

# Bosch Rexroth VT-VRPA2-2-1X/V0/T1 proportional valve amplifier

Manufacturer: Bosch Rexroth  
Manufacturer part number / published order designation: R900979889  
Published model: VT-VRPA2-2-1X/V0/T1

## About this compilation

Prepared by Hydmaster from selected manufacturer documentation. Original technical pages follow without cropped drawings, rewritten data or altered units. This cover and index are Hydmaster editorial material, not a manufacturer-issued exact-execution datasheet.

Coverage: selected pages relevant to the identified size and configuration. Other options or neighbouring models retained on an original page apply only where explicitly identified.

## Execution notes and conditions

Applies to 4WRE 10 series 2X with electrical position feedback; choose the actual valve-specific controller configuration.

0-2.5 A per output is amplifier capability, not a delivered current setting. Supply 18-35 V DC and operating temperature 0-50 °C apply.

## Source-page index

Source page numbers below are physical pages of each complete original PDF. The original printed page labels and technical content remain unchanged. Compiled page numbers count this cover/index.

### Source A: Bosch Rexroth Electronics Manufacturer Collection Original

| Original pages | Compiled pages | Relevant content                                                                                                                                                                                                                                                      |
|----------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 121-124        | 2-5            | Original RE30119/2013 VT-VRPA2 overview and manufacturer photograph; Existing type1/type2 valve-family key, T1/T5 option and command-input mapping; Enable, ramp, position-feedback controller and output-stage functions; Actual T1 block diagram and pin assignment |
| 126-127        | 6-7            | Supply, command, per-output current, connector and operating-temperature conditions; Actual T1 display, jumpers and adjustment controls                                                                                                                               |
| 130            | 8              | Eurocard dimensions and manufacturer installation/maintenance references                                                                                                                                                                                              |

# Valve amplifier for proportional directional valves

## Type VT-VRPA2

**RE 30119**

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H6641

- ▶ Component series 1X
- ▶ Analog, Euro-card format
- ▶ Suitable for controlling 4/3 proportional directional valves with electrical position feedback:
  - 4WRE 6...-2X,
  - 4WRE 10...-2X

### Features

- ▶ Differential input ( $\pm 10$  V)
- ▶ Four callable command value inputs ( $\pm 10$  V)
- ▶ Current input (4 ... 20 mA)
- ▶ Inversion of the internal command value signal via 24 V input or jumper
- ▶ Selection of ramp time via quadrant recognition (24 V input) or ramp time call-ups (24 V inputs) with option T5
- ▶ Selection of the ramp time range via jumper
- ▶ Characteristic curve correction by means of separately adjustable step levels and maximum values
- ▶ Enable input
- ▶ "Ready for operation" output signal
- ▶ Switchable measuring socket with option T5
- ▶ Reverse polarity protection for the voltage supply
- ▶ Power supply with DC/DC converter without raised zero point

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## Ordering code

| 01              | 02       | 03       | 04        | 05       | 06        |
|-----------------|----------|----------|-----------|----------|-----------|
| <b>VT-VRPA2</b> | <b>-</b> | <b>-</b> | <b>1X</b> | <b>/</b> | <b>V0</b> |

|    |                                                                                                                |                 |
|----|----------------------------------------------------------------------------------------------------------------|-----------------|
| 01 | Valve amplifier for proportional directional valves and proportional pressure valves, analog, euro-card format | <b>VT-VRPA2</b> |
| 02 | For controlling 4/3 proportional directional valves 4WRE 6...-2X                                               | <b>1</b>        |
|    | For controlling 4/3 proportional directional valves 4WRE 10...-2X                                              | <b>2</b>        |
| 03 | Component series 10 to 19 (10 to 19: Unchanged technical data and pin assignment)                              | <b>1X</b>       |
| 04 | Version: Standard                                                                                              | <b>V0</b>       |
| 05 | Option: With one ramp time                                                                                     | <b>T1</b>       |
|    | Option: With five ramp times                                                                                   | <b>T5</b>       |
| 06 | Further details in the plain text                                                                              | <b>*</b>        |

## Accessories

- Open card holder VT 3002-1-2X/48F (see data sheet 29928)

## Function

### Power supply unit [1]

The amplifier card has a power supply unit with making current limiter. This unit supplies all internally required positive and negative supply voltages.

### Command value specification

The internal command value signal is calculated from the total (summation [6]) of the external command value signal available at the differential input [2] and at the current input [3], the called-up signal [4] and the zero point offset [5] (zero point potentiometer "Zw").

### The following applies:

| Standard values | Current input        | Differential input | Command value measuring socket | Flow direction    |
|-----------------|----------------------|--------------------|--------------------------------|-------------------|
| -100 %          | 4 mA                 | -10 V              | -10 V                          | P to B,<br>A to T |
| 0 %             | 12 mA                | 0 V                | 0 V                            |                   |
| 100 %           | 20 mA                | 10 V               | 10 V                           | P to A,<br>B to T |
| 0 %             | < 1 mA <sup>1)</sup> |                    | 0 V                            |                   |

<sup>1)</sup> If the current input is not wired-up or if the cable of the current command value is broken, the resulting internal command value signal is 0 %.

There is no switch-over between current and voltage input. The inputs are permanently available (see block diagram).

### Command value call-ups [4]

Four command value signals "w1" to "w4" can be called up. The external command value voltages (command values 1 to 4) are either defined directly by the regulated voltage outputs +10 V and -10 V or via external potentiometers. If these command value inputs are directly connected to the regulated voltages, the command values are set at the potentiometers "w1" to "w4". When using external potentiometers, the internal potentiometers will function as attenuators or limiters.

Only one call-up can be operated at the same time. If several call-ups are operated simultaneously, call-up "1" has the lowest priority and call-up "4" has the highest priority. The respective active call-up is indicated via a yellow LED on the front plate.

### Command value inversion [7]

The command value created internally from the input signals, the command value call-ups and the zero point offset signal can be inverted by an external signal or jumper J1. The inversion is indicated by an LED ("-1") on the front plate.

**Enable function [8]**

The enable function enables the power output stages and forwards the internal command value signal to the ramp generator. The enable signal is indicated by an LED on the front plate. If enable is connected, the internal command value is changed (with any kind of command value specification) by the set ramp time. Thus, a controlled valve does not open abruptly.

**Ramp generator [9]**

The ramp generator limits the rise of the control output. The downstream step functions and amplitude attenuators do not extend or shorten the ramp time. Using jumper J2, the ramp time is set to a minimum (< 2 ms) (ramp off).

External ramp time setting:

Using an external potentiometer, the internally set ramp time can be extended. The setting can be verified by means of the measuring socket. In case of a cable break, the internal default setting will be valid automatically.

Note for setting and measuring the ramp time:

| Value at measuring socket<br>"t" (T1) / "v" (T5) |     |     |     |     |      | $U_t / V$ | 5    | 3    | 2  |
|--------------------------------------------------|-----|-----|-----|-----|------|-----------|------|------|----|
| Current ramp time ( $\pm 20\%$ )                 |     |     |     |     |      | $t / ms$  | 20   | 33   | 50 |
| $U_t / V$                                        | 1   | 0.5 | 0.3 | 0.2 | 0.1  | 0.05      | 0.03 | 0.02 |    |
| $t / ms$                                         | 100 | 200 | 333 | 500 | 1000 | 2000      | 3333 | 5000 |    |

By closing the jumper J3, the ramp times specified above can be increased tenfold.

**Characteristic curve generator [11]**

Using the adjustable characteristic curve generator, the step level and maximum values for positive and negative signals can be set separately according to the hydraulic requirements. The actual development of the characteristic curve through the zero point is not stepped but linear.

**Amplitude limiter [12]**

The internal command value is limited to approx.  $\pm 110\%$  of the nominal range.

**Oscillator [14]**

The oscillator creates the control signal for the inductive position transducer.

**Demodulator [15]**

The demodulator supplies the actual value signal of the valve spool position from the position transducer signal.  
100 %  $\triangleq$  10 V

**Position controller [17]**

The position controller is optimized in a valve-specific manner.

**Power output stage [18]**

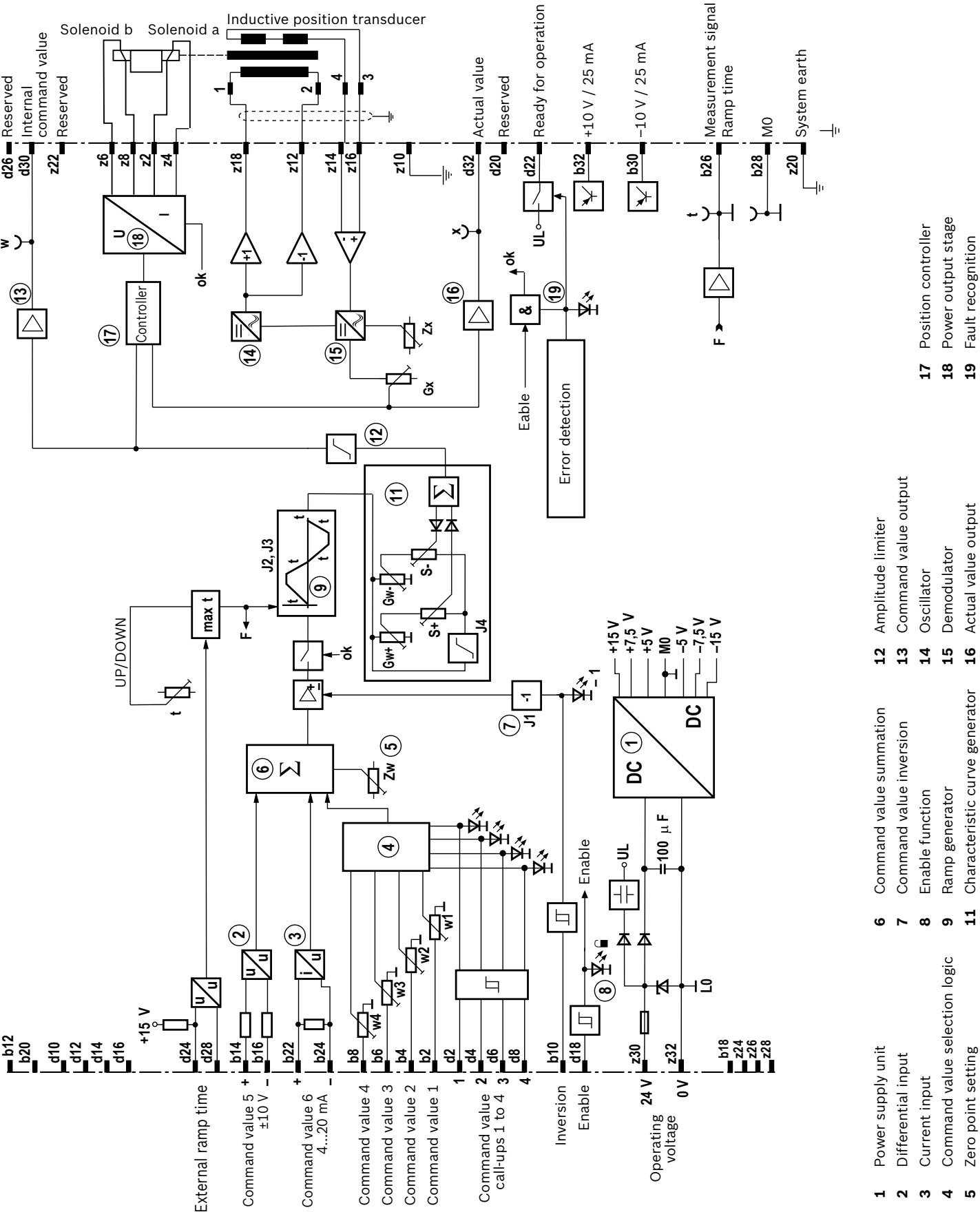
The power output stage creates the clocked solenoid current for the proportional valve. The solenoid current is limited to 2.5 A to 2.8 A per output. The output stage outputs are short-circuit-proof. The output stages are de-energized in case of an internal fault signal or if they have not been enabled..

**Fault recognition [19]**

The position transducer cable is monitored for cable break and short-circuits on the primary side as well as for over-currents at the output stage.

[ ] = Attribution to the block diagrams on pages 4 and 5

Block diagram/pin assignment, option T1



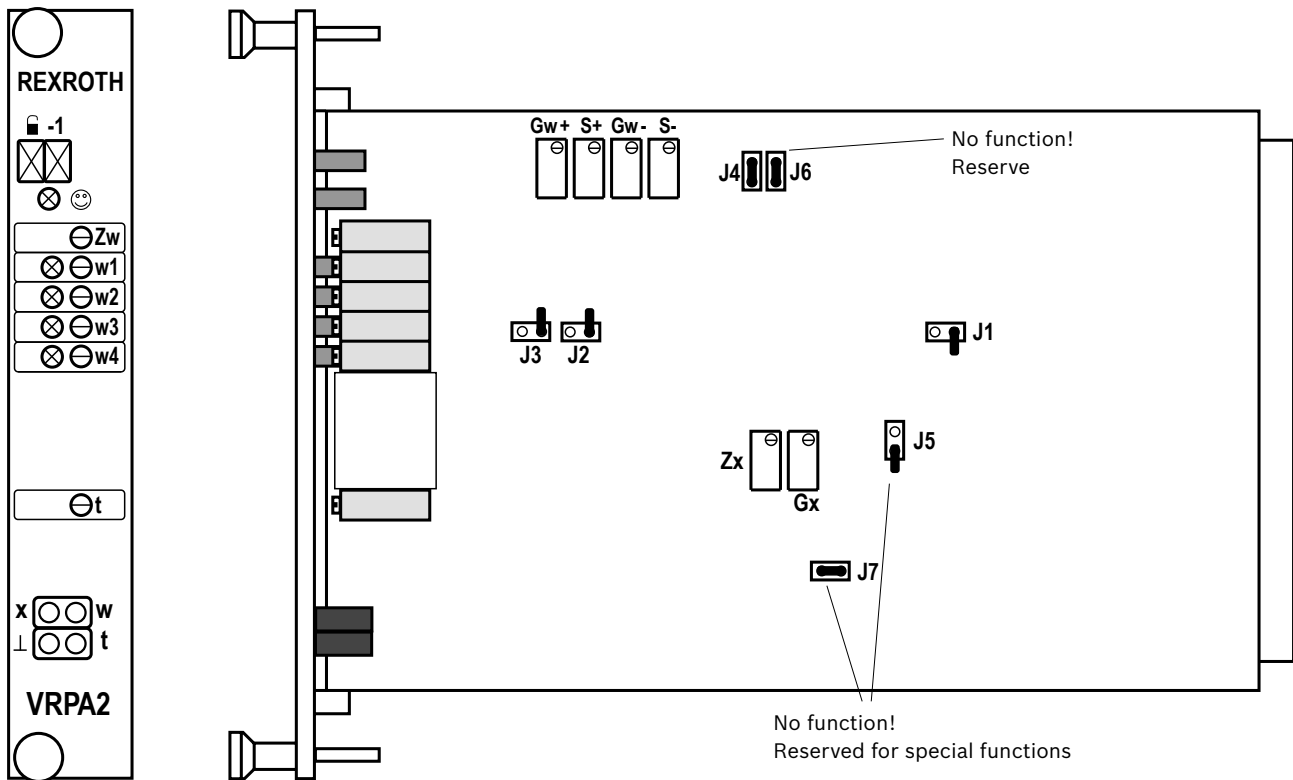
**Technical data** (for applications outside these parameters, please consult us!)

|                                                                                                                                  |                 |                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------|
| Operating voltage                                                                                                                | $U_B$           | 24 VDC + 40 % – 20 %                                                                                            |
| Operating range:                                                                                                                 |                 |                                                                                                                 |
| Upper limit value                                                                                                                | $U_B(t)_{\max}$ | 35 V                                                                                                            |
| Lower limit value                                                                                                                | $U_B(t)_{\min}$ | 18 V                                                                                                            |
| Power consumption                                                                                                                | $P_S$           | < 24 VA                                                                                                         |
| Current consumption                                                                                                              | $I$             | < 2 A                                                                                                           |
| Fuse                                                                                                                             | $I_S$           | 2 A medium time-lag, exchangeable                                                                               |
| Inputs, analog                                                                                                                   |                 |                                                                                                                 |
| Command values 1 to 4 (potentiometer inputs)                                                                                     | $U_e$           | 0 ... $\pm 10$ V, $R_e > 100$ k $\Omega$ (M0 is reference)                                                      |
| Command value 5 (differential input)                                                                                             | $U_e$           | 0 ... $\pm 10$ V, $R_e > 50$ k $\Omega$                                                                         |
| Command value 6 (current input)                                                                                                  | $I_e$           | 4 ... 20 mA, load $R_B = 100$ $\Omega$                                                                          |
| External ramp time                                                                                                               | $U_e$           | 0 ... +10 V, $R_e = 10$ k $\Omega$ (internally increased to +15 V, M0 is reference)                             |
| Inputs, digital                                                                                                                  |                 |                                                                                                                 |
| Command value call-ups,<br>Command value inversion,<br>Enable,<br>Ramp call-ups (option T5),<br>4-quadrant operation (option T5) | $U$<br>$U$      | 8.5 V ... $U_B \rightarrow$ ON, $R_e > 100$ k $\Omega$<br>0 ... 6.5 V $\rightarrow$ OFF, $R_e > 100$ k $\Omega$ |
| Setting ranges                                                                                                                   |                 |                                                                                                                 |
| Zero adjustment (potentiometer "Zw")                                                                                             |                 | $\pm 30$ %                                                                                                      |
| Command values (potentiometers "w1" to "w4")                                                                                     |                 | 0 ... 110 %                                                                                                     |
| Ramp times (potentiometer "t1" to "t5")                                                                                          |                 | 20 ms ... 5 s, switchable to 0.2 ... 50 s                                                                       |
| Step level (potentiometer "S+" and "S–")                                                                                         |                 | 0 ... 50 %                                                                                                      |
| Amplitude attenuator (potentiometer "G+" and "G–")                                                                               |                 | 0 ... 110 % (applies to the step level setting of 0 %)                                                          |
| Outputs                                                                                                                          |                 |                                                                                                                 |
| Command value signal                                                                                                             | $U$             | $\pm 10$ V $\pm 2$ %, $I_{\max} = 2$ mA                                                                         |
| Actual value signal                                                                                                              | $U$             | $\pm 2,5$ V $\pm 2$ %, $I_{\max} = 2$ mA                                                                        |
| Measurement signal (option 5)                                                                                                    | $U$             | $\pm 10$ V $\pm 2$ %, $I_{\max} = 2$ mA                                                                         |
| Ready for operation                                                                                                              | $U$             | > 16 V, 50 mA (in case of a fault: $U < 1$ V, $R_i = 10$ k $\Omega$ )                                           |
| Regulated voltages                                                                                                               | $U$             | $\pm 10$ V $\pm 2$ %, 25 mA, short-circuit-proof                                                                |
| Power output stage                                                                                                               | $I$             | 0 ... 2.5 A, short-circuit-proof, clocked with approx. 5 kHz                                                    |
| Oscillator                                                                                                                       | $U$<br>$f$      | $\pm 5$ V <sub>SS</sub> per output, 10 mA<br>5.6 kHz $\pm 10$ %                                                 |
| Measuring sockets                                                                                                                |                 |                                                                                                                 |
| Command value "w"                                                                                                                |                 | $\pm 10$ V $\pm 2$ %, $I_{\max} = 2$ mA                                                                         |
| Actual value signal "x"                                                                                                          |                 | $\pm 10$ V $\pm 2$ %, $I_{\max} = 2$ mA                                                                         |
| Ramp time "t"                                                                                                                    |                 | See description on page 3                                                                                       |
| Socket "v" (option T5)                                                                                                           |                 | See description on page 3 and table on page 9                                                                   |
| Type of connection                                                                                                               |                 | 48-pin male multipoint connector, DIN 41612, design F                                                           |
| Card dimensions                                                                                                                  |                 | Euro card 100 x 160 mm, DIN 41494                                                                               |
| Admissible operating temperature range                                                                                           | <b>9</b>        | 0 ... 50 °C                                                                                                     |
| Storage temperature range                                                                                                        | <b>9</b>        | –25 °C ... +85 °C                                                                                               |
| Weight                                                                                                                           | $m$             | 0.17 kg (net)                                                                                                   |

**Notice:**

For information on the environment simulation testing for the areas EMC (electromagnetic compatibility), climate and mechanical load, see data sheet 30119-U.

## Display/adjustment elements, option T1



|               |    |
|---------------|----|
| Inversion     | J1 |
| Inverting     |    |
| Not inverting | •  |

|               |    |
|---------------|----|
| Ramp function | J2 |
| Off           |    |
| On            | •  |

|                 |    |
|-----------------|----|
| Ramp time       | J3 |
| 0.2 ... 50 sec. |    |
| 0.02 ... 5 sec. | •  |

|               |    |
|---------------|----|
| Step function | J4 |
| Off           | •  |
| On            |    |

### LED displays:

- Ready for operation (green)
- Enable (yellow)
- 1** External inverting

### Measuring sockets:

- x, w, t** Measurement signal (see page 6)
- ⊥** Measurement zero

### Potentiometers (some with LED display):

- Zw Zero point calibration
- w1 Command value 1
- w2 Command value 2
- w3 Command value 3
- w4 Command value 4
- t Ramp time

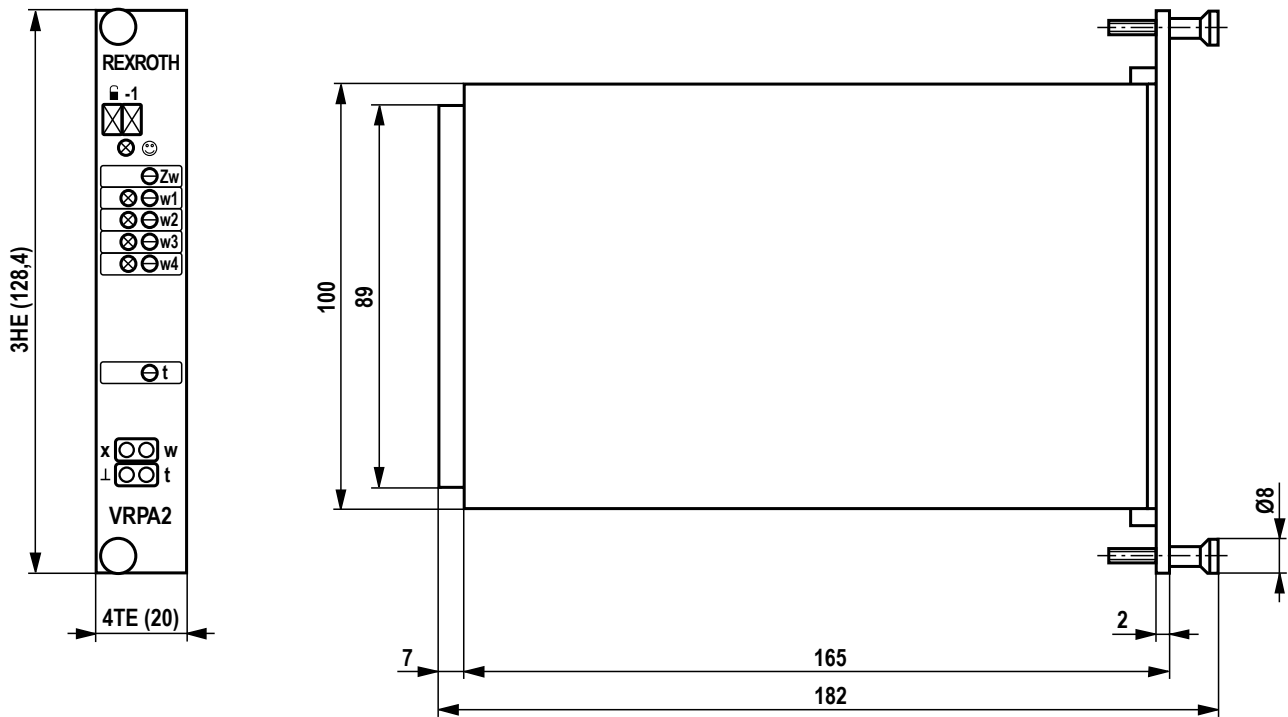
Adjustable on the board:

- Gw+ Amplitude attenuator for positive command values
- Gw- Amplitude attenuator for negative command values
- S+ Step level for positive direction
- S- Step level for negative direction

|   |                                  |
|---|----------------------------------|
| • | = Factory setting of the jumpers |
|   | = Jumper closed                  |
|   | = Jumper open                    |

**The warranty expires if the sealed potentiometer is adjusted.**

## Dimensions (dimensions in mm)



## Project planning / maintenance instructions / additional information

- For more information, refer to document 30119-B.