Rexroth
Bosch Group

Analogue command value module

RE 29902/07.05 1/6
Replaces: 02.03

Type VT-SWMA-1

Series 1X

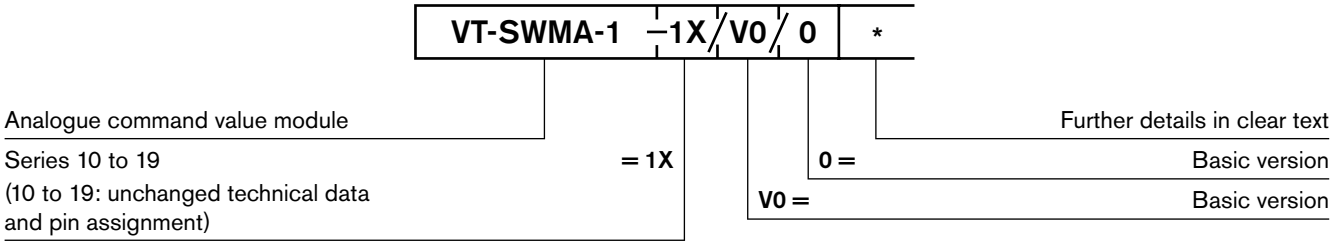
H5999

Table of contents

Features

- Suitable for controlling valves with integral electronics
- Possibility of realising simple hydraulic functions via digital controlling
- Adjustment elements:
  1 potentiometer for zero point adjustment (command value offset)
  1 potentiometer for command value attenuation (for differential input)
  4 potentiometers for command value preselection
  5 potentiometers for ramp time adjustment
- LED lamps: Command value call-up (4 x)
  Active ramp time (4 x)
  Quadrant recognition
  Polarity reversal
  Power
- Measuring sockets for command value and ramp time
- Differential input
- 4 call-up possibilities each for command value and ramp time
- Ramp generator with 5 ramp times; 4-quadrant recognition
- Control signal output
- Power supply unit without raised zero point
- Without power part

Ordering code



Functional description

General

The command value module is to be snapped onto top hat rails to EN 60715. The electrical connection is made using screw-type terminals. The module is operated with 24V DC voltage. A power supply unit [1] provides the internally required positive and negative supply voltages. The green LED (power) lights up as soon as the power supply unit is in operation.

Internal command value

The internal command value is generated from the external command value signal applied to differential input [2], a called up signal and an offset signal (zero point potentiometer “Z“ [3]).

The external command value signal can be changed from 0 % to approx. 110 % by means of potentiometer “G“ (amplitude attenuator [4]).

Command value call-ups

Call-up signals w1 to w4 [5] can also be adjusted between 0 % and 110 %. Call-up signals w1 and w2 have a positive, call-up signals w3 and w4 a negative polarity. This allows the realisation of two forward and two reverse movements of the hydraulic drive without requiring any additional circuitry. For applications that require more than two signals of the same polarity, command value inversion is provided [6]. If this is activated, for example, together with call-up 3, call-up signal w3 also provides a positive control variable.

Only 1 call-up is possible at a time. If several call-ups are activated simultaneously, the following is valid: Call-up “1“ has the lowest priority, call-up “4“ has the highest priority [7].

Quadrant recognition

When quadrant recognition [8] is activated, the electronics automatically recognises the polarity [9] and any changes (up/down) [10] in the control variable and assigns a ramp time to the current signal state.

Ramp time	Polarity of-control output	Signal changes in direction of…	
t1	+	Maximalwert	0 % → Maximum value (+)
t2	+	0 %	Maximum value (+) → 0 %
t3	–	Maximalwert	0 % → Maximum value (–)
t4	–	0 %	Maximum value (–) → 0 %

As long as the signal is being changed, the LED assigned to the current ramp is alight.

Ramp time call-ups [11]

When quadrant recognition is not activated, a separate ramp time “t1” to “t4” is assigned to each command value call-up “w1” to “w4”.

As long as a signal is being changed, the LED assigned to the current ramp time is alight.

Ramp time “t5“ [12]

If neither quadrant recognition nor a call-up is activated, ramp time “t5” is always valid. This ramp time can be used, among others, for an emergency stop function. The valve can be closed with the defined ramp time “t5“.

Ramp time adjustment

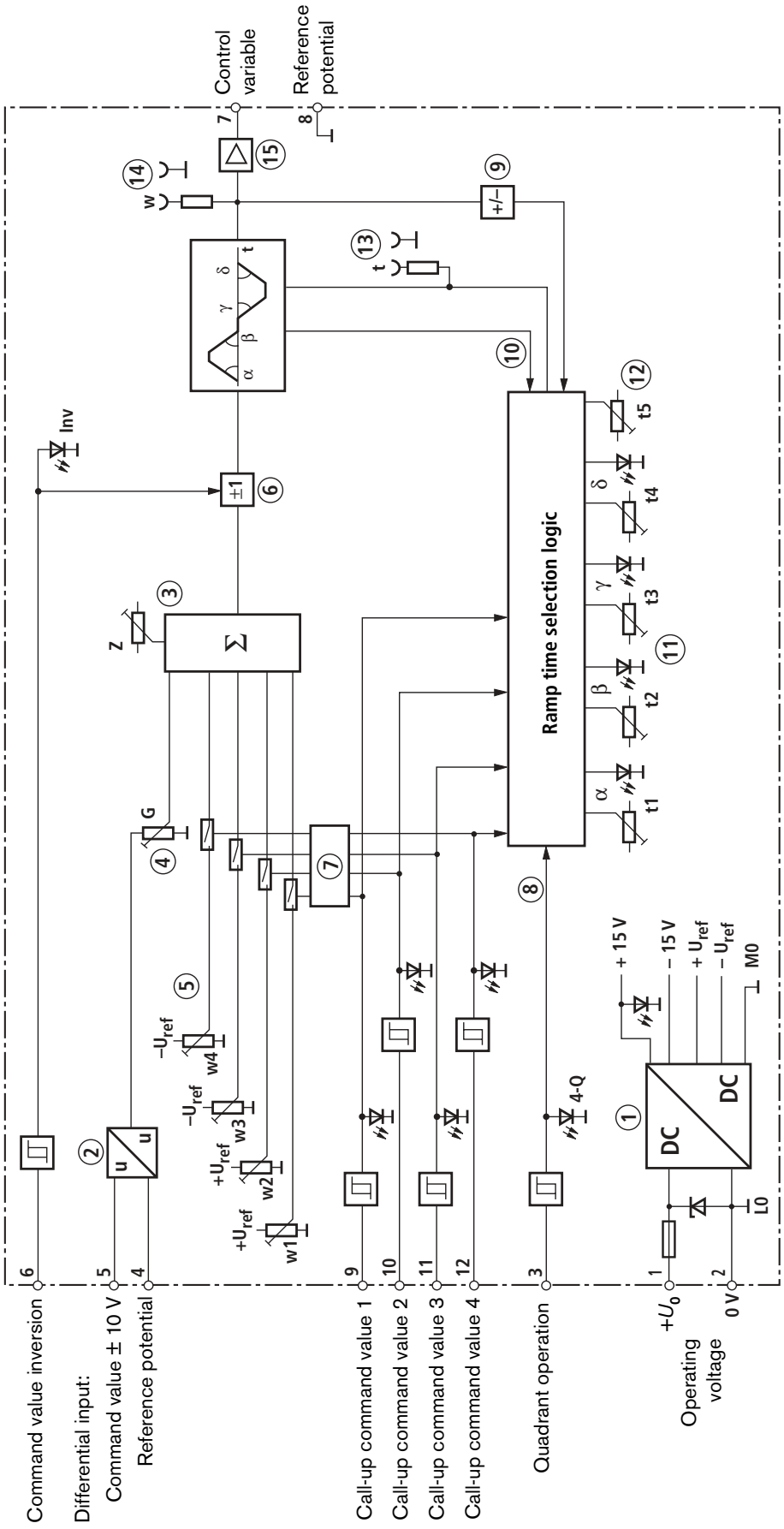
The current ramp time can be checked at measuring socket “t“ [13]. Ramp times “t1” to “t4” can be adjusted with the help of the ramp time potentiometers. Through activation of a call-up signal, ramp time signal “t” at the measuring socket is clearly assigned to one of the ramp times t1 to t4. t5 is assigned to the ramp time signal at the measuring socket, if neither a call-up nor quadrant recognition is activated. The adjustment range of the ramp time is selected so that these can be set reproducibly (for details, see “Technical data”).

Output

The output signal of the ramp generator can be checked at measuring socket “w“ [14]. The downstream matching amplifier [15] provides the control signal for the valve via output “control variable” [16].

[ ] = Cross-reference to block circuit diagram on page 3

Block circuit diagram / pin assignment



1 Power supply unit
2 Differential amplifier
3 Summator with zero point potentiometer
4 Amplitude attenuator
5 Call-up signals
6 Command value inversion
7 Priority logic
8 Quadrant recognition
9 Polarity recognition
10 Recognition of changes in the contol variable (up/down)
11 Ramp time call-ups
12 Ramp time potentiometer “t5“
13 Measuring socket “ramp time signal“
14 Measuring socket “internal command value“
15 Matching amplifier

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

Operating voltage	U_o	24 VDC +40 % −10 %
Operating range:		
– Upper limit value	$u_o(t)_{max}$	35 V
– Lower limit value	$u_o(t)_{min}$	18 V
Power consumption	P_S	12 VA
Current consumption	I_{max}	0.5 A
Fuse		Thermal overload protection (reactivation when temperature falls below threshold)
Inputs		
– Command value (differential input with attenuator)	U_i	0 to ±10 V; $R_i > 50$ kΩ
– Quadrant operation “4-Q“		
• active	$U_{4\text{-}Q}$	8.5 V to 35 V; $R_i > 50$ kΩ
• inactive	$U_{4\text{-}Q}$	0 to 6.5 V
– Command value inversion “Inv“		
• active	U_{Inv}	8.5 V to 35 V; $R_i > 50$ kΩ
• inactive	U_{Inv}	0 to 6.5 V
– Command value call-ups 1 to 4		
• active	U	8.5 V to 35 V; $R_i > 50$ kΩ
• inactive	U	0 to 6.5 V
Adjustment ranges:		
– Zero balancing (potentiometer “Z“)		±30 %
– Amplitude attenuator (potentiometer “G“)		0 % to ca. 110 %
– Command values (potentiometers “w1“ to “w4“)		0 % to ca. 110 % (factory setting 100 %)
– Ramp times (potentiometers “t1“ to “t5“)		20 ms to 5 s
Outputs:		
– Control variable	U	0 to ±10 V; ±2 mA; $R_L > 5$ kΩ
– Measuring socket for control variable “w“	U_w	0 to ±10 V (+100 % = +10 V; −100 % = −10 V)
– Measuring socket for ramp time “t“	U_t	0,01 V to +10 V 0,01 V(t_{max} = ca. 10 s); 10 V(t_{min} = ca. 10 ms)
Type of connection		12 screw terminals
Type of mounting		Top hat rail TH 35/7.5 to EN 60715
Type of protection		IP 20 to EN 60529
Dimensions (W x H x D)		40 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	0.3 kg

Note:
For details regarding **environment simulation tests** in the field of EMC (electro-magnetic compatibility), climate and mechanical stress, see RE 29902-U (declaration on environmental compatibility).

Note on the adjustment and measurement of the ramp time
For adjusting the ramp time potentiometers we recommend that 4-quadrant recognition be switched off and call-ups be activated.

Value at measuring socket "t"	U_t in V	5	3	2	1	0,5	0,3	0,2	0,1	0,05	0,03	0,02
Current ramp time (± 20 %)	t in ms	20	33	50	100	200	333	500	1000	2000	3333	5000

The following is valid: $t = \frac{100\ \text{V ms}}{U_t}$

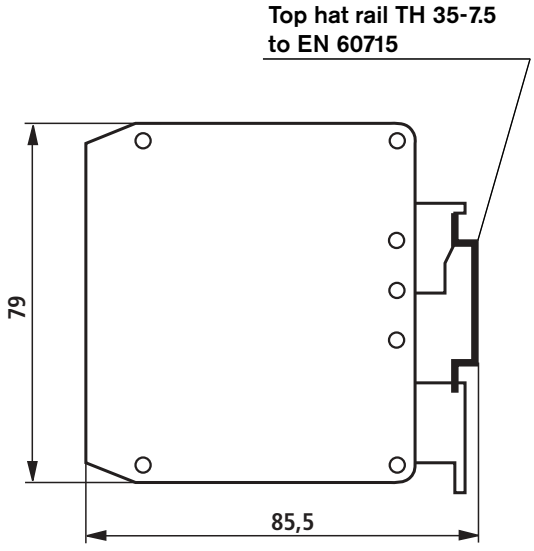
Example: Measured $U_t = 5$ V

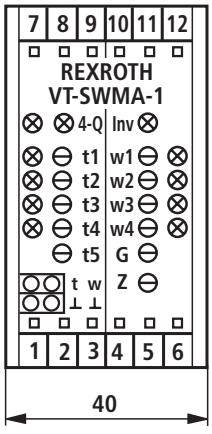
Results in $t = \frac{100\ \text{V ms}}{5\ \text{V}} = 20$ ms

Terminal assignment

Operating voltage	$+U_0$	1	7	Control variable output
	0 V	2	8	Reference potential
Quadrant operation	$+U_{4\text{-}Q}$	3	9	Call-up command value 1
Differential input	Reference potential	4	10	Call-up command value 2
	$\pm U_{comm}$	5	11	Call-up command value 3
Command value inversion	$+U_{Inv}$	6	12	Call-up command value 4

Unit dimensions (Dimensions in mm)





Potentiometers (some with LED lamps):
"t1" to "t5" → Ramp times
"w1" to "w4" → Command value call-ups
"G" → Amplitude attenuator for differential input
"Z" → Zero point balancing

LED lamps:
"4-Q" → Quadrant recognition
"Inv" → Inversion active
green → Ready for operation "power" (no lettering)

Measuring sockets:
"t" → Current ramp time
"w" → Internal control variable
"⊥" → Reference potential / ground

Engineering / maintenance notes / supplementary information

- The amplifier module may only be unplugged when disconnected from the power supply!
- Ensure a sufficient distance to aerial lines, radio sources and radar equipment (>> 1 m)!
- Shield command value lines, do **not** lay near power cables!
- **Caution:** When the **differential input** is used, **both inputs** must be activated or deactivated **simultaneously**!

  Note: Electrical signals (e.g. control variable) brought out via control electronics must not be used for switching safety-relevant machines functions!
  (See also the European standard "Safety requirements for fluid power systems and components – hydraulics", EN 982)

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Bosch Group

Analogue command value module

RE 29903/06.05 1/6
Replaces: 02.03

Type VT-SWMAK-1

Series 1X

H5973_d

Table of contents

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

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

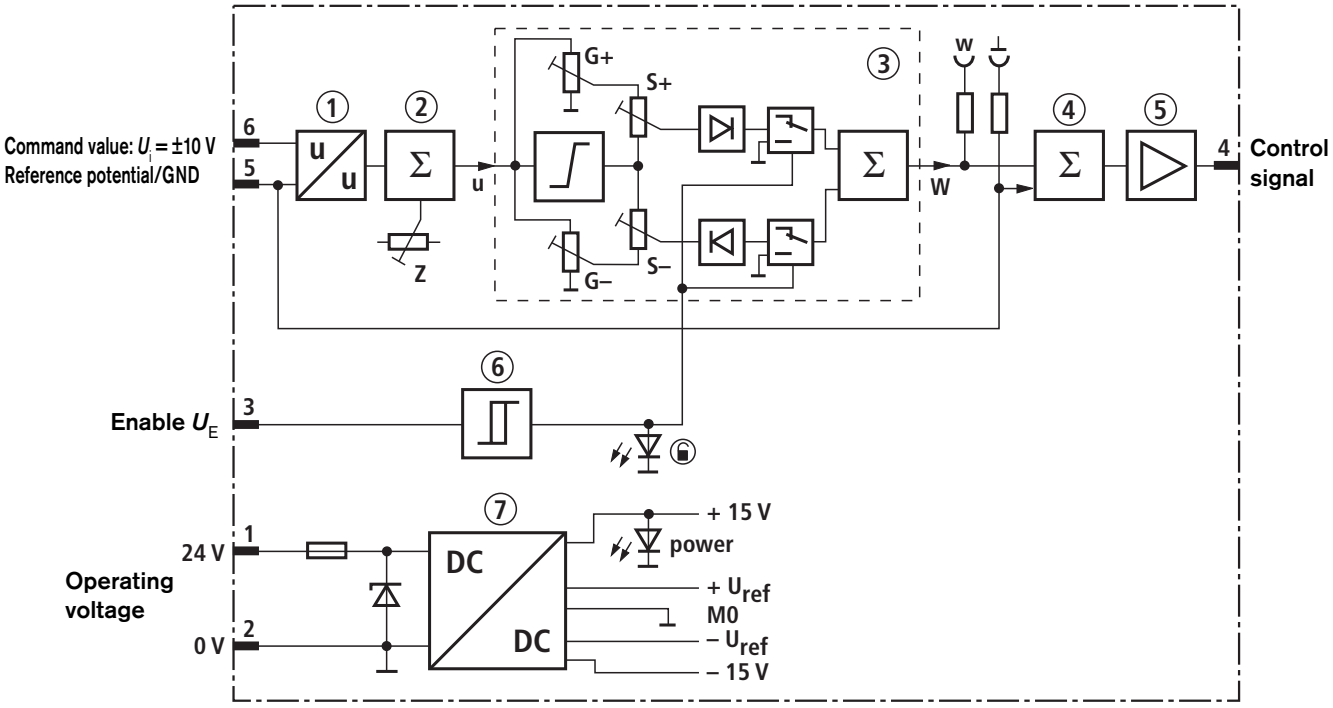
The command value module requires 24V DC voltage. A power supply unit [7] provides the internally required positive and negative supply voltage. As soon as the power supply unit is in operation, the green LED ("power") lights up. The control signal can be cut in or out by applying a signal at the enable 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).

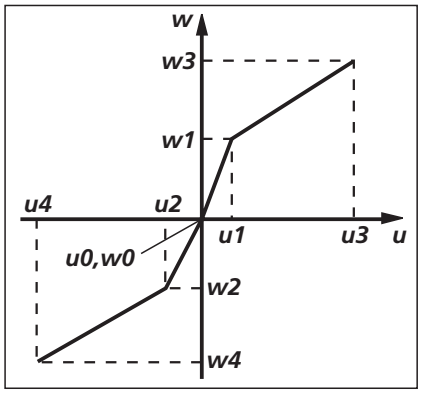
The control signal has the same reference potential/GND as the command value. In the case of fluctuations in the reference potential, the summator [4] corrects the control signal as required.

Block circuit diagram



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

Output characteristic curve



Points of inflection of characteristic curves:

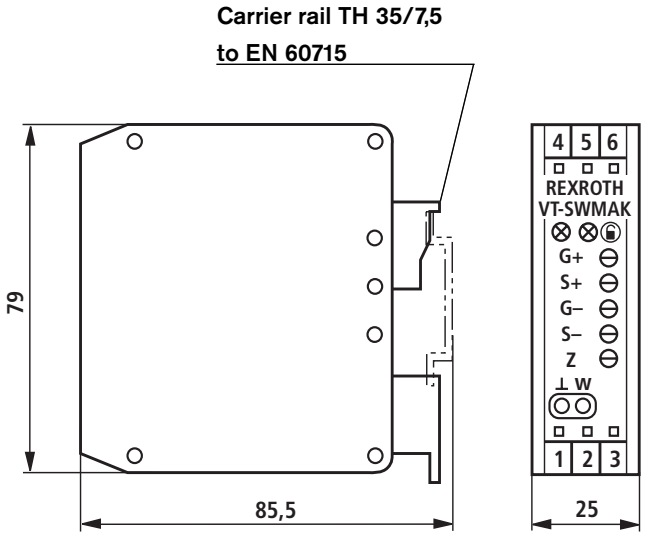
u0	0 %		
w0	0 %		
u1	+2 % = +200 mV		
w1	0 % to +50 % **(S+)**	=	0 V to +5 V
u2	−2 % = −200 mV		
w2	0 % to −50 % **(S−)**	=	0 V to −5 V
u3	+100 % = +10 V		
w3	w1 up to +110 % **(G+)**	=	w1 up to +11 V
u4	−100 % = −10 V		
w4	w2 up to −110 % **(G−)**	=	w2 up to −11 V

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

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Analog Command Value Card

RE 30255/06.05 1/8
Replaces: 11.02

Type VT-SWKA-1

Series 1X

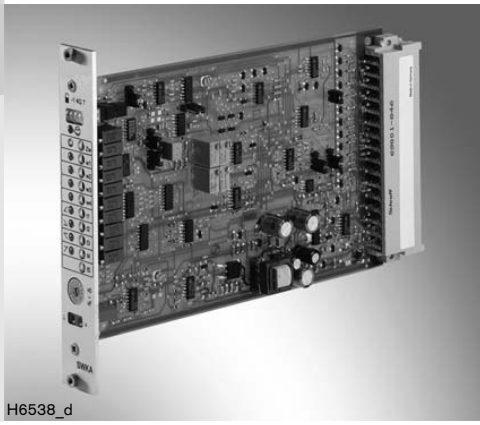

H6538_d

Table of contents

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

Features

- Analog command value card (without power part) for controlling valves with integral electronics
  →For controlling valves without integral electronics, a suitable additional amplifier is required.
- Suitable for generating, combining and normalizing command value signals
- Configuration and parameterization of the command value card by means of potentiometers
- Command value inputs:
  • Differential input ±10 V
  • 4 callable command value inputs ±10 V
  • Current input 4 to 20 mA
  (standard 0 to 100 %; can be changed over ±100 %)
- Control variable output:
  • Voltage ±10 V
  • Current 4 to 20 mA (standard 0 to 100 %; can be changed over ±100 %)
- Inversion of internal command value signal using 24V input or jumper
- Ramp time selection by quadrant recognition (24V input) or ramp time call-ups (24V inputs)
- Ramp time range can be changed over by means of jumpers

Features (continued)

- Characteristic curve correction by means of separately adjustable step-change heights and maximum values
- Enable input
- Output signal “ramp ready“ as auxiliary process variable
- Output signal “ready for operation“
- Switchable measuring socket
- Reverse voltage protection for voltage supply

Further information:

- VT-SWKA-1 product description and commissioning instructions, see RE 30255-B

Suitable card holders:

- 19“ rack types VT 19101, VT 19102, VT 19103 and VT 19110 (see RE 29768)
- Closed card holder VT 12302 (see RE 30103) with blind plate insert 4TE/3HE (material no. R900021004)
- Open card holder VT 3002-2X/48 (see RE 29928) For control cabinet installation only!

Suitable power supply units:

- Type VT-NE30-1X, see RE 29929 Compact power supply unit 115/230 VAC → 24 VDC, 70 VA
- Type VT-NE31-1X, see RE 29929 Compact power supply unit 115/230 VAC → 24 VDC, 7 VA
- Type VT-NE32-1X, see RE 29929 Compact power supply unit 115/230 VAC → 24 VDC, 60 VA (smoothed) and 24 VDC, 25 VA (regulated)

Ordering code

VT-SWKA-1 – 1X / V0 / 0 / *

Analog command value card

Series 10 to 19 **= 1X**
(10 to 19: unchanged technical data and pin allocation)

V0 = Basic version

0 = Basic version

Further details in plain text

Functional description

General

The command value card is designed as printed circuit board in Euro-format 100 x 160 mm and is suitable for installation in a rack. A power supply unit [1] provides the internally required positive and negative supply voltages. As soon as the power supply unit is in operation and no error is present, the green LED on the front panel lights up and the “ready for operation” signal is set.

Current input [3]

There is no changeover between current and voltage input. Both inputs are permanently available (see terminal allocation). The input signals are internally normalized and added. The zero point and the range of values of the current input can be changed over by means of jumper J5.

Command value call-ups [4]

Four command value signals, “w1“ to “w4“, can be called up. External command value voltages (command values 1 to 4) are preselected either directly via the regulated voltage inputs +10 V and −10 V or via external potentiometers. If the command value inputs are connected directly to the regulated voltages, the command values are adjusted by means of potentiometers “w1“ to “w4“. If external potentiometers are used, the internal potentiometers act as attenuators or limiters.

Only one call-up is possible at a time. If several call-ups are selected simultaneously, call-up “1” has lowest priority, call-up “4” highest priority.

A yellow LED on the front panel indicates, which call-up is active.

Command value inversion [7]

The command value that is generated internally from input signals, command value call-ups and zero point offset signals can be inverted by means of an external signal or jumper J1 . An LED (“−1“) on the front panel signals whether an external inversion signal is applied.

Enable function [8]

The enable function cuts the enable signal of the ramp generator in or out. When the enable is cut in or out, the control variable changes at any command value according to the set ramp time. This prevents a controlled valve from opening or closing suddenly. If an error signal is present, the input signal of the ramp generator is also set to 0 %. An LED on the front panel signals that an enable signal is applied.

Ramp generator [9]

The ramp generator limits the increase of the control variable. Downstream step-functions and amplitude attenuators do not shorten or extend the ramp time.

Jumper J2 can be used to set the ramp time to minimum (< 2 ms) (ramp off).

External ramp time adjustment

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

Ramp status signal [11]

The status signal “ramp ready“ indicates that the control variable has reached the requested final value. This signal (24V output) facilitates the synchronization of higher-level sequence controls with the valve function or the controlled hydraulic function.

Characteristic curve generator [12]

The adjustable characteristic curve generator can be used to adjust step-change heights and maximum values separately for positive and negative signals according to the hydraulic requirements. The actual characteristic curve shape through the zero point is not step-like, but linear.

Amplitude limiter [13]

The control variables (current output and voltage output) are limited to approx. ±110 % of the nominal range.

Fault recognition [14]

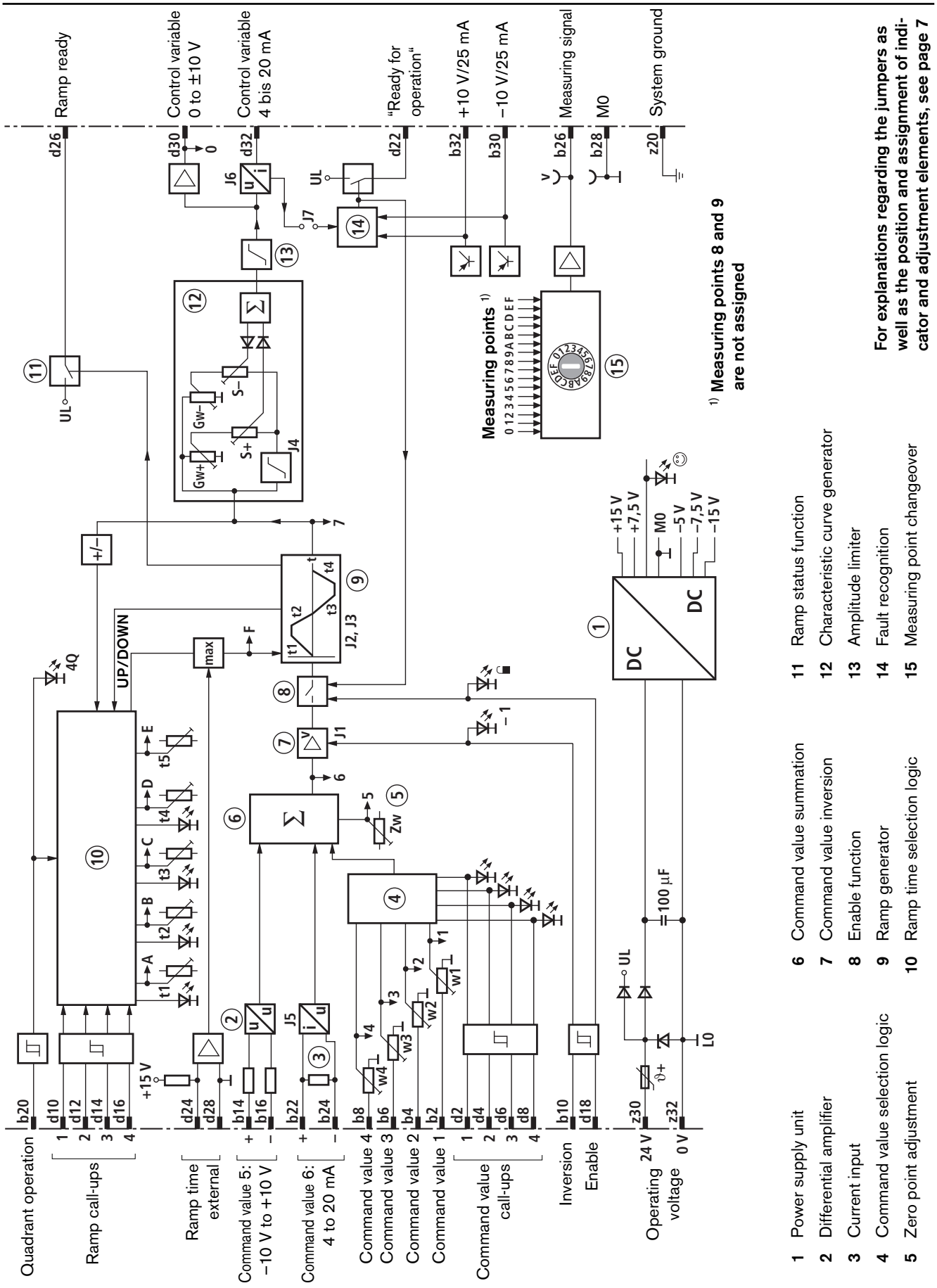
This features monitors internal operating voltages, voltage outputs and, if jumper J7 (1-2) is plugged, the current output for cable break. When no fault is present, the green “ready for operation” LED lights up and the output “ready for operation” is set to 24 V (operating voltage).

Measuring points [15]

A measuring socket is provided on the front panel to allow the verification of the settings of command value call-ups, ramp times and further, internal signals. The measuring points can be selected using the measuring point selector switch that is also provided on the front panel. The signal of the measuring socket is also connected to the blade connector (b26).

[ ] = Reference to the block circuit diagram on page 4

Block circuit diagram / pin allocation



1) **Measuring points 8 and 9 are not assigned**

For explanations regarding the jumpers as well as the position and assignment of indicator and adjustment elements, see page 7

1 Power supply unit
2 Differential amplifier
3 Current input
4 Command value selection logic
5 Zero point adjustment
6 Command value summation
7 Command value inversion
8 Enable function
9 Ramp generator
10 Ramp time selection logic
11 Ramp status function
12 Characteristic curve generator
13 Amplitude limiter
14 Fault recognition
15 Measuring point changeover

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 requirement	P_S	< 7 VA
Current consumption	I	< 0.3 A
Fuse		Thermal overload protection; auto-activating when triggered
Inputs:		
– Analog		
• command values 1 to 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; load R_B = 100 Ω (zero point can be changed over)
• ramp time external	U_e	0 to +10 V; R_e = 10 kΩ (internally raised to +15 V; reference is M0)
– Digital		
• command value call-ups	U	8.5 V to U_B → call-up activated
	U	0 to 6.5 V → no call-up
• ramp call-ups	U	8.5 V to U_B → call-up activated
	U	0 to 6.5 V → no call-up
• quadrant recognition	U	8.5 V to U_B → ON
	U	0 to 6.5 V → OFF
• command value inversion	U	8.5 V to U_B → ON
	U	0 to 6.5 V → OFF
• enable	U	8.5 V to U_B → ON
	U	0 to 6.5 V → OFF
Adjustment ranges:		
– Zero point adjustment (potentiometer “Zw“)		±30 %
– Command values (potentiometers “w1“ to “w4“)		0 to 110 %
– Ramp times (potentiometers “t1“ to “t5“)		20 ms to 5 s (can be changed over using J3)
– Step-change height (potentiometers “S+“ and “S–“)		0 % to 50 % (step-change height reached at ca. 2 % command value injection)
– Amplitude attenuator (potentiometers “G+“ and “G–“)		0 % to 110 % (valid when step-change height is set to 0 %)

Technical data

Outputs:			
– Analog signals			
• control variable	voltage	U	±10 V ±2 %; I_{max} = 2 mA
	current	I	4 mA to 20 mA ±2 %; $R_{B\,max}$ = 500 Ω (zero point can be changed over)
• measuring signal		U	±10 V ±2 %; I_{max} = 2 mA
– Digital signals			
• ramp ready		U	> 16 V; 50 mA → ready
		U	< 1 V; R_i = 10 kΩ → ramp active
• ready for operation		U	> 16 V; 50 mA (in the event of a fault: U < 1 V; R_i = 10 kΩ)
– Regulated voltages		U	±10 V ±2 %; 25 mA
– Measuring sockets			
• measuring signal “v“			
(depending on position of measuring point selector switch)		U	±10 V ±2 %; I_{max} = 2 mA
Type of connection			48-pin blade connector, DIN 41612, form F
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)
– Width component side			3 TE
Permissible operating temperature range		ϑ	0 to +50 °C
Storage temperature range		ϑ	–25 °C to +85 °C
Weight		m	0.15 kg

Note:

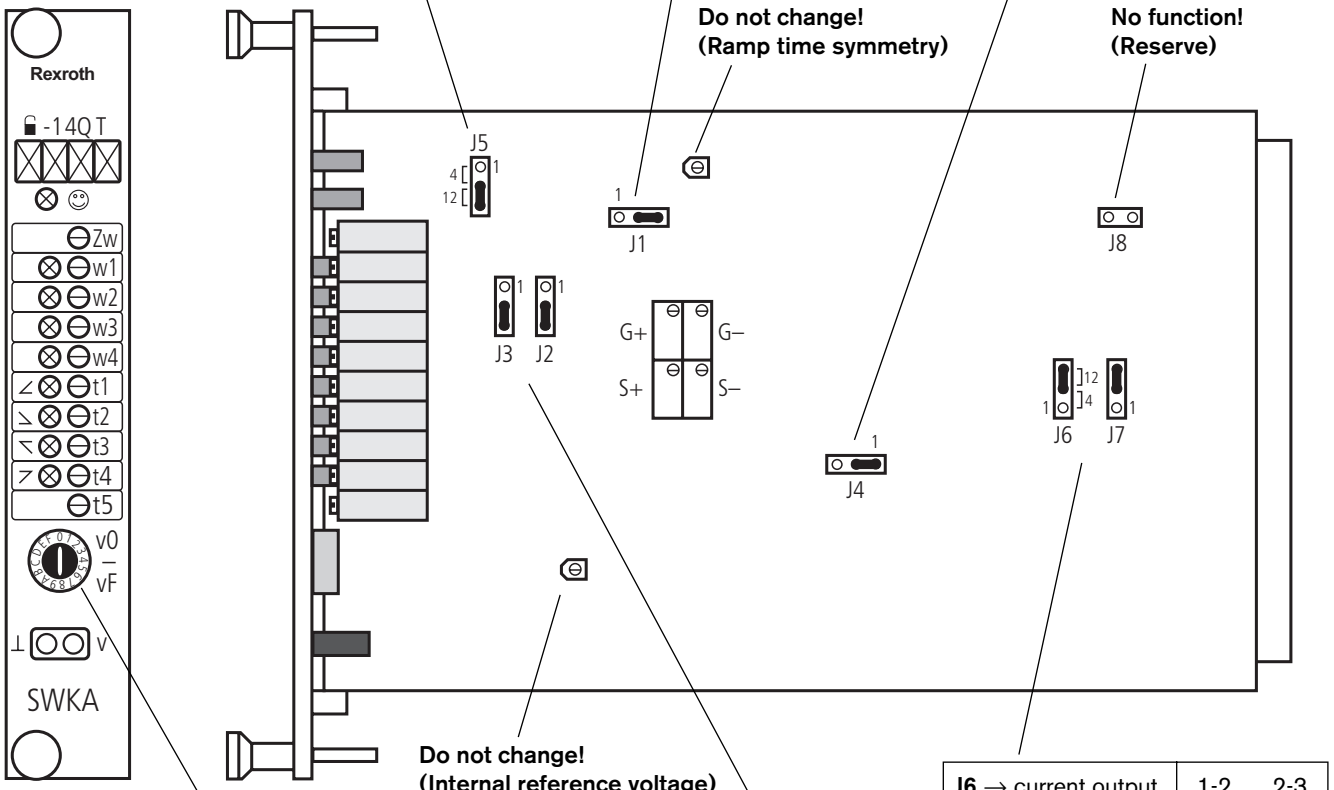
For details regarding **environment simulation tests** in the fields of EMC (electromagnetic compatibility), climate and mechanical stress, see RE 30255-U (declaration on environmental compatibilty).

Indicator / adjustment elements

J5 → current input	1-2	2-3
0 % ≙ 4 mA	•	–
0 % ≙ 12 mA	–	•

J1 → inversion	1-2	2-3
inverting	•	–
not inverting	–	•

J4 → Step function	1-2	2-3
OFF	•	–
ON	–	•



J6 → current output	1-2	2-3
0 % ≙ 4 mA	•	–
0 % ≙ 12 mA	–	•

J7 → cable break monitor	1-2	2-3
ON	•	–
OFF	–	•

J2 → Ramp function	1-2	2-3
OFF	•	–
ON	–	•

J3 → Ramp time		
Ten-fold	•	–
Single	–	•

LED lamps:

☺ Readiness for operation (green)

Enable (yellow)

–1 External inversion

4Q Quadrant recognition

T Reserved

Potentiometers (some with LED lamp):

Zw Zero point adjustment

w1 Command value 1

w2 Command value 2

w3 Command value 3

w4 Command value 4

t1 Ramp time 1

t2 Ramp time 2

t3 Ramp time 3

t4 Ramp time 4

t5 Ramp time 5

Cannot be adjusted on the front panel:

G+ Amplitude attenuator for positive commandvalues

G– Amplitude attenuator for negative command values

S+ Step-change height for positive direction

S– Step-change height for negative direction

Measuring sockets:

v Measuring signal

⊥ Measurement zero

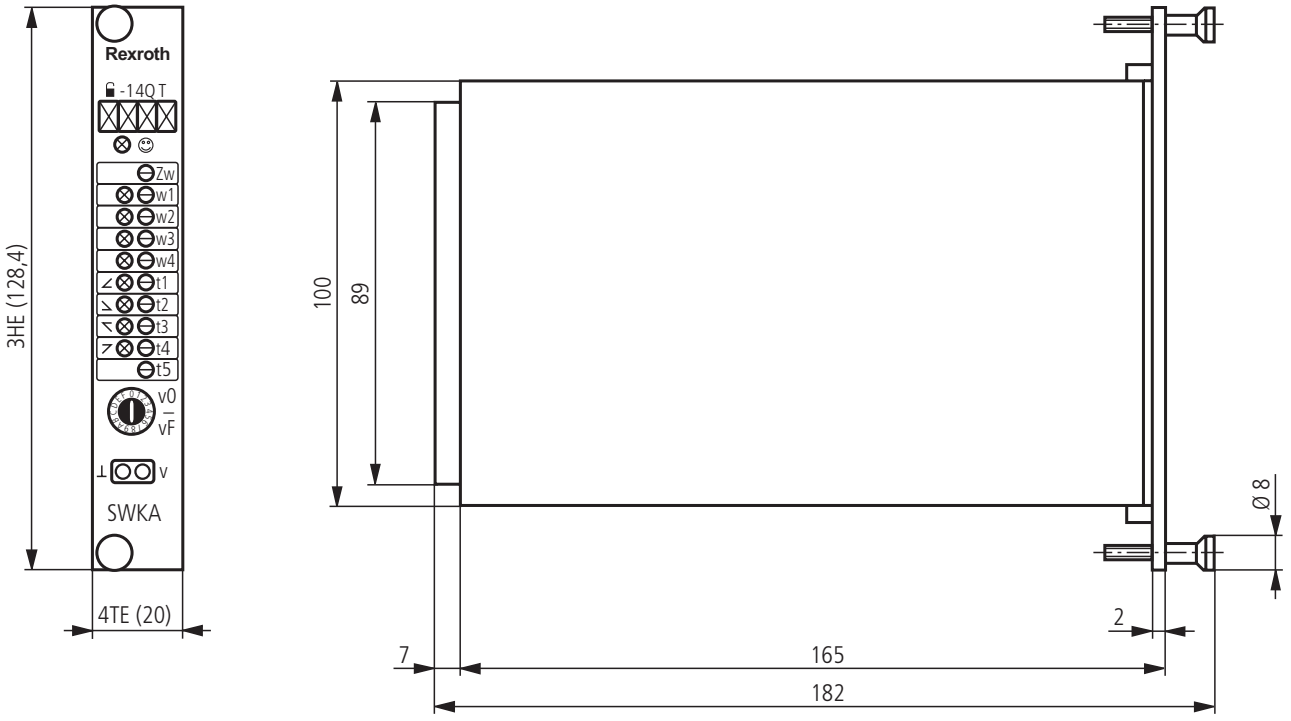
• … Connection made

– … Connection broken

☐ … Factory setting of jumpers

For further information and notes, see product description and commissioning instructions RE 30255-B!

Unit dimensions (Dimensions in mm)



Engineering / Maintenance notes / Supplementary information

- The command value card may only be withdrawn or plugged in when disconnected from the power supply!
- Never install cables near power cables!
- The distance to antenna cables, radio equipment and radar systems must be at least 1 m!
- Use relays with gold-plated contacts for switching command values (small voltages, small currents)!
- Always shield command value cables; connect shield to protective earth (PE) on the card side!

☞ **Note:**

- When using the **differential input, both inputs** must always be switched on or off **simultaneously**!
- Electrical signals processed by control electronics (e.g. signal “ready for operation“) must not be used for activating safety-relevant machine functions!
  (See European standard “Safety requirements for fluid power systems and components – hydraulics“, EN 982)

For further information, see “product description and commissioning instructions VT-SWKA-1“ (RE 30255-B).

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