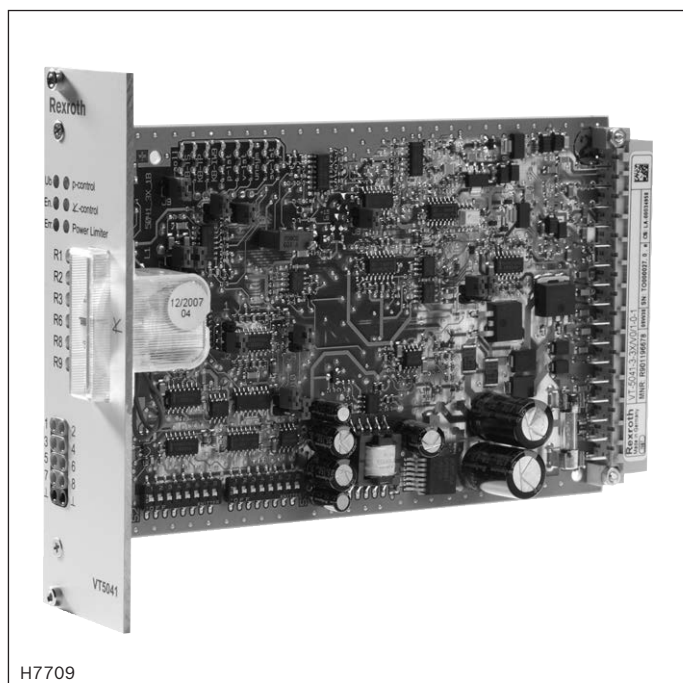


External control electronics for SYDFE1 control of the axial piston variable displacement pump A10VSO

Type VT 5041



- ▶ Component series 3X
- ▶ Analog, euro-card format
- ▶ Part of the SYDFE1 pressure and flow control system (component series 1X, 2X and 3X) for the control of the axial piston variable displacement pump A10VSO ... with SYDFE1 control via valve type VT-DFP...2X

Features

- ▶ Implementation of the electronic functions of the SYDFE1 control; pressure and swivel angle control; optional power limitation
- ▶ Pressure controller circuitry can be adjusted and switched to two existing hydraulic fluid volumes (actuators plus lines)
- ▶ Minimum value generator for pressure and swivel angle controller
- ▶ Pressure-dependent leakage compensation (can be switched off)
- ▶ Switchable actual pressure value input (current, voltage, range)
- ▶ 6 LED displays on the front plate for the operating state
- ▶ Display instrument on the front plate for actual swivel angle value (optional)
- ▶ Power limitation with internal or external command value presetting (optional)

Contents

Features	1
Ordering code	2
Functional description	3
Block diagram / pin assignment	4
Technical data	6, 7
Electronic card	8
Front plate	10
Accessories	10

Ordering code

01	02	03	04
VT 5041	-	3X	/
	-		0

01	External control electronics for SYDFE1 control of the axial piston variable displacement pump A10VSO	VT 5041
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02	Component series 30 ... 39 (30 ... 39: unchanged technical data and pin assignment)	3X
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Additional functions

03	Without power limitation, without display instrument	1
	Without power limitation, with display instrument	2
	With power limitation, with display instrument	3

04	For swivel angle sensor IW9 (standard)	0
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Available variants

Type	Material no.
VT 5041-3X/1-0	R901236404
VT 5041-3X/2-0	R901263598
VT 5041-3X/3-0	R901196678

Functional description

The analog control electronics VT5041-3X/... is designed as insertion card in euro format. It is provided with a command value input each for pressure and swivel angle (1) as a standard (optional power limitation). The actual pressure value is measured with a pressure transducer. The position transducer at the pump measures the actual swivel angle value. The measured actual values are processed in the amplifier (2) and (3) and compared with the provided command values. The minimum value generator (4) controls that only controller (6) or (10) which is allocated to the requested operating point is automatically activated. The output signal of the minimum value generator (4) becomes the command value for the valve control loop.

The optionally available power limitation is automatically activated by the provision of a suitable command value. The power command value can be provided internally or externally. If necessary, it limits the swivel angle command value by means of a minimum value generator (5). The resulting swivel angle command value can be measured at socket 7.

The actual valve value (position of the valve spool) is measured with an inductive position transducer. An oscillator/demodulator switch (7) enhances the signal. The control deviation is generated and processed in the controller for the valve spool position (8). The output signal of the valve controller (8) forms the command value for the self-timing power output stage (9) which controls the proportional solenoid of the valve.

The control electronics is equipped with a fault message output where a voltage of 0 V is applied in case of error (= low-active). At the same time, the "Err." LED lights up. Depending on the jumper J1 configuration, the valve output stage can be de-energized in case of an error message.

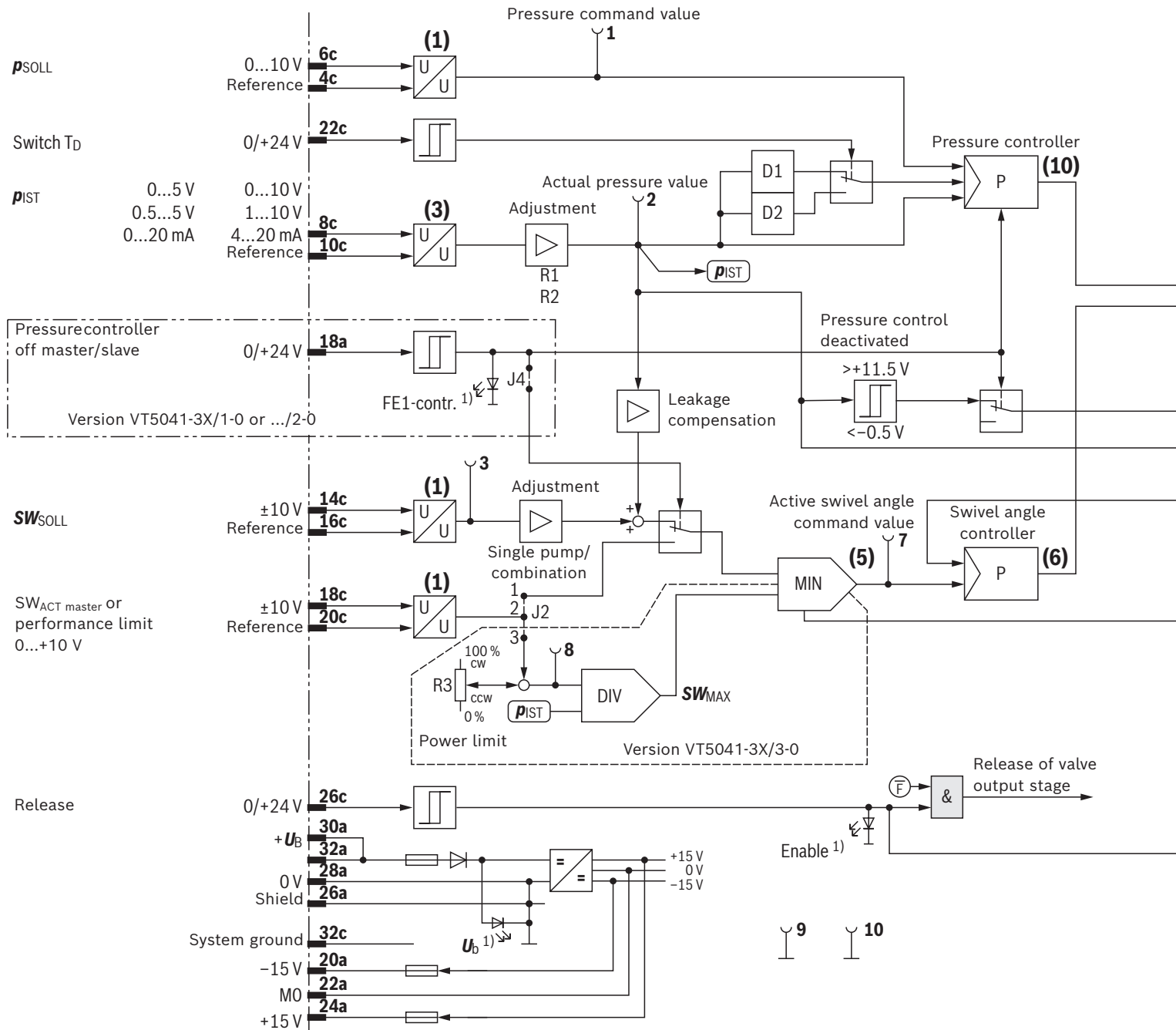
Causes for fault messages:

- ▶ Error in the internal voltage supply
- ▶ The actual pressure value is greater than the admissible system pressure (socket 2: $p_{act} > 11.5 \text{ V}$)
- ▶ No enable signal at port 26c
- ▶ Cable break or range of the swivel angle return exceeded
- ▶ Cable break or range of the valve spool return exceeded
- ▶ "Pressure transducer" cable break (with settings 4 ... 20 mA, 0.5 ... 5 V and 1 ... 10 V)
- ▶ Control error (control difference x controller amplification) is greater than 4 V (40%) for more than 1 second

In an error case, the electronics can be configured so that the output stage is de-energized and the valve spool is pressed to its mechanical end position. This causes the pump to swivel back. The error can only be acknowledged by resetting the enable signal.

See also "Block diagram" on page 4 and 5.

Block diagram / pin assignment



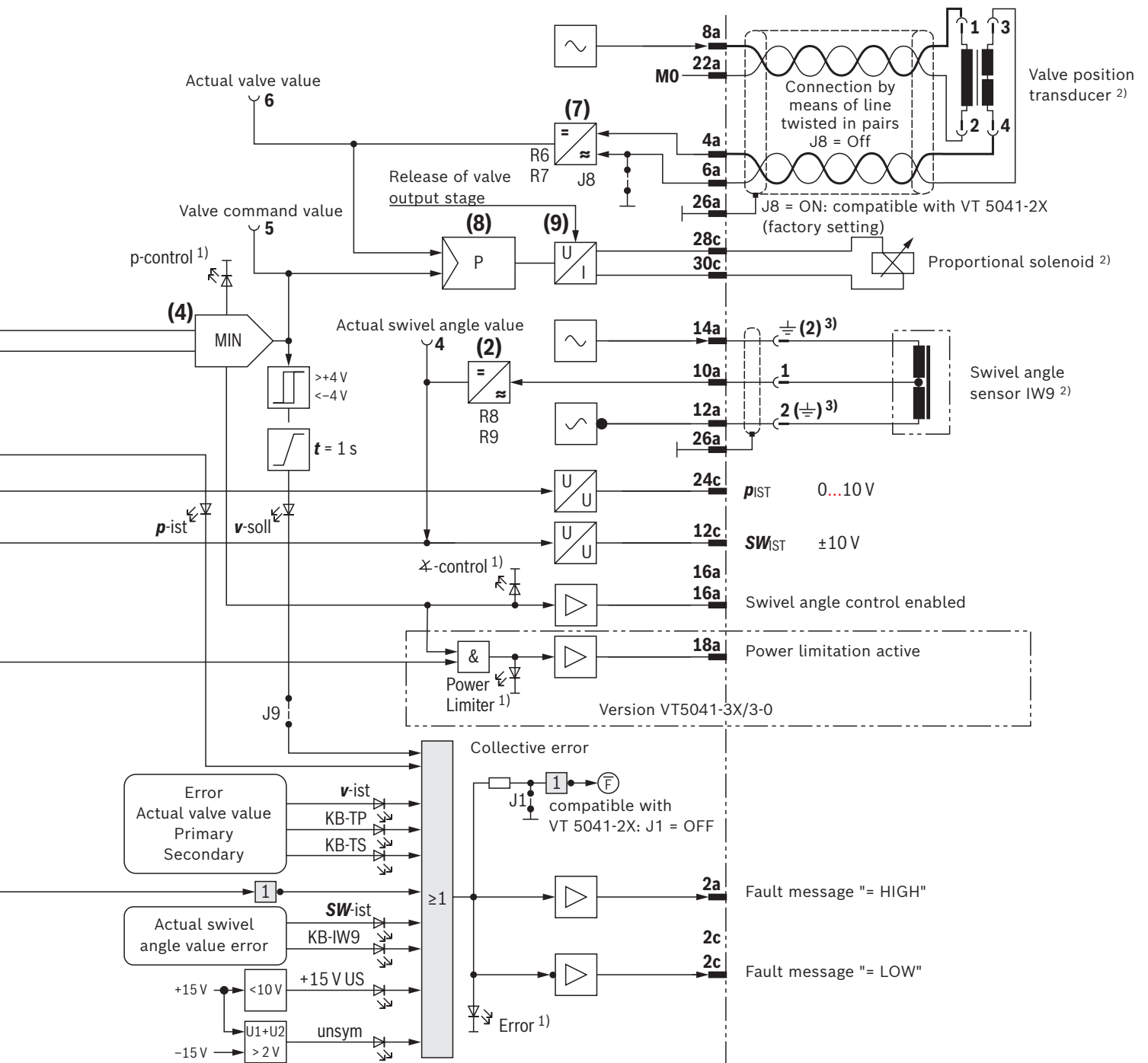
Abbreviations for signals

$p_{COMMAND}$	Pressure command value
p_{ACTUAL}	Actual pressure value
Switch T_D	Oil volume switch-over
$SW_{COMMAND}$	Swivel angle command value
SW_{ACTUAL}	Actual swivel angle value
SW_{ACT} master	Actual master swivel angle value
FE1 contr.	Pressure controller disabled

Function of the jumpers and switches on the electronic card see page 8.

For the meaning of the measuring sockets, display and adjustment elements (potentiometer) at the front plate, see page 9.

Block diagram / pin assignment



Diagnostic LEDs on the printed circuit board

vcommand	Persisting control deviation is too great	KB-IW9	Swivel angle position sensor cable break
vactual	Actual valve value error - exceeding of range	+15 V US	+15V undervoltage (internal power supply unit)
pactual	Actual pressure value error	asym	Internal voltage supply asymmetric
SWactual	Actual swivel angle value error - exceeding of range		
KB-TP	Valve position transducer cable break - primary		
KB-TS	Valve position transducer cable break - secondary		

1) LED display at the front plate (for meaning refer to page 9)

2) For further information with regard to the connection, see operating instructions 30011-B

3) Connection diagram for counterclockwise rotating systems in ()

Technical data

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

Operating voltage	▶ Nominal	VDC	24; +40% ... -10%
	▶ Upper limit value	V	35
	▶ Lower limit value	V	21
Current consumption	▶ Rated current	A	0.6
	▶ Maximum	A	1.25
Analog input, command value	▶ Pressure $p_{\text{COMMAND}}^{1)}$	V	0 ... 10
	▶ Swivel angle $SW_{\text{COMMAND}}^{1)}$		
	– Standard	V	± 10
	– Regenerative	V	0 ... 10
	▶ Power ¹⁾		
	– $(p \times SW)_{\text{max}}$	V	0 ... 10
	– $SW_{\text{ACT}} \text{ master}$	V	± 10
Analog input, actual value	▶ Pressure p_{ACT}		
	– Voltage ¹⁾	V	0 ... 5, 0 ... 10 0.5 ... 5, 1 ... 10
	– Current	mA	0 ... 20, 4 ... 20; $R_B = 100 \Omega$
Enable input (PLC)		V	>12
Analog output	▶ Output stage		
	– Solenoid current	A	2.5; $R_{20} = 2 \Omega$
	▶ Oscillator		
	– Frequency	kHz	5.4
	– Amplitude for IW9 (actual swivel angle value)	V	1 (port 12a /14a)
	– Amplitude for DM2 (actual valve value)	V	3.6 (port 8a)
	▶ Signal voltage outputs		
	– Actual pressure value	V	0 ... 10
– Actual swivel angle value	V	-10 ... +10 (-100% ... +100%)	
Auxiliary voltages for external use ($I_{\text{max}} = 10 \text{ mA}$)		V	± 15 ; +2% ... -6%
Measuring sockets, function and number	▶ Pressure command value (p_{COMMAND})	1	V 0 ... 10 (0 ... +100%; $R_i = 2 \text{ k}\Omega$)
	▶ Actual pressure value (p_{ACT})	2	V 0 ... 10 (0 ... +100%; $R_i = 2 \text{ k}\Omega$)
	▶ Swivel angle command value (SW_{COMMAND})	3	V ± 10 ($\pm 100\%$; $R_i = 2 \text{ k}\Omega$)
	▶ Actual swivel angle value (SW_{ACT})	4	V ± 10 ($\pm 100\%$; $R_i = 2 \text{ k}\Omega$)
	▶ Valve command value (x_{vcommand})	5	V ± 10 ($\pm 100\%$; $R_i = 2 \text{ k}\Omega$)
	▶ Actual valve value (x_{vact})	6	V ± 10 ($\pm 100\%$; $R_i = 2 \text{ k}\Omega$)
	▶ Active swivel angle command value	7	V ± 10 ($\pm 100\%$; $R_i = 2 \text{ k}\Omega$)
	▶ Power limit (P_{max})	8	V 0 ... 10 (0 ... +100%; $R_i = 2 \text{ k}\Omega$)
	▶ Reference	9, 10	
Message outputs	▶ Swivel angle control enabled	V	$U_B \dots 3$ ($I_{\text{max}} = 20 \text{ mA}$)
	▶ Power limitation active	V	$U_B \dots 3$ ($I_{\text{max}} = 20 \text{ mA}$)
Fault messages	▶ Low-active	V	$U_B \dots 3$ ($I_{\text{max}} = 20 \text{ mA}$); error at $U < 1$
	▶ High-active	V	$U_B \dots 3$ ($I_{\text{max}} = 20 \text{ mA}$)
Transducer type	▶ Swivel angle		
	– IW9 (inductive position transducer)		Throttle circuit; $\pm 4 \text{ mm}$; 3-conductor connection
	▶ Valve		
	– DM2 (inductive position transducer)		Trafo circuit; $\pm 0.6 \text{ mm}$; 4-conductor connection
Type of connection	▶ Compatibility		32-pole male multipoint connector, DIN 41612, design D
	▶ Card dimensions		Euro-card 100 x 160 mm; DIN 41494

1) $R_e > 50 \text{ k}\Omega$

Technical data

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

Front plate dimensions	▶ Height	3 HE (128.4 mm)
	▶ Conductor path side width	1 TE
	▶ Component side width	
	– Version "1"	5 TE
	– Version "2" and "3"	7 TE
Operating temperature range	°C	0 ... +50
Storage temperature range	°C	–20 ... +70
Weight	▶ Without display	kg 0.19
	▶ With display	kg 0.21

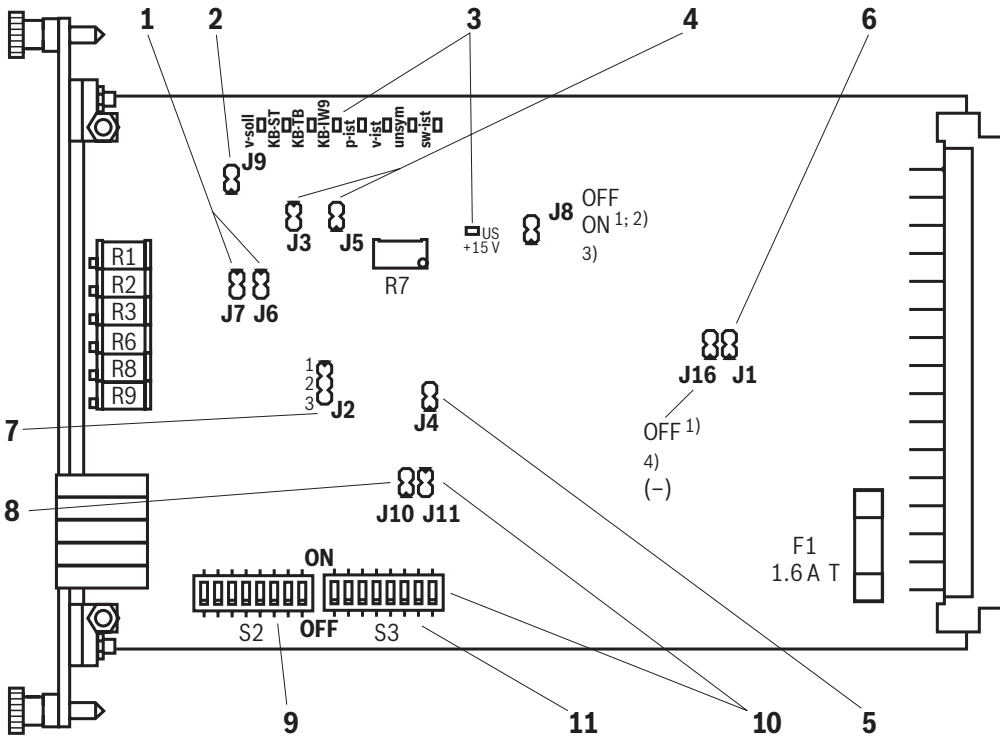
Environmental compatibility for the areas EMC, climate and mechanical load

Mechanical load	Test according to EN 60068-2 / IEC 68-2 / DIN 40046
EN 60068-2-6:1995, vibrations, sine-shaped	10 cycles / 10 ... 500 ... 10 Hz / $\Delta f = 1$ oct./min. / max. 2 g
IEC 68-2-36: 1973 / DIN 40046-24: 1977, vibrations, random (broadband noise)	20 ... 500 Hz / 2.2 g _{RMS} / 0.01 g ² /Hz / 30 min per axis
EN 60068-2-27:1993, shocking	Half-sine 15 g / 11 ms, 3 x each in positive and in negative direction per axis
Electro-magnetic compatibility (EMC)	
Interference resistance	Testing according to EN 61000-6-2:2005, VDE 0839 Part 6-2
ESD – EN 61000-4-2:1995, +A1:1998 +A2:2000, IEC 1000-4-2	Air discharge SG 3 / BWK A Contact discharge SG 4 / BWK A
Burst - EN 61000-4-4:2004, IEC 1000-4-4	Repetition rate 5KHz / 100KHz Ub: SG 3 / BWK A Data line: SG 4 / BWK A
Surge – EN 61000-4-5:2006, IEC 1000-4-5	Ub: SG 1 / BWK B
HF fields – EN 61000-4-6:2007, + corrigendum 08/2007, IEC 1000-4-6 (conducted)	Ub: SG 3 / BWK A
Interference emission	Testing according to EN 61000-6-3:2007, VDE 0839 Part 6-3
IEC/CISPR16-2-1:2005-09, point 7.4.1	Limit values according to EN 61000-6-3:2007
IEC/CISPR16-1-2:2006-08, point 4.3	0.15 ... 30 MHz; table 1, line 3

SG = severity level

BWK = evaluation criterion

Electronic card: Display and adjustment elements



1	Leakage compensation	J6	J7
	Off	OFF	OFF
	4%	OFF	ON
	6%	ON	OFF
	10%	ON	ON

2	Valve command value monitoring	J9
	On	ON
	Off ²⁾	OFF

3	Diagnostic LEDs
For a description, see page 5 and the operating instructions 30011-B	

4	Regenerative operation	J3	J5
	On	ON	OFF
	Off	OFF	ON

5	Function pin 18a⁵⁾	Jumper J4
	Pressure control on/off	OFF
	Master/slave on/off	ON

6	Valve switch-off in case of error	Jumper J1
	Active	OFF ²⁾
	Inactive	ON

7	Selection for analog input at pin 18c	Jumper J2 Bridge
	Actual master swivel angle value	1-2
	External power limitation	2-3

8	Actual pressure value gain	Jumper J10
	1-fold	OFF
	2-fold	ON

9	Signal adjustment actual pressure value	Switch S2									
			.1	.2	.3	.4	.5	.6	.7	.8	
		V	0 ... 10 V	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
		E	1 ... 10 V	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
		D	0 ... 5 V	OFF	OFF	ON	ON	OFF	OFF	ON	ON
		F	0.5 ... 5 V	OFF	OFF	ON	ON	ON	OFF	OFF	ON
		B	0 ... 20 mA	ON	ON	OFF	OFF	OFF	OFF	ON	ON
		C	4...20 mA	ON	ON	OFF	OFF	ON	ON	OFF	OFF

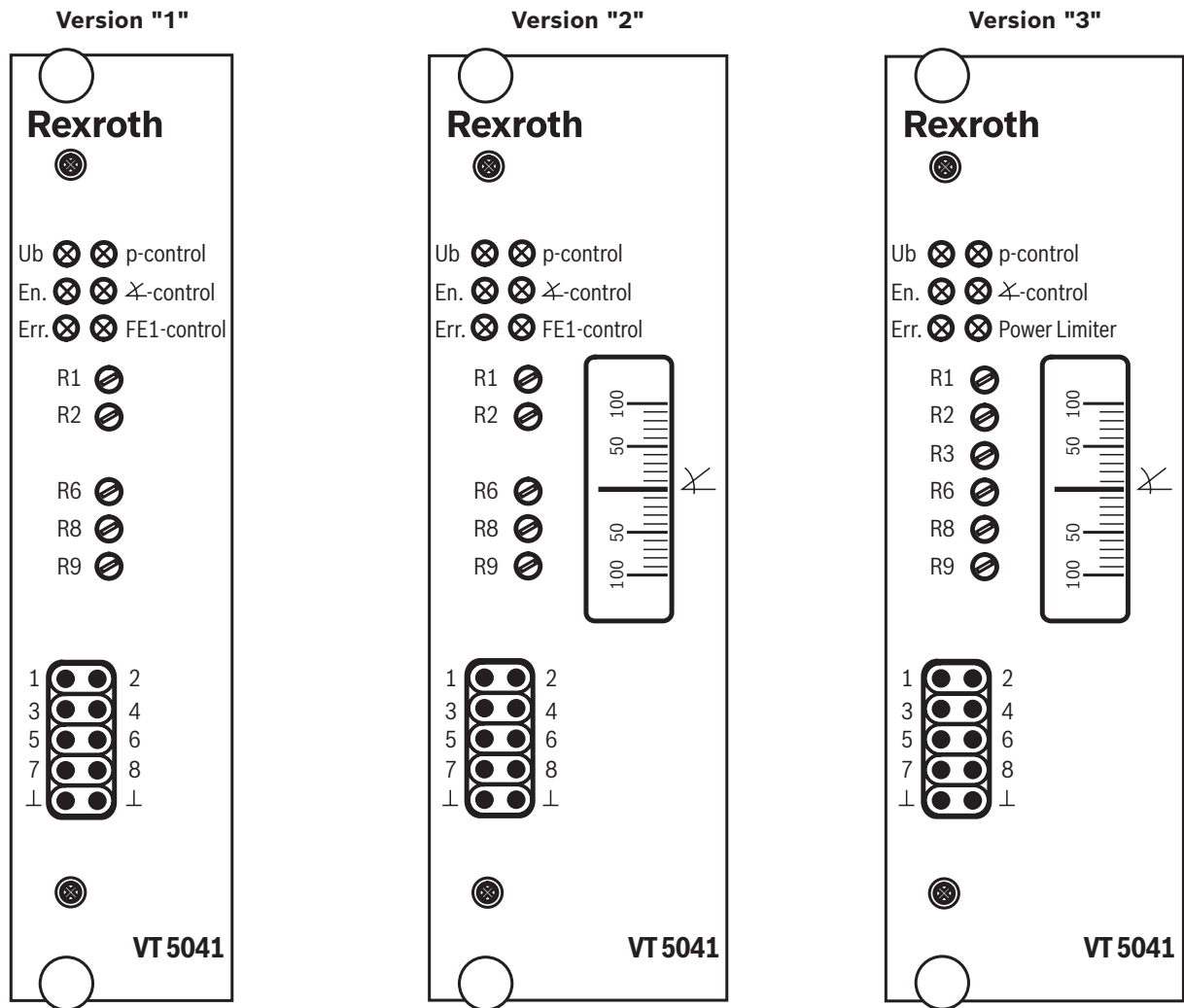
10	p gain pressure controller	Switch S3		Jumper J11		
		.7	.8			
		8.0	OFF		OFF	OFF
		4.8	OFF		ON	OFF
		4.0	OFF		OFF	ON
		3.0	OFF		ON	ON
		2.4	ON		OFF	ON
2.0	ON	ON	ON			

11	Volume adjustment of pressure controller							
	Input switch T_D = OFF	Switch S3			Input switch T_D = ON	Switch S3		
		.1	.2	.3		.4	.5	.6
	≤5.0 l	OFF	OFF	OFF	12.5 l	OFF	OFF	OFF
	7.5 l	OFF	ON	OFF	30.0 l	OFF	ON	OFF
	10.0 l	ON	ON	OFF	45 l	ON	ON	OFF
	15.0 l	ON	OFF	ON	60 l	ON	OFF	ON
	20.0 l	OFF	ON	ON	75 l	OFF	ON	ON
	25.0 l	ON	ON	ON	90 l	ON	ON	ON

ON Bridge closed
OFF Bridge open
 Factory setting

- 1) Factory setting
- 2) Compatible with VT 5041-2X
- 3) Reference for position transducer
- 4) Reference for actual pressure value
- 5) Only version "1" and "2" (without power limitation)

Measuring sockets, display and adjustment elements (potentiometer) at the front plate see page 9.

Front plate: Display and adjustment elements, measuring sockets**LED displays**

Ub (green)	Supply voltage available
En. (green)	Enable available
Err. (red)	Fault/collective error
p-control (yellow)	Pressure control enabled
∓-control (yellow)	Swivel angle control enabled
FE1 contr. (yellow)	Pressure controller disabled
Power Limiter (yellow)	Power limitation active

Adjustment elements (potentiometer)

R1	Zero point of actual pressure value
R2	Actual pressure value gain
R3	Setting of the power limit
R6	Zero point of actual valve value
R8	Zero point of actual swivel angle value
R9	Gain of actual swivel angle value

Measuring sockets ($R_i = 2 \text{ k}\Omega$)

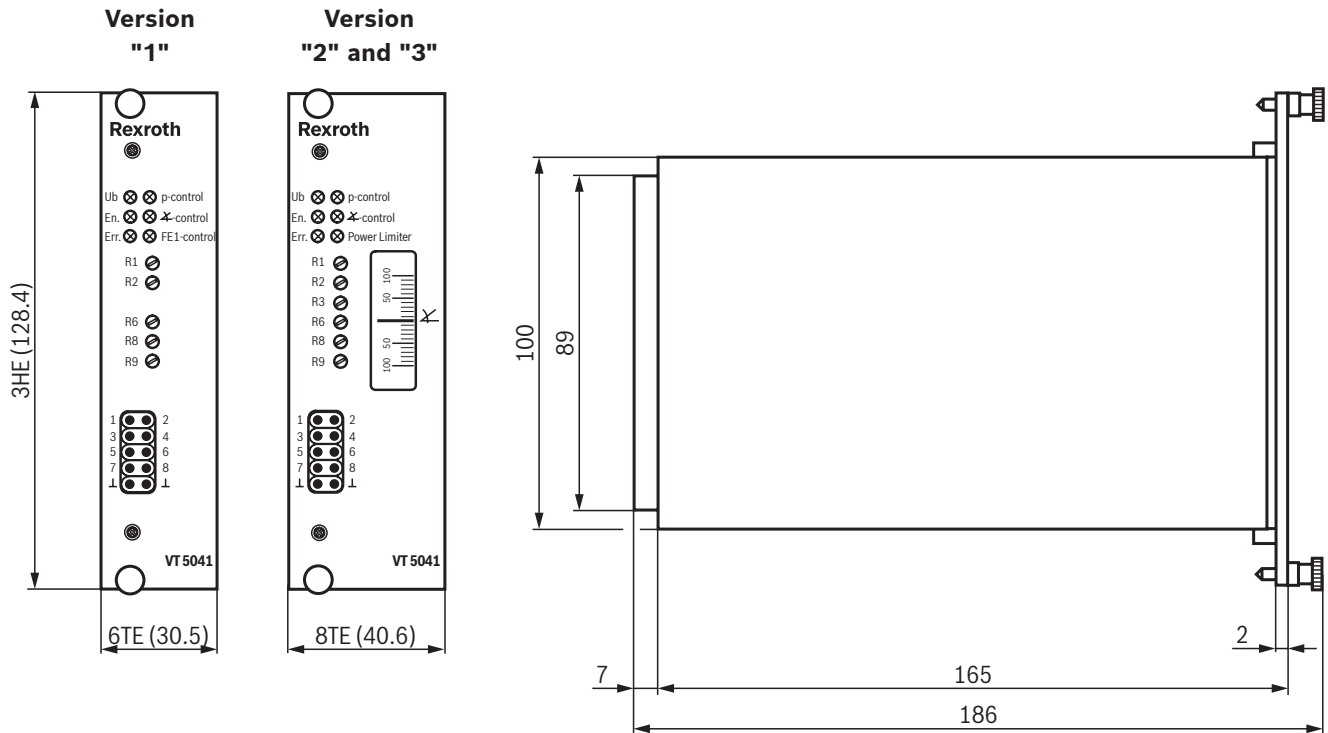
1	Pressure command value 0...+10 V
2	Actual pressure value 0...+10 V
3	Swivel angle command value $\pm 10 \text{ V}$
4	Actual swivel angle value $\pm 10 \text{ V}$
5	Valve command value $\pm 10 \text{ V}$
6	Actual valve value $\pm 10 \text{ V}$
7	Active swivel angle command value $\pm 10 \text{ V}$
8	Power limit 0...+10 V
⊥	Reference for measured values
⊥	Reference for measured values

Display (measuring instrument)

∓	Actual swivel angle value display in %
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Dimensions

(dimensions in mm)



Accessories (separate order)

Card holder	Material number	Data sheet
Open card holder VT 3002-1-2X/32D	-	29928
Power supply unit	Material number	Data sheet
Type VT-NE32-1X, compact power supply unit 115/230 VAC → 24 VDC	-	29929
▶ Output 1 (60 W) to supply VT-5041	-	-
▶ Output 2 (24 W) to supply pressure transducers; e.g. type HM20	-	30272

Bosch Rexroth AG
 Industrial Hydraulics
 Zum Eisengießer 1
 97816 Lohr am Main, Germany
 Phone +49 (0) 93 52/40 30 20
 my.support@boschrexroth.de
 www.boschrexroth.de

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Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

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