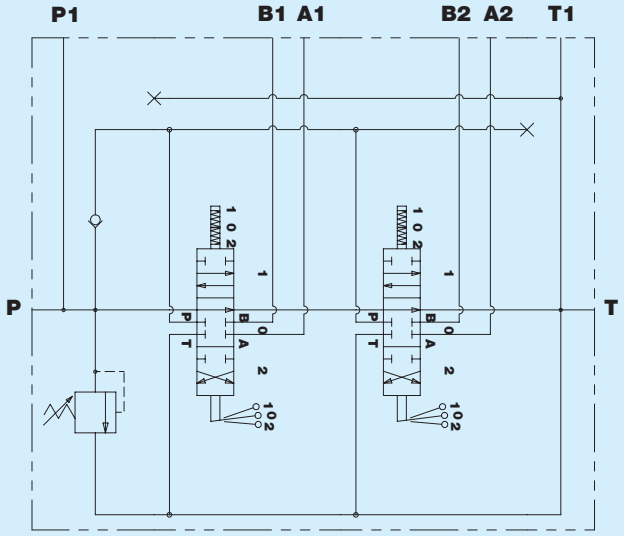
ML - Directional control valve

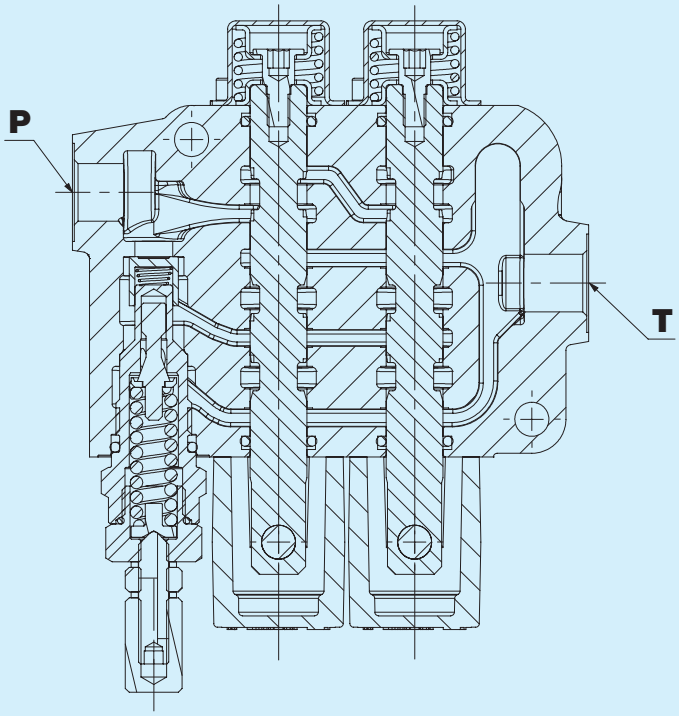
Before use, carefully read the GENERAL INSTRUCTIONS FOR USE OF DIRECTIONAL CONTROL VALVES

Nominal flow	**35 l/min** ***9.2 US gpm***
Nominal pressure	**250 bar** ***3625 psi***
Maximum tank pressure	**50 bar** ***725 psi***
Internal leakage (A or B -> P and T) p=100 bar (1450 psi)	**8 cm³/min ± 20** ***0.49 in³/min ± 1.22***
Temperature range	**-20°C +85°C NBR seals** ***(max peak +100°C)*** ***-20°C + 130°C HNBR seals***
Oil viscosity	**from 15 mm²/s to 90 mm²/s** ***(15 cSt to 90 cSt)***
Fluid	**Hydraulic fluids as defined in ISO 6743-4 standard**

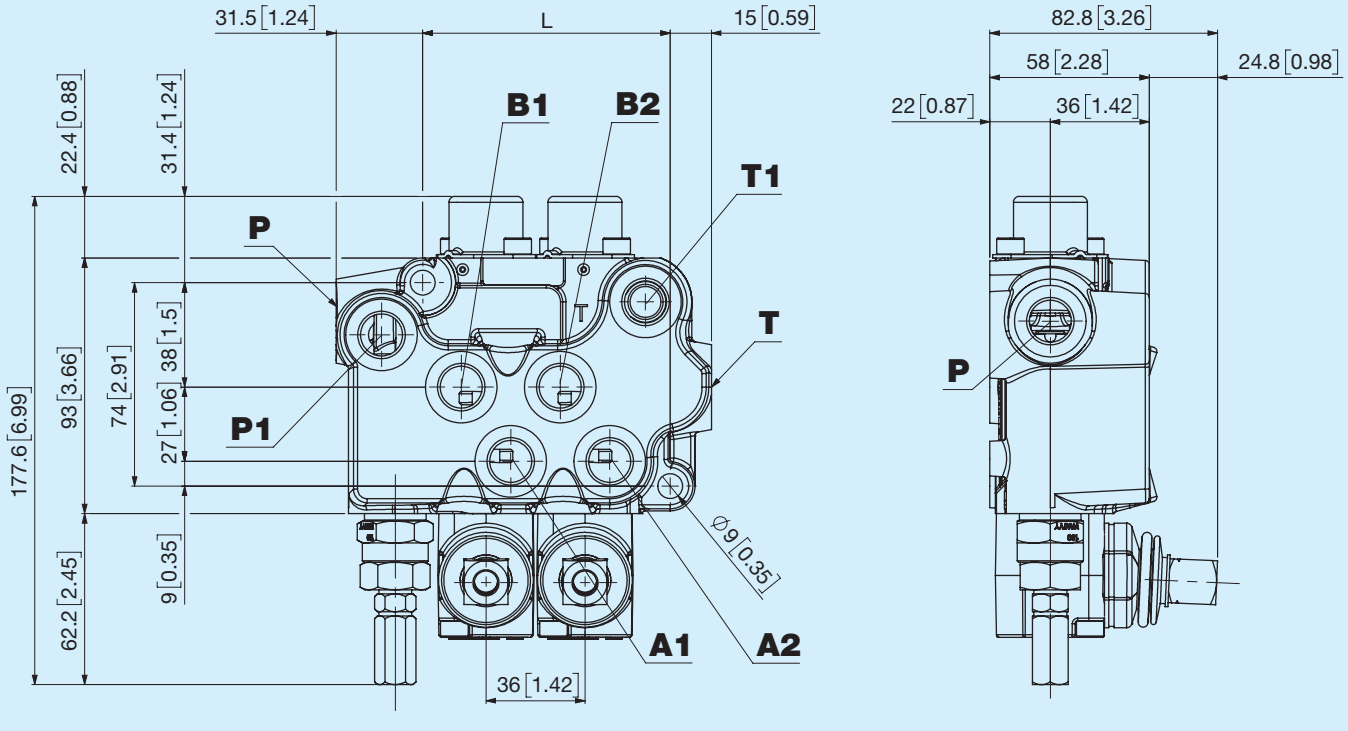


STANDARD version

Section



Dimensions

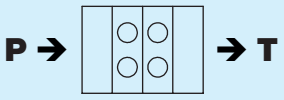


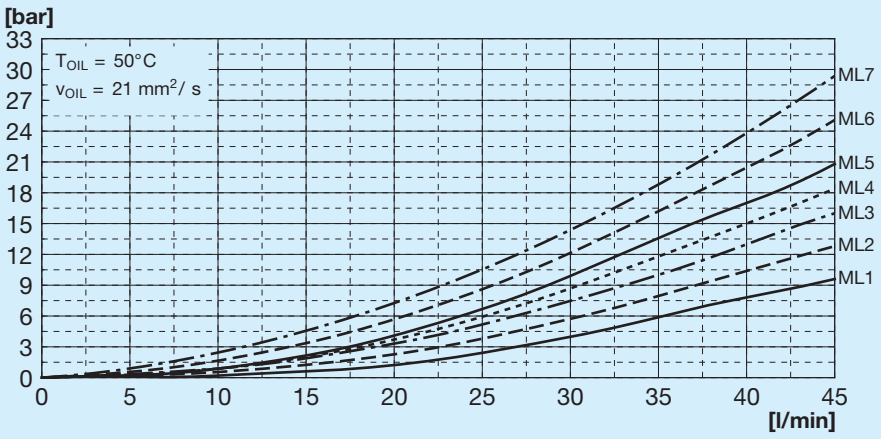
Standard

Dimensions per number of sections

Code	N° of sections	L		Weight	
		mm	in	kg	lb
1	1	54	2,1	2,9	6,4
2	2	90	3.5	4,2	9,2
3	3	126	4,9	5.3	11.7
4	4	162	6.3	6,6	14.5
5	5	198	7.8	7.8	17,2
6	6	234	9,2	9	19,9
7	7	270	10,3	10,2	22,6

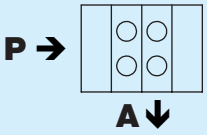
Pressure drops P-T

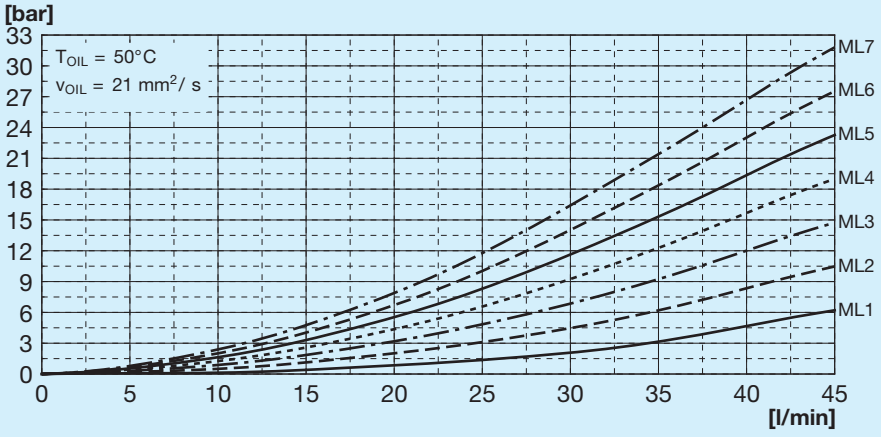




Testing parameters: Spool type **01**

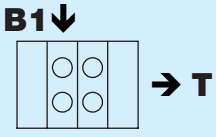
Pressure drops P-A

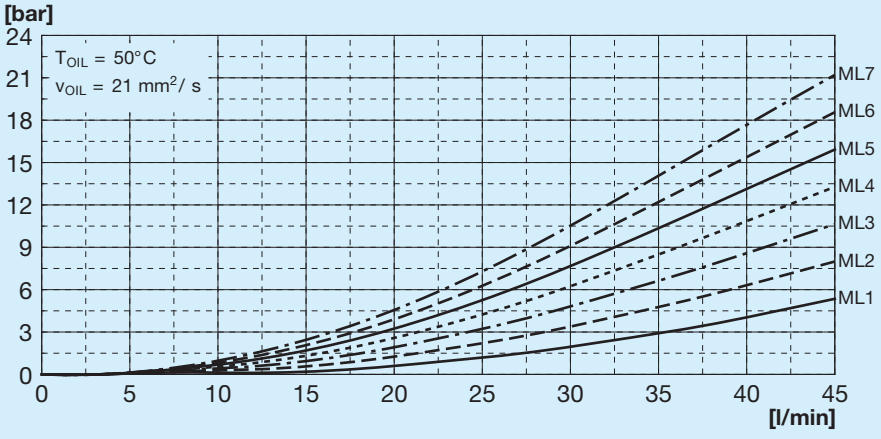




Testing parameters: Spool type **01**

Pressure drops B1-T

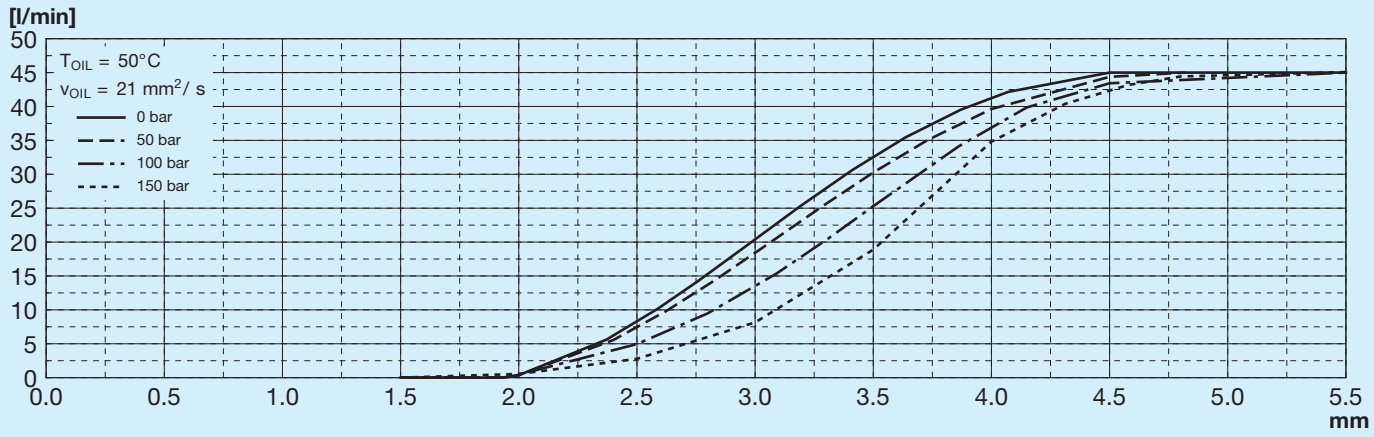




Testing parameters: Spool type **01**

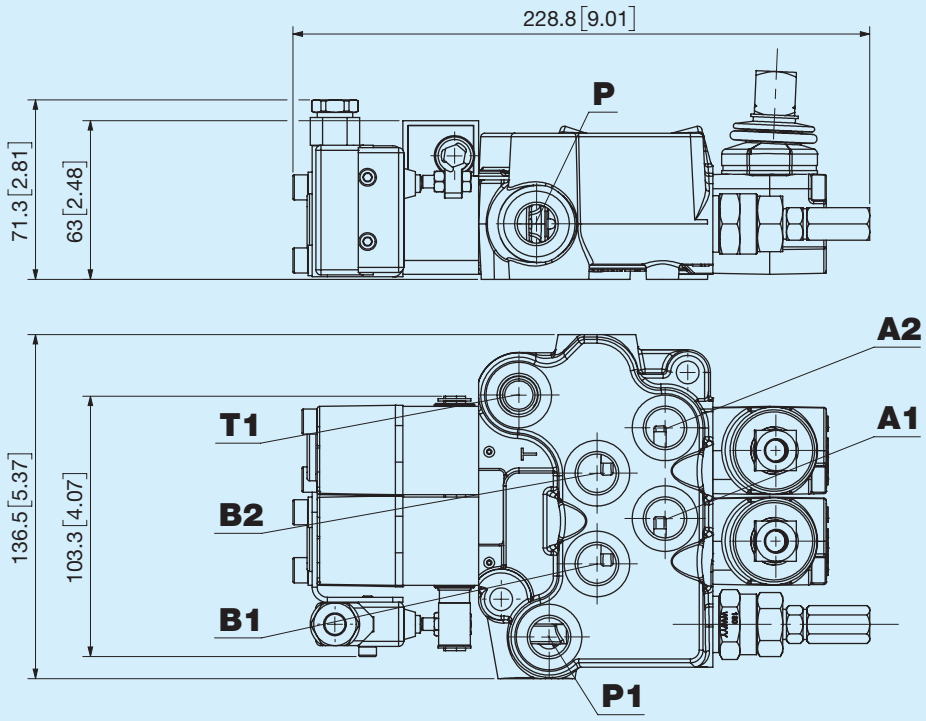
Characteristic curves

Metering

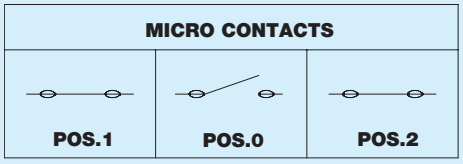


Testing parameters: Spool type **01**

M Centralised microswitch



Dual effect microswitch

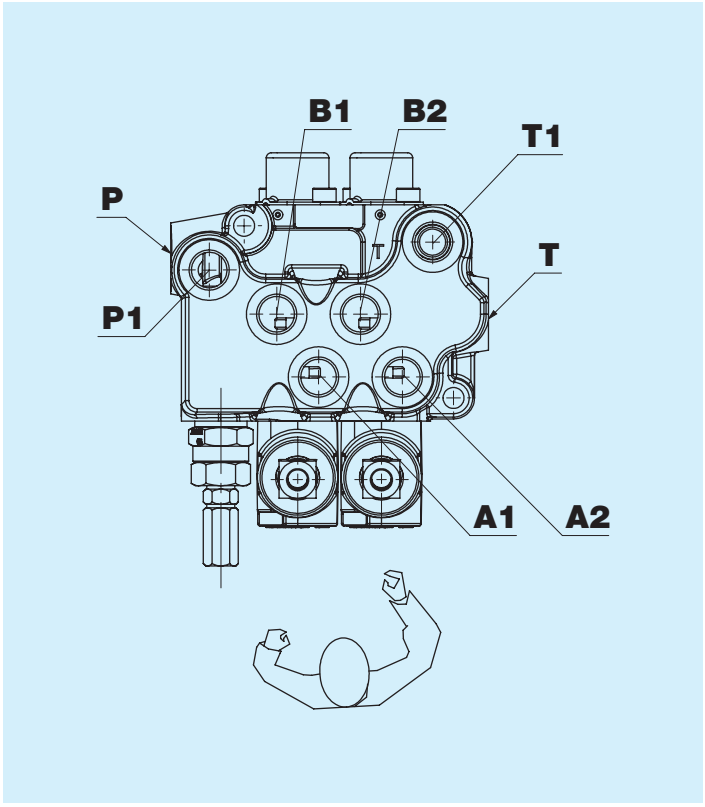


Characteristics of microswitch positioner

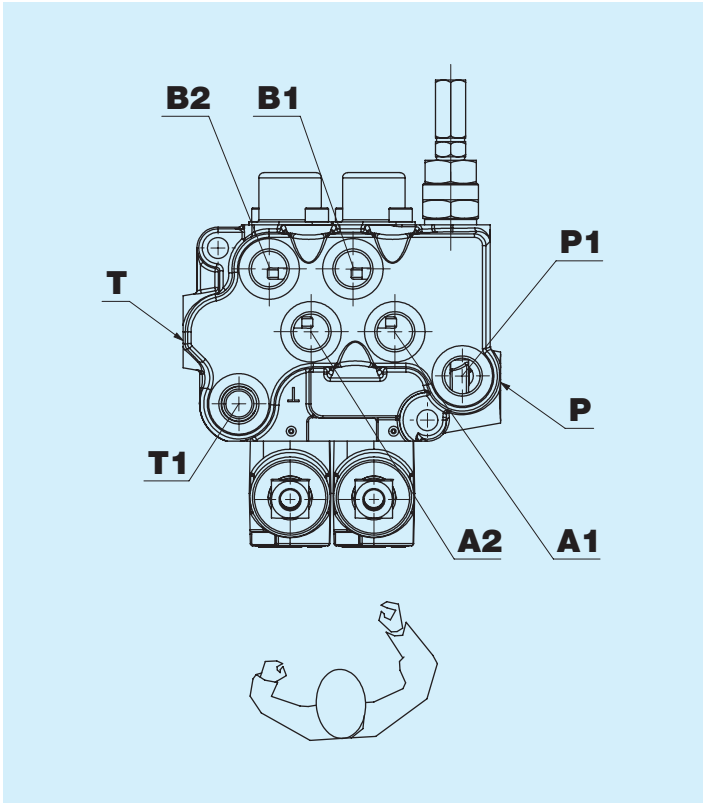
Contact rating	16(5)A at 250V A.C 50 Hz 3A at 30V D.C. L/R= 5 ms
Temperature range	-20° to 85° C
Expected mechanical life	10 million cycles at 1 Hz
Insulation	Up to 100 MΩ

Type of inlet

S Left (standard)



D Right



Port A is usually the nearest port to the actuator side.

Thread ports P - P1

Code	Type	Torque Nm
A	3/8'' GAS ISO 1179	42
B	1/2'' GAS ISO 1179	65
T	M16x1.5 ISO 9974	28
C	M18x1.5 ISO 9974	42
I	M16x1.5 ISO 6149	28
W	M18x1.5 ISO 6149	42
P	9/16'' - 18 SAE ISO 11926	28
E	3/4'' - 16 SAE ISO 11926	42

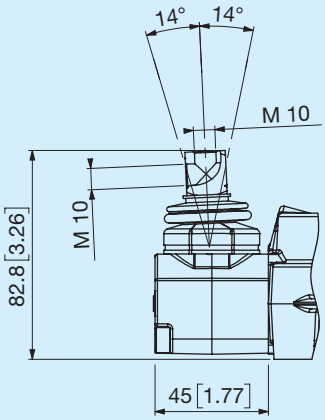
Thread ports A - B

Code	Type	Torque Nm
A	3/8'' GAS ISO 1179	42
T	M16x1.5 ISO 9974	28
C	M18x1.5 ISO 9974	42
I	M16x1.5 ISO 6149	28
W	M18x1.5 ISO 6149	42
E	3/4'' - 16 SAE ISO 11926	42

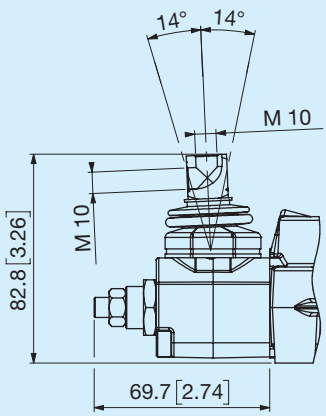
Thread ports T - T1

Code	Type	Torque Nm
A	3/8'' GAS ISO 1179	42
B	1/2'' GAS ISO 1179	65
T	M16x1.5 ISO 9974	28
C	M18x1.5 ISO 9974	42
I	M16x1.5 ISO 6149	28
W	M18x1.5 ISO 6149	42
P	9/16'' - 18 SAE ISO 11926	28
E	3/4'' - 16 SAE ISO 11926	42

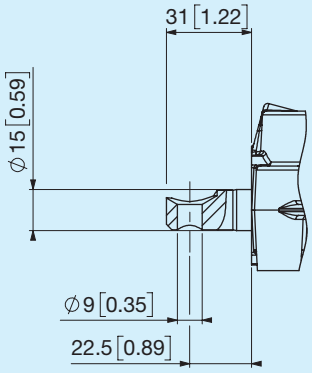
L Standard kit for lever holder



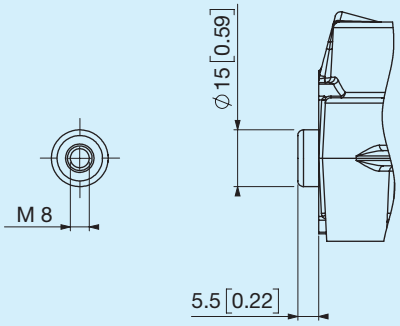
Z Lever holder with stroke limiter



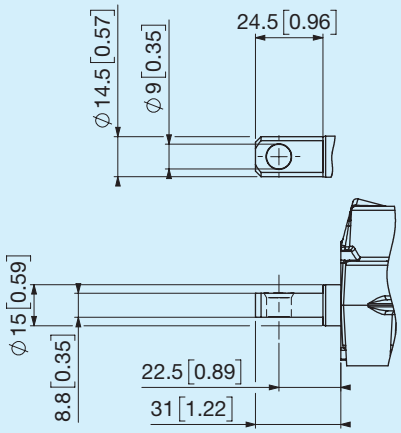
A Without lever holder, standard appendix



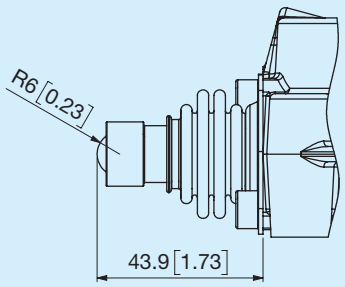
B Without lever holder, without appendix



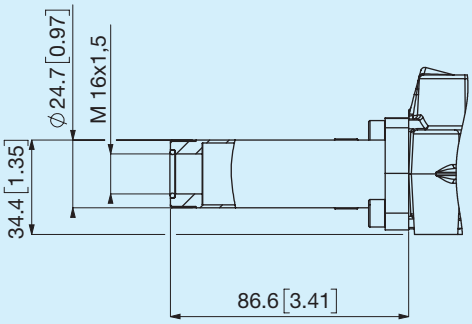
C Without lever holder, flat appendix



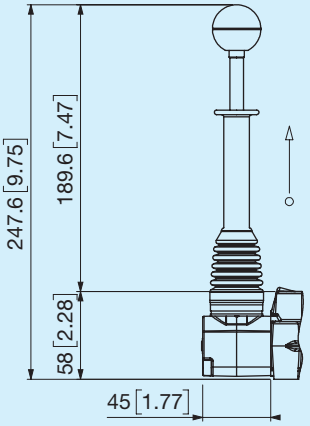
9 Actuator with integrated ball



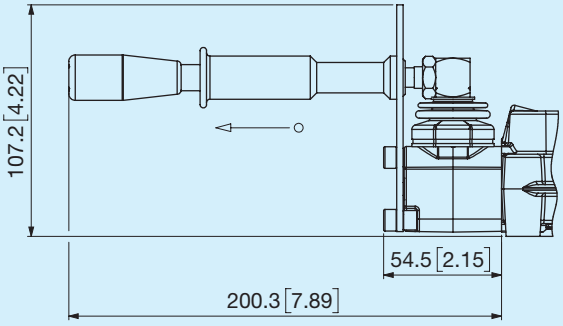
T Cable setting



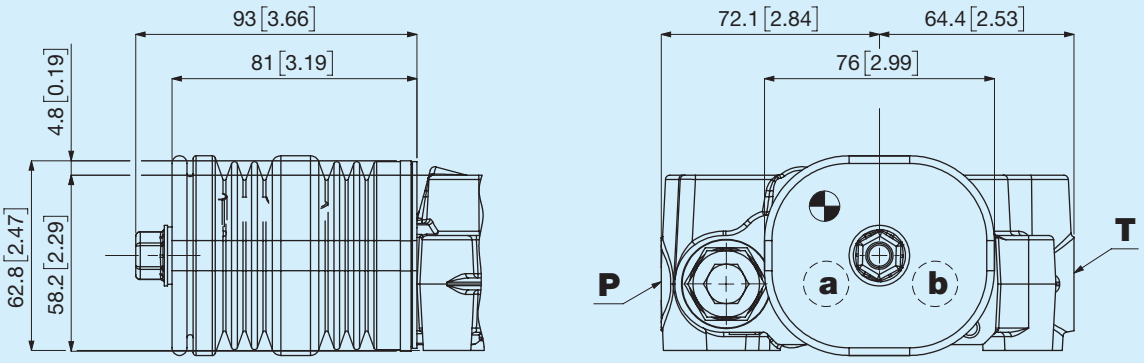
V Intentional, vertical



O Intentional, horizontal

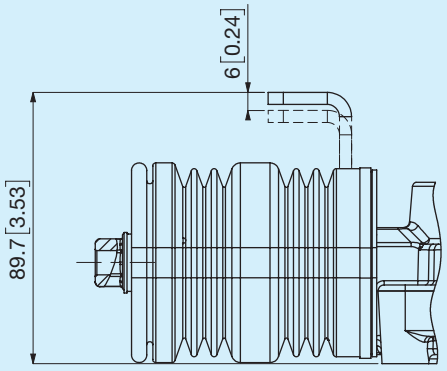


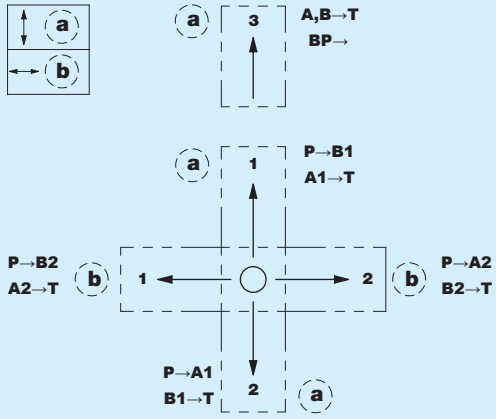
M Joystick



a=Spool 1st section b=Spool 2nd section

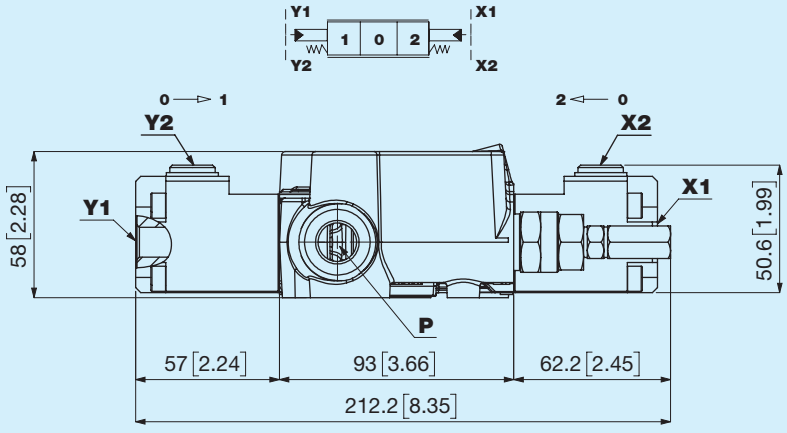
G Joystick with spool lock

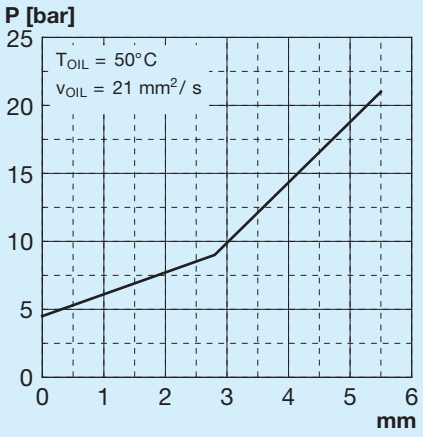




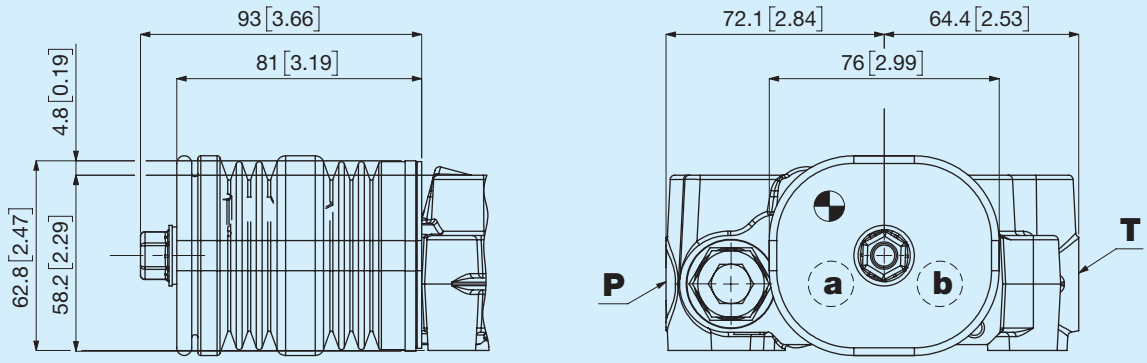
Also available in other configurations.

K Hydraulic control





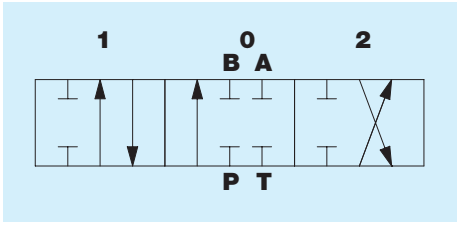
M Joystick



a=Spool 1st section b=Spool 2nd section

Spool types

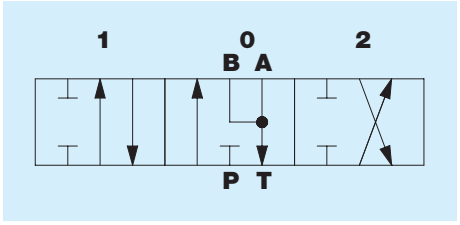
01 Spool type



Positions

3	1	0	2	4
	P → B A → T BP ⊣	P, T ⊣ A, B ⊣ BP →	P → A B → T BP ⊣	

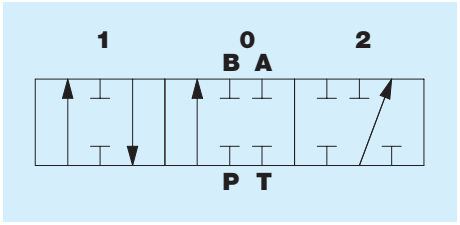
03 Spool type



Positions

3	1	0	2	4
	P → B A → T BP ⊣	A, B → T P ⊣ BP →	P → A B → T BP ⊣	

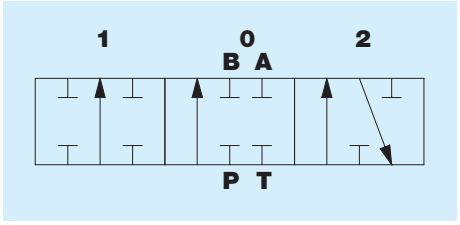
04 Spool type



Positions

3	1	0	2	4
	A → T P, B ⊣ BP →	P, T ⊣ A, B ⊣ BP →	P → A B, T ⊣ BP ⊣	

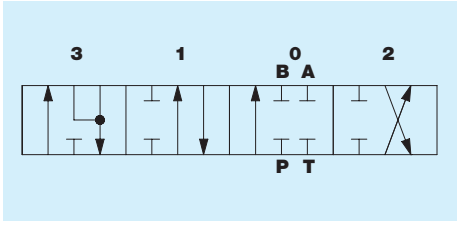
05 Spool type



Positions

3	1	0	2	4
	P → B A, T ⊣ BP ⊣	P, T ⊣ A, B ⊣ BP →	P, A ⊣ B → T BP →	

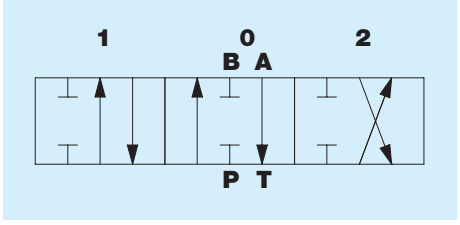
07 Spool type



Positions

3	1	0	2	4
A, B → T P ⊣ BP →	P → B A → T BP ⊣	P, T ⊣ A, B ⊣ BP →	P → A B → T BP ⊣	

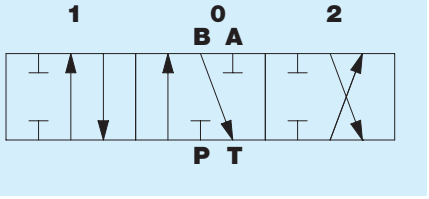
08 Spool type



Positions

3	1	0	2	4
	P → B A → T BP ⊣	P, B ⊣ A → T BP →	P → A B → T BP ⊣	

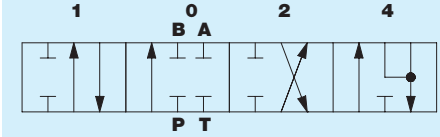
10 Spool type



Positions

3	1	0	2	4
	P → B A → T BP ⊣	B → T P, A ⊣ BP →	P → A B → T BP ⊣	

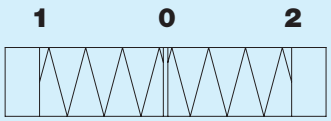
70 Spool type



Positions

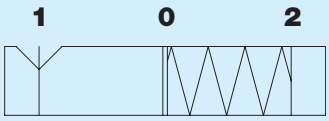
3	1	0	2	4
	P → B A → T BP ⊣	P, T ⊣ A, B ⊣ BP →	P → A B → T BP ⊣	A, B → T P ⊣ BP →

0A



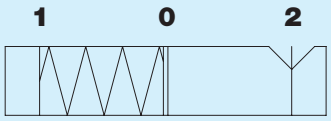
Neutral position in 0

0B



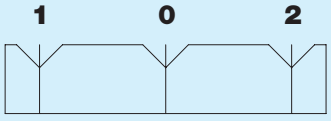
Neutral position in 0, detent in 1

0C



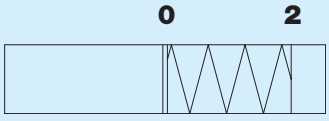
Neutral position in 0, detent in 2

0D



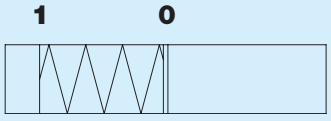
Detent in 0, 1, 2

0E



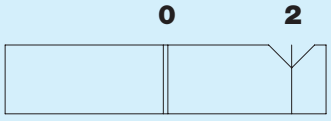
Neutral position in 0

0F



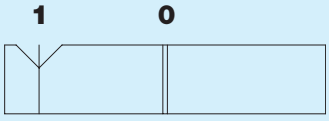
Neutral position in 0

0H



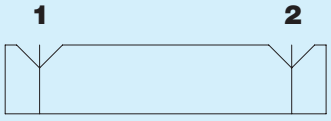
Detent in 2

0L



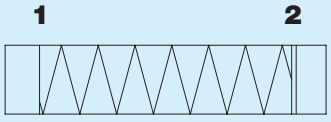
Detent in 1

0Q



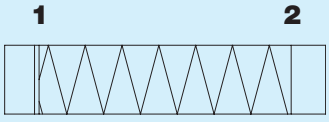
Detent in 1, 2

0R



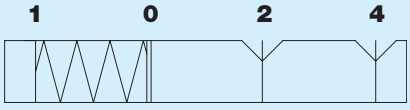
Neutral position in 2

0S



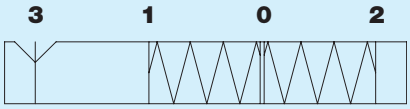
Neutral position in 1

CP



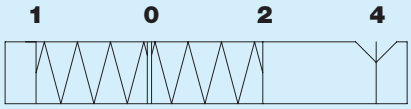
Neutral position in 0, detent in 2, 3

NS



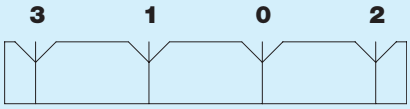
Neutral position in 0, detent in 3

NT



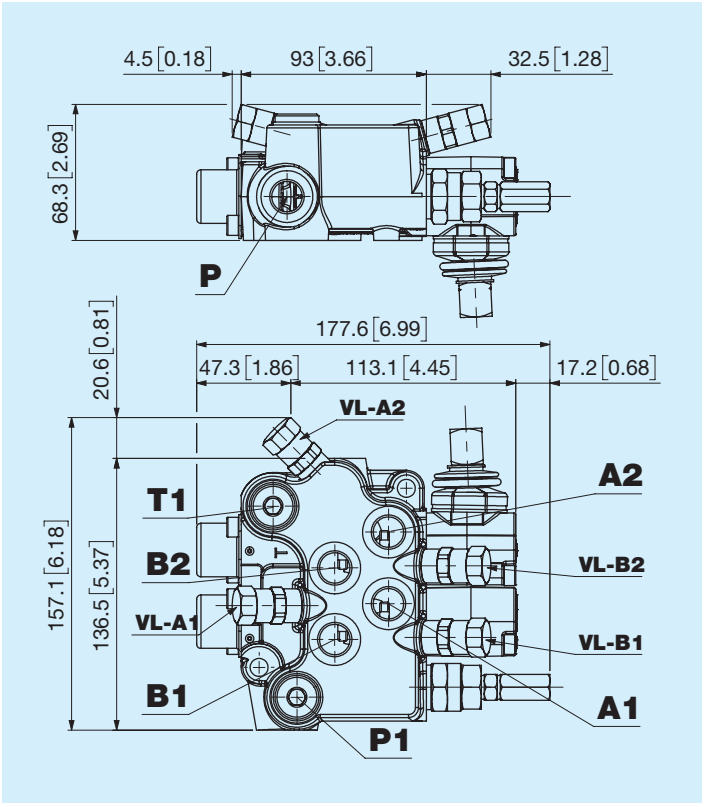
Neutral position in 0, detent in 4

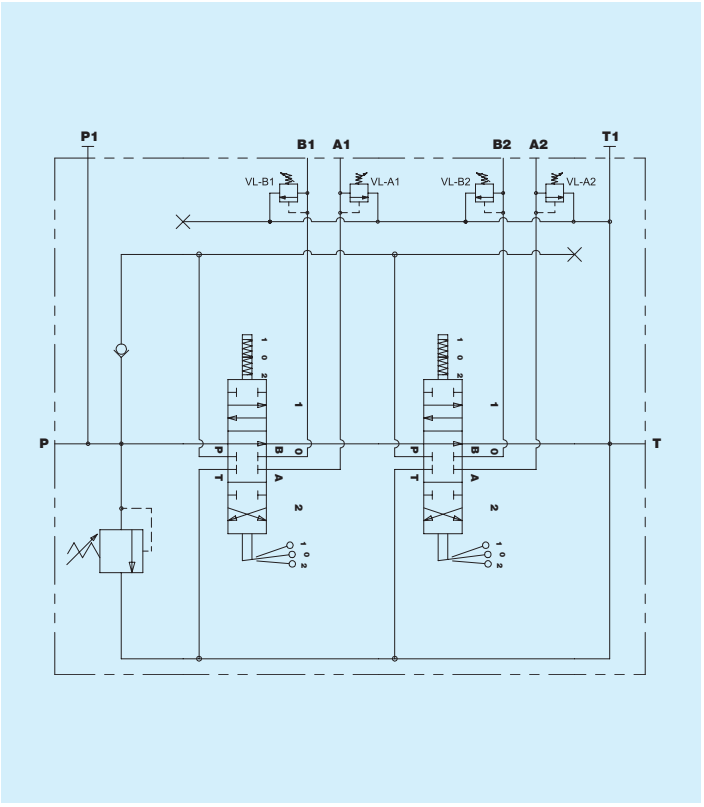
PS



Detent in 3, 1, 0, 2

VL - Pressure relief valve

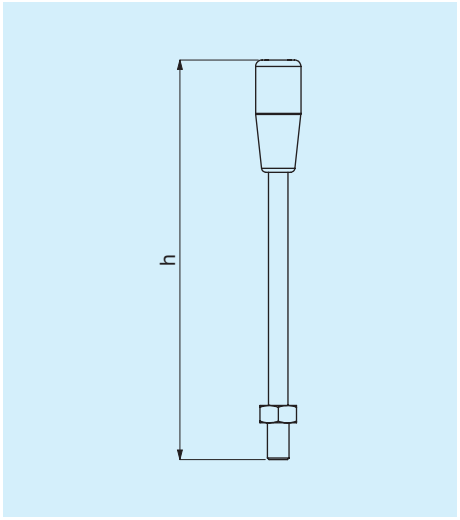




Lever options

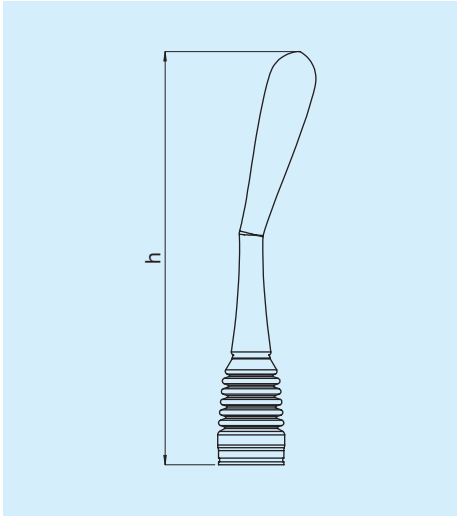
Straight standard knob

Code	Description	h [mm]	h [in]
A	Straight standard knob	109	4,3
B	Straight standard knob	134	5.28
C	Straight standard knob	184	7,24
D	Straight standard knob	214	8,42
E	Straight standard knob	254	10
F	Straight standard knob	304	11,97



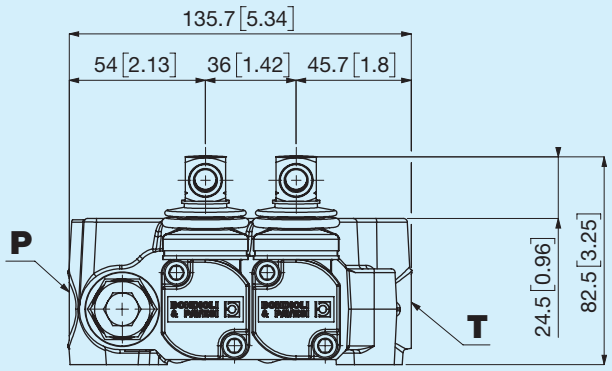
Ergonomic lever

Code	Description	h [mm]	h [in]
L	Straight vertical	180	7.09
O	Bent 15° vertical	180	7.09
R	Bent 30° vertical	180	7.09
M	Straight horizontal	180	7.09
Y	Bent 15° horizontal	180	7.09
Q	Bent 30° horizontal	180	7.09

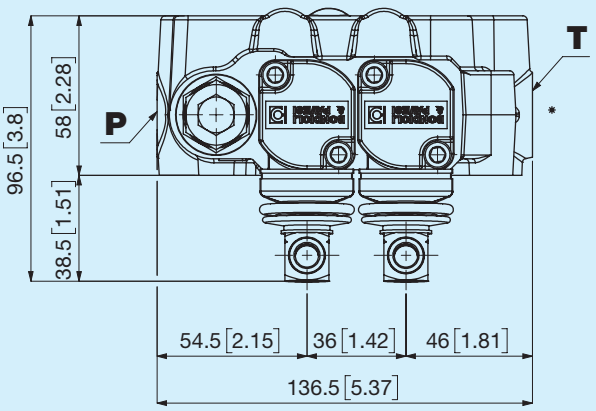


Lever holder position

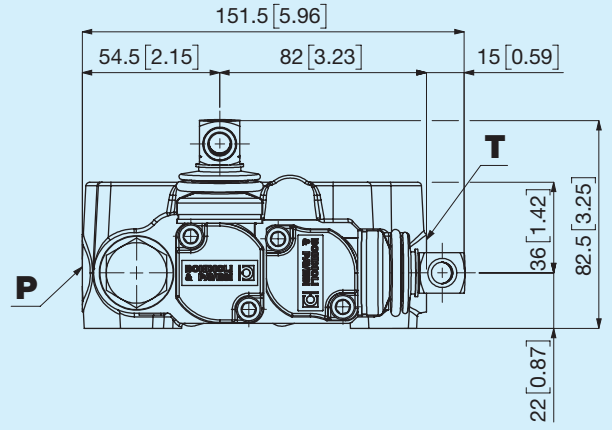
A Straight



C Rotated 180°

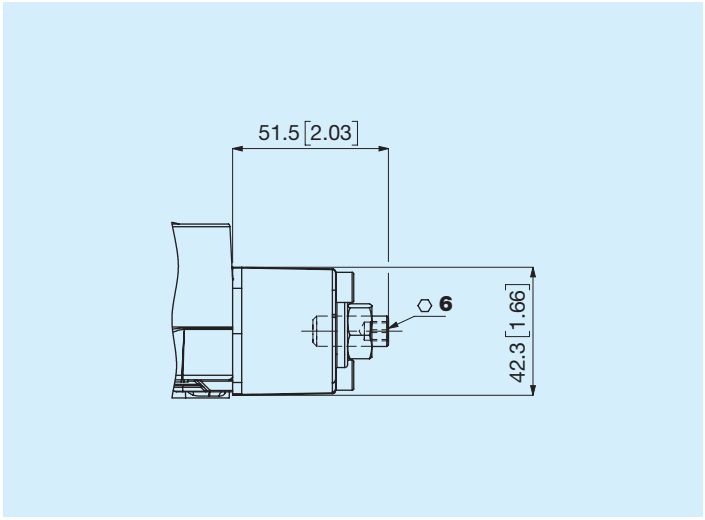


D Rotated 90° towards T

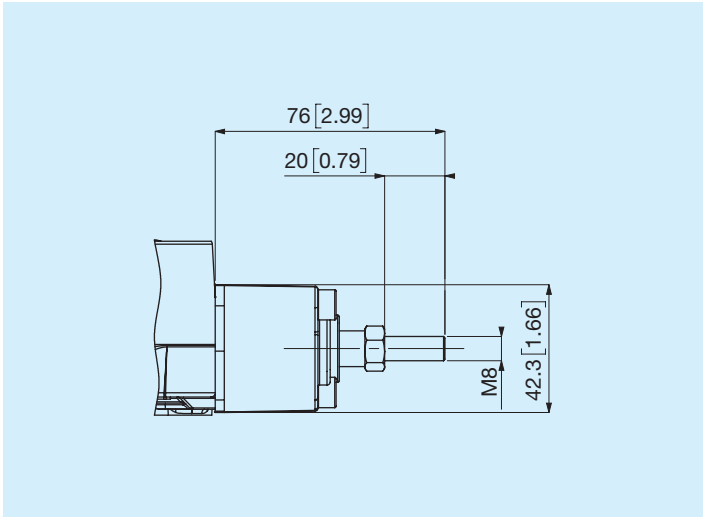


Options spool control side

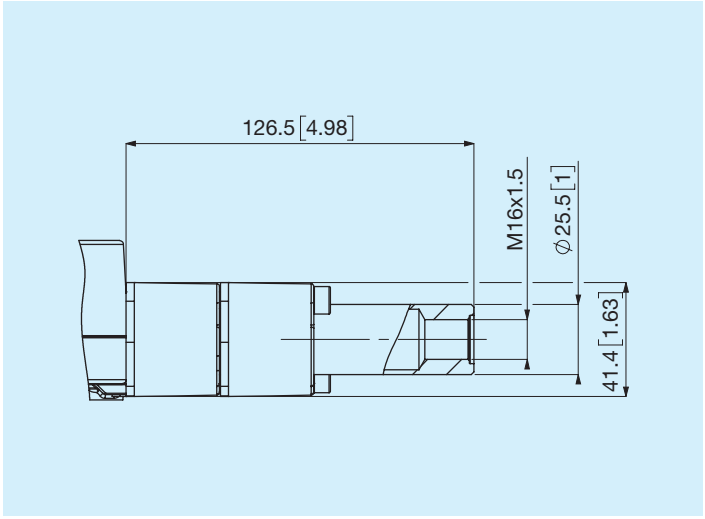
C Stroke limiter



M Male dual control

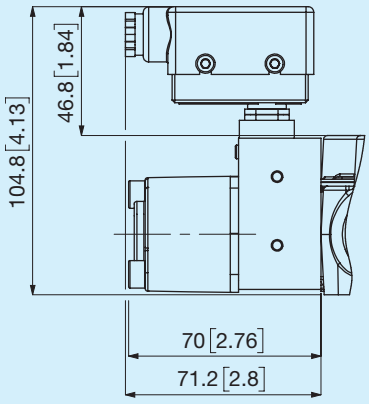


T Cable fitting



Options spool control side

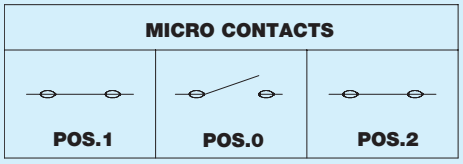
Microswitch



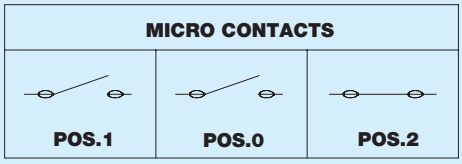
Characteristics of microswitch positioner

Contact rating	16(5)A at 250V A.C 50 Hz 3A at 30V D.C. L/R= 5 ms
Temperature range	-20° to 85° C
Expected mechanical life	10 million cycles at 1 Hz
Insulation	Up to 100 MΩ

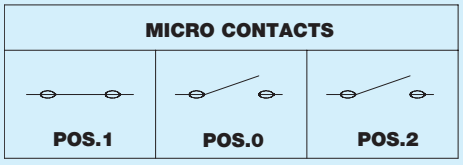
Y Dual effect microswitch



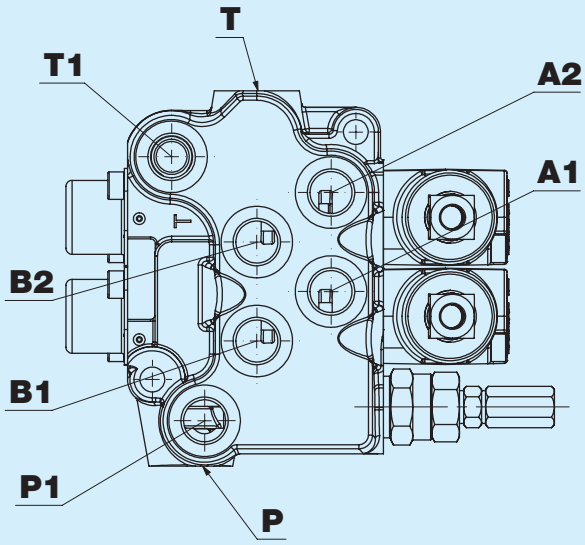
P Simple effect microswitch port A

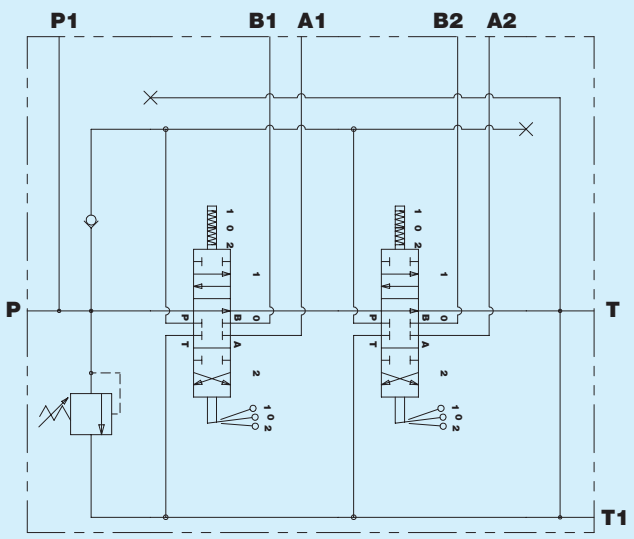


O Simple effect microswitch port B

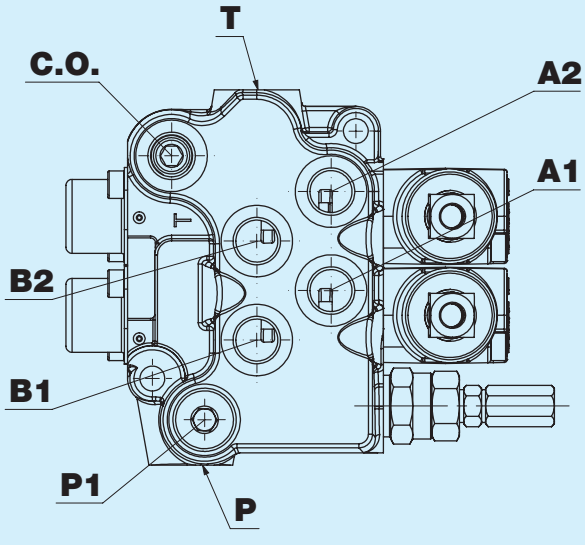


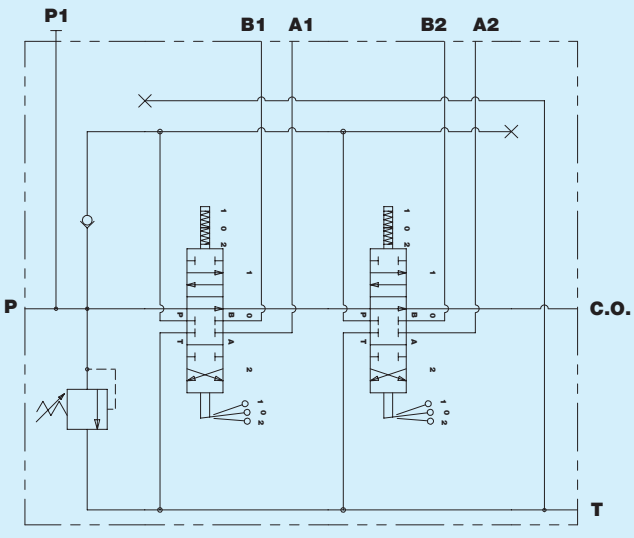
A Carry-over option



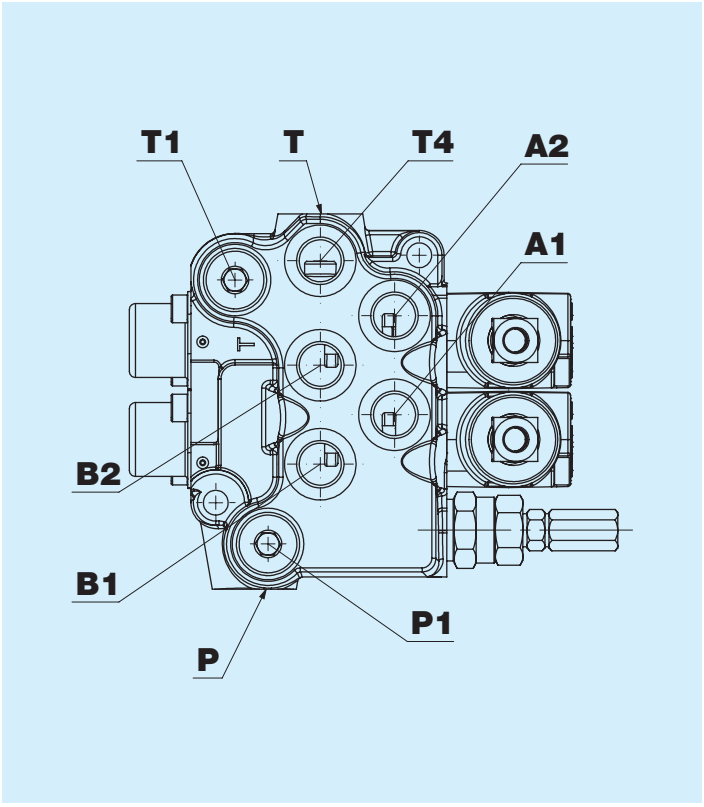


B With carry-over port T1





Port T4



Thread port T4

Code	Type	Torque Nm
0	Not processed (standard)	
L	1/4'' GAS ISO 1179	12
A	3/8'' GAS ISO 1179	42
B	1/2'' GAS ISO 1179	65
T	M16x1.5 ISO 9974	28
C	M18x1.5 ISO 9974	42
I	M16x1.5 ISO 6149	28
W	M18x1.5 ISO 6149	42
P	9/16'' - 18 SAE ISO 11926	28
E	3/4'' - 16 SAE ISO 11926	42

Instructions for ordering

Repeat for each section of the valve

ML	1	2	3	4	5	6	7 8	9	10	11	12 13	14	15 16	17

1 — Number of sections

1	Sections	**3**	Sections	**5**	Sections	**7**	Sections
2	Sections	**4**	Sections	**6**	Sections		

2 — General options

N	None	**Z**	Zinc plating	**O**	Paint and centr. microswitch
V	Black paint	**M**	Centralised microswitch	**Y**	Zinc plating and centr. microswitch

3 — Type of inlet

S	Left (standard)	**D**	Right

4 — Thread port P

A	3/8'' GAS ISO 1179	**T**	M16x1.5 ISO 9974	**I**	M16x1.5 ISO 6149	**P**	9/16'' - 18 SAE ISO 11926
B	1/2'' GAS ISO 1179	**C**	M18x1.5 ISO 9974	**W**	M18x1.5 ISO 6149	**E**	3/4'' - 16 SAE ISO 11926

5 — Thread port P1

A	3/8'' GAS ISO 1179	**T**	M16x1.5 ISO 9974	**I**	M16x1.5 ISO 6149	**P**	9/16'' - 18 SAE ISO 11926
B	1/2'' GAS ISO 1179	**C**	M18x1.5 ISO 9974	**W**	M18x1.5 ISO 6149	**E**	3/4'' - 16 SAE ISO 11926

6 — Options on port P-P1

A	P open - P1 open (standard)	**B**	P open - P1 plugged	**C**	P plugged - P1 open

7 8 — Maximum pressure relief valve type

00	VMP replacement plug	**11**	110 bar	**17**	170 bar	**23**	230 bar
06	60 bar	**12**	120 bar	**18**	180 bar	**24**	240 bar
07	70 bar	**13**	130 bar	**19**	190 bar	**25**	250 bar
08	80 bar	**14**	140 bar	**20**	200 bar		
09	90 bar	**15**	150 bar	**21**	210 bar		
10	100 bar	**16**	160 bar	**22**	220 bar		

9 — Sealing type maximum pressure relief valve

G	Grub screw	**P**	Sealed	**N**	None
C	Cap	**R**	Sealing provided		

10 — Thread ports A - B

A	3/8'' GAS ISO 1179	**C**	M18x1.5 ISO 9974	**W**	M18x1.5 ISO 6149
T	M16x1.5 ISO 9974	**I**	M16x1.5 ISO 6149	**E**	3/4'' - 16 SAE ISO 11926

11 — Actuators

L	Standard kit for lever holder	**B**	Without lever holder, without appendix	**T**	Cable setting	**K**	Hydraulic control
Z	Lever holder with stroke limiter	**C**	Without lever holder, flat appendix	**V**	Intentional, vertical	**M**	Joystick
A	Without lever holder, standard appendix	**9**	Actuator with integrated ball	**O**	Intentional, horizontal	**G**	Joystick with spool lock

12 13 — Spool types

01	Spool type	**04**	Spool type	**07**	Spool type	**10**	Spool type
03	Spool type	**05**	Spool type	**08**	Spool type	**70**	Spool type

Instructions for ordering

18	19 20	21	22	23	24	25	26	27	28

14 Spool options

E	Standard spool	**A**	Spool 20-45 l/min	**C**	Spool 8-20 l/min		
F	Standard nickel-plated spool	**B**	Nickel-plated spool 20-45 l/min	**D**	Nickel-plated spool 8-20 l/min		

15 16 Spool control

NN	None	**0E**	Neutral position in 0	**0R**	Neutral position in 2	**PS**	Detent in 3, 1, 0, 2
0A	Neutral position in 0	**0F**	Neutral position in 0	**0S**	Neutral position in 1	**...**	
0B	Neutral position in 0, detent in 1	**0H**	Detent in 2	**CP**	Neutral position in 0, detent in 2, 3	**...**	For selection, see the relevant chapter
0C	Neutral position in 0, detent in 2	**0L**	Detent in 1	**NS**	Neutral position in 0, detent in 3		
0D	Detent in 0, 1, 2	**0Q**	Detent in 1, 2	**NT**	Neutral position in 0, detent in 4		

17 18 Valve type port A

00	None	**10**	VL 100 bar	**16**	VL 160 bar	**22**	VL 220 bar
TP	Processed and plugged	**11**	VL 110 bar	**17**	VL 170 bar	**23**	VL 230 bar
06	VL 60 bar	**12**	VL 120 bar	**18**	VL 180 bar	**24**	VL 240 bar
07	VL 70 bar	**13**	VL 130 bar	**19**	VL 190 bar	**25**	VL 250 bar
08	VL 80 bar	**14**	VL 140 bar	**20**	VL 200 bar		
09	VL 90 bar	**15**	VL 150 bar	**21**	VL 210 bar		

19 20 Valve type port B

00	None	**10**	VL 100 bar	**16**	VL 160 bar	**22**	VL 220 bar
TP	Processed and plugged	**11**	VL 110 bar	**17**	VL 170 bar	**23**	VL 230 bar
06	VL 60 bar	**12**	VL 120 bar	**18**	VL 180 bar	**24**	VL 240 bar
07	VL 70 bar	**13**	VL 130 bar	**19**	VL 190 bar	**25**	VL 250 bar
08	VL 80 bar	**14**	VL 140 bar	**20**	VL 200 bar		
09	VL 90 bar	**15**	VL 150 bar	**21**	VL 210 bar		

21 Lever options

N	None	**C**	h 184 mm / 7.24 in	**L**	Straight vertical	**Y**	Bent 15° horizontal
S	Without lever	**D**	h 214 mm / 8.42 in	**O**	Bent 15° vertical	**Q**	Bent 30° horizontal
A	h 109 mm / 4.3 in	**E**	h 254 mm / 10 in	**R**	Bent 30° vertical		
B	h 134 mm / 5.28 in	**F**	h 304 mm / 11.97 in	**M**	Straight horizontal		

22 Lever holder position

A	Straight	**C**	Rotated 180°	**N**	None
B	Rotated 90° towards P (right inlet)	**D**	Rotated 90° towards T		

23 Options spool control side

N	None	**M**	Male dual control	**Y**	Dual effect microswitch	**O**	Simple effect microswitch port B
C	Stroke limiter	**T**	Cable setting	**P**	Simple effect microswitch port A		

24 Thread Port T

A	3/8'' GAS ISO 1179	**T**	M16x1.5 ISO 9974	**I**	M16x1.5 ISO 6149	**P**	9/16'' - 18 SAE ISO 11926
B	1/2'' GAS ISO 1179	**C**	M18x1.5 ISO 9974	**W**	M18x1.5 ISO 6149	**E**	3/4'' - 16 SAE ISO 11926

25 Thread Port T1

A	3/8'' GAS ISO 1179	**T**	M16x1.5 ISO 9974	**I**	M16x1.5 ISO 6149	**P**	9/16'' - 18 SAE ISO 11926
B	1/2'' GAS ISO 1179	**C**	M18x1.5 ISO 9974	**W**	M18x1.5 ISO 6149	**E**	3/4'' - 16 SAE ISO 11926

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Thread Port T4

N	None (standard)	**B**	1/2'' GAS ISO 1179	**I**	M16x1.5 ISO 6149	**E**	3/4'' - 16 SAE ISO 11926
L	1/4” GAS ISO 1179	**T**	M16x1.5 ISO 9974	**W**	M18x1.5 ISO 6149		
A	3/8'' GAS ISO 1179	**C**	M18x1.5 ISO 9974	**P**	9/16'' - 18 SAE ISO 11926		

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Options on port T-T1-T4

A	T - T1 - T4 open	**D**	T - T4 open, T1 plugged	**G**	T plugged, T1-T4 open	**L**	T - T1 plugged, T4 open
B	T - T1 open, T4 not processed	**E**	T open, T1 plugged, T4 not processed	**H**	T plugged, T1 open, T4 plugged		
C	T - T1 open, T4 plugged	**F**	T open, T1 - T4 plugged	**I**	T plugged, T1 open, T4 not processed		

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C.O. - Carry Over

A	Carry-over option	**B**	With carry-over port T1