

External control electronics for the SYDFE1 control of A10VSO axial piston pumps

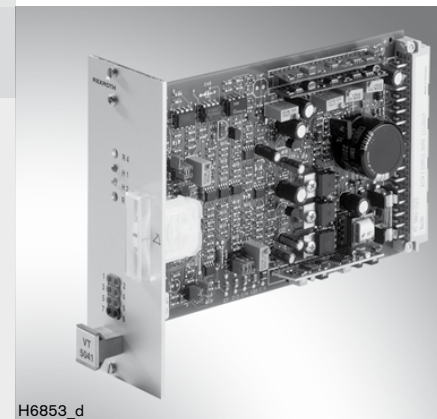
Analogue amplifier, configurable

RE 30241/08.06
Replaces: 07.06

1/8

Type VT 5041

From Component series 25



H6853_d

Table of contents

Inhalt	Seite
Merkmale	1
Bestellangaben	2
Funktionsbeschreibung	2
Blockschaltbild / Anschlussbelegung	3
Technische Daten	4 und 5
Anzeige-/ Einstellelemente	6
Geräteabmessungen	7
Zusatzinformationen	7

Card holder:

- Type VT 3002-2X/32, see RE 29928
- Single card holder without power supply unit

Power supply unit:

- Type VT-NE32-1X, see RE 29929
- Compact power supply unit 115/230 VAC → 24 VDC
- Output 1 (60 W) for supplying amplifier card type VT 5041
- Output 2 (25 W) for supplying pressure transducers; e.g. types HM 12 or HM 13, see RE 29933

Features

- Integral part of the SYDFE1 pressure and flow control system (Component series 1X, 2X and 3X) for controlling A10VSO... axial piston unit with SYDFE1 control
- Implementation of the electronic functions of the SYDFE1 control; pressure and swivel angle control; optional power limiter
- Circuitry of the pressure controller can be matched to existing hydraulic fluid volumes (actuator plus lines)
- Differential amplifier inputs
- Controller for valve spool position
- Minimum value generator for pressure and swivel angle controller
- Self-clocking output stage
- Pressure-related leakage compensation (can be switched of)
- Polarity reversal protection for power supply
- Switchable actual pressure value input (current, voltage, range)
- LED lamps on the front panel:
 - Error / no enable „H1“
 - Internal supply voltage „H2“
- Indicator instrument for actual swivel angle value on the front panel (optional)
- Power limiter with internal or external command value feedforward (optional)

Ordering code

VT 5041

-2X

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Component series 25 to 29
(25 to 29: unchanged technical data and pin assignment)

Additional functions:

- Without power limiter, without indicator instrument
- With power limiter, with indicator instrument

= 2X

= 1

= 3

Further details in clear text

Preferred types

Material no.	Type
R900749982	VT5041-2X/1
R900749983	VT5041-2X/3

Functional description

VT 5041-2X analogue amplifiers are designed as plug-in cards in Euro-format. As a standard, they are provided with one command value input each for pressure and swivel angle [1] (power limiter, optional). The actual pressure value is sensed by a pressure transducer. A position transducer on the pump acquires the actual swivel angle value. The acquired actual values are processed in an amplifier [10 and 12] and compared with the injected command values. Minimum value generator [4] ensures that only the controller assigned to the relevant working point is automatically activated. The output signal of minimum value generator [4] becomes the command value for the closed control loop of the valve.

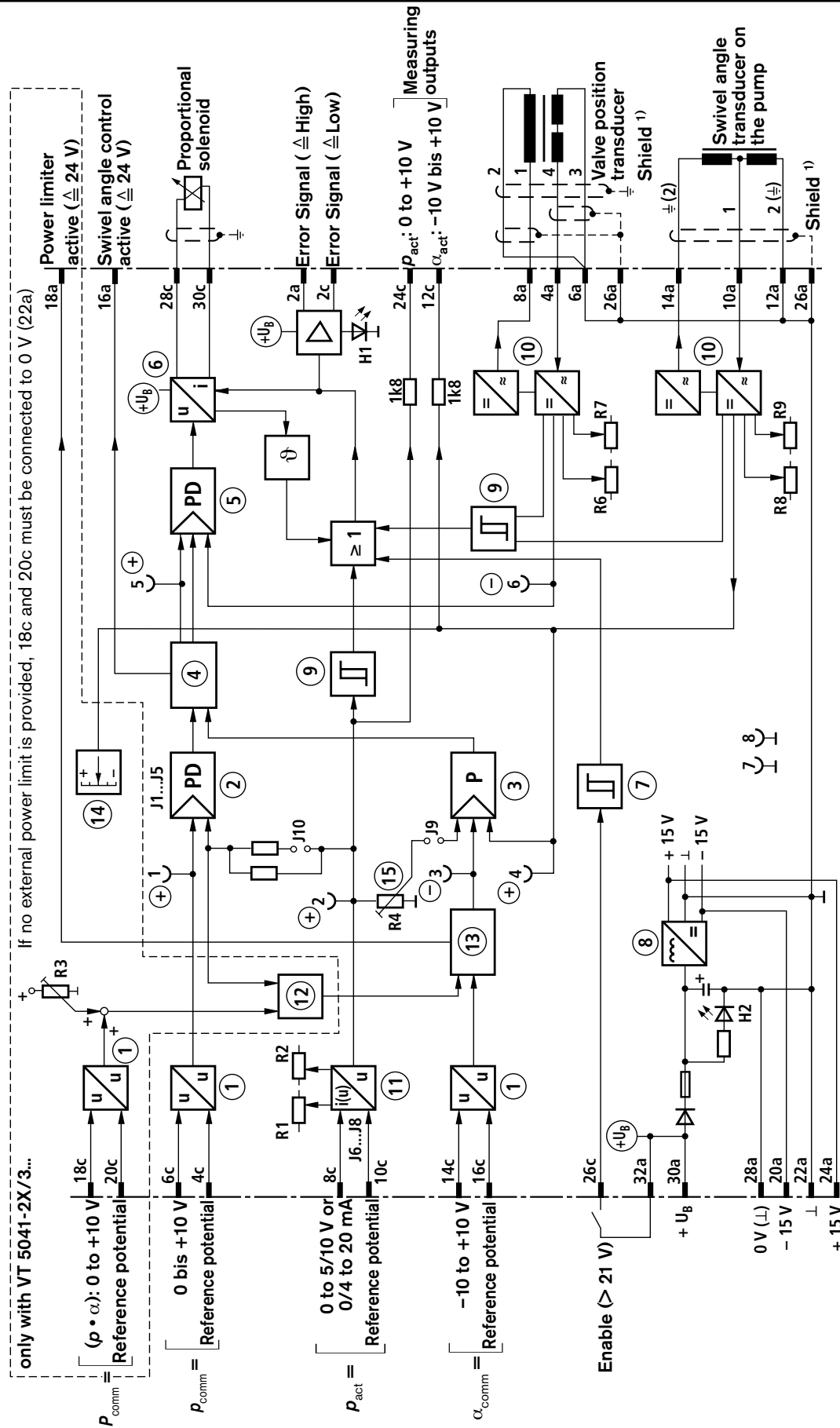
The optional power limiter is automatically activated by the feed-forward of a suitable command value. The power command value can be provided internally or externally. If required, it acts directly on swivel angle controller [3] via a minimum value generator [13].

The actual valve value (position of the valve spool) is acquired by an inductive position transducer. Oscillator/demodulator circuit [10] processes the signal. Valve spool position controller [5] determines and processes the system deviation. The output signal of valve controller [5] forms the command value for self-clocking current output stage [6], which controls the proportional solenoid of the valve.

- The following events trigger an error message:
- Actual pressure value greater than permissible system pressure (socket 2 $p_{act} > 10\text{ V}$)
 - Enable signal missing at connection 26c
 - Excessive temperature of the output stage
 - Cable break or range of swivel angle feedback exceeded
 - Cable break or range of valve spool position feedback exceeded
 - Cable break „proportional solenoid“
 - Cable break „pressure transducer“ (only in conjunction with setting 4 to 20 mA)
- In the case of an error, the output stage is deactivated and the valve spool pushed by a spring to its mechanical end position. The error can only be acknowledged by a reset of the enable signal.
- The pressure-related pump leakage can be compensated for via the swivel angle control loop using potentiometer [15].

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

Block circuit diagram / pin assignment



- | | | | | | | |
|----------|---------------------------------|-----------|------------------------|-----------|----------------------|---|
| 1 | Differential amplifier | 6 | Output stage | 11 | Input amplifier | ¹⁾ For notes on the shielding , see engineering notes for the complete system RE 30030-01-V |
| 2 | Pressure control | 7 | Output stage enable | 12 | Divider | |
| 3 | Swivel angle controller | 8 | Power supply unit | 13 | Min. value generator | |
| 4 | Minimum value generator | 9 | Cable break detector | 14 | Indicator instrument | |
| 5 | Valve spool position controller | 10 | Oscillator/demodulator | 15 | Leakage compensation | |

Note!

- Connection of the swivel angle transducer is valid for clockwise rotating pump ($_{(n)}$ " anti-clockwise rotating pump)
- Deviations between α_{comm} (socket 3) and α_{act} (socket 4) can also result from the setting of R4 (leakage compensation).

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

Operating voltage	U_B	24 VDC +40 % –10 %
Operating range:		
– Upper limit value	$u_B(t)_{\max}$	35 V
– Lower limit value	$u_B(t)_{\min}$	21 V
Power consumption	P_S	35 VA
Current consumption	I_{nom}	0.6 A ($I_{\max} = 1.25 \text{ A}$)
Fuse	I_F	1.6 A T
Inputs:		
– Command values (pressure, swivel angle)	U_i	0 to 10 V; $R_e = 100 \text{ k}\Omega$
– Actual value (pressure)	U_i I_e	0 to 5 V or 0 to 10 V; $R_e = 100 \text{ k}\Omega$ 0 to 20 mA or 4 to 20 mA; $R_e = 500 \text{ }\Omega$
– Power selection ($p \cdot \alpha$) _{comm} (only with VT 5041-2X/3...)	U_i	0 to 10 V; $R_e > 100 \text{ k}\Omega$
– Enable	U_e	> 21 V (use relay with contact for currents < 10 mA)
Outputs:		
– Output stage		
• Solenoid current / resistance	$I_{\max}$	2.5 A; $R_{(20)} = 2 \text{ }\Omega$
– Drivers for inductive transducers:		
• Oscillator frequency	f	ca. 5 kHz
• Voltage amplitude (U_{SS})	U_a	10 V
– Signal voltage		
• Actual value (pressure, swivel angle)	U	0 to 10 V
• Swivel angle control active	U	$U_b - 1 \text{ V}$
• Power limiter active (only with VT 5041-2X/3...)	U	$U_b - 1 \text{ V}$
– Auxiliary voltages	U	$\pm 15 \text{ V} \pm 3 \text{ %}$; 10 mA
– Error signal		
• L-active	U_o	$\geq U_B - 5 \text{ V}$; 10 mA (short-circuit-proof); error at $U_o < 1 \text{ V}$
• H-active	U_o	$< 1 \text{ V}$; error at $\geq U_B - 5 \text{ V}$; 10 mA
– Measuring sockets		
• Pressure command value (p_{comm}) „1“	U	+10 V = 100 %
• Actual pressure value (p_{act}) „2“	U	+10 V = 100 %
• Swivel angle command value (α_{comm}) „3“	U	–10 V = 100 %
• Actual Swivel angle value (α_{act}) „4“	U	+10 V = 100 %
• Spool position command value (s_{comm}) „5“	U	$\pm 10 \text{ V} = \pm 100 \text{ %}$
• Actual spool position value (s_{act}) „6“	U	$\pm 10 \text{ V} = \pm 100 \text{ %}$
Type of transducer:		
– for pump		IW 9 (throttle circuit; $\pm 4 \text{ mm}$; 3-wire connection)
– for valve		DM2 (transformer circuit; $\pm 0.6 \text{ mm}$; 4-wire connection)
Type of connection		32-pin male connector, DIN 41612, form D
Card dimensions		Euro-card 100 x 160 mm, DIN 41494

Technical Data (continuation)

Card dimensions:		
– Height		3 HE (128.4 mm)
– Width circuit board conductor side		1 TE
– Width component side		
• VT 5041-2X/1 ...		5 TE
• VT 5041-2X/3...		9 TE
Permissible operating temperature range	⊖	0 to 50 °C
Storage temperature range	⊖	–20 to +70 °C
Weight		
• VT 5041-2X/1 ...	m	0.19 kg
• VT 5041-2X/3...	m	0.21 kg

Indicator / adjustment elements: VT 5041-2X/1 and VT 5041-2X/3 from Serie 25

Leakage comp.

ON

OFF

Jumper J9

on

off

Gain of act. pressure value

Single

Double

Jumper J10

off

on

Diagram labels: J9, R4, J11, H1, H2, R2, J10, J1, J2, R3¹⁾, J6, J7, J8, J3, J4, J5, R1, R7, R9, R6, R8, F1 1,6 A T.

Actual pressure value for chngover	
Input signal	Jumper position
	J6 J7 J8
0 to 10 V	off off off
0 to 5 V	off off on
0 to 20 mA	on off off
4 to 20 mA	on on off

... Factory setting of jumpers

Potentiometers:

R1

Zero point of actual pressure value

R2

Actual pressure value adjustment
factory setting:
right-hand limit stop = max. gain

R3¹⁾

Power command value
→ is added to an externally provided command value
factory setting: left-hand limit stop = max. power

R4

Leakage compnesation
(factory setting: left-hand limit stop = min. compensation)

R6

Zero point of valve position transducer

R7

Amplitude of valve position transducer (factory setting)

R8

Zero point of swivel angle transducer

R9

Amplitude of swivel angle transducer (factory setting)

P-component of the pressure controller

P-gain	Jumper position		
	J1	J2	J11
2	on	on	on
2.4	on	off	on
2.7	on	on	off
3	off	on	on
3.4	on	off	off
4	off	off	on
4.8	off	on	off
8	off	off	off

D-component of the pressure controller	
Hydraulic fluid volume (in litre) in the system (actuators plus lines)	Jumper position
	J3 J4 J5
≤ 5,0	off off off
7.5	off on off
10.0	on on off
15.0	on off on
20.0	off on on
25.0	on on on

LED lamps

H1

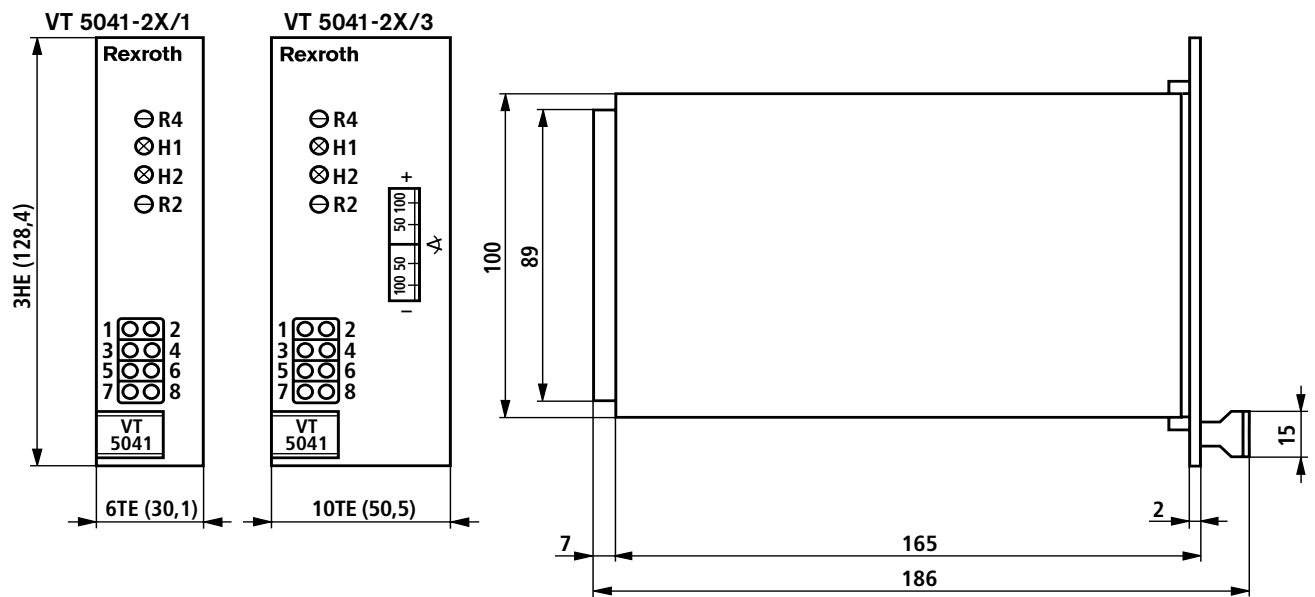
Error / no enable (red)

H2

Internal voltage supply (green)

¹⁾ only with VT 5041-2X/3

Unit dimensions (Dimensions in mm)



Potentiometers:

- „R2“ → Matching of amplitude p_{act} (pressure transducer)
- „R4“ → Leakage compensation

LED lamps:

- „H1“ → Error / no enable
- „H2“ → Internal supply voltage

Measuring socket:

- „1“ → Pressure command value p_{comm}
- „2“ → Actual pressure p_{act}
- „3“ → Swivel angle command value α_{comm}
- „4“ → Actual swivel angle value α_{act}
- „5“ → Spool position command value S_{comm}
- „6“ → Actual spool position value S_{act}
- „7“ and „8“ → Reference potential / ground

Supplementary information

Note!

Electrical signals processed by control electronics (e.g. actual value) must not be used for activating safety-relevant machine functions! (See also European standard "Safety requirements for fluid power systems and components – hydraulics", EN 982).

Notes
