amplifier card with five adjustable ramp times. With this option, the ramp time can additionally be selected via ramp time call-ups (24V inputs) or in the 4-quadrant operating mode. In addition, a switchable measuring socket is installed.

Features of the amplifier cards

- Command value inputs:
  - Differential input ±10 V
  - 4 callable command value inputs ±10 V
  - Current inputs 4 to 20 mA
- Inversion of the internal command value signal via 24V input or jumper
- Ramp time selection via 4-quadrant recognition (24V input) or ramp time call-up (24V inputs) (option T5)
- Characteristic curve correction by means of step-change heights and maximum values that can be adjusted separately.
- Verification of settings at measuring sockets (switchable measuring socket with option T5)
- 24 V enable input
- 24 V output "ready for operation"
- Polarity reversal protection for power supply
- Power supply unit with DC/DC converter – without raised zero point

2 Technical data

General data

Designation		Value
Operating voltage	U_B	24 V DC + 40 % - 20 %
	$U_B(t)_{max}$	35 V
	$U_B(t)_{min}$	18 V
Current consumption	I	< 2 A
Power consumption	P_S	< 24 VA
Fuse		M 2 A; replaceable
Type of connection		48-pin blade connector; DIN 41612; form F
Card dimensions	Length x width	160 mm x 100 mm; Euro-card DIN 41494
Front panel dimensions	Height	3 HE (128.4 mm)
	Width soldering side	1 TE (5.08 mm)
	Width component side	3 TE (15.24 mm)
Weight	m	0.170 kg (net)
Permissible operating temperature range	υ	0 to + 50 °C
Storage temperature range	υ	- 25 to + 85 °C

Notes on environmental simulation tests in the fields of EMC (electromagnetic compatibility), climate and mechanical stress can be found in the "declaration on environmental compatibility"
(RE 30301-U).

Adjustment ranges

Designation	Potentiometer	Adjustment range
Zero balancing	"Zw"	± 30 %
Command values	"w1" to "w4"	0 to 110 %
Ramp times	"t1" to "t5" (option T5) „t" (option T1)	0.02 to 5 sec; can be changed over: 0.2 to 50 sec
Step-change height	"S+" and "S-"	0 to 50 %
Amplitude attenuator	"Gw+" and "Gw-"	0 to 110 % (valid when step-change height is set to 0 %)

Specification of inputs

Designation		Value
Command values 1 – 4 (potentiometer inputs)	U_e	0 to ± 10 V R_e = 100 kΩ (reference is M0)
Command value 5 (differential input)	U_e	0 to ± 10 V R_e > 50 kΩ
Command value 6 (current input)	I_e	4 to 20 mA; resistance R_B = 100 Ω
Ramp time external	U_e	0 to + 10 V; R_e = 10 kΩ (internally raised to + 15 V; reference is M0)
Command value call-ups	U	8.5 V to U_B → call-up activated; , R_e > 100 kΩ
		0 to 6.5 V → no call-up, R_e > 100 kΩ
Ramp call-ups (option T5)	U	8.5 V to U_B → call-up activated, R_e > 100 kΩ
		0 to 6.5 V → no call-up, R_e > 100 kΩ
Quadrant recognition (option T1)	U	8.5 V to U_B → ON, R_e > 100 kΩ
		0 to 6.5 V → OFF, R_e > 100 kΩ
Command value inversion	U	8.5 V to U_B → ON, R_e > 100 kΩ
		0 to 6.5 V → OFF, R_e > 100 kΩ
Enable	U	8.5 V to U_B → ON, R_e > 100 kΩ
		0 to 6.5 V → OFF, R_e > 100 kΩ

Specification of outputs

Designation		Value
Command value signal	U	± 10 V ± 2 %; I_{max} = 2 mA
Actual value signal	U	± 10 V ± 2 %; I_{max} = 2 mA
Measuring point signal (option T5)	U	± 10 V ± 2 %; I_{max} = 2 mA
Ready for operation	U	> 16 V, 50 mA; (in the case of an error < 1V, R_i = 10 kΩ)
Regulated voltages	U	+ 10 V ± 2 %; 25 mA; short-circuit-proof
	U	- 10 V ± 2 %; 25 mA; short-circuit-proof
Current output stage	I	0 to 2,5 A; short-circuit-proof; clocked to ca. 5 kHz
Oscillator	U	± 5 V_{SS} per output; 10 mA
	F	5,6 kHz ± 10 %
Measuring sockets	U	± 10 V ± 2 %; I_{max} = 2 mA

3 Block circuit diagrams

Block circuit diagrams of the amplifiers are shown on the next two pages:

- VT-VRPA2.../T1
- VT-VRPA2.../T5

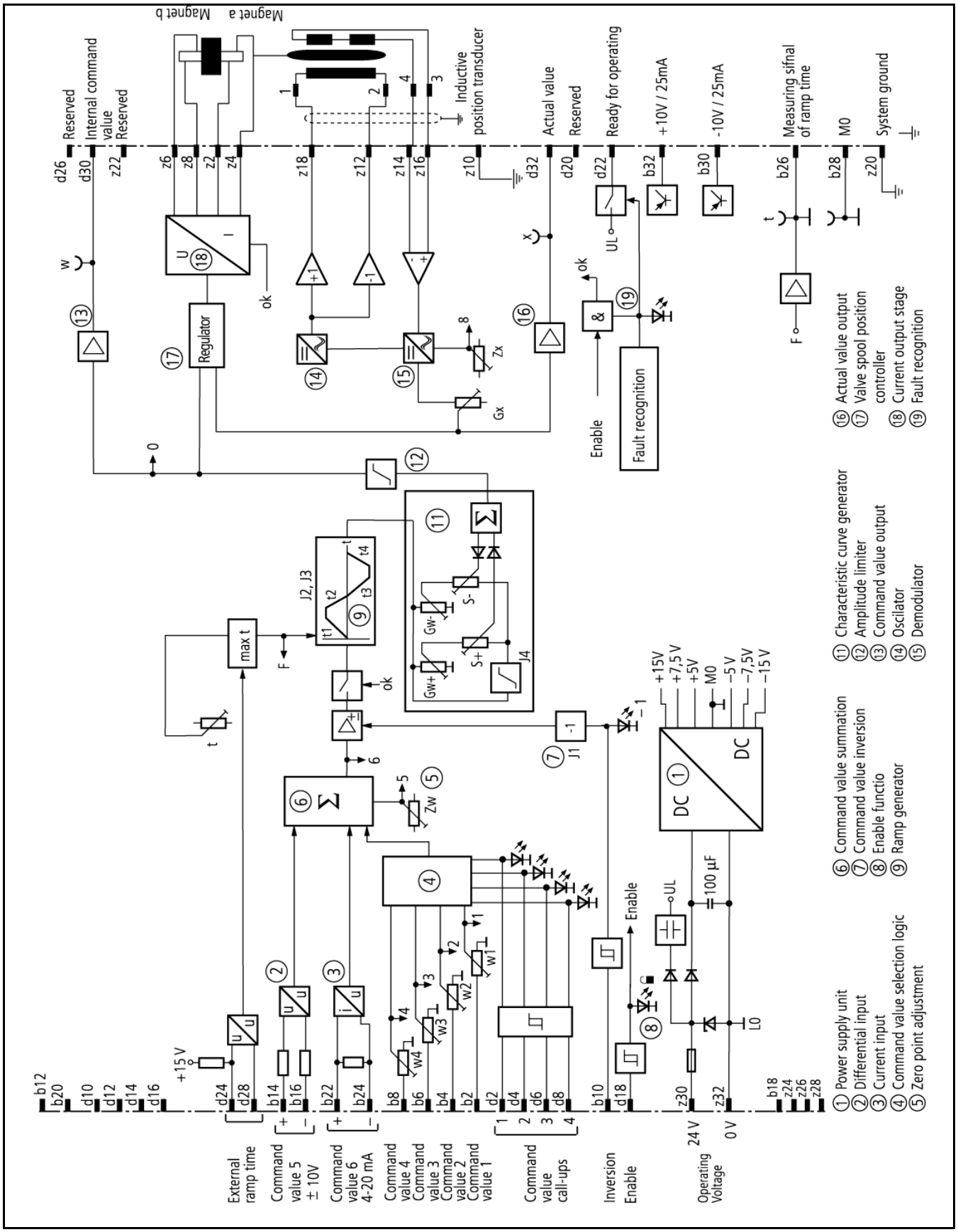


Fig. 3.1: Block circuit diagram of VT-VRPA2.../T1 amplifier card

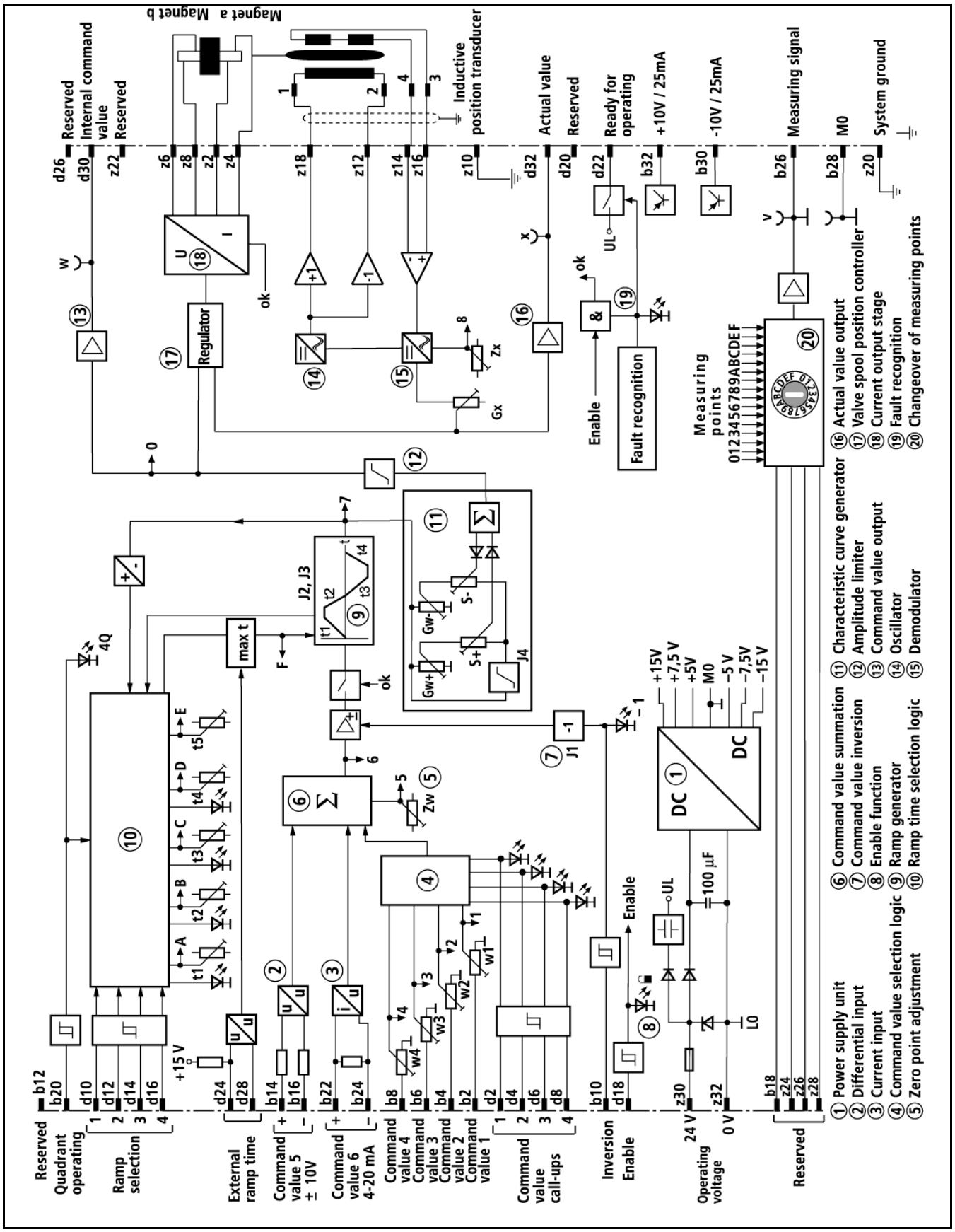


Fig.. 3.2: Block circuit diagram of VT-VRPA2.../T5 amplifier card

4 Functional description

The assemblies described here are shown on the block circuit diagrams Fig. 3.1 (on page 8) and Fig. 3.2 (on page 9).

4.1 Power supply unit (1)

The amplifier card is fitted with a power supply unit (1) with making-current limiter. It supplies all internally required positive and negative voltages. The making-current limiter prevents making-current peaks caused by the smoothing capacitors in the current output stage.

4.2 Command value preselection

The internal command value signal is generated from the summation (6) of the following signals:

- External command value signal at the differential input (2)
- External command value signal at the current input (3)

  The inputs are not changed over between current and voltage. Both inputs are permanently available (see pin allocation).
- Zero point offset (5) (potentiometer "Zw")

  The zero point offset (command value zero point adjustment) serves for correcting the zero signal on the input side and can, by deliberate trimming, be used as command value preselection jump (compensation for hydraulic valve spool overlap).
- Called signal

  Four different command value signals can be called up with the help of the command value selection logic (4).

  To this end, four command value call-ups (24 V inputs) are available. Only 1 call-up is possible at a time. If several call-ups are activated simultaneously, call-up "1" will have lowest priority and call-up "4" highest priority. A yellow LED signals, which call-up is active. This LED is installed on the front panel directly next to the associated potentiometer.

The following is valid:

Normalization values	Input signals			Command value measuring sockets	Direction of flow
	Current input	or	Differential input		
- 100 %	4 mA		- 10 V	- 10 V	P to B; A to T
0 %	12 mA		0 V	0 V	
100 %	20 mA		10 V	10 V	P to A; B to T
0 %	< 1mA **			0 V	

** The resulting internal command value signal corresponds to 0 %, if the current input is not used or a cable break occurred in the current command value cable.

External command value voltages

External command value voltages are either fed forward directly through regulated voltages (+10 V, -10 V; connection b30, b32) or via external potentiometers:

- If the command value inputs are connected directly to the regulated voltages, the command values are adjusted using potentiometers "w1" to "w4".
- If you use external potentiometers, the internal potentiometers act as attenuators or limiters.

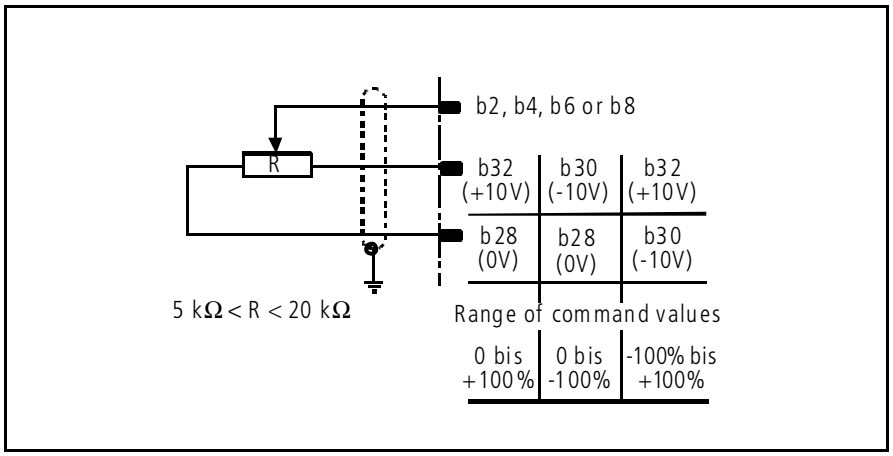


Fig. 4.1:
Command value adjustment using an external potentiometer

4.3 Command value inversion (7)

The internal command value, which was generated through command value summation, can be inverted using an external signal or a jumper (J1). Applying both procedures simultaneously results in a double inversion, i.e. the procedures offset each other. An LED ("-1") signals whether an external 24 V signal is applied for inversion.

4.4 Enable function (8)

The enable function is used to

- enable the current output stage and
- pass on the internal command value signal to the ramp generator.

The enable signal is indicated by an LED on the front panel.

When the enable is cut in, the internal command value changes (at any preselected command value) according to the set ramp time. This ensures that a controlled valve does not open suddenly.

4.5 Ramp generator (9)

The ramp generator generates a ramp-shaped output signal from a given step-change signal.

The ramp generator limits the gradient of the input signal. In this way, a ramp-shaped output signal is created from a step-change signal. The ramp time refers to a 100 % command value change of the input signal.

The ramp time is not shortened or extended in the downstream characteristic curve generator.

Adjustment options

- You can adjust the ramp time at any time to minimum (< 2 msec) (= ramp OFF) with the help of jumper "J2". This is valid independently of the ramp times set.
- The available adjustment range for the ramp time can be changed over using jumper "3": 0.02 - 5 sec or 0.2 - 50 sec.
- The following is valid for the VT-VRPA2.../T5 amplifier card:
  - 5 different ramp times can be selected and activated (see chapter "ramp time selection logic").
  - The ramp times can be adjusted with the help of potentiometers "t1" to "t5" and read and verified using measuring socket "v".
- The following is valid for the VT-VRPA2../T1 amplifier card:
  - Only one ramp time can be set at a time. It is the same for all command value changes (up, down, positive and negative).
  - The ramp time can be adjusted with the help of potentiometer "t" and read and verified using measuring socket "t".

External ramp time adjustment

The ramp time set internally can be extended using an external potentiometer. In the case of a cable break, the internal setting will be used automatically.

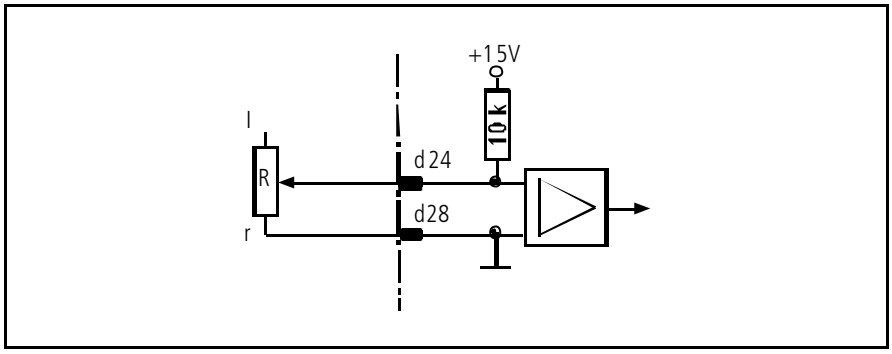


Fig. 4.2:
Ramp time adjustment using an external potentiometer

The adjustment range depends on resistance "R".

R	Adjustment range **	
	Minimum ramp time Rotary angle of potentiometer = left-hand limit stop	Maximum ramp time Rotary angle of potentiometer = 95%
1 kΩ	80 msec	1 sec
500 Ω	150 msec	2 sec
100 Ω	0.8 sec	10 sec
** The minimum ramp time can only be achieved, if the internally set ramp time is smaller, i.e. the relevant potentiometer is turned to its left-hand limit stop.		

The given ramp times are valid if jumper "J3" = open.

4.6 Ramp time selection logic (10) (for VT-VRPA2.../T5 only)

The ramp time selection logic allows 3 operating modes:

- 4-quadrant operation
- Ramp time call-ups
- Ramp time "t5"

4-quadrant operation

If 4-quadrant operation is active (external 24V input signal "4Q"), the electronics automatically recognizes the command value polarity and the direction of change of the command value and assigns a ramp time to the current signal state.

One of 4 ramp times is selected in dependence upon the signal state:

- Ramp up, positive (ramp potentiometer "t1")
- Ramp down, positive (ramp potentiometer "t2")
- Ramp up, negative (ramp potentiometer "t3")
- Ramp down, negative (ramp potentiometer "t4")

4-quadrant operation has a priority over any other ramp time call-up. As long as a signal is being changed, the LED that is assigned to the current ramp time is ON. The LEDs are located on the front panel directly next to the associated potentiometer.

Note: In the case of very short ramp times, you can no longer perceive the LEDs' lighting up.

When 4-quadrant operation is active, LED "4Q" on the front panel lights up.

Ramp time call-ups

When 4-quadrant operation is not active, you can call up 4 ramp times using any call-up signal (24V input). Only 1 call-up is possible at a time. If several call-ups are activated simultaneously, call-up "1" has lowest priority, call-up "4" highest priority.

Each called up ramp time is signaled by a yellow LED. This LED is located on the front panel directly next to the associated potentiometer.

Ramp time "t5"

Ramp time "t5" is always valid, when neither 4-quadrant operation nor a ramp time call-up are activated.

4.7 Characteristic curve generator (11)

After having been processed in the ramp generator, the command value signal is fed to the characteristic curve generator. Here, you can adjust the step-change heights and the maximum values separately for positive and negative signals according to the hydraulic requirements.

Adjustment options

- With the help of jumper "J4" you can switch the jump function ON (J4 = open) or OFF (J4 = closed).

  Note: To prevent a residual jump (< 1%) you have to switch the jump function OFF (= jumper "J4" is closed) and also turn potentiometers "S+" and "S-" to their left-hand limit stop.

- You can adjust/correct the step-change height "S" separately for positive and negative signals using potentiometers "S+" and "S-".

- You can adjust the maximum internal command value separately for positive and negative signals. Potentiometers "Gw+" and "Gw-" are provided for this purpose. The adjustment range is 0 % to 110 %.

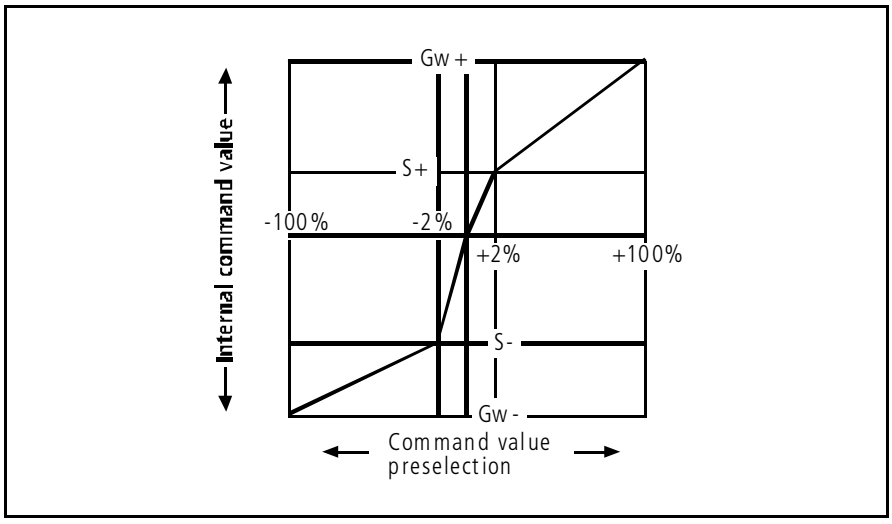


Fig. 4.3:
Correcting the characteristic curve with the help of the characteristic curve generator

4.8 Amplitude limiter (12)

After having been processed in the characteristic curve generator, the signal is fed to the amplitude limiter (12). Here, the internal command value is limited to ca. ± 110 % of the nominal range.

4.9 Valve spool position controller (17)

The valve spool position controller (17) is installed downstream of the amplitude limiter. Here, the control output for the current output stage is created from the actual value provided by the inductive position transducer and the preselected command value. The position controller is optimized to the specific valve type.

4.10 Oscillator (14)

The oscillator (14) generates the control signal for the inductive position transducer.

4.11 Demodulator (15)

The demodulator (15) provides the actual value of the valve spool position (100 % = 10 V) on the basis of the position transducer signal.

4.12 Current output stage (18)

The current output stage (18) generates the clocked solenoid current for the proportional directional valve. The maximum current is limited to 2.3 A to 2.5 A per output. The output stage outputs are short-circuit-proof.

In the case of an internal fault signal or missing enable, the current output stages are deactivated.

5 Installing the amplifier card

5.1 Safety regulations

- Amplifier cards may only be installed by trained and qualified specialists in accordance with generally valid electrotechnical regulations.
- You may only plug in or withdraw the amplifier cards from a card holder/rack, when the power supply cables to the cards are disconnected.

5.2 Installing the amplifier card

The amplifier cards are designed as printed circuit board in Euro-format 100 x 160 mm and intended for installation in a rack.

Suitable card holders are:

- 19" rack types VT19101, VT19102, VT19103 and VT19110 (see RE 29768)
- Closed card holder type VT12302 (see RE 30103) + dummy plate 4 TE/3 HE (mat. no.: 021004)
- Open card holder VT3002-2X/48 (see RE 29928)

  Open card holders may only be used for installation in a control cabinet. Only in a cabinet can shock-hazard protection be ensured.

Note: Please make sure that the permissible operating temperature range of 0 to 50 °C is adhered to at the place of installation!

5.3 Connecting the amplifier card

Power supply unit

A suitable power supply unit for the amplifier card is type VT-NE30-1X, see RE 29929.

Important notes on the installation

- At the place of installation, the distance between the card and aerials, radio equipment and radar systems must be at least 1 m.
- Do not lay solenoid and signal cables near power cables!
- For solenoid lines up to 50 m, use cable type LiYCY 1.5 mm^2. In the case of greater lengths, please consult us!
- Do not use connectors with free-wheeling diodes or LED lamps for connecting the solenoid cables to the valves.
- Always shield actual value and position transducer cables. Connect the shield to "PE" on the card side. In individual cases, e.g. in case "PE" is exposed to severe interference, it may be required to connect the shield of the position transducer cable directly to the PE connection "z10" or "LO" of the card. Leave the other end open (risk of earth loops!).
- The system ground is an essential part of EMC protection of the amplifier card. Interference coming via data and supply lines are to be discharged via the system ground. However, this is only possible, if the system ground itself does not inject interference into the amplifier card. Recommendation: Also shield solenoid cables!
- Note: When using the differential input, both inputs must always be switched on or off simultaneously.
- Use relays with gold-plated contacts for passing on command values (small voltages, small currents).
- Electrical signals provided by control electronics (e.g. "ready-for-operation" signal) must not be used for switching safety-relevant machine functions! (see also European standard "Safety requirements for fluid power systems and components – Hydraulics" prEN 982).

Pin assignment of blade connector

Pin	Row d	Row b	Row z
2	Command value call-up 1 (24V input)	Command value 1 (potentiometer connection ±10 V)	Solenoid a+
4	Command value call-up 2 (24V input)	Command value 2 (potentiometer connection ±10 V)	Solenoid a-
6	Command value call-up 3 (24V input)	Command value 3 (potentiometer connection ±10 V)	Solenoid b+
8	Command value call-up 4 (24V input)	Command value 4 (potentiometer connection ±10 V)	Solenoid b-
10	Ramp call-up 1 (24V input) **	Command value inversion (24V input)	Shield (position transducer shield only)
12	Ramp call-up 2 (24V input) **	Reserved	Position transducer supply (- output)
14	Ramp call-up 3 (24V input) **	Command value 5 + (10V)	Position transducer signal (- input)
16	Ramp call-up 4 (24V input) **	Command value 5 - (-10V)	Position transducer signal (+ input)
18	Enable (24V input)	Reserved	Position transducer supply (+ output)
20	Reserved	4-quadrant operation (24V input) **	System ground
22	Ready-for-operation signal (24 V, H-active, 50 mA)	Command value 6 + (4 to 20 mA)	Reserved
24	External ramp	Command value 6 - (4 to 20 mA)	Reserved
26	Reserved	Measuring point signal	Reserved
28	Reference/external ramp	Reference potential for outputs (M0)	Reserved
30	Command value output ± 10 V	- 10 V/20 mA	Operating voltage (24 V)
32	Actual value output ± 10 V	+ 10 V/20 mA	L0 (0 V)
** only with amplifier card type VT-../T5			

6 Commissioning the amplifier card

6.1 Safety regulations

Commissioning of these amplifier cards requires special knowledge in the field of electronics and hydraulics. Amplifier cards must, therefore, only be commissioned by specialists who are familiar with:

- the operating principle of the card and the hydraulic system
- the characteristics of the control electronics
- the operating principle of the higher-level control

If you change the settings of the sealed potentiometers ("ramp time symmetry" and "internal reference voltage"), the warranty becomes void!

Before installing the card, make sure that the jumpers are plugged correctly on the amplifier card.

Only use measuring instrument with an internal resistance of (Ri) > 100 kΩ.

Use a screw-driver with a blade width of 4 mm for adjusting the potentiometers and for changing over the measuring point selector switch (VT-.../T5).

6.2 Adjustment and display elements

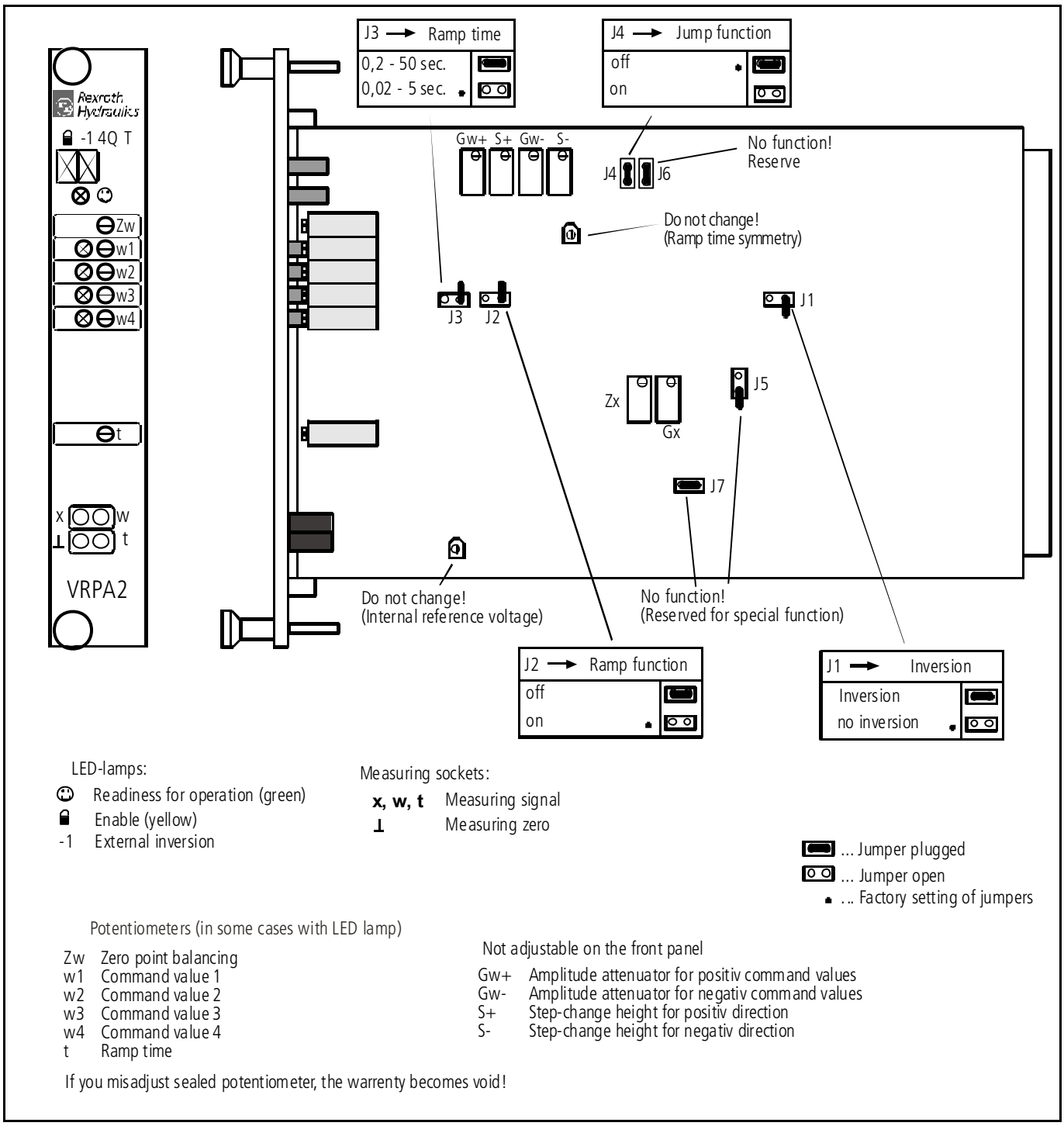


Fig. 6.1: Adjustment and display elements of the VT-VRPA2../T1 amplifier card

Measuring sockets (option T1)

Two measuring sockets for the command value (w) and actual value (x) are provided on the front panel. Both measuring sockets have the same polarity. The following is valid: ± 100 % = ± 10 V.

In addition, a measuring socket (t) is provided for adjusting the ramp time. The measuring voltage ranges between 10 mV and 10 V.

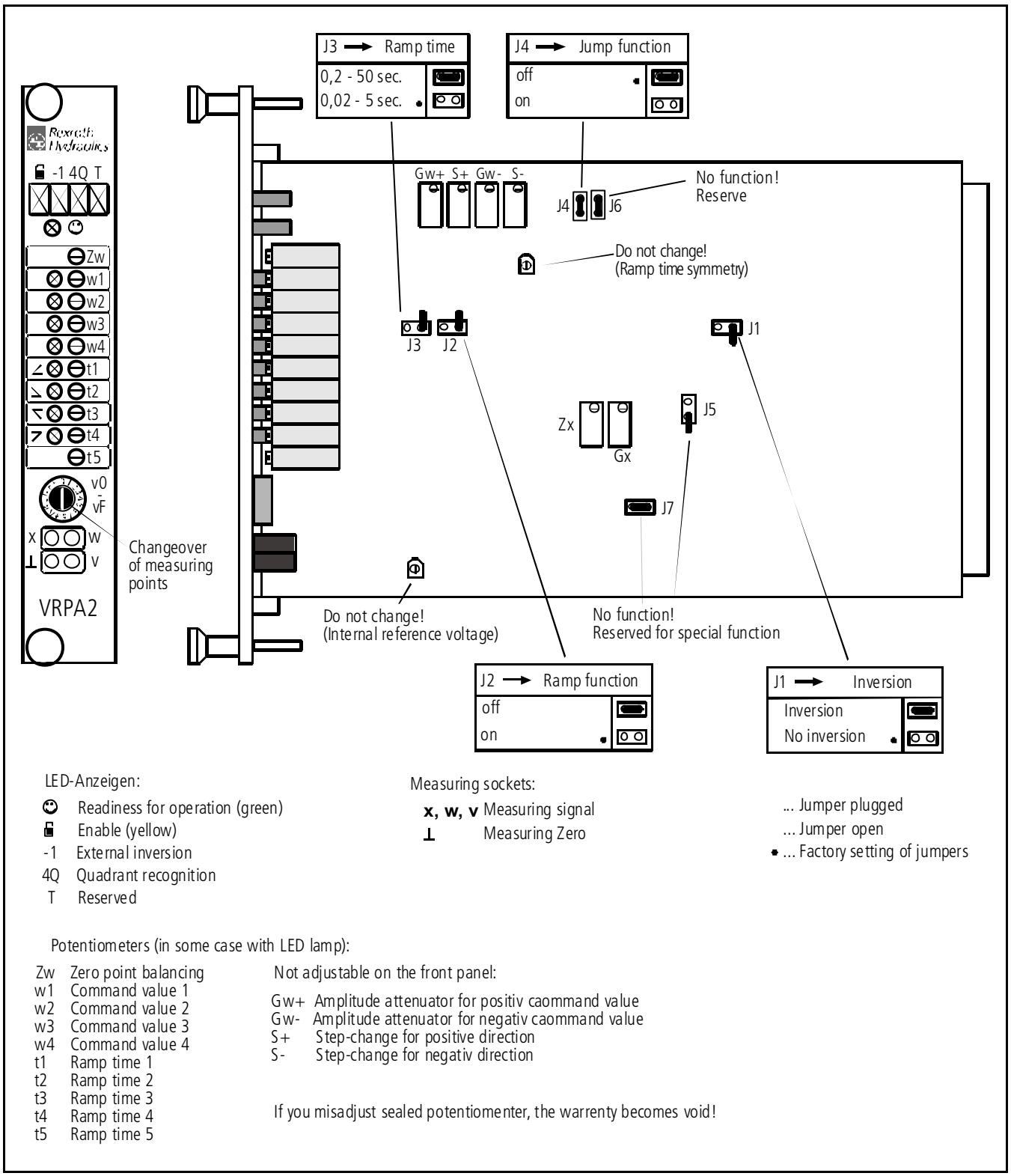


Fig. 6.2: Adjustment and display elements of the VT-VRPA2../T5 amplifier card

Measuring sockets

Two measuring sockets are provided for the command value (w) and the actual value (x) on the front panel. Both measuring sockets have the same polarity. The following is valid:
± 100 % = ± 10 V.

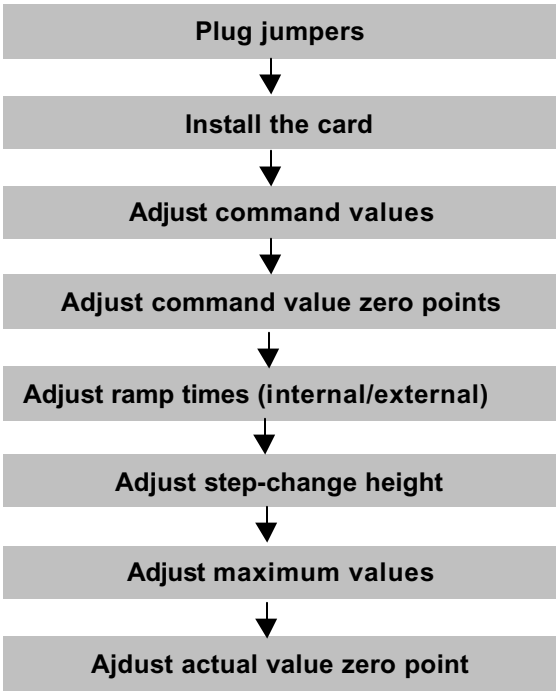
An additional measuring socket (v) is provided for adjusting the command values and the ramp times and for measuring additional internal signals. The measuring points are selected using the measuring point selector switch on the front panel. The signal of measuring socket (v) is additionally connected to the blade connector.

Measuring point	Switch position	Measuring signal "v"
Internal command value	0	± 100 % = ± 10 V
Command value call-up 1	1	± 100 % = ± 10 V
Command value call-up 2	2	± 100 % = ± 10 V
Command value call-up 3	3	± 100 % = ± 10 V
Command value call-up 4	4	± 100 % = ± 10 V
Zero point offset "Zw"	5	± 30 % = ± 3 V
1 summation signal of command values	6	± 100 % = ± 10 V
Ramp output signal	7	± 100 % = ± 10 V
Zero point offset "Zx"	8	± 30 % = ± 10 V
Free	9	
Ramp time "t1"	A	10 mV to 10 V
Ramp time "t2"	B	10 mV to 10 V
Ramp time "t3"	C	10 mV to 10 V
Ramp time "t4"	D	10 mV to 10 V
Ramp time "t5"	E	10 mV to 10 V
Current ramp time "t"	F	10 mV to 10 V

6.3 Adjusting the amplifier card

Working steps

You should observe the following order:



Before you can start carrying out the adjustment work, the system-specific connections must be completed.

Plugging the jumpers

Plug jumpers "J1" to "J7" according to the specific application so that the associated bridge is either open or closed. For information on the settings, please refer to Fig. 6.1 on page 21 (for option T1) or Fig. 6.2 on page 22 (for option T5).

Adjusting the command value zero point

The command value zero point can be adjusted and used for:

- correcting the zero signal on the input side
- adjusting the jump function for command value feedfoward, when no internal command value is available

Option VT-.../T1

Procedure:

Precondition: No command value may be activated.

➢ Set external command value selections to 0 V.

➢ Adjust the internal command value to 0 V using potentiometer "Zw". Check the setting at measuring socket "w"

Option VT-.../T5

Procedure:

Precondition: No command value may be activated.

➢ Set external command value selections to 0 V.

➢ Set measuring point selector switch to "6".

➢ Adjust the internal command value to 0 V using potentiometer "Zw". Check the setting at measuring socket "v".

Adjusting the command value

Option VT-.../T1

Procedure:

➢ Select the command value to be adjusted (1, 2, 3 or 4) using a call-up signal (command value call up 1 to 4).

➢ Adjust the required command value using the associated potentiometers "w1" .. „w4" (or a connected external potentiometer). Check the setting at measuring socket "w".

✓ Now you can continue with the next command value.

Option VT-.../T5

Procedure:

➢ Select the command value to be adjusted (1, 2, 3 or 4) using a call-up signal (command value call up 1 to 4).

➢ Change the measuring point selector switch over to the command value to be adjusted (switch position 1, 2, 3 or 4 = command value call-up 1 to 4).

➢ Adjust the required command value using the associated potentiometers "w1" .. „w4" (or a connected external potentiometer). Check the setting at measuring socket "v".

✓ Now you can adjust the next command value.

Adjusting ramp times internally

The ramp time setting serves for limiting the limit stop of the hydraulic drive.

Conversion table

The table below shows the ramp time, which corresponds to the test voltage measured.

The conversion formula is: $t = 100\ \text{msec} / U_{\text{measuring socket}} / \text{V}$

J3	$U_{\text{measuring socket}}$ /V	5	3	2	1	0.5	0.3	0.2	0.1	0.05	0.03	0.02
Open (=basic setting)	t/msec ± 20 %	20	33	50	100	200	333	500	1000	2000	3333	5000
Plugged	t/sec ± 20 %	0.2	0.33	0.50	1	2	3.33	5	10	20	33	50

Option VT-.../T1

Procedure:

➢ Adjust the ramp time with the help of potentiometer "t" according to the conversion formula or the conversion table. Check the setting at measuring socket "t".

Option VT-.../T5

Procedure:

➢ Turn the measuring point selector switch to the ramp time to be adjusted (t1 to t5).

➢ Adjust the ramp time with the help of the associated potentiometer (t1 to t5) according to the conversion formula or conversion table. Check the setting at measuring socket "v".

✓ Repeat procedure for the next ramp time.

Adjusting ramp times externally

The use of an additional external potentiometer offers the following options:

- Increase in the ramp time set internally.
- Remote adjustment of the ramp time.
- Changing the ramp time by an analog jump signal coming from an external control

Conversion table

The following table lists the ramp times that correspond to the test voltage measured.

The conversion formula is as follows:

$$t = 100\ \text{msec} \Big/ U_{\text{measuring socket}} / \text{V}$$

J3	$U_{\text{measuring socket}}$ /V	5	3	2	1	0.5	0.3	0.2	0.1	0.05	0.03	0.02
Open (=basic setting)	t/msec ± 20 %	20	33	50	100	200	333	500	1000	2000	3333	5000
Plugged	t/sec ± 20 %	0.2	0.33	0.50	1	2	3.33	5	10	20	33	50

Option VT-.../T1

Procedure:

➢ Turn ramp potentiometer "t" to its left-hand limit stop.

➢ Adjust the ramp time with the help of the external potentiometer according to the conversion formula or conversion table. Check the setting at measuring socket "t".

Option VT-.../T5

Procedure:

Precondition: No ramp call-up may be activated.

➢ Turn potentiometer "t5" to its left-hand limit stop.

➢ Turn the measuring point selector switch to "F" (= current ramp time "t").

➢ Adjust the ramp time with the help of the external potentiometer according to the conversion formula or conversion table. Check the setting at measuring socket "v".

✓ No you can adjust the next ramp time (repeat procedure).

Adjusting the step-change height

By adjusting the step-change height you can correct the characteristic curve of the command value signal and adjust it to the hydraulic requirements.

This adjustment option is used for

- compensating for the hydraulic valve spool overlap and
- setting the optimum creep speed at defined input signals

Option VT-.../T1

Procedure:

Precondition: Enable signal is applied.

➢ Read all settings from measuring socket "w".

➢ Turn potentiometers "S+" and "S-" to their left-hand limit stops.

➢ Adjust the measuring signal to + 0.3 V using potentiometer "Zw".

➢ Set the required step-change height using potentiometer "S+".

➢ Adjust the measuring signal to - 0.3 V using potentiometer "Zw".

➢ Set the required step-change height using potentiometer "S-".

➢ Adjust the zero point using potentiometer "Zw".

Note: An external command value preselection must result in at least + 0.3 V / - 0.3 V at measuring socket "w" (with S+ /S- being turned to their left-hand limit stops).

Option VT-.../T5

Procedure:

Precondition: Enable signal is applied.

➢ Read all settings from measuring socket "v".

➢ Turn the measuring point selector switch to "7".

➢ Adjust the measuring signal to 0.3 V using potentiometer "Zw".

➢ Turn the measuring point selector switch to "0".

➢ Set the required step-change height using potentiometer "S+".

➢ Turn measuring point selector switch to "7".

➢ Adjust the measuring signal to - 0.3 V using potentiometer "Zw".

➢ Turn the measuring point selector switch to "0".

➢ Set the required step-change height using potentiometer "S-".

➢ Adjust the zero point using potentiometer "Zw".

Note: An external command value preselection must result in at least + 0.3 V / -0.3 V at measuring socket "v" (measuring point selector switch position "7").

Adjusting maximum values

By adjusting the maximum values for positive and negative signals you can correct the characteristic curve of the command value signal and adjust it to the hydraulic requirements (e.g. for symmetrizing the forward and backward movement).

Option VT-.../T1

Procedure:

Precondition: Before the maximum values can be adjusted, the zero point and step-change heights must be correctly set.

- ➤ Generate command value = ±100 % externally or with the help of a command value call-up.
- ➤ Adjust the required maximum value using potentiometers "Gw+" / "Gw-". Check the setting at measuring socket "w".

Option VT-.../T5

Procedure:

Precondition: Before the maximum values can be adjusted, the zero point and step-change heights must be correctly set.

- ➤ Generate command value = ±100 % externally or with the help of a command value call-up.
- ➤ Turn the measuring point selector switch to "7". Check at measuring socket "v" that the measuring signal = 10 V ± 0.2 V.
- ➤ Adjust the required maximum value using potentiometers "Gw+" / "Gw-". Check the setting at measuring socket "w".

Adjusting the actual value zero point

The zero point adjustment is used for compensating for the zero point offset, which is usually caused by unfavorable cabling influences.

Option VT-.../T1
Option VT-.../T5

Procedure:

- ➢ Switch the enable signal off or disconnect the solenoid connector from the hydraulic valve.
- ✓ The hydraulic valve moves to the mechanically centered position.
- ➢ Set the actual value to 0 V using potentiometer "Zx". Check the setting at measuring socket " x".

Note: In the case of valves with V-spool we recommend adjusting the zero point together with the hydraulic drive (in the operating state).

Recommended procedure for valves with V-spool:

- ➢ Activate enable signal.
- ➢ Preselect command value = 0 V. Check the setting at measuring socket "w".
- ➢ Bring the hydraulic drive to a standstill using potentiometer "Zx".

7 Troubleshooting

When an error is present:

- the green LED "readiness for operation" lights up
- the 24 V operating voltage is applied at output "ready for operation"

The error detector (19) provided on the amplifier monitors

- the position transducer cable for:
  - cable break (each individual wire)
  - short-circuit on the primary side
- overcurrent at the output stage (short-circuit)

Note: If the current input (command value 6) is de-energized as a result of a short-circuit or a cable break, the electronics sets the relevant command value component to zero.

If the polarity of the position transducer is reversed or the solenoids of connections "a" and "b" are interchanged, this will result in a positive feedback. In this case, the valve opens completely in an undefined direction. This wiring error is not recognized or signaled by the control. When faults occur, you should, therefore, check the wiring in particular (card – position transducer, card – solenoids).

Rexroth
Bosch Group

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr, Germany
info@boschrexroth.de
www.boschrexroth.com

Printed in Germany
RE 30119-B/03.04