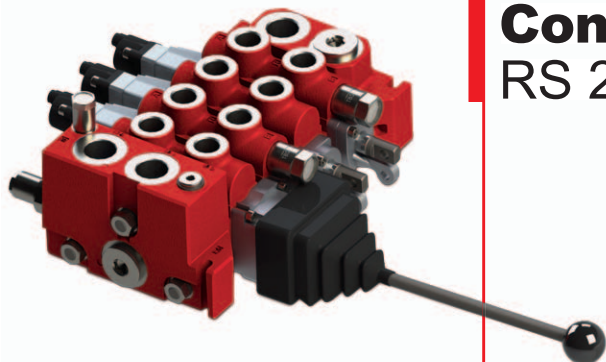


Sectional Directional Control Valve RS 210



Key valve features

RS 210 is a sectional open center valve, designed for max. operating pressures up to 300 bar and max. pump flows up to 70 l/min.

RS 210 is available with 1 to 10 working sections per valve assembly.

The valve can be used in different systems for parallel as well as tandem circuits. It is designed with an open center for fixed and variable displacement pumps.

The valve can be operated manually, with cable or by pneumatic and electro-pneumatic or electro-hydraulic remote control.

RS 210 offers excellent operating characteristics because of the specially designed spools for different applications.

Low and uniform spool forces are the result of careful balancing of the flow forces.

Q-function

The flow control (Q-function) of the inlet section by-passes the major part of the pump flow to tank when the system is idling, still giving access to full pump flow when the services are operated. Besides greatly reducing heat generation this also provides improved operating characteristics.

Applications

The RS 210 is ideal for applications where you need excellent control characteristics such as cranes, excavators, back-hoe-loaders, skid loaders and tipping gear.

Technical data

Pressure and flow values*

Max. operating pressure per port:

P1, P2, P3, P4, A, B¹: 300 bar

T1, T2, T3, T4¹: 20 bar

Max. permissible flow either on port:

P1, P2 inlets type A, B, C, E: 50 l/min

P1, P4 inlets type Q: 70 l/min

¹ Inlets type A and intermediate sections M uses "A" and "B" designation for P and T connections. Consider the detailed information for the respective part in this data sheet.

Further data

Spool stroke:

Nominal: +/- 6 mm

4th position: + 12 mm

Spool control force spool control 9:

Neutral position: 110 N

Max. spool stroke: 140 N

Detent in: > 300 N

Detent out: < 100 N

Permissible contamination level: Equal or better than 20/18/14 as per ISO 4406

Viscosity range: 10 – 400 mm²/s (cst)
Higher viscosity allowed at start up

Leakage A, B → T at 100 bar, 32 cst and 40 °C: ≤ 13 cc/min

Pressure fluid: Mineral oil and synthetic oil based on mineral oil HL, HLP according to din 51524

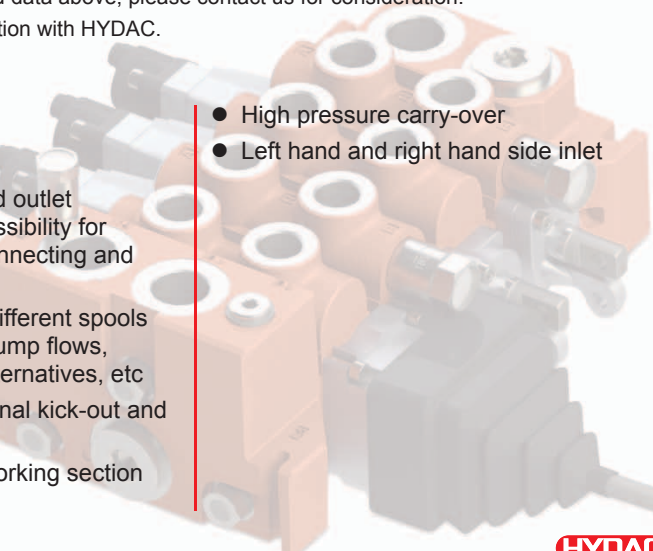
Fluid temperature range: -15 °C up to +80 °C

* Higher values are possible, depending on application. For applications with demands that exceed stated data above, please contact us for consideration.
MTTFd value after consultation with HYDAC.

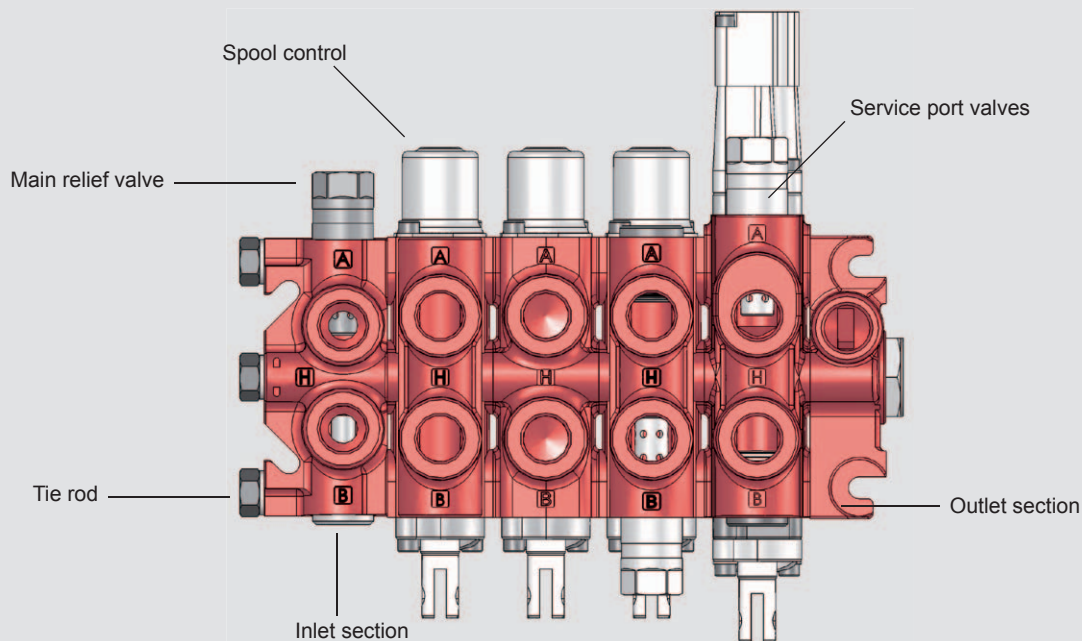
Further properties and possibilities

- Several different in- and outlet alternatives offering possibility for electrical unloading, connecting and dimensional flexibility
- Very wide program of different spools optimized for various pump flows, applications, system alternatives, etc
- Spool controls for external kick-out and spool position sensing
- Load checks in each working section

- High pressure carry-over
- Left hand and right hand side inlet



General overview



Weight

Inlet section	Weight in kg
I01A	1.8
I06B	1.7
I02C	2.5
I01E	2.3
I02Q	4.5
I06Q	4.5

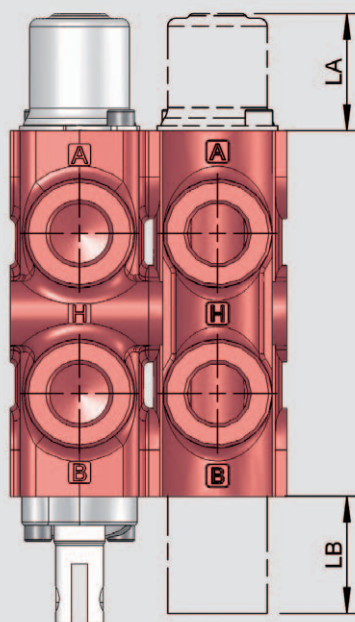
Outlet section	Weight in kg
U01A	1.0
U01B	1.4
U01C	0.7

Working section	Weight in kg
S01A	2.4
S01B	2.4
S01H	2.8
S02C	1.9
S10A	2.4

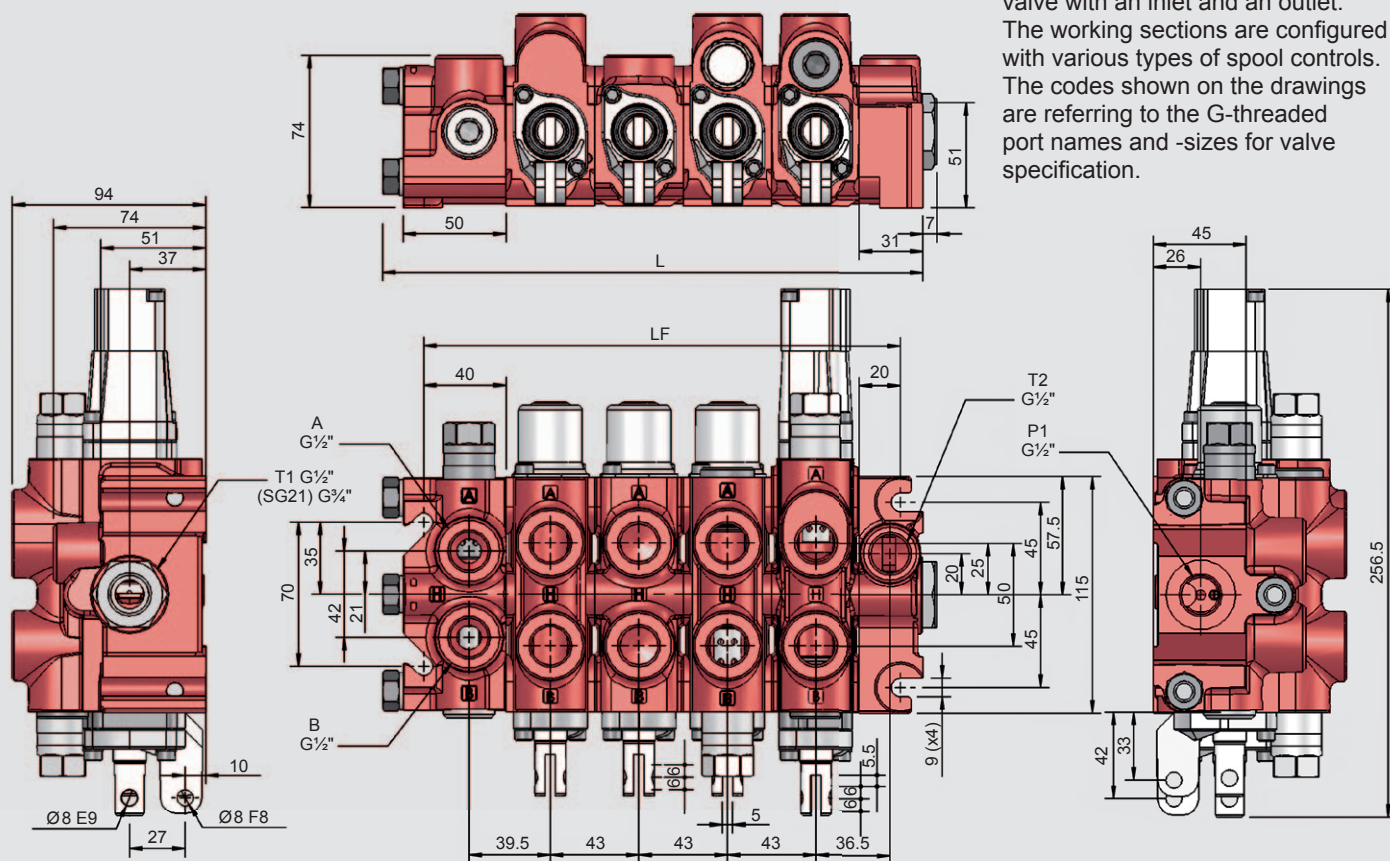
Intermediate section	Weight in kg
M01A	1.7
M01B	1.7

Dimensions, spool controls

Type	LA [mm]	LB [mm]
910	37	
10	74	
11	83	
13	74	
14	74	
L61	97	
L62	97	
L63	97	
L64	101	
P	103	
EP	103	
HPD	70	70
LEF	94, 105	
M19		41
M29		50
M111		41
M211		50
M2		9



Dimensions inlet and outlet type A – side connection

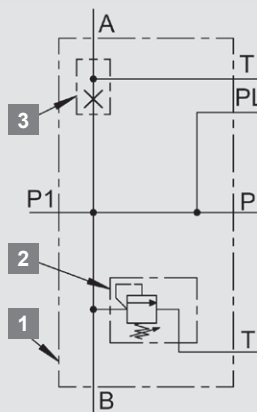


I01A has two pump ports and one tank port.

With the main relief valve fitted in the A-side cavity, the A-port is the pump port and the B-port is the tank port. If the main relief valve is fitted in the B-side cavity the opposite is valid for the pump and tank ports.

For information regarding the outlet – see outlet sections.

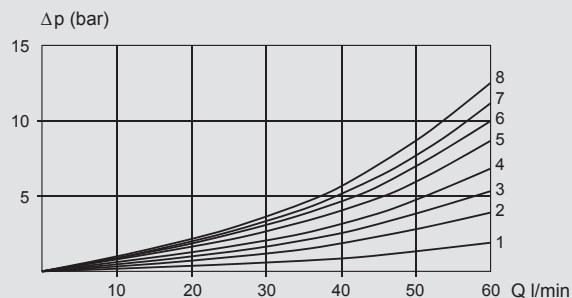
1	Inlet section type A	I01A
2	Main relief valve	TBD131
3	Plug	PL131



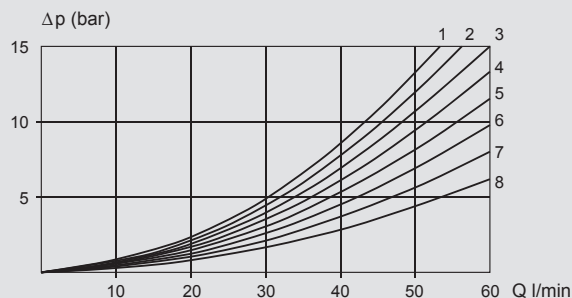
No. of sections	L [mm]	LF [mm]
1	136	103
2	179	146
3	222	189
4	265	232
5	308	275
6	351	318
7	394	361
8	437	404

Pressure drop

Oil temperature / viscosity for all graphs: +40 °C / 32 cSt

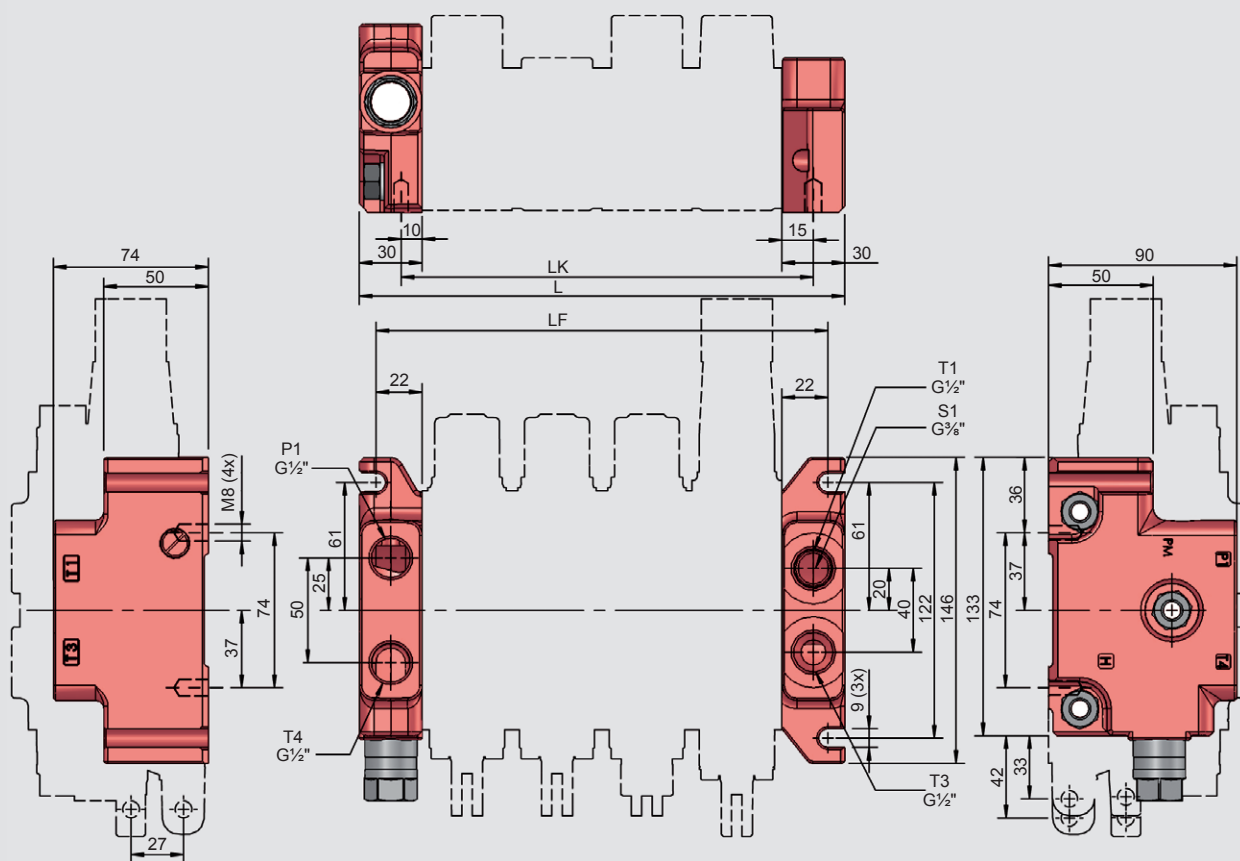


Pressure drop 1-8 sections, P1 – T1, inlet section I01A, outlet section U01A



Pressure drop, A/B – T, inlet section I01A, outlet 1-8 sections U01A

Dimensions inlet and outlet section type B – top connection

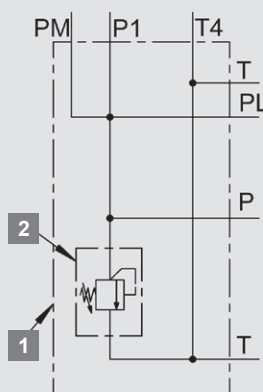


I06B has one pump port and one tank port, both facing upwards. The main relief cavity is on the B-side.

Note: Inlet section of type B offers a connection between the tank galleries of A- and B-sides.

For information regarding the outlet – see outlet sections.

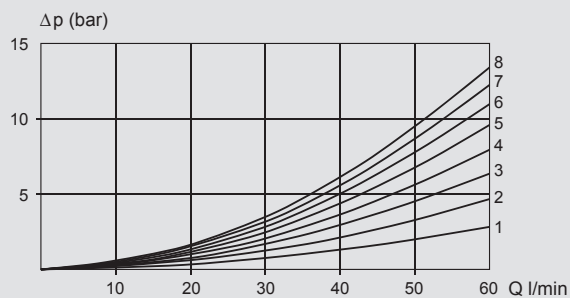
1	Inlet section type B	I06B
2	Main relief valve	TBD131



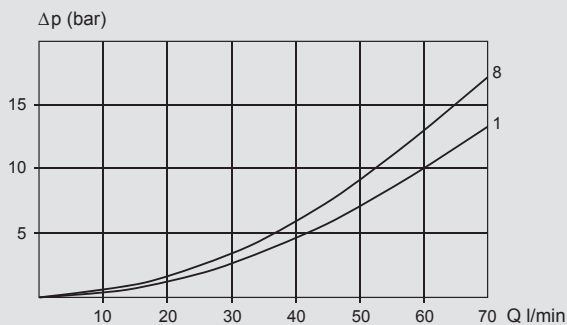
No. of sections	L [mm]	LF [mm]	LK [mm]
1	103	87	68
2	146	130	111
3	189	173	154
4	232	216	197
5	275	259	240
6	318	302	283
7	361	345	326
8	404	388	369

Pressure drop

Oil temperature / viscosity for all graphs: +40 °C / 32 cSt

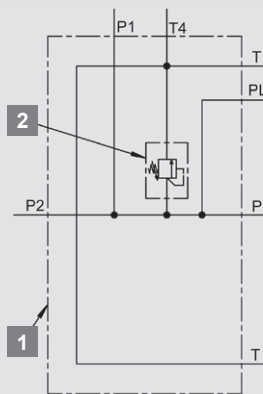


Pressure drop 1-8 sections, P1 – T1,
inlet section I06B, outlet section U01B



Pressure drop 1 or 8 sections, A/B – T,
inlet section I06B, outlet section U01B

1	Inlet section type C	I02C
2	Main relief valve	TBD131



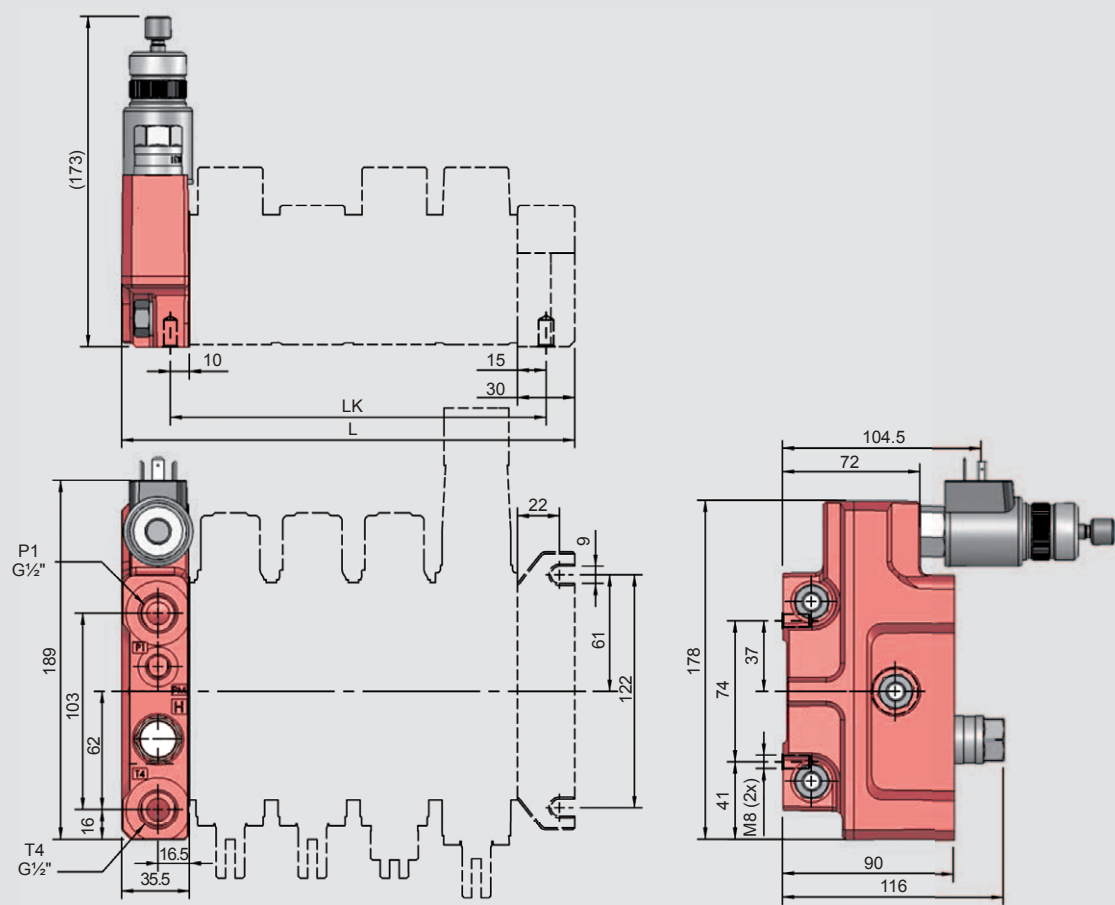
No. of sections	L [mm]	LK [mm]
1	98	61
2	141	104
3	184	147
4	227	190
5	270	233
6	313	276
7	356	319
8	399	362

The graph shows the relationship between pressure drop Δp (bar) and flow rate Q (l/min) for three different filter configurations. The y-axis ranges from 0 to 30 bar, and the x-axis ranges from 0 to 60 l/min. Three curves are plotted, labeled 1, 5, and 8, representing different filter setups. Curve 1 is the lowest, Curve 5 is in the middle, and Curve 8 is the highest. All curves show an increase in pressure drop with increasing flow rate, with Curve 8 showing the steepest increase.

Flow rate Q (l/min)	Pressure drop Δp (bar) - Curve 1	Pressure drop Δp (bar) - Curve 5	Pressure drop Δp (bar) - Curve 8
0	0	0	0
10	~1	~2	~3
20	~2	~4	~6
30	~3	~7	~12
40	~4	~10	~20
50	~5	~14	~30
60	~6	~18	~42

31-02-RS210-10/12.13

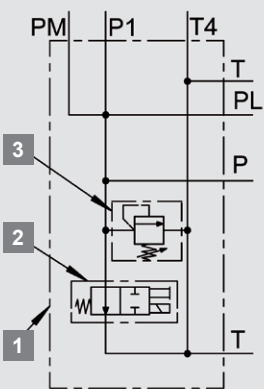
Dimensions inlet section type E – with electrical unloading



I01E has one pump port and one tank port, both facing upwards. The main relief cavity is facing upwards.
Main relief options:
TBD160 or TBS400 up to max. 300 bar.

The cavity for the electrical unloading valve is facing upwards. The A- and B-side tank channels are connected.

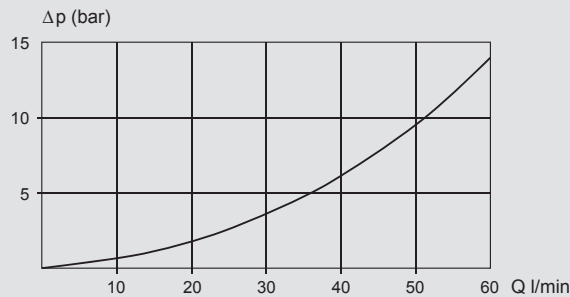
1	Inlet section type E	I01E
2	Electrical unloading valve	E912
2	Electrical unloading valve	E926
3	Main relief valve	TBD160
3	Main relief valve	TBS400



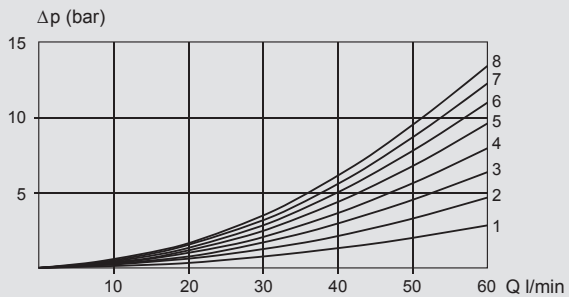
No. of sections	L [mm]	LK [mm]
1	107	68
2	150	111
3	193	154
4	236	197
5	279	240
6	322	283
7	365	326
8	408	369

Pressure drop

Oil temperature / viscosity for all graphs: +40 °C / 32 cSt

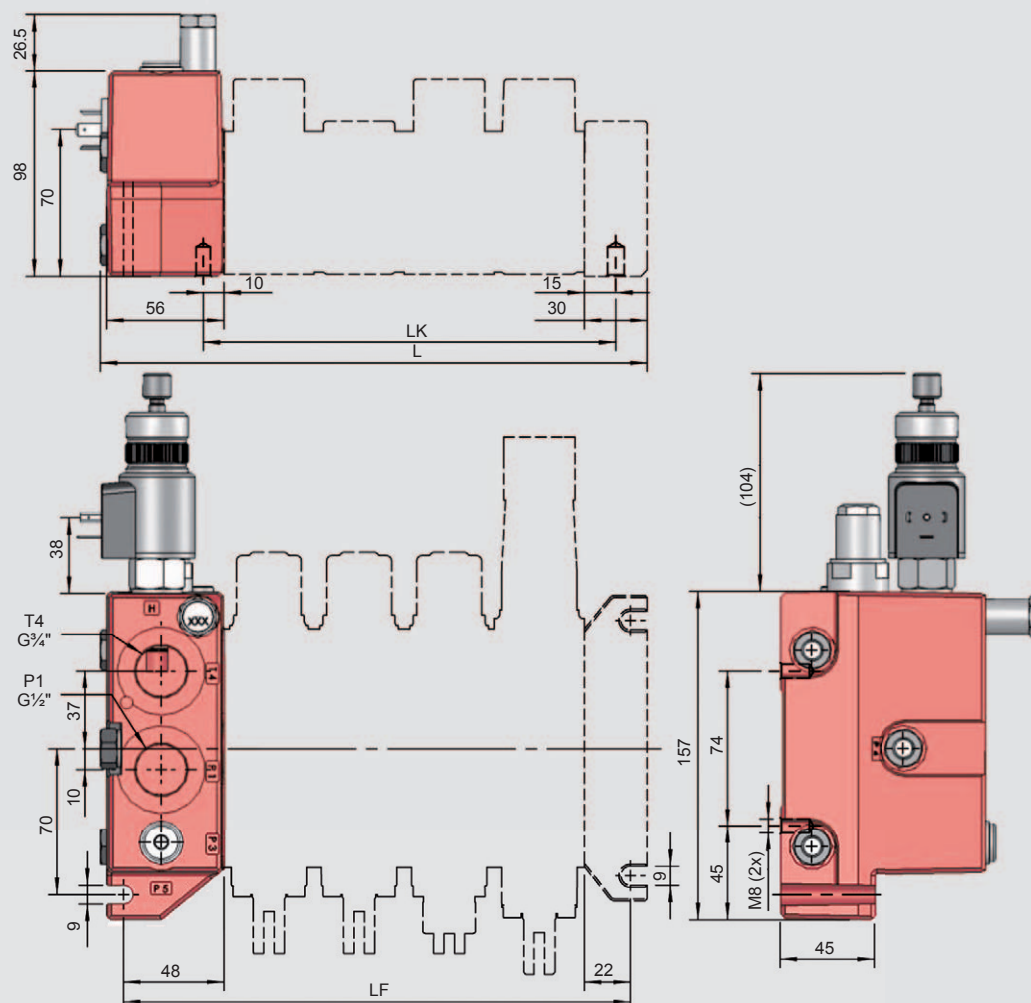


Pressure drop, P1 – T4, inlet section I01E, unloaded



Pressure drop 1-8 sections, P1 – T1/T3, inlet section I01E, outlet section U01B

Dimensions inlet section type I02Q – with by-pass and electrical unloading



I02Q is an inlet section with flow control, main relief valve and unloading function.

When the system is idling a small regulated flow passes the center gallery of the valve. Excess pump flow is routed directly to tank.

The regulated flow is defined by the flow control valve FKA283 and the metering orifice PF.

When a spool is operated the whole pump flow is instantly available for the user. The low center gallery flow during idling conditions reduce pressure drop $P - T$ through the valve body, and this facilitates higher pump flow without negative influence on the spool forces and heat generation.

I02Q also is equipped with main relief valve TB12, which together with flow control FKA283, function as a pilot operated main relief valve. The Q-inlet can be equipped with a solenoid operated valve for electrical unloading.

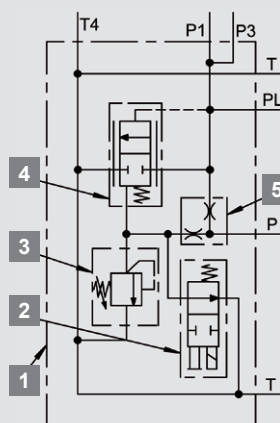
The available metering orifices are PF11 and PF12.

In combination with FKA283 they provide:

PF11: 25 l/min; PF12: 28 l/min

A lower flow creates less pressure drop $P - T$.

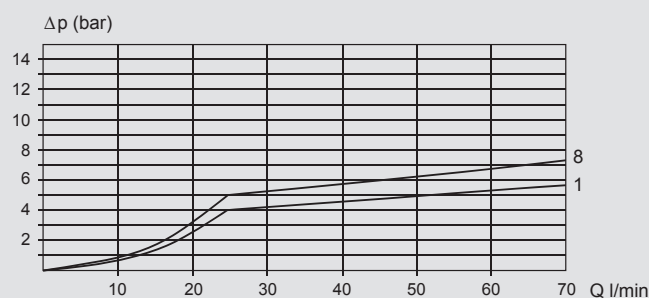
A spool that matches the flow improves the operating characteristics.



No. of sections	L [mm]	LF [mm]	LK [mm]
1	135	113	68
2	178	156	111
3	221	199	154
4	264	242	197
5	307	285	240
6	350	328	283
7	393	371	326
8	436	414	369

Pressure drop

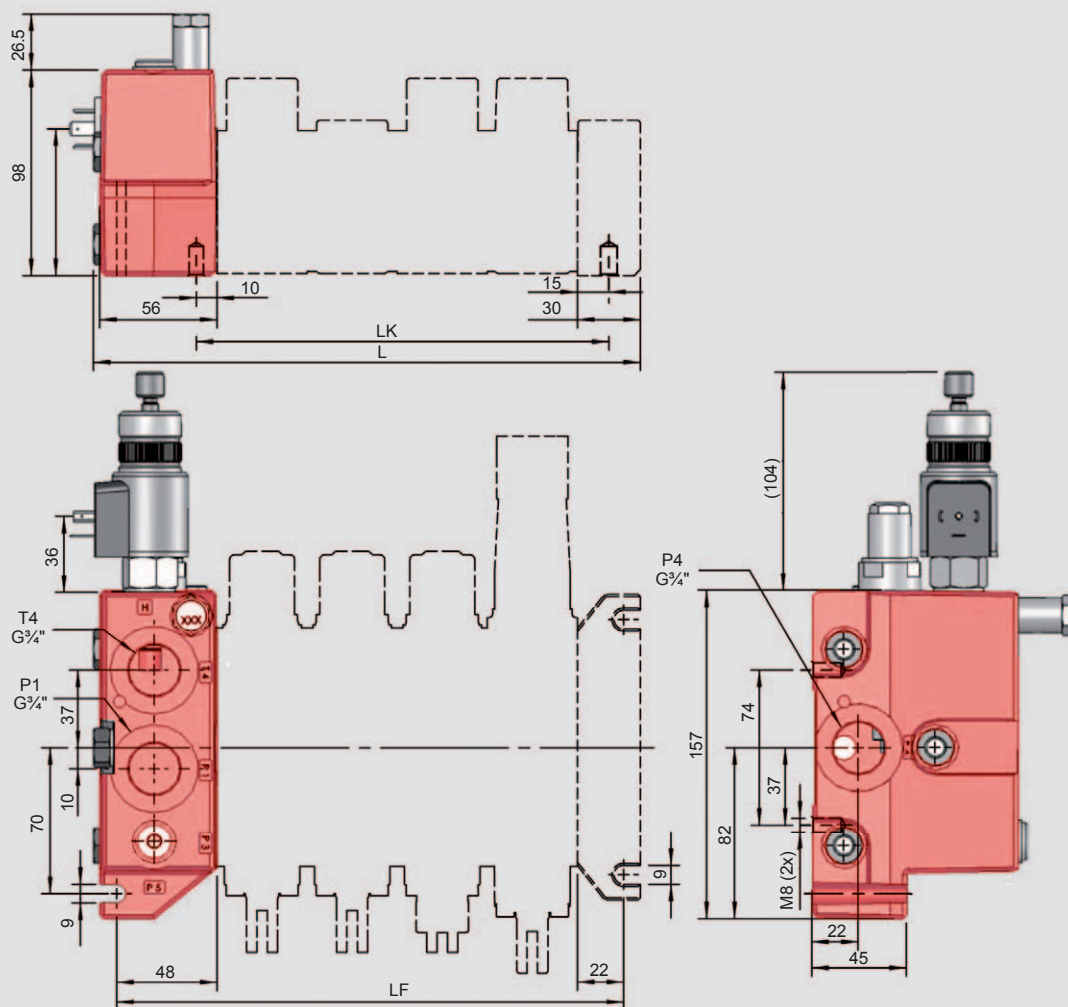
Oil temperature / viscosity for all graphs: +40 °C / 32 cSt



Pressure drop 1 and 8 sections, $P1 - T4$, inlet section I02Q/I06Q, with flow control FKA283/2 and PF12, outlet section U01B

1	Inlet section type Q	I02Q
2	Electrical unloading valve	E912
2	Electrical unloading valve	E926
3	Main relief valve	TB12
4	Flow control	FKA283/2
4	Flow control	FKA283/3
5	Metering orifice, diam 5.4 mm	PF11
5	Metering orifice, diam 5.7 mm	PF12

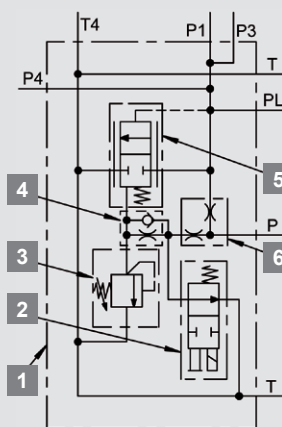
Dimensions inlet section type I06Q – with by-pass and electrical unloading



I06Q has the same functions as I02Q but with an added special check valve FSB3 in the signal gallery to damp the unloading function of the flow control valve FKA.

I06Q also provides an additional pump port.

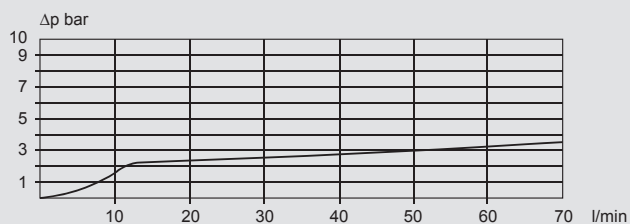
1	Inlet section type Q	I06Q
2	Electrical unloading valve	E912
2	Electrical unloading valve	E926
3	Main relief valve	TB12
4	Damp check valve	FSB3
5	Flow control	FKA283/2
5	Flow control	FKA283/3
6	Metering orifice, diam 5.4 mm	PF11
6	Metering orifice, diam 5.7 mm	PF12



No. of sections	L [mm]	LF [mm]	LK [mm]
1	135	113	68
2	178	156	111
3	221	199	154
4	264	242	197
5	307	285	240
6	350	328	283
7	393	371	326
8	436	414	369

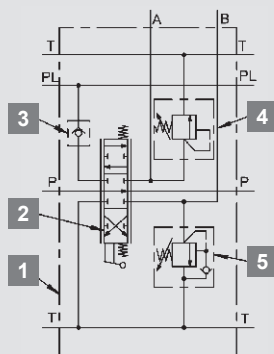
Pressure drop

Oil temperature / viscosity for all graphs: +40 °C / 32 cSt



Pressure drop, P1 – T4, inlet I02Q/I06Q, unloaded

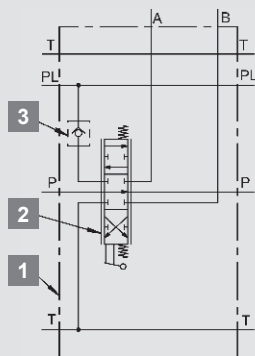
S01A



S01A, for 3-position spool and cavities for service port valves

1	Spool section	S01A
2	Spool	
3	Check valve	MB01
4	Port relief valve	TBD121
5	Port relief and anticavitation valve	TBSD121

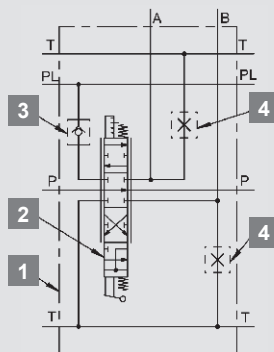
S01B



S01B, for 3-position spool without cavities for service port valves

1	Spool section	S01B
2	Spool	
3	Check valve	MB01

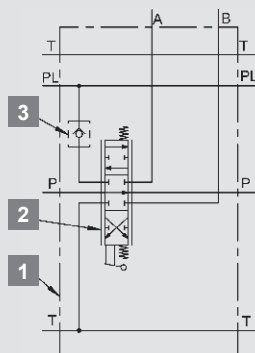
S01H



S01H, for 4-position spool and cavities for service port valves

1	Spool section	S01H
2	Spool	
3	Check valve	MB03
4	Plug	P121

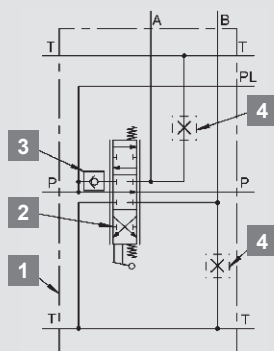
S02C



S02C, for 3-position spool without service port valve possibility

1	Spool section	S02C
2	Spool	
3	Check valve	MB01

S10A

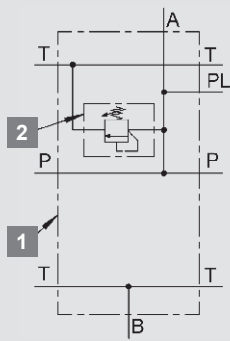


S10A, for 3-position spool and cavities for service port valves for tandem

1	Spool section	S10A
2	Spool	
3	Check valve	MB01
4	Plug	P121

Intermediate sections

M01A



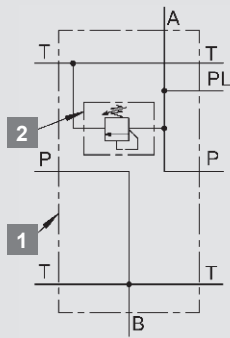
M01A

M01A is an intermediate inlet section used in dual circuit systems.

The A-port is for pump connection and the B-port is for tank connections. The main relief valve cavity is on the A-side. The second circuit pump is connected to port A. If the first circuit pump flow is connected to the inlet section and spool sections upstream of M01A is not used, both pump flows are available for use downstream of M01A. The sum of the pump flow should not exceed max. permissible flow of 50 l/min. The tank gallery is common for all sections.

1	Intermediate section	M01A
2	Main relief valve	TBD131

M01B



M01B

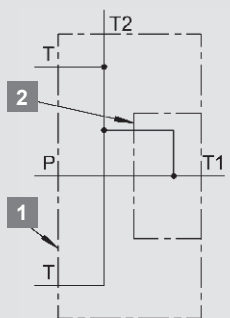
M01B is an intermediate inlet section used for two completely separated circuits.

The A-port is for pump connection and the B-port is for tank connections. The main relief valve cavity is on the A-side. The sum of the pump flow should not exceed max. permissible flow of 50 l/min. The tank gallery is common for all sections.

1	Intermediate section	M01B
2	Main relief valve	TBD131

Outlet sections

U01A



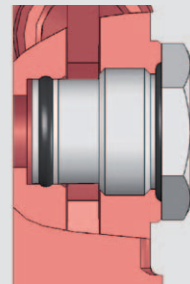
U01A

U01A has two tank ports, T2 on the top and T1 on the side. For series connection a high pressure carry-over nipple should be fitted in T1. In this case an alternative tank port always has to be connected to the tank.

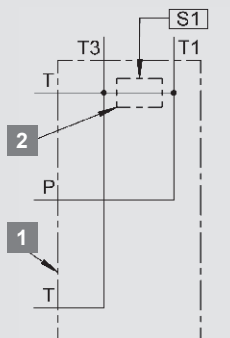
1	Outlet section	U01A
2	High pressure carry-over nipple	SG21

U01A

High pressure carry-over nipple SG21 is fitted in port T1.



U01B



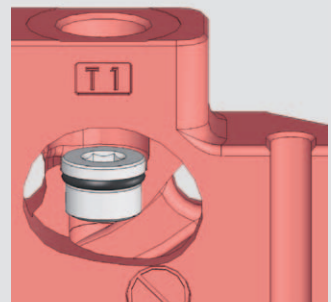
U01B

U01B has two tank ports, both facing upwards. For series connection a high pressure carry-over plug PS20 should be fitted in location S1 in port T1. In this case an alternative tank port always has to be connected to the tank.

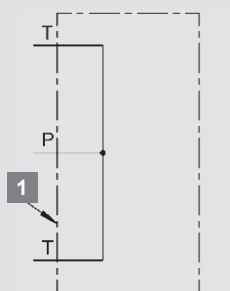
1	Outlet section	U01B
2	Plug (S1)	PS20

U01B

High pressure carry-over plug PS20 is fitted through port T1 in location S1. T1 is now port for series connection.



U01C



U01C

U01C is an end plate without porting.

1	Outlet section	U01C
---	----------------	------

Electrical unloading valve

The electrical unloading valve is a 2-way, normally open, solenoid type cartridge valve. It is an option in inlet sections I02Q, I06Q and I01E.

It is intended for emergency stop and for pressure drop / heat generation reduction.

In Q-inlets a de-energized unloading valve drains the pilot circuit so that the FKA283 spool dumps the whole pump flow directly to tank.

In inlet I01E a de-energized unloading valve dumps the whole pump flow to tank.

Data

Rated flow:	40 l/min
Power consumption:	17 W
Rated voltage:	12 or 24 V
Max voltage variation:	+/- 15 %
Duty factor*:	100 %
Connection:	Hirschmann ISO 4400 DIN 43650
Protection class:	IP65

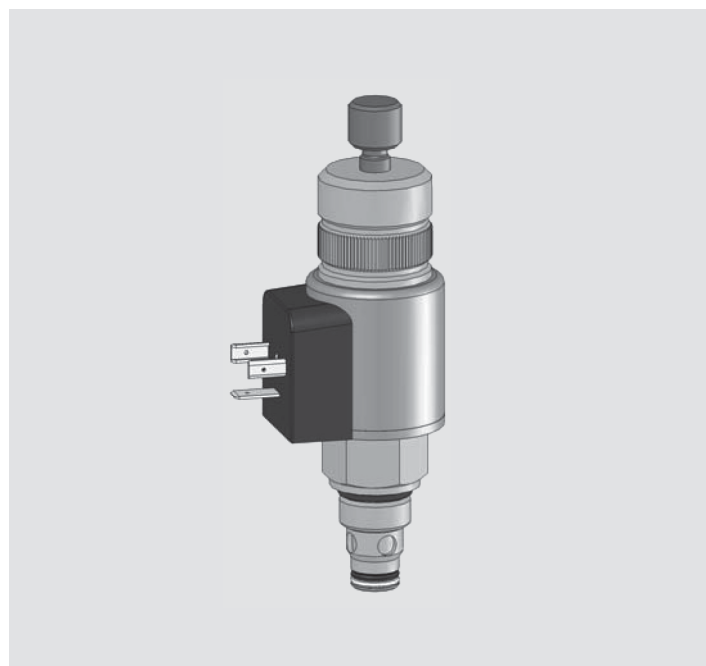
* Sufficient cooling must be secured

The unloading valve has manual override.

E912 and E926 has push and twist type pin operation.
This pin is sealable.
PE20 is the plug for the cavity.

Codes

E912	push and twist type override 12 V
E926	push and twist type override 24 V



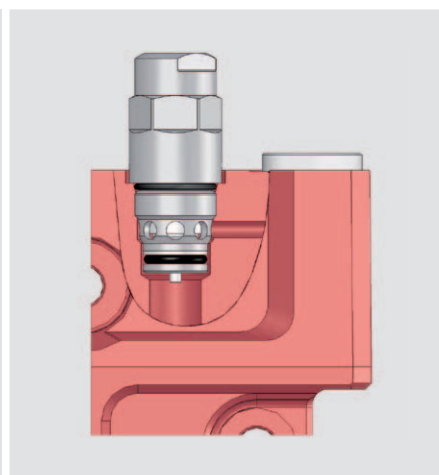
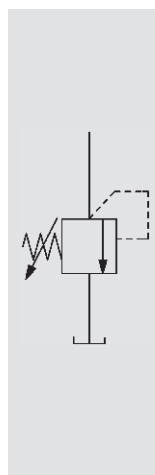
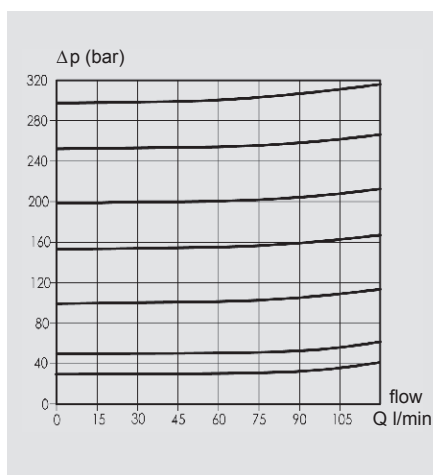
Main relief valves

Main relief valve TBS400

TBS400 is a pilot operated relief valve for the primary circuit. It is adjustable and sealable.

It is optional in inlet section I01E.

- Setting range:
35 – 300 bar (3.5 – 30.0 MPa)
- Setting range step: 5 bar

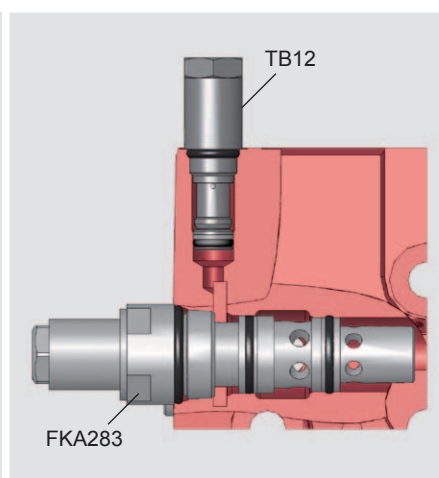
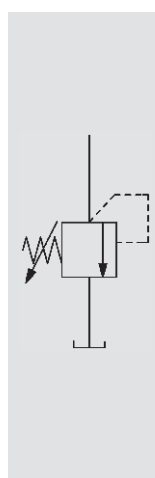
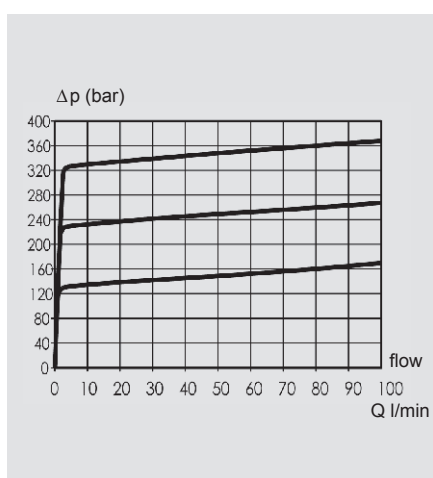


Main relief function with TB12

The flow control valve FKA283, in combination with the relief valve TB12, form the pilot operated main relief function of the Q-inlets.

TB12 is adjustable and sealable.

- Setting range:
35 – 300 bar (3.5 – 30.0 MPa)
- Setting range step: 5 bar

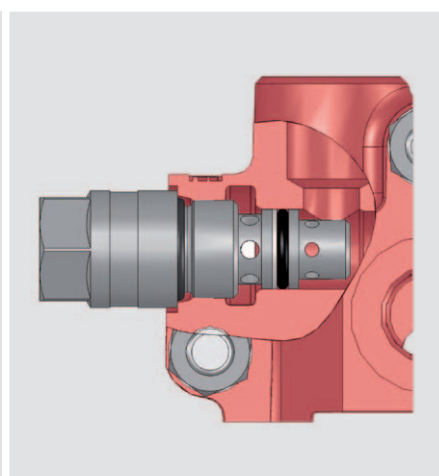
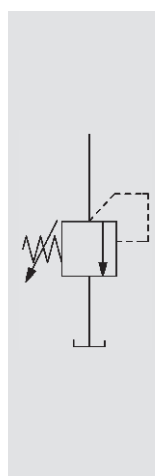
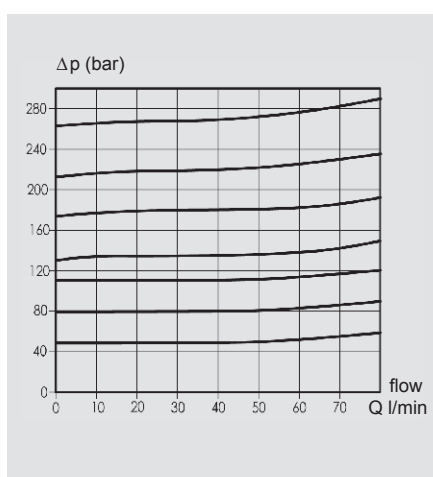


Main relief valve TBD131

TBD131 is a differential area, direct acting relief valve for the primary circuit. It is adjustable and sealable.

TBD131 is used in inlet sections I01A, I06B, I02C and intermediate sections M01A and M01B.

- Setting range:
35 – 300 bar (3.5 – 30.0 MPa)
- Setting range step: 5 bar

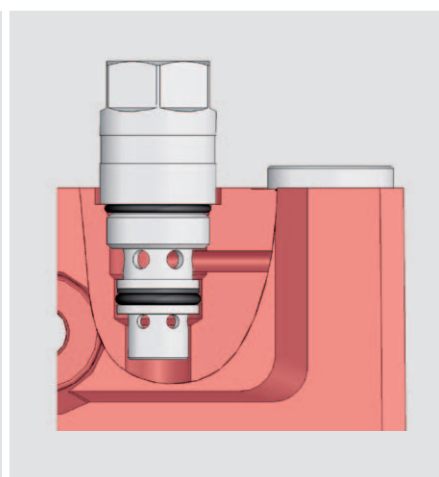
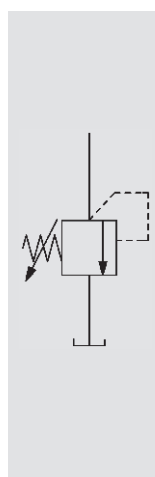
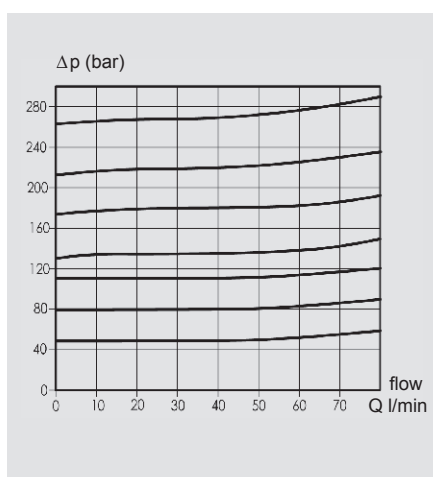


Main relief valve TBD160

TBD160 is a differential area, direct acting relief valve for the primary circuit. It is adjustable and sealable.

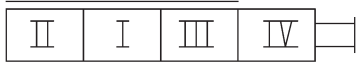
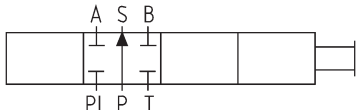
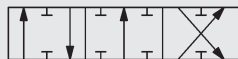
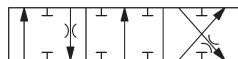
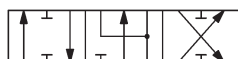
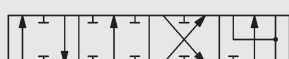
TBD160 is optional in inlet section I01E.

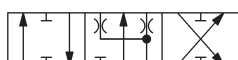
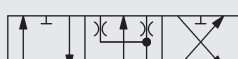
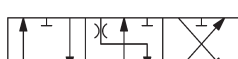
- Setting range:
35 – 300 bar (3.5 – 30.0 MPa)
- Setting range step: 5 bar



Spools

The RS 210 spools are available in variety of flows and styles to accommodate most design requirements. Since the development of spools is a continuous process and all available spools are not described in this data sheet, contact HYDAC for advice on choosing spools in order to optimize your valve configuration.

Spools for general use		Flow range	
Function	10 – 30	25 – 50	
			
			
	Double acting spool	1D	1K
	Slewing spool, gentle operating	–	1M
	Single acting spool P - A	2D	2K
	Motor spool	–	4K
	Motor spool A - T	–	4KA
	Motor spool B - T	–	4KB
	Double acting spool with 4 th pos. for float	3D	3K

Spools designed for cranes		Flow range		
Function	20 – 30	30 – 45	35 – 50*	
	For slewing function. In combination with spool control 918 only.	12SA	14SA	124SA
	For use with load holding valves. Assymetric. B-port to be connected to piston side of cylinder.	12ZA	14ZA	124ZA
	For use with load holding valves.	12ZB	14ZB	124ZB
	For use with load holding valves. Assymetric. A-port to be connected to piston side of cylinder.	12XA	14XA	124XA
	For use with load holding valves. Assymetric. B-port to be connected to piston side of cylinder.	12YA	14YA	124YA

* Note: Spools for flow range 35 - 50 l/min only in combination with Q-inlets.

Spool controls – A-side

Spool control 9	
9 Spring centered. 9W for cable control	
Spool control 10	
Detents at positions 1, 2 and 3	
Spool control 11	
Spring centering with detent at position 4	
Spool control 13	
Spring centering with detent at position 2	
Spool control 14	
Spring centering with detent at position 3	
Spool control P	
Pneumatic*	
Spool control EP	
Electro / pneumatic on / off**	
Spool control HPD	
Hydr. proportional Pilot pressure 6 – 16 bar Max. pilot pressure 25 bar*	
Spool control L61	
External hydraulic kick-out from inserted spool*	
Spool control L62	
External hydraulic kick-out from extended spool ***	
Spool control L63	
External hydraulic kick-out from inserted and extended spool***	
Spool control L64	
External hydraulic kick-out from inserted and extended spool, locking neutral position*	
Spool Control HLS 200	
Spool position indicator. Operating range 10 – 30 V	

* Connection G 1/8" BSP

*** Connection G 1/4" BSP

** Power consumption	4.8 W
Rated voltage	24 V
Max voltage variation	+/- 10 %
Duty factor	100 %
Connection	according to EN175301-803/B
Protection class	IP65

Spool controls – B-side

Bracket M19	Bracket M2
Bracket for 3-position spool, gear ratio 9:1	Bracket for 3-position spool, without ear
Bracket M29	3W
Bracket for 4-position spool, gear ratio 9:1	Cap for 3-position spool controlled by cable
Bracket M111	4W
Bracket for 3-position spool, gear ratio 11:1	Cap for 4-position spool controlled by cable
Bracket M211	Lever M2K250
Bracket for 4-position spool, gear ratio 11:1	Coordinate lever for spool with 3 or 4 pos.
Spool control M02	
M02 is a spool actuator that assures dry and sealed spool ends for a manual lever	

Electro-hydraulic remote control

As a part of the RS210 modular system is also a sub system for electrical remote is available.

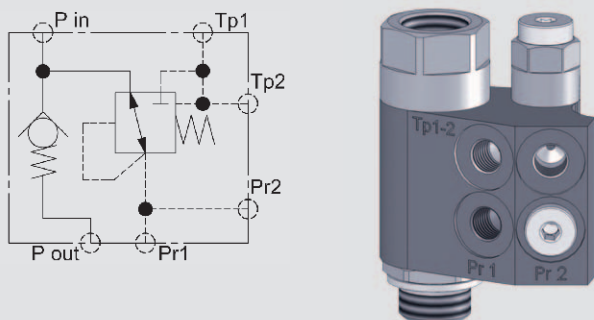
The main parts in that system are a pilot supply unit, spool controls with 12 or 24 Volt proportional solenoid operated valves and piping.

The spool control is for control of 3-positional spools. It is possible to use the remote controlled spool controls with inlets of type "Q".

The pilot supply unit builds up supply pressure but includes also a pressure reducing valve that limits the supply pressure.

The spool control is designed as a double acting cylinder assembled on the valves A-side and the spool ends on the B-side are available for manual over ride by a lever.

The spool controls are designed with an interface for internal

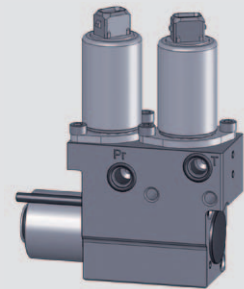
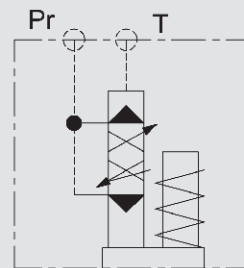


Pilot supply block

The pilot supply block includes a pressure build up valve that gives an initial pressure depending of flow but in the range of 10 to 14 bar. That pressure is enough for start of the maneuver of the spool that will raise up the system pressure. The supply pressure to the spool controls is limited to 23 bar which is the pressure set for the pressure reducing valve. Both the supply to the spool controls and the return from them is piped to the block.

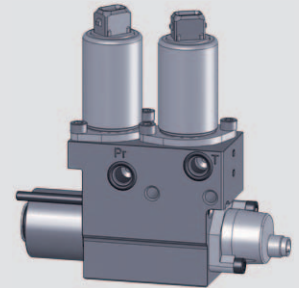
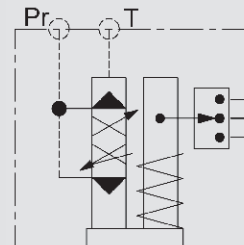
connection between the controls of both supply pressure as well as return flow.

The valve can be delivered complete by assembled with spool controls, pilot supply and piping. The modular and easy to handle design makes the remote controls suitable also for complete assembly on existing valves.

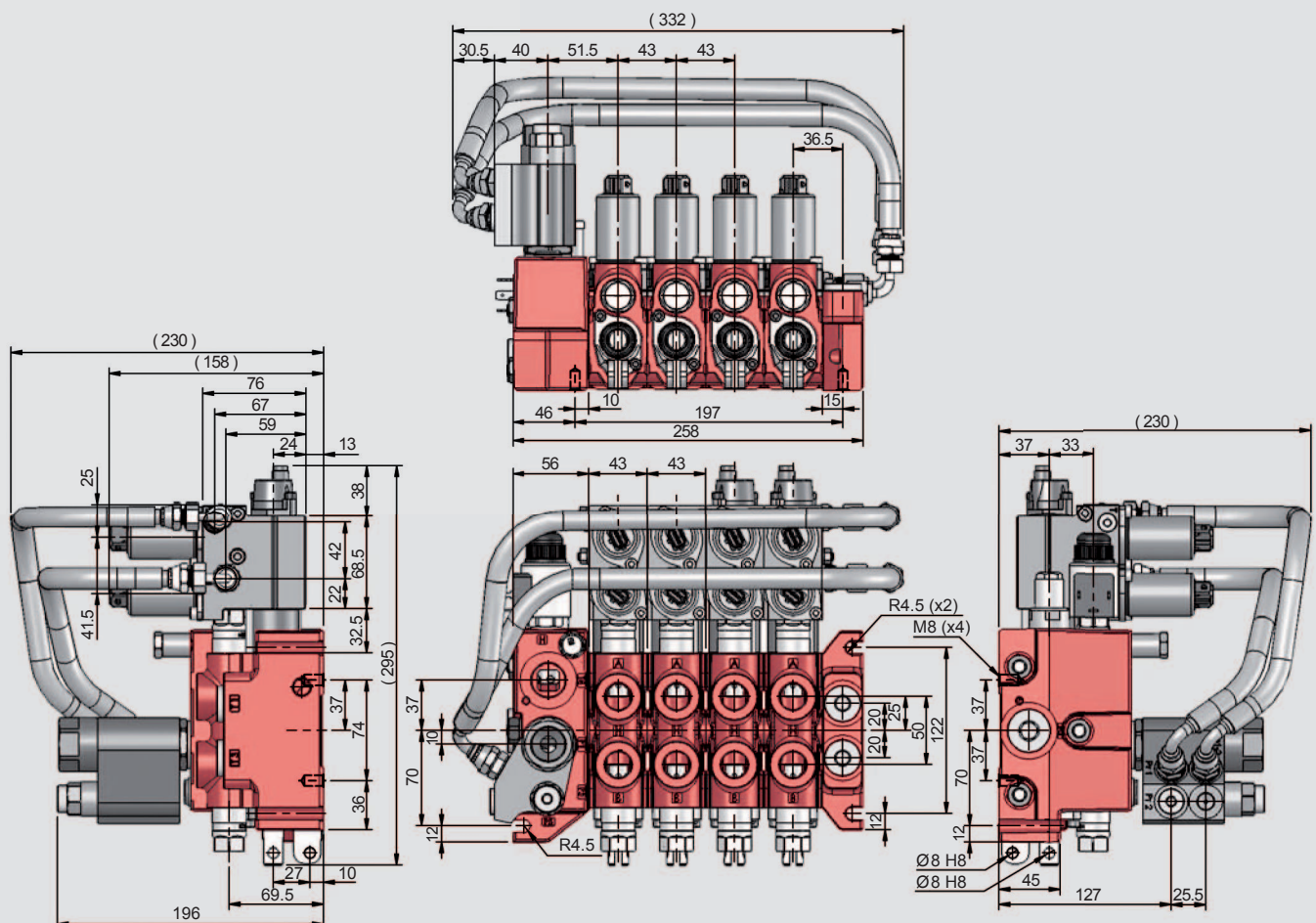


The spool control shall be assembled on the valves A-side.

The design is a double acting cylinder that positions the spool against a spring. The proportional solenoid valves are available both for 12 Volts as well as for 24 Volts and for PWM supply.



The spool controls can also be delivered with a spool position indicator.

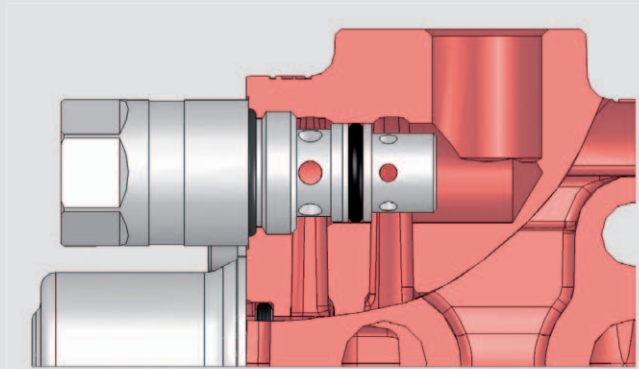
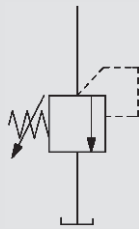


Service port valves

Port relief valve TBD121

TBD121 is a direct acting relief valve for the secondary circuit. It is adjustable and sealable.

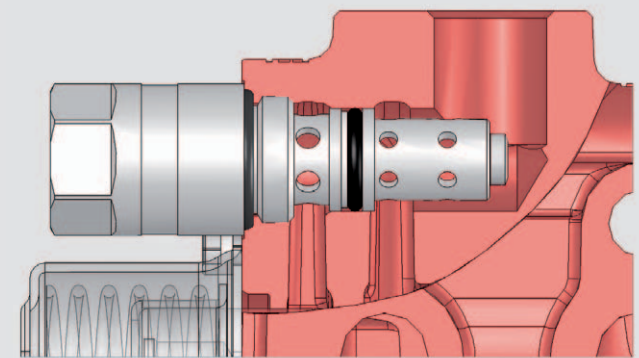
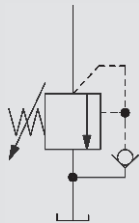
- Setting range:
35 – 300 bar (3.5 – 30.0 MPa)
- Setting range step: 5 bar



Port relief and anticavitation valve TBSD121

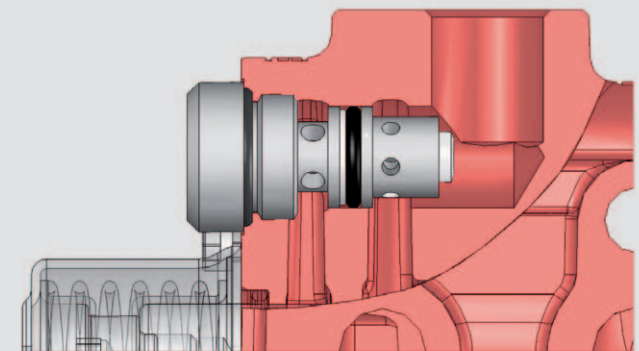
See TBD121 and SB160 for functional principles.

- Setting range:
35 – 300 bar (3.5 – 30.0 MPa)
- Setting range step: 5 bar

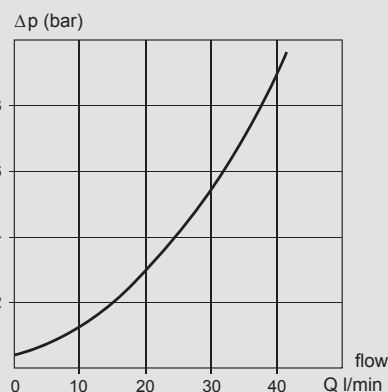


Anticavitation valve SB160

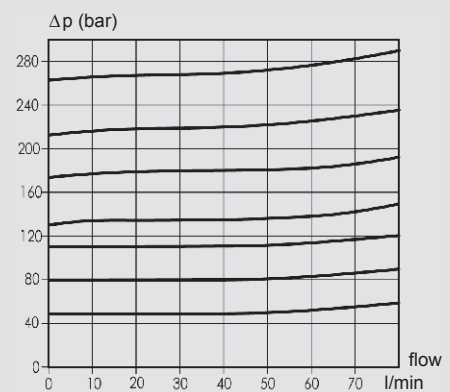
The anticavitation valve ensures that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.



Anticavitation and pressure drop characteristics

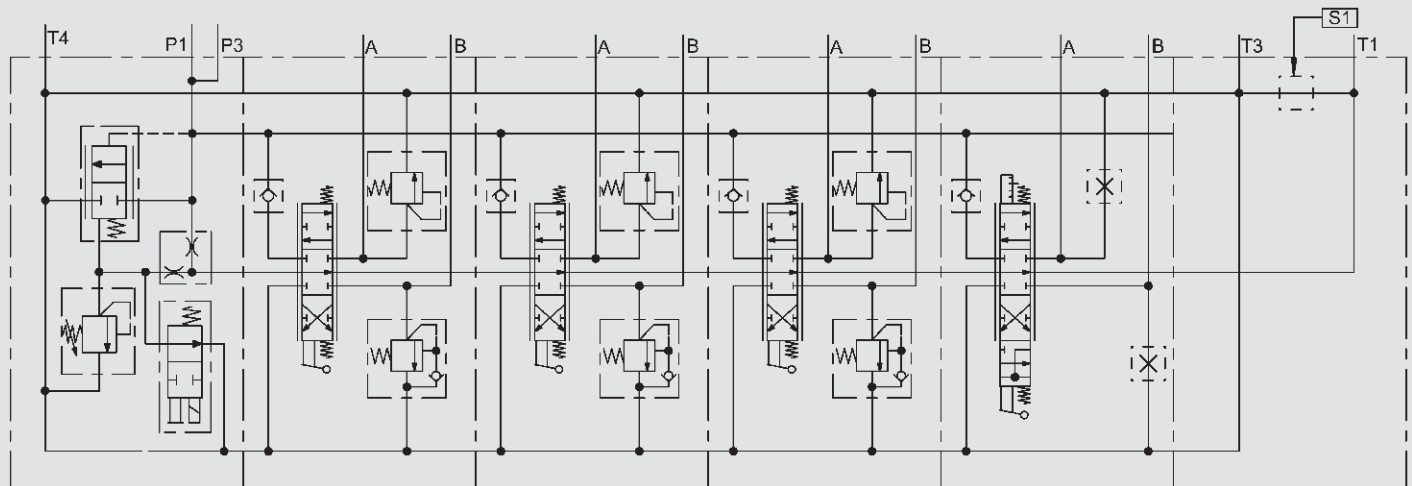


Anticavitation characteristics
TBSD121 and SB160

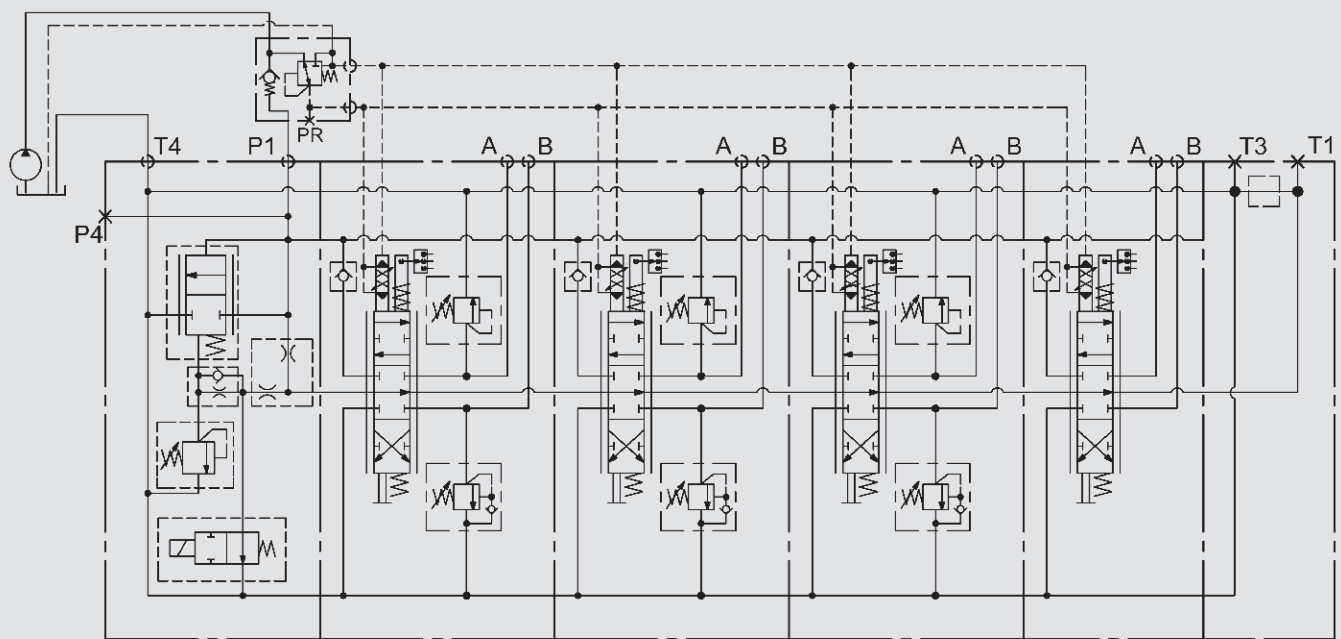


Pressure drop characteristics
TBD/TBSD121

Typical hydraulic diagrams



Hydraulic diagram for a 4-sectional RS 210 valve.
 It is fitted with a Q-inlet with electrical unloading.
 The first 3 sections contain 3-positions spools for double acting functions and port relief and anticavitation valves.
 The 4th section contains a 4-position spool for double acting functions with float position in position 4. The outlet section gives possibility for high pressure carry-over (if S1 is plugged).



The circuit diagram shows a complete RS 210 valve, 4 sections with an inlet with flow regulator ("Q-inlet") and completed with pilot supply and spool controls for remote control.
 Note the separate piping to tank for the return flow from the remote control. It is required to pipe up the system in that way in order to avoid high pressure and pressure peaks in the return line.



Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.



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