Plug-in switching amplifier with pulse width modulation (PWM)

Type VT-SSBA1

RE 30362
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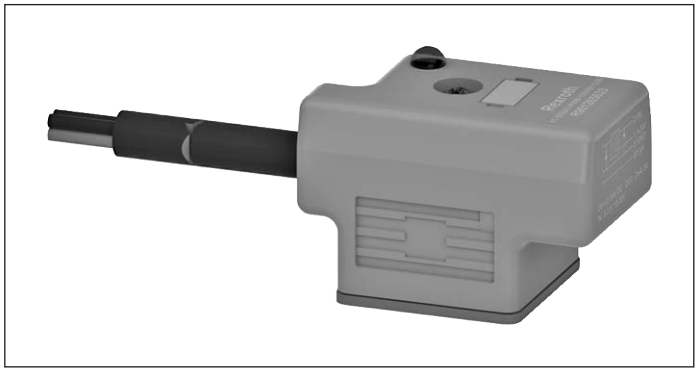


- Component series 1X

CE

Features

- Fast switching:
  Control of hydraulic on/off valves with 12 V solenoids
- Energy saving:
  Power reduction when controlling hydraulic on/off valves with 24 V solenoids
- Reduction of the coil temperature by at least 30°K during 100 % duty cycle (in eco mode)
- Suitable for control of on/off valves type WE6 and WE10 with 12 V or 24 V DC solenoids with the control spools described in the data sheet
- For valves with K4 connector as per DIN EN 175301-803
- Potted-in cable with open end
- 3-conductor connection, power supply and release separated
- Short-circuit proof output
- Status display of the switching status by LED

Table of contents

Ordering codes

01		02	03		04	05
VT-SSBA1-PWM	**–**	**1X**	**/**		**/**		*****

01	Plug-in switching amplifier with pulse width modulation (PWM)	**VT-SSBA1-PWM**
02	Component series 10 to 19 (10 to 19: Unchanged installation and connection dimensions)	**1X**
03	Variant	
	Power reduction after 100 ms for fast switching with 12 V solenoids	**V001**
	Power reduction after 300 ms for energy saving with 24 V solenoids	**V002**
04	Cable length 5 m	**5**
	Cable length 10 m	**10**
	Cable length 15 m	**15**
05	Further details in the plain text	*****

Switching times (with variant V001)

Comparison of 24 V coil (control standard 24 V signal) with 12 V coil (controlled by VT-SSBA1..V001)

Switching times for 4WE10..5x valves (3 chamber)			
Control spool	**Coil**	**Switching time**	
		ON	OFF
C	24 V	58	48
	12 V with V001	26	48
D	24 V	78	28
	12 V with V001	29	28
E	24 V	55	35
	12 V with V001	22	35
E67	24 V	84	31
	12 V with V001	24	31
J	24 V	63	51
	12 V with V001	28	51
J2	24 V	47	31
	12 V with V001	24	31
Y	24 V	57	31
	12 V with V001	23	31
Y11	24 V	46	50
	12 V with V001	28	50

Switching times for 4WE6..6x valves			
Control spool	**Coil**	**Switching time**	
		ON	OFF
C	24 V	27	14
	12 V with V001	17	14
D	24 V	42	11
	12 V with V001	25	11
E	24 V	32	11
	12 V with V001	22	11
E67	24 V	39	12
	12 V with V001	21	12
G	24 V	33	11
	12 V with V001	28	11
J	24 V	37	17
	12 V with V001	17	17
L	24 V	36	15
	12 V with V001	21	15
M	24 V	47	26
	12 V with V001	33	26
X7	24 V	62	13
	12 V with V001	47	13

Switching times for 5-4WE10..5x valves (5 chamber)			
Control spool	**Coil**	**Switching time**	
		ON	OFF
J2	24 V	170	23
	12 V with V001	44	23
X84	24 V	39	67
	12 V with V001	20	67

Switching times for Z-4WE6..3x valves			
Control spool	**Coil**	**Switching time**	
		ON	OFF
E63	24 V	27	14
	12 V with V001	15	14
E68	24 V	27	14
	12 V with V001	15	14
X250	24 V	31	20
	12 V with V001	16	20
X252	24 V	47	13
	12 V with V001	17	13

☞ **Notices:**

- For switching on and off, an additional dead time of approx. 2 ms is to be taken into account (valid for signal level 24 V).
- The switching times correspond to the time indicated by signaling a pressure change of up to 5 %.
- The switching times are specified for the same power limits documented in the data sheets (see 23178, 23340 and 23352) and for horizontal installation positions.
- The use of the plug-in amplifier V001 is not possible for valves with reinforced spring.

Further valves on request.

Using the connector switching amplifier may result in an improvement in the performance limit. The degree of improvement depends on the particular switching symbol of the valve. More information is available on request.

Energy saving (with variant V002)

Energy saving valves with 24 V coils using the plug-in amplifier VT-SSBA1..V002

Energy consumption for 4WE10..5x valves (3 chamber)		
Control spool	**Energy consumption [W] for 24 V coil**	**Energy consumption [W] for 24 V coil with V002**
C	40	24
D		
E		
E67		
J		
J2		
Y		
Y11		

Energy consumption for 4WE6..6x valves		
Control spool	**Energy consumption [W] for 24 V coil**	**Energy consumption [W] for 24 V coil with V002**
C	30	18
D		
E		
E67		
G		
J		
L		
M		
X7		

Energy consumption for 5-4WE10..5x valves (5 chamber)		
Control spool	**Energy consumption [W] for 24 V coil**	**Energy consumption [W] for 24 V coil with V002**
J2	40	24
X84		

Energy consumption for Z-4WE6..3x valves		
Control spool	**Energy consumption [W] for 24 V coil**	**Energy consumption [W] for 24 V coil with V002**
E63	30	18
E68		
X250		
X252		

☞ **Notices:**

- The use of the plug-in amplifier V002 is not possible for valves with reinforced spring.
- Reduction of the coil temperature by at least 30 K

Further valves on request.

Using the connector switching amplifier may result in an improvement in the performance limit. The degree of improvement depends on the particular switching symbol of the valve. More information is available on request.

Function

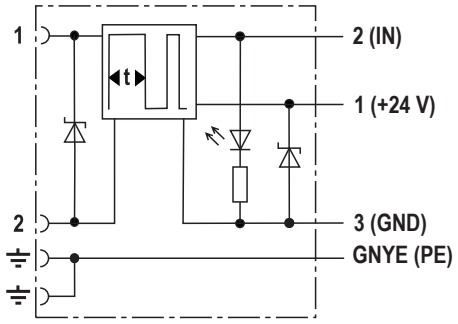
The VT-SSBA1 switching amplifier is directly mounted on the valve's K4 connector.
It is supplied with 24 V direct voltage. If a high signal is applied to wire no. 2 (release "IN"), the voltage profile is applied to the valve according to the functional diagram.
As soon as the release input is switched, the "yellow" status display LED lights up.

Fast switching (V001)
As fast switching amplifier, the VT-SSBA1 considerably reduces the switching time of standard directional valves in connection with 12 V solenoid coils.
Upon activation, there is an overexcitation of the solenoid by 100 % with 24 V. Then, the voltage is reduced and the necessary holding current is set via the pulse width modulation.

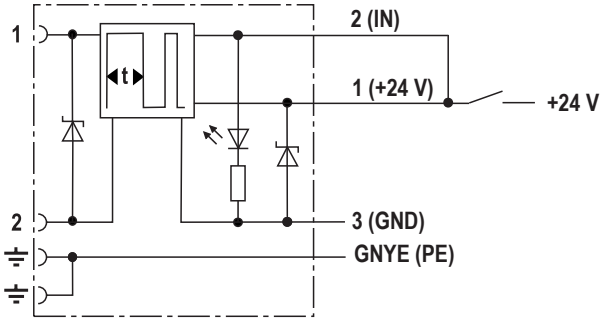
Energy saving (V002)
To save energy, reducing the switching amplifier when using 24 V standard valves reduces continuous current consumption significantly.
After a specified current application and the associated hydraulic conductivity, switching of the valve is switched to pulse width modulation and thus significantly reduces performance. A holding power is activated that lies beneath the power of a 24 V valve at 24 V supply voltage.

Tables on pages 2 and 3 contain the assignment of the valves with the voltage version of the switching amplifiers VT-SSBA1-PWM-1X/V001 and VT-SSBA-PWM-1X/V002.

Block diagram/pinout



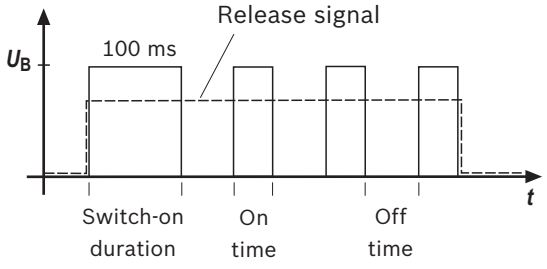
Circuit variation: 2 conductor port



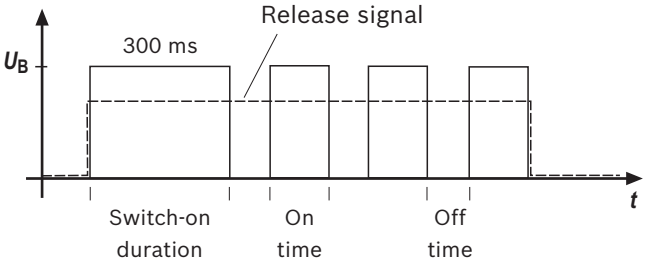
Wire no. 2: Release "IN"
Wire no. 1: Operating voltage "+U_B" (24 V)
Wire no. 3: Operating voltage "GND"
Wire GNYE: Protective earthing "PE"

Functional diagram

PWM with V001: Ratio on/off = 40/60



PWM with V002: Ratio on/off = 60/40



Technical data

(For applications outside these parameters, please consult us!)

General			
Weight		g	Approx. 350 (incl. cable)
Housing			Valve connector for K4 connector as per DIN EN 175301-803
Operating temperature		°C	–20 ... +60
Storage temperature range		°C	–20 ... +60

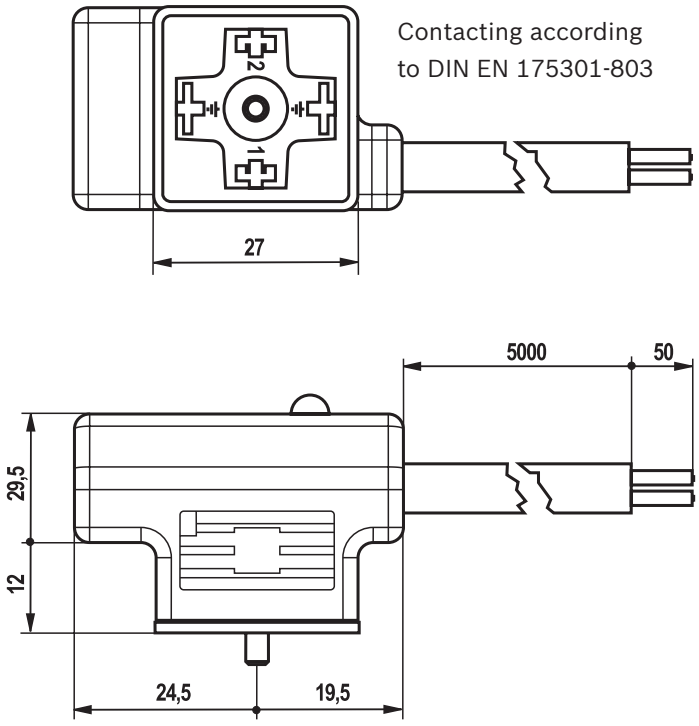
Electric [1]			
Voltage type			Direct voltage
Operating voltage		U_B	24 V ± 10 %
Holding current		I_{max}	2 A
Steuerspannung (Freigabe „IN“)	▶ ON	V	10 ... 30
	▶ OFF	V	< 3,5
Galvanic separation			No
Control current (release „IN“)		I_{IN}	2.5 ... 12 mA
Max. switching frequency		f	≤1 Hz
PWM frequency		f_{max}	PWM operation 300 ... 500 Hz
Protection class according to EN 60529			IP 65, IP 67
Cable connection			Potted-in cable with open end
Cable type			See table below
Switch-on duration	▶ V001 (Fast switching)	ms	100 ... 115
	▶ V002 (Energy saving)	ms	300 ... 330
PWM duty factor	▶ V001 (Fast switching)	%	40 ±5 on
	▶ V002 (Energy saving)	%	60 ±5 on
CE conformity			According to EMC directive 2004/108/EEC Applied harmonized standards: EN 61000-6-2:2005, EN 61000-6-3:2007

[1] The specified values relate to an operating voltage of 24 V

Information on the cable type:

Jacket material	Jacket color	Wire insulation	Wire color	Wires	Jacket diameter
PUR-JZ	Black	PP	BK, GNYE	4 x 0.75 mm²	6.5

Dimensions (dimensions in mm)



Mounting screw M3,
tightening torque M_A = 0.4 Nm

Project planning/maintenance instructions/additional information

- The plug-in switching amplifier may only be operated within the limits and applications defined in the data sheet.
- The distance to radios and mobile phones must be sufficient (>> 1 m).
- In case of overload or short-circuit, the output will be de-energized. Before another switch-on, release "IN" must be switched to "OFF" (< 3.5 V).
- Between input and output, there is no galvanic separation.
- In applications as power reducer, the power in PWM operation is not sufficient for switching the valve through a second time if the performance limit is exceeded in the switched condition.
- In case of an error, the temperature of the valve solenoid may increase. Take external monitoring measures to ensure that the maximum admissible surface temperature of the solenoid is complied with.
- VT-SSBA1.. is not a safety-related part of a control system according to EN ISO 13849-1:2006.
- For safety reasons, please comply with the following instructions:
  - If the safety function is activated, the power supply and the enable input of the VT-SSBA1 are to be reliably turned off by means of an appropriate switching element.
  - If persons have to enter the danger zone with activated VT-SSBA1, additional measures for guaranteeing their safety have to be taken for the reasons specified above.

Notes

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