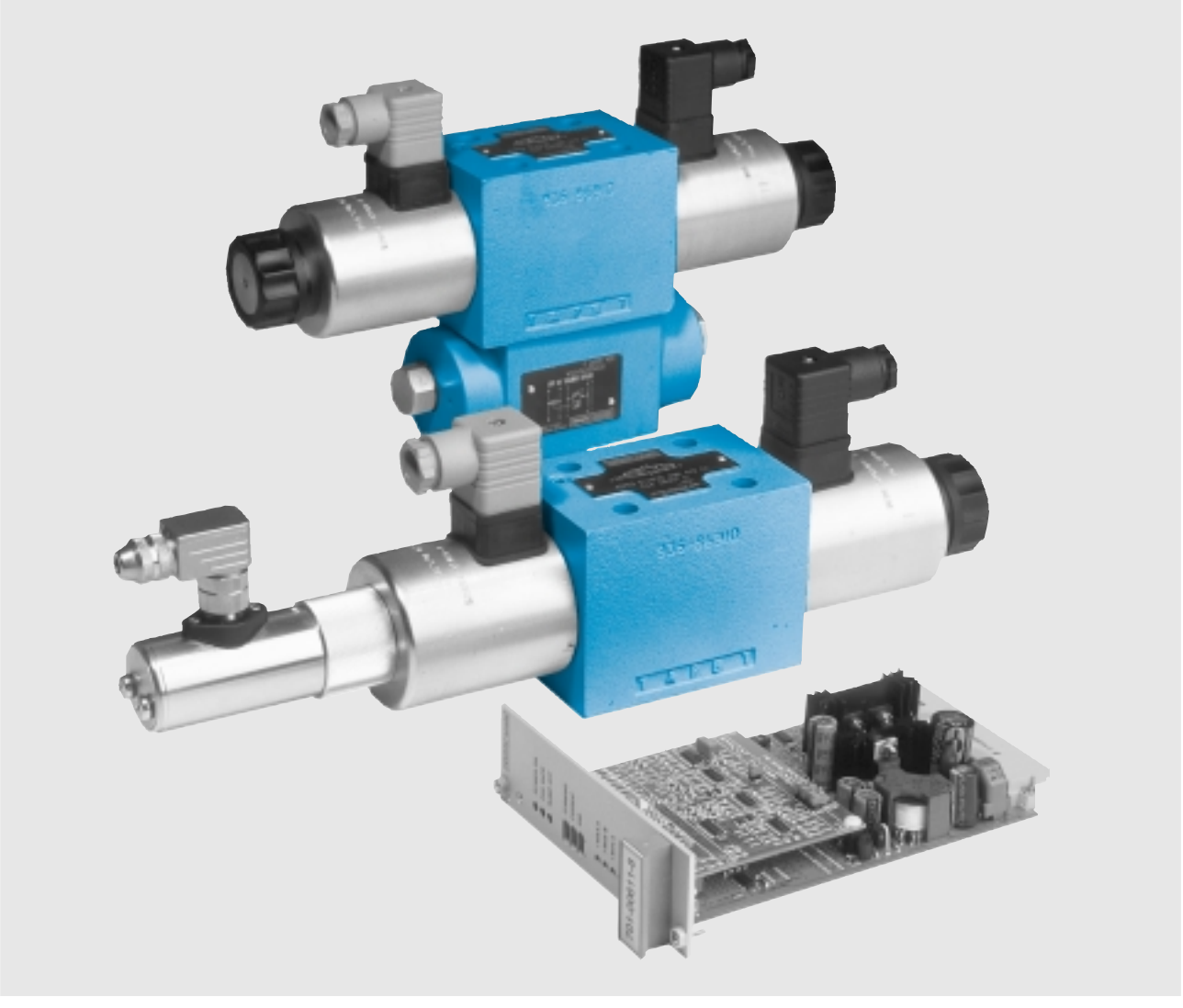
DENISON HYDRAULICS
Proportional Directional Valves

Series 4DP02 – Design B – Cetop 05



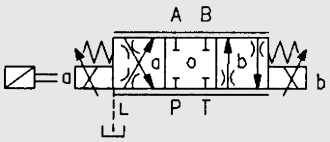
Publ. 4–EN 3410–A, replaces 4–EN 340–C

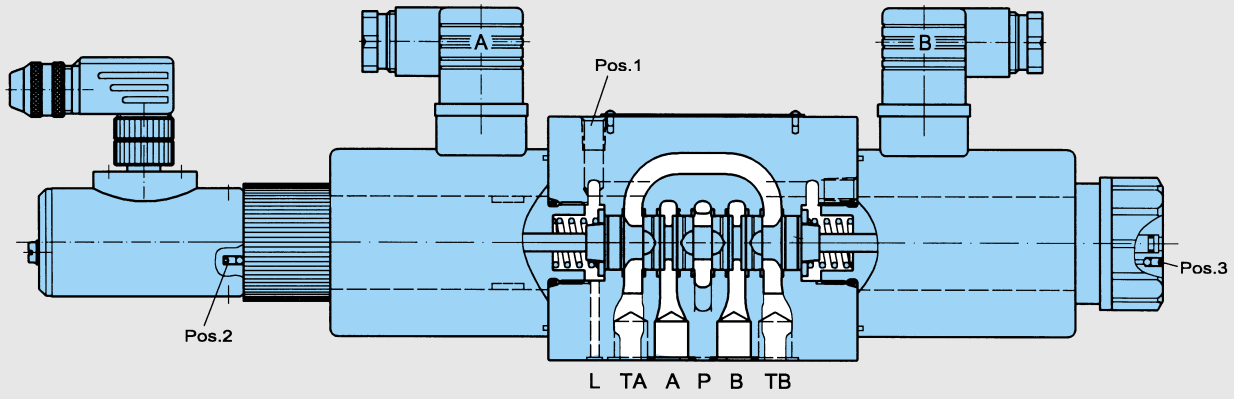
DENISON Hydraulics

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.
- One source supply of valve and proportional amplifier ensures optimized performance.
- Electrical connection by a standard plug-in connector conform 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 conform to ISO.
- Each valve is factory tested prior to delivery.
- Full interchangeability of spools through close tolerances.
- Worldwide DENISON service.

SYMBOL (example)



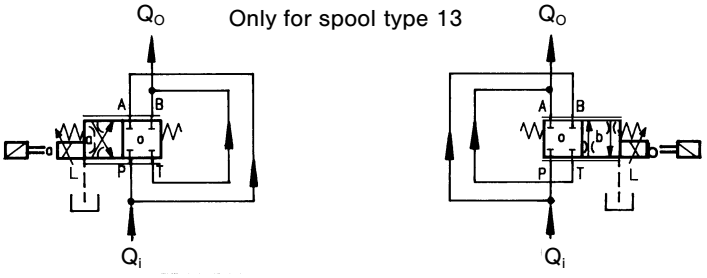


Example with position feedback

DOUBLE FLOW PATH

By splitting the flow between two spool edges, the 4DP02 proportional directional valve can control higher flow than to be achieved by a single flow circuit (see chart below).
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 **Spool position 05**



	Flow at pressure drop Δp 5 bar Spool type 13
Single flow path	40, 60, 80 l/min
Double flow path	75, 90, 110 l/min

GENERAL

The proportional directional valves, 4DP02 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.

Open Loop Version Code E
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 spool edges of the spool. The flow characteristics of different valves depend on the resistance profile of the throttle notches.

Close Loop Version Code T
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 is balanced by the position feedback circuit of the proportional amplifier.
Depending on the application, valves with or without position feedback can be selected, as per required hysteresis, repeatability, response time etc.

Pressure Compensator
The flow depends on size and pressure drop at the set flow cross-section. In combination with the shown pressure compensators the pressure drop and thus the flow can be kept constant.

ELECTRONIC

The proportional 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 pressure > 210 bar (see page 4) or where the return line flow causes higher pressure peaks in the return line, body with port "L" must be selected and connected to tank. The valves should be mounted below the oil level of the tank. This ensures that the valve is at all times filled with oil.
Where it is necessary to mount the valve above the oil level of the tank, 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.

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.

VENTING

The valves are factory vented prior to delivery. In case the valve must be vented again this is done by:

1. Removing all venting screws (pos. 1, 2 and 3).
2. Filling either of the three vent ports with recommended fluid until this runs bubble free from the other vent ports. At this point the vent screws should be replaced and re-tightened.

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 conform to ISO 4401		
• Max. operating pressure	P, A, B	T	L
– drain port "L" connected	315 bar	210 bar	10 bar
– without drain port "L"	315 bar	210 bar	210 bar
• Flow	see curves page 8		
• Nominal flow (at Δp = 5 bar each metering edge)	40 / 60 / 80 l/min		
• Fluid temperature range	– 18 . . . + 80 °C		
• Ambient temperature range	– 18 . . . + 50 °C		
• Viscosity range	10 . . . 650 cSt; optimal 30 cSt		
• Hysteresis	≦ 1 % with position feedback		
(at Δ p = 100 bar)	≦ 5 % without position feedback		
• Repeatability	≦ 0.5 % with position feedback		
(at Δ p = 100 bar)	≦ 3 % without position feedback		

• Response time [1]	without feedback	with feedback
	12 V	12 V
– step signal 0 . . . 100 %	100 ms	50 ms
– step signal 100 . . . 0 %	50 ms	40 ms
– step signal ± 100 %	110 ms	60 ms

[1] at Δ p = 5 bar each metering edge

• Fluid	Petroleum base anti-wear fluids (covered by DENISON HF-0 and HF-2 specification). Such as mineral oil according to DIN 51524/25. Maximum catalogue ratings and performance data are based on operation with these fluids.
• 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
• Coil resistance	
– cold start 20 °C	3.72 Ω
– warm value 50 °C	4.16 Ω
• Nominal current	2.8 A
• Max. current	2.95 A
• Temperature class H	+ 180 °C
• Type of protection (DIN 40050)	IP 65
• Relative operating period	100 %

TRANSDUCER CHARACTERISTICS

• Supply voltage U_S	24 V DC ± 10 % (protected against reverse polarity)
• Current consumption I_S	≦ 55 mA
• Output voltage U	12mA ± 8mA
• Sensitivity	2.0mA / mm
• Measuring stroke	± 4.0 mm
• Temperature drift	≦ ± 0.05 % 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.: **4DP02 – . . .. – .. B . –G12 C1 – ..**

1 2 3 4 5 6 7 8 9 10 11

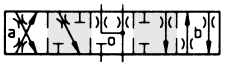
1 Series
02 = Cetop 05

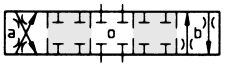
2 Body
3 = Standard body
L = body with drain port "L"
(always connect "L" to tank
when T > 210 bar)

3 Control
E = solenoid operation without position feedback
T = solenoid operation with position feedback

4 Spool Type

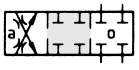
Spool Position 03

02 

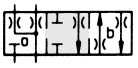
43 

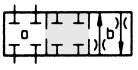
Spool Position 06

12 

13 

Spool Position 05

12 

13 

5 Flow P–A; B–T or P–B; A–T
(at 5 bar Δ p for each spool edge)
F40 = 40 l/min
F60 = 60 l/min
F80 = 80 l/min

6 Spool Position
03 = 3 (a, o, b), spring centred pos. "o"
05 = 2 (o, b), spring centred pos. "o", energized to "b"
06 = 2 (o, a), spring centred pos. "o", energized to "a"

7 Design Letter

8 Seal Class
1 = NBR seals
5 = FPM seals (Viton®)

9 Solenoid Voltage
G12 = 12 V DC

10 Electrical Connector
without code = connector not supplied
C1 = connector PG 11 (for valves without position feedback)
connector PG 11 + connector for position feedback Ø 6 mm

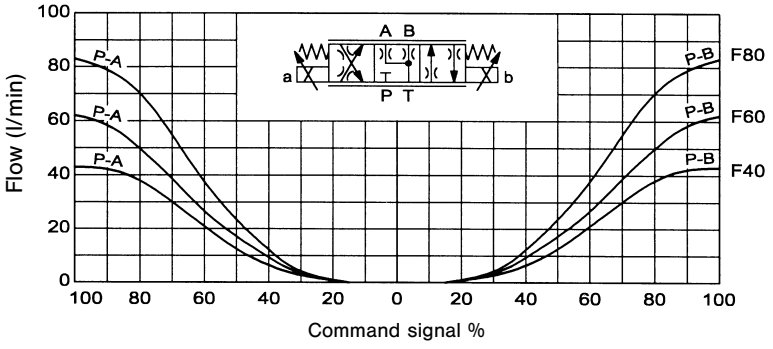
11 Modification
NO = without manual override

Note: For ordering information on Cetop 05 pressure compensators see page 23.

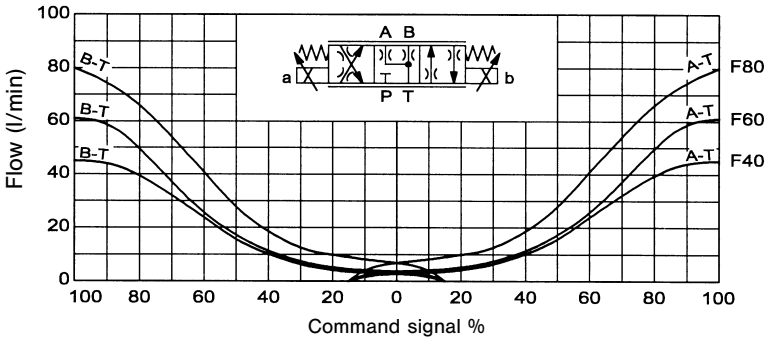
Oil temperature 50 °C; viscosity 40 cSt.

Flow versus Command Signal
at Δ p = 5 bar each spool edge

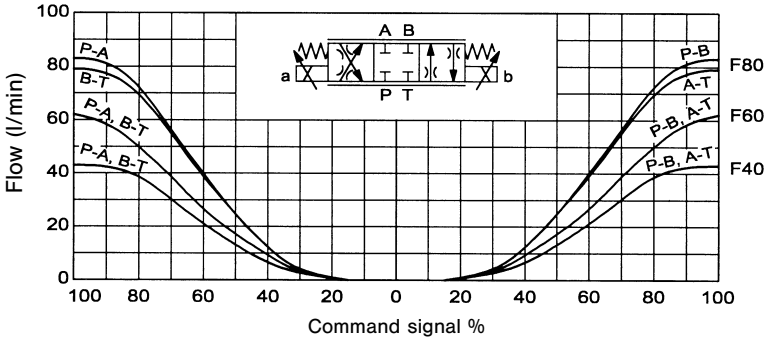
Spool Type 02 / P-A; P-B



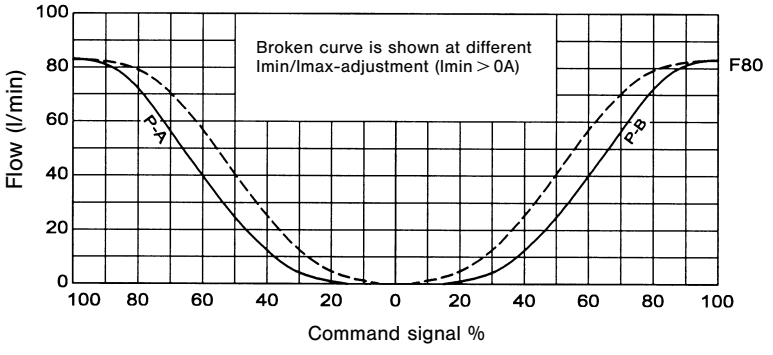
Spool Type 02 / A-T; B-T



Spool Type 43



Example for other Imin-Adjustment



Note: Full line curves are measured with amplifier factory setting:
I_{min} = 0 A, I_{max} = I_{nom} = 2.8 A

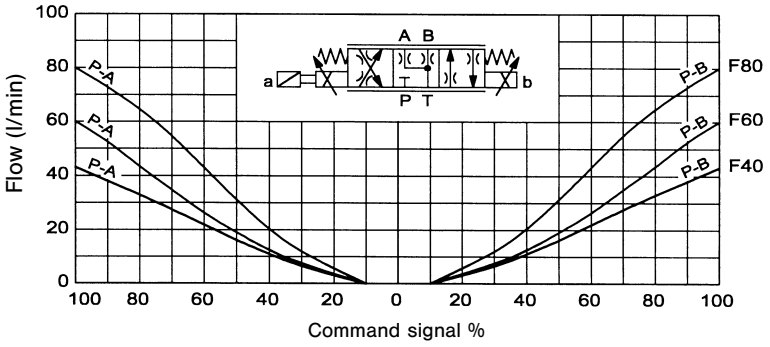
Nominal flow
Using other pressure drops the flow is changing as following:

$$Q_X = Q_N \cdot \sqrt{\frac{\Delta p_X}{5}}$$

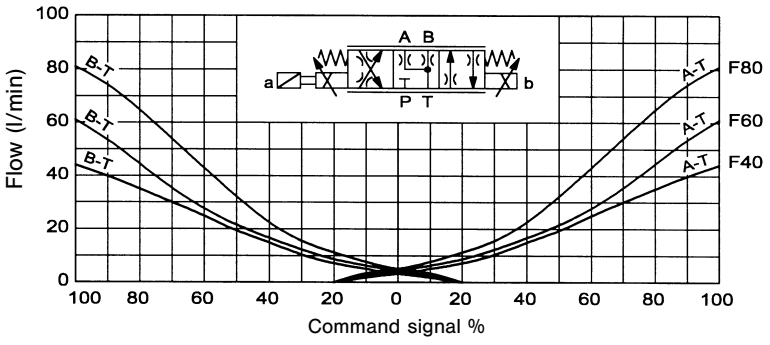
Oil temperature 50 °C; viscosity 40 cSt.

Flow versus Command Signal
at Δ p = 5 bar each spool edge

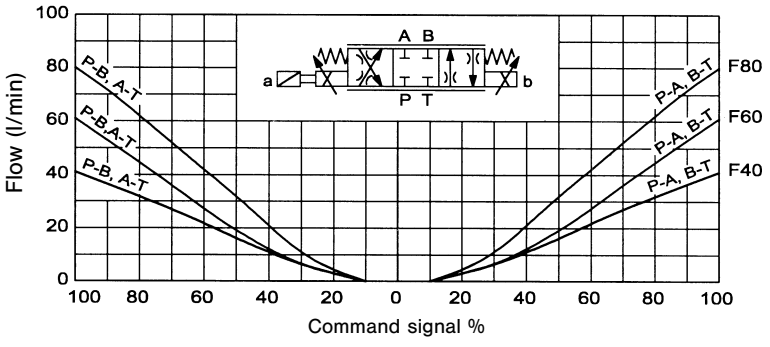
Spool Type 02 / P-A; P-B



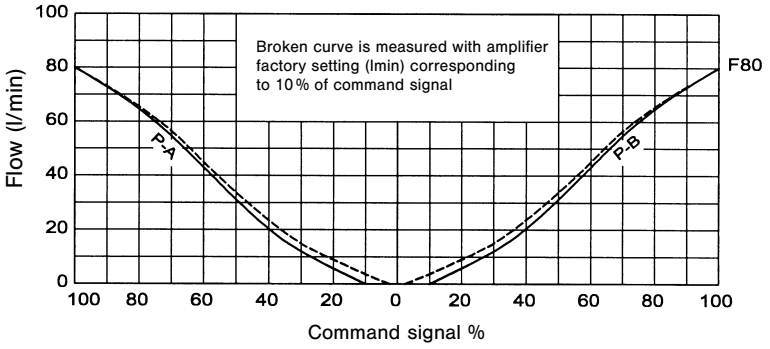
Spool Type 02 / A-T; B-T



Spool Type 43



Example for other Imin-Adjustment



Note: Full line curves are measured with amplifier setting $I_{min} = 0$.

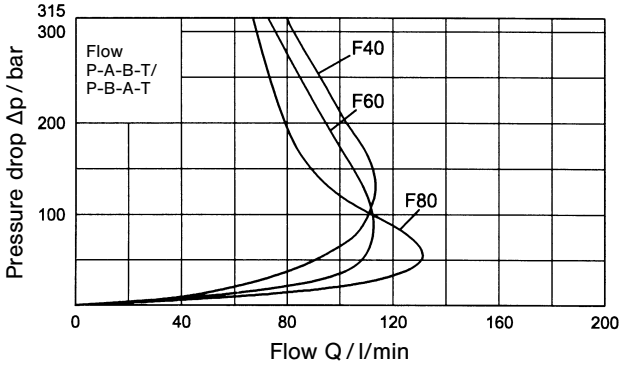
Nominal flow
Using other pressure drops the flow is changing as following:

$$Q_X = Q_N \cdot \sqrt{\frac{\Delta p_X}{5}}$$

Oil temperature 50 °C; viscosity 40 cSt.

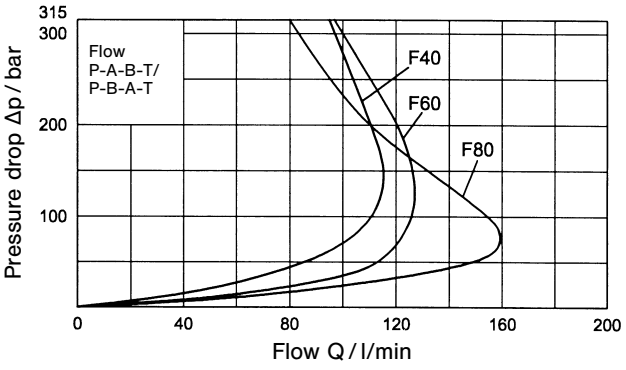
4DP02-.E (without feedback)

Spool 02

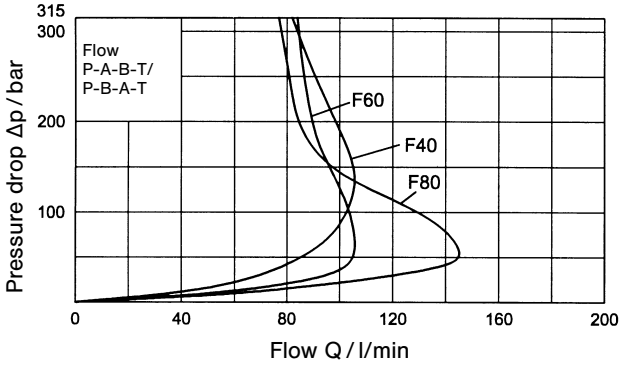


4DP02-.T (with feedback)

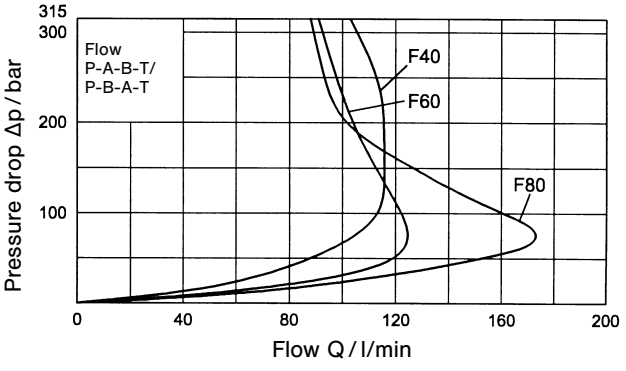
Spool 02



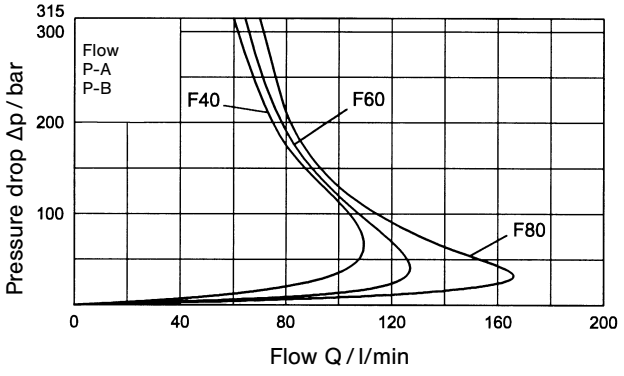
Spool 43



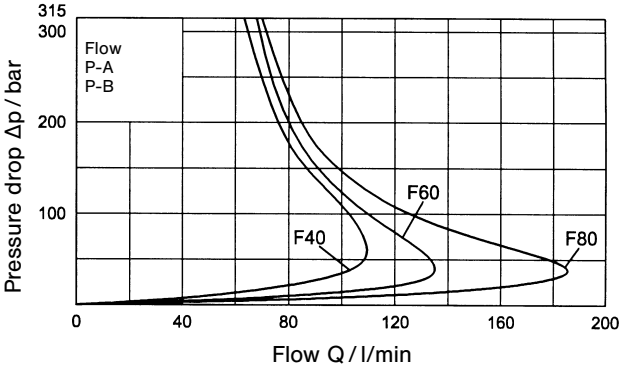
Spool 43



Spool 12/13



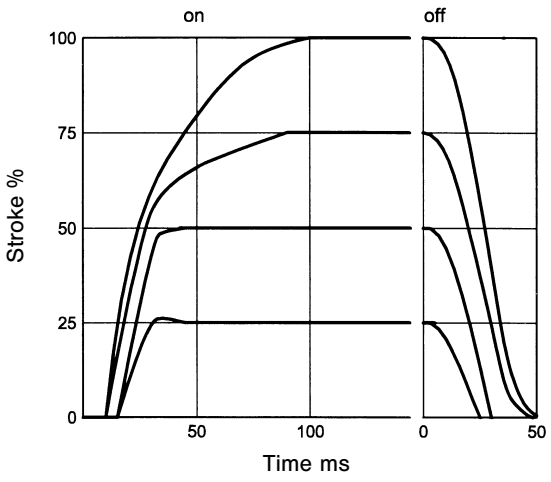
Spool 12/13



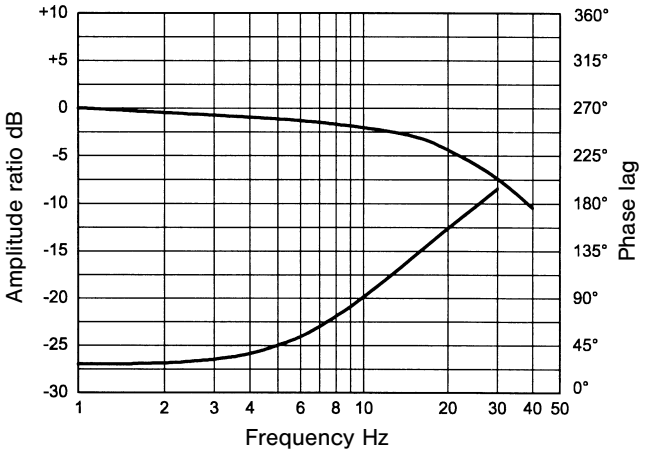
Oil temperature 50 °C; viscosity 40 cSt.

4DP02-.E (without feedback)

Step Response Time

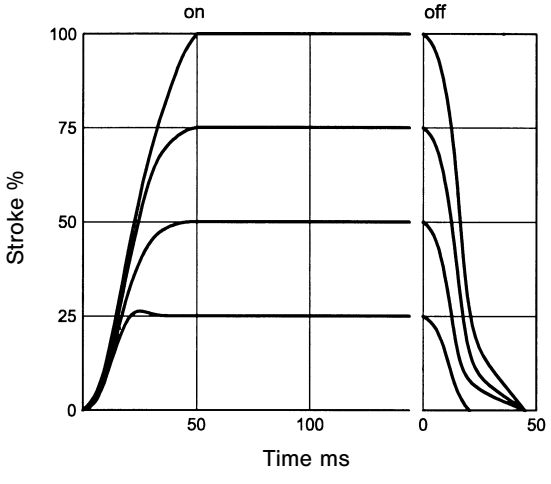


Frequency Characteristics
(at signal 50 %, variation ± 25 %)

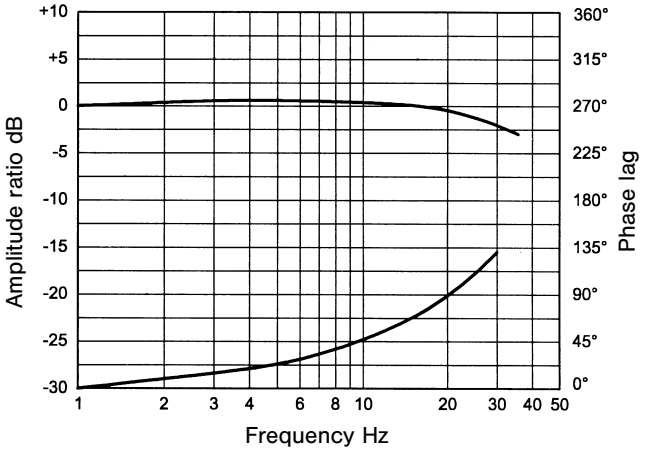


4DP02-.T (with feedback)

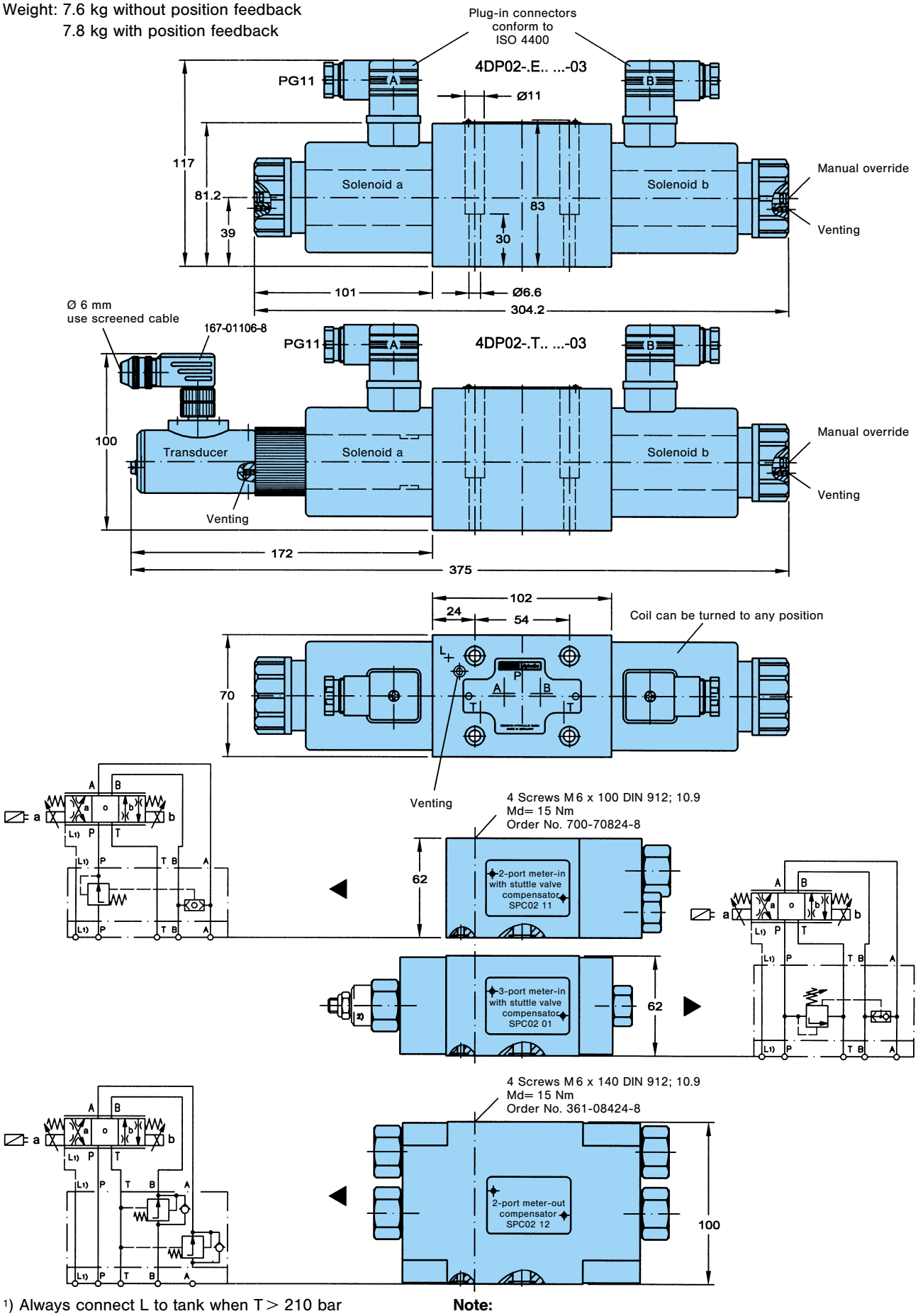
Step Response Time



Frequency Characteristics
(at signal 50 %, variation ± 25 %)



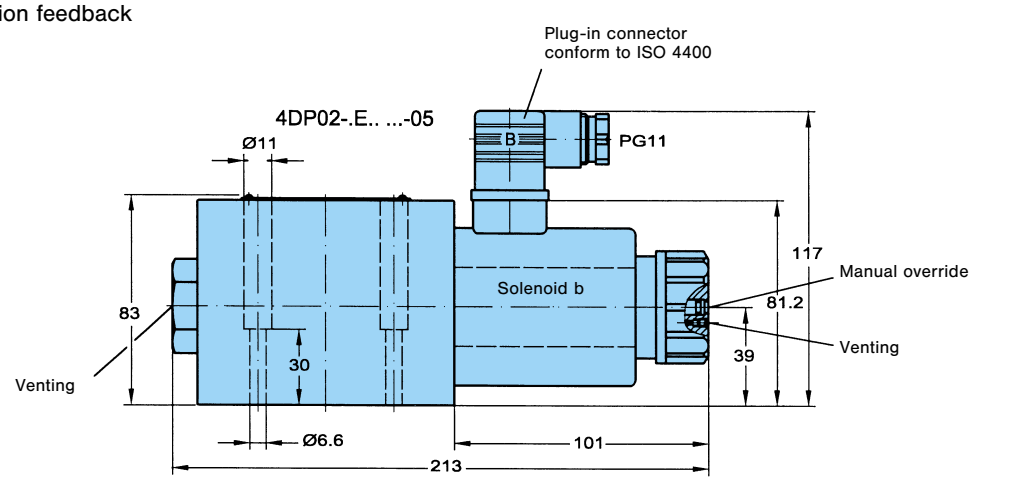
Weight: 7.6 kg without position feedback
7.8 kg with position feedback

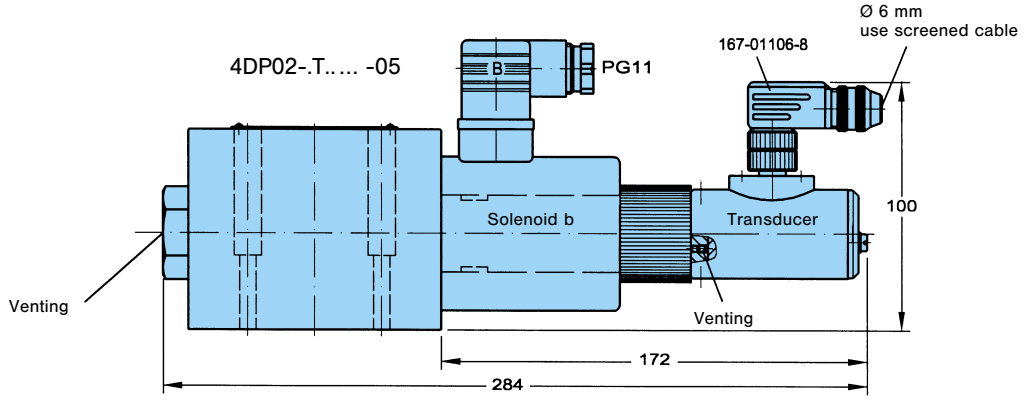


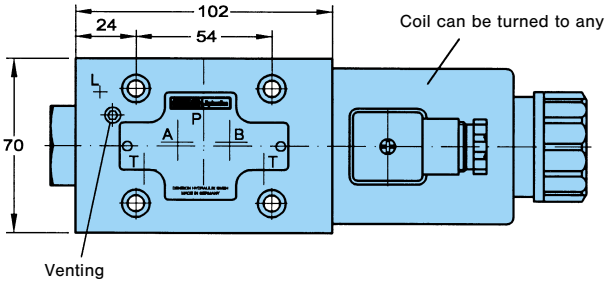
[1]) Always connect L to tank when T > 210 bar
[2]) Optional adjustment for SPC02 01

Note:
For order information on pressure compensators see page 23

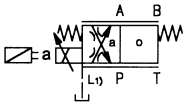
Weight: 5.6 kg without position feedback
5.8 kg with position feedback



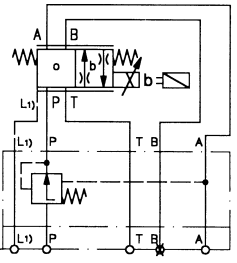


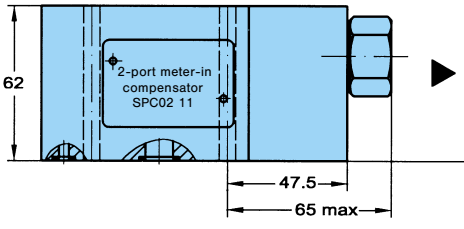


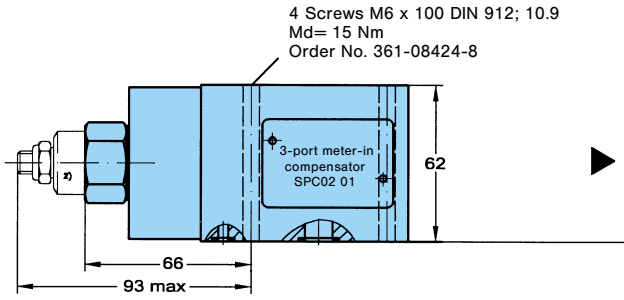
Spool position 06

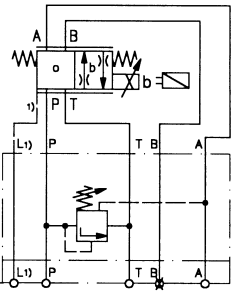


Spool position 05





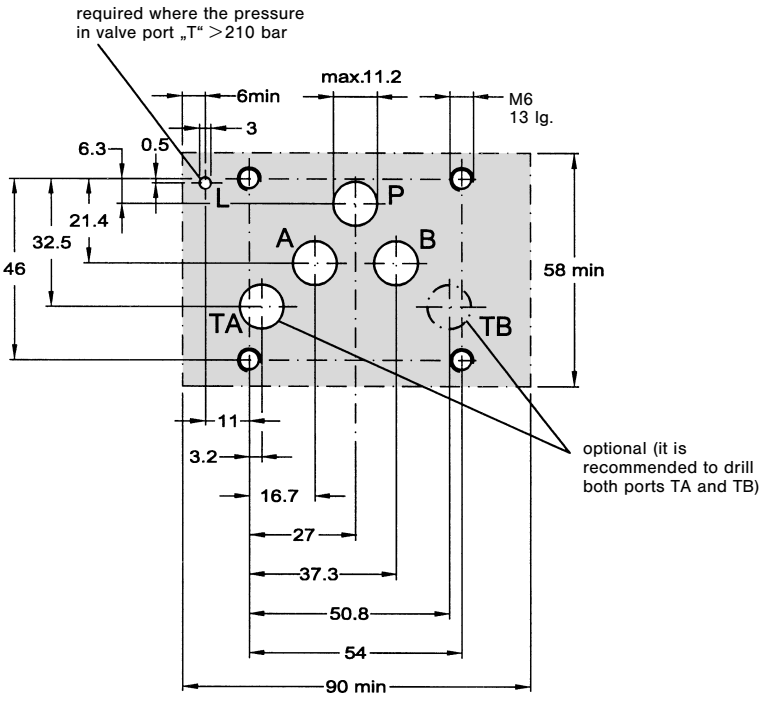




[1]) Always connect L to tank when T > 210 bar
[2]) Optional adjustment for SPC02 01

Note:
For order information on pressure compensators see page 23

Conform to ISO 4401



Block mounting face

Flatness 0.01 mm / 100 mm length

Surface finish 0.8

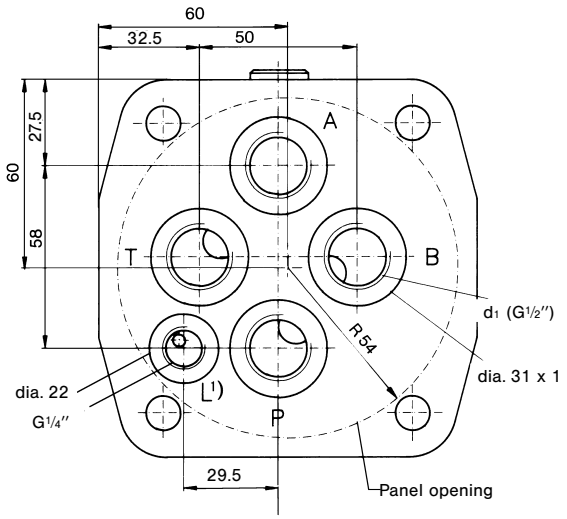
For valves ordered without subplate, mounting screws must be ordered separately.

4–mounting screws	Order-No.
M 6 x 40, DIN 912; 12.9	361–08244–8

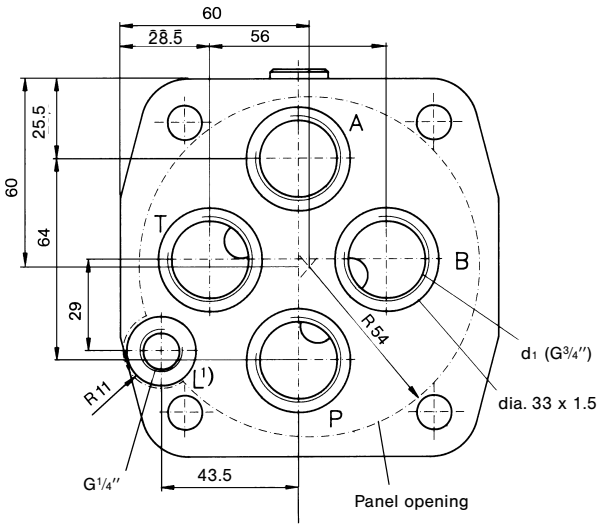
Torque 15 Nm

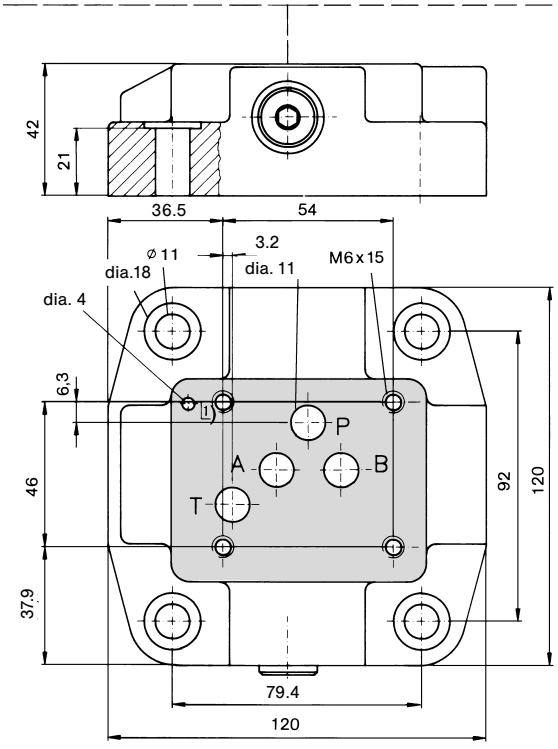
Mounting configuration conform to ISO 4401

½″ Subplates



¾″ Subplates





[1]) L-port available only at subplates SS–B–08–G141 & SS–B–12–G141

Model-No.	Order-No.	Weight	d_1 (A, B, P, T)	L-Port
SS–B–08–G 138	S26–34192-0	3 kg	G½″	–
SS–B–12–G 138	S26–34193-0	3 kg	G¾″	–
SS–B–08–G 141	S26–34194-0	3 kg	G½″	G¼″
SS–B–12–G 141	S26–34195-0	3 kg	G¾″	G¼″

Mounting screws are included in subplate order.

Order No.: 701–00602–8
one (1) 12 V solenoid
Order No.: 701–00611–8
two (2) 12 V solenoids
Weight: 260 g

These proportional amplifiers are designed to control proportional directional valves without position feedback and 12 V solenoids. They proportionally convert electrical input signals into solenoid current.
The amplifiers have a reverse polarity protection and one (or two) short circuit protected PWM-output stage(s) with max. current limit.
To operate a single solenoid proportional valve with the associated proportional amplifier only the output stage for solenoid A is fitted on the board.
The command signal input will be connected always to the same input line. The different kind of command signals will be set by DIP-switches on the main board.
Potentiometers are intended for the adjustment of ramp circuits up/down (independently from each other), max. flow (I_{max}) and min. flow (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 % of max. command signal, the amplifier passes over to the "I_{min}-leap"-function (dead-band elimination).
There are diagnostic LED's to display the operating condition (POWER ON), ramp function (RAMP ON/OFF) and "FAIL SAFE" in case of short circuit or external STOP of the card. Two test sockets are provided to measure either the actual solenoid current or the command voltage.

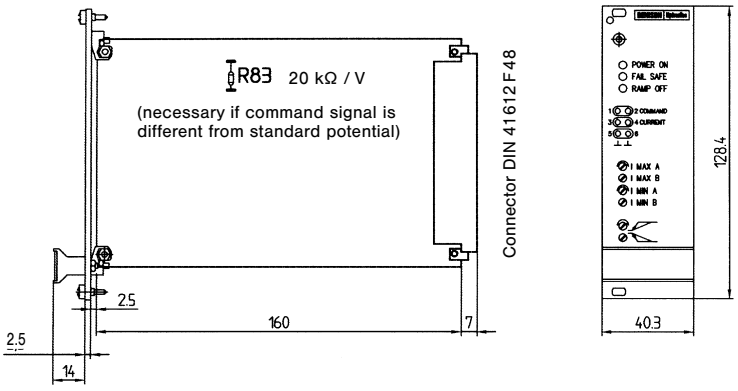
Characteristics – Proportional Amplifiers

- Supply voltage
  - nominal: 24 V DC
  - smoothed battery voltage: 20...32 V DC
- Reference voltage: ± 15 V (± 5 %) @ 50 mA from amplifier; ± 10 V (± 0.5 %) @ 10 mA stabilised from amplifier
- Solenoid nominal current: I_{nom} = 2.95 A at 100 % command signal
- Current consumption max.
  - 12 V solenoid: < 3 A
- Short circuit protection: for solenoid
- Input signals

	1 solenoid	2 solenoids	Input impedance
1.	0...+ 20 mA = 0...+ 100 %	– 20...0...+ 20 mA = – 100...0...+ 100 %	100 Ω
2.	+ 4...+ 20 mA = 0...+ 100 %	+ 4...+ 20 mA = – 100...0...+ 100 %	100 Ω
3.	0...+ 5 V = 0...+ 100 %	– 5...0...+ 5 V = – 100...0...+ 100 %	100 kΩ
4.	0...+ 10 V = 0...+ 100 %	– 10...0...+ 10 V = – 100...0...+ 100 %	200 kΩ
5.	customised selectable; R83 = 20 kΩ/V x $V_{command}$	customised selectable; R83 = 20 kΩ/V x $V_{command}$	value determined by R83

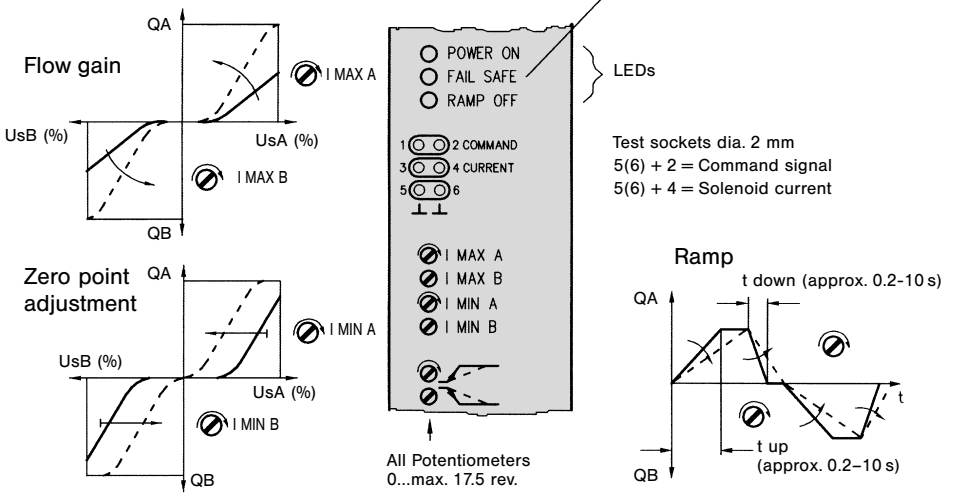
- Outputs: + = solenoid A, (– = solenoid B for two solenoid version)
- External stop (nom 24 V): illuminates on "FAIL SAFE", implement as NC (normally closed circuit) connection with an input voltage of 4 V...32 V; input impedance 3.3 kΩ
- Ramp off (nom 24 V): illuminates when "RAMP OFF", implement as NO (normally open circuit) connection with an input voltage of 4 V...32 V; input impedance 3.3 kΩ
- Potentiometer for
  - max. flow (I_{max} A, B): ...2.95 A
  - min. flow (I_{min} A, B): 0...50 % of I_{max}; factory set 0 %
  - ramp up: 0.2...10 s ± 20 % (1...50 V/s)
  - ramp down: 0.2...10 s ± 20 % (1...50 V/s)
- Dither frequency (selectable by DIP-switch): - 100 Hz factory set for amplifier no. 701-00611-8; - 150 Hz factory set for amplifier no. 701-00602-8
- Dither amplitude: set to approx. 300 mA
- Test socket
  - solenoid current: 1 V ≙ 1 A ± 5 %
  - command voltage: approx. 0...10 V at 100 % command signal (depends on I_{min}, I_{max} adjustment)

Dimensions Plug-in module 3U/8HP according to IEC 297

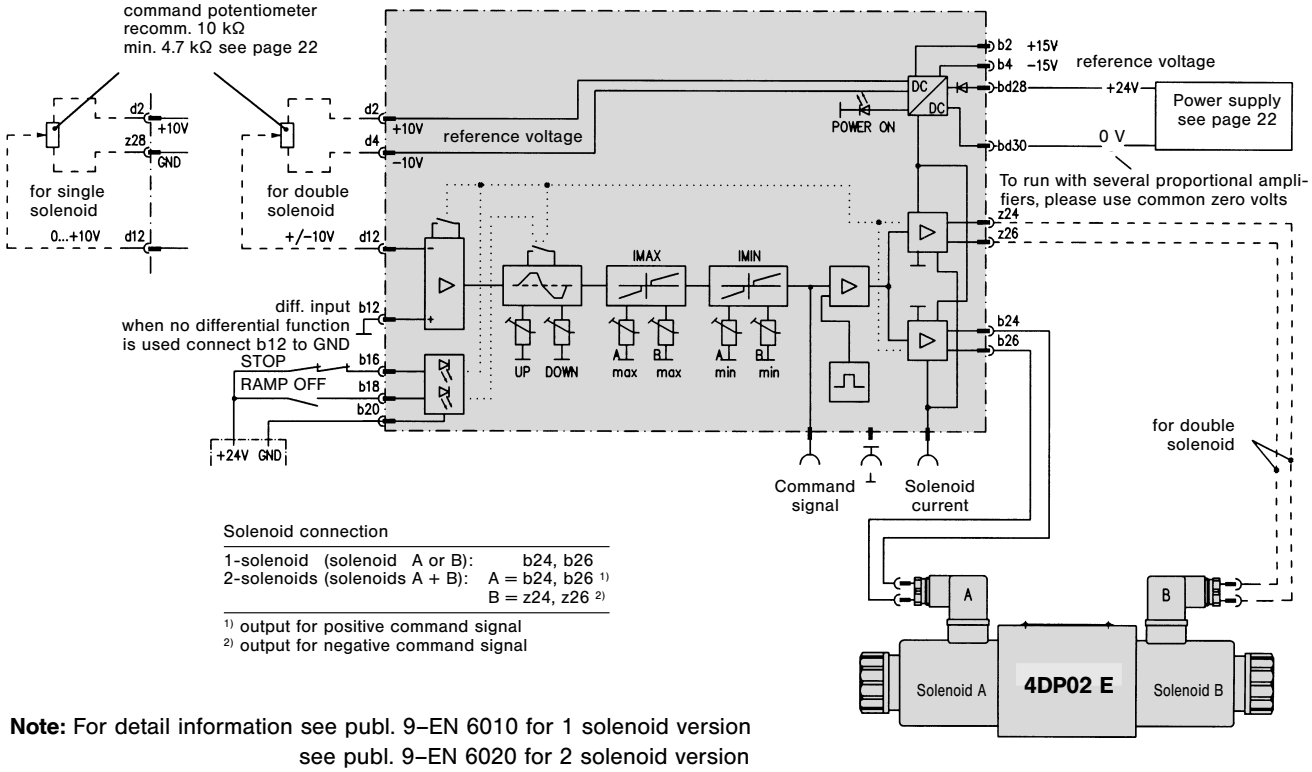


The output stages are short circuit protected.
Short circuits at the outputs and supply input voltage falling below 20.5 V will result in the shutdown of the output stages, causing the "Fail Safe" LED come on.
In this event, the supply voltage to the proportional amplifier must be switched off for a period of about 10 seconds.

Details on the front panel



Schematic block diagram and terminal assignment



Solenoid connection

1-solenoid	(solenoid A or B):	b24, b26
2-solenoids	(solenoids A + B):	A = b24, b26 [1]
		B = z24, z26 [2]

[1] output for positive command signal
[2] output for negative command signal

Note: For detail information see publ. 9–EN 6010 for 1 solenoid version
see publ. 9–EN 6020 for 2 solenoid version

Order No.: 701–00621–8
Weight: 260 g

This proportional amplifier is designed to control direct operated proportional directional valves with position feedback and 12 V solenoids. The amplifier proportionally converts electrical input signals into solenoid current. The transducer forms a position feedback circuit for the valve together with the PID regulator on the proportional amplifier. Differences between command and feedback signal are supplied as a corrective current to the proportional solenoid on the valve.
The amplifier has a reverse polarity protection and two short circuit protected PWM-output stages with max. current limit.
To operate a single solenoid proportional valve with the associated proportional amplifier only the output stage for solenoid A is fitted on the board.
The command signal input will be connected always to the same input line. The different kind of command signals will be set by DIP-switches on the main board.
Potentiometers at the front panel are intended for the adjustment of ramp circuits up/down (independently from each other), max. flow (I_{max}) and min. flow (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 % of max. command signal, the amplifier passes over to the "I_{min}-leap"-function (dead-band elimination).
There are diagnostic LED's to display the operating condition (POWER ON), ramp function (RAMP ON/OFF) and "FAIL SAFE" in case of short circuit or external STOP of the card. Test sockets are provided at the front panel to measure the actual solenoid current as well as the command voltage or the transducer feedback signal (see drawing).

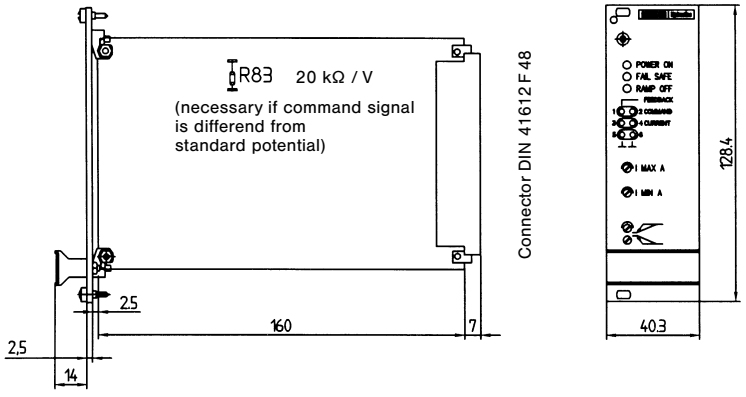
Characteristics – Proportional Amplifier

- Supply voltage
  - nominal: 24 V DC
  - smoothed battery voltage: 20...32 V DC
- Reference voltage: ± 15 V (± 5 %) @ 50 mA — from amplifier to external supply
  ± 10 V (± 0.5 %) @ 10 mA stabilised — from amplifier to command potentiometer
- Solenoid nominal current: I_{nom} = 2.95 A @ 100 % command signal
- Current consumption max.
  - 12 V solenoid: < 3 A
- Short circuit protection: for solenoid
- Input signals

	1 Solenoid	Input impedance
1.	0...+ 20 mA = 0...+ 100 %	100 Ω
2.	+ 4...+ 20 mA = 0...+ 100 %	100 Ω
3.	0...+ 5 V = 0...+ 100 %	100 kΩ
4.	0...+ 10 V = 0...+ 100 %	200 kΩ
5.	customised selectable; R83 = 20 kΩ/V x $V_{COMMAND}$	Value determined by R83

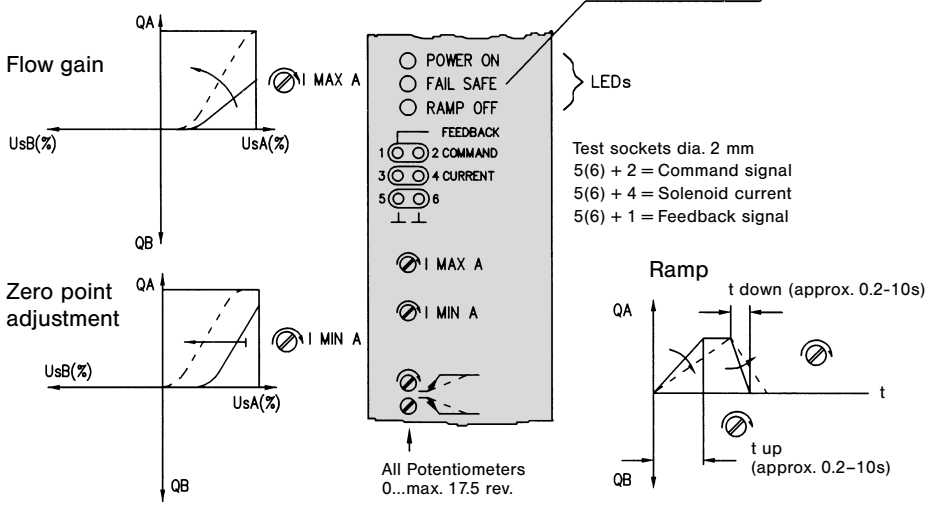
- Outputs: (+) = solenoid A
- External stop (nom. 24 V): illuminates on "FAIL SAFE", implement as NC (normally closed circuit) connection with an input voltage of 4 V...32 V; input impedance 3.3 kΩ
- Ramp off (nom. 24 V): illuminates when "RAMP OFF", implement as NO (normally open circuit) connection with an input voltage of 4 V...32 V; input impedance 3.3 kΩ
- Potentiometer for
  - max. flow (I_{max} A): ...2.95 A
  - min. flow (I_{min} A): 0...50 % of I_{max}; factory set 10 %
  - ramp up: 0.2...10 s ± 20 % (1...50 V/s)
  - ramp down: 0.2...10 s ± 20 % (1...50 V/s)
- Dither frequency (selectable by DIP-switch): 150 Hz factory set
- Dither amplitude: set to approx. 300 mA
- Test socket
  - solenoid current: 1 V ≙ 1 A ± 5 %
  - command voltage: approx. 0... 10 V at 100 % command signal (depends on I_{min}, I_{max} adjustment)
  - feedback signal: 12 mA transducer signal ≙ 0 V
    20 mA transducer signal ≙ + 5 V

Dimensions Plug-in module 3U/8HP according to IEC 297

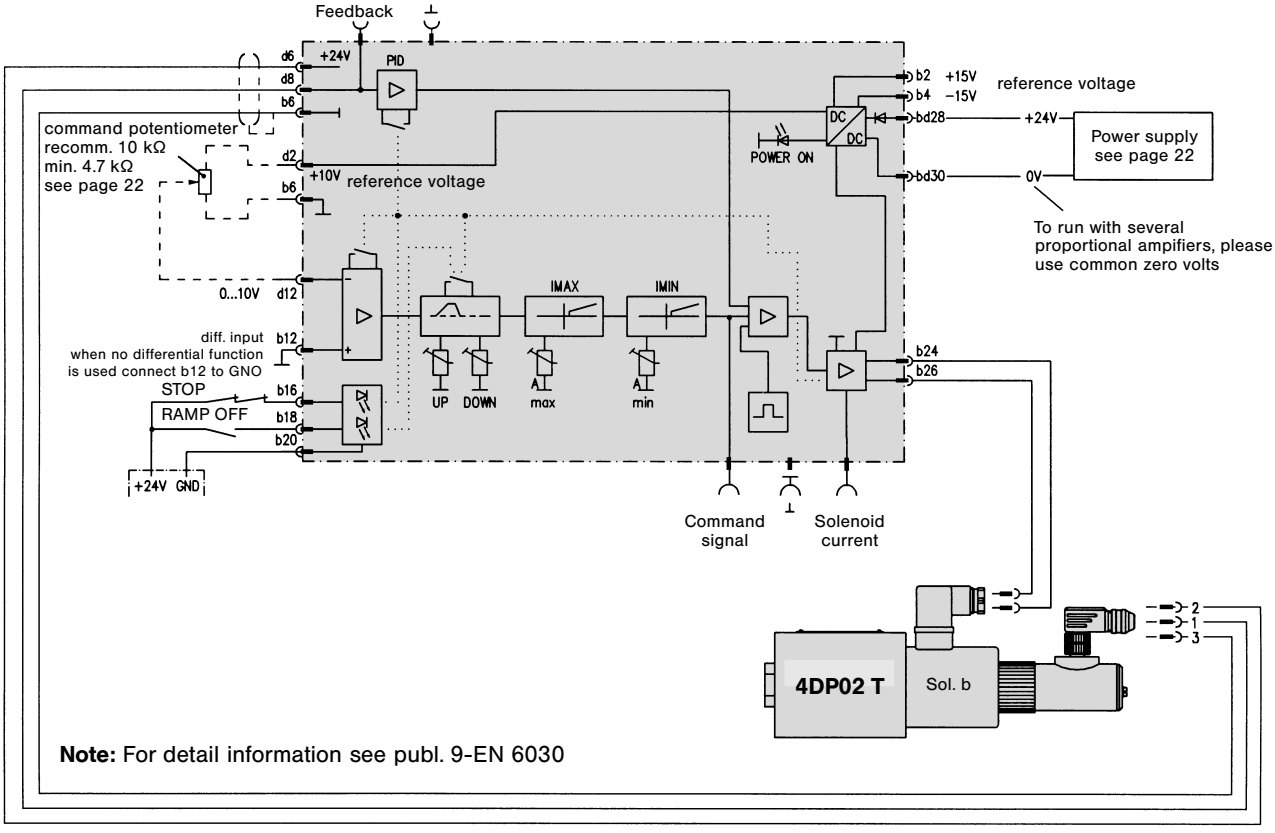


The output stages are short circuit protected.
Short circuits at the output and supply input voltage falling below 20.5 V will result in the shutdown of the output stages, causing the "Fail Safe" LED come on.
In this event, the supply voltage to the proportional amplifier must be switched off for a period of about 10 seconds.

Details on the front panel



Schematic block diagram and terminal assignment



Note: For detail information see publ. 9-EN 6030

Order No.: 701–00631–8
Weight: 260 g

This proportional amplifier is designed to control direct operated proportional directional valves with position feedback and 12 V solenoids. The amplifier proportionally converts electrical input signals into solenoid current. The transducer forms a position feedback circuit for the valve together with the PID regulator on the proportional amplifier. Differences between command and feedback signal are supplied as a corrective current to the proportional solenoid on the valve.
The amplifier has a reverse polarity protection and two short circuit protected PWM-output stages with max. current limit.
To operate this double solenoid proportional valve with the proportional amplifier the output stages for solenoid A must be fitted correctly with pin b24/b26 and for solenoid B with pin z24/z26.
The command signal input will be connected always to the same input line. The different kind of command signals will be set by DIP-switches on the main board. Potentiometers at the front panel are intended for the adjustment of ramp circuits up/down (independently from each other), max. flow (Imax) and min. flow (Imin).
The zero-point adjustment enables the positive overlap of the spool, typical of proportional valves, to be bypassed. The electrical zero-point (Imin) can be adjusted to 0...50 % of Imax.
By changing the input signal from 0...2 % of max. command signal, the amplifier passes over to the "Imin-leap"-function (dead-band elimination).
There are diagnostic LED's to display the operating condition (POWER ON), ramp function (RAMP ON/OFF) and "FAIL SAFE" in case of short circuit or external STOP of the card. Test sockets are provided at the front panel to measure the actual solenoid current as well as the command voltage or the transducer feedback signal (see drawing).

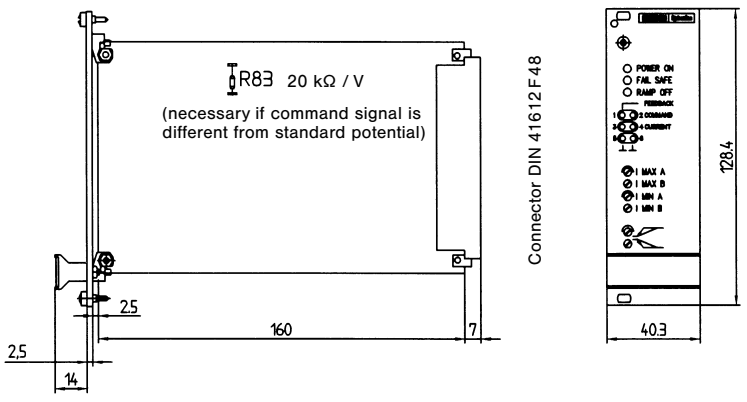
Characteristics – Proportional Amplifier

- Supply voltage
  - nominal: 24 V DC
  - smoothed battery voltage: 20...32 V DC
- Reference voltage: ± 15 V (± 5 %) @ 50 mA — from amplifier to external supply
  ± 10 V (± 0.5 %) @ 10 mA stabilised — from amplifier to command potentiometer
- Solenoid nominal current: Inom = 2.95 A @ 100 % command signal
- Current consumption max.
  - 12 V solenoid: < 3 A
- Short circuit protection: for solenoid
- Input signals

	2 Solenoids	Input impedance
1.	– 20...0...+ 20 mA = – 100...0...+ 100 %	100 Ω
2.	+ 4...+ 20 mA = – 100...0...+ 100 %	100 Ω
3.	– 5...0...+ 5 V = – 100...0...+ 100 %	100 kΩ
4.	– 10...0...+ 10 V = – 100...0...+ 100 %	200 kΩ
5.	customised selectable; R83 = 20 kΩ/V x VCOMMAND	Value determined by R83

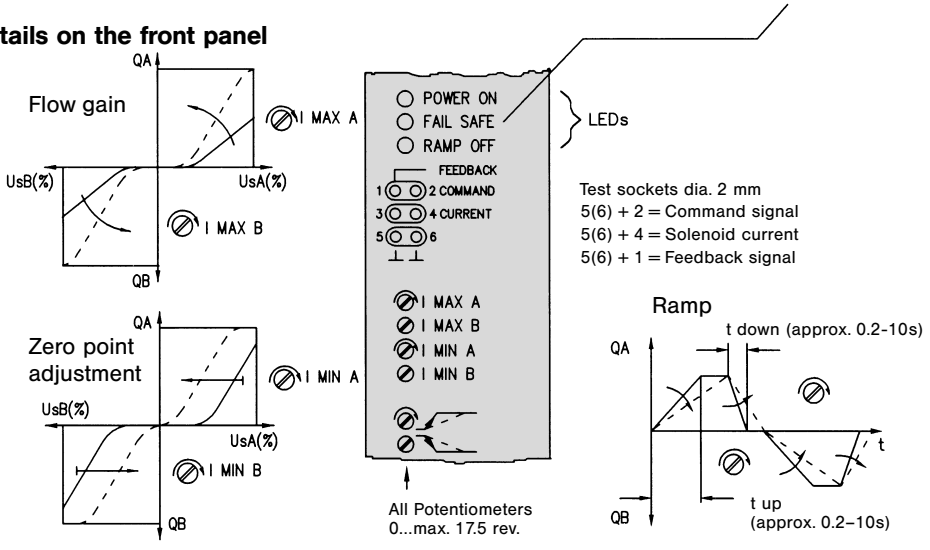
- Outputs: (+) = solenoid A, (–) = solenoid B
- External stop (nom. 24 V): illuminates on "FAIL SAFE", implement as NC (normally closed circuit) connection with an input voltage of 4 V...32 V; input impedance 3.3 kΩ
- Ramp off (nom. 24 V): illuminates when "RAMP OFF", implement as NO (normally open circuit) connection with an input voltage of 4 V...32 V; input impedance 3.3 kΩ
- Potentiometer for
  - max. flow (Imax A, B): ...2.95 A
  - min. flow (Imin A, B): 0...50 % of Imax; factory set 10 %
  - ramp up: 0.2...10 s ± 20 % (1...50 V/s)
  - ramp down: 0.2...10 s ± 20 % (1...50 V/s)
- Dither frequency (selectable by DIP-switch): 150 Hz factory set
- Dither amplitude: set to approx. 300 mA
- Test socket
  - solenoid current: 1 V ≙ 1 A ± 5 %
  - command voltage: approx. 0...± 10 V at 100 % command signal (depends on Imin, Imax adjustment)
  - feedback signal: 4 mA transducer signal ≙ – 5 V
    20 mA transducer signal ≙ + 5 V

Dimensions Plug-in module 3U/8HP according to IEC 297

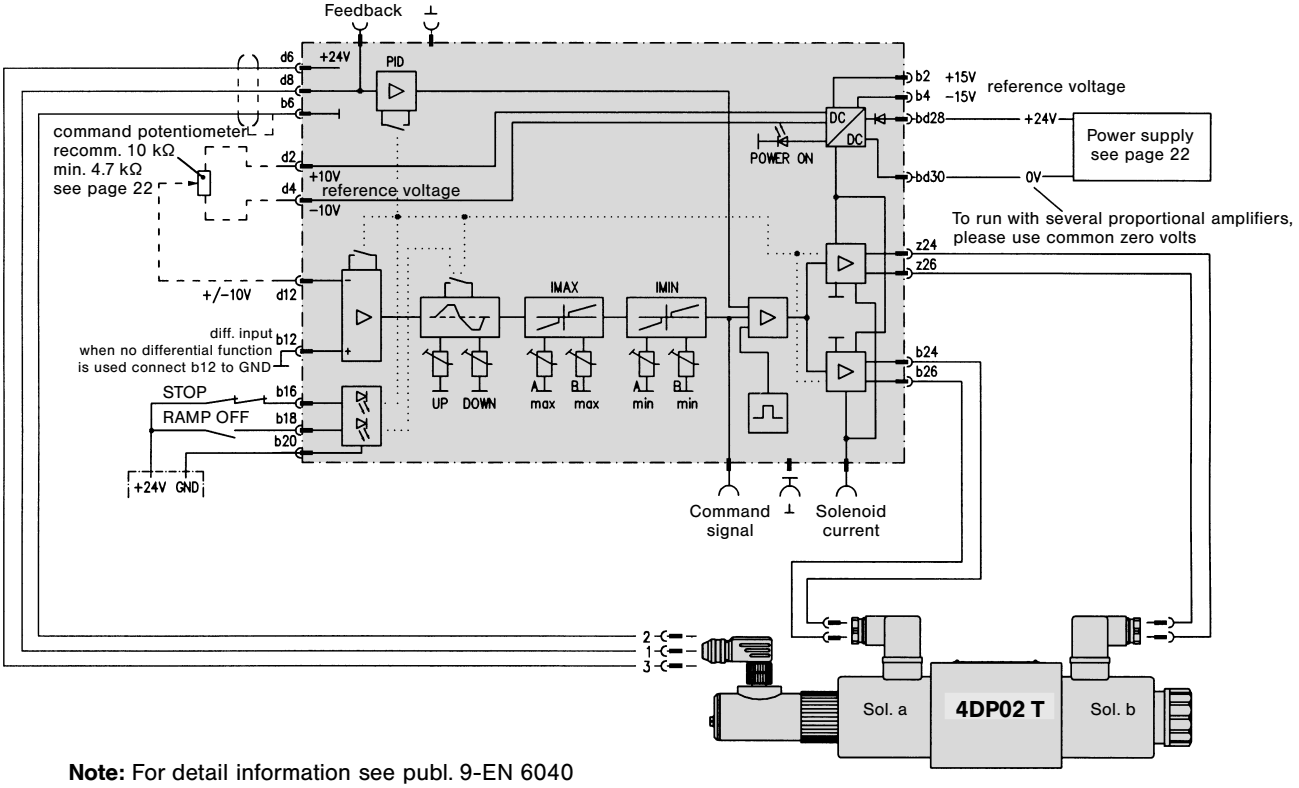


The output stages are short circuit protected.
Short circuits at the outputs and supply input voltage falling below 20.5 V will result in the shutdown of the output stages, causing the "Fail Safe" LED come on.
In this event, the supply voltage to the proportional amplifier must be switched off for a period of about 10 seconds.

Details on the front panel



Schematic block diagram and terminal assignment



Note: For detail information see publ. 9-EN 6040

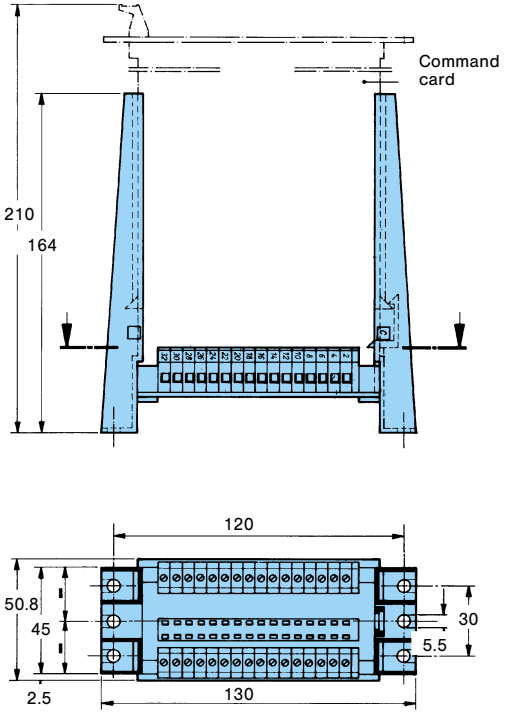
Order No.: 701–00028–8
Weight: 0.15 kg

This command card is designed to interface with all proportional amplifiers for DENISON proportional valves.
Five multiturn-potentiometers (P1...P5) allow adjustment of different command signals. Selection is made by external energizing of the five selector relays on the command card.
By moving the soldered 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 (soldered 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 proportional 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.

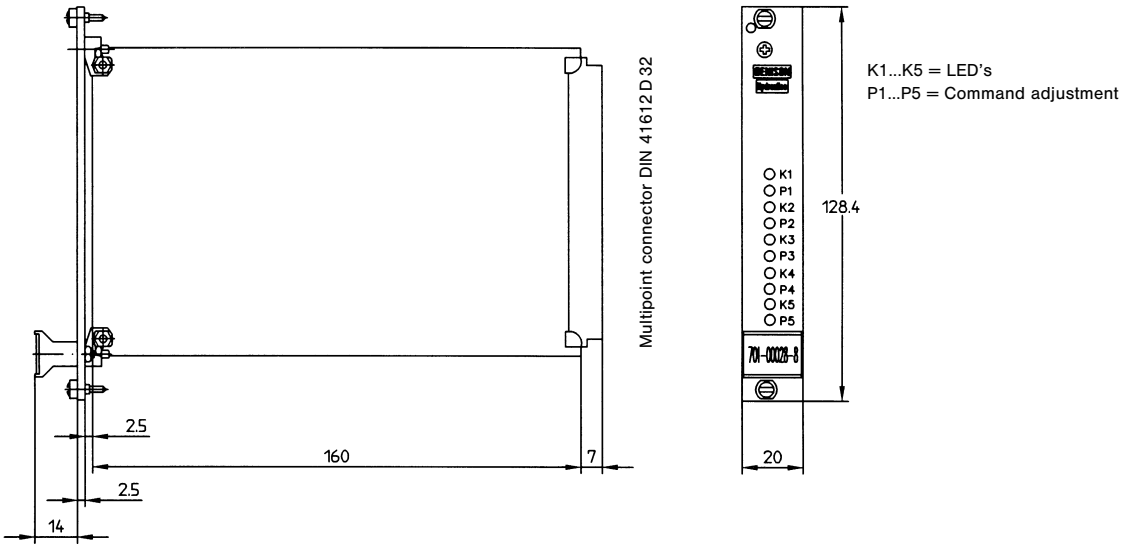
Characteristics – Command Card

• Supply voltage:	
– command card	supply from proportional 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

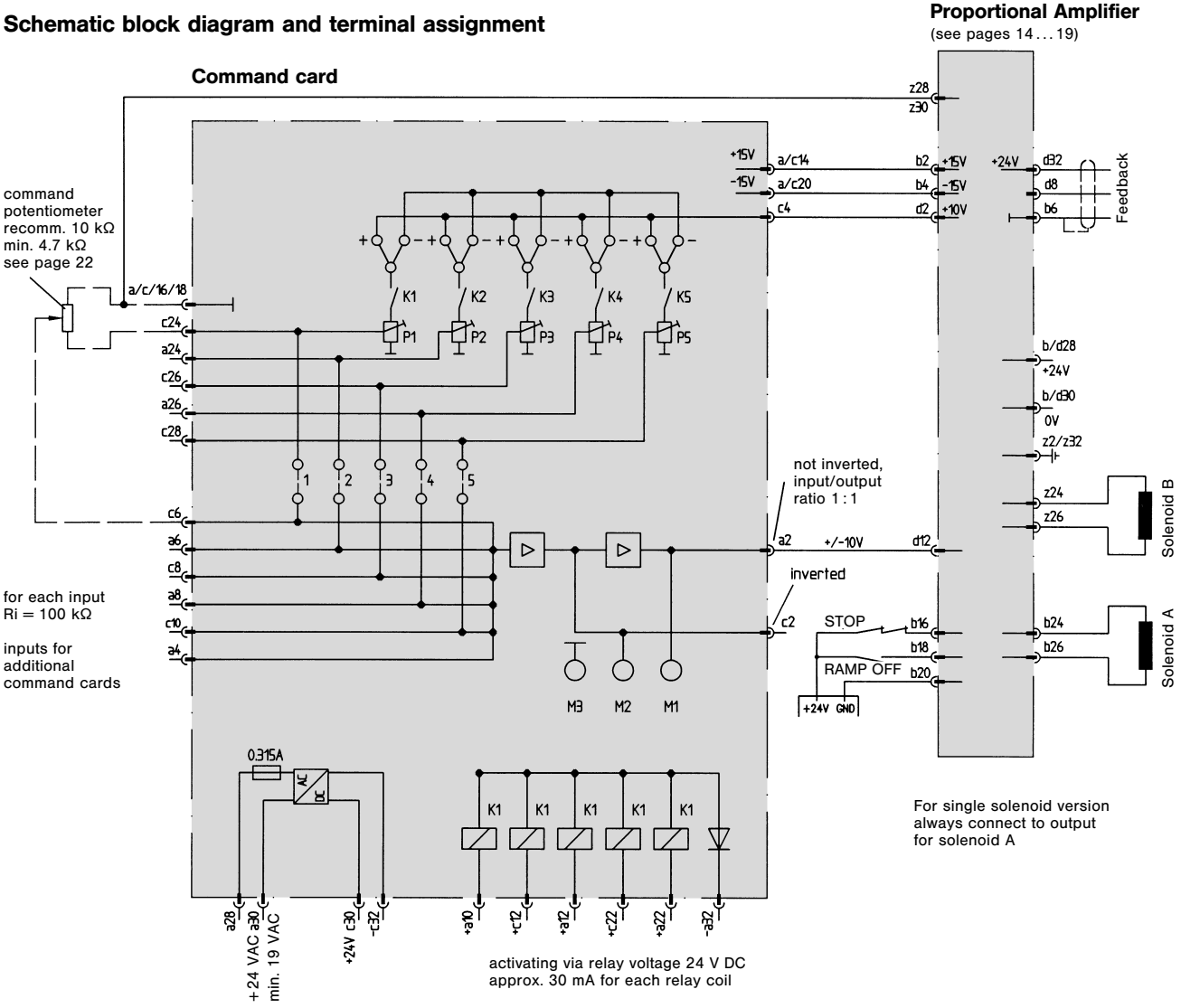
Euro-Card-Holder
Order No. 701–00007–8
(for command card 701–00028–8)



Dimensions Plug-in module 3U/4HP conform to IEC 297

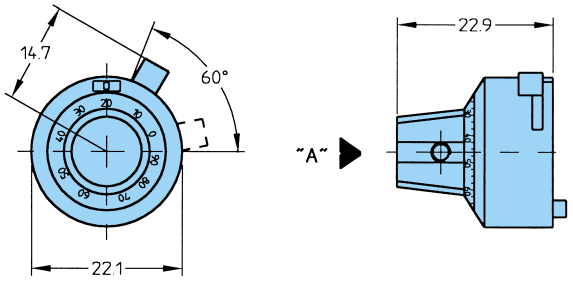


Schematic block diagram and terminal assignment



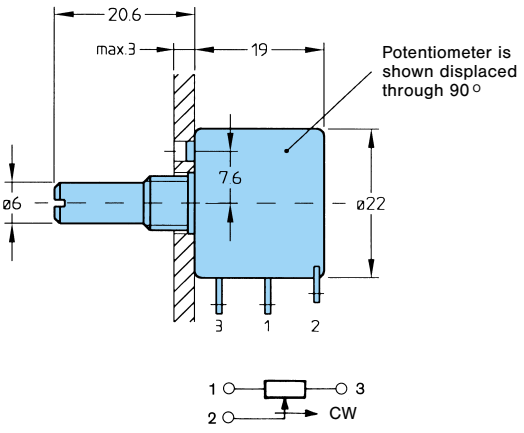
Potentiometer-Adjusting knob
Order No. 701–00014–8

View „A“

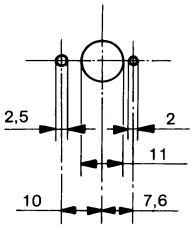


Adjusting knob with scale 0...100
and with revolution counter.
Adjustment is lockable.

Potentiometer

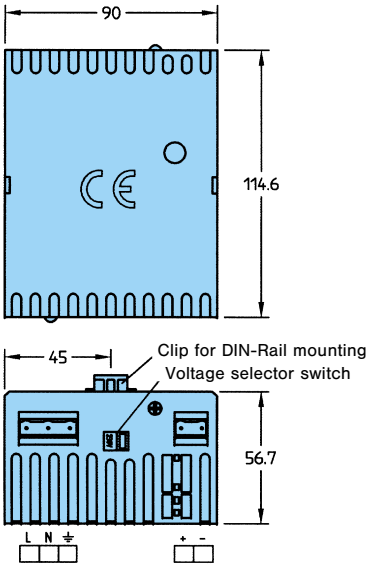


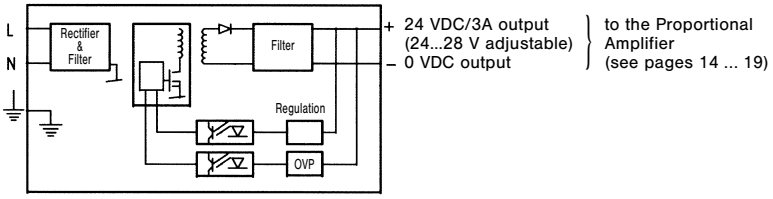
Panel opening



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°

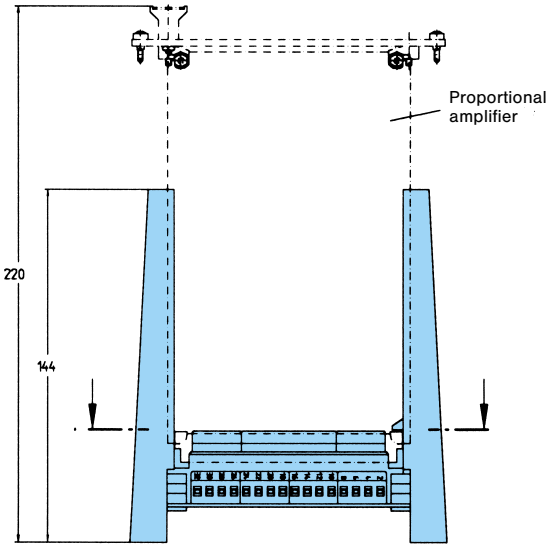
Power supply
Order No. 701–00023–8
Weight: 0.25 kg

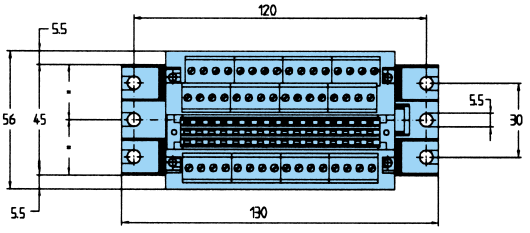




L = Nominal frequency 50/60 Hz
Nominal voltage 230 VAC or 115 VAC (pay attention to voltage selector switch setting)
N = Neutral line

Euro-Card-Holder
Order No. 701–00066–8
Holder for individual mounting according to DIN 41612





ORDER INFORMATION FOR PRESSURE COMPENSATORS

Model No.: **SPC 02 .. .. 1 . . A**

[1] **Series**
SPC = Pressure compensator

[2] **Size**
02 = Cetop 05

[3] **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

[4] **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)

[5] **Circuit type**
1 = single

[6] **Load sensing port**
A = in A
C = in A or B

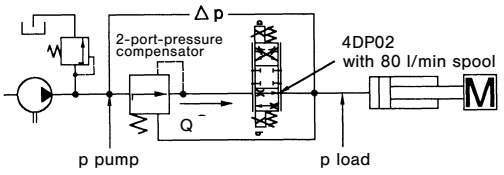
[7] **Body**
3 = Aluminium (up to 210 bar)
5 = Steel (up to 315 bar)

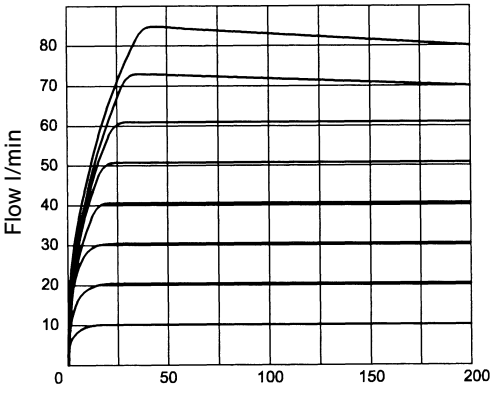
[8] **Design letter**

[9] **Seal class**
1 = NBR seals
5 = FPM seals (Viton®)

		Model No.	Order No.	Weight
3-port Meter-in Compensators with shuttle valve P-A/B	Alu	SPC 02 01 041C3A	026 - 42586 - 0	
		SPC 02 01 051C3A	026 - 42587 - 0	1.7 kg
		SPC 02 01 101C3A	026 - 42588 - 0	
	Steel	SPC 02 01 041C5A	026 - 42589 - 0	
		SPC 02 01 051C5A	026 - 42590 - 0	3.5 kg
		SPC 02 01 101C5A	026 - 42591 - 0	
3-port Meter-in Compensators P–A	Alu	SPC 02 01 041A3A	026 - 42598 - 0	
		SPC 02 01 051A3A	026 - 42599 - 0	1.2 kg
		SPC 02 01 101A3A	026 - 42600 - 0	
	Steel	SPC 02 01 041A5A	026 - 42601 - 0	
		SPC 02 01 051A5A	026 - 42602 - 0	2.8 kg
		SPC 02 01 101A5A	026 - 42603 - 0	
2-port Meter-in Compensators with shuttle valve P-A/B	Alu	SPC 02 11 051C3A	026 - 42563 - 0	1.5 kg
	Steel	SPC 02 11 051C5A	026 - 42566 - 0	3.1 kg
2-port Meter-in Compensators P–A	Alu	SPC 02 11 051A3A	026 - 42575 - 0	1.2 kg
	Steel	SPC 02 11 051A5A	026 - 42578 - 0	2.8 kg
2-port Meter-out Compensators P-A/B	Alu	SPC 02 12 051C3A	026 - 42611 - 0	2.5 kg
	Steel	SPC 02 12 051C5A	026 - 42614 - 0	4.6 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.