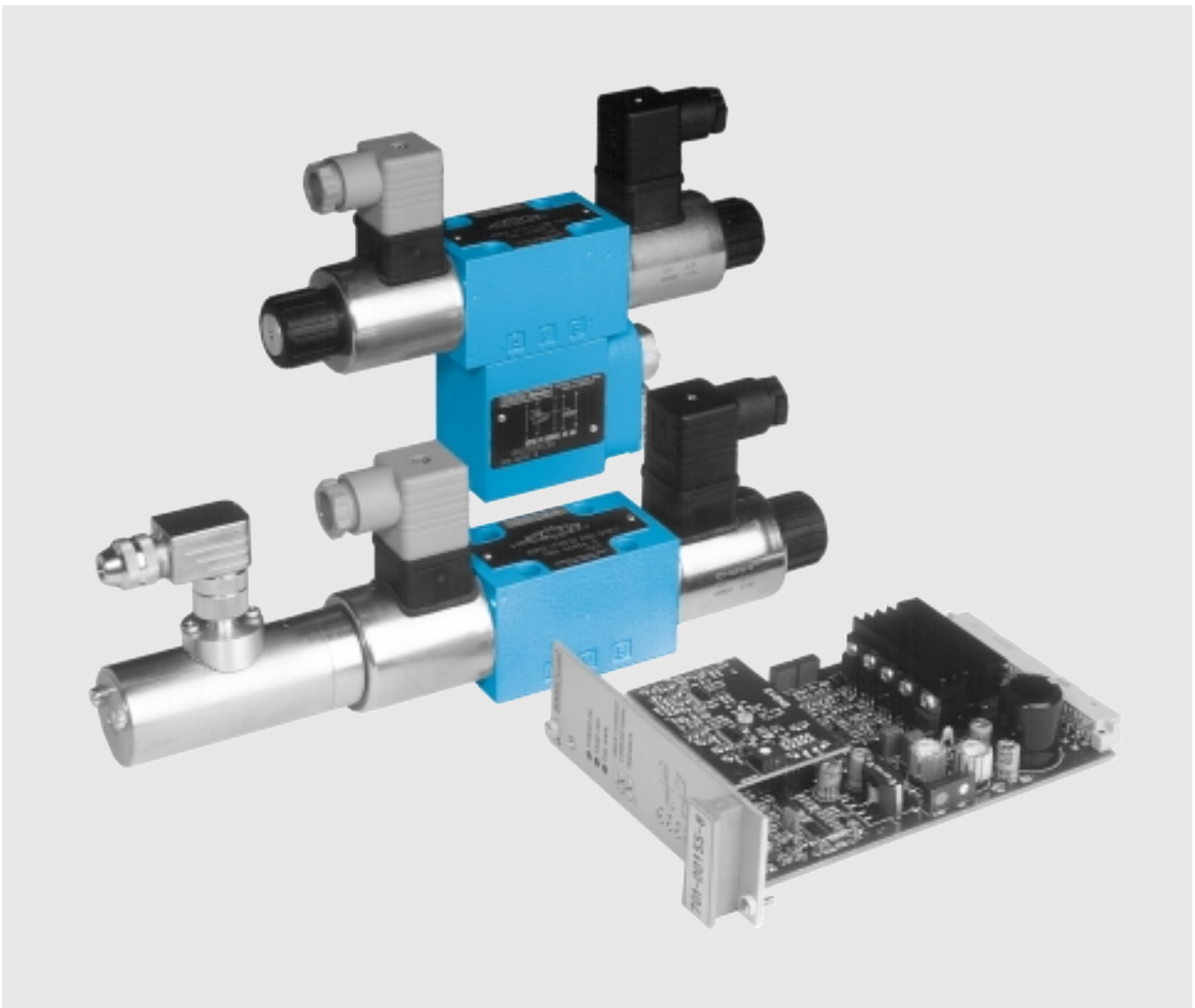


DENISON HYDRAULICS

Proportional Directional Valves

Series 4DP01 – Cetop 03



Publ. 4-EN 315-E, Replaces 4-EN 315-D

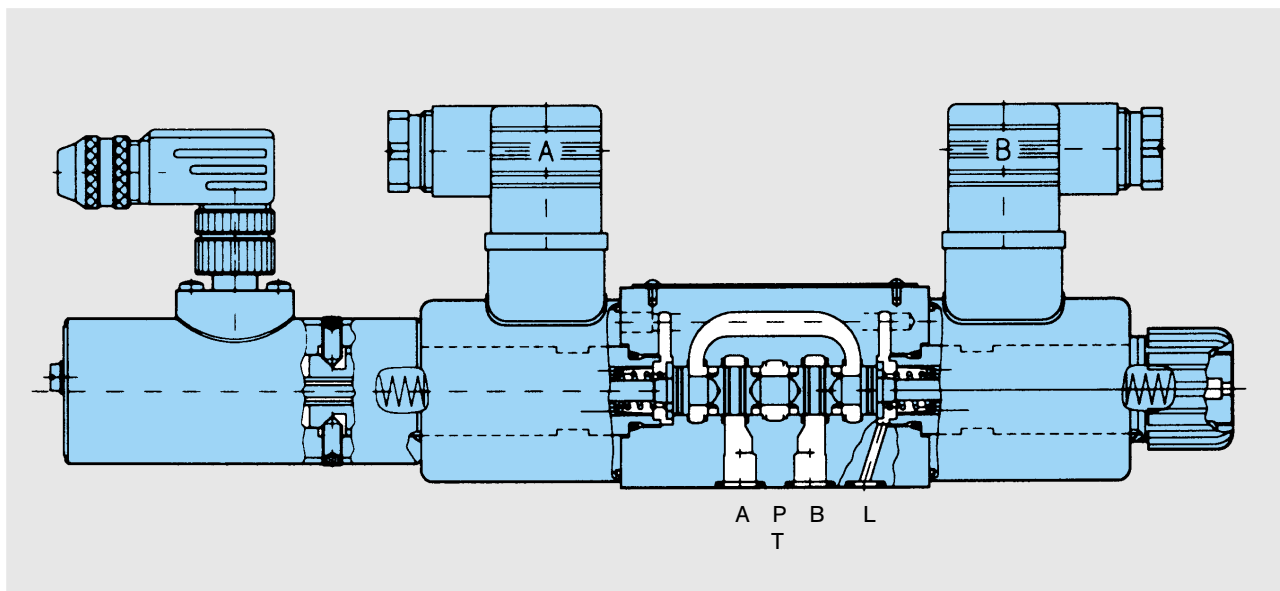
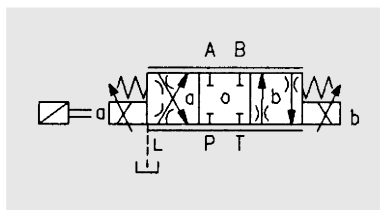
DENISON Hydraulics

FEATURES, SYMBOL, DOUBLE FLOW

FEATURES

- Stepless control of hydraulic operations to optimise machine cycling.
- Spools for various functions and flows to match precise system requirements.
- Also suitable for double flow operation (see below).
- Integral position feedback for superior dynamic performance, precise repeatability, and reduced hysteresis.
- Suitable for use with an external closed loop system.
- Economic operation through system power saving.
- Valve and servo amplifier from one source to guarantee precise matching.
- Electrical connection is by a standard plug-in connector according to ISO 4400, DIN/VDE 0660 part 208 A6.
- Stackable 2- and 3-port pressure compensators maintain flow independent of load induced pressure changes. Available in three different pressure drop ranges (see page 23).
- Mounting configuration according to CETOP, ISO and DIN.
- Easy assembly – no dynamic loaded seals.
- Each valve is factory tested prior to delivery.
- Full interchangeability of spools through close tolerances.
- Worldwide DENISON service.

SYMBOL (example)

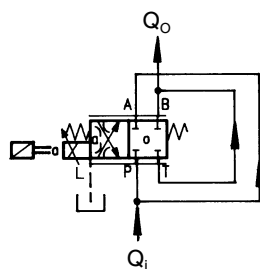


DOUBLE FLOW

By splitting the flow between two metering edges, the 4DP01 proportional directional valve can control considerably higher flow than can be achieved by a single flow circuit.

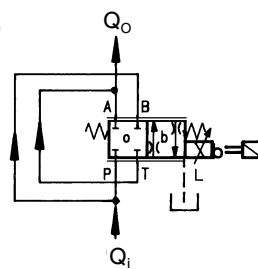
For this application, a body with drain port L must be used. The max. permissible operating pressure is then the max. permissible pressure in port T (210 bar).

Spool position 06



Only for spool 13

Spool position 05



DESCRIPTION

GENERAL

The proportional directional valves, 4DP01 series, are direct operated by proportional solenoids and are, therefore, dynamically independent of pilot oil or supply pressure.

In the de-energized state, the spool is held in neutral position by springs. An electrical input signal (command-point) changes the setting of the hydraulic output (flow). See diagram on page 6.

Energizing the opposite solenoid reverses the flow direction.

When using the 4DP01 for **power control**, the force of the proportional solenoid moves the spool against a spring. When the spring compresses sufficiently, the reaction force of the spring is equal to the solenoid force and a balance is reached between the two.

With each signal input, a balance point between the spring and solenoid forces is reached and, therefore, a particular spool stroke.

With each spool stroke, a certain throttling cross-section is produced at the metering edges of the spool. The flow characteristics of different valves depend on the resistance profile of the throttle notches.

The flow depends on size and pressure drop at the set flow cross-section. In combination with a pressure compensator the pressure drop and thus the flow can be kept constant.

The **position feedback design** has an inductive transducer to sense the spool position. The difference between command and feedback signal, caused by friction and flow forces are balanced by the servo amplifier position feedback circuit.

Depending on the application, valves with or without position feedback can be selected, as per required hysteresis, repeatability, response time etc.

ELECTRONIC

The servo amplifiers developed in conjunction with the valve are illustrated in this brochure, with schematic block diagrams and terminal connections, as well as accessories.

DRAIN LINE

Where the T-port is exposed to pressures > 160 bar (see page 4) or where the return line flow causes large pressure changes in the return line, port "L" must be connected to tank. The valves should be mounted at a level below that of the oil in the reservoir. This ensures that the valve is at all times filled with oil.

VALVE MOUNTING ABOVE THE OIL LEVEL IN THE TANK

Where it is necessary to mount the valve above the oil level in the tank, then it is recommended that ports T and L are preloaded by means of a check valve with a back pressure spring of 1...2 bar, mounted in the drain line.

PRESSURE COMPENSATORS

The flow of a proportional valve equates to $Q = f(\Delta p : A)$, the pressure differential Δp across the throttling orifice A.

Pressure compensators sense the Input and Output pressure of the proportional valve and maintain a constant pressure differential (Δp).

In combination with 2- or 3-port pressure compensators, proportional valves maintain flow or speed independent of load pressure changes.

TECHNICAL DATA

GENERAL AND HYDRAULIC CHARACTERISTICS

• Design	Sliding spool valve, proportional, with or without feedback		
• Mounting position	Optional but horizontal recommended (see also page 3)		
• Type of mounting	Subplate body according to ISO 4401		
• Max. operating pressure	P, A, B	T	L
– drain port "L" connected	350 bar	210 bar	10 bar
– without drain port "L"	350 bar	160 bar	160 bar
• Flow	see curves page 7		
• Nominal flow (at $\Delta p = 5$ bar each metering edge)	10 / 20 / 30 l/min		
• Fluid temperature range	– 18... + 80 °C		
• Ambient temperature range	– 18... + 50 °C		
• Viscosity range	10...650 cSt; optimal 30 cSt		
• Hysteresis (at $\Delta p = 100$ bar)	$\leq 1\%$ with position feedback $\leq 5\%$ without position feedback		
• Repeatability (at $\Delta p = 100$ bar)	$\leq 0.5\%$ with position feedback $\leq 3\%$ without position feedback		
• Response time ¹⁾	without feedback with feedback		
– step signal 0...100 %	12 V	24 V	12 V
– step signal 100...0 %	40 ms	55 ms	30 ms
– step signal $\pm 100\%$	25 ms	30 ms	20 ms
¹⁾ at $\Delta p = 5$ bar each metering edge	60 ms	75 ms	40 ms
• Fluid	Mineral oil according to DIN 51524/25 (other fluids on request)		
• Contamination level	Fluid must be cleaned before and continuously during operation by filters that maintain a cleanliness level of NAS 1638 Class 8 (Class 9 for 15 Micron and smaller). This approximately corresponds to ISO 17/14. Better cleanliness levels will significantly extend the life of the components. As contaminant entrainment and contaminant generation may vary with each application, each must be analyzed to determine proper filtration to maintain the required cleanliness level.		

ELECTRIC CHARACTERISTICS

• Type of voltage (DC)	12 V	24 V (not with position feedback)
• Coil resistance		
– cold start 20 °C	3.7 Ω	15.7 Ω
– warm value 50 °C	4.51 Ω	21.8 Ω
• Nominal current	2.2 A	1.1 A
• Max. current	2.5 A	1.2 A
• Max. coil temperature (temperature class F)	+ 155 °C	+ 155 °C
• Type of protection (DIN 40050)	IP 65	IP 65
• Relative operating period	100 %	100 %

TRANSDUCER CHARACTERISTICS

• Supply voltage U_s	20...28 V DC (protected against reverse polarity)
• Permissible ripple from U_s	$\leq 5\%$
• Current consumption I_s	≤ 40 mA
• Output voltage U	7.5 V \pm 4.05 V DC
• Sensitivity	1.5 V / mm
• Measuring stroke	± 2.7 mm
• Temperature drift	$\leq \pm 0.03\%$ from stroke / °C

If the performance characteristics outlined above do not meet your own particular requirements, please consult your local DENISON Office.

ORDERING CODE

Model No.: 4DP01 - . . . - .. - .. B . - G.. C1 - ..

Series _____
 01 = Cetop 03

Body _____
 3 = Standard body
 L = body with drain port "L"
 (always connect "L" to tank
 when T > 160 bar)

Control _____
 E = solenoid operation w/o position feedback
 T = solenoid operation with position feedback

Spool type _____

Spool position 03	Spool position 06	Spool position 05
02	12	12
43	13	13

Flow P-A; B-T or P-B; A-T _____
 (at 5 bar Δp for each metering edge)
 F10 = 10 l/min
 F20 = 20 l/min
 F30 = 30 l/min

Spool position _____
 03 = 3 (a, o, b), spring centered pos. "o"
 05 = 2 (o, b), spring centered pos. "o", energized to "b"
 06 = 2 (o, a), spring centered pos. "o", energized to "a"

Design letter _____

Seal class _____
 1 = NBR seals
 5 = FPM seals (Viton®)

Solenoid voltage _____
 G12 = 12 V DC
 G24 = 24 V DC (not for valves with position feedback)

Electrical connector _____
 C1 = connector PG 11 (for valves w/o position feedback)
 connector PG 11 + PG 9 (for valves with position feedback)

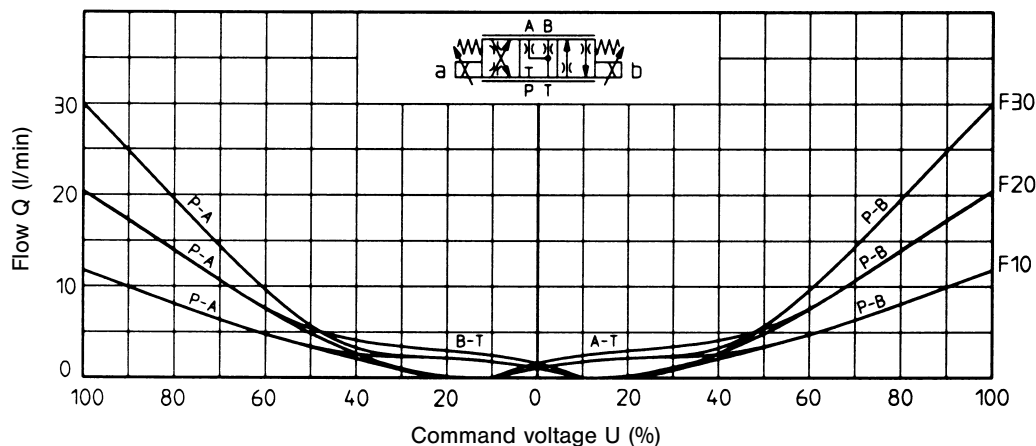
Modification _____

Note: For ordering information on Cetop 03 pressure compensators see page 23.

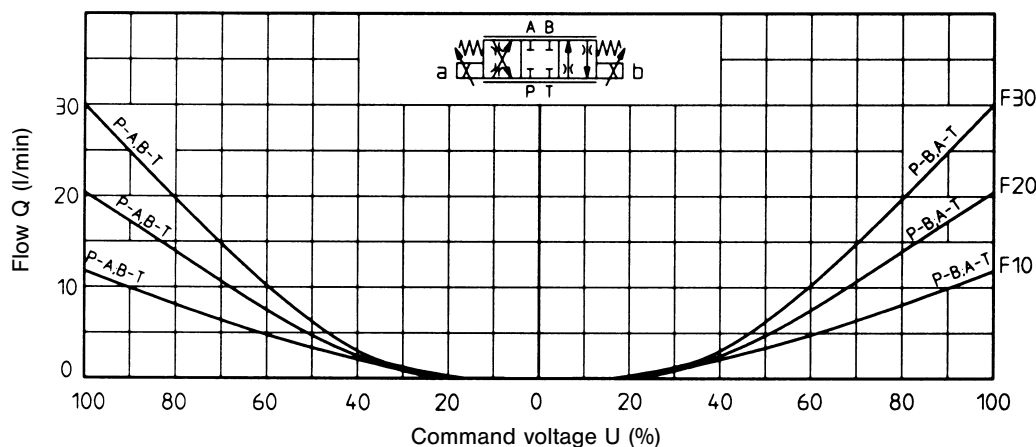
CURVES

Oil temperature 50 °C; viscosity 40 cSt.

Spool 02 ($\Delta p = 5$ bar for each metering edge)



Spool 43 ($\Delta p = 5$ bar for each metering edge)



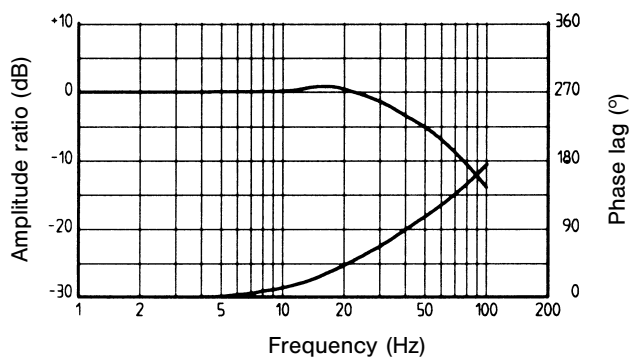
Nominal flow

In the case of a different pressure drop (e.g. in combination with a pressure compensator), the flow is altered as follows:

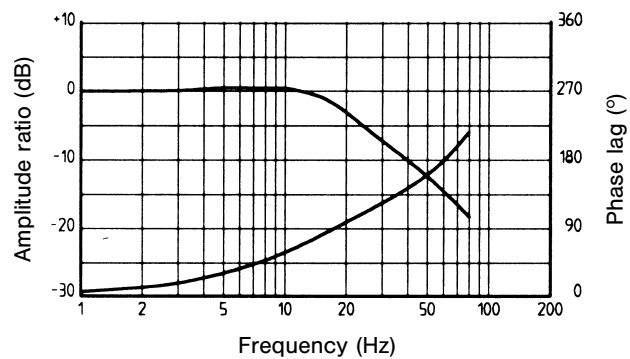
$$Q_x = Q_N \cdot \sqrt{\frac{\Delta p_x}{5}}$$

Attention: Q_{\max} see page 7

Frequency characteristics (Signal 50 % \pm 25 %)
with feedback



without feedback

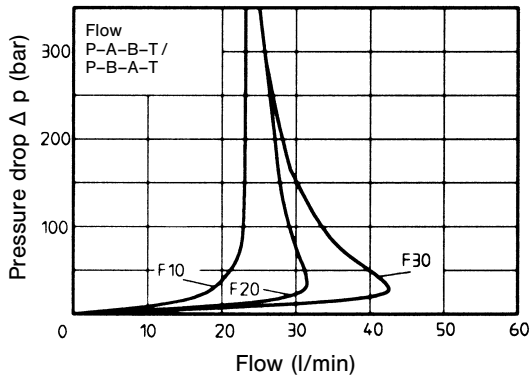


FUNCTIONAL LIMITS

Oil temperature 50 °C; viscosity 40 cSt.

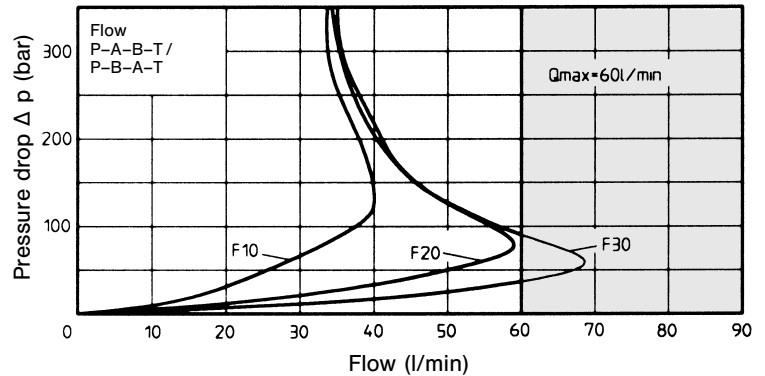
4DP01 – .E (without feedback)

Spool 02

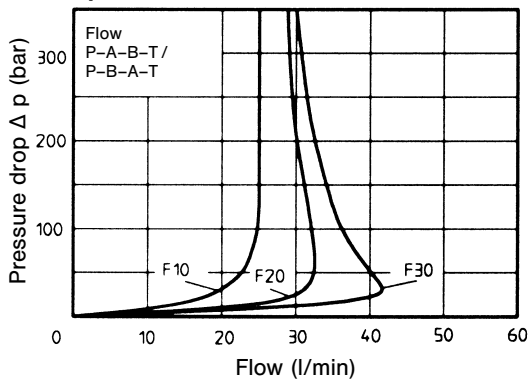


4DP01 – .T (with feedback)

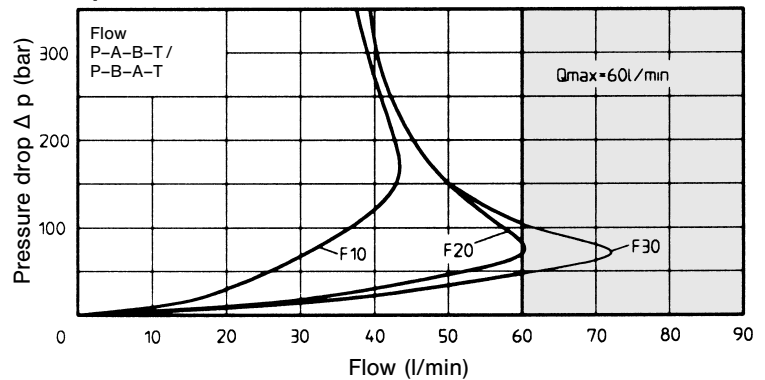
Spool 02



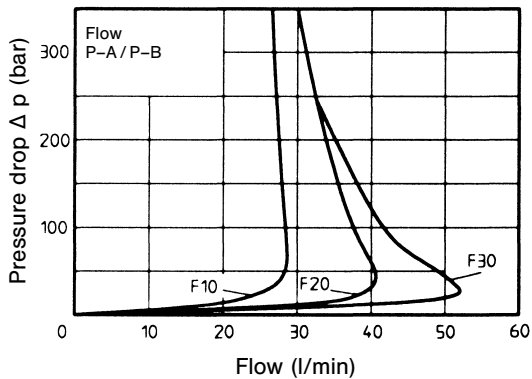
Spool 43



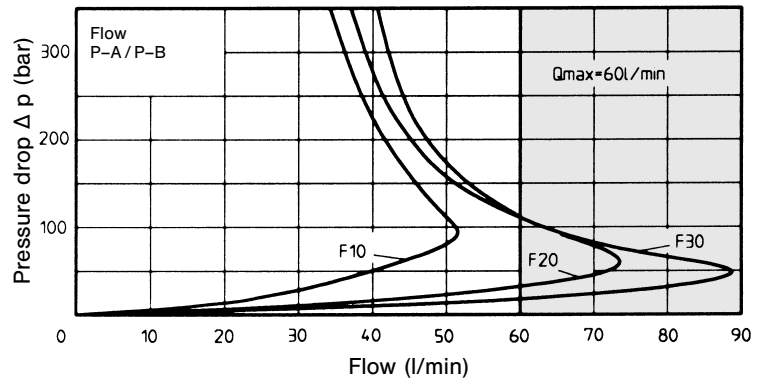
Spool 43



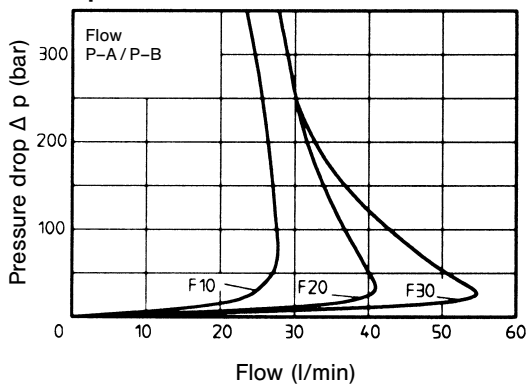
Spool 12



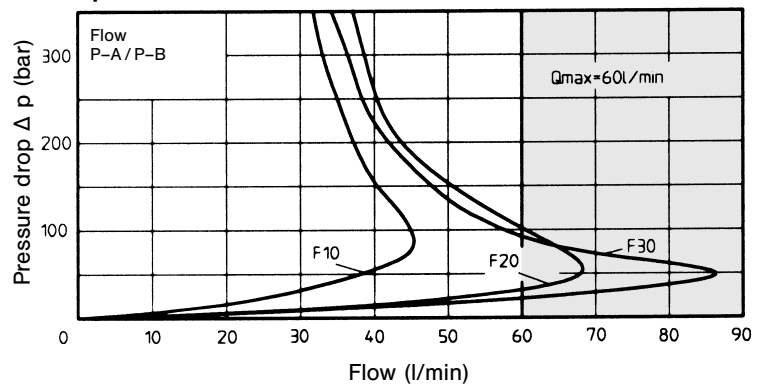
Spool 12



Spool 13



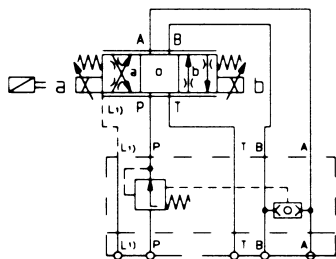
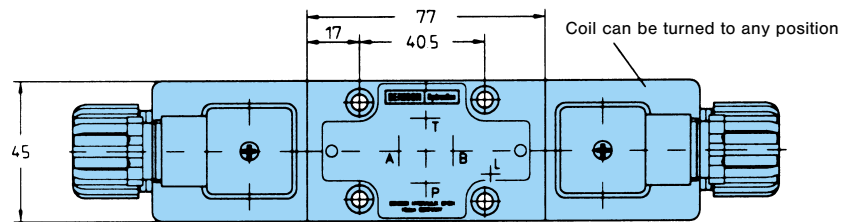
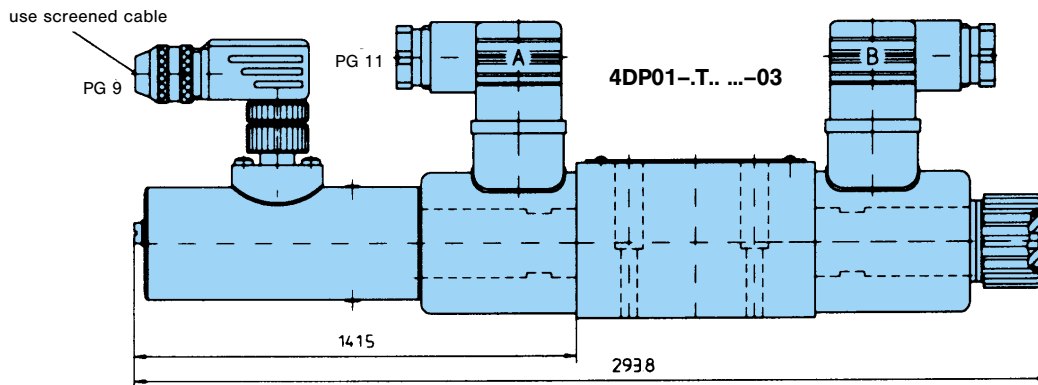
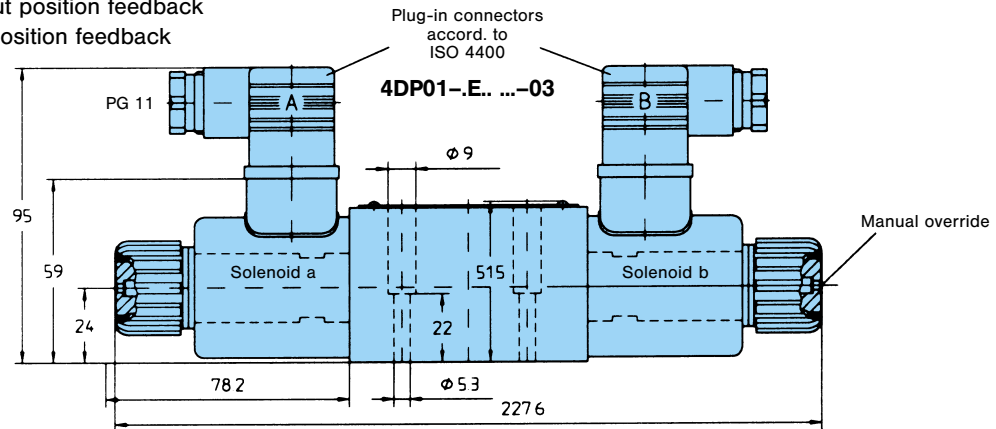
Spool 13



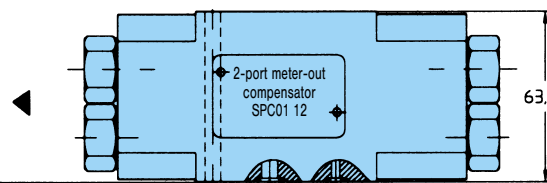
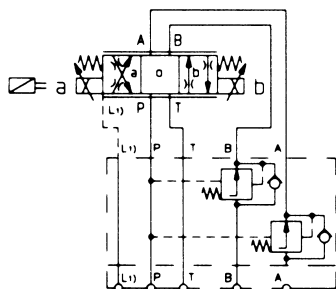
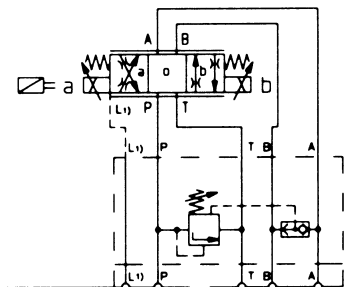
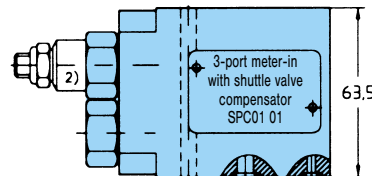
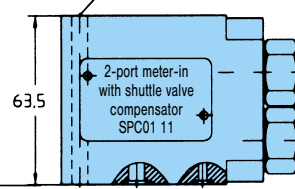
SPOOL POSITION 03

Weight: 2.3 kg without position feedback

Weight: 2.6 kg with position feedback



4 Screws M5 x 95 DIN 912; 10.9
Md = 8.3 Nm
Order No. 361-07353-2



1) Always connect L to tank when T > 160 bar

2) Optional adjustment for SPC01 01

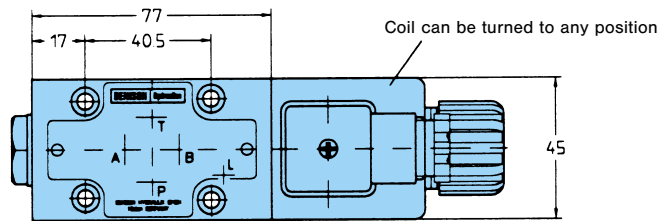
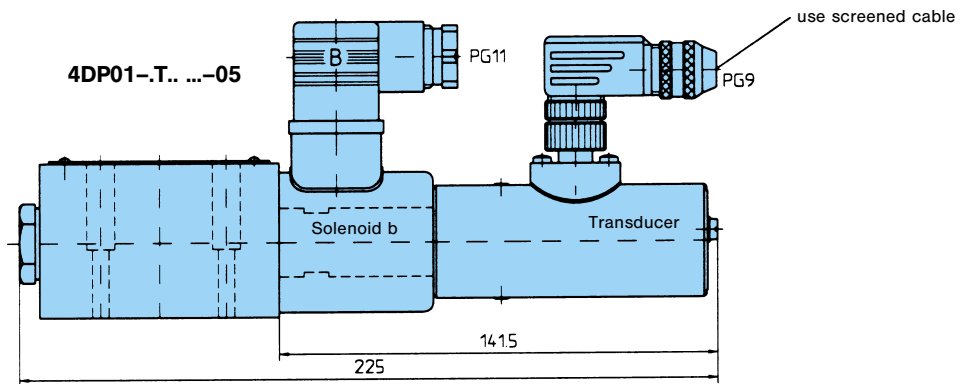
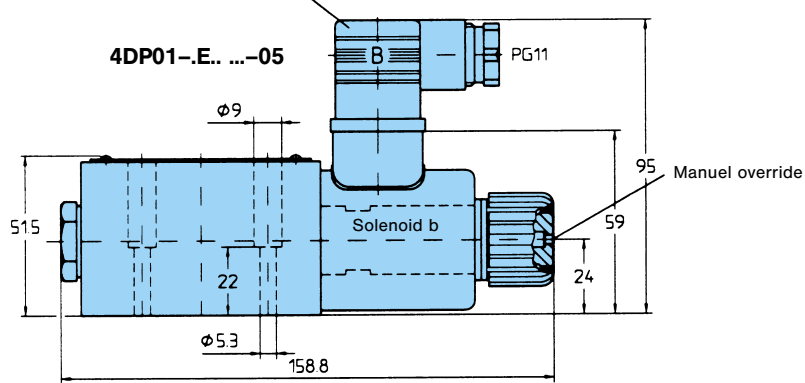
Note:

For order information on pressure compensators see page 23

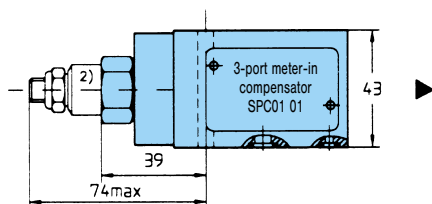
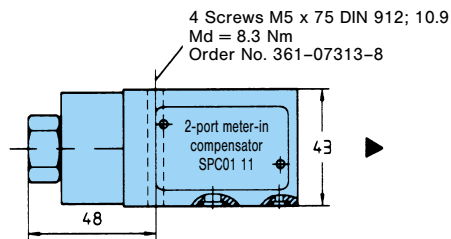
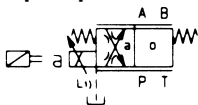
SPOOL POSITION 05 & 06

Weight: 1.8 kg without position feedback, 2.1 kg with position feedback

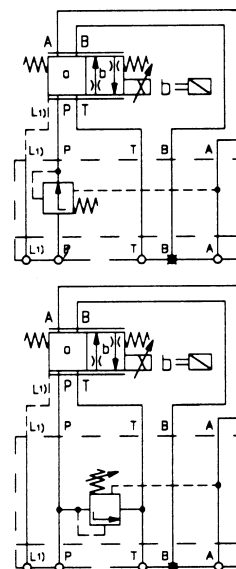
Plug-in connector accord. to ISO 4400



Spool position 06



Spool position 05



1) Always connect L to tank when T > 160 bar

2) Optional adjustment for SPC01 01

Note:

For order information on pressure compensators see page 23

According to CETOP, ISO and DIN



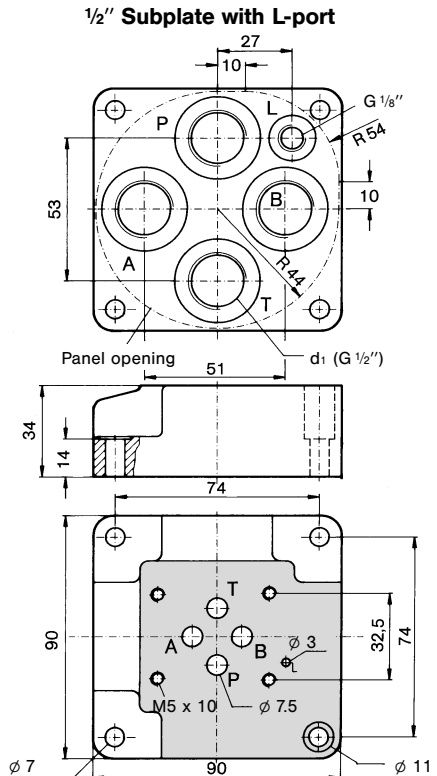
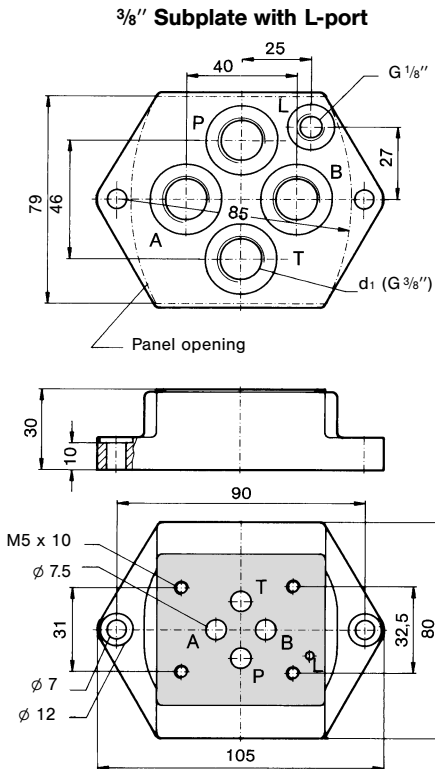
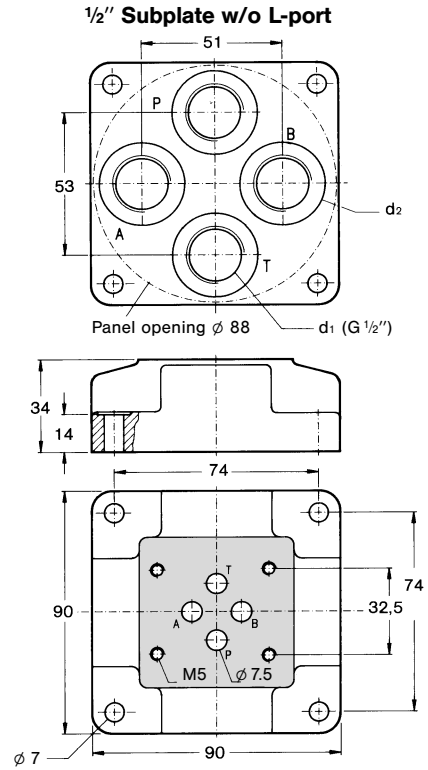
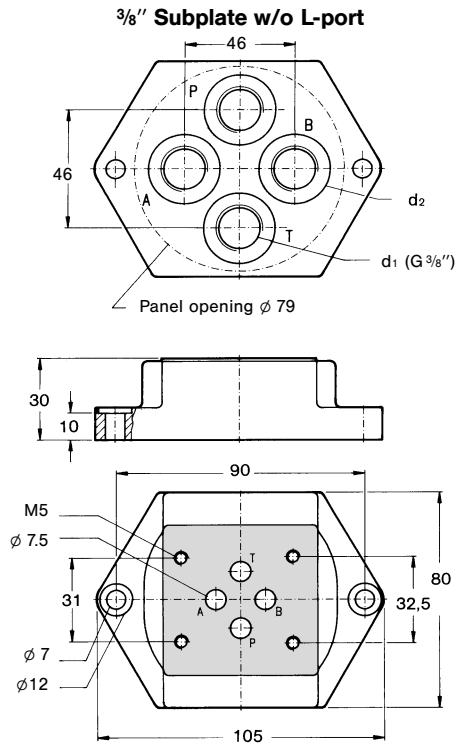
Surface finish $\sqrt{0.8}$

4-mounting screws	Order-No.
M 5 x 30, DIN 912; 10.9	700-70834-8

10

SUBPLATES

Mounting configuration accord. to CETOP, ISO and DIN



Model No.	Order No.	Weight	d ₁ (A, B, P, T)	L-port	d ₂
SS-B-06-G 136	S26-32960	1.4 kg	G 3/8"	-	$\phi 26 \times 1$
SS-B-08-G 136	S26-32961	1.7 kg	G 1/2"	-	$\phi 31 \times 1$
SS-B-06-G 140	S26-34139	1.4 kg	G 3/8"	G 1/8"	$\phi 26 \times 1$
SS-B-08-G 140	S26-34140	1.7 kg	G 1/2"	G 1/8"	$\phi 31 \times 1$

Mounting screws are included in subplate order.

SERVO AMPLIFIERS WITH RAMPS FOR USE WITH VALVES WITHOUT POSITION FEEDBACK

Order No.: 701-00153-8 (12 V)

701-00154-8 (24 V)

Weight: 0.25 kg



These servo amplifiers are designed to control direct operated proportional directional valves without position feedback. They proportionally convert electrical input signals into solenoid current.

These amplifiers have two reverse polarity and short circuit protected PWM-output stages with max. current limit.

To operate the single solenoid proportional valve, only one output stage is connected. Four different inputs are available for different command signals. On the front panel there are potentiometers to adjust the ramp circuits up / down (independently from each other), flow gain (I_{max}) and the zero point (I_{min}).

The zero-point adjustment enables the positive overlap of the spool, typical of proportional valves, to be bypassed. The electrical zero-point (I_{min}) can be adjusted to 0...50 % of I_{max} .

By changing the input signal from 0...2 %, the amplifier passes over to the "Imin-leap"-function (dead-band elimination).

The front panel includes diagnostic LEDs to display the working condition (power on), ramp function (ramp off) and "fail-safe" in case of short circuit or external stop of the card. Two measuring sockets are provided to measure either the nominal solenoid current or the command voltage.

These servo amplifiers can also be used with "A"-design valves.

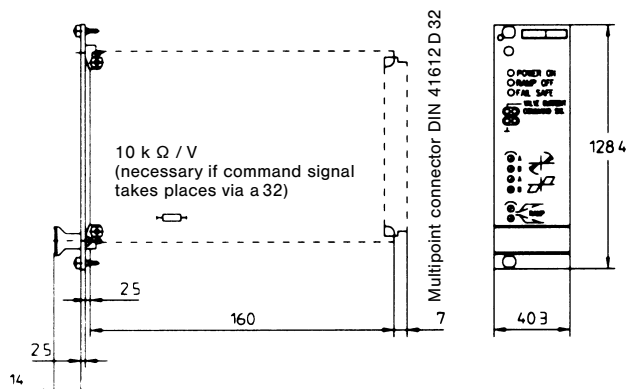
Characteristics – Servo Amplifiers

• Supply voltage		
– nominal		24 V DC
– smoothed battery voltage		23...32 V DC
– rectified AC		16...24 V Ueff (single-phase, full-wave rectifier)
• Reference voltage		$\pm 15 \text{ V}$ 25 mA $\pm 5 \%$ } from amplifier ¹⁾ stabilized $\pm 10 \text{ V}^1$ 10 mA $\pm 0.5 \%$ }
• Current consumption max.		
– 12 V – solenoid		approx. 2.5 A
– 24 V – solenoid		approx. 1.2 A
• Short circuit protection		for solenoids A, B and reference voltage
• Inputs		$\left. \begin{array}{l} 1. +/ - 0 \dots 20 \text{ mA}, 100 \Omega \\ 2. +/ - 0 \dots 5 \text{ V}, 50 \text{ k} \Omega \\ 3. +/ - 0 \dots 10 \text{ V}, 100 \text{ k} \Omega \end{array} \right\} \text{ input impedance}$
(for single solenoid prop. valves only positive (+) command signals)		4. free choice 10 k Ω / V input voltage
• Outputs		
– 2 solenoids version		(+) = solenoid A; (–) = solenoid B
– 1 solenoid version		(+) = solenoid A or B
• External stop		illuminates on "Fail Safe", implement as normally closed circuit connection with an input voltage between 2.5 and 24 V DC: input impedance 4.7 k Ω
• Potentiometers for		
– flow gain	A, B (I_{max})	...2.2 A (12 V); ...1.1 A (24 V) solenoid current at 100 % command
– zero point adjustment	A, B (I_{min})	0...50 % from I_{max} ; 20 % factory set
– ramp	up	0.1...10 s $\pm 20 \%$ \triangleq 1...100 V/s
	down	0.1...10 s $\pm 20 \%$ \triangleq 1...100 V/s
• Ramp off		illuminates when "Ramp off". Ramp is switched off by applying an input voltage between 2.5 and 24 V DC at pin a4; input impedance 4.7 k Ω
• PWM		150 Hz $\pm 10 \%$ at 24 V 250 Hz $\pm 10 \%$ at 12 V
• Measuring socket – solenoid current		$\pm 1 \text{ V} \triangleq \pm 1 \text{ A} \pm 5 \%$
– command voltage		approx. 0... $\pm 10 \text{ V}$ at 100 % command signal (depends on I_{max} -adjustment)

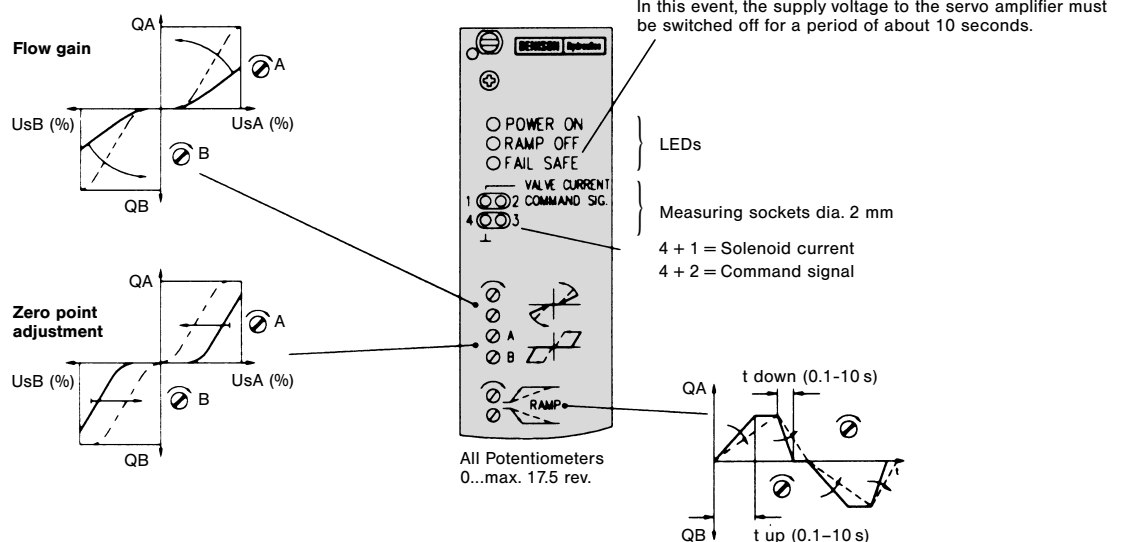
Note: Power supply, Potentiometer, Card holder see page 22.

SERVO AMPLIFIERS WITH RAMPS FOR USE WITH VALVES WITHOUT POSITION FEEDBACK

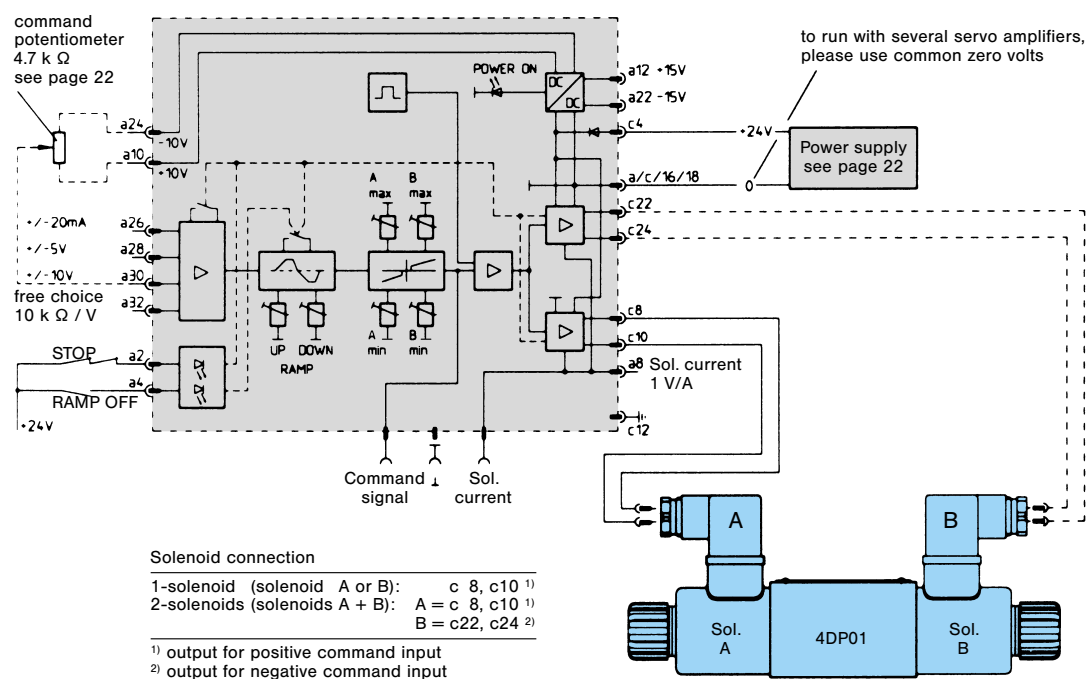
Dimensions Plug-in module 3HE according to IEC 297



Details on the front panel



Schematic block diagram and terminal assignment



SERVO AMPLIFIER WITH RAMPS FOR USE WITH VALVES WITH POSITION FEEDBACK

Order No.: 701-00155-8 (12 V)
Weight: 0.25 kg



This servo amplifier is designed to control a direct operated proportional directional valve equipped with a transducer. The transducer forms a position feedback circuit for the valve together with the PID-regulator on the amplifier card. Differences between command and actual point are supplied as a corrective current to the proportional solenoid on the valve.

The amplifier has two reverse polarity and short circuit protected PWM-output stages with max. current limit.

To operate the single solenoid proportional valve, only one output stage is connected. Four different inputs are available for different command signals. On the front panel there are potentiometers to adjust the ramp circuits up / down (independently from each other), flow gain (I_{max}) and the zero point (I_{min}).

The zero-point adjustment enables the positive overlap of the spool, typical of proportional valves, to be bypassed. The electrical zero-point (I_{min}) can be adjusted to 0...50 % of I_{max} .

By changing the input signal from 0...2 %, the amplifier passes over to the "Imin-leap"-function (dead-band elimination).

The front panel includes diagnostic LEDs to display the working condition (power on), ramp function (ramp off) and "fail-safe" in case of short circuit or external stop of the card. Three measuring sockets are provided to measure the nominal solenoid current, the command voltage, and the transducer feedback signal.

This servo amplifier can also be used with "A"-design valves.

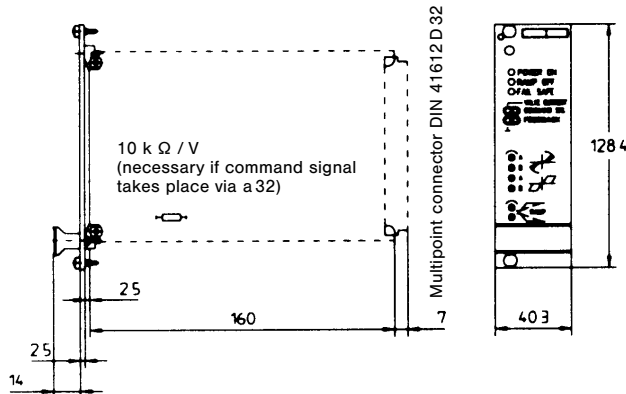
Characteristics – Servo Amplifier

- Supply voltage
 - nominal 24 V DC
 - smoothed battery voltage 23...32 V DC
 - rectified AC 19...24 V Ueff (single-phase, full-wave rectifier)
 - transducer approx. 24 V \pm 10 % stabilized (from amplifier)
- Reference voltage
 - \pm 15 V 25 mA \pm 5 % } from amplifier ¹⁾ stabilized
 - \pm 10 V¹⁾ 10 mA \pm 0.5 % }
- Valve nominal current I_{nom} A = I_{nom} B = 2.2 A
- Current consumption max. approx. 2.5 A
- Short circuit protection for solenoids A, B and reference voltage
- Inputs
 - 1. +/– 0...20 mA, 100 Ω } input impedance
 - 2. +/– 0... 5 V, 50 k Ω }
 - 3. +/– 0...10 V, 100 k Ω }
 - 4. free choice 10 k Ω / V input voltage
- Outputs
 - 2 solenoids version (+) = solenoid A; (–) = solenoid B
 - 1 solenoid version (+) = solenoid A or B
- External stop illuminates on "Fail Safe", implement as normally closed circuit connection with an input voltage between 2.5 and 24 V DC: input impedance 4.7 k Ω
- Potentiometers for
 - flow gain A, B (I_{max}) ...2.2 A, solenoid current at 100 % command
 - zero point adjustment A, B (I_{min}) 0...50 % from I_{max} ; 10 % factory set
 - ramp up 0.1...10 s \pm 20 % \triangleq 1...100 V/s
 - down 0.1...10 s \pm 20 % \triangleq 1...100 V/s
- Ramp off illuminates when "Ramp off". Ramp is switched off by applying an input voltage between 2.5 and 24 V DC at pin a4; input impedance 4.7 k Ω
- Measuring socket – solenoid current \pm 1 V \triangleq \pm 1 A \pm 5 %
- command voltage approx. 0... \pm 10 V at 100 % command signal (depends on I_{max} -adjustment)
- feedback \pm 5 V max. level at 100 % command signal

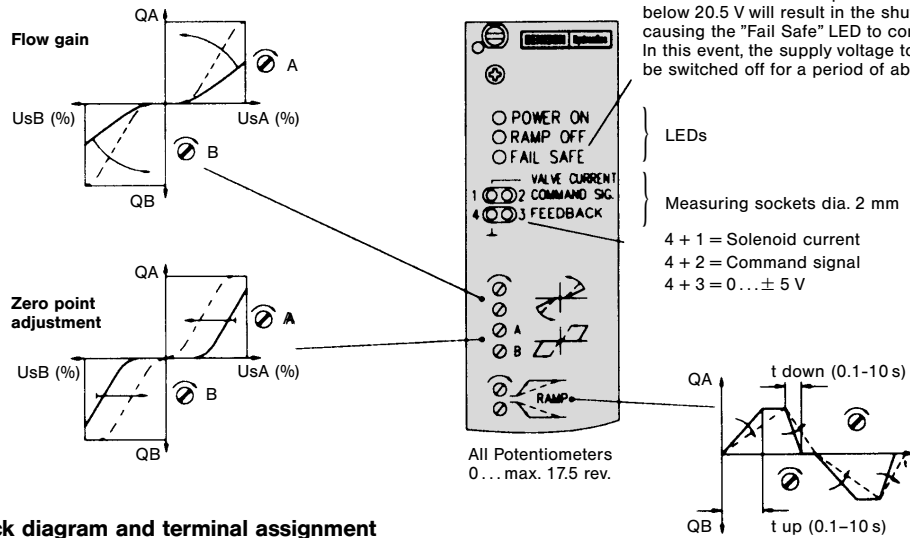
Note: Power supply, Potentiometer, Card holder see page 22.

SERVO AMPLIFIER WITH RAMPS FOR USE WITH VALVES WITH POSITION FEEDBACK

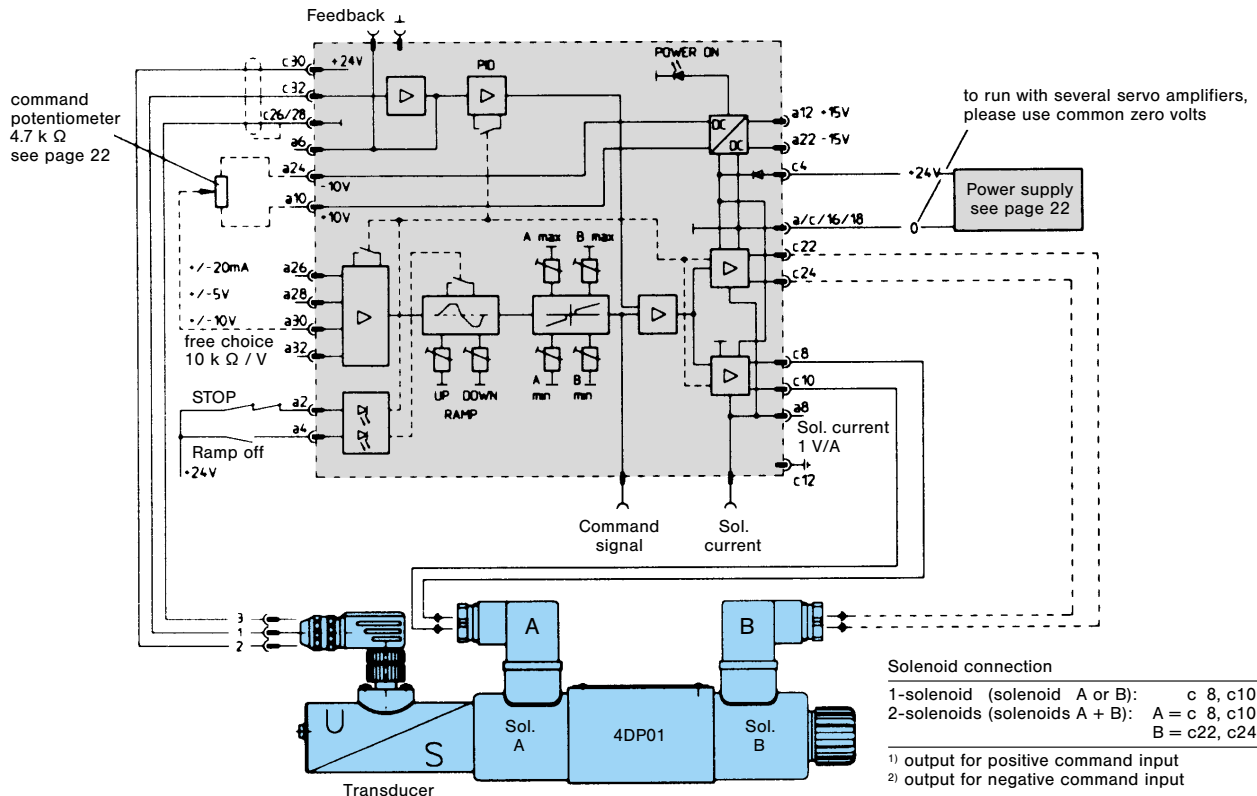
Dimensions Plug-in module 3HE according to IEC 297



Details on the front panel



Schematic block diagram and terminal assignment



COMMAND CARD FIVE CHANNEL

Order No.: 701-00028-8

Weight: 0.15 kg



This command card is designed to interface with all servo amplifiers for DENISON proportional valves.

Five multiturn-potentiometers (P1...P5) allow different command signals. Selection is made by external energizing of the five selector relays on the command card. By moving the solder bridges (+/-) it is possible to preset positive or negative commands for the desired level and direction.

In addition, the command card has a summing amplifier which enables the monitoring of the internal commands (solder bridges 1...5), or additional external resistor array.

These inputs (e.g. a 4) also make it possible to cascade further command cards if required.

The output signal to the servo amplifier is available "not inverted" (a 2) and "inverted" (c 2).

The command card has a power rectifier with a 24 V DC output (input 24 V AC). Via this output c 30/32, the command relays can be energized.

All potentiometers are adjustable on the front panel.

The operating status of the corresponding command is indicated by an LED display on the front pannel (K1...K5).

LED on = Command level selected.

Characteristics – Command Card

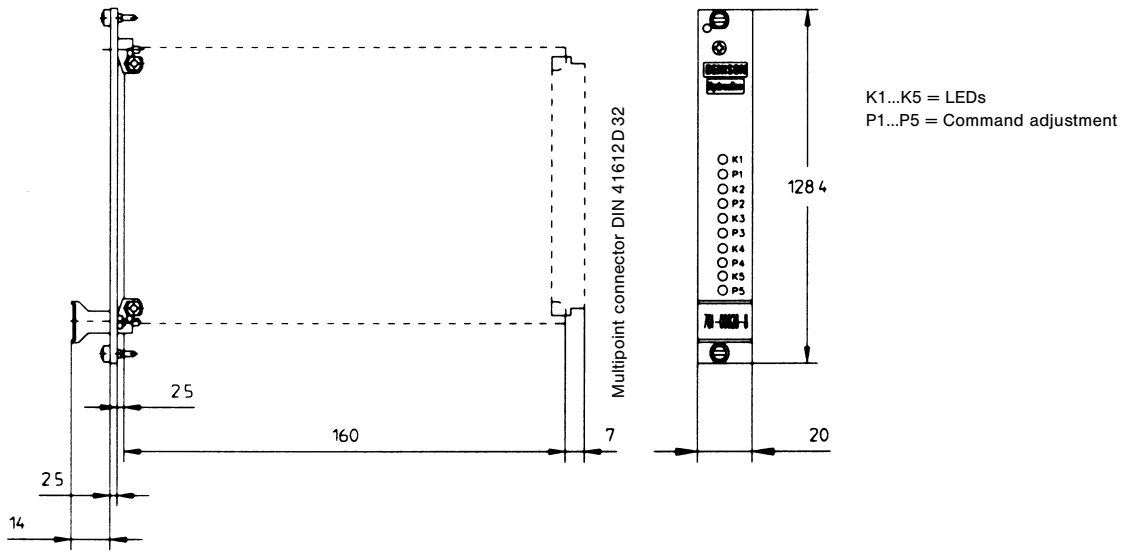
- Supply voltage:
 - command card supply from servo amplifier
 - rectifier 24 V AC (min. 19 V AC)
- Command potentiometer 5 potentiometers 0... 10 V
- Command relays 5 potential – free contacts
- Relay contacts:
 - max. current on contact (resistive load) 100 mA
 - max. switching voltage 30 V
 - coil voltage 24 V DC, approx. 30 mA incl. LED-display

Note: Servo Amplifiers see pages 12...15.

Potentiometer, Card holder see page 22.

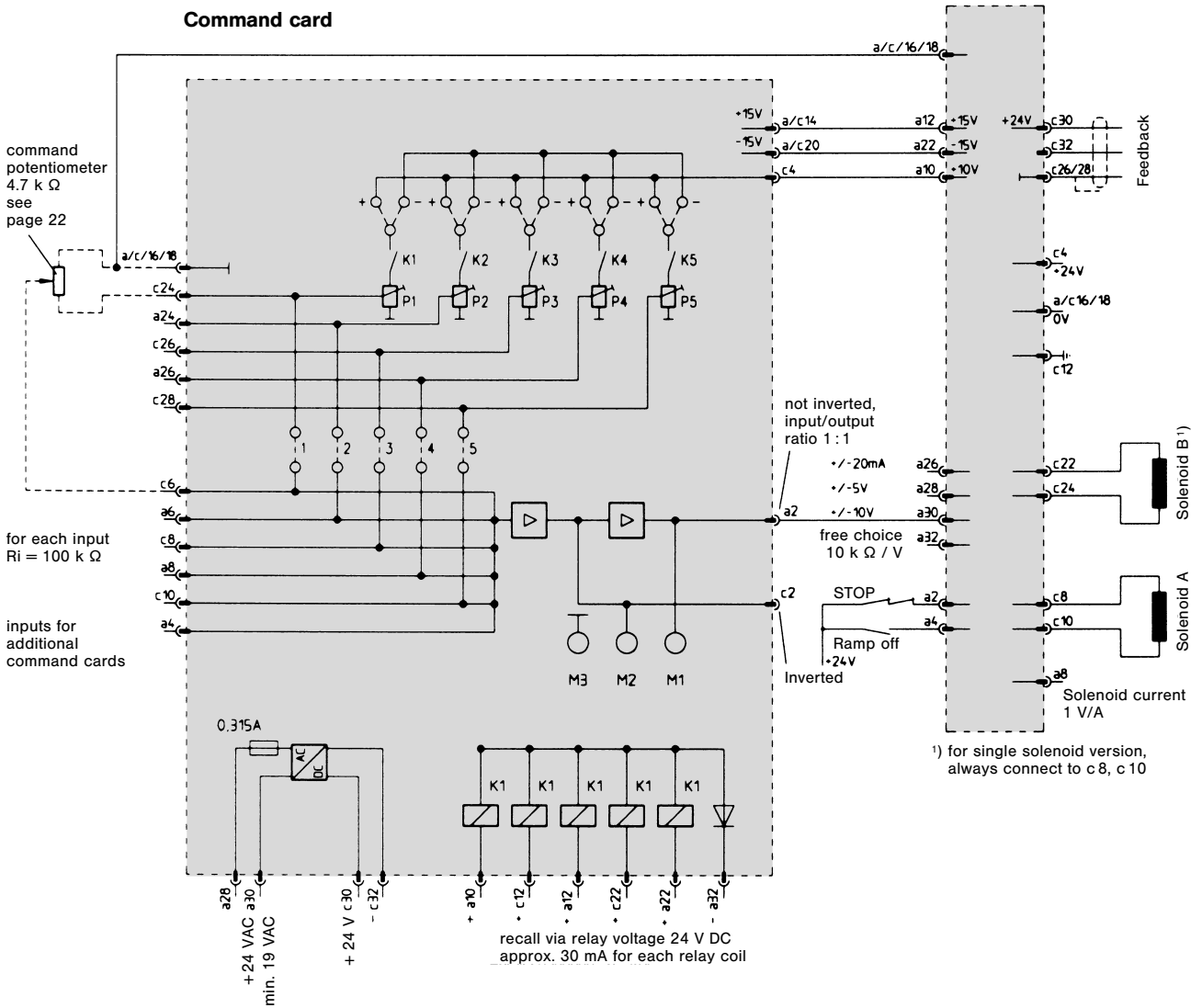
COMMAND CARD FIVE CHANNEL

Dimensions Plug-in module 3HE according to IEC 297



Schematic block diagram and terminal assignment

Servo Amplifier
(see pages 12...15)



PLUG-ON DRIVER

Order No. 701-00507-8 (12 V)
701-00508-8 (24 V)



This range of Plug-on Drivers is designed to operate DENISON 4DP01 open loop Proportional Directional valves. The Plug-on Driver has reverse polarity and short circuit protection and converts a linear input command signal to a proportional output current sufficient to control the valve solenoid.

Each Plug-on Driver controls one proportional solenoid.

When these Plug-on Drivers are used as a pair, to drive a double solenoid valve, the individual ramp settings must be set to zero (0), and the ramp, where required, has then to be supplied by the external command system.

In addition, the command invert link must be fitted to Plug-on Driver "B".

Interesting features of this module include the fact that all necessary building blocks, normally required to control a proportional valve, are included within the small sized Plug-on Driver.

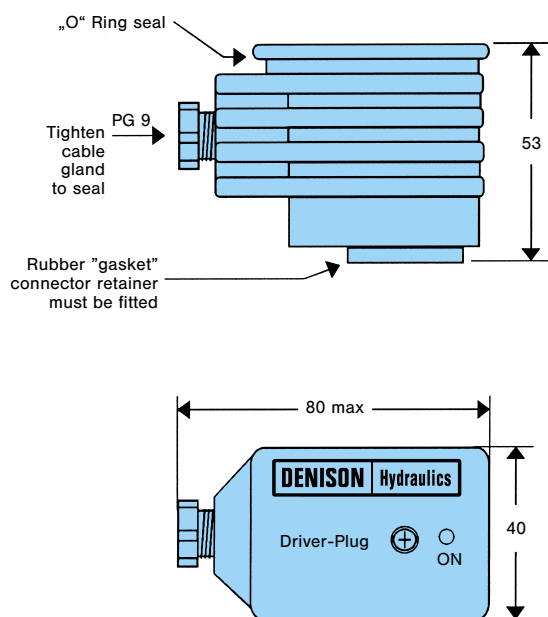
This version is housed in a rugged thermo plastic shell which has a "o" ring sealing to give an IP 54 rating when assembled correctly.

Characteristics – Plug-on Driver

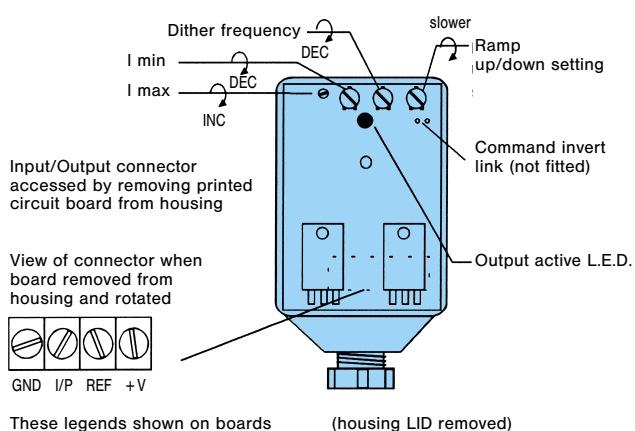
• Board style	Custom design
• Connector type	Standard Hirschmann female outline (rotatable)
• Input supply voltage	12 or 24 Volts DC + 20 %
• Input supply current	Valve current + approx. 30 mA max.
• User output voltage	1 x +8.5 VDC (+/- 15%) 10 mA max.
• Valve supply voltage	...95 % of DCV input (P.W.M.)
• Valve current	12 V = 2.2 Amp
	24 V = 1.1 Amp
• Command input values	0... +10 V
• Available adjustments (inside)	I _{min} , I _{max} , ramp up & down (same value), dither frequency
• Ramp type	linear and continuously variable
• Ramp up time	50 ms... 8 s +/- 20 % \triangleq 0.5... 100 V/s
• Ramp down time	50 ms... 8 s +/- 20 % \triangleq 0.5... 100 V/s
• Dither amplitude	preset
• Dither frequency	40... 300 Hz +/- 20 %

PLUG-ON DRIVER

Dimensions

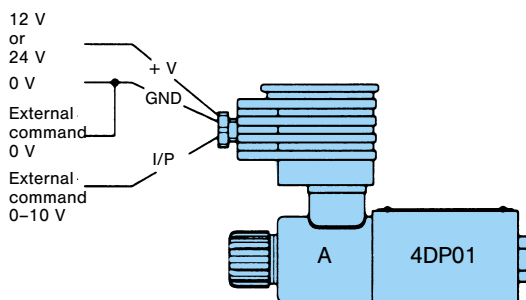


Details

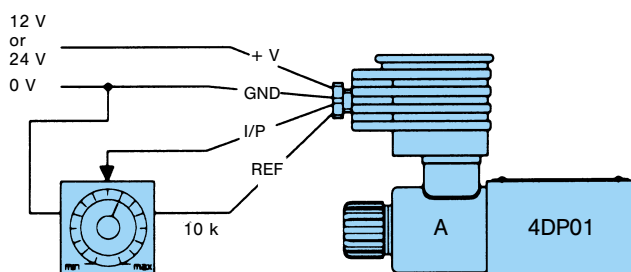


Installation

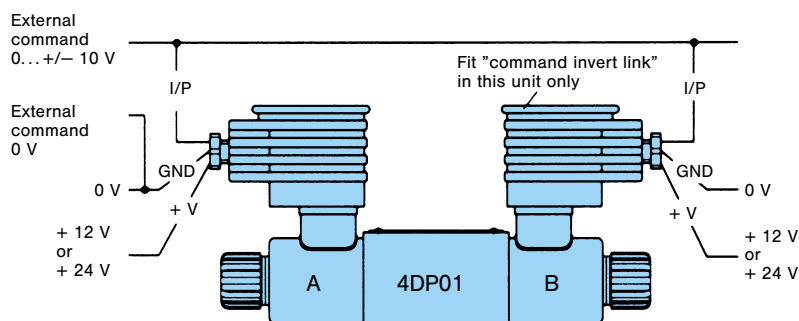
Proportional valve with external command input



Proportional valve with potentiometer command input



Double sided valve application showing external command input connections



Notes:

1. Solenoid A responds to "+" voltage commands only.
2. Solenoid B responds to "-" voltage commands only.
3. The individual ramp settings must be set to zero (0), and the ramp, where required, has then to be supplied by the external command system.
4. External command voltage range is +/- 10 V max.
5. Command deadband is approximately +/- 220 mV around zero volts.
6. Set "I_{min}" before setting "I_{max}".
7. In addition, the command invert link must be fitted to Plug-on Driver "B".

DUAL DRIVER

Order No. 701-00502-8 (12 V)
701-00503-8 (24 V)



This range of high quality Dual Drivers is designed to operate DENISON 4DP01 open loop Proportional Directional Valves. This dual driver has reverse polarity and short circuit protection and converts a linear input command signal to a proportional output current sufficient to control the valve solenoids.

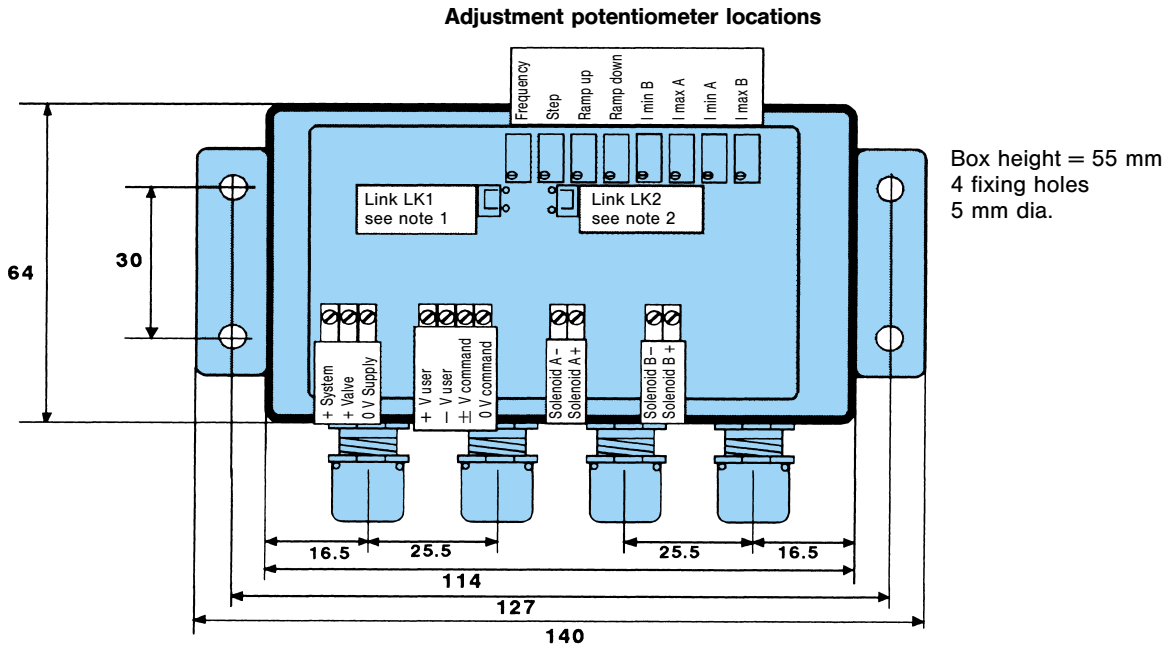
This version of the dual driver is designed to control a double solenoid valve. The innovative feature of this dual driver, apart from the aluminium enclosure (IP65 & EMI proof), is that all the necessary building blocks required to control a proportional directional valve are built into the dual driver, and adjustments are, once set, protected from unauthorised tampering within the enclosure.

Characteristics – Dual Driver

• Board style	Custom design
• Connector type	PG 7 cable glands and screw terminals
• Input supply voltage	12 or 24 Volts DC $\pm 20\%$
• Input supply current	Valve current + approx. 50 mA max.
• User output voltage	± 10 VDC ($\pm 5\%$) 5 mA max. / rail
• Valve supply output	...95 % of DCV input (P.W.M.)
• Valve current	12 V = 2.2 Amp
	24 V = 1.1 Amp
• Command input values	0... ± 10 V
• Available adjustments (inside)	I_{min} , I_{max} (A & B), ramp up, ramp down, dither frequency, deadband
• Ramp type	linear and continuously variable
• Rampe up time	50 ms... 10 s $\pm 20\% \triangleq 1.0...200$ V/s
• Rampe down time	50 ms... 10 s $\pm 20\% \triangleq 1.0...200$ V/s
• Dither amplitude	preset
• Dither frequency	50...300 Hz $\pm 15\%$

DUAL DRIVER

Dimensions & Details



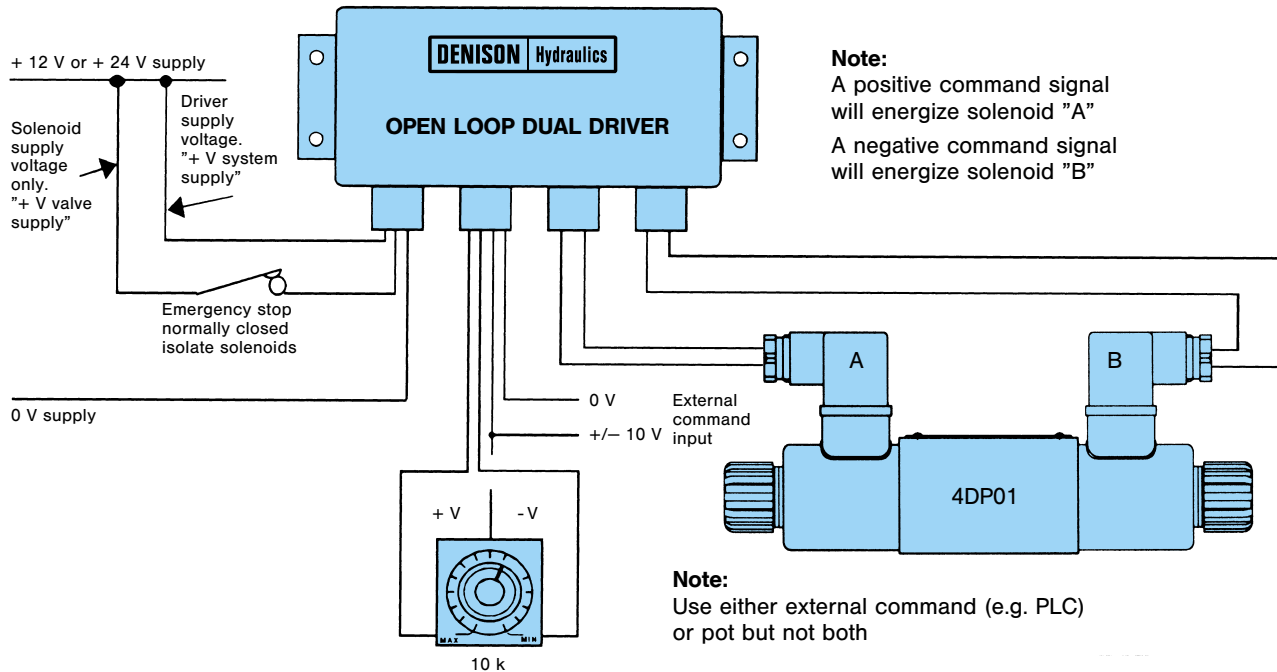
Note 1:

Keep link LK1 fitted when no ramp is required.
System internal ramp is then less than 5 msec.

Note 2:

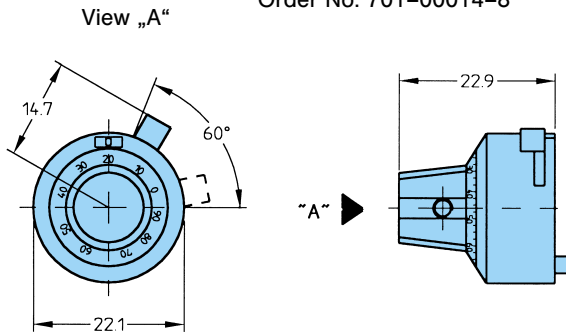
Keep link LK2 fitted if no individual deadband is required.
Without threshold the deadband is approx. 60 mV.
With threshold the deadband potentiometer (step) must be adjusted to reach the required value.

Installation



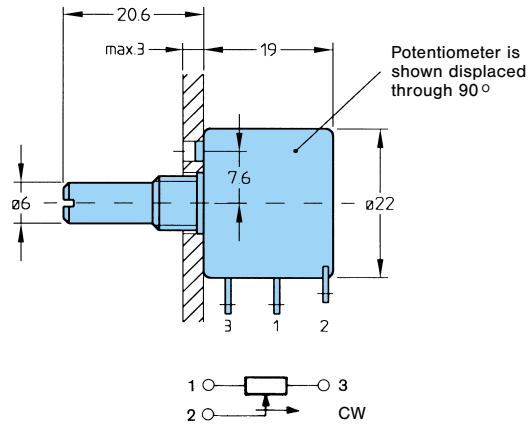
ACCESSORIES

Potentiometer-Adjusting knob Order No. 701-00014-8

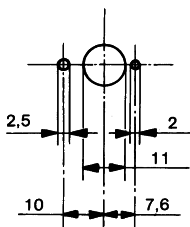


Adjusting knob with scale 0...100 and with revolution counter. Adjustment is lockable.

Potentiometer



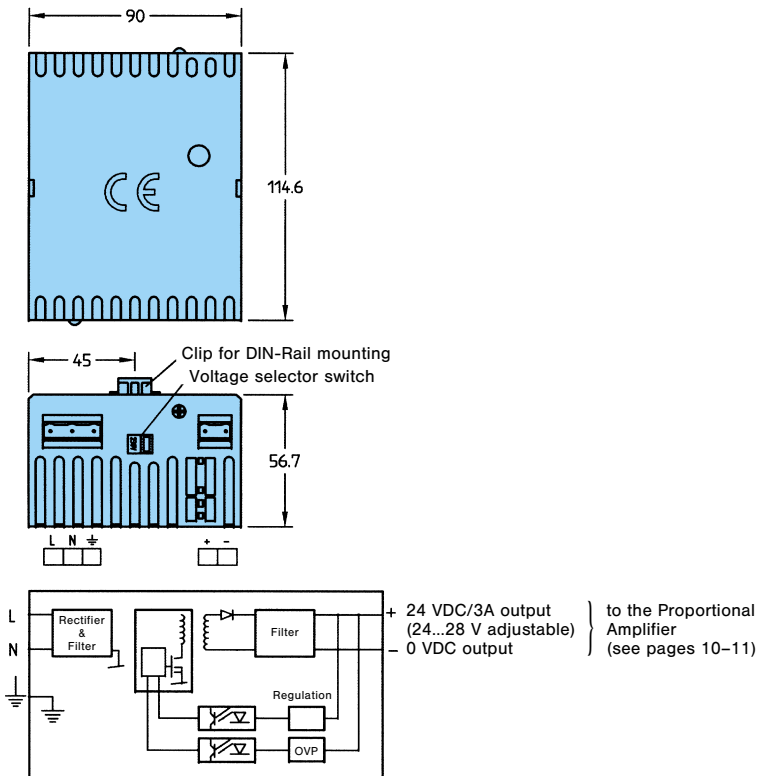
Panel opening



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°

Power supply

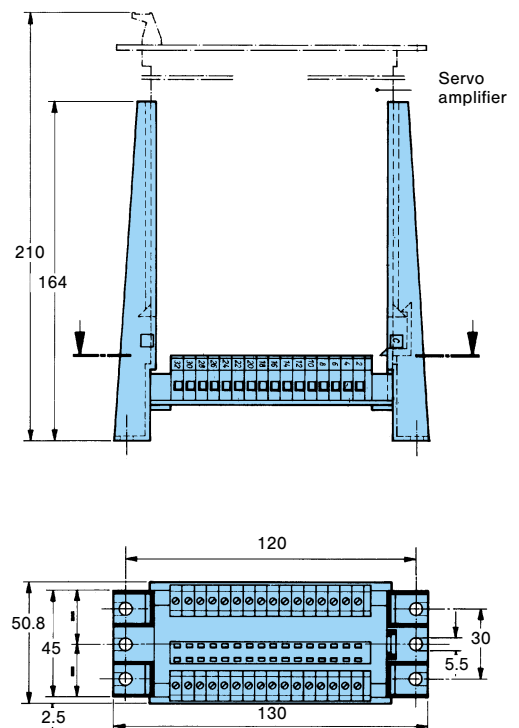
Order No. 701-00017-8
Weight: 2 kg



L = Nominal frequency 50/60 Hz
Nominal voltage 230 VAC or 115 VAC (pay attention to voltage selector switch setting)
N = Neutral line

Euro-Card-Holder

Order No. 701-00007-8
Holder for individual mounting according to DIN 41612

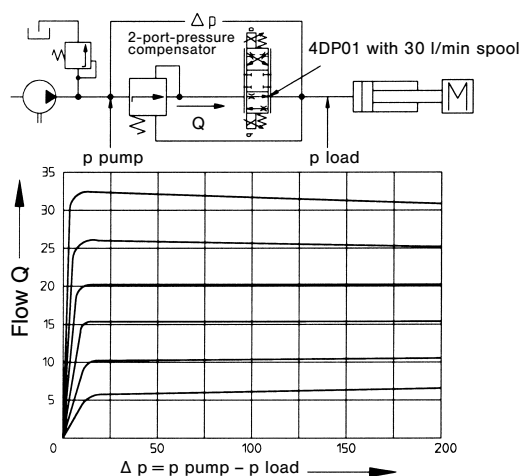


ORDER INFORMATION FOR PRESSURE COMPENSATORS

Model No.:	SPC	01	1	.	.	A	
Series	SPC = Pressure compensator								Seal class
									w/o code = NBR-seals V = Viton
Size	01 = Cetop 03								Design letter
Function	01 = 3-port Meter-in Compensator 11 = 2-port Meter-in Compensator 12 = 2-port Meter-out Compensator ¹⁾ ¹⁾ only with sensing port Code C								Body
									3 = Aluminium (up to 210 bar) 5 = Steel (up to 350 bar)
Control pressure drop range	04 = 2...5 bar adjustable (only for 3-port compensator) 05 = 5 bar 10 = 10 bar (only for 3-port compensator)								Load sensing port
									A = in A C = in A or B
									Circuit type
									1 = single

		Model No.	Order No.	Weight
3-port Meter-in Compensators with shuttle valve P-A/B	Alu	SPC 01 01 041C3A	026 425800	0.8 kg
		SPC 01 01 051C3A	026 425810	
		SPC 01 01 101C3A	026 425820	
	Steel	SPC 01 01 041C5A	026 425830	1.6 kg
		SPC 01 01 051C5A	026 425840	
		SPC 01 01 101C5A	026 425850	
3-port Meter-in Compensators P-A	Alu	SPC 01 01 041A3A	026 425920	0.5 kg
		SPC 01 01 051A3A	026 425930	
		SPC 01 01 101A3A	026 425940	
	Steel	SPC 01 01 041A5A	026 425950	1.1 kg
		SPC 01 01 051A5A	026 425960	
		SPC 01 01 101A5A	026 425970	
2-port Meter-in Compensators with shuttle valve P-A/B	Alu	SPC 01 11 051C3A	026 425570	0.7 kg
	Steel	SPC 01 11 051C5A	026 425600	1.5 kg
2-port Meter-in Compensators P-A	Alu	SPC 01 11 051A3A	026 425690	0.6 kg
	Steel	SPC 01 11 051A5A	026 425720	1.3 kg
2-port Meter-out Compensators P-A/B	Alu	SPC 01 12 051C3A	026 426050	1.4 kg
	Steel	SPC 01 12 051C5A	026 426080	2.9 kg

Flow regulation Example: 2-port Meter-in compensator



The product described is subject to continual development and the manufacturer reserves the right to change the specifications without notice.