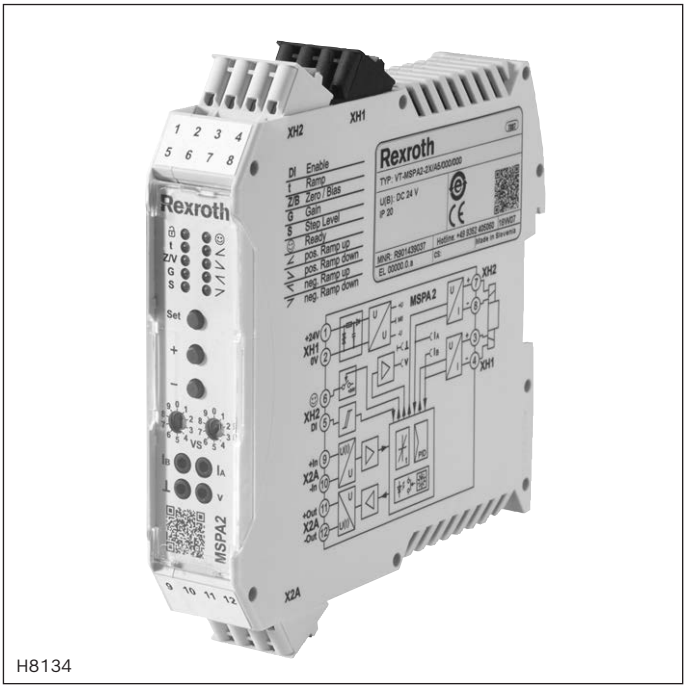
**RE 30232-02**
Edition: 2021-04

rexroth
A Bosch Company

# Valve amplifier for proportional valves without electrical position feedback Maximum current limitation 1.5 A

# Type VT-MSPA2...1A5




H8134

- Component series 2X
- Easy valve selection of the Rexroth valves for industrial hydraulics
- Characteristic curves of the valves stored in the device
- Valve optimization via push-buttons
- All valve parameters adjustable
- For valve with one or two solenoids and 24 V nominal voltage

## Features

- Command value input 0 ... ±10 V
- Maximum ambient temperature range 70 °C
- Reverse polarity protection of the operating voltage
- Ramp generator up and down is separately adjustable
- Zero point setting
- Command value adjustment
- Characteristic curve generator
- Clocked power output stage
- Output short-circuit-proof
- LED status displays
- Measuring sockets for actual current value, internal current command/setting

## Contents

## Ordering code

| 01 | 02 | 03 | 04 | 05 | 06 |
|---|---|---|---|---|---|
| **VT-MSPA** | **2** | **–** | **2X** | **/** | **A5** | **/** | **1A5** | **/** | **000** | ***** |

| | | |
|---|---|---|
| 01 | Valve amplifier for proportional valves without position feedback, analog, modular design | **VT–MSPA** |
| 02 | For proportional valves with 1 or 2 solenoids | **2** |
| 03 | Component series 20 ... 29 (20 ... 29: unchanged technical data and connections) | **2X** |
| 04 | Command value voltage (1 solenoid 0 ... +10 V / 2 solenoids 0 ... ±10 V) | **A5** |
| 05 | Maximum current limitation 1.5 A | **1A5** |
| 06 | Further details in the plain text | ***** |

### Available variant

| Type | Material no. |
|---|---|
| VT-MSPA2-2X/A5/1A5/000 | R901505408 |

## Function

**General**
The valve amplifiers are intended for assembly on top hat rails. The electrical connection is established via 3 tension spring plug-in connectors. The supply voltage is 24 VDC.

**Power supply unit (1)**
The internal power supply unit has a making current limiter to prevent current peaks. Additionally, inverse-polarity protection is integrated.

**Command value, command value summing device (3)**
The "internal command value" comprises:
- "External command value", connected at the input of the differential amplifier (2)
- Zero point offset (4), "Z/B" adjustable in the standard setup
- Via solenoid B, a command value of 0 ... +10 V results in a flow in the valve from P to A and from B to T.
- Via solenoid A, a command value of 0 ... -10 V results in a flow in the valve from P to B and from A to T. In the expert setup, it is possible to invert the command value (5) (see operating instructions 30232-02-B).
- In normal operation, the "internal command value" can be measured at the "v" measuring socket.

**Ramps**
A ramp limits the incline of the command value.
You can choose between a single ramp (6) (one time for all ramps, default value) and a 4Q/2Q ramp (7)
(different times for the possible ramps). The 4Q/2Q ramp times are set in the expert setup. The characteristic curve generator (9) does not influence the ramp time.

**Command value attenuator "G" (8)**
By means of the command value attenuator, the command value can be reduced.

**Characteristic curve generator (9)**
In the characteristic curve generator, the pre-set valve characteristic curve can be adjusted to the actual hydraulic and control-technical conditions.
The following can be adjusted in the expert setup:
- Pilot current "B"
- Step "S"
- Maximum current "G" (separately possible for solenoid A and B)

**Current controller (10)**
The solenoid current is recorded, compared to the command value in the current controller and the difference is compensated.

**Clock generator (11)**
The clock generator creates the clock frequency "f" of the output stage. With Rexroth valves, the clock frequency sometimes changes dependent on the command value and/or the operating voltage.

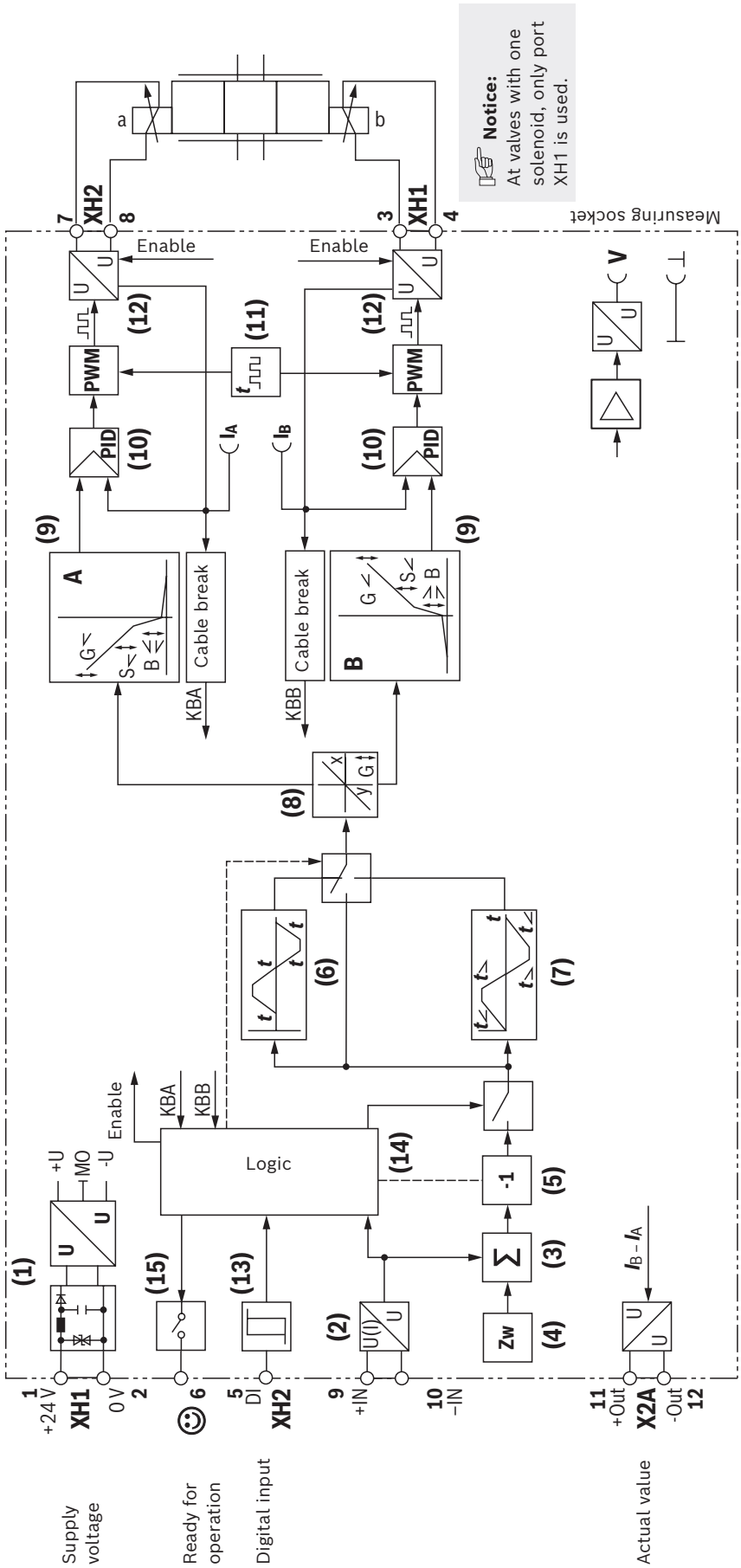
**Power output stage (12)**
The power output stage creates the clocked solenoid current for the proportional valve. The solenoid current is limited to the maximum admissible current per output, depending on the set valve. The output stages are short-circuit-proof. With an internal interference signal or in case enable is missing, the output stage will be switched off.

**Digital input (13)**
The input DI can be set to four different functions:
- 1. Enable (factory setting)
- 2. Command value inversion (permanent enable)
- 3. Ramp on/off (permanent enable)
- 4. Single or quadrant ramp (permanent enable)

**Digital output (15)**
Device notifies ready for operation if there is no cable break, no internal error and $\boldsymbol{U}_{B} \geq \boldsymbol{U}_{B\,min}$

See also "block diagram", on page 4.

## Block diagram




**1** Power supply unit
**2** Differential amplifier
**3** Command value summing device
**4** Zero point setting
**5** Inverter
**6** Single ramp
**7** 4-quadrant ramp
**8** Command value attenuator
**9** Characteristic curve generator
**10** Current controller
**11** Clock generator
**12** Output stage
**13** Enable / inverting / ramp off / 4Q ramp
**14** Switching logics / fault recognition
**15** Digital output

See also "Function" on page 3.

## Technical data

| | | | |
|---|---|---|---|
| **General** | | | |
| Component series | | | 2X |
| Design | | | Module |
| **Voltage supply** | | | |
| Operating voltage | ▶ Nominal | V | 24; +40% ... –20% |
| | ▶ Lower limit value | V | 18 |
| | ▶ Upper limit value | V | 36 |
| | ▶ Maximum admissible residual ripple (40 ... 400 Hz) | Vpp | 2.5 (observe the admissible limits) |
| Maximum power consumption | | W | < 48 |
| Maximum current consumption | | A | < 2 |
| Maximum switch-on current | | A | < 4 |
| External fuse | | A | 3.15 time-lag |
| **Analog input** | | | |
| Command value | ▶ 2 solenoids (0 ... ±100%) | V | 0 ... ±10 |
| | ▶ Voltage (differential input) | kΩ | 200 (input resistance) |
| **Analog output** | | | |
| Solenoid current as voltage | ▶ $I_A$ | V | 0 ... -1.5 (V ≙ A) |
| | ▶ $I_B$ | V | 0 ... 1.5 (V ≙ A) |
| | ▶ Minimum load impedance | Ω | 1000 |
| **Digital input** | | | |
| On (active) [1] | | V | 11 ... $U_B$ |
| Off (inactive) | | V | -3 ... 5 |
| **Solenoid outputs** | | | |
| Maximum solenoid current | | A | 1.5 |
| Clock frequency setting range [2] | | Hz | 95 ... 505 |
| Other properties, solenoid output | | | Short-circuit-proof, clocked |
| Cable length for 1.5 mm² | | m | 50 |
| **Adjustment options** | | | |
| Zero point calibration | | % | ±10 |
| Command value attenuator [3] | | % | 70 ... 110 |
| Ramp time up / down | | s | 0.01 ... 30 |
| Step level | | % | 0 ... 50 |
| **Measuring sockets** | | | |
| Command value/setting | ▶ "v" | V | 0 ... ±10 |
| Actual current value | ▶ $I_A$ | V | 0 ... 1.5 (V ≙ A) |
| | ▶ $I_B$ | V | 0 ... 1.5 (V ≙ A) |
| Reference potential | ▶ "⊥" | | |
| Additional information | | | See operating instructions 30232-02-B |

[1] $R_E$ > 50 k

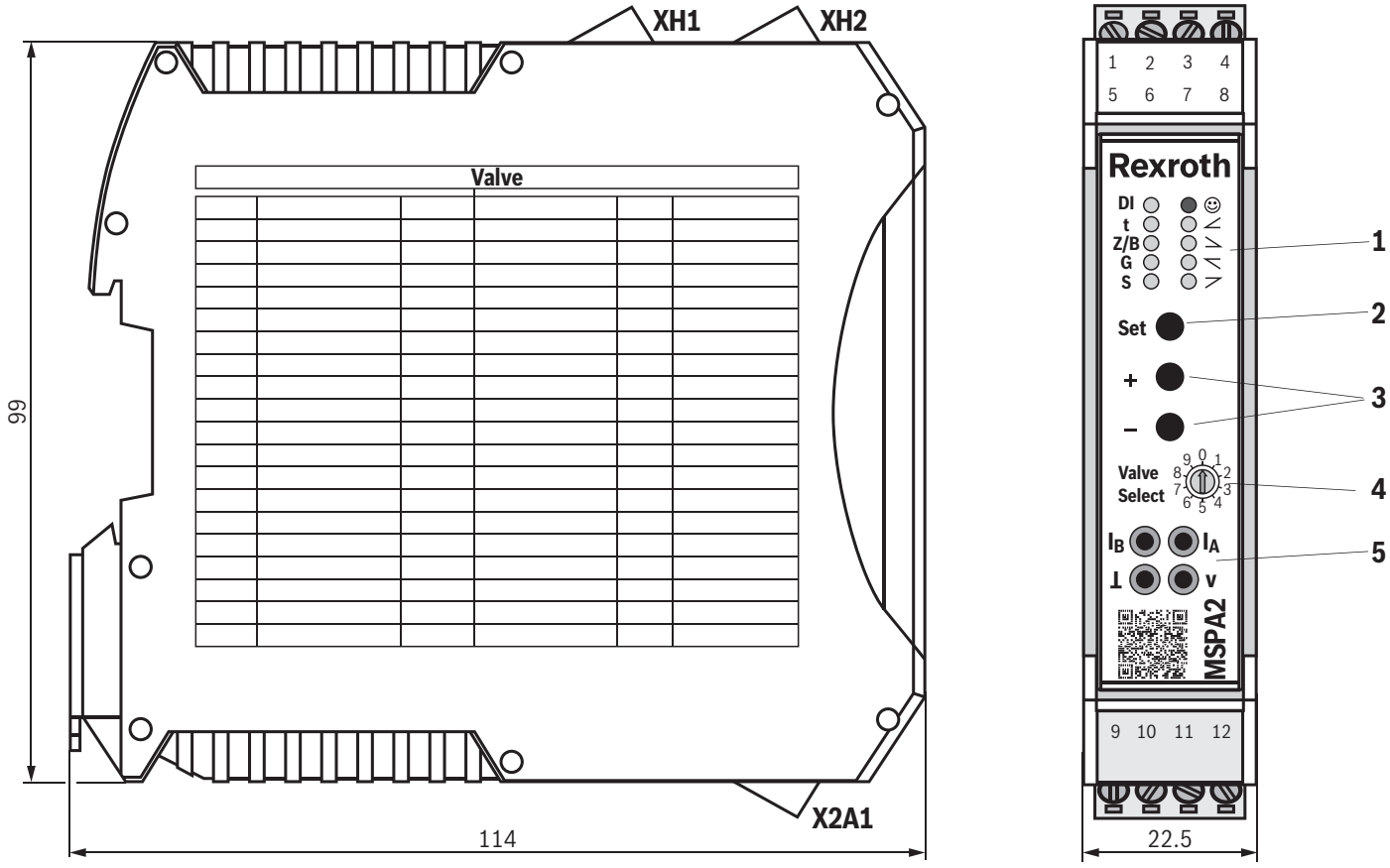
[2] Depending on the selected valve

[3] Applies to a command value of 100%

## Technical data

| **Supplementary information** | | | |
|---|---|---|---|
| Start-up time | | s | < 1 |
| Type of connection | | | 3 tension spring plug-in connectors, detachable |
| Protection class according to EN 60529 | | | IP 20 |
| Ambient temperature range | | °C | 0 ... +70 |
| Weight | | kg | 0.14 |
| Maximum admissible temperature change | | °C/min | 5 |
| Transport temperature range | | °C | –40 ... +70 |
| Recommended storage temperature with UV protection | | °C | +5 ... +40 |
| Relative air humidity (without condensation) | | % | 10 ... 95 |
| Maximum altitude for use | | m | 2000 |
| UV resistance | | | Housing is only partly UV resistant. Extended exposure to radiation may cause color changes. |
| Transport shock according to DIN EN 60068-2-27 | | | 15 g / 11 ms / 3 axes |
| Sine test according to DIN EN 60068-2-6 | | Hz | 10 ... 500 (maximum 2 g / 10 cycles / 3 axes) |
| Noise test according to DIN EN 60068-2-64 | | Hz | 20 ... 500 (2.2 g RMS / 6.6 g peak / 30 min. / 3 axes) |
| Free fall (in original packaging) | | m | 1 |
| Installation position | | | Vertical. For breathing of the assembly, the ventilation slots of the top and bottom side must be at least 2 cm away from covers, walls, etc. With an ambient temperature of more than 50 °C, the clearance to the next assembly must be 1 cm. |
| Top hat rail assembly | | | TH35-7.5 or TH35-15 according to EN 60715 |
| Housing material | | | Glass-fiber reinforced polyamide plastic |
| Resistance against aggressive media | | | Contact with conductive dusts is not admissible. Avoid contact with hydraulic fluids. |
| Electro-magnetic compatibility (EMC) | ▶ EN 61000-6-2 | | |
| | – EN 61000-4-2 ESD | kV | 4 kV CD / 8 kV AD with BWK B |
| | – EN 61000-4-3 HF radiated | V/m | 10 (80 ... 6000 MHz) with BWK A |
| | – EN 61000-4-4 Burst | kV | 2 (5 kHz and 100 kHz) with BWK B |
| | – EN 61000-4-5 Surge | kV | 0.5 (2 **Ω/12 Ω**) to operating voltage, 1 kV (42 **Ω) to signal with** BWK B |
| | – EN 61000-4-6 HF conducted | $V_{eff}$ | 10 (150 kHz ... 80 MHz) with BWK A |
| | – EN 61000-4-8 Magnetic field 50/60 Hz | A/m | 100 with BWK A |
| | ▶ EN 61000-6-3 / EN 61000-6-4 | | |
| | – EN 55016-2-1 Interference voltage | MHz | 0.15 ... 30 (class A, EN 55022) |
| | – EN 55016-2-3 Radio interference field strength | MHz | 30 ... 6000 (class B, EN 55022) |

## Dimensions
(dimensions in mm)




1 **Status LEDs**
Display the current operating state, menu levels and error conditions

2 **SET key**
Editing the selected parameters, selection of work operation, selection of the "expert mode"

3 **+ / - keys**
Selection of the parameters and adjustment of the parameter values

4 **Rotary switch**
Valve type selection

5 **Measuring sockets for connecting a measuring instrument**

**Assignment:** Switch position/valve type

| Switch position | Valve type |
|---|---|
| 0 | No valve |
| 1 | 4WRA 6 WA15...2X...K10<br>4WRA 6 XA00...K10 |
| 2 | 4WRA 6 W30...2X...K10<br>4WRA 6 E00 ...2X ...K10 |
| 3 | 4WRZ ...7X...K10 |
| 9 | Universal (1.5 A) |

**Terminal assignment**

| Assignment | | Connector | Terminal |
|---|---|---|---|
| Operating voltage | $+U_B$ | XH1 | 1 |
| | 0 V | XH1 | 2 |
| + solenoid B | | XH1 | 3 |
| – solenoid B | | XH1 | 4 |
| Digital input | | XH2 | 5 |
| Ready | | XH2 | 6 |
| + solenoid A | | XH2 | 7 |
| – solenoid A | | XH2 | 8 |
| + command value | | X2A | 9 |
| – command value | | X2A | 10 |
| + actual value | | X2A | 11 |
| – actual value | | X2A | 12 |

## Status description LEDs

| Indicator light | Operating state | Display mode | Meaning |
|---|---|---|---|
| "Digital input" LED (yellow) | Normal operation | Permanent light on/off | Digital input status |
| | Setup | Flashing | Standard setup active |
| | Setup | Off | Expert setup active |
| | Setup | On/flashing/flickering | Expert setup: Digital input setting |
| "Ready" LED (red/green) | Normal operation | Permanent light, green | Module ready for operation |
| | Normal operation | Permanent light, red | Error |
| | Normal operation and setup | Flashing light, red-green | Valve setting changed |
| | Normal operation and setup | Flashing light, red | Inadmissible valve number |
| | Normal operation | Off | Module not ready for operation |
| | Setup | Flashing light, green | Expert setup active |

| **Description of the LED display** [1] | |
|---|---|
| DI | Enable [2] |
| t | Ramp |
| Z/B | Zero point / pilot current |
| G | Command value attenuator |
| S | Step level command value |
| ☺ | Ready for operation |
| ◿ | 1. quadrant (positive command value rising) |
| ◺ | 2. quadrant (positive command value falling) |
| ◸ | 3. quadrant (negative command value rising) |
| ◹ | 4. quadrant (negative command value falling) |

[1] A detailed description is contained in the operating instructions 30232-02-B

[2] Function of the digital input can be adjusted in the setup

## **Accessories** (separate order)

| | **Material no.** |
|---|---|
| Shield set for the installation with shielded lines | **R961011117** |

## Project planning and maintenance instructions

☞ **Maintenance instructions:**

- The devices have been tested in the plant and are supplied with default settings.
- Only complete devices can be repaired.
- Repaired devices are returned with default settings. User-specific settings must be made by the machine end-user once again.

☞ **Notices:**

- In especially EMC-sensitive environments, additional measures must be taken (depending on the application, e.g. shielding, filtration)
- **Wiring information**
  - Maximum possible spatial separation between signal and load lines.
  - Do not lead signal lines through magnetic fields.
  - If possible, install signal lines without intermediate terminals.
  - Do not install signal lines in parallel to the load lines.
  - Connect cable shields (see operating instructions 30232-02-B)
  - For digital inputs and outputs as well as command and actual value, the max. admissible cable length for unshielded cables is 30 m. With longer cable lengths, shielded cables are to be used.
  - The distance to radios must be sufficient (> 1 m).
  - With a strongly fluctuating operating voltage, in individual cases, it may be necessary to use an external smoothing capacitor with a capacity of at least 2200 µF.
- Recommendation: capacitor module VT 11110 (see data sheet 30750); sufficient for up to 3 amplifier modules.
- The upper and lower ventilation slots must not be concealed by adjacent devices in order to provide for sufficient cooling.

## Further information

| | |
|---|---|
| ▶ Valve amplifier for proportional valves without electrical position feedback; maximum current limitation 1.5 A | Operating instructions 30232-02-B |
| ▶ Installation, commissioning and maintenance of proportional valves | Data sheet 07800 |
| ▶ Assembly, commissioning and maintenance of hydraulic systems | Data sheet 07900 |

## Notes

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