33 43502C01 Product Specification

33 43502C01

Controller / amplifier
for proportional solenoids

The controller / amplifier is designed to control proportional solenoids with constant current. It can be directly mounted on plug connectors, being conform to DIN 43 650 form A.

The core elements of the controller are: voltage stabilization, linear ramp former for positive and negative ramp, dither oscillator, fuse elements and chopped power output stage (f = 240…400 Hz).
The dither amplitude is adjustable by the potentiometer P3, the initial current I_{min} by P5, the max. current I_{max} by P4, the ramp down time t_{off} by P1 and the ramp up time t_{on} by P2.
An emergency stop function can be achieved by interrupting the supply voltage.

CE

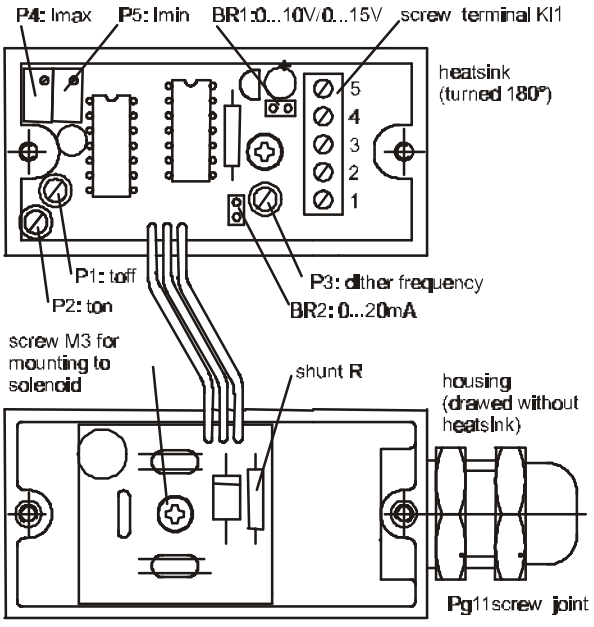
These devices meet the requirements of the **EMC Directive 89/336/EEC.** Compliance with the following standards is confirmed:
EN 55011 (VDE 0875, part 11, 1992) group 1, class A, Disturbance voltage; group 1, class B, Disturbance radiation.
DIN EN 61000-4-3, (1997) level 3.
DIN EN 61000-4-4, (1996) level 3.
DIN EN 61000-4-5, (1996) level 3.
DIN EN 61000-4-2, (1995) level 3.
The products are considered components in the sense of the **Machinery Directive 98/37/EEC** and are not to be used until the machine in which they are to be incorporated is declared to conform to the requirements of the EEC Directives.

Technical data

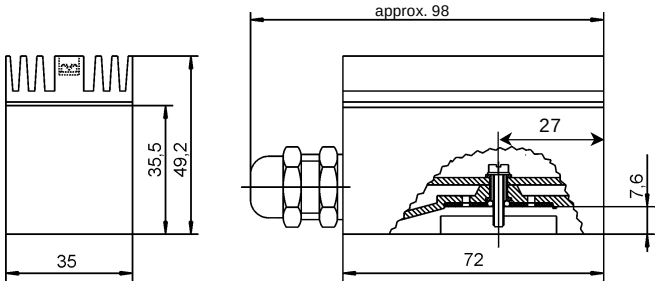
Type	**33 43502C01**
Supply voltage V_S	18 ...32 V
Residual ripple	≤10 %
Max. output current I_{max}	2,4 A
Chopper frequency	240 ... 400 Hz adjustable
Temperature drift	≤±1 % of I_{max}
Voltage dependency	≤±0,5 % of I_{max}
Initial current I_{min} (adjustable)	0...2 A
Maximal Output current $I_{max.}$ (adjustable)	I_{min} + 2,4 A (max. 2,6 A)
Stabilized voltage (Kl 4)	15 V ±0,6 V
max. loadability (Kl 4)	≤5 mA
Setpoint signal (Kl 3) (selectable; BR1, BR2)	0...15 V / 0...10 V / 0...20 mA / 4 … 20 mA upon request
Ramp up time (adjustable; P2) Ramp down time (adjustable; P1) (related to setpoint signal 0...max.)	0,1 ...7 s
Ambient temperature	-20 ...+70 °C
Connection (via PG11)	screw terminal 5-pole, 1.5² fine wire
Fuse	TR5 F2A

Factory settings	**33 43502C01**
Imin	0 A
Imax	1,6 A
Setpoint	0 – 10 V
tup = tdown	<0,1 s
Dither frequency	400 Hz

Connection diagram



Dimensions (mm)



Selection of setpoint signal:

...C01	BR1	BR2
0..10 V	X	
0..15 V		
0..20 mA	X	X

Terminal assignment:
KL1: GND (supply voltage)
KL2: GND (setpoint)
KL3: Setpoint
KL4: Stabilized voltage
KL5: V_S Supply voltage

Protection type:
As per EN 60529: IP 65

Subject to design modifications without notice.

Please observe operating instructions and ordering data!

KES: 28.05.2002

33 43502C01 Operating instructions

1. Mounting and connecting instructions

1.1 Supply voltage
The device has to be supplied with potential-free voltage.
Type 33 43502C01: 18..32 V.
Smoothed d.c. voltage with residual ripple ≤10 %.
If bridge-rectified supply voltage is applied, the size of the capacitors used for voltage smoothing has to be adjusted to the selected maximum current. Guiding values: 2200 µF / 40 V to I_{max} = 1,2 A; 4700 µF / 40 V to I_{max} = 2,6 A.
Attention: Overvoltage will damage the controller.

1.2 It is necessary to connect the supply line directly to the battery or the mains. A separate grounding wire is to be used for the setpoint signal. The grounding wire is to be connected directly to terminal 2.

1.3 If the connecting cable is longer than 3 m, a shielded cable is to be used for the signal cords. The shield has to be connected to terminal 2.

1.4 The cables must not be laid parallel to power cables.

1.5 The setpoint voltage must not be < -10 V or > +15 V. The current controller may be damaged by prolonged application of setpoint voltages being outside of that range.

2. Setting instructions

For all subsequent settings the potentiometer P3 (Dither) is to be turned to zero (counter-clockwise). It is advisible to define the current flowing through the solenoid by measuring the voltage drop over the shunt resistor R (see 3.4).

2.1 Adjustment of the initial current (I_{min}) by potentiometer P5.
a) Adjust nominal value to zero.
b) Turn potentiometer P5 (I_{min}) clockwise until the desired magnitude (pressure or quantity) is reached.

2.2 Adjustment of the maximum current (I_{max}) by potentiometer P4.
a) Adjust nominal value to maximum.
b) Turn potentiometer P4 (I_{max}) clockwise until the desired magnitude (pressure or quantity) is reached.
Note: I_{max} must not exceed the solenoids limit current I_{lim}.

2.3 Adjustment of ramp up time and ramp down time by potentiometer P1 (t_{off}) and P2 (t_{up}).
Turn the potentiometers to adjust the shift time in such a manner that the desired transient response is achieved.

2.4 Adjustment of the dither signal by potentiometer P3.
a) Adjust approx. 0,4 x I_{max} by nominal value.
b) Turn potentiometer P3 clockwise, but stop before the oszillations are transmitted to the hydraulic system. The current must not change more than 10 mA (current measuring see 3.4).
Note: Check the dither over whole current area!

3. Trouble shooting

3.1 Measuring the supply voltage between Kl1.5 and Kl1.1
Type 33 43502C01: 18..32 V.
Measuring the internal reference between Kl1.4 and Kl1.2.
Device 33 43502C01: +15V. Measuring the nominal value between Kl1.3 and Kl1.2 respectively before Kl1.3 with a current as setpoint signal.
Note jumper BR1 and BR2 (see table 2).

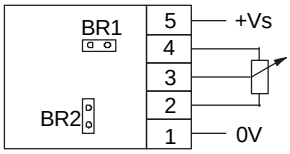
3.2 Measuring the current I_M flowing through the solenoid by measuring the voltage drop over the shunt resistor R.
$I_M = 5\ A/V \times U_R \pm 5\ \%$ (100 mV are equal to 500 mA)
Note: The controller/amplifier has to be mounted correctly on the solenoid!

3.3 Current controlling
The desired maximum current can only be reached until the following condition is maintained: $I_M \geq (V_S - 2\ V)/R_M$.

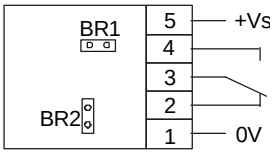
I_M: Highest possible maximum current.
V_S: Momentary value of the supply voltage.
Voltage drop at the controller: max. 2 V.
R_M: Momentary resistance of the excitation winding of the solenoid (changes with temperature)!.

4. Connection examples

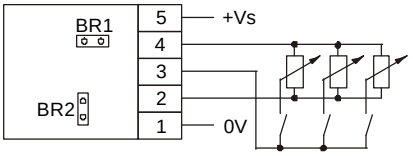
4.1 Use of the internal, stabilized voltage (Kl1.4)



Potentiometer 5...20 kΩ



Nominal value switch



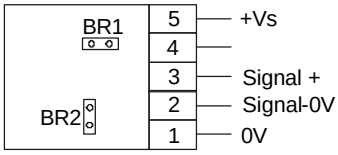
Several potentiometers
(Total resistance of all potentiometers: >5 kΩ!

Jumper settings:

	C01
BR1	
BR2	

Table 1

4.2 External setpoint signal

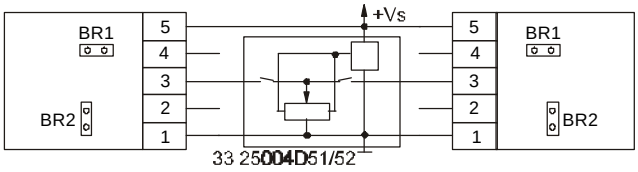


Selection of setpoint signal:

...C01	BR1	BR2
0..10 V	X	
0..15 V		
0..20 mA	X	X

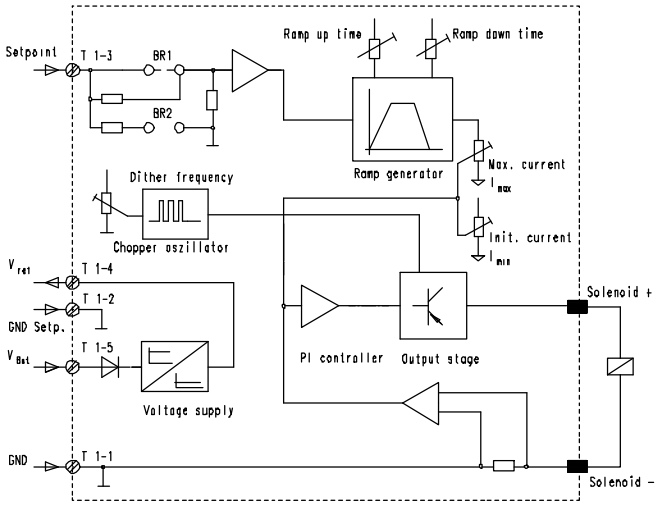
Table 2

4.3 Connection of a 4/3-way proportional valve



2 controllers / amplifiers and a joystick 33 25004D51/D52

5. Block diagram



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Ordering example

Controller / amplifier 33 43502C [. .]

01: V_S = 18...32 V