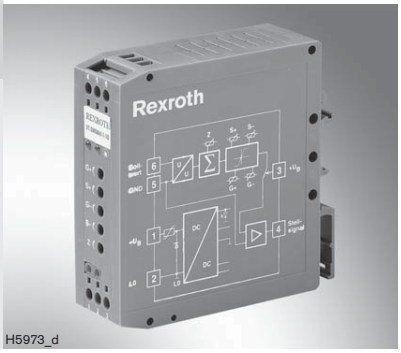
Analogue command value module

RE 29903/06.05 1/6
Replaces: 02.03

Type VT-SWMAK-1

Series 1X



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Features

- Suitable for controlling valves with integral electronics
- For valve spool overlap compensation
- Possibility of adjusting the maximum valve opening and the hydraulic zero point; convenient correction of zero point shifts
- Adjustment elements:
  1 potentiometer for zero point adjustment (command value offset)
  2 potentiometers for command value attenuation for positive and negative signals
  2 potentiometers for jump adjustment for positive and negative signals
- LED lamps: Enable
  Power
- Measuring socket for command value
- Differential input; enable input
- Control signal output
- Power supply unit without raised zero point
- Without power part
- Reverse voltage protection for voltage supply

Ordering code

**VT-SWMAK-1 −1X/V0/ 0 *

- Analogue command value module
- Series 10 to 19 (10 to 19: unchanged technical data and pin assignment) = 1X
- Basic version
- Basic version
- Further details in clear text

Functional description

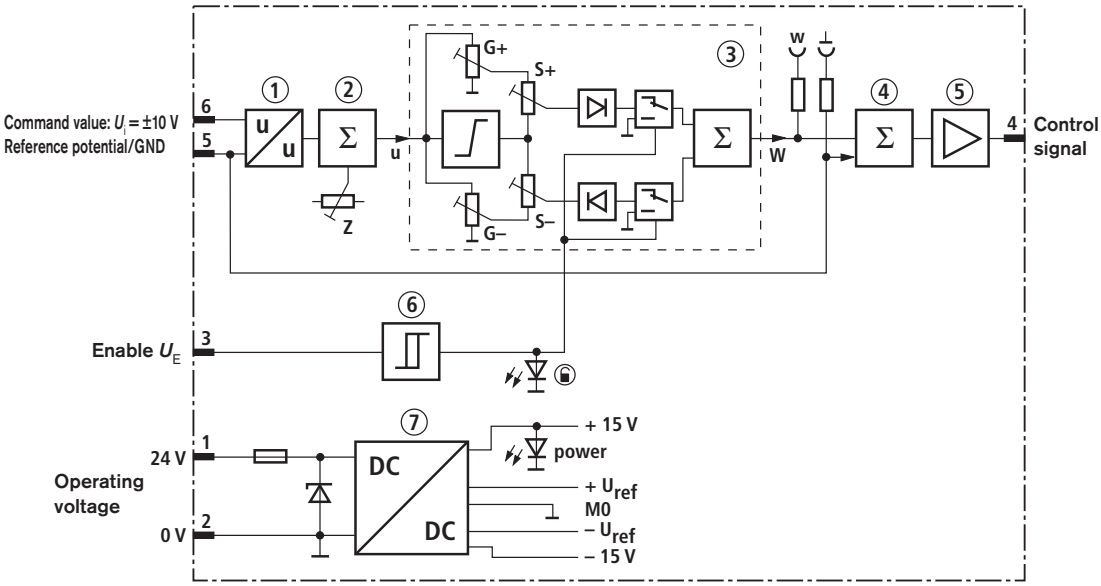
The command value module requires 24V DC voltage. A power supply unit [7] provides the internally required positive and negative supply voltage. As soon as the power supply unit is in operation, the green LED (“power“) lights up. The control signal can be cut in or out by applying a signal at the enable input (connection 3). If no enable signal is applied, the control signal is 0 % (with reference to the reference potential “GND“ of the command value).

The summator [2] adds an offset, which can be adjusted by means of potentiometer “Z”, to the externally provided command value. Thus, zero point drifts from the control side can be compensated for and the hydraulic zero point can be exactly adjusted. The adjustable characteristic curve generator [3] can be used to adjust the jump height and maximum values independently of each other for positive and negative signals in accordance with the hydraulic requirements.

The potentiometers “S+“ and “S−“ serve to compensate for the valve overlap; the potentiometers “G+“ and “G−“ are used for adjusting the maximum flow of the servo- or proportional valve (see output characteristic curve and adjustment recommendation).

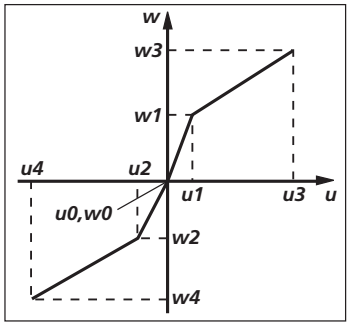
The control signal has the same reference potential/GND as the command value. In the case of fluctuations in the reference potential, the summator [4] corrects the control signal as required.

Block circuit diagram



1	Differential input	**5**	Output amplifier
2; 4	Summator	**6**	Trigger
3	Characteristic curve generator	**7**	Power supply unit

Output characteristic curve



Points of inflection of characteristic curves:

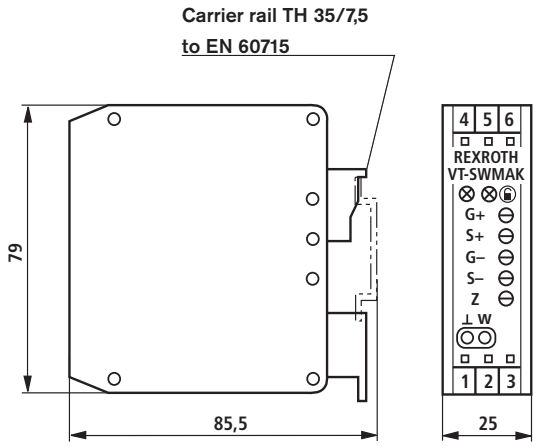
u0	0 %		
w0	0 %		
u1	+2 % = +200 mV		
w1	0 % to +50 % **(S+)**	=	0 V to +5 V
u2	−2 % = −200 mV		
w2	0 % to −50 % **(S−)**	=	0 V to −5 V
u3	+100 % = +10 V		
w3	w1 up to +110 % **(G+)**	=	w1 up to +11 V
u4	−100 % = −10 V		
w4	w2 up to −110 % **(G−)**	=	w2 up to −11 V

The minimum value of *w3* and *w4* corresponds to the setting of *w1* and *w2*.

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

Operating voltage	U_O	24 VDC
Operating range:		
– Upper limit value	$u_O(t)_{max}$	35 V
– Lower limit value	$u_O(t)_{min}$	18 V
Power consumption	P_C	1.2 VA
Current consumption	I_{max}	50 mA
Fuse		Electronic protection
Inputs:		
– Command value (differential input)	U_e	0 to ±10 V; Re = 100 kΩ (common reference potential with control signal output)
– Enable		
• active	U_F	> 8.5 V
• inactive	U_F	< 6.5 V
Adjustment range:		
– Jump function		0 to 50 %; jump height achieved at U_{comm} = 2 % (can be adjusted separately for positive and negative signals)
– Amplitude attenuator		0 % to 110 %; this is valid for a jump height setting = 0 % (can be adjusted separately for positive and negative signals)
– Balance		±10 %
Outputs:		
– Actuating signal	U	0 to ±10 V
– Measuring socket for command value "w"	U_w	0 to ±10 V (±10 V = ±100 %)
Type of connection		6 screw-type terminals
Type of mounting		Carrier rail NS 35/7.5 to DIN 50022
Type of protection		IP 20 to DIN 40050
Dimensions (W x H x D)		25 x 79 x 85.5 mm
Permissible operating temperature range	ϑ	0 to +50 °C
Storage temperature range	ϑ	−25 to +85 °C
Weight	m	0.08 kg

Unit dimensions (Dimensions in mm)



G+	Amplitude attenuator for positive command values
S+	Jump height for positive direction
G–	Amplitude attenuator for negative command values
S–	Jump height for negative direction
Z	Balancing
w	Internal command value
⊥	Reference potential

LED lamps:

green → power

yellow → enable „🔓“

Terminal assignment

Operating voltage	**$+U_O$**	**1**	**4**		**Control signal output**
	0 V	**2**	**5**	**GND**	**Reference potential**
Enable	**U_E**	**3**	**6**	**U_i**	**Command value input**

Engineering / maintenance notes

- The command value module may only be wired when disconnected from the power supply!
- Do **not** lay lines near power cables!
- The distance to aerial lines, radio equipment and radar systems must be at least 1 m!
- Always connect the reference potential of the differential input “GND“ to the earth of the control!

Adjustment recommendations

With external command value feedforward:

1. • Apply operating voltage
   • Turn potentiometers “S+“ and “S-“ to the left-hand limit stop (Min)
   • Turn amplitude attenuators “G+“ and “G-“ to the righthand limit stop (Max)
   • Preselect command value 0 %
   • Apply enable signal
2. Zero point adjustment
   Attention! Terminal 5 is the reference potential for the command value input and the actuating signal output and must be connected to 0 V (earth) at the control.
   • Set 0 V at measuring socket “w” using potentiometer “Z“
3. Jump height adjustment
   • Preselect command value +2 %
   → the measuring socket signal is now approx. 0.19 V to 0.23 V
   • Adjust the positive jump height using potentiometer “S+“; check the control variable at measuring socket “w“ (10 V = 100 %)
   • Preselect command value −2 %
   → the measuring socket signal is approx. −0.19 V to −0.23 V
   • Adjust the negative jump height using potentiometer “S-“; check the control variable at measuring socket “w“ (−10 V = −100 %)

   For an exact hydraulic adjustment, the valve and the hydraulics must also be in operation. The jump height must be adjusted according to the required min. drive speed (creep speed).
4. Maximum value adjustment
   • Preselect command value +100 %
   → the measuring socket signal is now approx. 10 V to 11 V
   • Set the positive max. control variable using potentiometer “G+“; check the control variable at measuring socket “w“ (10 V = 100 %)
   • Preselect command value −100 %.
   → the measuring socket signal is now approx. −10 V to −11 V
   • Set the negative max. control variable using potentiometer “G-”; check the control variable at measuring socket “w“ (−10 V = −100 %)

Without external command value feedforward:

1. • Apply operating voltage
   • Turn potentiometers “S+“ and “S-“ to the left-hand limit stop (Min)
   • Turn amplitude attenuators “G+“ and “G-“ to the right-hand limit stop (Max)
   • Preselect command value 0 % (input open or short-circuited)
   • Apply enable signal
2. Step height adjustment
   • Set an internal command value of +2 % using potentiometer “Z“ → the measuring socket signal is now 0.2 V
   • Adjust the positive jump height using potentiometer “S+“; check the control variable at measuring socket “w“ (10 V = 100 %)
   • Set an internal command value of −2 % using zero point potentiometer “Z“
   → the measuring socket signal is now −0.2 V
   • Adjust the negative jump height using potentiometer “S-“; check the control variable at measuring socket “w“ (−10 V = −100 %)
3. Zero point adjustment
   • Set 0 V at measuring socket “w” with the help of potentiometer “Z“
4. Maximum value adjustment
   • Only possible with external command value feedforward

Notes