#### RE 30362

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

# Type VT-SSBA1



► Component series 1X

CE

#### **Features**

- ► Fast switching: Control of hydraulic on/off valves with 12 V solenoids
- ► Energy savings: Power reduction in the control of hydraulic on/off valves with 24 V solenoids
- ► Reduction in the coil temperature of at least 30°K with 100% duty cycle (with energy savings)
- ▶ Suitable for the control of on/off valves of the type WE 6 and WE 10 with 12 V and/or 24 V direct current solenoids with the control spools described in the data sheet.
- ► For valves with connector K4 according to EN 175301-803
- ▶ Potted-in cable with open end
- ► 3-conductor connection, power supply and enable input separated
- ► Short-circuit-proof output
- ▶ Status display of the switching status with LED

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#### **Ordering code**

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

01	Connector switching amplifier with pulse width modulation (PWM)	VT-SSBA1-PWM
02	Component series 10 19 (10 19: unchanged technical data and pin assignment)	1X
03	Power reduction to 100 ms for fast switching for 12 V solenoids	V001
	Power reduction to 300 ms for energy savings for 24 V solenoids	V002
Cabl	e length	
04	5 m	5
	10 m	10
	15 m	15
05	Further details in the plain text	*

#### **Function**

The connector switching amplifier type VT-SSBA1 is directly mounted at the K4 connector of the valve. It is supplied with 24 V direct voltage. If at wire 2 (enable "IN"), a high-signal is applied, the voltage profile is applied at the valve according to the functional diagram. If the enable input is switched, the status display LED is flashing yellow.

#### Fast switching ("V001")

As fast switching amplifier, the connector switching amplifier type VT-SSBA1 considerably reduces the switching time of standard directional valves in connection with 12 V solenoids.

On switching on, the solenoid is overexcited with 24 V by 100%. Afterwards, the voltage is reduced and the required holding current is set via pulse width modulation.

#### Energy savings ("V002")

If 24 V standard directional valves are used, the connector switching amplifier considerably reduces the continuous current to save energy.

After a defined power supply time and the connected hydraulic switching of the valve, the system switches to pulse width modulation and the power is considerably reduced. This leads to a holding power under the power of a 24 V valve at 24 V supply voltage.

Assignment of valves with their voltage version to versions "V001" and "V002", see page 6 and 7.

# **Technical data**

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

General		
Weight (incl. cable), approx.	350	
Housing	Valve connector K4 according to DIN EN 175301-803	
Ambient temperature range °C	-20 +60	
Storage temperature range °C	-20 +60	

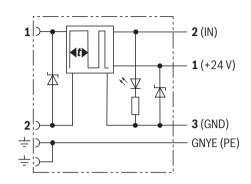
Electric 1)			
Voltage type			Direct voltage
Operating voltage		V	24 ±10%
Holding current		А	2
Control voltage	► ON	V	10 30
(enable "IN")	► OFF	V	<3.5
Galvanic separation			no
Control current (enab	le "IN")	mA	2.5 12
Maximum switching frequency Hz		≤1	
PWM frequency Hz		PWM operation 300 500	
Protection class accor	ding to EN 60529		IP65, IP67
Cable connection			Potted-in cable with open end
Cable type			See table below
Duty cycle	► "V001" (fast switching)	ms	100 115
	► "V002" (energy savings)	ms	300 330
PWM duty factor	► "V001" (fast switching)	%	40 ±5 on
	► "V002" (energy savings)	%	60 ±5 on
Conformity	► CE according to EMC directive 2014/30/EU, tested according to		EN 61000-6-2:2005, EN 61000-6-3:2007 + A1:2011

 $<sup>^{\</sup>rm 1)}$  The specified values refer to an operating voltage of 24 V

## Cable type

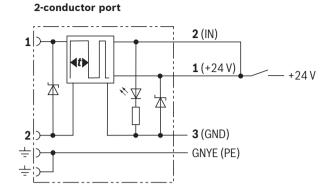
Jacket material	Jacket color	Lead insulation	Wire color	Wires	Jacket diameter
				in mm²	in mm
PUR-JZ	Black	PP	BK, GNYE	4 x 0.75	6.5

# Block diagram / pin assignment



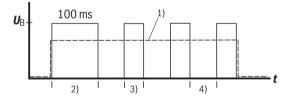
- **1** Operating voltage "+ $\boldsymbol{U}_{\text{B}}$ " (+24 V)
- 2 Enable "IN"
- 3 Operating voltage "GND"

**GNYE** Protective grounding conductor "PE"



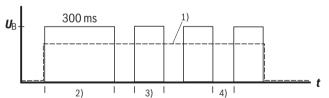
# **Functional diagram**

Version "V001" (ratio on/off = 40/60)

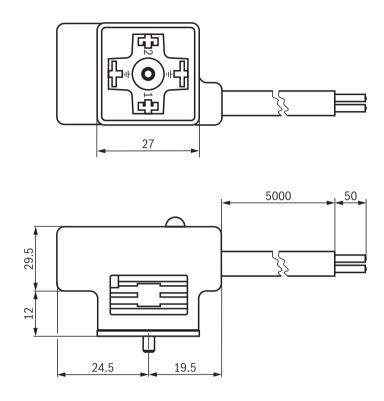


- 1) Enable signal
- 2) Duty cycle
- 3) On time
- 4) Off time

Version "V002" (ratio on/off = 60/40)



# **Dimensions** (dimensions in mm)



- ▶ M3 mounting screw, tightening torque  $M_A$  = 0.4 Nm
- ► Contacting according to DIN EN 175301-803

## Switching times: Version "V001"

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

#### Directional spool valves type 4WE 10 ... (3 chambers)

Symbol	Coil	Switching	time in ms
		ON	OFF
С	24 V	58	48
	12 V; "V001"	26	48
D	24 V	78	28
	12 V; "V001"	29	28
E	24 V	55	35
	12 V; "V001"	22	35
E67	24 V	84	31
	12 V; "V001"	24	31
J	24 V	63	51
	12 V; "V001"	28	51
J2	24 V	47	31
	12 V; "V001"	24	31
Υ	24 V	57	31
	12 V; "V001"	23	31
Y11	24 V	46	50
	12 V; "V001"	28	50

# Directional spool valves type 4WE 6 ...

Symbol	Coil	Switching time in ms		
		ON	OFF	
С	24 V	27	14	
	12 V; "V001"	17	14	
D	24 V	42	11	
	12 V; "V001"	25	11	
E	24 V	32	11	
	12 V; "V001"	22	11	
E67	24 V	39	12	
	12 V; "V001"	21	12	
G	24 V	33	11	
	12 V; "V001"	28	11	
J	24 V	37	17	
	12 V; "V001"	17	17	
L	24 V	36	15	
	12 V; "V001"	21	15	
М	24 V	47	26	
	12 V; "V001"	33	26	
Х7	24 V	62	13	
	12 V; "V001"	47	13	

#### Directional spool valves type 5-4WE 10 ... (5 chambers)

Symbol	Coil	Switching time in ms	
		ON	OFF
J2	24 V	170	23
	12 V; "V001"	44	23
X84	24 V	39	67
	12 V; "V001"	20	67

#### Shut-off valves type Z-4WE 6 ...

Symbol	Coil	Switching	time in ms
		ON	OFF
E63	24 V	27	14
	12 V; "V001"	15	14
E68	24 V	27	14
	12 V; "V001"	15	14
X250	24 V	31	20
	12 V; "V001"	16	20
X252	24 V	47	13
	12 V; "V001"	17	13

## Motices:

- ► Additional valves on request.
- ▶ If the connector switching amplifier is used, the power limit may be improved. The degree of improvement depends on the respective symbol of the valve. Further information on request.
- ▶ When switching on and off, an additional dead time of approx. 2 ms must be taken into account (applies at signal level 24 V).
- ▶ The specified switching times correspond to the time of signaling until a pressure change of 5%.
- ▶ The switching times are specified for the same power limits as documented in data sheets (see 23178, 23340 and 23352) and for a horizontal installation position.
- ► The use of version "V001" is not possible in connection with valves with amplified spring.

#### Energy savings: Version "V002"

#### Energy savings with valves with 24 V coils using connector amplifier VT-SSBA1..V002

#### Directional spool valves type 4WE 10 ... (3 chambers)

Symbol	Energy consumption in W		
	24 V coil (standard)	24 V coil with "V002"	
C; D; E;			
E67; J; J2;	40	24	
Y; Y11			

#### Directional spool valves type 4WE 6 ...

Symbol	Energy consumption in W				
	<b>24 V coil</b> (standard)	24 V coil with "V002"			
C; D; E; E67; G; J; L; M; X7	30	18			

#### Directional spool valves type 5-4WE 10 ... (5 chambers)

Symbol	Energy consumption in W	
	<b>24 V coil</b> (standard)	24 V coil with "V002"
J2; X84	40	24

#### Shut-off valves type Z-4WE 6 ...

Symbo	ι	Energy consumption in W		
		<b>24 V coil</b> (standard)	24 V coil with "V002"	
E63; E6 X250; X252	;	30	18	

#### **∏** Motices:

- ► Additional valves on request.
- ▶ If the connector switching amplifier is used, the power limit may be improved. The degree of improvement depends on the respective symbol of the valve. Further information on request.
- ► The use of version "V001" is not possible in connection with valves with amplified spring.
- ▶ Reduction of the coil temperature by at least 30 K.

# **Project planning and maintenance instructions**

- ► The connector switching amplifier may only operated in accordance with the limits and applications defined in the data sheet.
- ► Sufficient distance to radios and mobile phones is required (>1 m).
- ► In case of overload or short-circuit, the output is de-energized. Before switching it on again, enable signal "IN" has to be switched to "OFF" (<3.5 V).
- ► There is no galvanic separation between the input and output.
- ► If used as power reducer, the power in PWM operation is not sufficient for repeated switching of the valve after exceeding the power limit in switched state.
- ► In an error case, the temperature of the valve solenoid may increase. Take external monitoring measures to ensure that the maximum surface temperature of the solenoid is complied with.

- ► The connector switching amplifier type VT-SSBA1 is no safety-relevant part of a control system according to EN ISO 13849-1:2006.
  - To comply with safety requirements, the following points must be observed:
  - In case the safety function is required, the voltage supply and the enable input of the connector switching amplifiers type VT-SSBA1 is to be switched off by a suitable switching element with appropriate reliability.
  - If persons have to enter the danger zone with activated connector switching amplifier type
    VT-SSBA1, additional measures for guaranteeing their safety have to be taken for the reasons specified above.

# **Further information**

- ▶ Mating connectors and cable sets for valves and sensors
- ► Hydraulic valves for industrial applications
- ► Information on available spare parts

Data sheet 08006 Operating instructions 07600-B www.boschrexroth.com/spc