

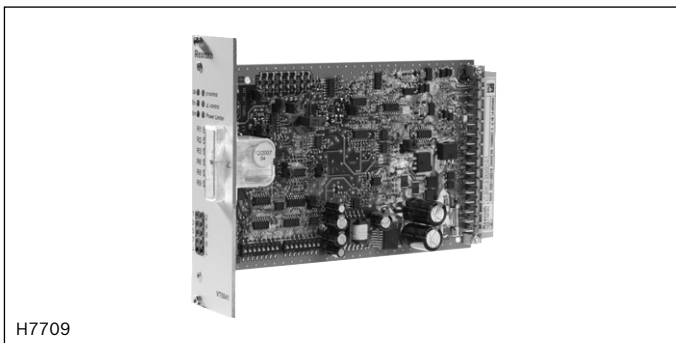
External control electronics for the SYDFE1 control of the A10VSO axial piston variable displacement pump

Type VT 5041

RE 30242

Edition: 2013-06

Replaces: 12.11



- ▶ 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 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)
- ▶ Differential amplifier inputs
- ▶ Controller for valve spool position
- ▶ Minimum value generator for pressure and swivel angle controller
- ▶ Self-timed output stage
- ▶ Pressure-dependent leakage compensation (can be switched off)
- ▶ Reverse polarity protection for voltage supply
- ▶ 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)

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Ordering codes

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

01	External control electronics for the SYDFE1 control of the A10VSO axial piston variable displacement pump	VT 5041
02	Component series 30 to 39 (30 to 39: Unchanged technical data and pin assignment)	3X
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 IW9 swivel angle sensor (standard)	0

Preferred types

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

Recommended accessories

Card holder:

- ▶ Open card holder VT 3002-1-2X/32D
(see data sheet 29928)

Power supply unit:

- ▶ Type VT-NE32-1X, see data sheet 29929
Compact power supply unit 115/230 VAC → 24 VDC
 - Output 1 (60 W) for VT-5041 supply
 - Output 2 (24 W) for the supply of pressure transducers; e.g. type HM 12 or HM 13, see data sheet 29933

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 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 flashes. Depending on the jumper J1 configuration, the valve output can be de-energized in case of an error message.

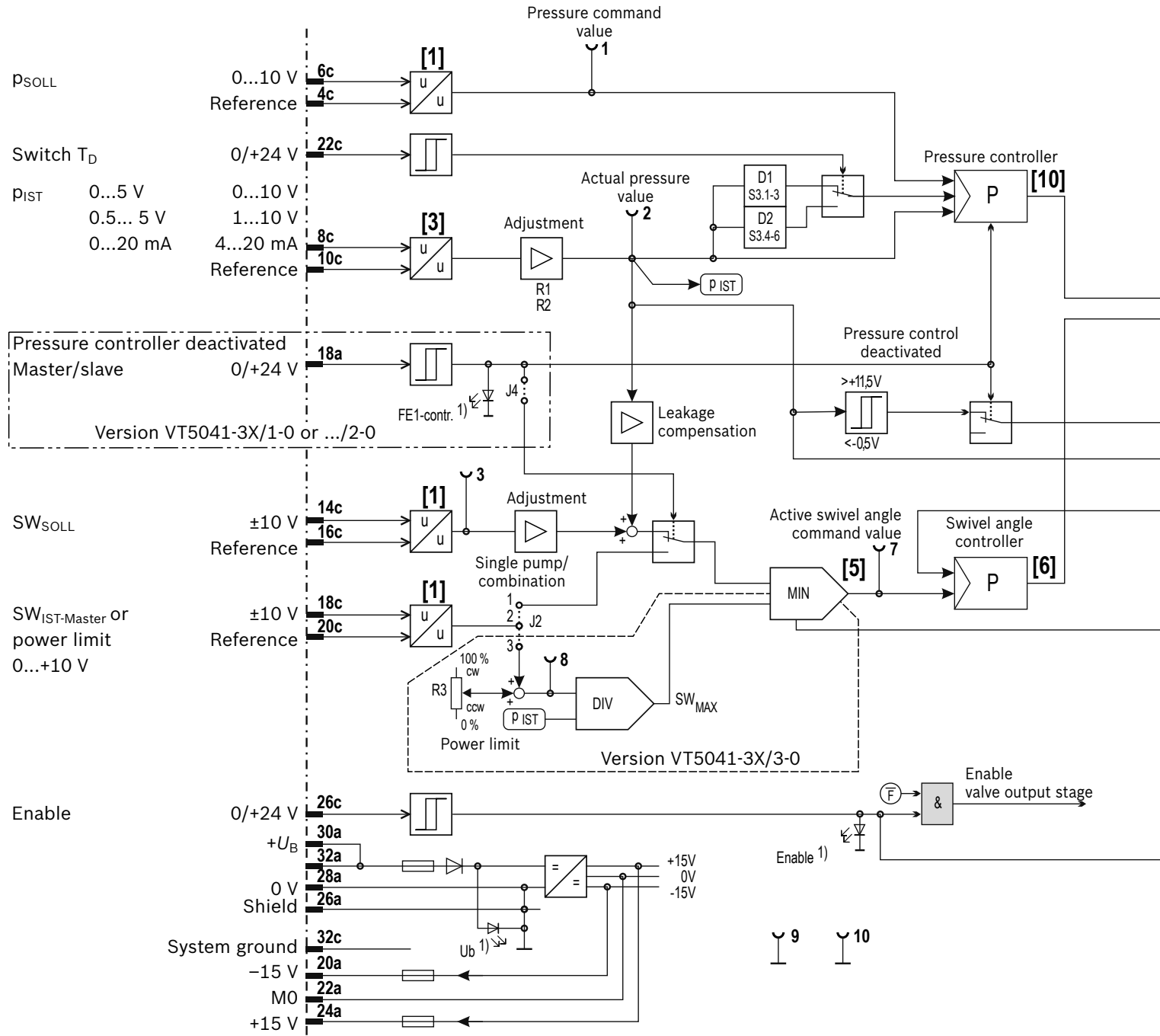
Causes for error messages:

- ▶ Defective internal voltage supply
- ▶ The actual pressure value is greater than the admissible system pressure (socket 2: $p_{act} > 11.5$ 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
- ▶ Cable break "pressure transducer" (for adjustments 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 case of error, 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.

[] = assignment to the block diagram on page 4 and 5

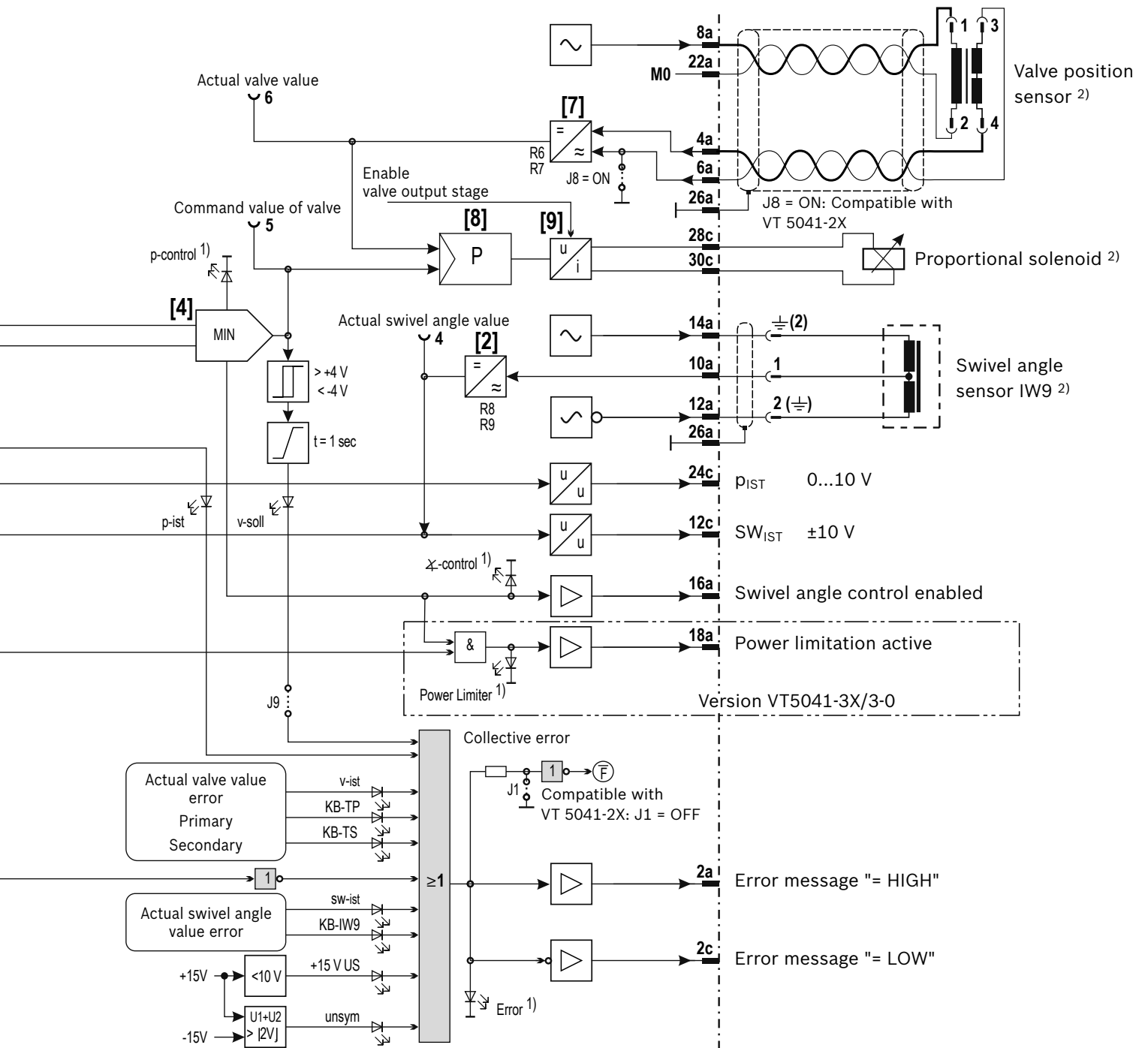
Block diagram/pin assignment



Abbreviations for the signals

P_{SOLL}	Pressure command value
P_{IST}	Actual pressure value
Switch T_D	Oil volume selection
SW_{SOLL}	Swivel angle command value
SW_{IST}	Actual swivel angle value
$SW_{IST-Master}$	Actual master swivel angle value
FE1 contr.	Pressure controller disabled

For the function of the jumpers and switches on the electronic card see page 8.
 For the meaning of the measuring sockets, and display and adjustment elements (potentiometer) on the front plate, see page 9.



Diagnostic LEDs on the printed circuit board

- v-soll Persisting control deviation is too great
- v-ist Actual valve value error - exceeding of range
- p-ist Actual pressure value error
- sw-ist Actual swivel angle value error - exceeds range
- KB-TP Valve position sensor cable break - primary
- KB-TS Valve position sensor cable break - secondary
- KB-IW9 Swivel angle position sensor cable break
- +15 V US +15 V undervoltage (internal power supply unit)
- unsym Internal voltage supply is asymmetric

1) LED displays on the front plate (for meaning see page 9)
 2) For further information with regard to the connection, see operating instructions 30011-B

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

Operating voltage	U_B	24 V DC + 40 -10% (21.6... 33.6 V)
Upper limit value	$u_B(t)_{\max}$	35 V
Lower limit value	$u_B(t)_{\min}$	21 V
Current consumption	$I_{\text{rated}} (I_{\max})$	0.6 A (1.25 A)
Analog command value inputs		
Pressure p_{SOLL}	U_e	0...10 V; $R_e > 50 \text{ k}\Omega$
Swivel angle SW_{SOLL}	U_e	Standard $\pm 10 \text{ V}$; regenerative: 0...10 V; $R_e > 50 \text{ k}\Omega$
Power $(p \cdot SW)_{\max}$ or $SW_{\text{IST-Master}}$	U_e	0...10 V, $R_e > 50 \text{ k}\Omega$ $\pm 10 \text{ V}$, $R_e > 50 \text{ k}\Omega$
Analog actual value inputs		
Pressure p_{IST}	U_e I_e	0...5 V, 0...10 V; $R_e > 50 \text{ k}\Omega$ 0.5...5 V, 1...10 V; $R_e > 50 \text{ k}\Omega$ 0...20 mA, 4...20 mA; $R_B = 100 \Omega$
Enable input (PLC)	U_e	> 12 V
Analog outputs		
Output stage		
Solenoid current	I_{\max}	2.5 A; $R_{20} = 2 \Omega$
Oscillator		
Frequency	f	5.4 kHz
Amplitude for IW9 (actual swivel angle value)	U_{ss}	1 V (port 12a /14a)
Amplitude for DM2 (actual valve value)	U_{ss}	3.6 V (port 8a)
Signal voltage outputs		
Actual pressure value	U	0...10 V
Actual swivel angle value	U	-10 V... +10 V \triangleq -100%... +100%
Auxiliary voltages for external use		
	U	$\pm(15 \text{ V} + 2\% - 6\%)$; $I_{\max} = 10 \text{ mA}$
Measuring sockets, function and number		
Pressure command value (p_{SOLL})	1	U 0... 10 V \triangleq 0... +100%; $R_i = 2 \text{ k}\Omega$
Actual pressure value (p_{IST})	2	U 0... 10 V \triangleq 0... +100%; $R_i = 2 \text{ k}\Omega$
Swivel angle command value (SW_{SOLL})	3	U $\pm 10 \text{ V} \triangleq \pm 100\%$; $R_i = 2 \text{ k}\Omega$
Actual swivel angle value (SW_{IST})	4	U $\pm 10 \text{ V} \triangleq \pm 100\%$; $R_i = 2 \text{ k}\Omega$
Valve command value (x_{Vsol})	5	U $\pm 10 \text{ V} \triangleq \pm 100\%$; $R_i = 2 \text{ k}\Omega$
Actual valve value (x_{Vist})	6	U $\pm 10 \text{ V} \triangleq \pm 100\%$; $R_i = 2 \text{ k}\Omega$
Active swivel angle command value	7	U $\pm 10 \text{ V} \triangleq \pm 100\%$; $R_i = 2 \text{ k}\Omega$
Power limit (P_{\max})	8	U 0... +10 V \triangleq 0... +100%; $R_i = 2 \text{ k}\Omega$
Reference	9 and 10	
Message outputs		
Swivel angle control enabled	U	$U_B - 3 \text{ V}$ ($I_{\max} = 20 \text{ mA}$)
Power limitation active	U	$U_B - 3 \text{ V}$ ($I_{\max} = 20 \text{ mA}$)
Error messages		
Low-active	U	$U_B - 3 \text{ V}$ ($I_{\max} = 20 \text{ mA}$); error at $U < 1 \text{ V}$
High-active	U	$U_B - 3 \text{ V}$ ($I_{\max} = 20 \text{ mA}$)
Type of sensor		
Swivel angle		
IW9 (inductive position transducer)		Throttle circuit; $\pm 4 \text{ mm}$; 3-conductor connection
Valve		
DM2 (inductive position transducer)		Transformer circuit; $\pm 0.6 \text{ mm}$; 4-conductor connection

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

Type of connection	
Compatibility	32 pin male multipoint connector; DIN 41612; design D
Card dimensions	Euro-card 100 x 160 mm; DIN 41494
Front plate dimensions	
Height	3 HE (128.4 mm)
Conductor path side width	1 TE
Component side width	
VT 5041-3X/1-0	5 TE
VT 5041-3X/2-0 and VT 5041-3X/3-0	7 TE
Operating temperature range	9 0... +50 °C
Storage temperature range	9 -20... +70 °C
Weight	
Electronic card without display	m 0.19 kg
Electronic card with display	m 0.21 kg

Electronic card: Display and adjustment elements

Leakage compensation

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

Valve command value monitoring

Valve command value monitoring	J9
On	ON
Off *	OFF

Diagnostic LEDs

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

Regenerative operation

Regenerative operation	J3	J5
On	ON	OFF
Off	OFF	ON

Function pin 18a **

Function pin 18a **	J4
Pressure control on/off	OFF
Master/slave on/off	ON

** Only for versions without power limitation (VT 5041-3X/1-0 und VT 5041-3X/2-0)

Valve deactivation in case of error

Valve deactivation in case of error	J1
Active	OFF *
Inactive	ON

* Compatible with VT 5041-2X

Selection for analog input at pin 18c

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

Pressure controller p amplification

Pressure controller p amplification	Switch S3 .7	Switch S3 .8	Jumpers J11
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

Actual pressure value amplification

Actual pressure value amplification	Jumpers J10
1-fold	OFF
2-fold	ON

Volume adjustment of pressure controller

Input switch T _D = OFF	Switch S3		
	.1	.2	.3
≤ 5.0 l	OFF	OFF	OFF
7.5 l	OFF	ON	OFF
10.0 l	ON	ON	OFF
15.0 l	ON	OFF	ON
20.0 l	OFF	ON	ON
25.0 l	ON	ON	ON

Input switch T _D = ON	Switch S3		
	.4	.5	.6
12.5 l	OFF	OFF	OFF
30.0 l	OFF	ON	OFF
45 l	ON	ON	OFF
60 l	ON	OFF	ON
75 l	OFF	ON	ON
90 l	ON	ON	ON

Signal adjustment of actual pressure value

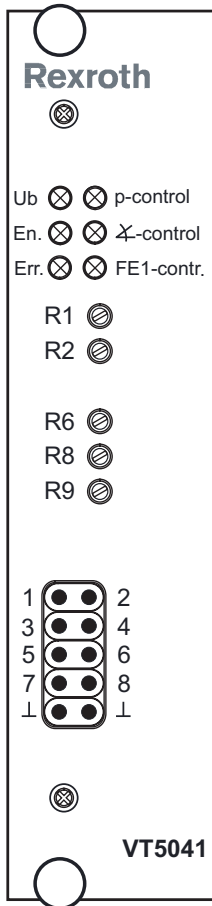
Signal adjustment of actual pressure value	Switch S2								
	.1	.2	.3	.4	.5	.6	.7	.8	
V	0...10 V	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
E	1...10 V	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
D	0...5 V	OFF	OFF	ON	ON	OFF	OFF	ON	ON
F	0.5...5 V	OFF	OFF	ON	ON	ON	OFF	OFF	ON
B	0...20 mA	ON	ON	OFF	OFF	OFF	OFF	ON	ON
C	4...20 mA	ON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

Explanations:
 ON = bridge closed
 OFF = bridge open
 [Grey box] = factory setting

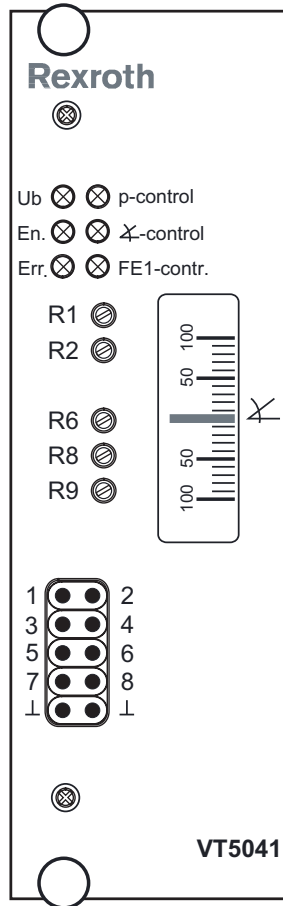
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Front plate: Display and adjustment elements, measuring sockets

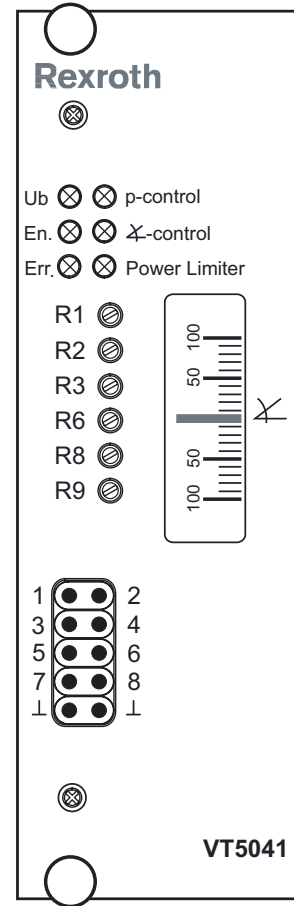
VT 5041-3X/1-0



VT 5041-3X/2-0



VT 5041-3X/3-0



LED displays

Ub (green)	Supply voltage available
En. (green)	Enable available
Err. (red)	Fault/collective error
p-control (yellow)	Pressure control enabled
swivel 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 amplification
R3	Setting of the power limit
R6	Zero point of actual valve value
R8	Zero point of actual swivel angle value
R9	Amplification of actual swivel angle value

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

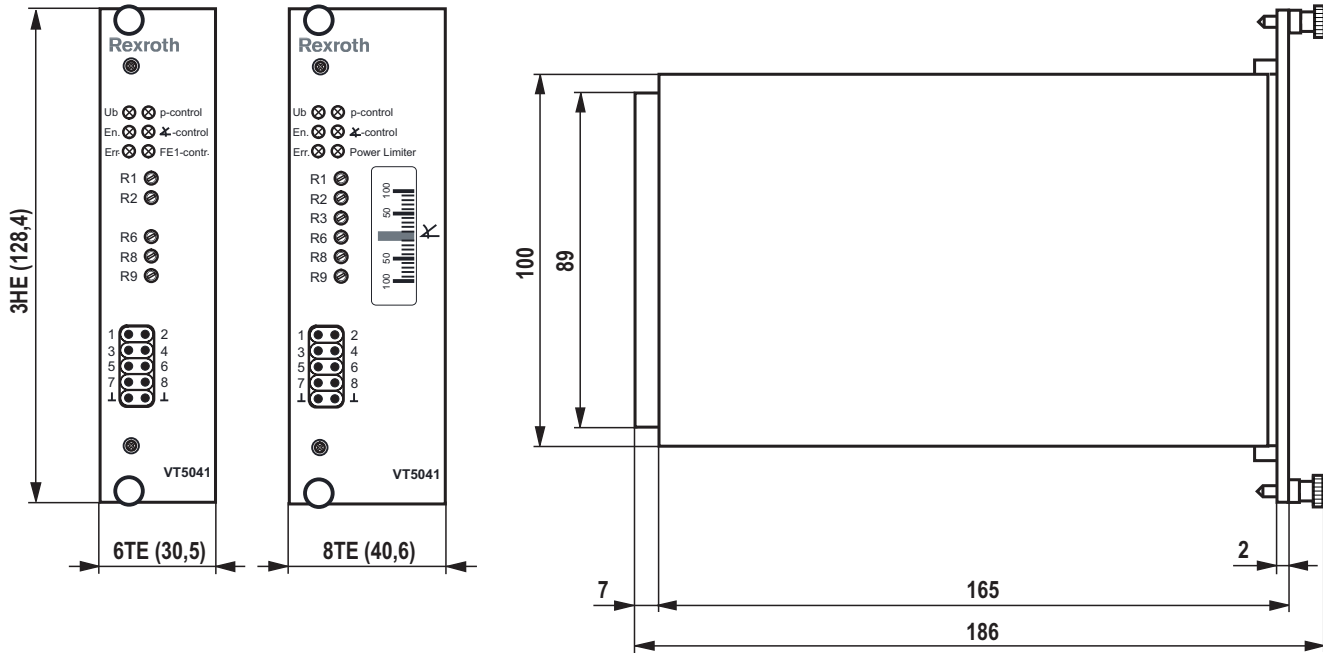
1	Pressure command value 0...+10 V
2	Actual pressure value 0...+10 V
3	Swivel angle command value ± 10 V
4	Actual swivel angle value ± 10 V
5	Valve command value ± 10 V
6	Actual valve value ± 10 V
7	Active swivel angle command value ± 10 V
8	Power limit 0...+10 V
⊥	Reference for measured values
⊥	Reference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

Display (measuring instrument)

swivel angle display	Display of actual swivel angle value in %
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Dimensions (dimensions in mm)

VT 5041-3X/1-0 VT 5041-3X/3(2)-1



Bosch Rexroth AG
 Hydraulics
 Zum Eisengießer 1
 97816 Lohr am Main, Germany
 Phone +49 (0) 93 52/18-0
 documentation@boschrexroth.de
 www.boschrexroth.de

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Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/18-0
documentation@boschrexroth.de
www.boschrexroth.de

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