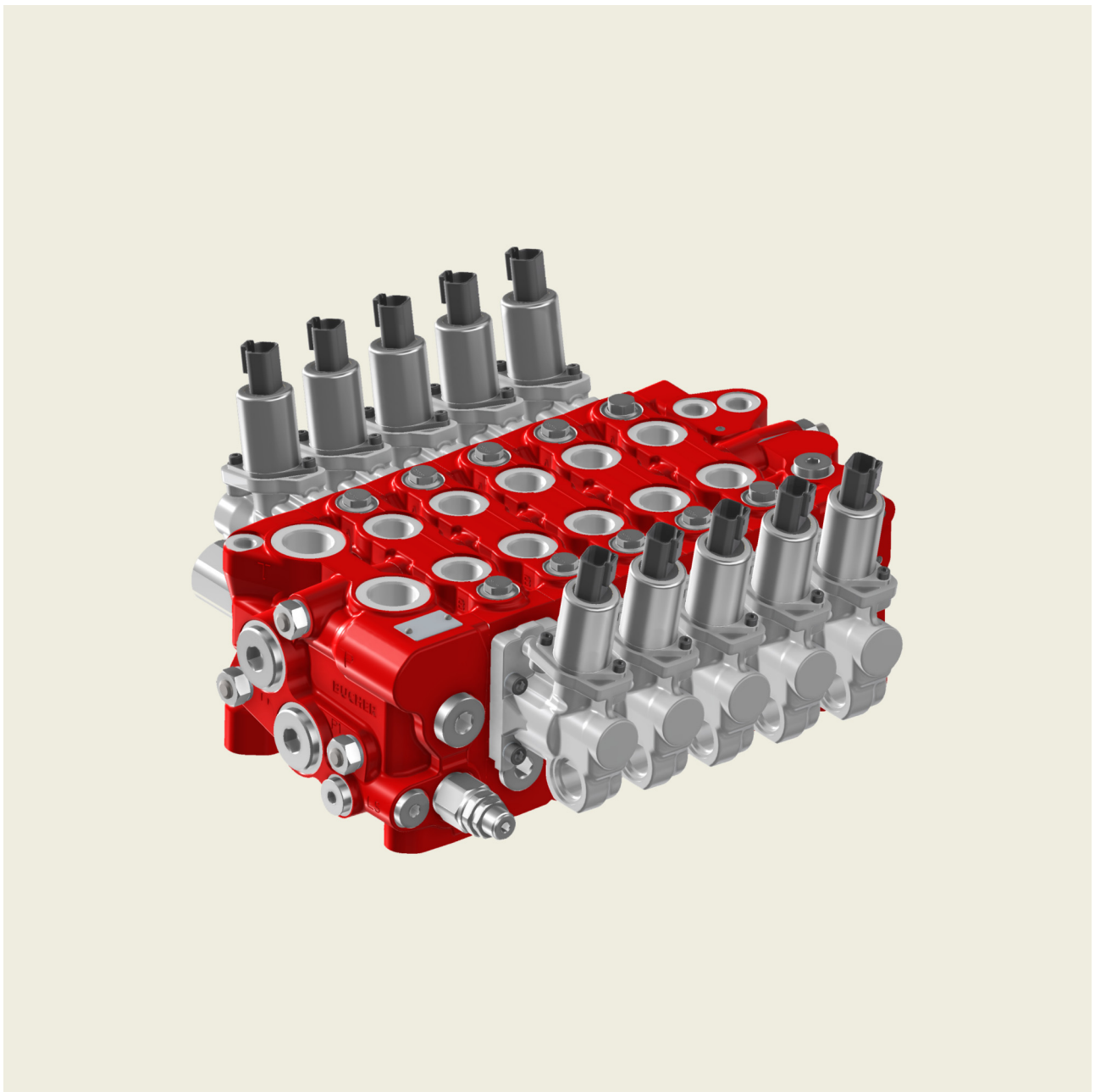


Directional Control Valve HDS24

Proportional Flow Sharing



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1 General information

1.1 Introduction

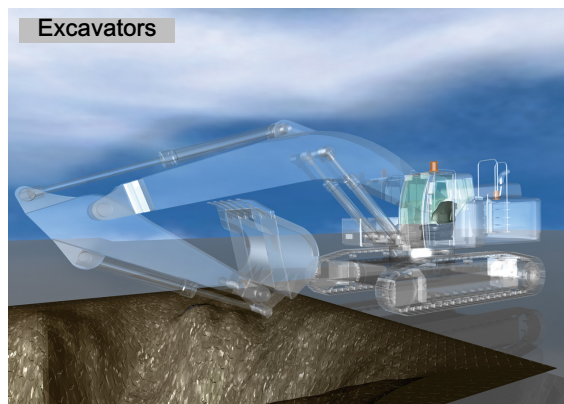
The commitment of machine manufacturers, to comply with the global guidelines of energy saving and functional safety, is increased considerably, in recent years, forcing the entire production chain to a big effort in order to follow technological innovation trend.

In this context, the consolidated leadership and extensive know-how in telescopic loaders, material handling and earth moving applications, the deep experience in the field, the powerful capacity to develop innovative solutions and the strong commitment to anticipate the upcoming technical and application needs of our customers, have guided Bucher Hydraulics in the development of the new flow-sharing size 12 directional valve HDS24.

The flexible and versatile construction with a wide range of inlet and outlet covers as well as of controls, gives the designer a high degree of freedom in the choice of the valve configuration and of the hydraulic circuit which fits in the best way the machine requirements.

Each valve section can be equipped with a load holding valve as well as flow sharing or priority pressure compensators, whose stability and smooth behaviour grant high levels of system controllability.

The wide range of controls, combined with innovative solutions and compact dimensions, makes HDS24 a powerful and flexible product able to fulfil all the requirements of modern machines.



1.2 Directional valve installation

For the installation of the directional control valve it is important to consider the following recommendations:

- the valve can be assembled in any position but, in order to avoid deformations and spool sticking, the surface on which the product is mounted has to be flat;
- before cabling pipelines, make sure that the pipeline hollows as well as fittings and seals are thoroughly clean; check also that the work ports are protected until the connection of the pipelines

- during assembly and servicing operations, it is necessary to adopt clean procedures and work in an environment free of chips, swarf, dust and other possible source of pollution;
- if the spools are connected to the machine controls through additional linkages, make sure that they do not affect their proper operation;
- before painting the valve, check that the work port plastic plugs are tightly in place.

1.3 Fittings

In the interest of safety, only fittings with STRAIGHT THREAD ENDS should be used (e.g. DIN3852).

Fittings with TAPERED THREAD ENDS (e.g. DIN 3852 form C) must never be used, as they can cause deformation and cracks in the valve body.

Our warranty conditions will not be valid in case tapered fittings are used.

The work port adaptors have to be fastened respecting the tightening torque values indicated in the following table (for different port types contact our Sales Dept.):

Recommended tightening torque for work port fittings - Nm / lbf				
Metric - ISO 261	M14X1.5	M18X1.5	M22X1.5	M27X2
With O-Ring seal (ISO 6149-1)	30 / 22.1	40 / 29.5	60 / 44.3	90 / 66.4
With copper washer (ISO 9974-1)	30 / 22.1	40 / 29.5	60 / 44.3	90 / 66.4
With rubber washer or steel (ISO 9974-1)	25 / 18.4	35 / 25.8	60 / 44.3	70 / 51.7
BSP - ISO 228-1	1/4" BSP	3/8" BSP	1/2" BSP	3/4" BSP
With copper washer (ISO 1179-1)	30 / 22.1	40 / 29.5	60 / 44.3	90 / 66.4
With rubber washer or steel (ISO 1179-1)	25 / 18.4	35 / 25.8	60 / 44.3	70 / 51.7
UN-UNF - ISO 263	SAE6 - 9/16-18 UNF	SAE8 - 3/4-16 UNF	SAE10 - 7/8-14UNF	SAE12 - 1-1/16-12UNF
With O-Ring seal (ISO 11926-1)	30 / 22.1	40 / 29.5	60 / 44.3	90 / 66.4

For metric threads availability please contact our Sales Department



IMPORTANT!: Tightening torques depends on several different factors including lubrication, coating and surfaces finish. The fitting manufacturer shall be consulted.

1.4 Hydraulic fluid

The main function of the fluid used in hydraulic systems is to transfer energy but it performs also other important functions: protect the components from corrosion, lubricate the directional valve sliding parts, remove particles and heat from the system.

In order to ensure proper operation and long life of the system it is important to choose the correct hydraulic fluid with proper additives.

Bucher Hydraulics recommends to use a mineral based oil responding to ISO 6743/4 requirements, only.

The system should be operated only with hydraulic oil containing anti-foaming and antioxidant additives.

Before using other types of fluid, please contact our Sales Department, since they can cause serious damage to the directional valve components and jeopardize the correct function of the system.

1.5 Filtration

In order to ensure proper operation and long life of the directional valve components it is extremely important to provide a proper and effective filtration of the hydraulic fluid. It is advisable to follow filter manufacturers instructions and recommendations.

The fineness of the filter should be selected in order to maintain the fluid contamination level according to the values listed at section 1.7 (Technical specification)

It is advisable to use a pressure filter with by-pass and indicator.

The size of return filters must suit the maximum return flow whereas the size of pressure filters must suit the maximum pump flow.

It is advisable to fit filters with pressure gauge or dirt indicator in order to make it possible to verify the filter condition.

Particular attention has to be paid to the cleaning of the machine hydraulic circuit and its components before the first run-in, since the presence of foreign materials could cause damages to the directional valve components even if a proper filtration is provided.

The filters integrated in the HDS24 are provided to protect the valve components against big particles and not to filter the system.

1.6 Directives and standards

- PED (97/23/EC)

The pressure relief valves assembled into the directional control valve can not to be considered and/or confused with the safety valve when the PED Directive is applied to the hydraulic system.

- Atex



Attention: The equipment and protective systems of this catalogue ARE NOT intended for use in potentially explosive atmospheres. Ref: Directive 99/92/EC and Directive 2014/34/UE

- ISO 9001:2015 / ISO 14001:2015

Bucher Hydraulics S.p.A. is certified for research, development and production of directional control valves, power units, gear pumps and motors, electro pumps, cartridge valves and integrated manifolds for hydraulic applications.

1.7 Technical specification:



IMPORTANT!: Parameter values and diagrams shown in this catalogue have been measured with mineral oil having a viscosity of 23 mm²/s at 50° C

Features		
Max inlet flow		130 l/min (35 US gpm)
Max inlet pressure (P) ¹⁾		280 bar (4060 PSI)
Max work port pressure (A/B) ¹⁾		320 bar (4640 PSI)
Max back pressure (T)	standard	30 bar (430 PSI)
	with electro-hydraulic positioner (EHO)	5 bar (70 PSI) (*)
Max internal leakage A/B→T (at 100 bar/1450 PSI, 23 mm ² /s) ²⁾	without port valves standard	16 cc/min (**) (0.976 Cu In/min)
	with port valves standard	20 cc/min (**) (1.22 Cu In/min)
Fluid		mineral based oil (see 1.4)
Fluid temperature (with NBR seals)		-20°C / +80°C (-4° to 176° F)
Max contamination level		20/18/15 ISO 4406:1999 (NAS 1638 class 9)
Viscosity operating range	recommended	from 15 to 75 mm ² /s
	admissible	from 12 to 400 mm ² /s
Max number of elements		10
Ambient temperature in operating conditions:	with mechanical/hydraulic/ pneumatic controls	from -30 to +60 °C
	with electric/ electrohydraulic devices	from -30 to +50 °C
Tie-rods tightening torque	standard	30 Nm

For different operating conditions, please contact our Sales Dept.

1) Fatigue tested according to internal procedure at 1.16x rated pressure on 6 samples for 1' 000' 000 cycles.

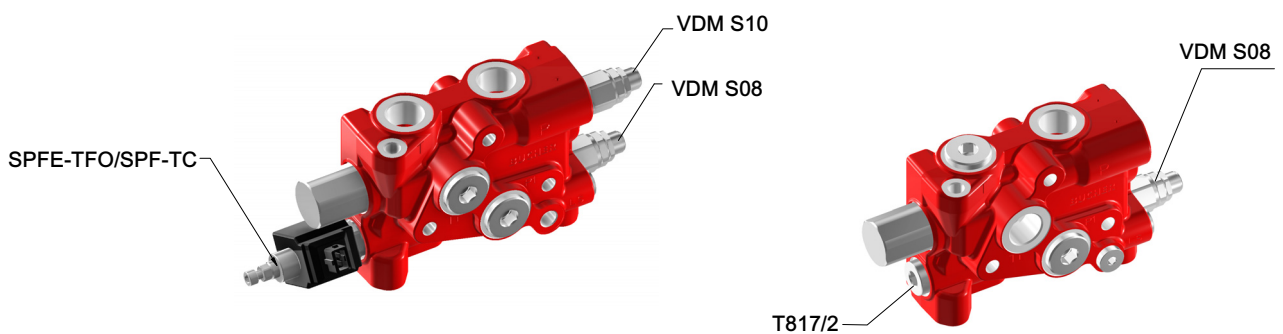
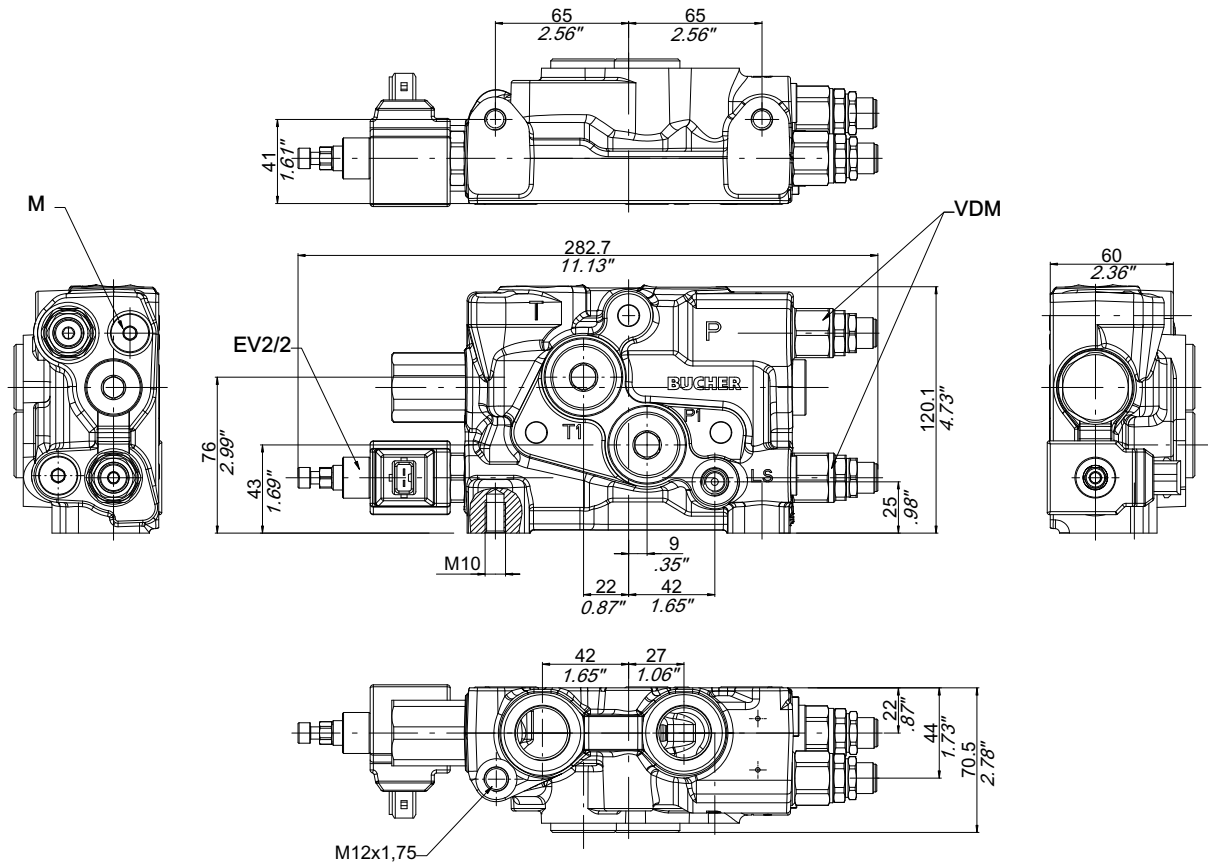
2) Spool leakage values are strongly influenced by fluid viscosity with a linear inversed relationship: 10 cc/min at 100 bar and 23 cSt become roughly 5 cc/min at 100 bar and 46 cSt.

(**) Lower values can be provided on demand

(*) With electro-hydraulic pilot heads the back pressure must not exceed 5 bar. For higher back pressure values the pilot flow must be unloaded to tank through a separate line (Tp)

2 Inlet covers

2.1 Standard, for fixed/LS pumps



VDM S10 = P full flow adjustable relief valve.

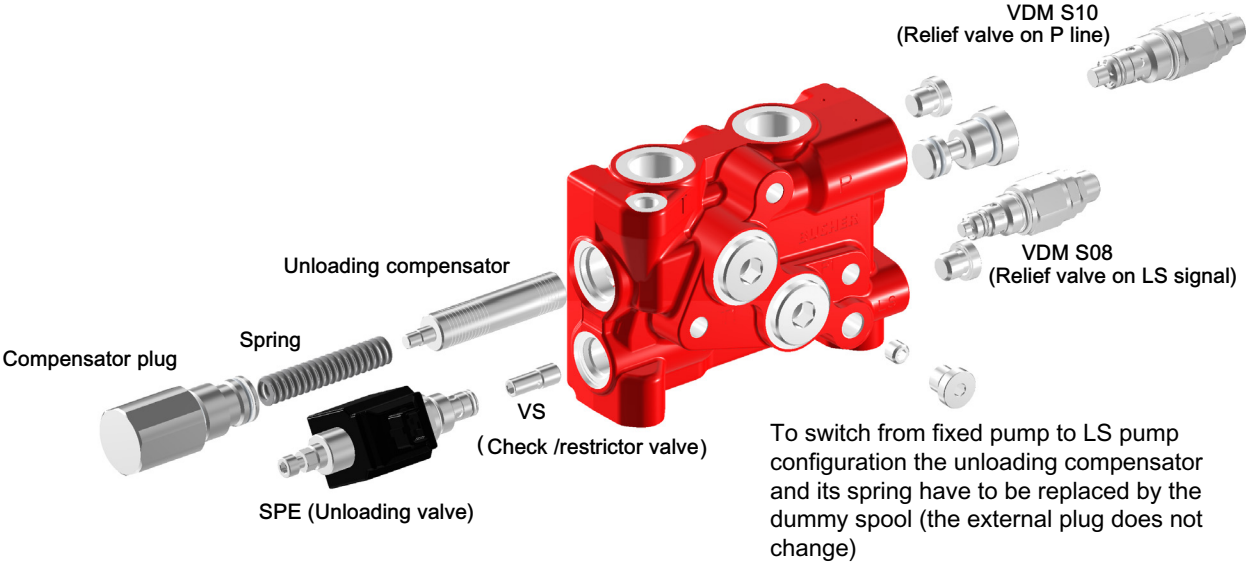
VDM S08 = Ls signal adjustable relief valve.

SPFE-TFO= Electrovalve normally open with emergency screw.

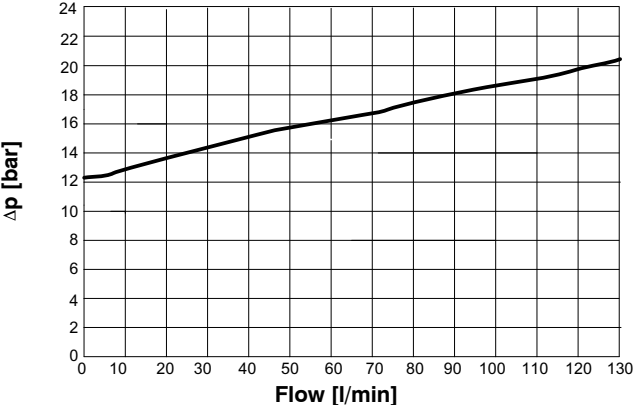
SPF-TC= Electrovalve normally closed with emergency screw.

2.1.1 Ports Size

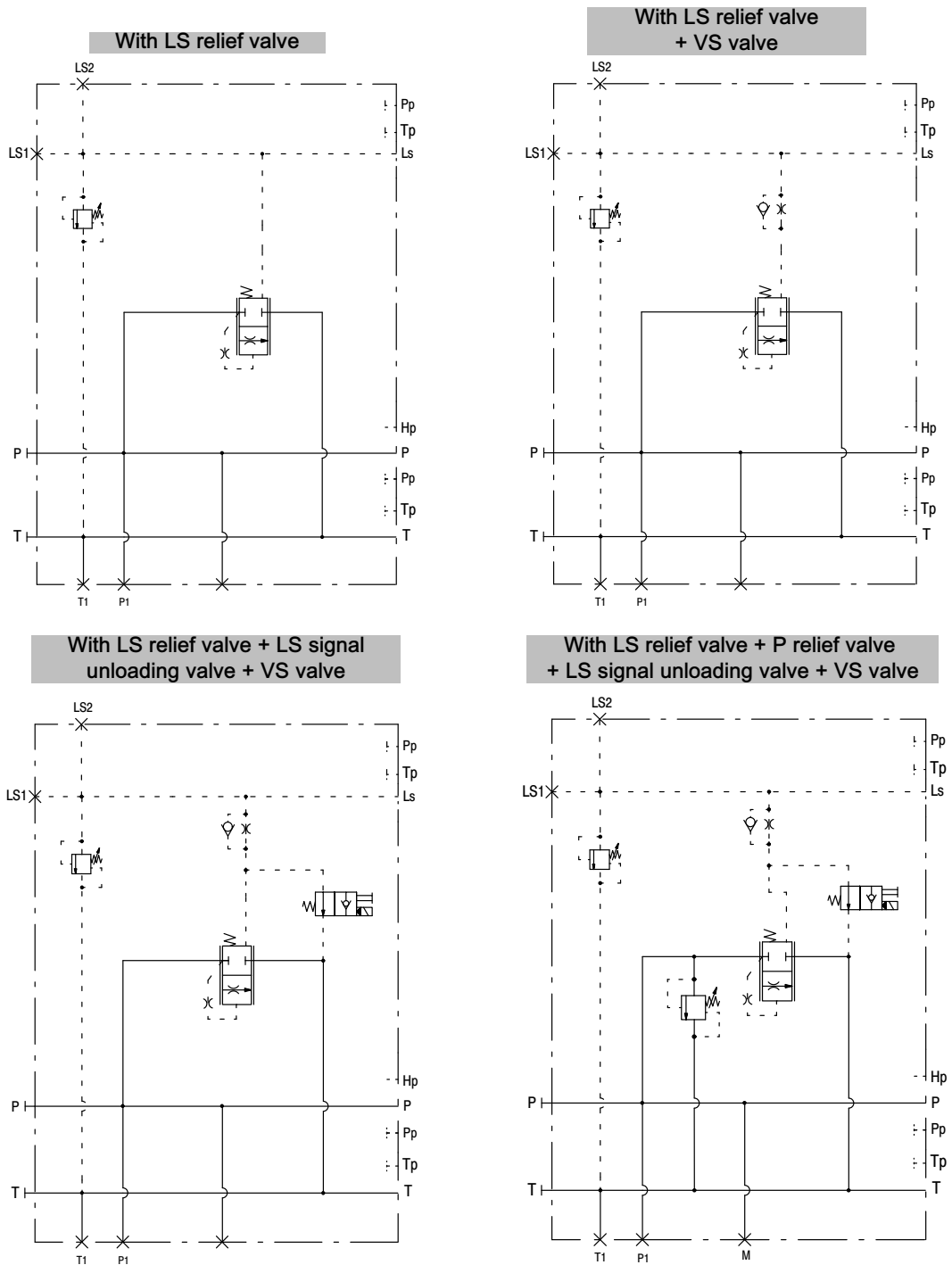
Threads	P	T	T1	P1	LS	M
BSP	3/4"	3/4"	3/4"	3/4"	1/4"	1/4"
UNF	SAE12	SAE12	SAE12	SAE12	SAE6	SAE6



Unloading compensator P → T characteristic

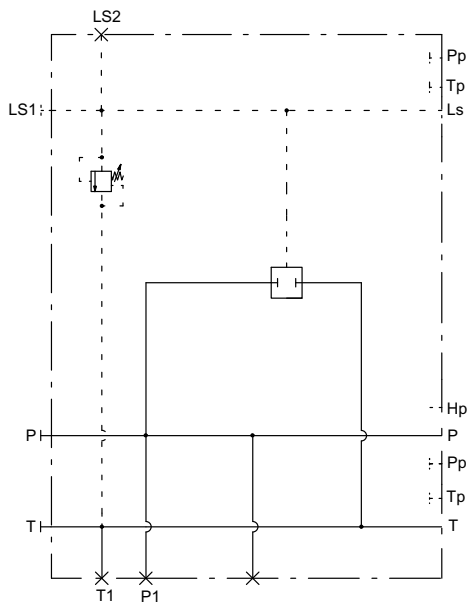


2.1.2 Systems with fixed displacement pump (TF) - Examples

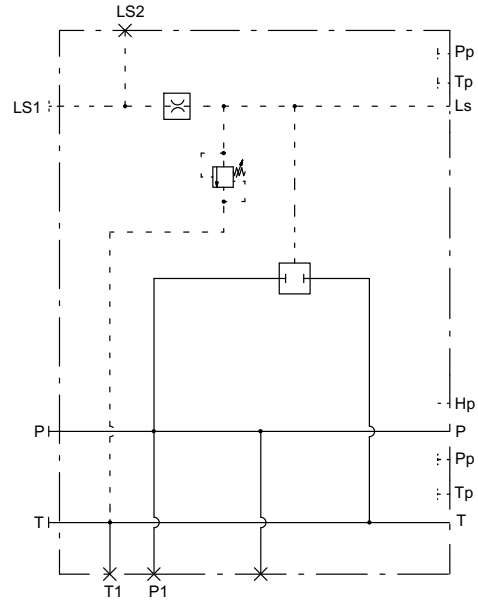


2.1.3 Systems with LS pump (TV) - Examples

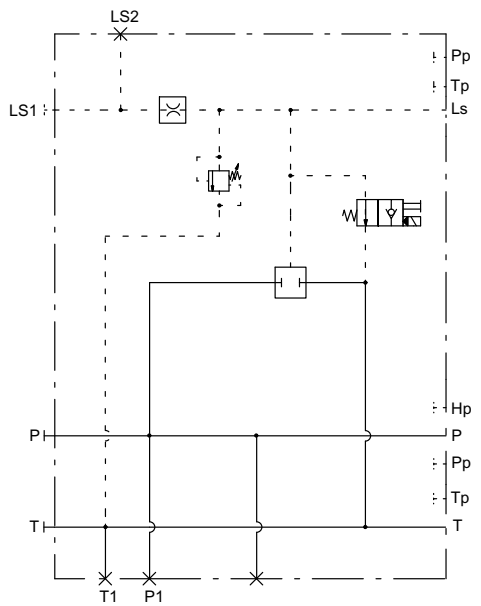
With LS relief valve



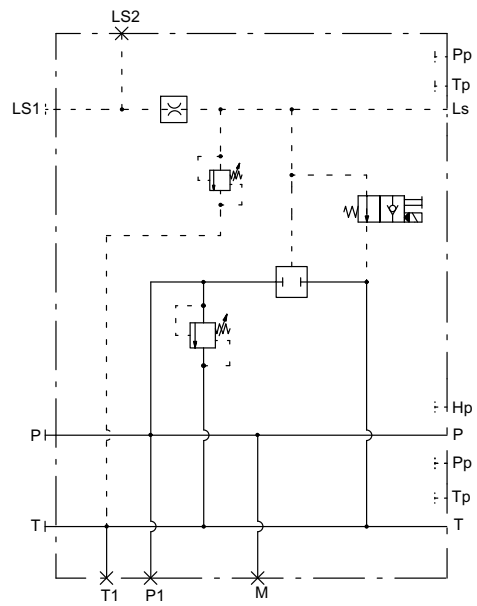
With LS relief valve + damping with LS output signal



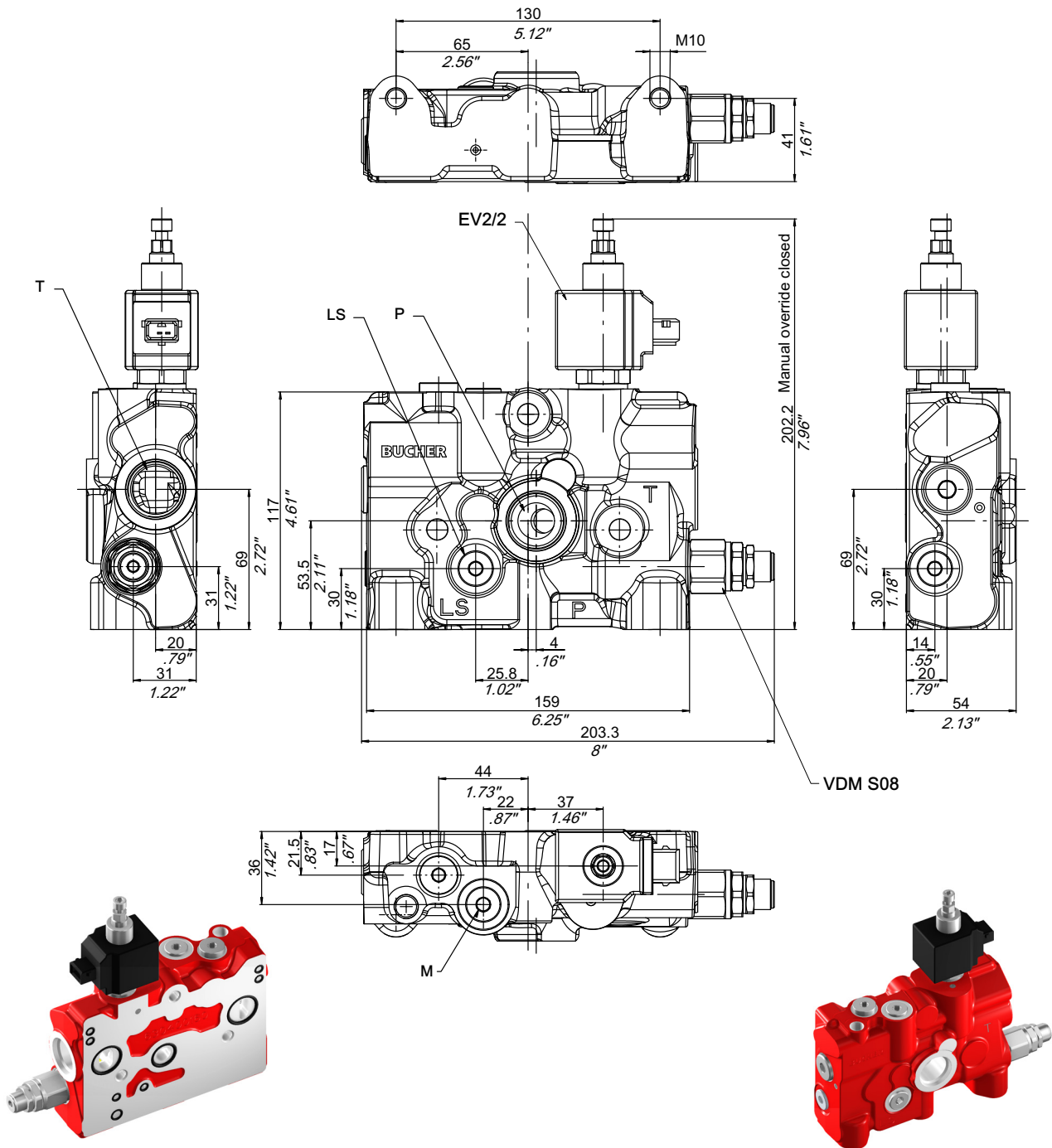
With LS relief valve + damping on LS output signal + LS signal unloading valve



With LS relief valve + P relief valve + damping on LS output signal + LS signal unloading valve



2.2 PT type - System with LS pump



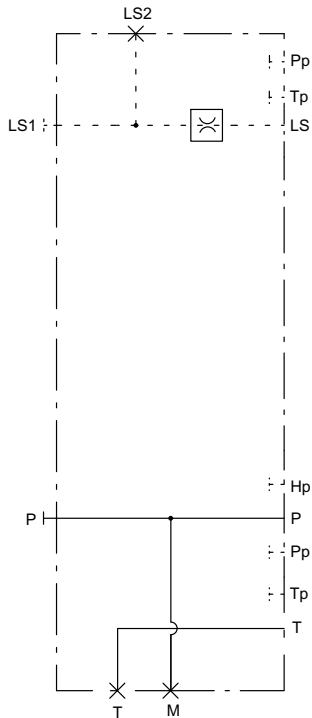
2.2.1 Ports Size

Threads	P	T	LS	M
BSP	3/4"	3/4"	1/4"	1/4"
UNF	SAE12	SAE12	SAE6	SAE6

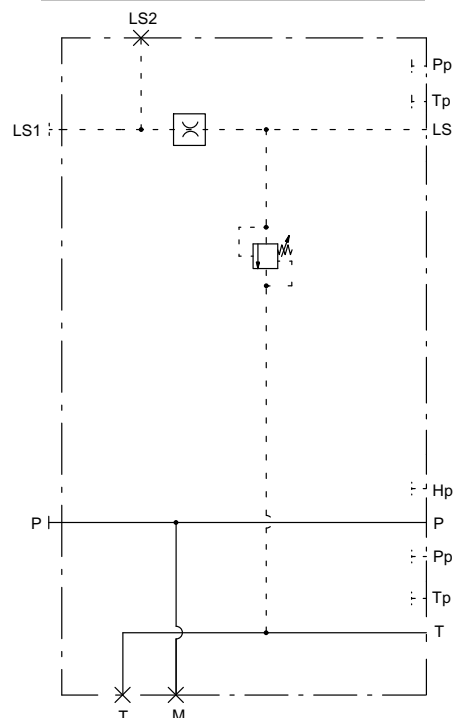
For further information, please contact our Sales Department.

2.2.2 PT type - Systems with LS pump - Examples

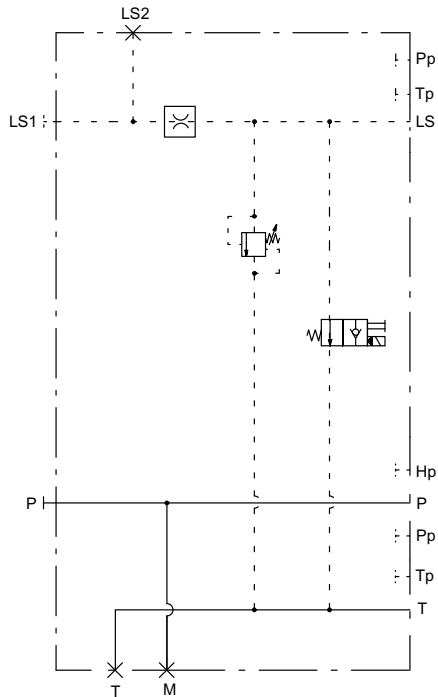
With damping on LS output signal
+ manometric port on P signal (M)



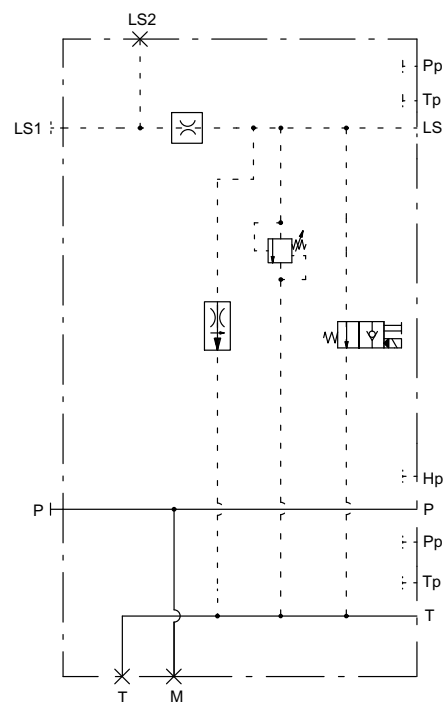
With damping on LS output signal
+ LS relief valve
+ Manometric port on P signal (M)



With damping on LS output signal
+ LS relief valve
+ LS signal unloading valve
+ Manometric port on P signal (M)



With LS flow control
+ damping on LS output signal
+ LS relief valve
+ LS signal unloading valve
+ Manometric port on P signal (M)



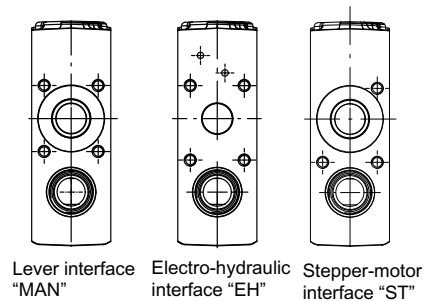
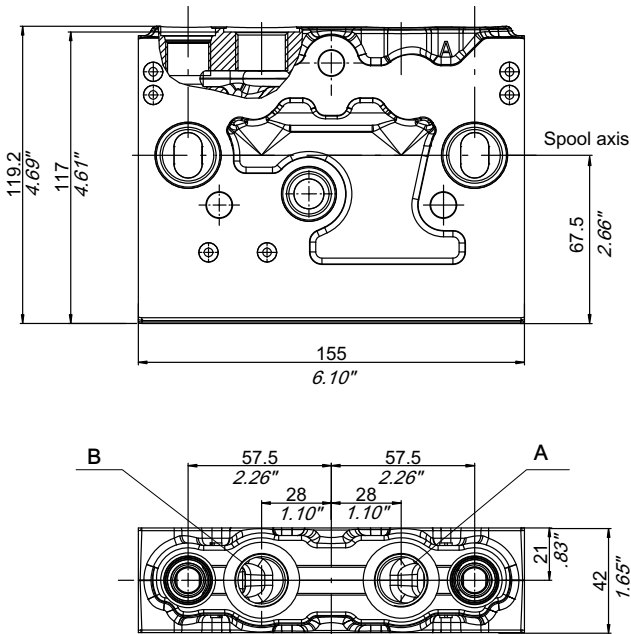
3 Elements

3.1 Standard body arrangements KLS/KCS

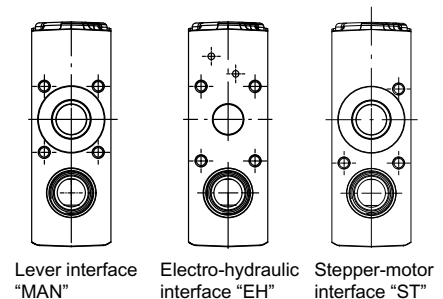
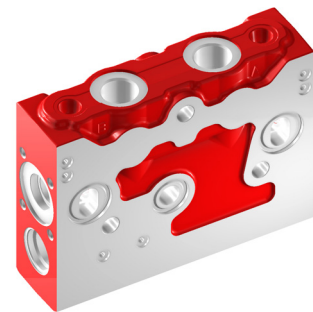
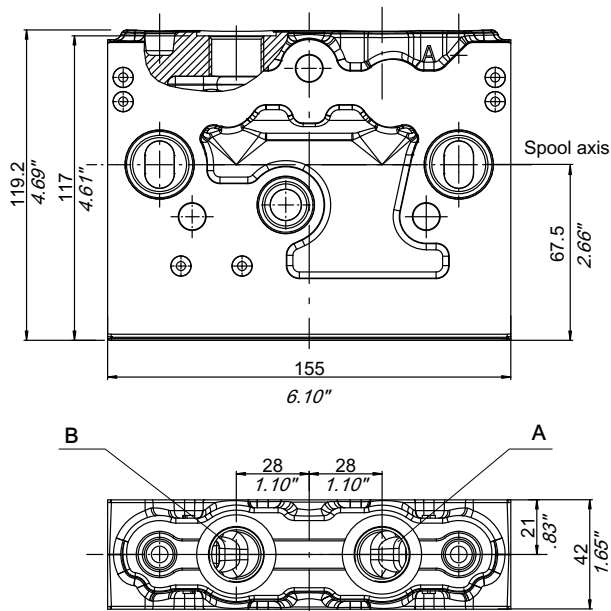
"KLS": with local compensator with check function

"KCS" : with local compensator without check function

3.1.1 With service port cavities



3.1.2 Without service port cavities



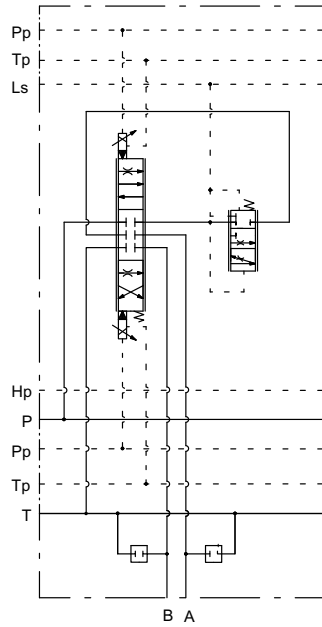
3.1.3 Ports size

Threads	Standard A/B
BSP	1/2"
UNF	SAE10
Metric	M22X1.5

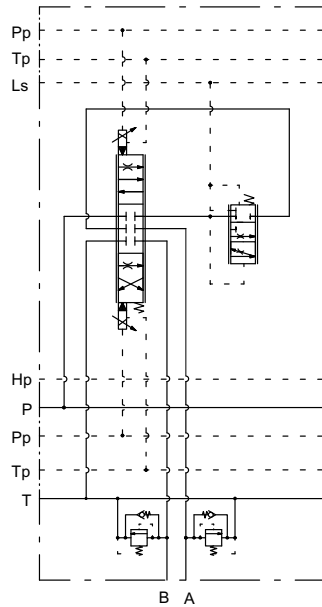
3.2 Element hydraulic schemes

KCS

Local compensator

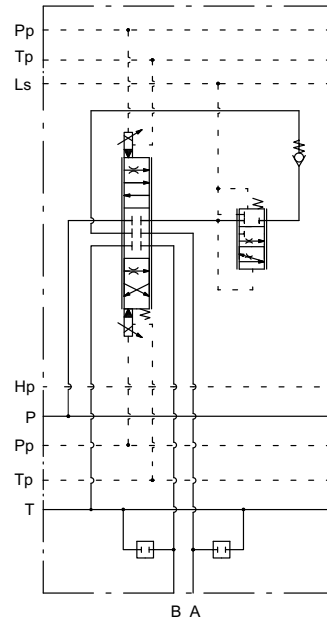


Local compensator + service port valves

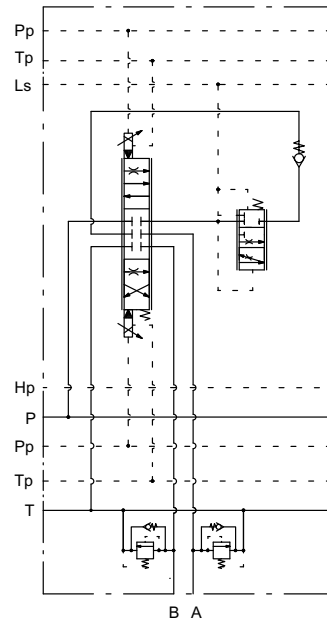


KLS

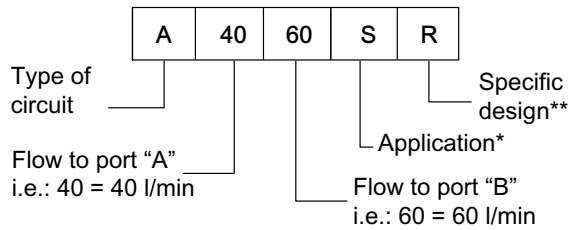
Local compensator + check function



Local compensator + check function + service port valves



4 Spools



Example of symmetric spool: A1010S

Example of not symmetric spool: A1080S

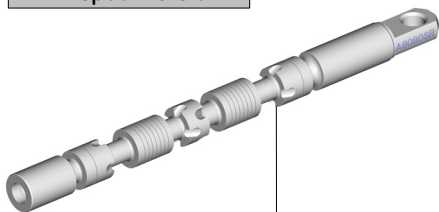
* S = standard overlap

** R = linear metering with soft start for rotation

Note: contact our Sales Dept. for asymmetrical spool available combinations

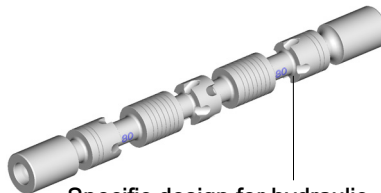
Ref	Nominal Flow (13 bar margin)
10	10 l/min
20	20 l/min
30	30 l/min
40	40 l/min
60	60 l/min
80	80 l/min
C0	100 l/min

MAN spool version



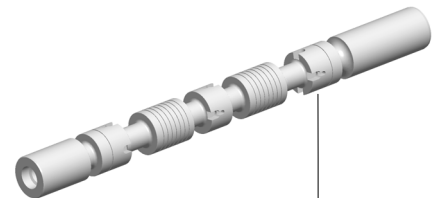
Specific design for manual controls

EH spool version



Specific design for hydraulic and electro-hydraulic controls

ST spool version

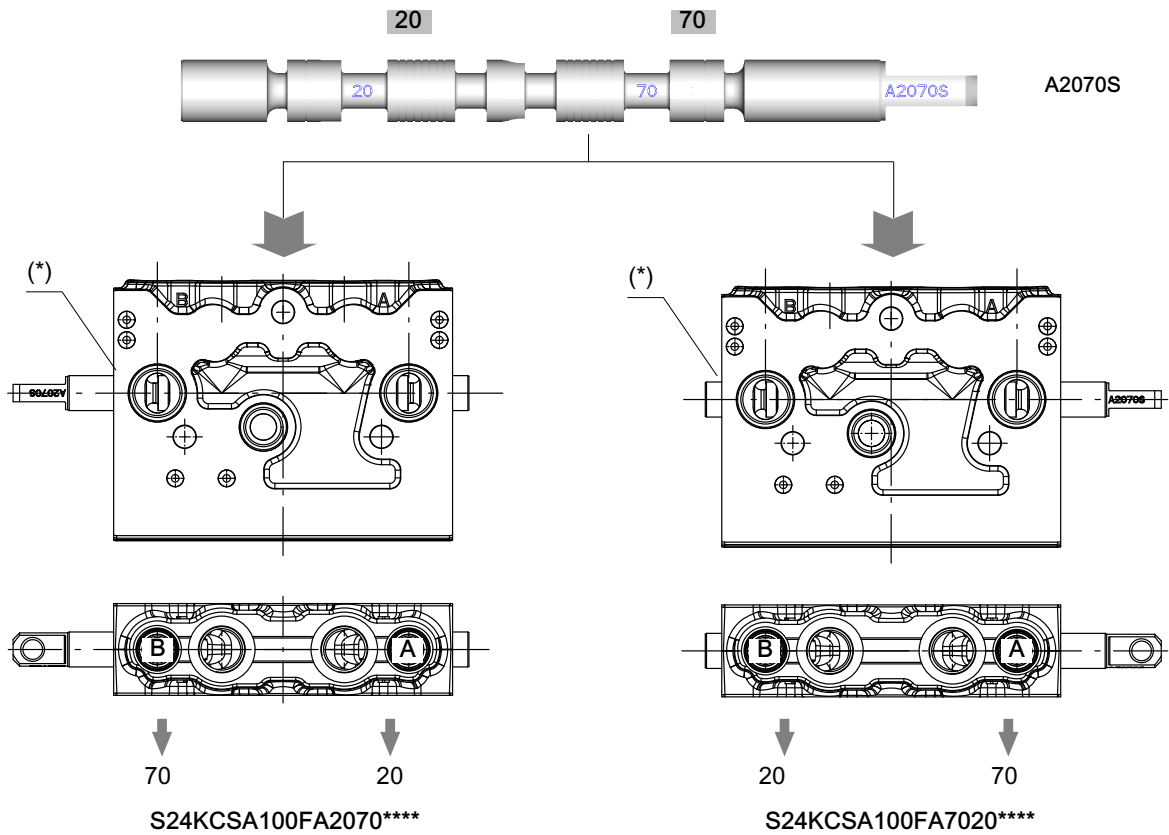


Specific design for stepper-motor controls

Spool Type	Hydraulic schematic	Features
A		A/B ports closed to tank
C		A/B ports connected to tank - Motor spool
D		B port connected to tank A port closed
L		A port connected to tank B port closed
W		Floating position pushing the spool
S		Single effect
G		Single effect

4.1 Spools metering

Not symmetric spools example

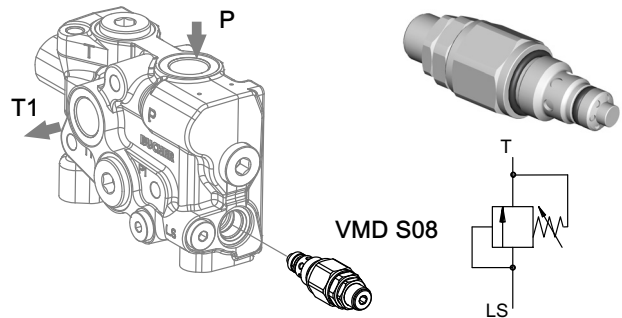
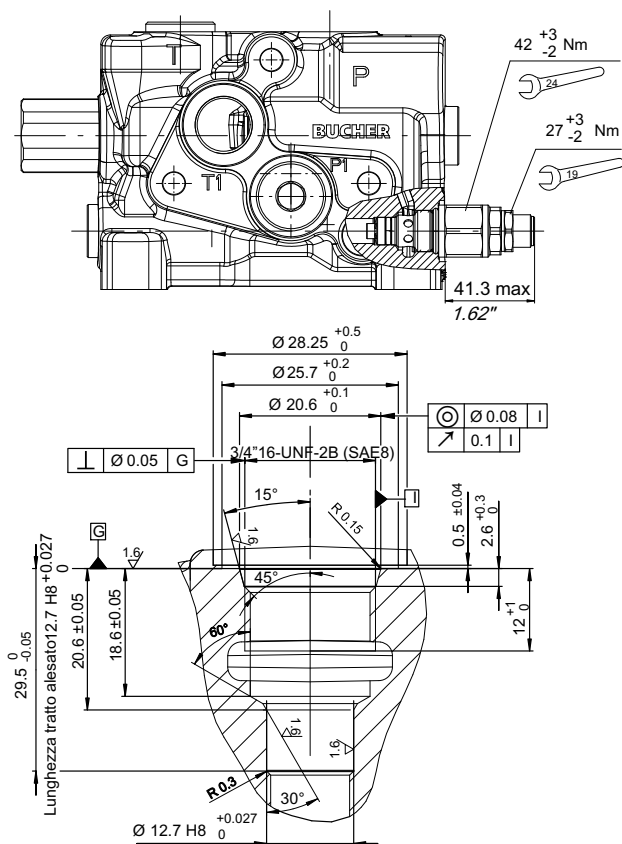


(*) Independently by lever spool position, "B" port remains always in the same side (the body is printed)

Note: contact our Sales Dept. for asymmetrical spool available combinations

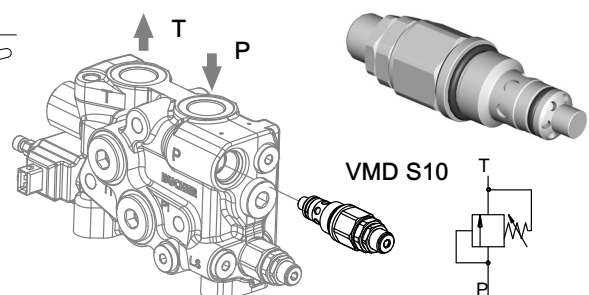
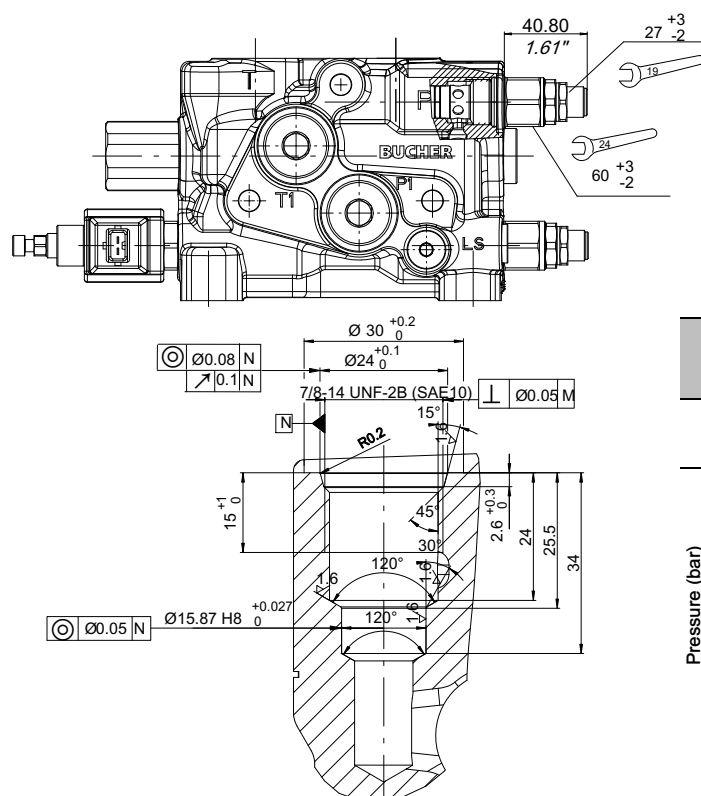
5 Valves

5.1 LS signal adjustable relief valve

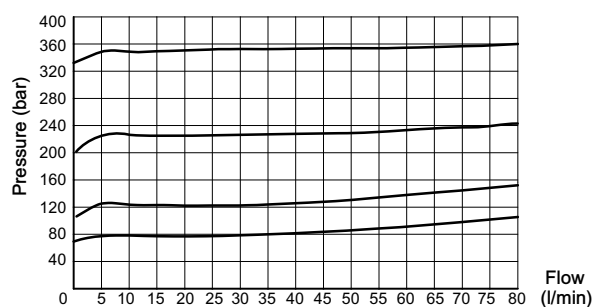


Pressure setting range bar (PSI)	Type	Code
40- 200 (580 - 5080)	VMD S08 T.20	200533930168
201- 350 (2910 - 5080)	VMD S08 T.35	200533930167

5.2 Adjustable relief valve on P port

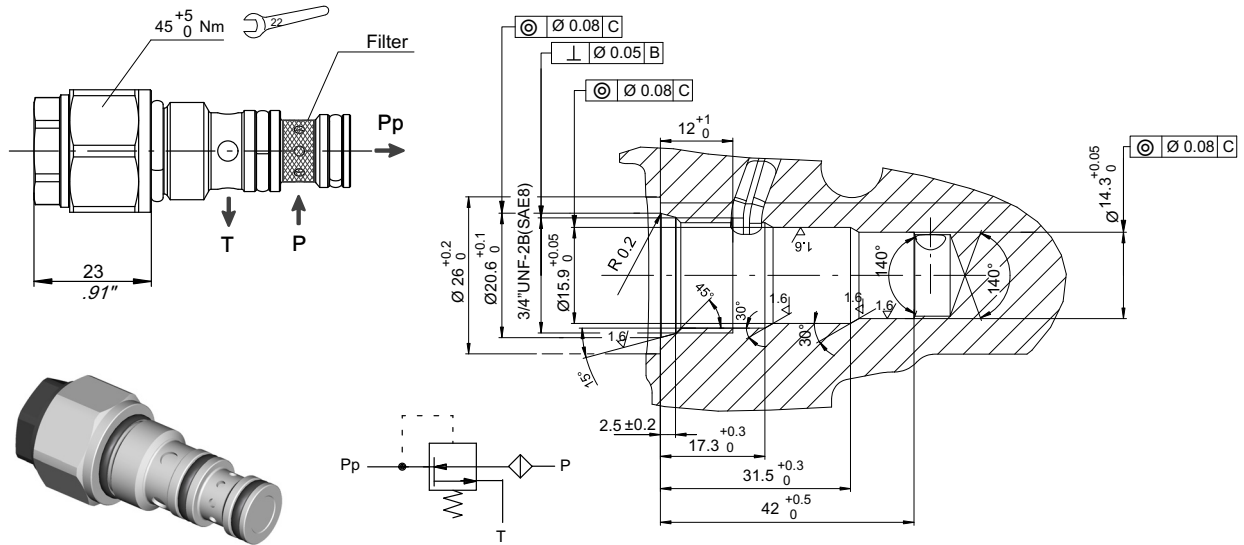


Pressure setting range bar (PSI)	Type	Code
221 - 350 (3200 - 5080)	VMD S10	-



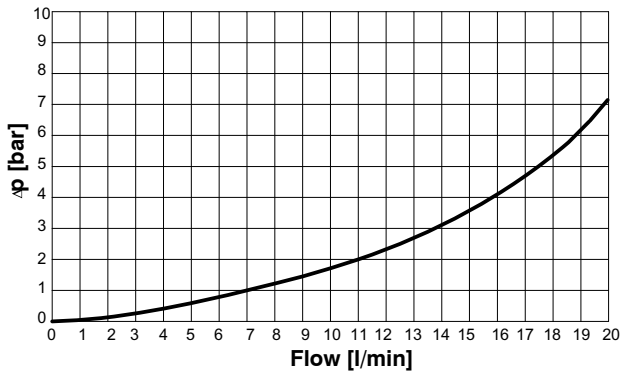
For further information, please contact our Sales Department.

5.3 Pressure reducing valve VRP

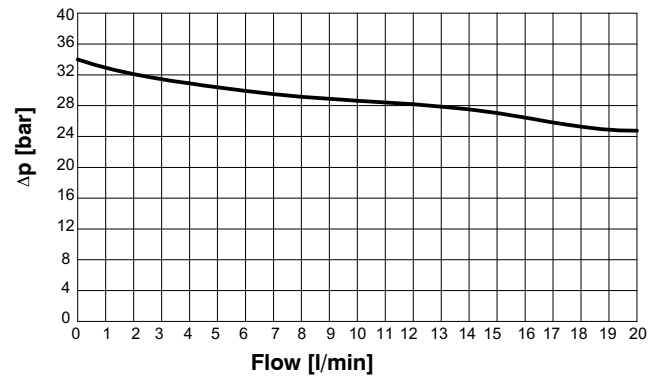


Type	Code	Nominal pressure (bar)
VALV VRP08-T32-F	200533930174	32

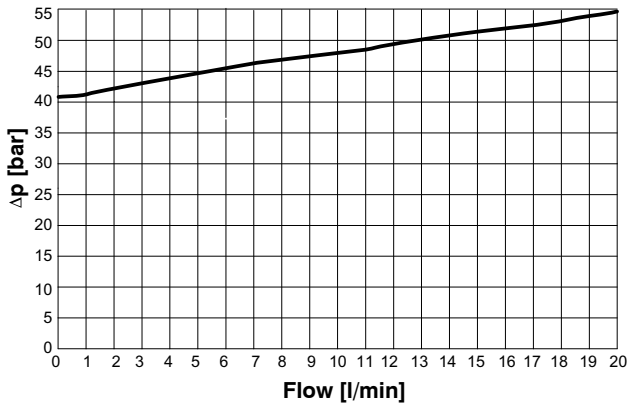
Pressure Vs. Flow Curve P → Pp (Fully open)



Pressure Vs. Flow Curve P → Pp (Reducing)



Pressure Vs. Flow Curve Pp → T (Relieving)

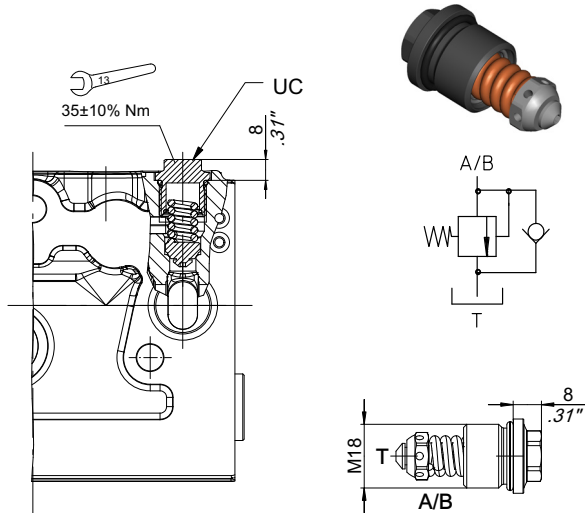


(See back cover section).

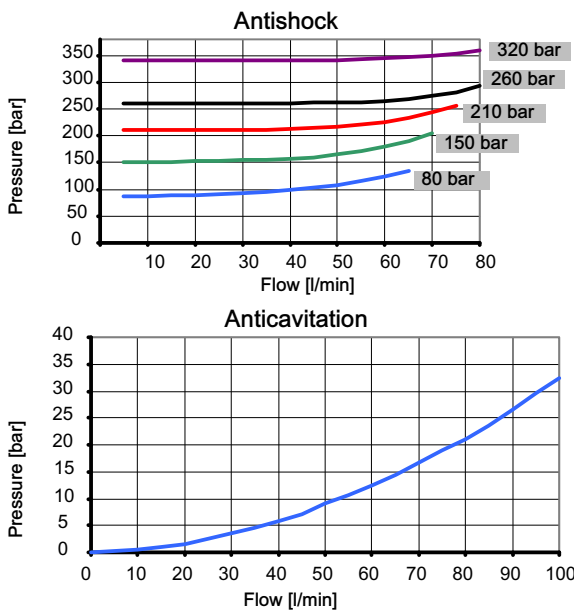
6 Valves

6.1 Anti-shock and anti-cavitation valves UC

6.1.1 Fixed setting



Pressure setting at 10 l/min (*) bar (psi)	Code
50 (720)	200533930240
80 (1160)	200533930370
100 (1450)	200533930250
120 (1740)	200533930260
150 (2170)	200533930270
160 (2320)	200533930380
170 (2460)	200533930280
180 (2610)	200533930460
190 (2750)	200533930290
200 (2900)	200533930300
210 (3040)	200533930310
230 (3330)	200533930320
240 (3480)	200533930390
250 (3620)	200533930330
260 (3770)	200533930400
270 (3910)	200533930410
280 (4060)	200533930340
320 (4640)	200533930350
350 (5070)	200533930360
VC (plug)	200778400410

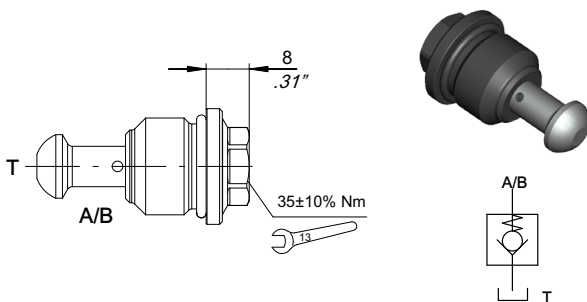


(*) For different pressure settings please contact our Sales Department

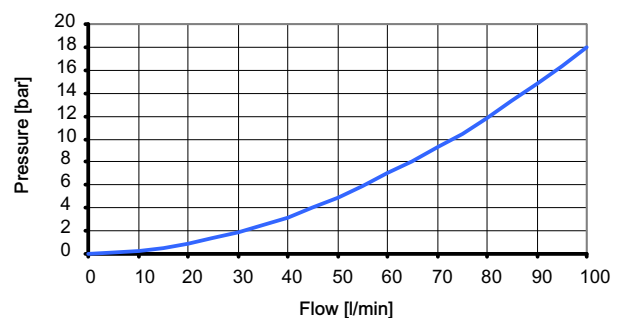


IMPORTANT! The UC anti-shock valve is designed to absorb shock effects. Therefore, it should not be used as pressure relief valve

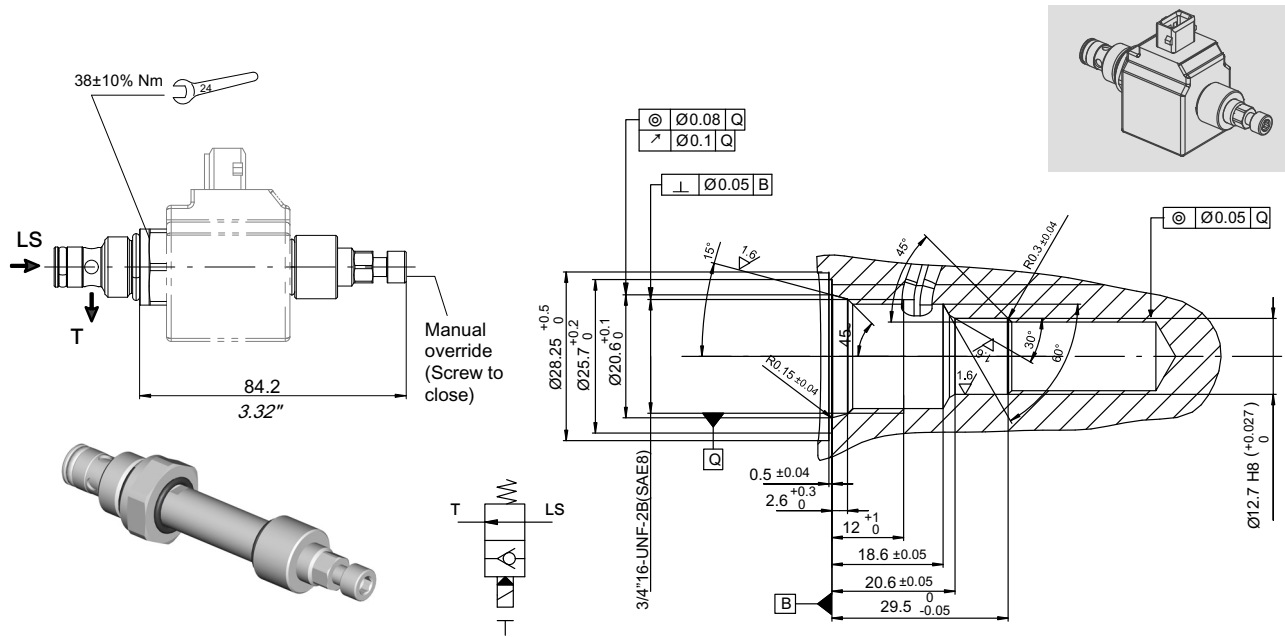
6.2 Anti-cavitation valves C



Type	Code
C	200533940088

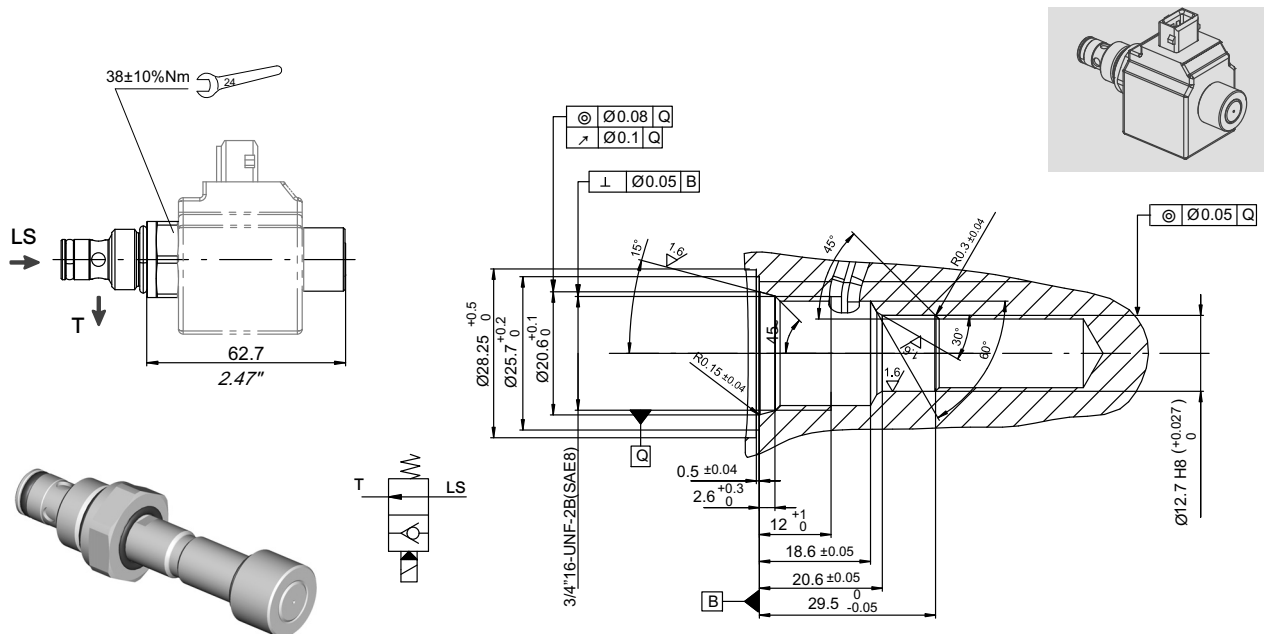


6.3 LS signal normally open unloading valve with manual override (SPFE-TFO)



Mechanical part only	Solenoid
200542300028	See 6.7

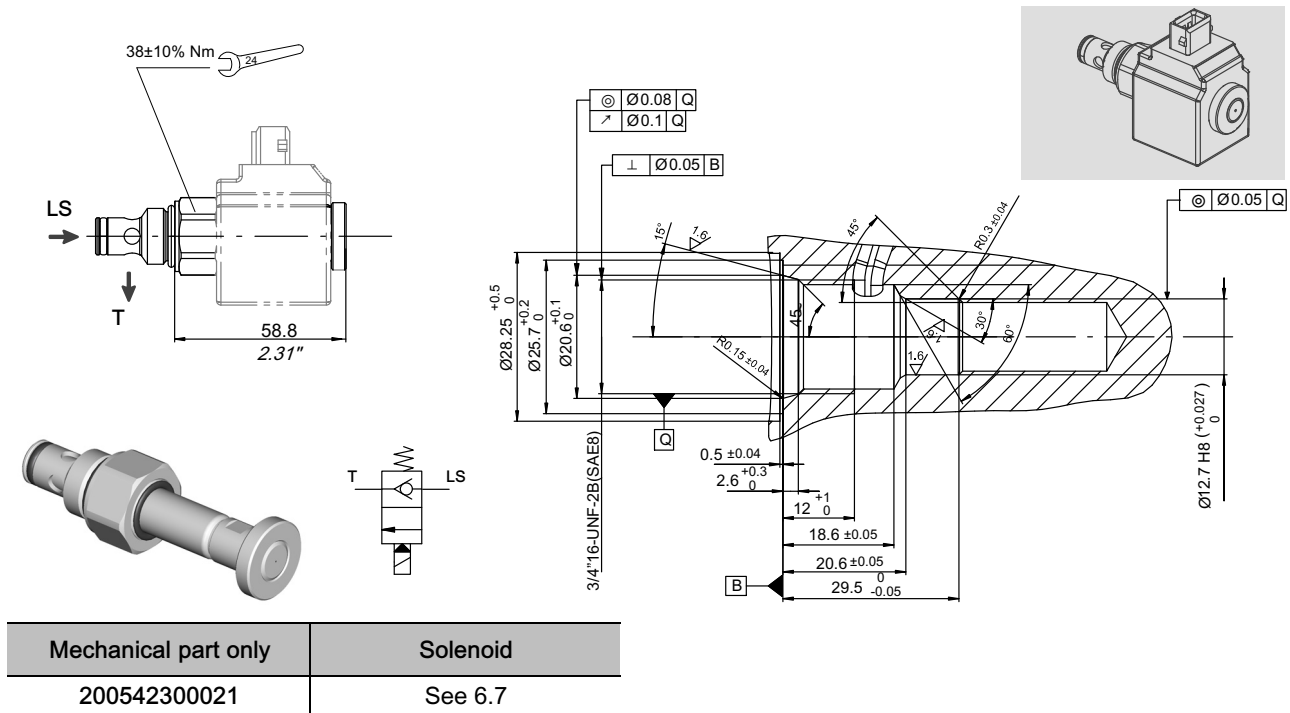
6.4 LS signal normally open unloading valve without manual override (SPF-TFO)



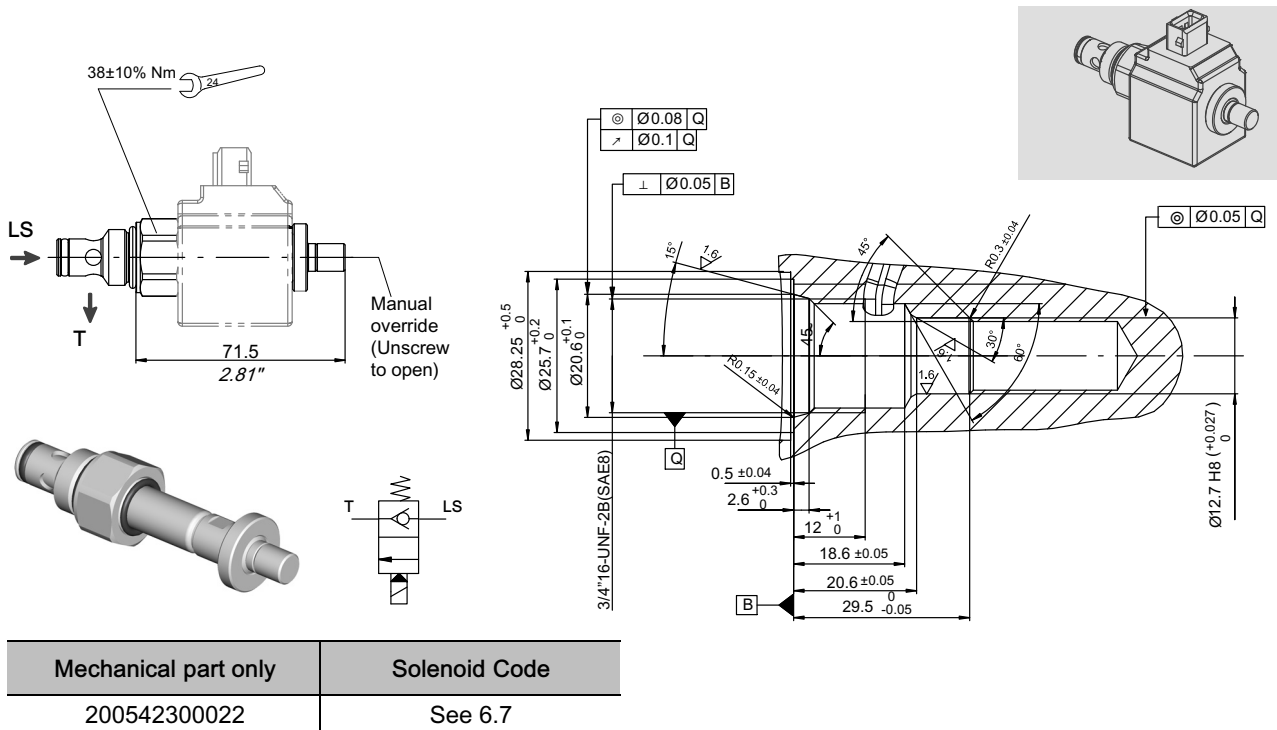
Mechanical part only	Solenoid
200542300026	See 6.7

For further information, please contact our Sales Department.

6.5 LS signal normally closed unloading valve without manual override (SPF-TC)



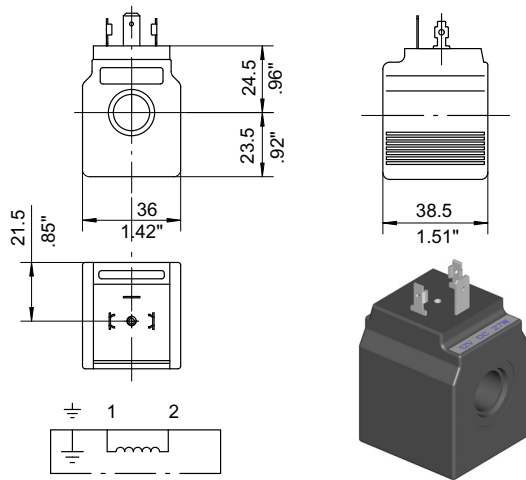
6.6 LS signal normally closed unloading valve with manual override (SPE-TC)



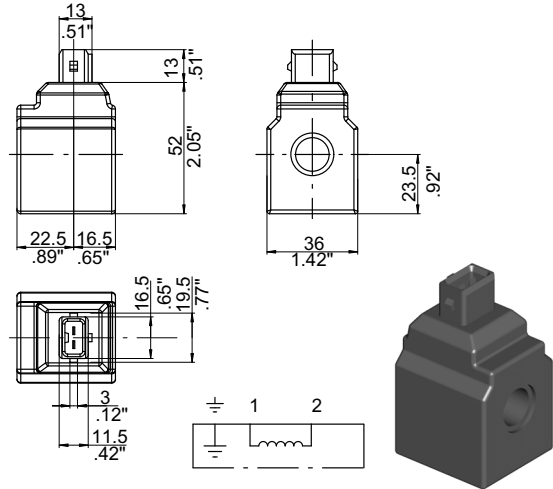
For further information, please contact our Sales Department.

6.7 Coils for ON-OFF unloading solenoid valves and loking system positioners

DIN connector



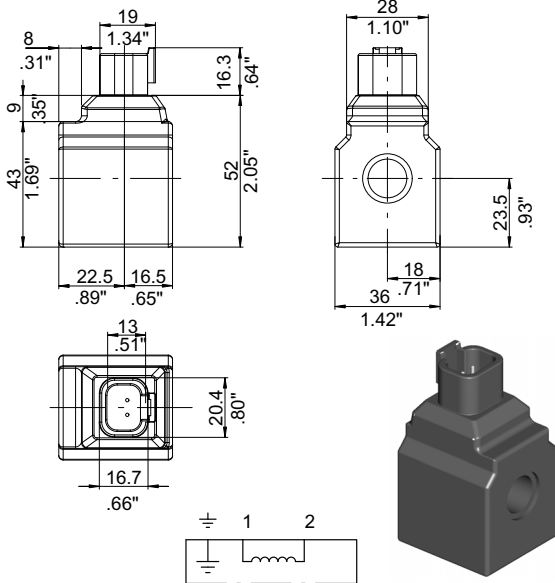
AMP connector



Available with Diode arrangement*



DT connector



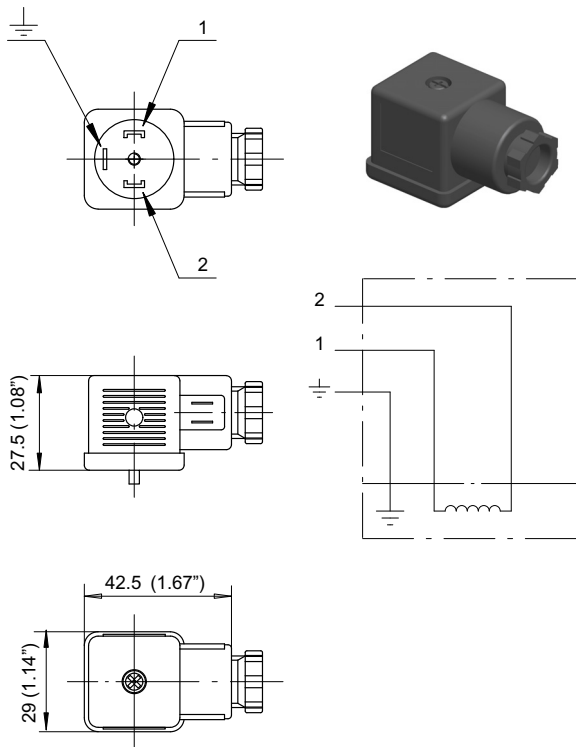
For solenoid valve series

Wire class	H (VDE0580)
Protection	IP65 (DIN40050)
Coil insulation	F
Duty rating	ED 100%
Voltage tolerance	± 10%

Connector style	Nominal Coil voltage	Power (Watt)	Resistance (Ohm) Ambient temp.	Current (Ampere) Ambient temp.	Coil code
DIN	12 V. DC.	27.2	5.3	2.2	200674910100
	24 V. DC.	27	21.3	1.12	200674920080
AMP	12 V. DC.	27.2	5.3	2.2	200674910250
	24 V. DC.	27	21.3	1.12	200674920200
AMP + DIODE*	12 V. DC.	21	6.85	1.75	200541210032
	24 V. DC.	21	27	0.78	200541220033
DT	12 V. DC.	27	5.3	2.2	200674910370
	24 V. DC.	27.2	21.3	1.12	200674920290

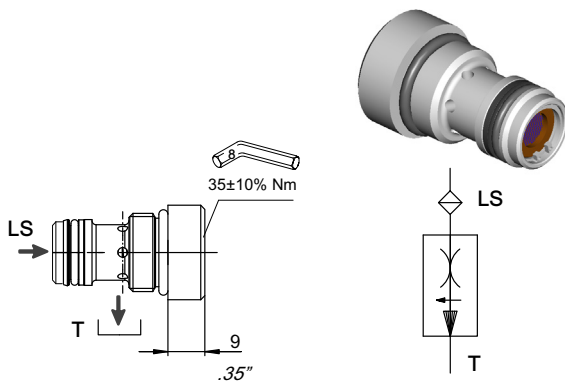
6.7.1 Connector for DIN type solenoids

Code 200544110009



For power input	D.C.
Connector type	DIN 43650
Number of poles	2 + \perp
Supply voltage	max. 220 V.
Nom. capacity at contacts	10 A.
Max capacity at contacts	16 A.
Resistance at contacts	≥ 4 mOhm
Max section of cable	1.5 mm ²
Outer material	Glass fibre reinforced Nylon
Contact mount material	
Color	Black
Armour clamp	Pg 9
Ø cable	6-8 mm.
Protection factor	IP65 (DIN40050)
Insulation class	C (VDE0110)
Temperature range	-40 / +90 °C

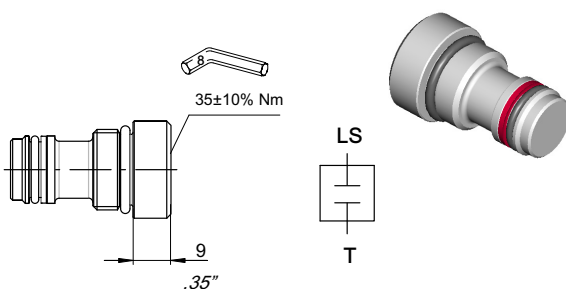
6.8 LS signal flow compensated drain valve (VRC)



Type	Code
VALV VRC D. 0,5 (STD)	200787202320
VALV VRC D. 0,7	200787202102

(See end cover section).

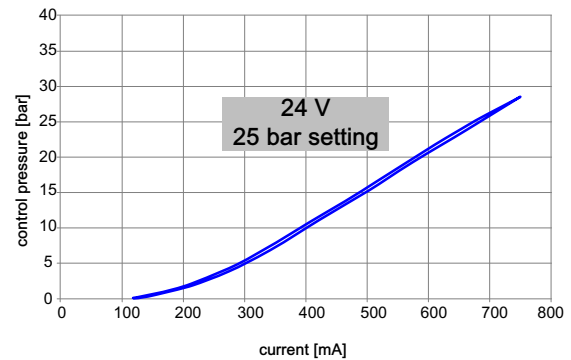
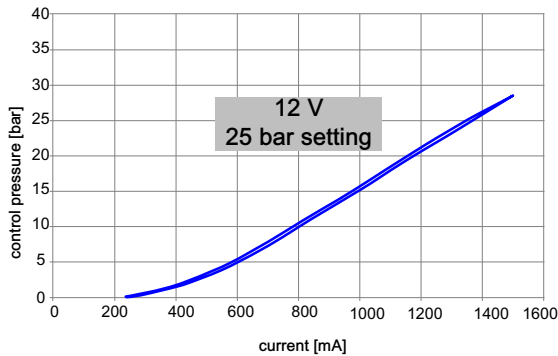
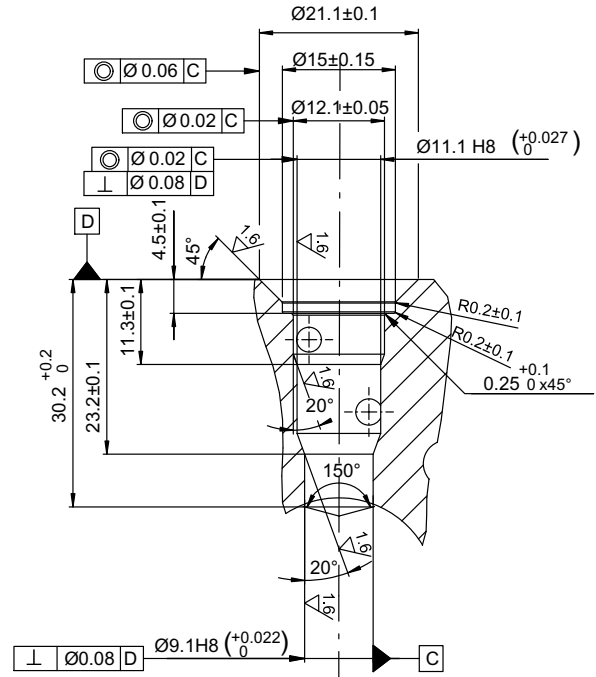
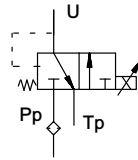
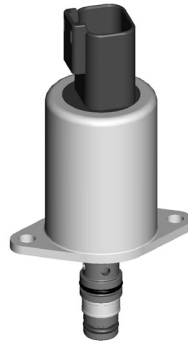
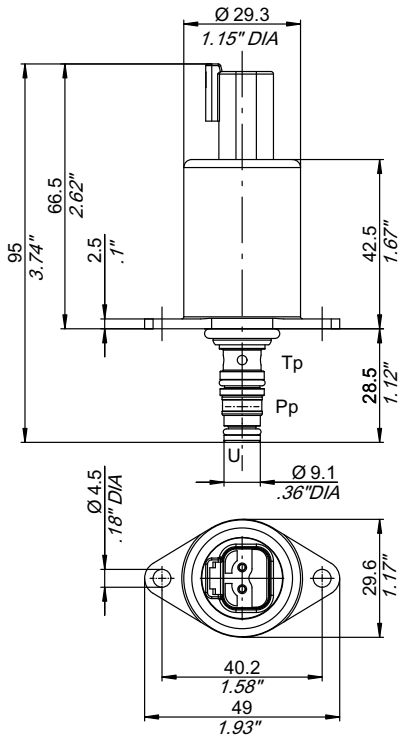
6.9 VRC plug



Type	Code
PLUG	200778300360

(See end cover section).

6.10 Proportional pressure reducing valve



Electro-hydraulic specifications	12 V	24 V
Nominal flow rate	4 l/min (1 GPM)	
Max inlet pressure	50 bar (725 psi)	
Rated supply voltage	12 VDC	24 VDC
Current supply characteristic	PWM (Pulse width modul.)	
Maximal current	1500±10 mA	750±10 mA
Superimposed dither frequency	100 Hz	
Degree of protection	AMP IP65	Deutsch IP69K
Pp filter screen	125 µm	
Coil resistance	4.7 Ohm ±5%	20.8 Ohm ±5%
Response time	< 50 ms	
Leakage from Pp to Tp	< 30 cc/min. at 35 bar and 50°C (< 0.9 cu.in./min. at 500 psi and 176 °F)	
Duty cycle	ED 100%	
Connector Type	AMP Junior timer (AMP84-9419) / DEUTSCH DT04-2P	
Connector colour	MOSSY-GREY	BLACK
Code - 25 bar setting (*) (**)	200533960015 (DEUTSCH) 200533960016 (AMP)	200533960013 (DEUTSCH) 200533960014 (AMP)

(*) nr. 2 screws M4x12 are not included

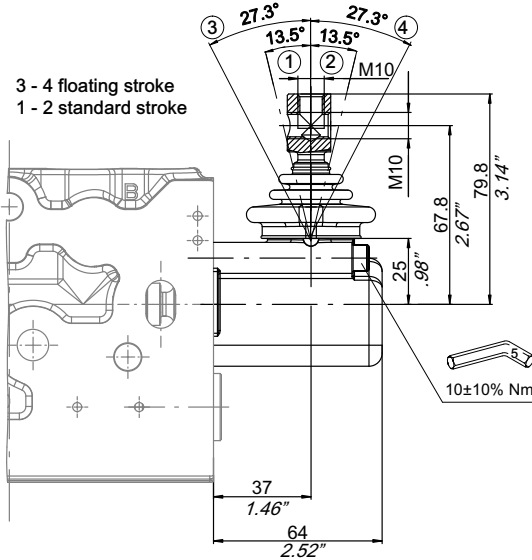
(**) For available different setting please contact our Sales Dept.

7 Levers

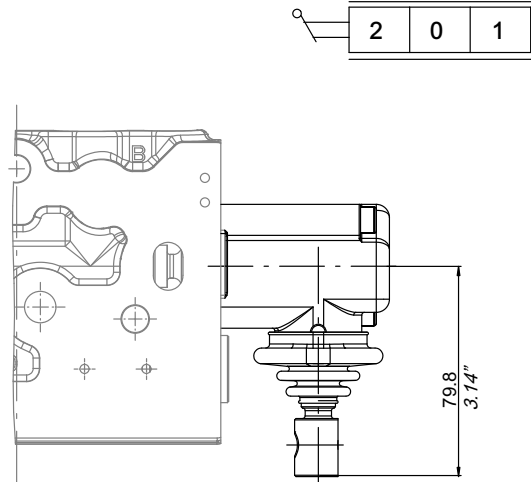
7.1 Standard lever group

Code: 200707120570

L100



L300



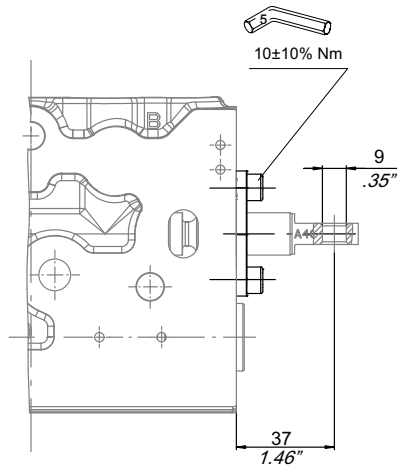
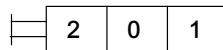
	Lo		Type	Code
	mm	inches		
	190	7.48	AL001	200702220010
	255	10.04	AL002	200702220030
	300	11.81	AL003	200702220040
	350	13.78	AL004	200702220050

Body Interface	Spool type
MAN	MAN

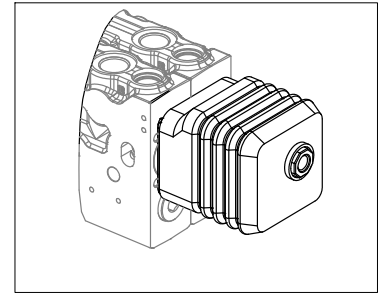
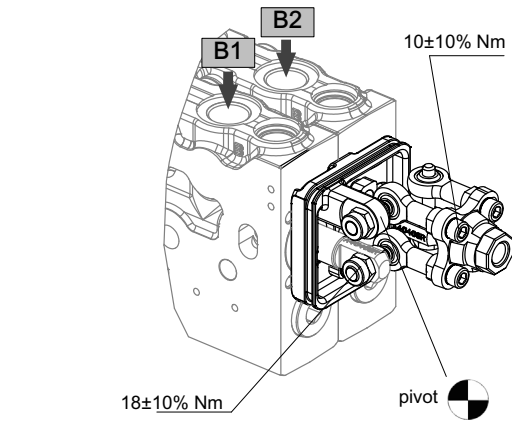
7.2 Free end spool with dust proof seal



Code: 200707190030

L55

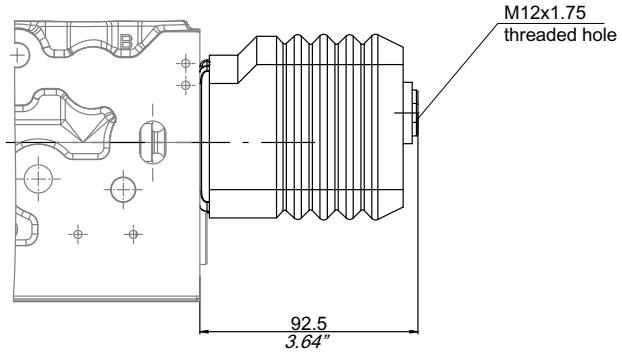
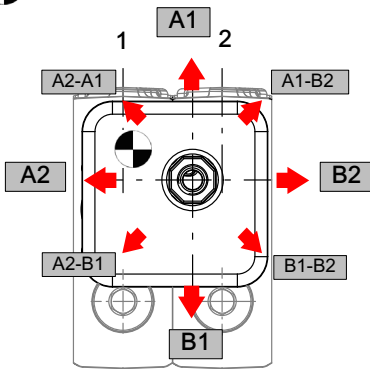


7.3 Standard joystick control

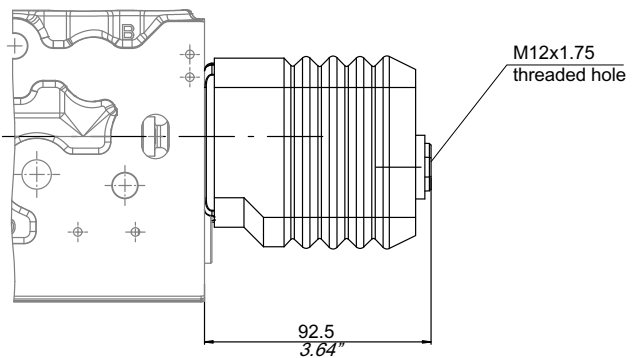
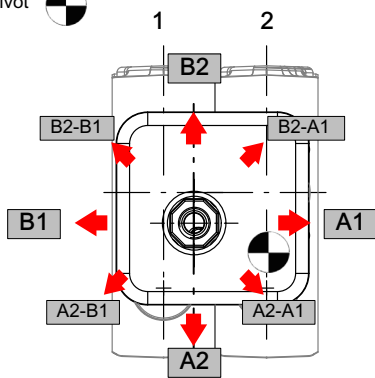


Body Interface	Spool type
	
MAN	MAN

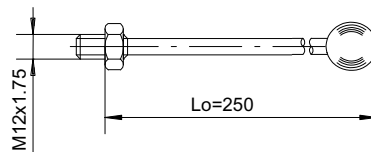
L133



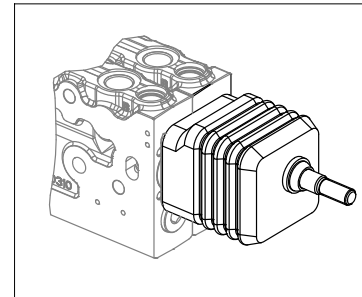
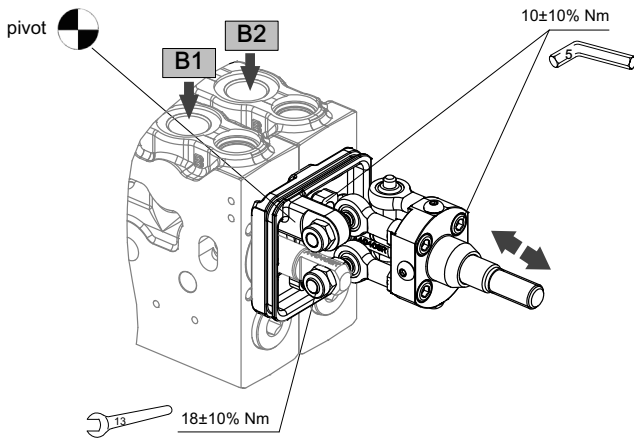
L134





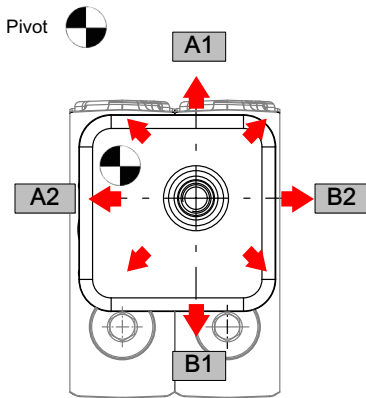
AL010
Code: 200702230040



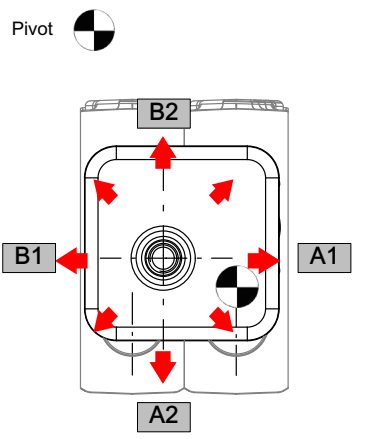
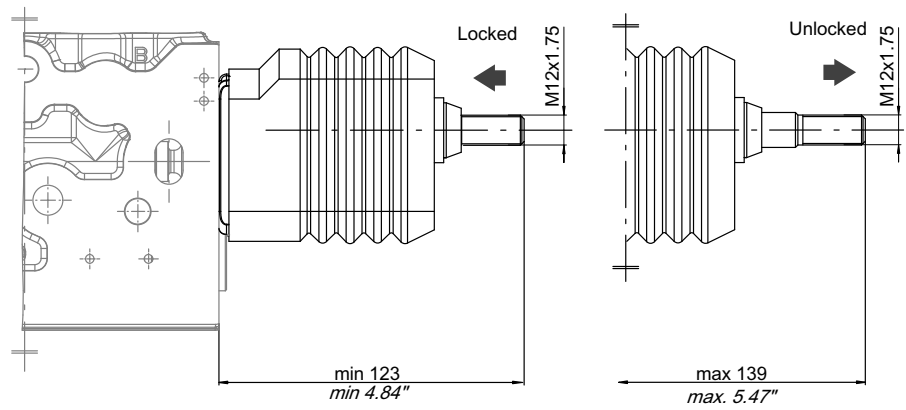
7.4 Joystick control with integrated locking system



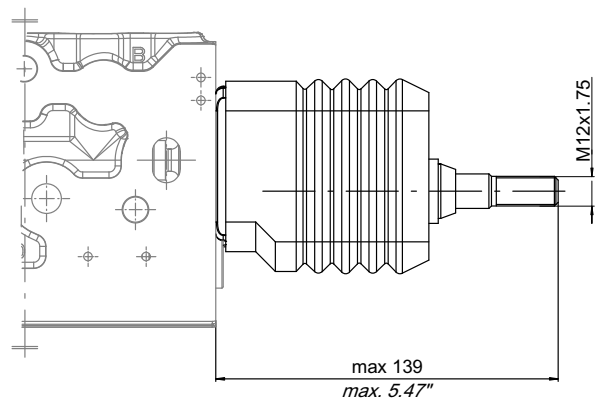
Body Interface	Spool type
	
MAN	MAN



PORT SIDE **L260**

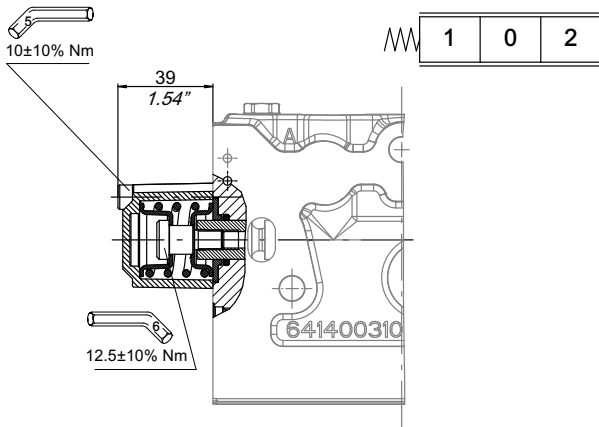


L460

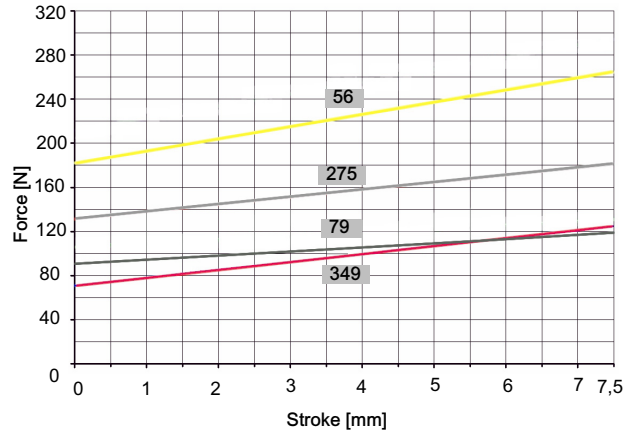


8 Positioners

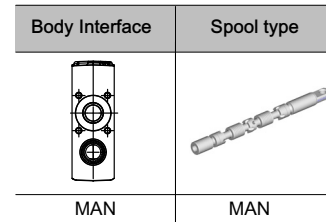
8.1 Spring return to neutral position



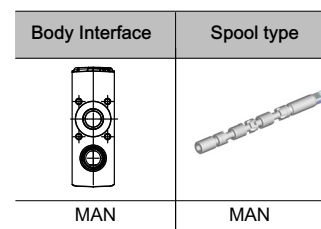
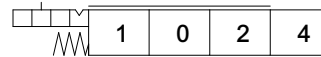
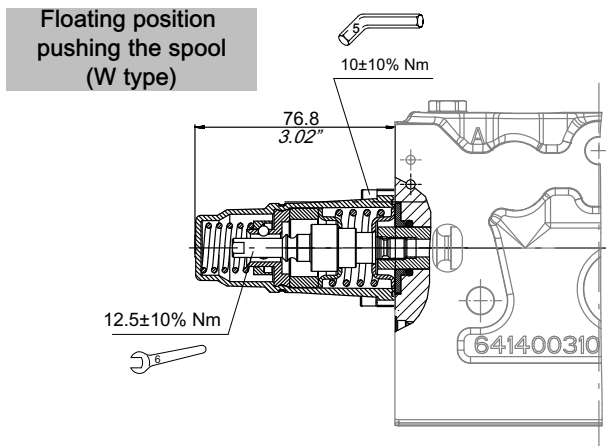
SPRING FORCE-STROKE DIAGRAM



Type	Code	Colour
349	200768611811	RED
79	-	BLACK
56	200768610861	YELLOW
275	200768611331	WHITE



8.2 Detent in floating position 4 and spring return to neutral from position 1 and 2

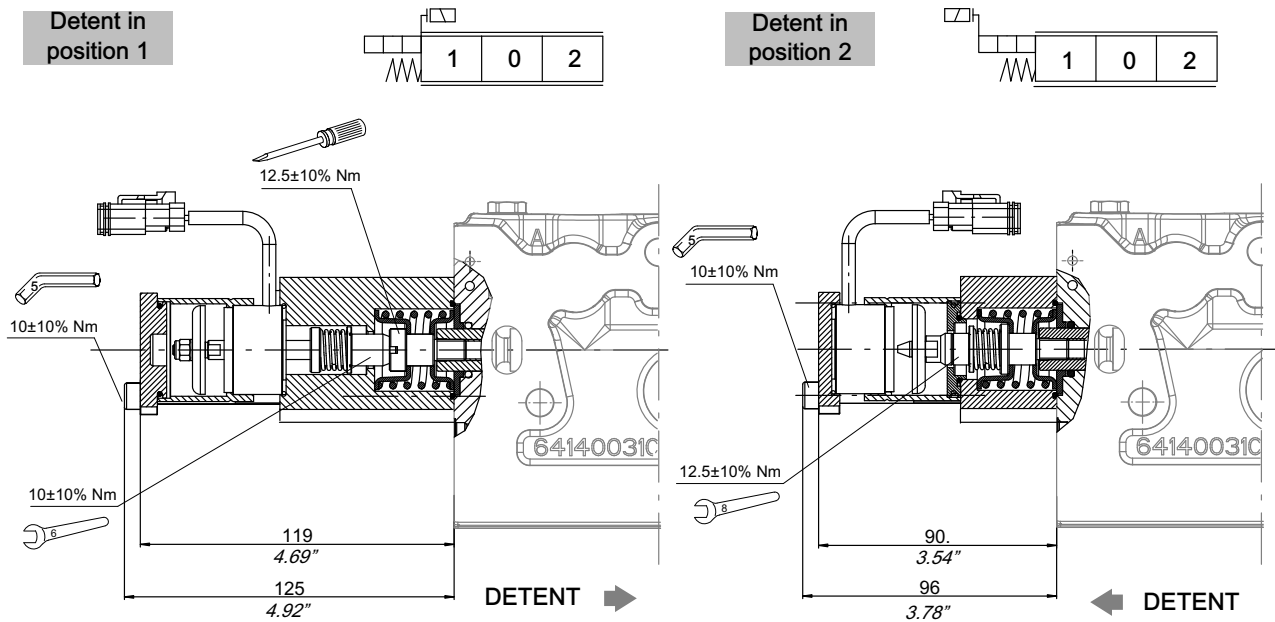


Type	Code	Main spring	Detent spring
06	-	RED	BLACK

For further information, please contact our Sales Department.

8.3 Electro-magnetic detent (EMD)

A pre-feeling (force increase) signals the operator that the detent position is going to be engaged



8.3.1 Operating features

COIL

Nominal voltage: 12 VDC \pm 10%



Power rating: 7 W

Electrical resistance when holding (20°C): 21 \pm 1.5 Ohm:

Min. solenoid axial hold force: 260 N

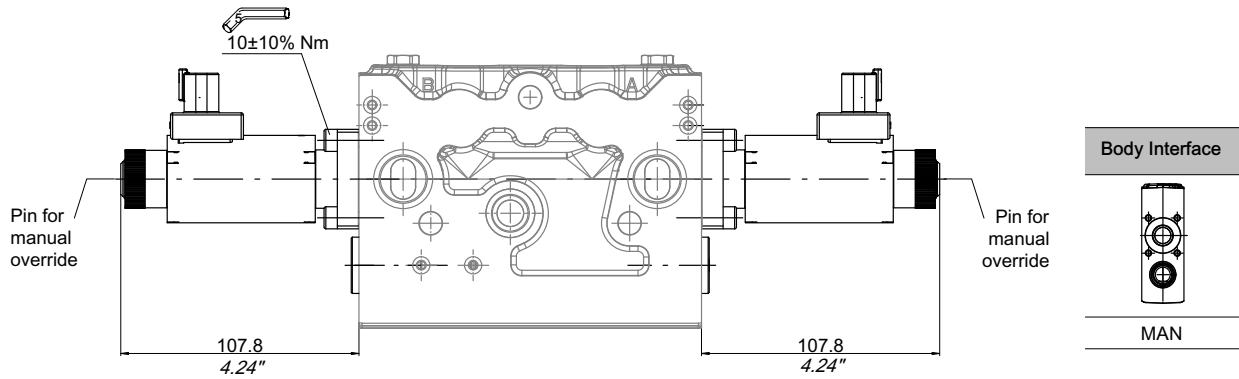
Duty cycle: 100%

Standard cable length: 500 mm

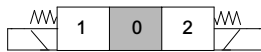
Body Interface	Spool type
	
MAN	MAN

Type	Code	Spring positioner	Voltage	Min. holding force (detent position)	Connector	Detent position
336	-	RED	12 VDC	137 N	DEUTSCH DT06-2S	2
363	-	RED	12 VDC	137 N	DEUTSCH DT06-2S	1

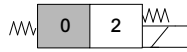
8.4 Electromagnetic ON-OFF control - Push-Push direct acting type



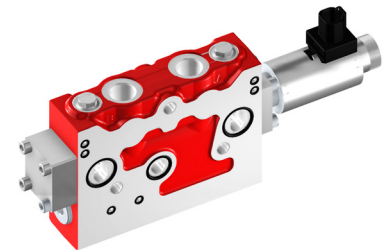
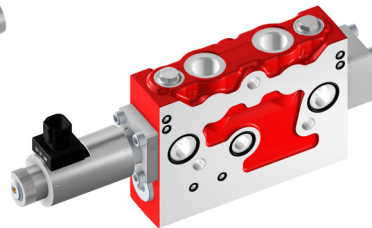
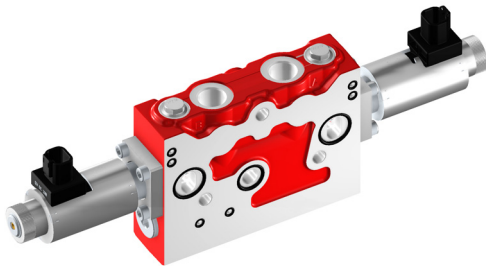
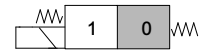
Double acting



Single acting port "B"



Single acting port "A"



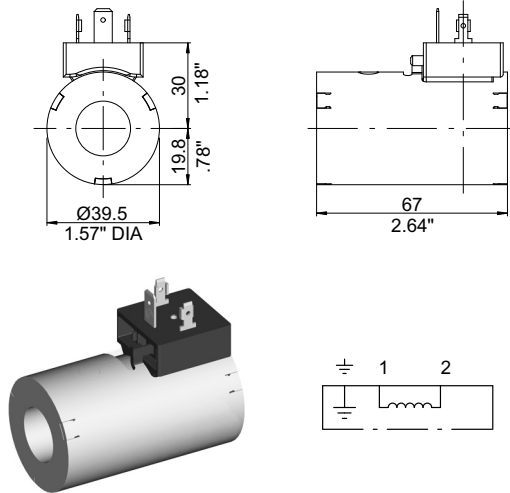
Double acting				Single acting port "B"				Single acting port "A"			
Type	Code	Voltage	Connector	Type	Code	Voltage	Connector	Type	Code	Voltage	Connector
500	-	12 V.DC.	AMP	500G	-	12 V.DC.	AMP	500S	-	12 V.DC.	AMP
501	-	24 V.DC.		501G	-	24 V.DC.		501S	-	24 V.DC.	
502	-	12 V.DC.	DE	502G	-	12 V.DC.	DE	502S	-	12 V.DC.	DE
503	-	24 V.DC.		503G	-	24 V.DC.		503S	-	24 V.DC.	
504	-	12 V.DC.	HC	504G	-	12 V.DC.	HC	504S	-	12 V.DC.	HC
505	-	24 V.DC.		505G	-	24 V.DC.		505S	-	24 V.DC.	

For coils see section 8.5.

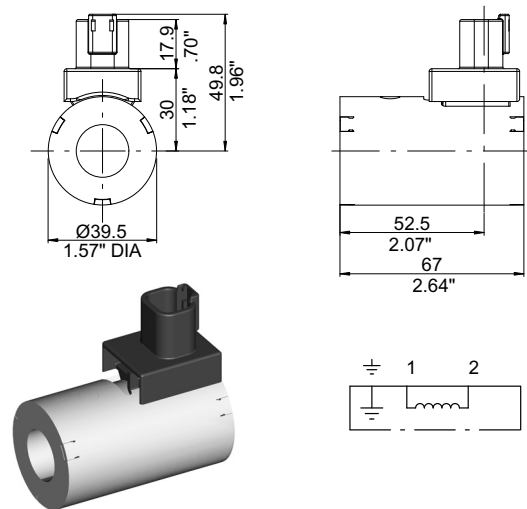
For further information, please contact our Sales Department.

8.5 Coils for ON-OFF elements

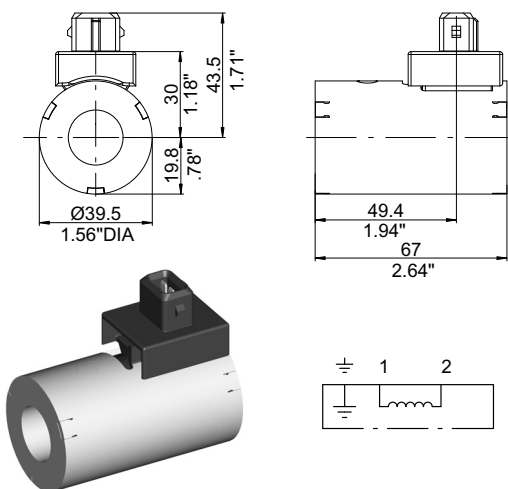
DIN connector



DT 04 connector



AMP JPT connector



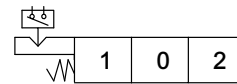
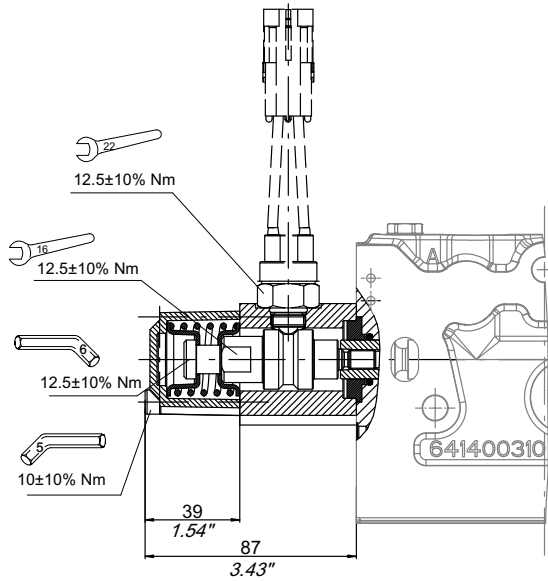
Solenoid main features

Wire class	H (VDE0580)
Duty rating	ED 100%
Voltage tolerance	± 10%
Magnetic frame protection	Fe/ZnNi5/Cn/T0 (DIN 50979)

Connector style	IP	Code	Nominal Coil voltage (VDC)	Power (Watt)	Current consumption at 20° C (A)	Resistance at 20° C (Ohm)
DIN	65	200674910430	12	29	2.35	5.1
		200674920320	24	25	1.12	21.5
AMP	65	200674910450	12	29	2.35	5.1
		200674920340	24	25	1.12	21.5
DT	67	200674910440	12	29	2.35	5.1
		200674920330	24	25	1.12	21.5

8.6 Microswitch positioners

8.6.1 Spool movement detection



Body Interface	Spool type
MAN	MAN



DE: microswitch operated in both directions

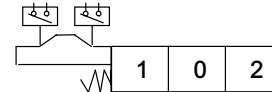
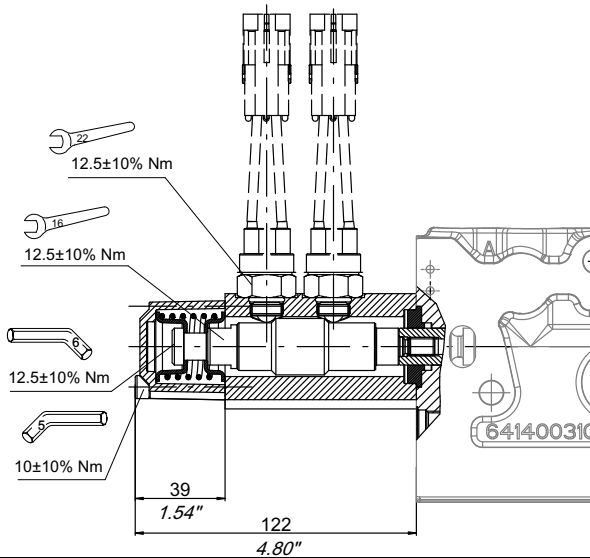


SE1: microswitch operated in POS.1



SE2: microswitch operated in POS.2

8.6.2 Spool directions detection (Redundant signal)



Microswitch control

Current rating	.01 - 5.0 DC Amp
Voltage rating	5.0 - 24.0 VD C
Mechanical life	500.000 cycles
Temperature range	-30 to 120° C

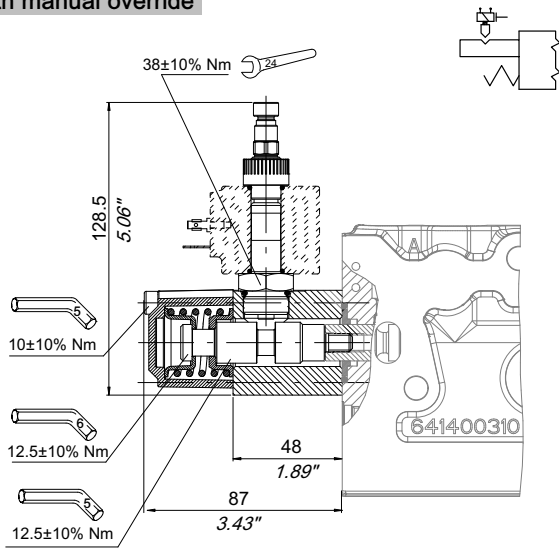
The normally closed version is available too.

Switch type	Code	Hydraulic scheme	Description	Connector	
SAE6 C21-478	200544124021		Normally Closed, Encapsulated with Wire Leads	Packard Weather Pack	
SAE6 O21-477	200544124022		Normally Open, Encapsulated with Wire Leads	Packard Weather Pack	
SAE6 O21-467	200544124023		Normally Open, Encapsulated with Wire Leads, Convoluted nylon wire shield	Packard Metri-pack	
SAE6 C21-462	200544124027		Normally Closed, Sealed Terminals	Packard Weather Pack	

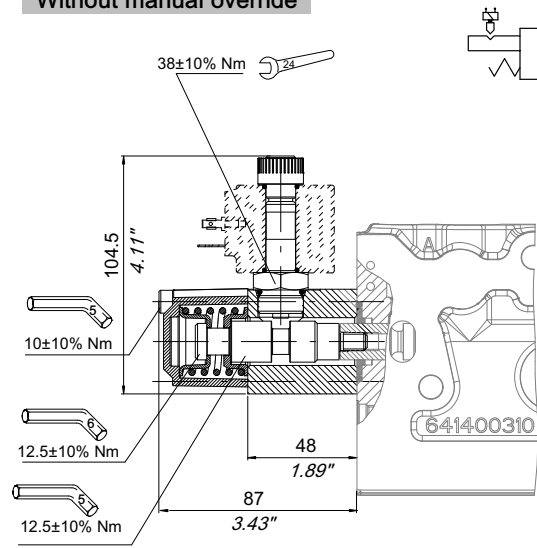
For further information, please contact our Sales Department.

8.7 Electro-mechanical locking system (normally locked)

With manual override



Without manual override



Type	Code	Positioner spring	Manual override
369	-	WHITE	Y
368	-	WHITE	N

For coils see 6.7

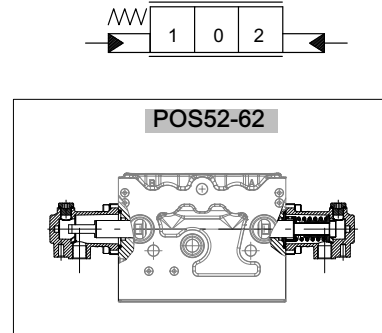
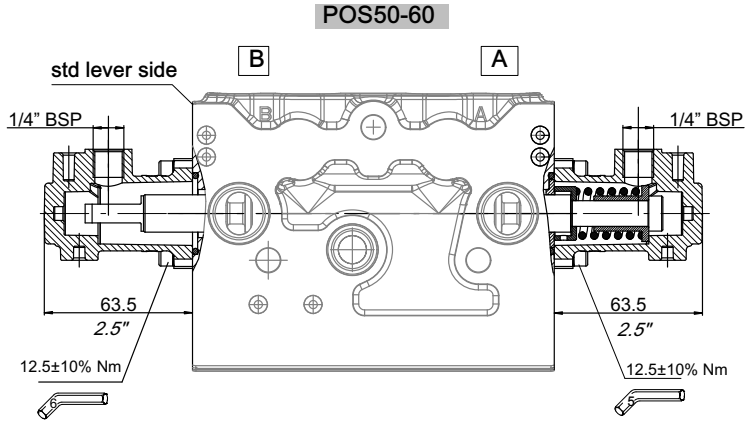
For different types of springs see section 8.1

Body Interface	Spool type
MAN	MAN

8.8 Hydraulic controls (HP)

$P_{max} = 40 \text{ bar (580 PSI)}$

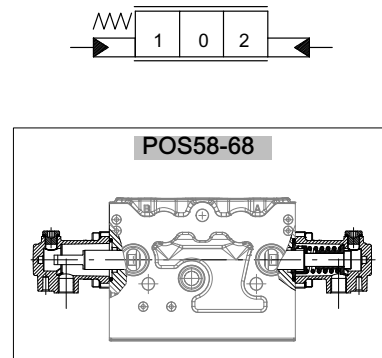
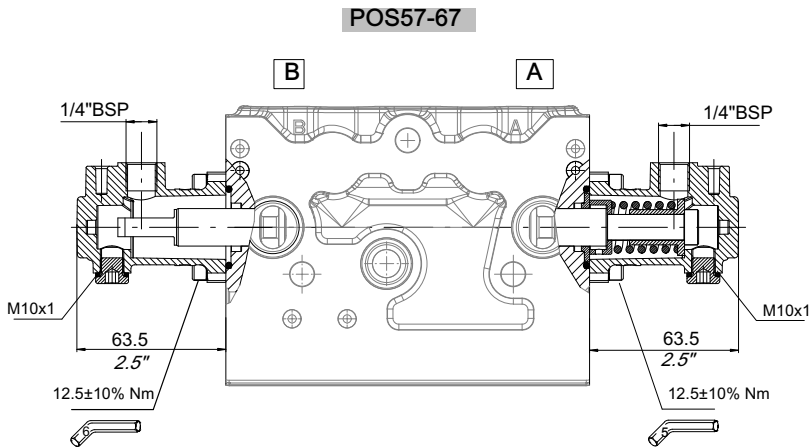
8.8.1 Standard HP positioner



Type	Code	Spring type
50-52	200768650770	5
60-62	200768650780	6

For SAE6 ports positioner please contact our Sales Department

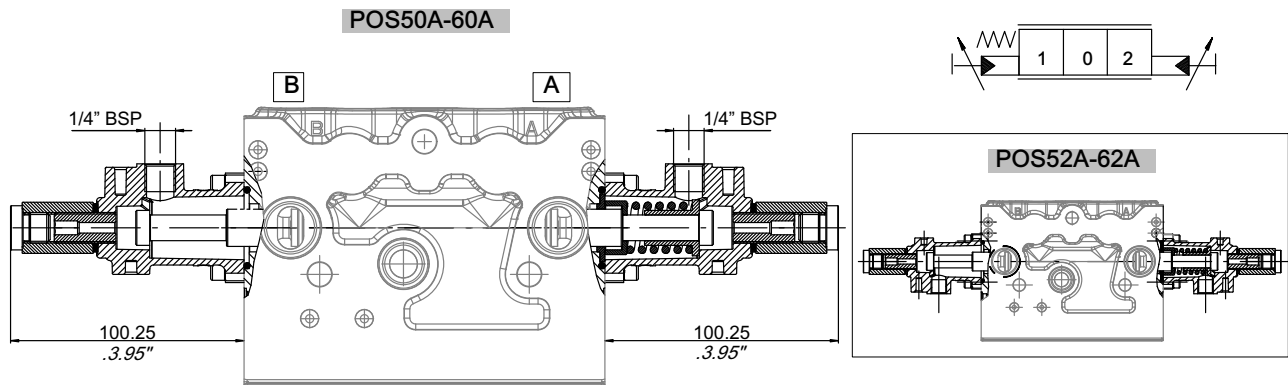
8.8.2 HP positioner + air bleeding plugs



Type	Code	Spring type
57-58	200768650860	5
67-68	200768650870	6

For SAE6 ports positioner please contact our Sales Department

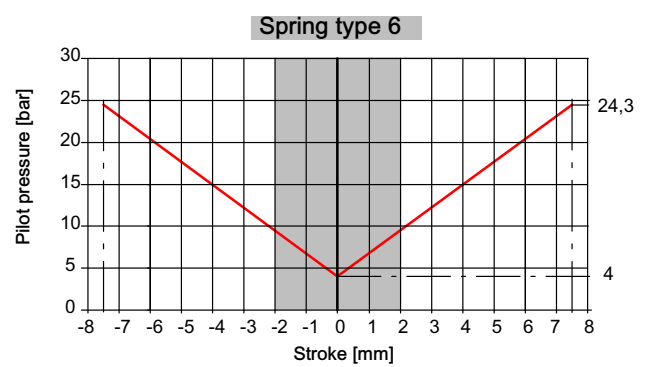
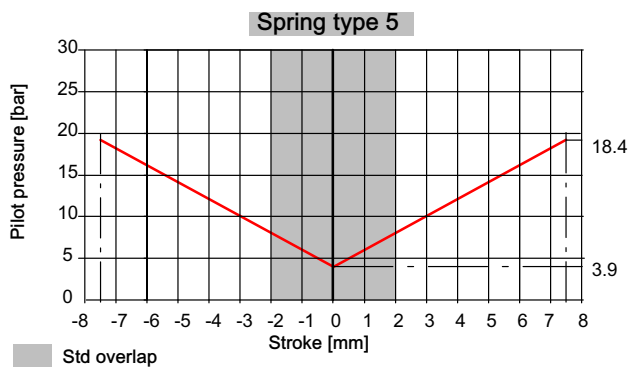
8.8.3 HP positioner + stroke limiters



Type	Code	Spring
50A-52A	200768650830	5
60A-62A	200768650810	6

For SAE6 ports positioner please contact our Sales Department.

8.8.4 HP positioner - spring characteristic curves

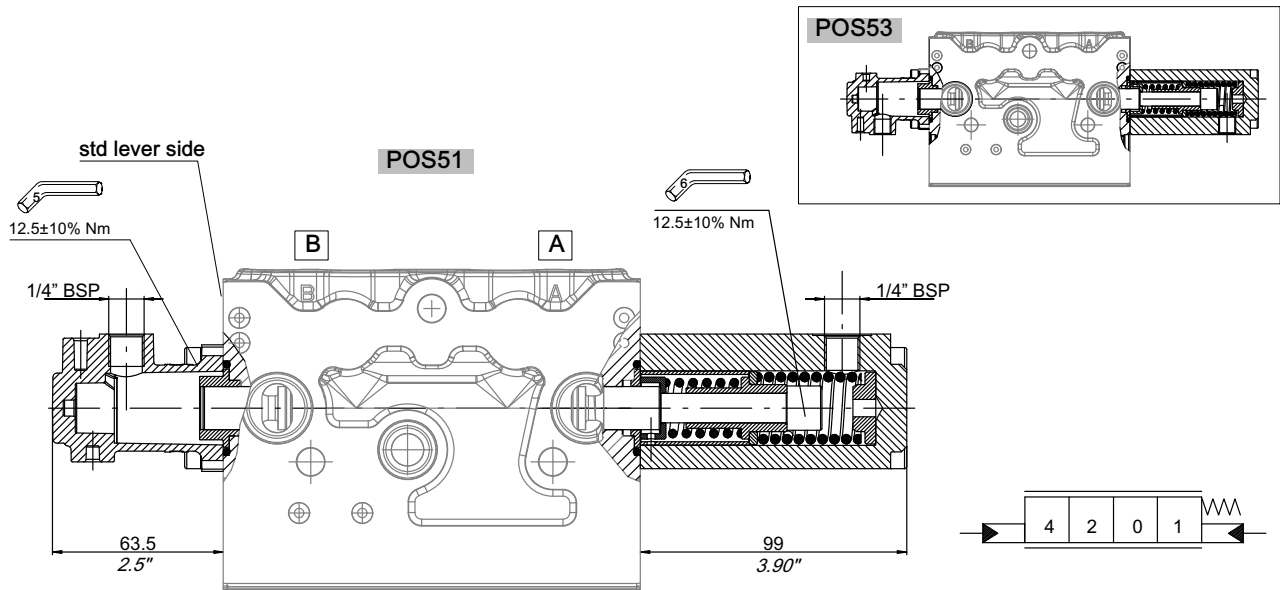


The metering area depends on the type of spool (see metering curves 4.1)

Body Interface	Spool type
MAN	EH (Standard) - MAN (Admitted)


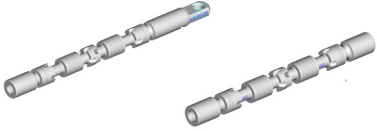
8.9 Hydraulic control + floating position with step

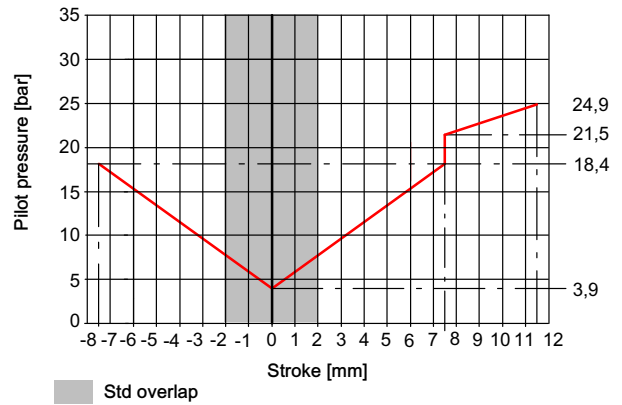
$P_{max} = 40 \text{ bar (580 PSI)}$



Type	Code
51-53	200768650820

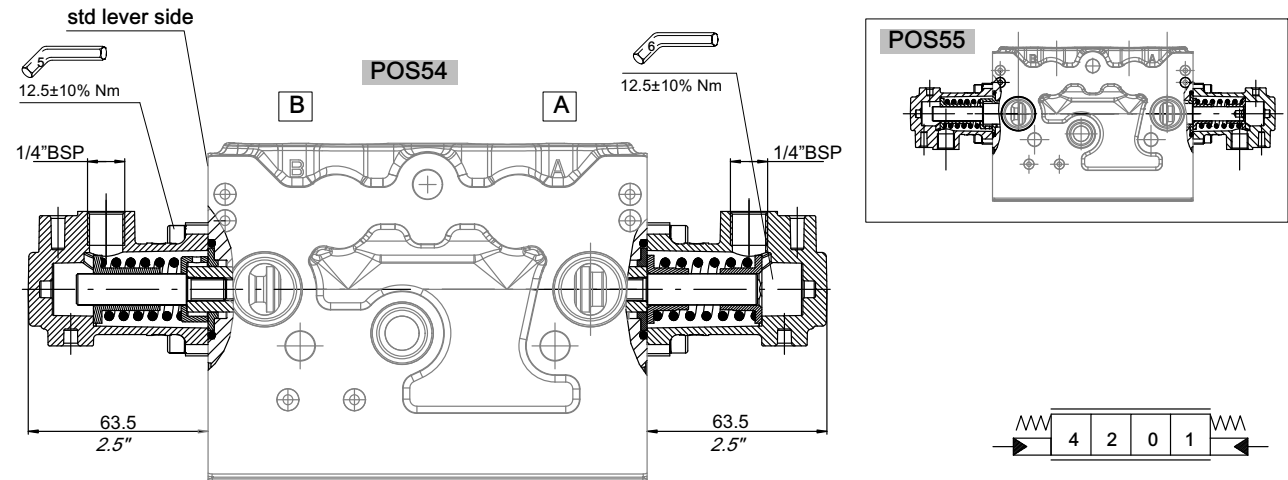
For SAE6 ports positioner please contact our Sales Department

Body Interface	Spool type
	
MAN	EH (Standard) - MAN (Admitted)


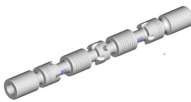


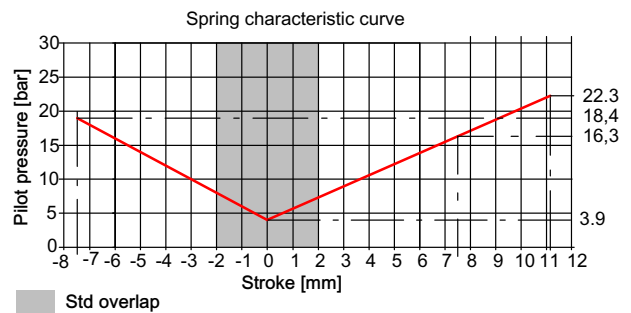
8.10 Hydraulic control + floating position without step

Pmax= 40 bar (580 PSI)



Type	Code
54-55	200768650790

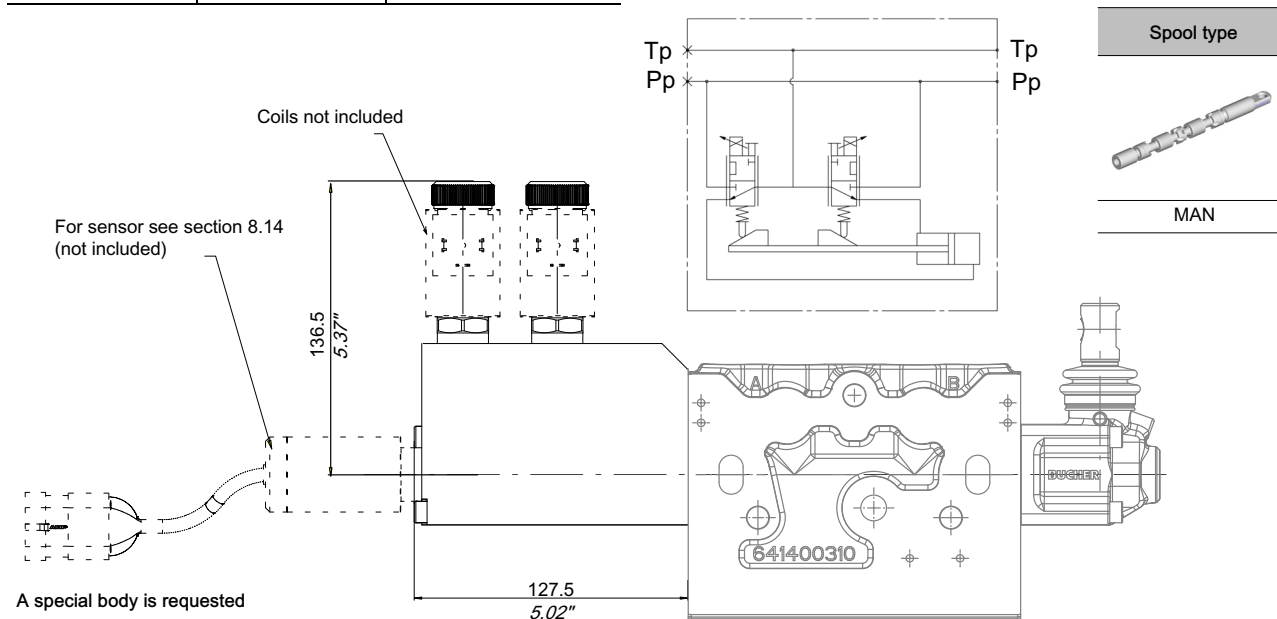
Body Interface	Spool type
 MAN	 EH



8.11 Electro-hydraulic proportional control with lever option (EHM)

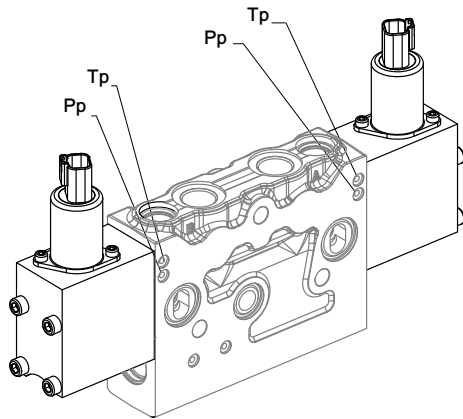
Pmax= 30 bar (435 PSI)

Voltage	Type	Code
12/24 V.DC	EHM 330B	-

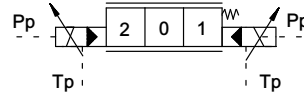


8.12 Electro-hydraulic open loop proportional control (EHO)

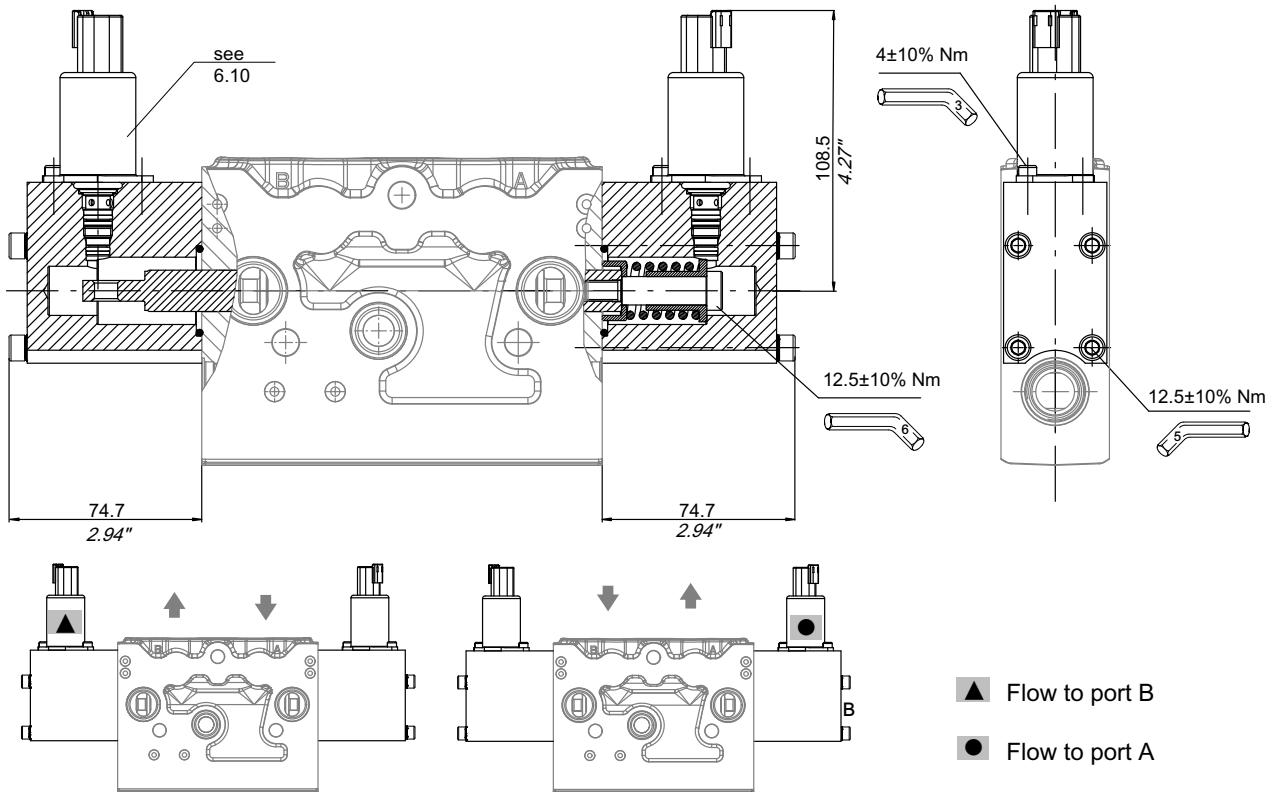
8.12.1 Standard electro-hydraulic open loop proportional control



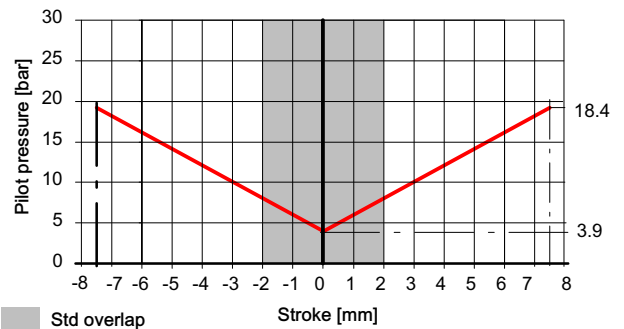
Simplified scheme



Body Interface	Spool type
 EH	 EH (Standard) - MAN (Admitted)



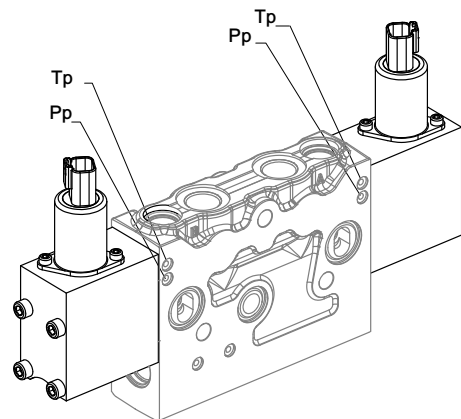
EHO positioner spring curve



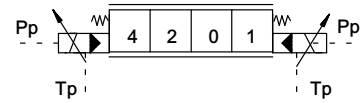
Type	Code	Voltage	Connector
310B	200768661240	12 VDC	AMP
311B	200768661250	24 VDC	AMP
312B	200768661260	12 VDC	Deutsch
313B	200768661270	24 VDC	Deutsch

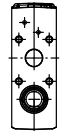
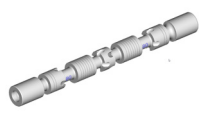
The pressure differential between pilot lines Pp and Tp should be > 25 bar in order to be sure to switch the spool to full stroke in all operating conditions

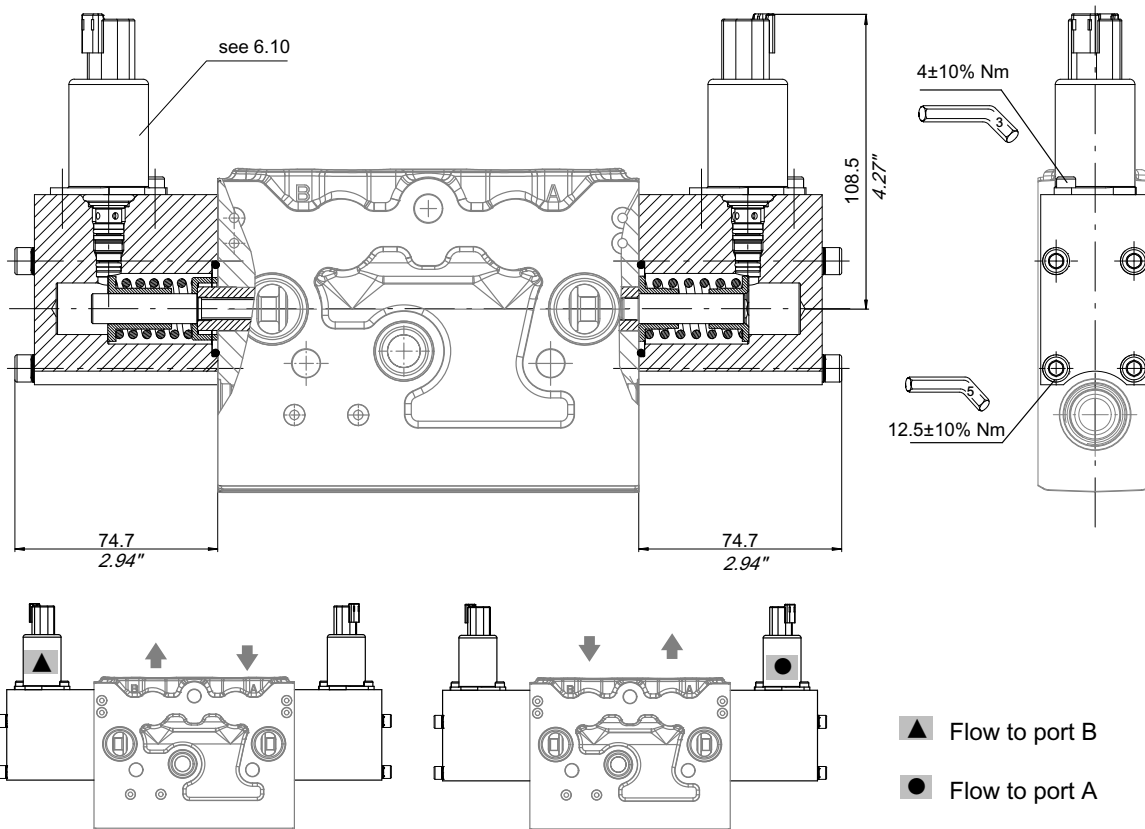
8.12.2 Electro-hydraulic open loop proportional control + floating position without step



Simplified scheme



Body Interface	Spool type
 EH	 EH (W version)

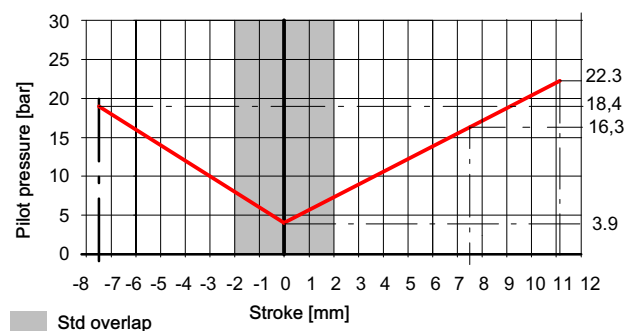


▲ Flow to port B

● Flow to port A

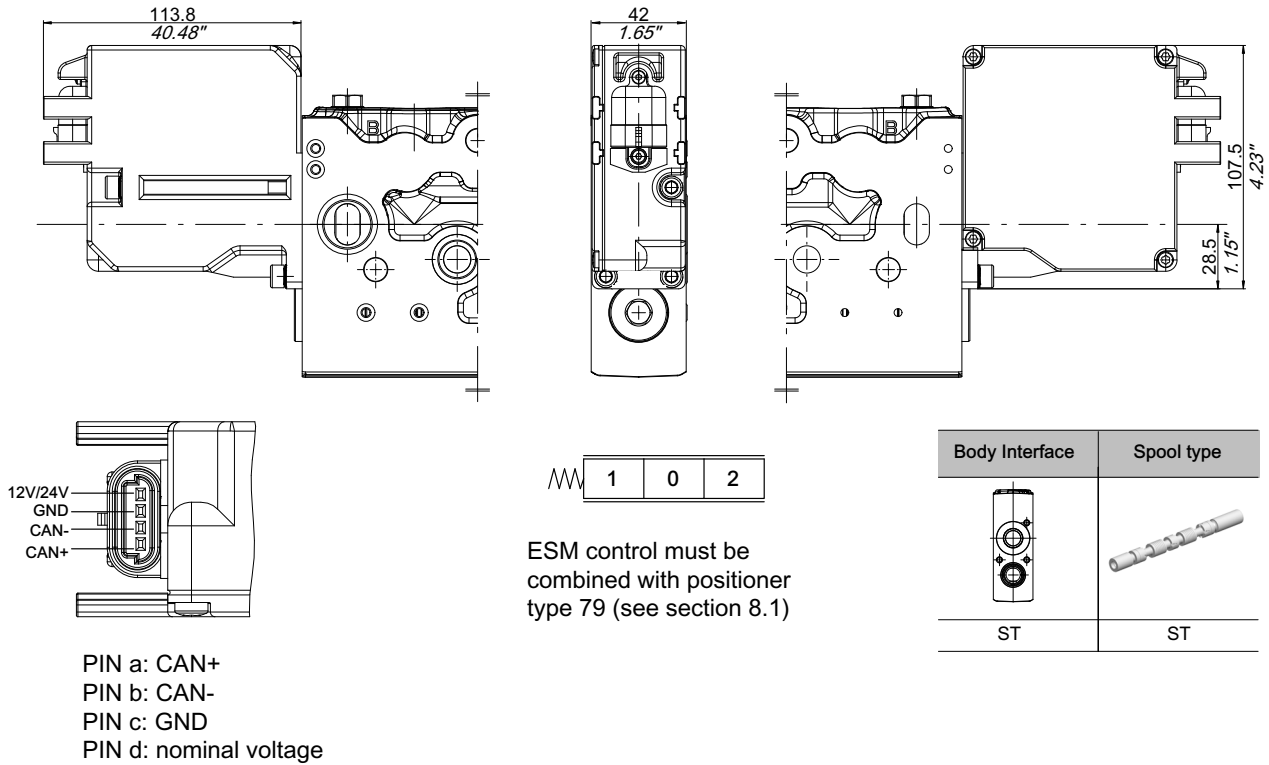
Type	Code	Voltage	Connector
330B	200768661280	12 VDC	AMP
331B	-	24 VDC	AMP
332B	200768661290	12 VDC	Deutsch
333B	-	24 VDC	Deutsch

EHO positioner spring curve



The pressure differential between pilot lines Pp and Tp should be > 25 bar in order to be sure to switch the spool to full stroke in all operating conditions. For further information, please contact our Sales Department.

8.13 Stepper motor electronic control (ESM)



Technical specification		
Version	12 VDC	24 VDC
Communication protocol	CAN-BUS SAE J1939 compatible	
Power supply*	9 - 16 VDC	16 - 33 VDC
Working stroke**	-7.2 / +11.2 mm	
Speed ***	up to 80 mm/sec	up to 100 mm/sec
Standard resolution	0.048 mm/CAN value	
Min. Actuating force	> 240 N	
Max recommended load force	160 N	
Max residual force	< 50 N	
Connector type	Delphi Metri Pack 150.2	

* reduced speed: under 10.8 VDC for 12 VDC version
under 20 VDC for 24 VDC version

** Spool stroke can be limited by the software.

*** Speed restriction due to internal temperature control.

For further information, please contact our Sales Department.

8.14 Spool position transducer / Hall effect sensor

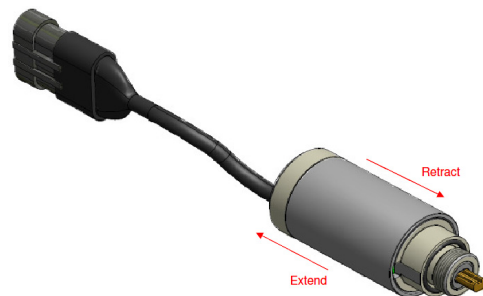
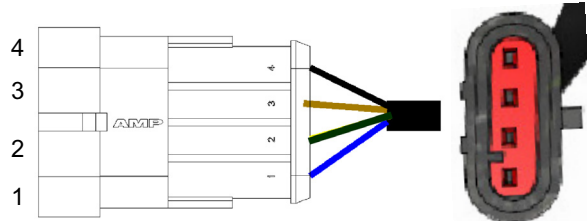
8.14.1 Features

Code : 200544124029

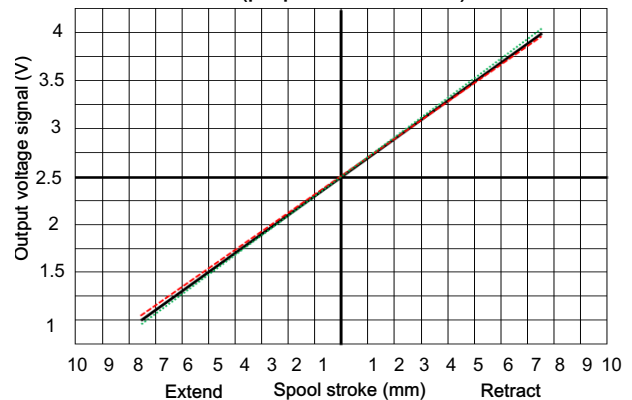
Mechanical specifications	
Maximum mechanical stroke	$\geq \pm 8,5\text{mm}$
External diameter	35 mm
Body length	$91 \pm 8,5\text{mm}$
Cable length (including connector)	350mm
Maximum operating pressure	5 MPa (50bar)
Operating temperature range	$-25^{\circ}\text{C} / +105^{\circ}\text{C}$
Protection class	IP 67
Connector	Amp seal, 4 male pins
Mechanical life	5 Million cycles
Electrical specifications	
Power Supply Voltage	$7 \div 32\text{ Vdc}$
Current Consumption	$< 20\text{ mA}$
Output signal in Neutral	2,5V
Output signal range	$1\text{ V} \div 4\text{ V}$
Tolerance on output signal	$\pm 0,1\text{ V}$
Maximum linearity error ($-25 \div 105^{\circ}\text{C}$)	$\pm 2\%$
Max. Electrical stroke linearity range	$\pm 7,5\text{mm}$
Electrical life	10 Million cycles

Electrical Connections (proportional version)

1. Vcc - Blue
2. Gnd - Green/Yellow
3. Proportional Output - Brown
4. n.u. - Black

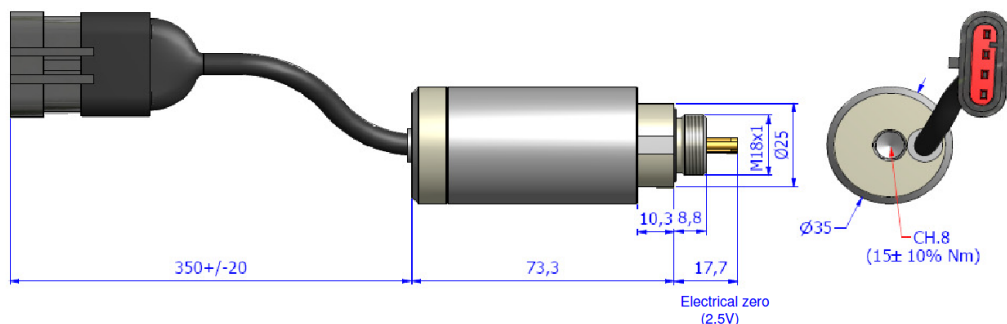


Output signal control characteristic (proportional version)

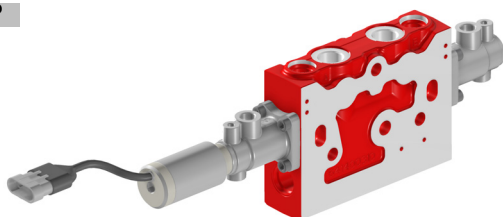


Red lines: $-25 / +85^{\circ}\text{C}$

Green lines: $85 / 105^{\circ}\text{C}$



HP

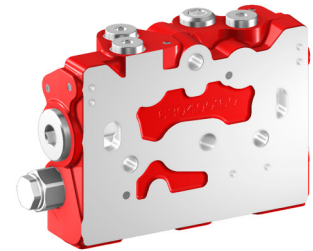
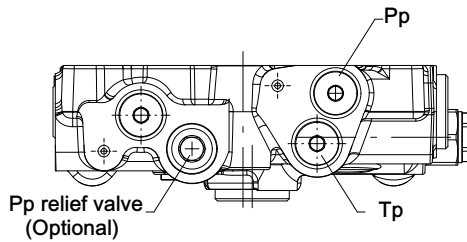
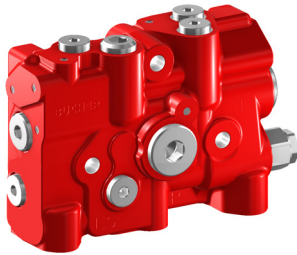
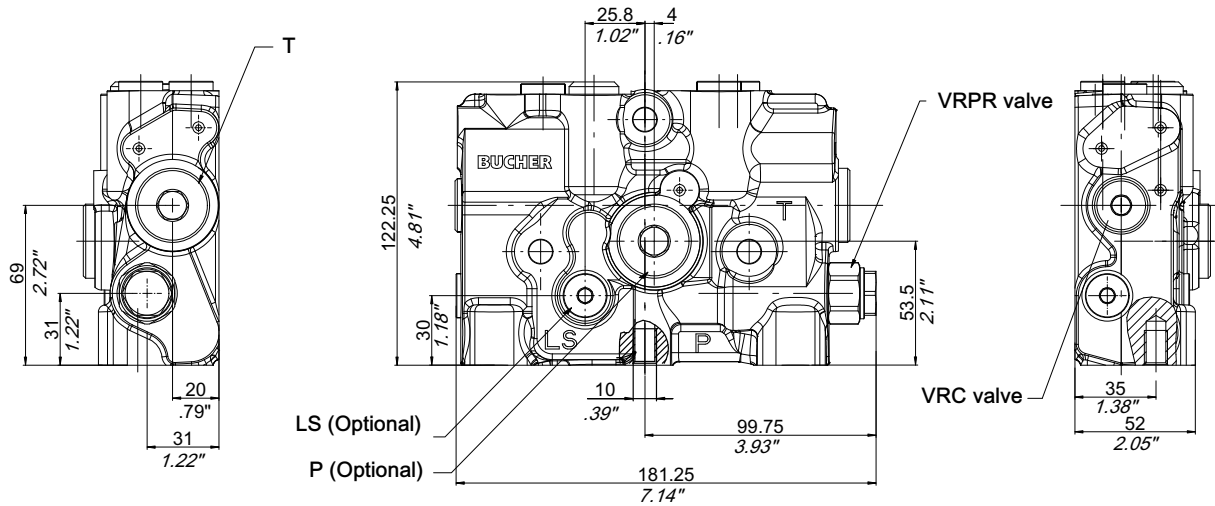


9 End covers

9.1 End cover plate with tank line port (PH and PM series)

PH: with integrated pilot lines for electro-hydraulics controls

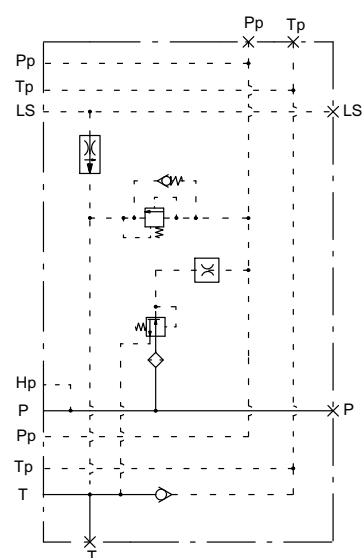
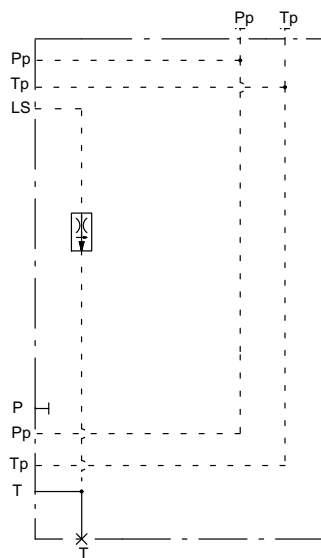
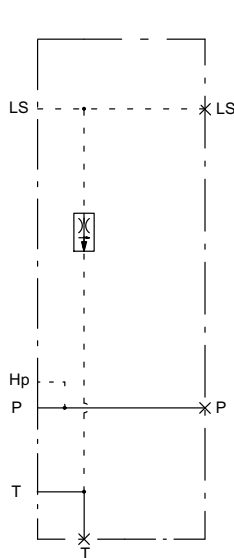
PM: standard end cover without integrated pilot lines



PM end cover
with LS flow control
valve + high pressure
supply line

PH end cover
with LS flow control valve
+ external supply pilot oil
+ external drain pilot oil

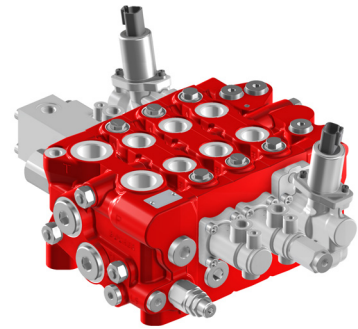
PH end cover
with LS flow control valve
+ pilot tank line check valve
+ pilot oil supply pressure reducing valve
+ pilot oil supply relief valve
+ high pressure supply line



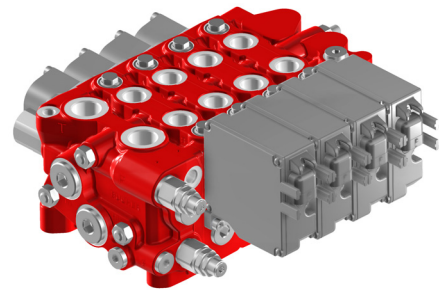
Pp max supply pressure 40 bar

10 Suitable applications (Examples)

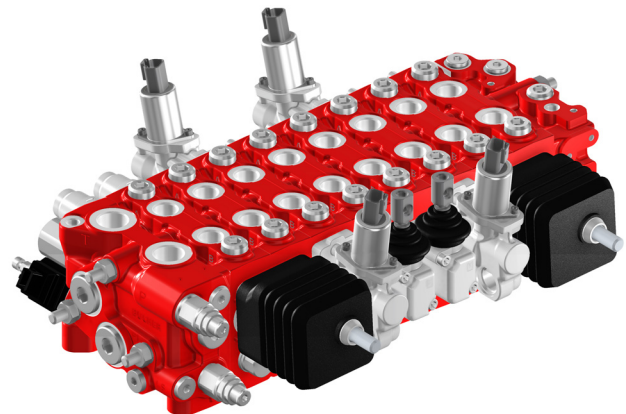
10.1 Wheel loaders



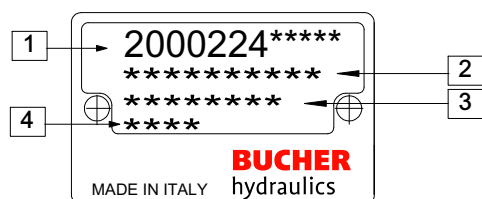
10.2 Telehandlers



10.3 Forestry cranes



10.4 Product identification plate



- 1 : BHRE Product Order Code.
- 2 : Customer Code (on demand, only - if not request there will be the Manufacturing year and month).
- 3 : WO : Production Work Order .
- 4 : WO progressive number.

Manufacturing month	Manufacturing year					
	2016	2017	2018	2019	2020	2021
January	6A	7A	8M	9M	0M	1M
February	6B	7B	8N	9N	0N	1N
March	6C	7C	8P	9P	0P	1P
April	6D	7D	8Q	9Q	0Q	1Q
May	6E	7E	8R	9R	0R	1R
June	6F	7F	8S	9S	0S	1S
July	6G	7G	8T	9T	0T	1T
August	6H	7H	8U	9U	0U	1U
September	6I	7I	8V	9V	0V	1V
October	6J	7J	8Z	9Z	0Z	1Z
November	6K	7K	8X	9X	0X	1X
December	6L	7L	8Y	9Y	0Y	1Y

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Classification: 430.300.000