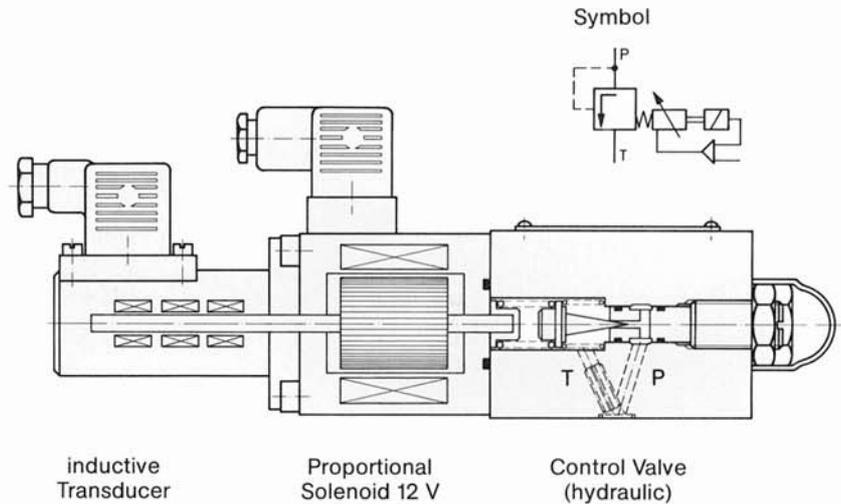


CETOP 03
max. 25/140/210/350 bar
max. 10/3/2,5/2 l/min

Features

- Proportional solenoid with integrated, inductive transducer.
- Low hysteresis, $\leq 1\%$
- Good repeatability, $\leq 0.5\%$
- 4 pressure stages, giving higher resolution.
- Maximum dynamic range through use of 12 V proportional solenoid.
- No mechanical adjustment of transducer necessary.
- Mounting configuration according to CETOP, ISO and DIN.
- Servo amplifier to European format with voltage regulator, ramp generator, PID regulator, pulse-width-modulated output stage with output current limiter and load-independent output current.



Description

Denison R1EP01 direct operated proportional pressure relief valves with electronic position control are designed to adjust pressure according to the current input. Of the tried and tested seat type, these valves consist mainly of seat, cone, 2 pressure springs and proportional solenoid with integrated, inductive transducer.

The R1EP01 is used as an electrically adjustable remote control valve. The valve is supplied for subplate mounting to CETOP 03, using connections P and T. This is the preferred design for controlling cartridge pressure valves to DIN 24342.

All components are subject to the most stringent quality control during manufacture to ensure long service and high operational reliability. Each unit undergoes a final test-bench check before delivery.

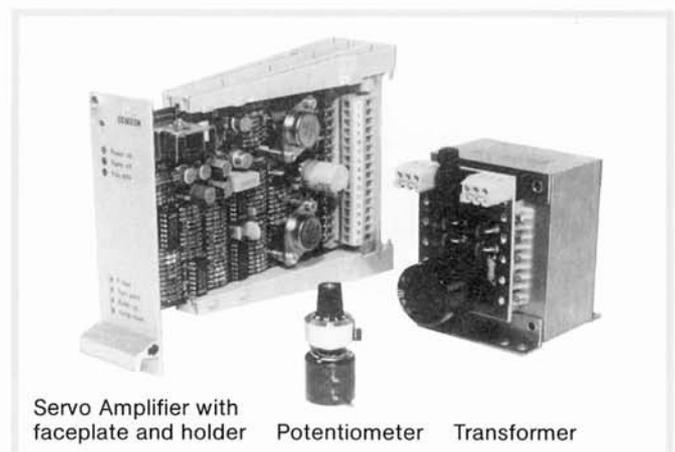
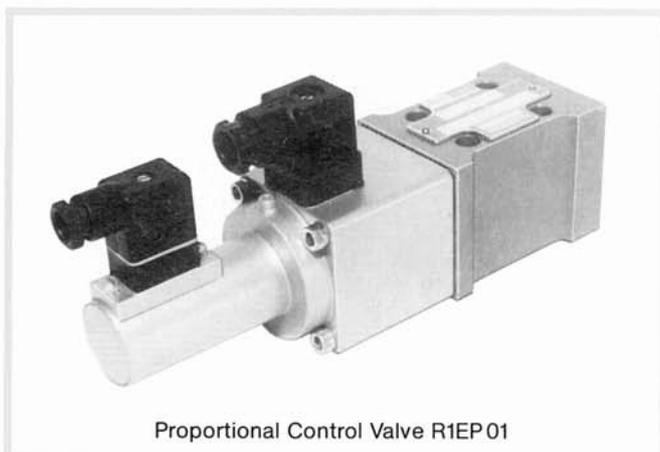
Efficient manufacturing processes and adherence to close tolerances allows components to be replaced, changed or modified.

This is also true, without exception, for spare parts, which are available through an international after-sales service network.

Operation

On receipt of a nominal value signal the proportional solenoid precompresses the springs. The difference in length which results is recorded by the transducer (actual value) and compared to the nominal value by the PID regulator. The resulting differential signal is regulated against zero, so matching the actual value to the nominal value. Any variations are detected by the transducer and corrected. This system ensures high repeatability and almost hysteresis-free nominal value pressure characteristics. If no actual value reply is received, the valve switches to pressureless circulation (fail safe). No mechanical adjustment of the displacement measuring system is necessary. Any functional tolerances, caused by valve production deviation, can be eliminated at the zero-point regulator on the amplifier board.

N.B: the valve seat is factory-adjusted and set. The zero point of the transducer, the max. pressure and the time ramps are all adjustable at the amplifier via trimming potentiometers. LED's indicate power on, out of circuit ramp and malfunction of the transducer. The unit operates with a pulse-width-modulated output stage.



Characteristics

General														
1	Design	Poppet type												
2	Type of connection	indirect via subplate or manifold												
3	Weight	4,2 kg												
4	Mounting position	optional												
5	Direction of flow	P→T												
6	Ambient temperature range	- 20...+ 60 °C												
Hydraulic														
7	Pressure stages	25, 140, 210, 350 bar												
8	Max. operating pressure (port P)	350 bar												
9	Port T	direct to tank without pressure												
10	Min. pressure setting (dependent on flow)	see diagrams page 3												
11	Max. flow – pressure stage 25 bar – pressure stage 140 bar – pressure stage 210 bar – pressure stage 350 bar	10 l/min 3 l/min 2,5 l/min 2 l/min												
12	Fluid	Mineral oil according to DIN 51524 and 51525. For other fluids please consult Denison.												
13	Fluid temperature range	- 18... + 80 °C												
14	Viscosity range	10...650 cSt, optimal 30 cSt												
15	Contamination level	Max. permissible contamination level according to NAS 1638 Class 8 (Class 9 for 15 Micron and smaller) or ISO 17/14												
16	Hysteresis	≤ 1% of max. pressure setting												
17	Linearity at $q_v = 1$ l/min	≤ 1,5% of max. pressure setting												
18	Repeatability	≤ 0,5% of max. pressure setting												
19	Step response (0...100% pressure setting) – at pressure stage 25 bar and 6 l/min – at pressure stage 140 bar and 2 l/min – at pressure stage 210 bar and 2 l/min – at pressure stage 350 bar and 2 l/min	<table border="0"> <tr> <td>Pressure increase $p_{min} \dots p_{max}$ (influenced by application considerations)</td> <td>Pressure decrease $p_{max} \dots p_{min}$</td> </tr> <tr> <td>50 ms</td> <td>45 ms</td> </tr> <tr> <td>50 ms</td> <td>35 ms</td> </tr> <tr> <td>50 ms</td> <td>35 ms</td> </tr> <tr> <td>50 ms</td> <td>35 ms</td> </tr> <tr> <td colspan="2">plus 15 ms for solenoid regulating time</td> </tr> </table>	Pressure increase $p_{min} \dots p_{max}$ (influenced by application considerations)	Pressure decrease $p_{max} \dots p_{min}$	50 ms	45 ms	50 ms	35 ms	50 ms	35 ms	50 ms	35 ms	plus 15 ms for solenoid regulating time	
Pressure increase $p_{min} \dots p_{max}$ (influenced by application considerations)	Pressure decrease $p_{max} \dots p_{min}$													
50 ms	45 ms													
50 ms	35 ms													
50 ms	35 ms													
50 ms	35 ms													
plus 15 ms for solenoid regulating time														
20	Valve production deviation	± 3% of max. pressure setting												
21														
Electrical														
22	Nominal voltage – proportional solenoid	12 V DC												
23	Coil resistance	4 Ω at 20 °C 4,6 Ω at 50 °C												
24	Relative operating period	100%												
25	Type of protection (by DIN 40050)	IP 65												
26	Current consumption – Transducer	≤ 25 mA												
27	Output voltage (from transducer)	7,5...12 V												
28	Supply voltage (to the transducer)	20...28 V DC												
29	Electrical connector – Proportional solenoid – Transducer	Plug-in connect. accord. to DIN 43650/2 pol. + SL/PG 9/11 Plug-in connector accord. to DIN 43650 type B (Plug-in connectors are included in valve order)												

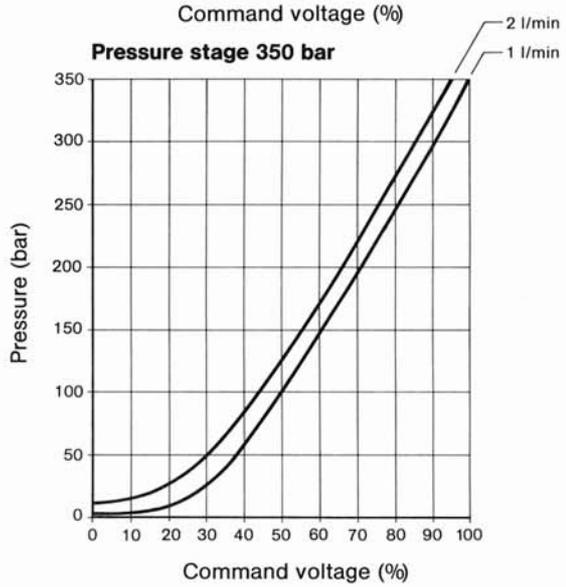
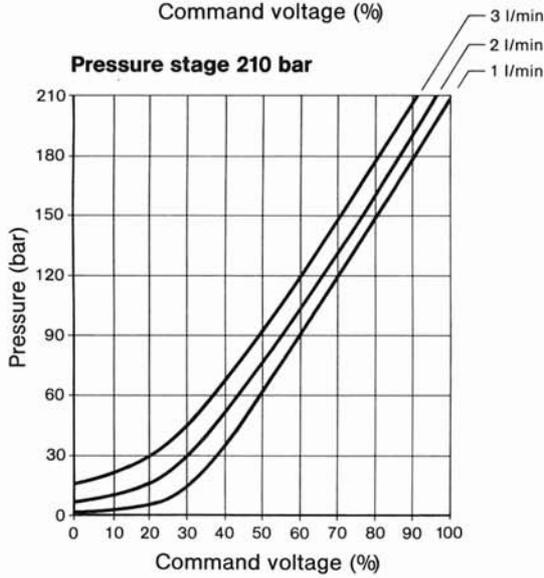
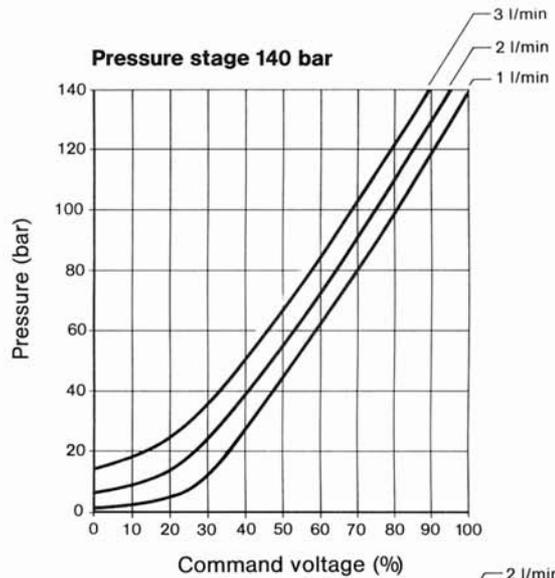
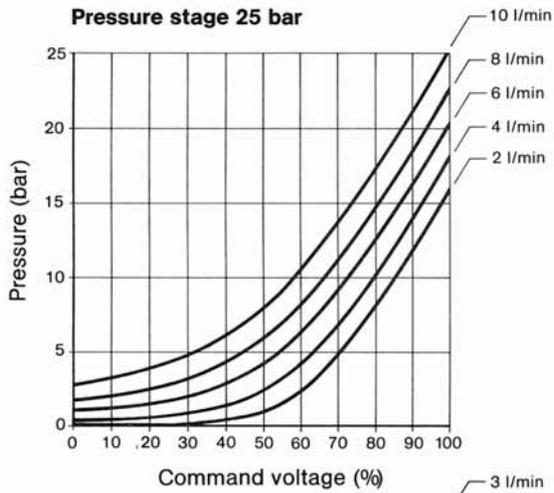
If the performance characteristics outlined above do not meet your own particular requirements.

Please consult your local Denison Office.

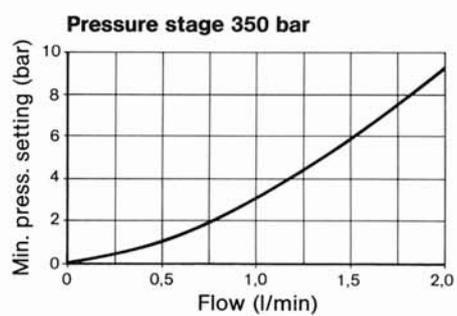
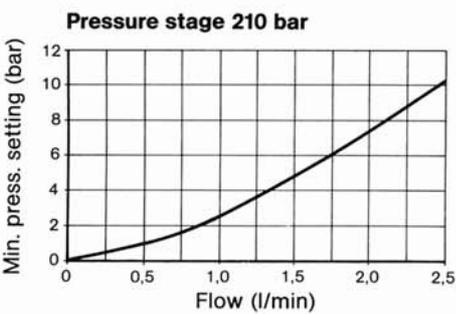
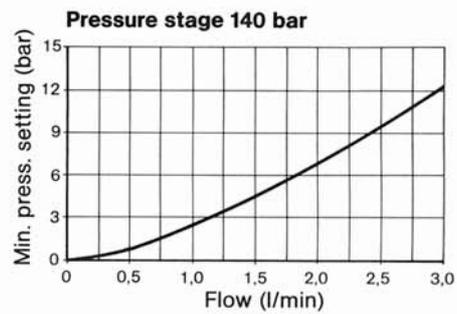
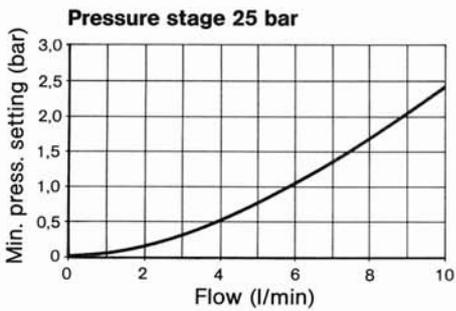
Characteristics for the servo amplifier see page 6.

Characteristics (at 40 cSt, 50°C and without back pressure in T)

p-Q-characteristics dependent on command voltage

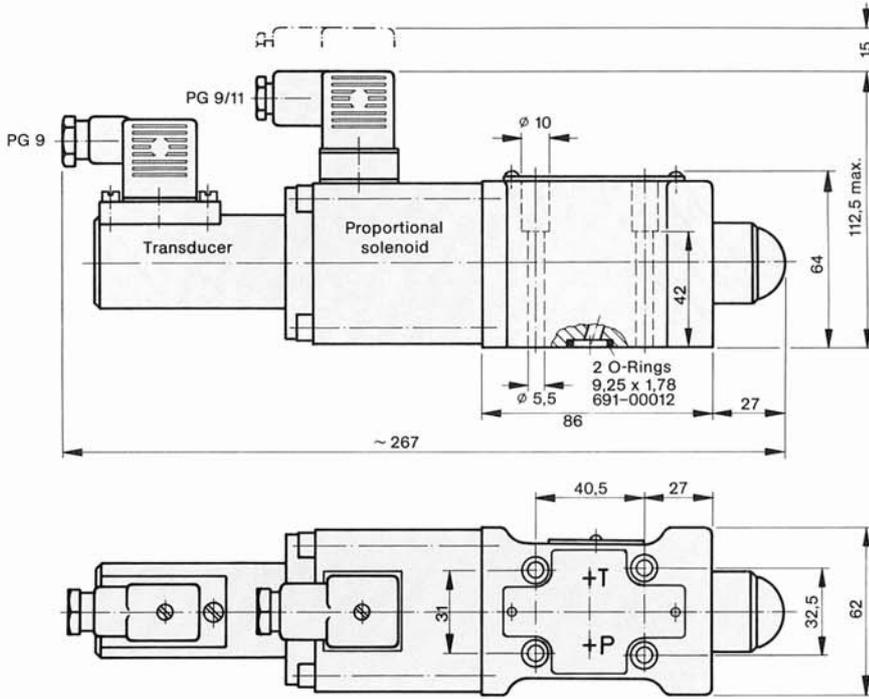


Min. pressure setting dependent from flow



All Performance Data given is typical and can be influenced by application.

Dimensions



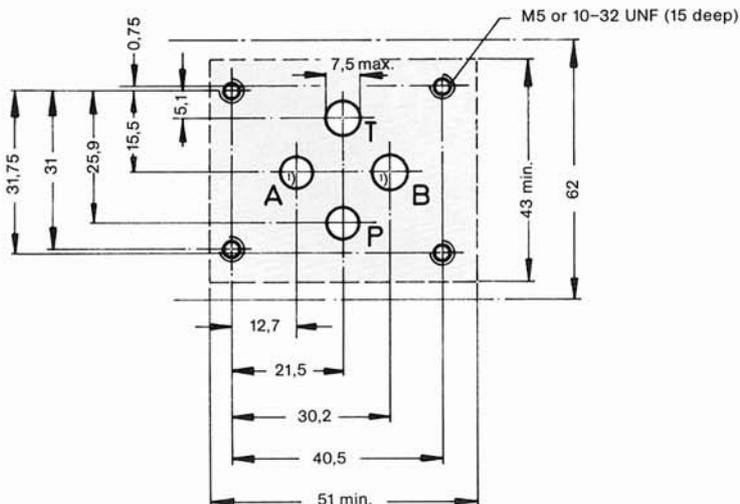
Model no.

R1EP 01-31	*	-103-A	*
Pressure range A = 1...25 bar 2 = 3...140 bar 3 = 3...210 bar 5 = 3...350 bar			
Seal class 1 = N.B.R. (Buna N) Standard 5 = VITON			

Note: To equip existing Denison Pressure Control Valves R4* and R5* as well as 3-Port Compensators R5P with this proportional pilot, R1EP 01 valves with the corresponding interface are available.
 22 = with orifices in P = 0,6/T = 1,5/Z = 0,6
 23 = with orifices in P = 1,0/T = 1,5/Z = 1,0
 Sleeve and spring in the main body then must be changed. Please consult Denison.

Note: The R1EP 01 will only operate with the servo amplifier shown on page 6.

Block mounting face according to CETOP, ISO and DIN



Flatness 0,01 mm / 100 mm length

Surface finish $0,8 \sqrt{\text{mm}}$

1) Ports A & B not required

For valves ordered without subplate fixing screws must be ordered separately.

4-Fixing screws	Order-No.
M 5 x 50, DIN 912; 10.9	361-07263-80
10-32 UNF x 2" (SAE)	359-09240

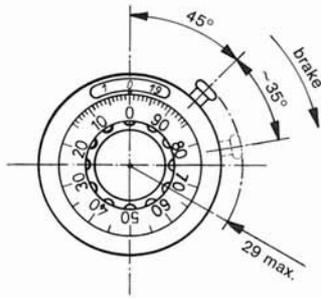
Torque 8,3 Nm

Accessories

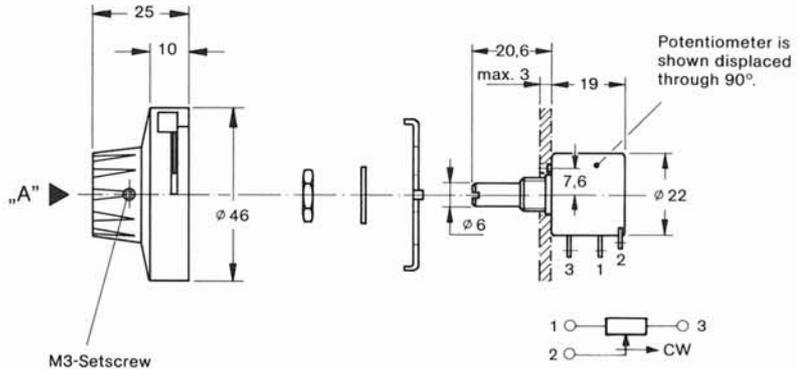
Potentiometer-Adjusting knob

Order no. 701-00014-8

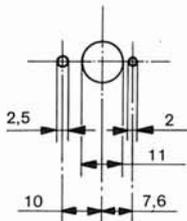
View "A"



Adjusting knob with scale 0...100 and with revolution counter. Adjustment is lockable.



Panel opening

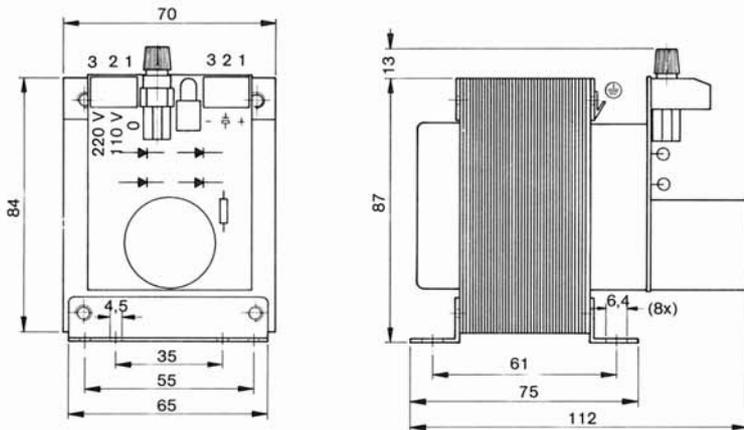


Potentiometer-Characteristics	Potentiometer Order no.	
	701-00012-8	701-00013-8
Angle of rotation	360°	3600°
Linearity	±0,5%	±0,25%
Resolution-Drift	0,11% of 360°	0,02% of 3600°

Transformer

Order no. 701-00017-8

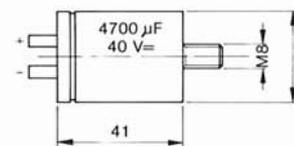
Weight: 2 kg



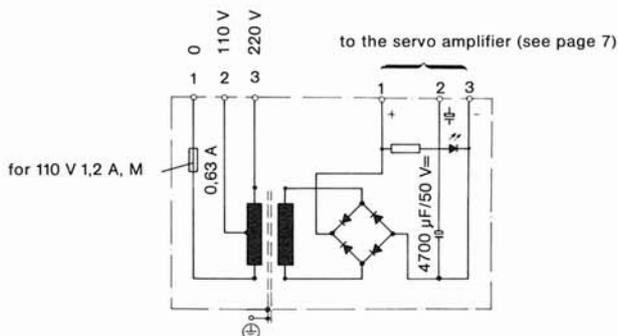
Condenser

Order no. 701-00018-8

Weight: 0,04 kg



Note: This condenser is not necessary when using transformer 701-00017-8



The mains transformer 701-00017-8 supplies the servo amplifier 701-00016-8. Secondary voltage is rectified and smoothed to meet the requirements of the servo amplifier by an auxiliary board mounted on the transformer. It carries a LED function indicator and the primary fuse.

N.B.: in 110-V operation the standard fuse must be replaced by a 1.2 A fuse.

Accessories

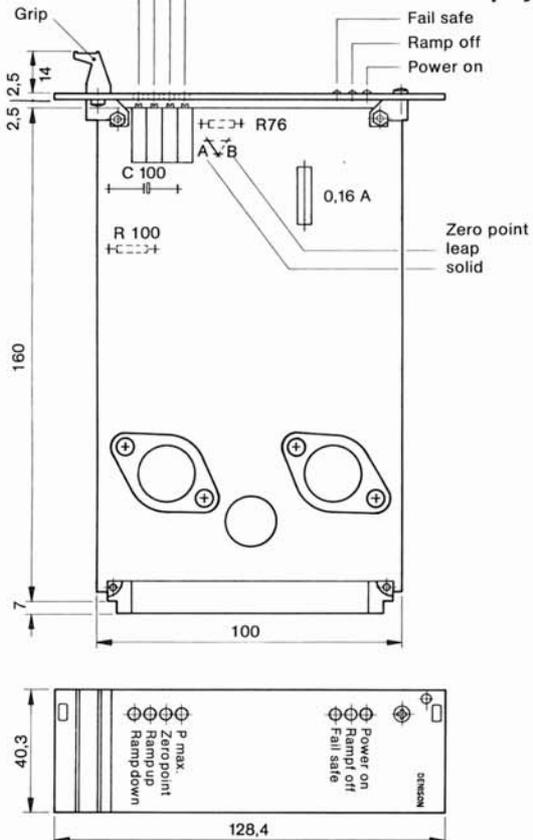
Servo Amplifier

Order no. 701-00016-8

Trim-Potentiometers

Ramp down } CCW increases the ramp time
 Ramp up }
 Zero point (Imin) } CW for +
 Pmax (Imax) } CCW for -

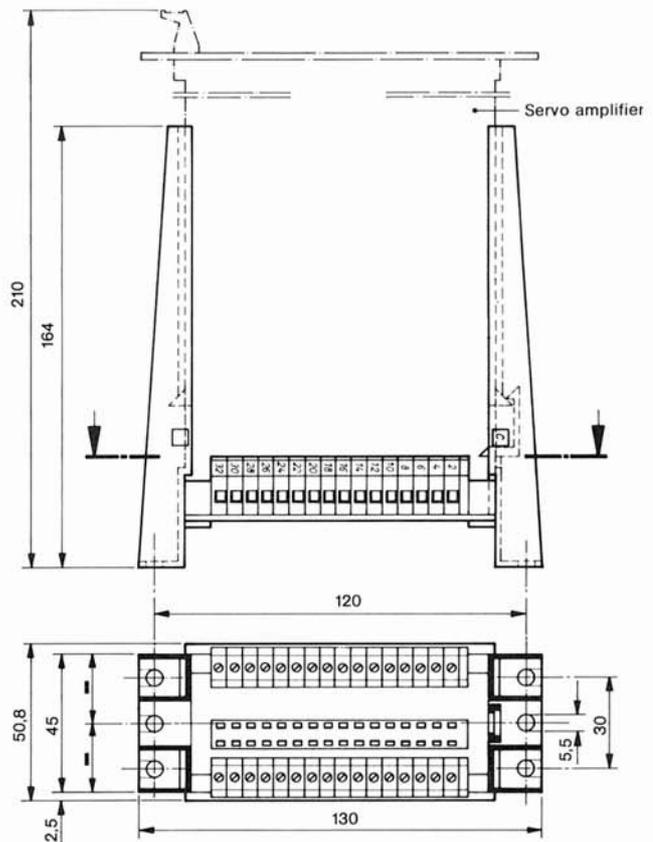
LED-Display



Euro-Card Holder

Order no. 701-00007-8

Holder for individual mounting according to DIN 41612



Characteristics – Servo Amplifier

Size Weight Multipoint connector Design	Euro size 100 x 160 x 40,3 (incl. faceplate) 0,21 kg (with holder 0,36 kg) according to DIN 41612, pattern D, 32-pin Amplifier with voltage regulator, ramp-forming circuit, PID-Regulator, pulse-width modulated output stage with output current limitation and load-independent output current.
Supply voltage Fuse Ambient temperature range Set point energizing	DC, optimal 25...30 V DC; at full-wave bridge rectification 20 V _{eff} AC ± 10% at three-phase bridge rectification 24 V _{eff} AC ± 10% 0,16 A, M, 250 V, DIN 41571 0...50 °C from separate supply or via potentiometer
Potentiometer supply	from servo amplifier: Reference voltage + 12 V DC on a12 0V on c16, c18, a16 or a18, collector on a30
Inputs for external set points	+ 4...+ 20 mA on a24 0...+ 5V on a28 0...+ 20 mA on a26 0...+ 10 V on a30 Voltage input free choice on a32. When using input a24, resistor R76 must be soldered with 620 k Ω. When using a32, resistor R100 must be soldered with 10 k Ω/V.
Output current Reference voltage	0...2,5 A on c8 and c10 ± 12 V DC, stabilized loading, up to 50 mA.
Ramp	Separately adjustable up and down from 0,05...5s. The ramp can be switched off by a bridge from a12 to a4 or by a positive voltage of 3...30 V.

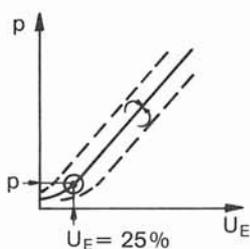
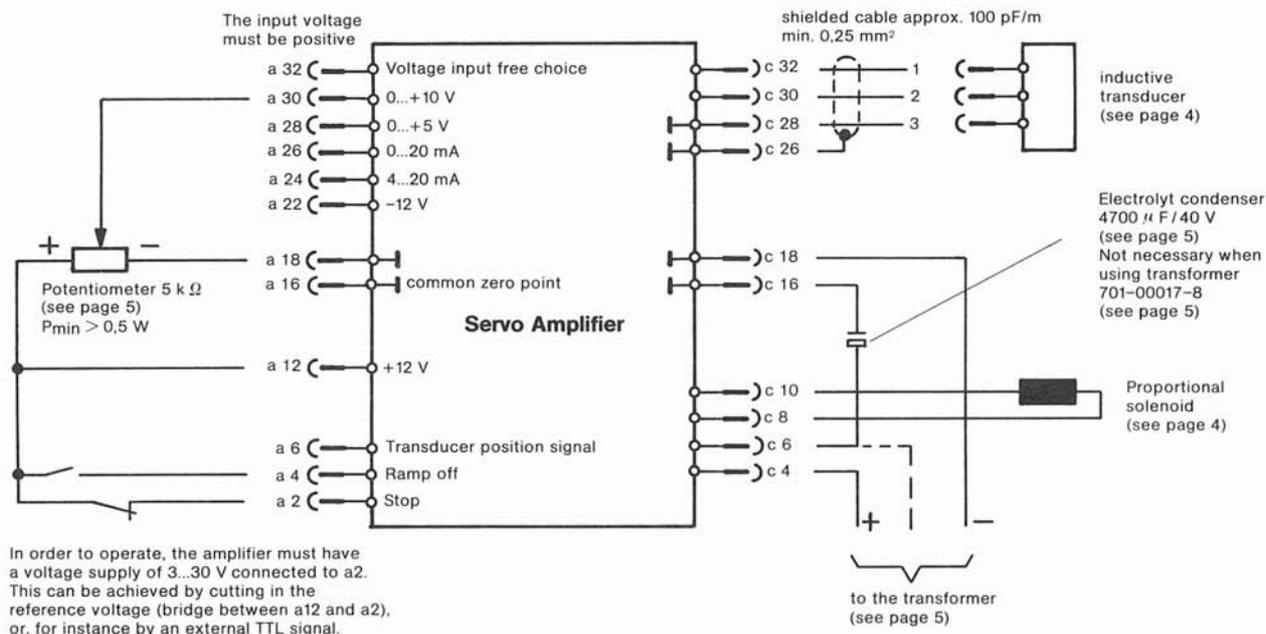
Accessories

Description – Servo Amplifier

The servo amplifier is designed for the operation of proportional pressure valves with positional control. It is protected against short-circuiting and reverse polarization and boasts transducer monitoring and ramps which can be switched off externally as well as an emergency stop facility. By virtue of identical zero potential it is possible to run several amplifiers from a single power supply. The final output stage works with pulse width modulation, which, in combination with a PID regulator and the transducer, works as a closed position control circuit. The final stage is protected against short-circuiting and incorporates a current limiter which cuts out at

approx 2.5 A. Short circuits in the reference voltage area or the final stage or the breakage of a connection lead of the transducer result in the immediate blocking of the final stage, causing the "fail safe" LED to come on. In the event of a short circuit, the supply voltage must be switched off for a period of 20 seconds, after which the amplifier will be ready to resume operation.

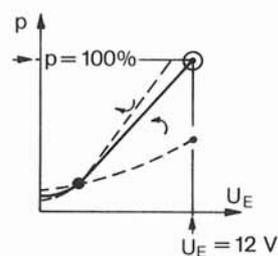
Zero point, maximum pressure, break-in and break-out ramps are adjustable via trimming potentiometers arranged on the front panel. The ramp generator has an adjustment range of 1:100 and ramp times are adjustable between 0.05 and 5.00 sec.



Adjustment procedure for servo amplifier

zero point potentiometer
min. pressure setting

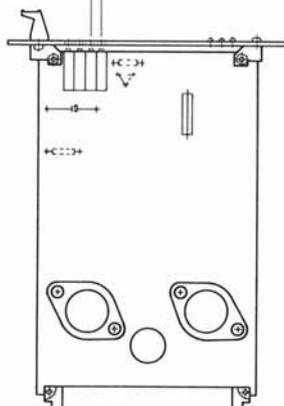
p_{max} -Potentiometer



1. Dependent on command voltage and by use of a sensitive gauge the min. pressure setting is factory adjusted as follow:

- flow $P \rightarrow T = 1 \text{ l/min}$
(other flows effect $p-U_E$ -curve shifting).
- viscosity $36 \pm 4 \text{ cSt}$ at $44...60^\circ\text{C}$.
- 25% command voltage is put on a30 of the servo amplifier by using a command potentiometer.
- the zero point potentiometer is adjusted as follow:
pressure stage...140 bar = p_7 bar
pressure stage...210 bar = p_{10} bar
pressure stage...350 bar = p_{15} bar

Important: When changing p_{min} (zero point), the p_{max} adjustment must always be corrected.

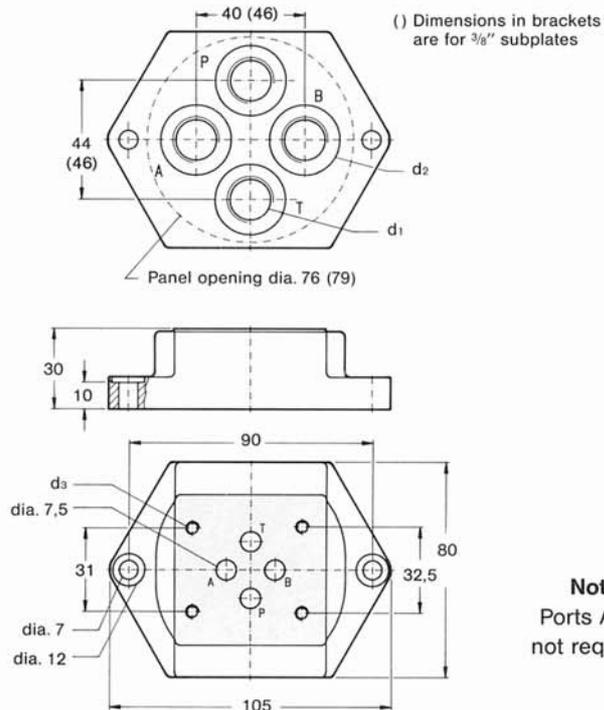


2. The p_{max} potentiometer is preset to give 100% (12 V) valve spring deflection (maximum pressure for specific valve). For requirements of less than 100% maximum pressure but with 100% input command signal turn p_{max} potentiometer anti-clockwise to lower pressure to required value.

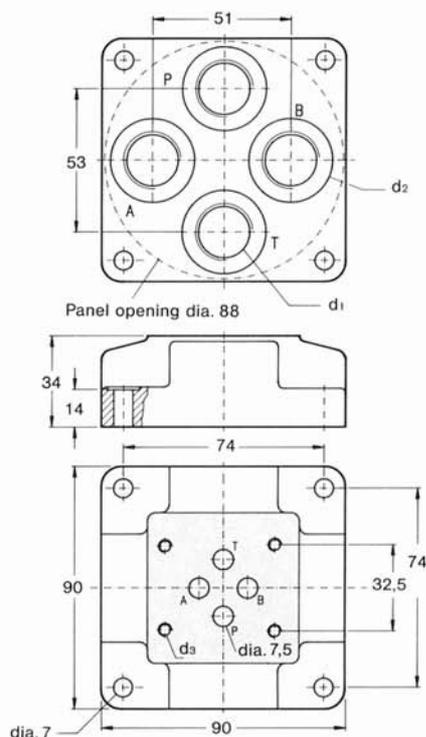
The original zero set point potentiometer setting and p_{min} value will be maintained but the sensitivity of the valve will be increased.

Subplates (mount. configuration accord. to CETOP, ISO and DIN)

1/4" and 7/8" subplates



1/2" subplates



Model-No.	Order-No.	Weight	d ₁ (A, B, P, T)	d ₂	Thread for fixing screws d ₃
SS-B-04-G 136	S26-32959	1,4 kg	1/4" B.S.P.P.	∅ 23 x 1	M 5
SS-P-04-G 135	S26-32962	1,4 kg	1/4" NPTF	-	10-24 UNC-2A
SS-B-06-G 136	S26-32960	1,4 kg	3/8" B.S.P.P.	∅ 26 x 1	M 5
SS-B-08-G 136	S26-32961	1,7 kg	1/2" B.S.P.P.	∅ 31 x 1	M 5
SS-P-08-G 135	S26-32963	1,7 kg	1/2" NPTF	-	10-24 UNC-2A

fixing screws are included in subplate order.