33 43501C0 . Product Specification

33 43501C00

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.

Types:
33 43501C00
Supply voltage V_S: 18...32 V

33 43501C05
Supply voltage V_S: 11...18 V

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~2,5kHz).
The dither amplitude is adjustable by the potentiometer P3, the base 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.
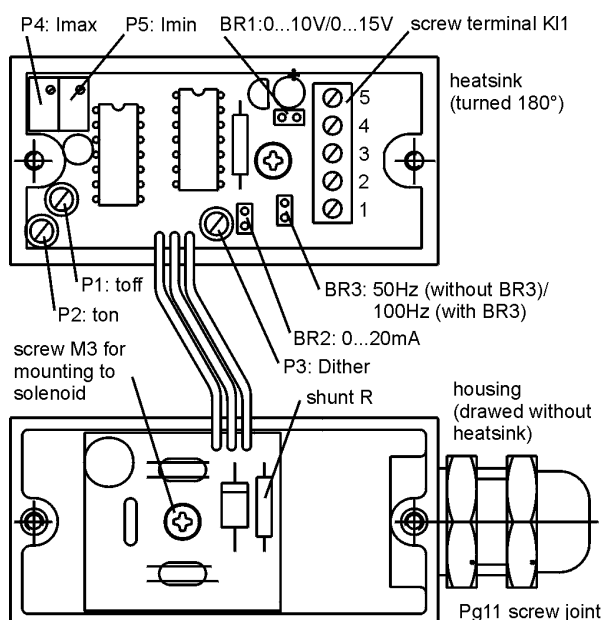DIN EN 61000-4-4, (1996) level 3.

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 89/392/ EWG** 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 EC Directives.
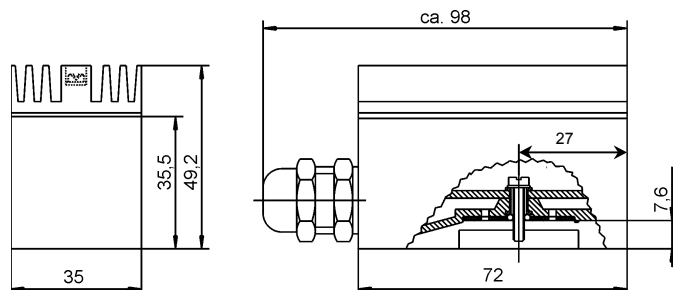
Technical data

Device type 33 43501...	C00	C05
Supply voltage V_S	18 ... 32 VDC	11 ...18 VDC
Residual ripple	≤10 %	≤10 %
max. output current I_{max}	2.4 A	2.4 A
Temperature drift	≤±1 % of I_{max}	≤±1 % of I_{max}
Voltage dependency	≤±0.3 % of I_{max}	≤±0.3 % of I_{max}
Initial current I_{min} (adjustable)	0 ... 2 A	0 ... 1.8 A
Fuse	TR5 F2A	TR5 F2A
Dither frequency (selectable;BR3)	50 / 100 Hz	50 / 100 Hz
Dither amplitude (adjustable; P3)	0 ... 750 mA$_{pp}$	0 ... 750 mA$_{pp}$
Stabilized voltage (Kl1. 4)	15 ±0.6 V	8.2 ±0.3 V
max. loadability (Kl1.4)	≤5 mA	≤5 mA
Setpoint signal (Kl1. 3) (selectable; BR1, BR2)	0 ..15 V / 0 ..10 V / 0 .. 20 mA	0 .. 15 V / 0 .. 10 V / 0 .. 20mA
Ramp up time (adjustable; P2) Ramp down time (adjustable; P1) (related to setpoint signal 0...max.)	0.1 ... 7 s	0.1 ... 6 s
Temperature range	-20 ...+70 °C	-20 ...+70 °C
Connection (via PG11)	screw terminal 5-pole	screw terminal 5-pole
Connection cross section	1.5 mm^2 fine wire	1.5 mm^2 fine wire

Basic settings	33 43501C00	33 43501C05
Imin	0 A	0 A
Imax	1.6 A	1.6 A
tauf = tab	<0.1 s	<0.1 s
Dither amplitude	0	0
Dither frequency	50 Hz	50 Hz

Connection diagram

P4: Imax   P5: Imin   BR1:0...10V/0...15V   screw terminal Kl1
heatsink (turned 180°)
5 4 3 2 1
P1: toff
P2: ton
screw M3 for mounting to solenoid
BR3: 50Hz (without BR3)/ 100Hz (with BR3)
BR2: 0...20mA
P3: Dither
shunt R
housing (drawed without heatsink)
Pg11 screw joint

Dimensions (mm)

ca. 98
35,5
49,2
35
27
7,6
72

Selection of setpoint signal:

...C00	BR1	BR2	...C05
0..10 V	X		0..8 V
0..15 V			0..10 V
0..20 mA	X	X	0..20 mA

Protection type:
As per EN 60529: IP 65

Terminal assignment:
KL1.1: GND (supply voltage)
KL1.2: GND (setpoint)
KL1.3: Setpoint
KL1.4: Stabilized voltage
KL1.5: V_S Supply voltage

Subject to design modifications without notice.

Please observe operating instructions and ordering data!

33 43501C. . Operating instructions

1. Mounting and connecting instructions

1.1 Supply voltage
The device has to be supplied with potential-free voltage.
Type 33 43501C00: 18..32 V.
Type 33 43501C05: 11..18 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.
Attantion: 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 advisable 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 I_{lim} (limit current of solenoid)!

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)   Select the dither frequency according to solenoid and valve size by jumper BR3. (with BR3: 100 Hz; without BR3: 50 Hz).
   b)   Adjust approx. 0,4 x I_{max} by nominal value.
   c)   Turn potentiometer P3 counter-clockwise, but stop before the oszillations were transmitted to the hydraulic system. The current must not change more than 10 mA (current measuring see 3.4).

3. Trouble shooting

3.1 Measuring the supply voltage between KI1.5 and KI1.1
Type 33 43501C00: 18..32 V. Type 33 43501C05: 11..18 V.

3.2 Measuring the internal reference between KI1.4 and KI1.2.
Device 33 43501C00: +15V. Device 33 43501C05: +8 V.

3.3 Measuring the nominal value between KI1.3 and KI1.2 respectively before KI1.3 with a current as setpoint signal.
Note jumper BR1 and BR2 (see table 2).

3.4 Measuring the current I_M flowing through the solenoid by measuring the voltage drop over the shunt resistor R.
I_M = 5 A / V x U_R ± 5 % (100 mV -> 500 mA)
Note: The controller/amplifier has to be mounted correctly on the solenoid!

3.5 Current controlling

The desired maximum current can only be reached until the following condition is maintained: $I_M \geq (V_S - 2\ V) / R_M$.
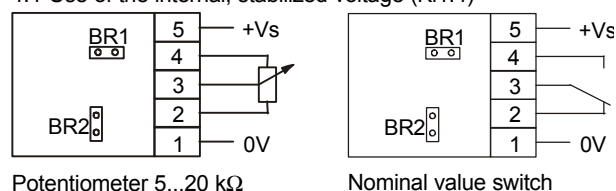
I_M: Highest possible maximum current.
V_S: Momentary value of the supply voltage.
Voltage drop at the controller: max. 2 V.
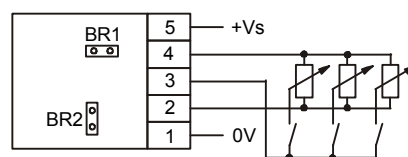R_M: Momentary resistance of the excitation winding of the solenoid (changes with temperature)!.

4. Connection examples

4.1 Use of the internal, stabilized voltage (KI1.4)
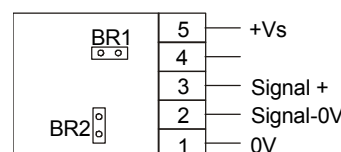

Potentiometer 5...20 kΩ   Nominal value switch

several potentiometers
(Total resistance of all potentiometers: >5 kΩ !)

Jumper settings:

	C00	C05
BR1		X
BR2		

Table 1

4.2 External setpoint signal

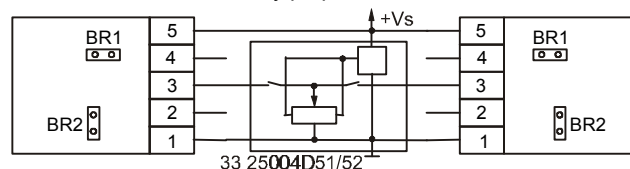Selection of setpoint signal:

...C00	BR1	BR2	...C05
0..10 V	X		0..8 V
0..15 V			0..10 V
0..20 mA	X	X	0..20 mA

Table 2

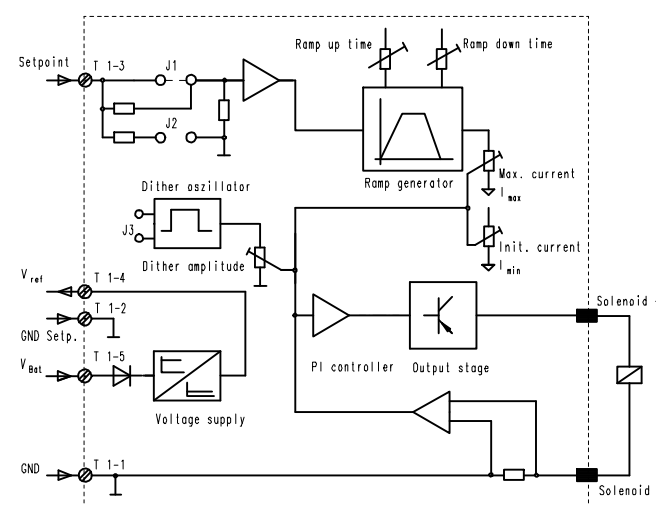4.3 Connection of a 4/3-way proportional valve

33 25004D51/52

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

5. Block diagram

Ordering example   Controller / amplifier 33 43501C [. .]

00: V_S = 18...32 V
05: V_S = 11...18 V