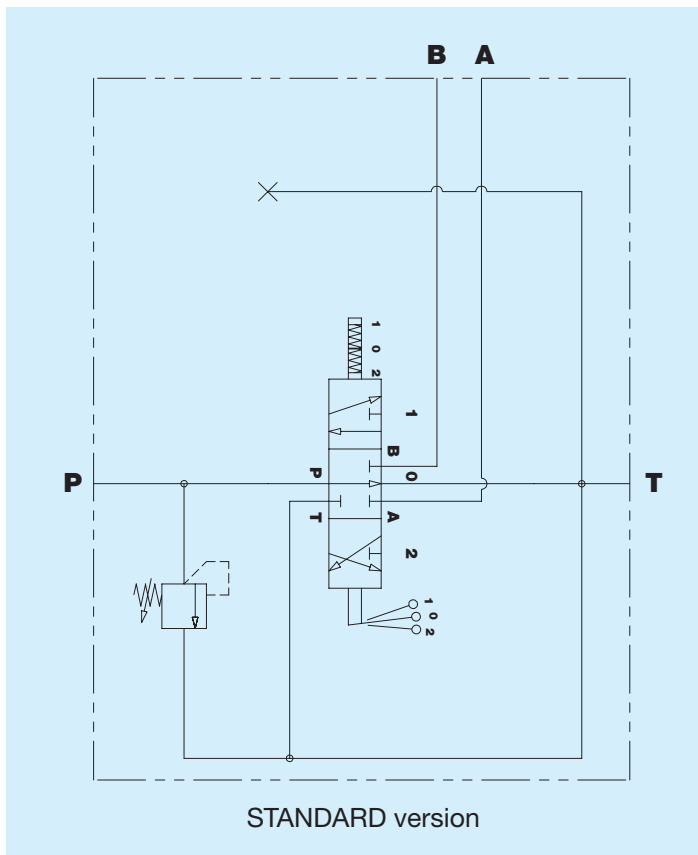


## MD1 - Directional control valve

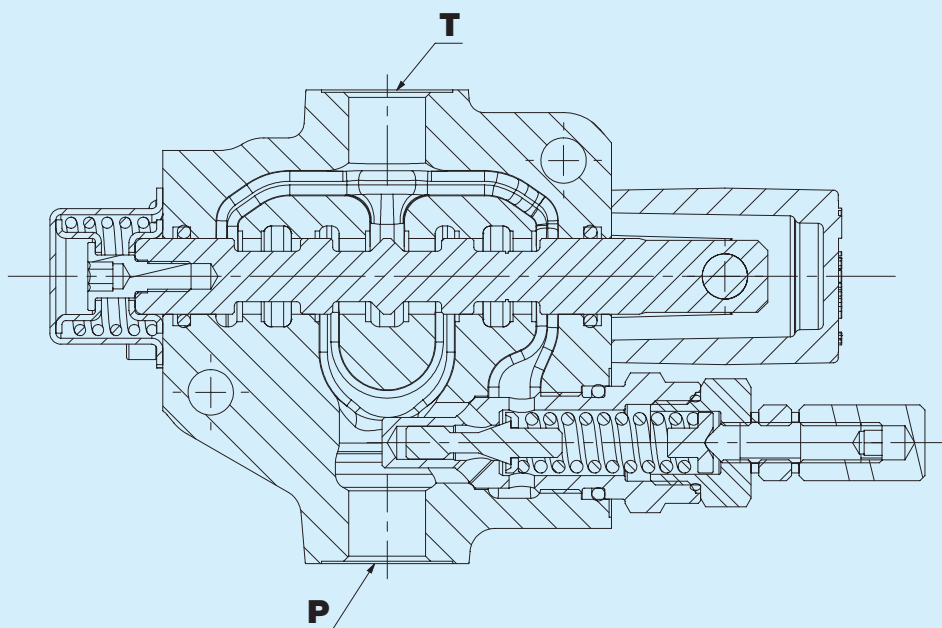


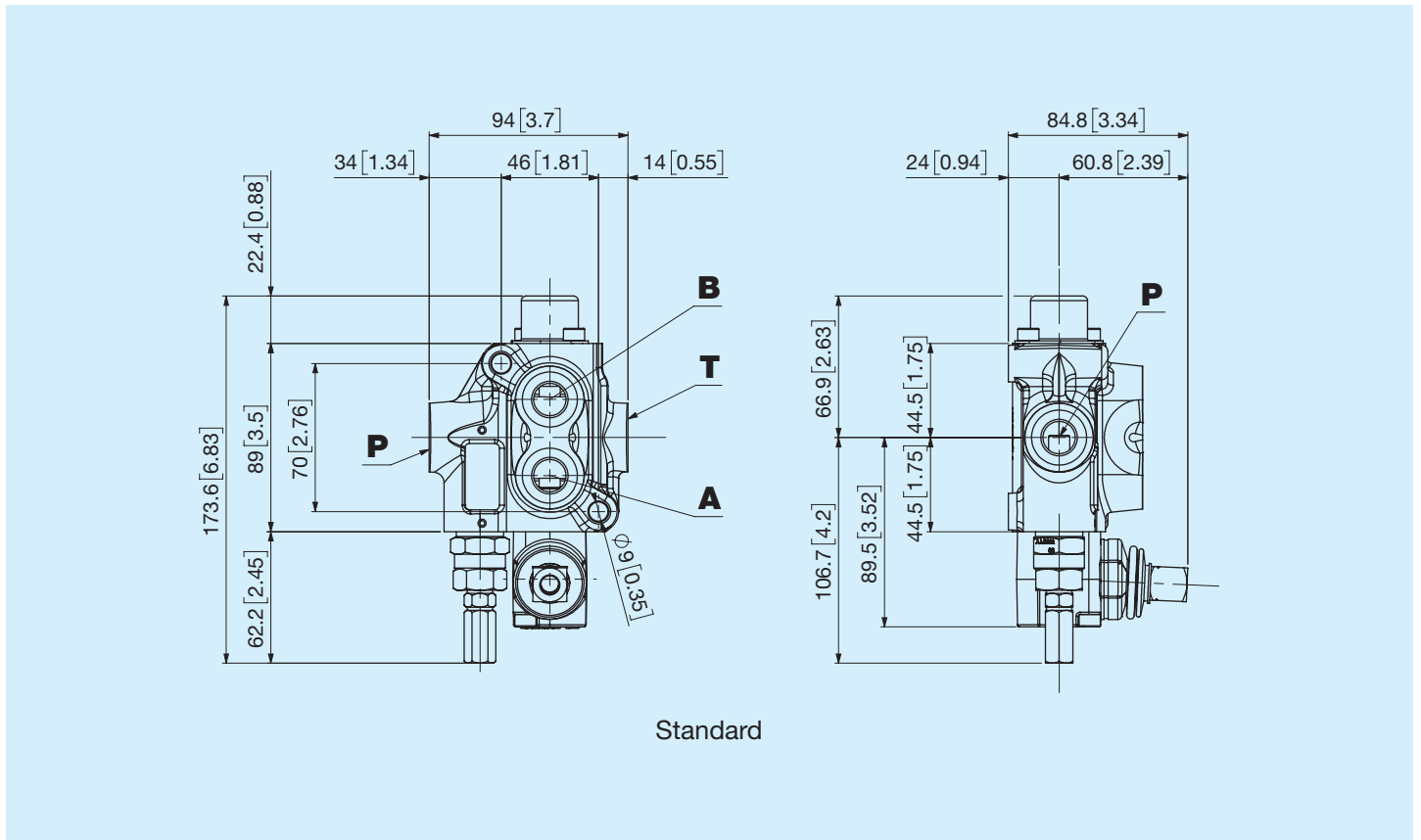
Before use, carefully read the GENERAL INSTRUCTIONS FOR USE OF DIRECTIONAL CONTROL VALVES

Nominal flow	<b>35 l/min</b> <b>9.2 US gpm</b>
Nominal pressure	<b>250 bar</b> <b>3625 psi</b>
Nominal inlet flow with electric actuators	<b>20 l/min</b> <b>5.3 US gpm</b>
Maximum pressure with electric actuators	<b>180 bar</b> <b>2610 psi</b>
Maximum tank pressure	<b>50 bar</b> <b>725 psi</b>
Internal leakage (A or B -> P and T) p=100 bar (1450 psi)	<b>8 cm<sup>3</sup>/min</b> <b>0.49 in<sup>3</sup>/min</b>
Temperature range	<b>-20°C +85°C NBR seals</b> <b>(max peak +100°C)</b> <b>-20°C + 130°C HNBR seals</b>
Oil viscosity	<b>from 15 mm<sup>2</sup>/s to 90 mm<sup>2</sup>/s</b> <b>(15 cSt to 90 cSt)</b>
Fluid	<b>Hydraulic fluids as defined in ISO 6743-4 standard</b>
Weight	<b>2.2 kg</b> <b>4.8 lb</b>



## Section

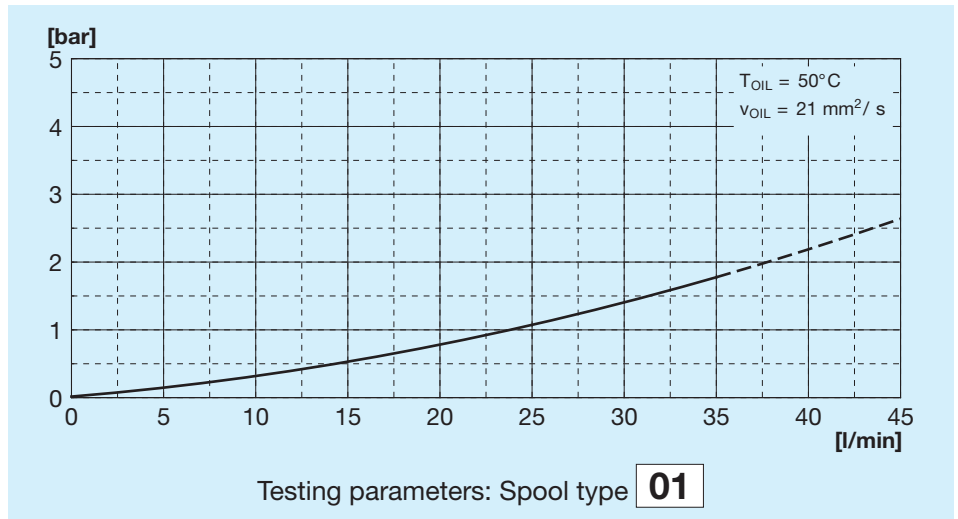
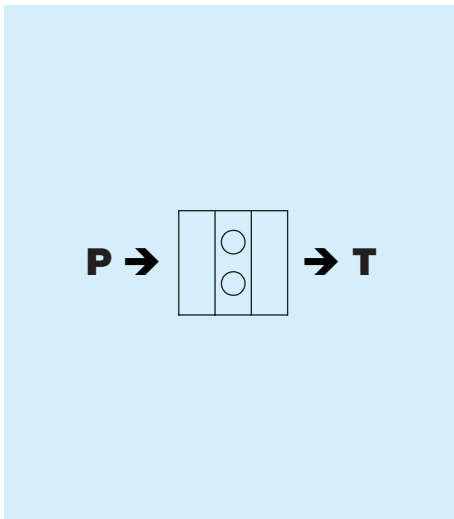




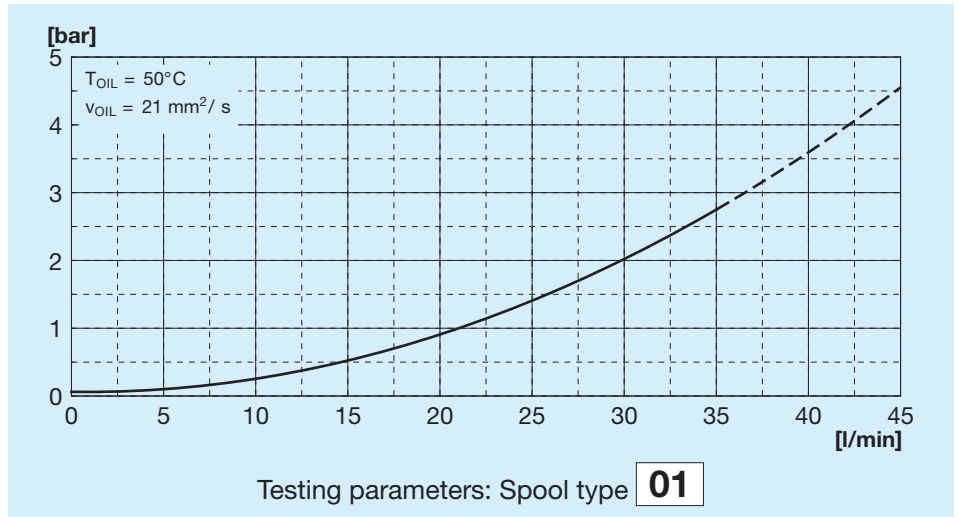
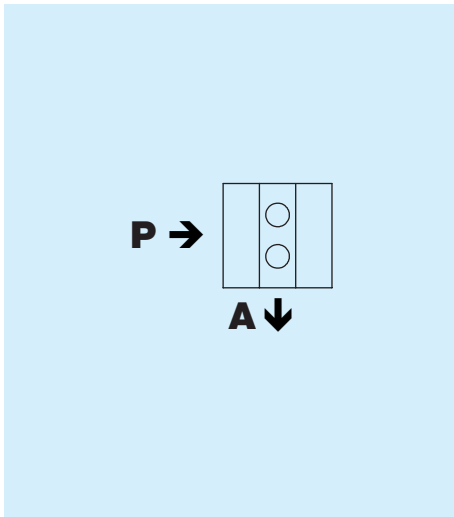
## Dimensions per number of sections

Code	N° of sections	L		Weight	
		mm	in	kg	lb
<b>1</b>	1	46	1,8	2,2	4.8

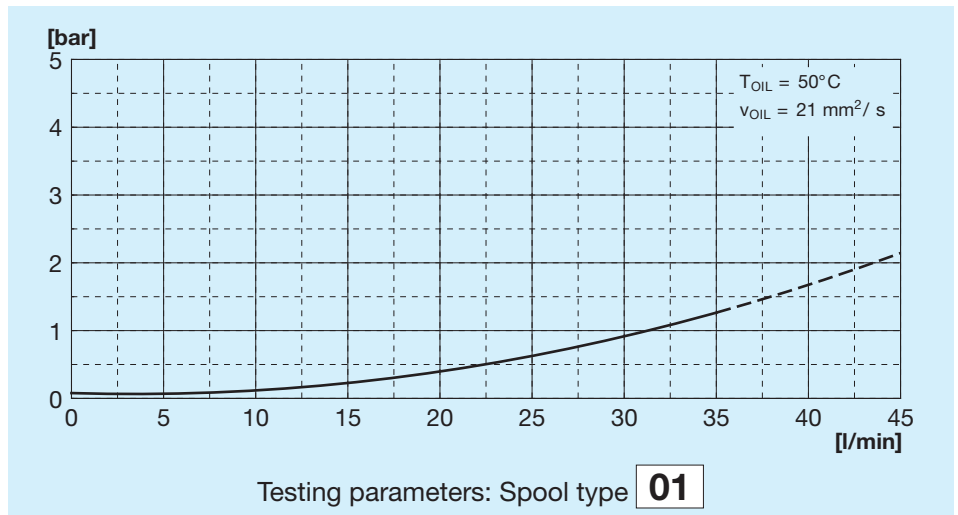
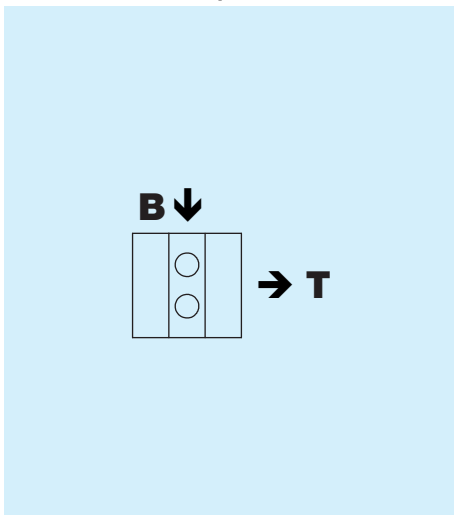
## Pressure drop P-T

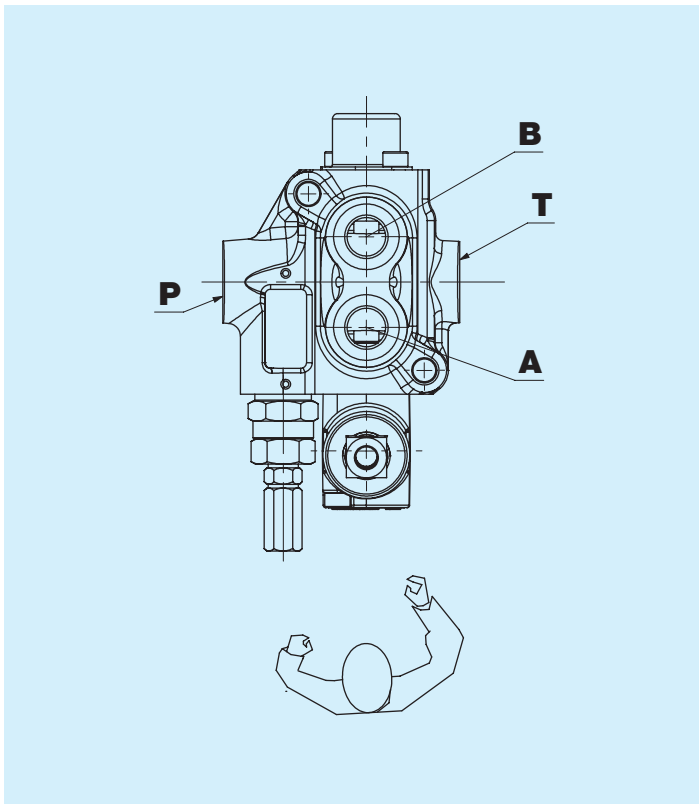
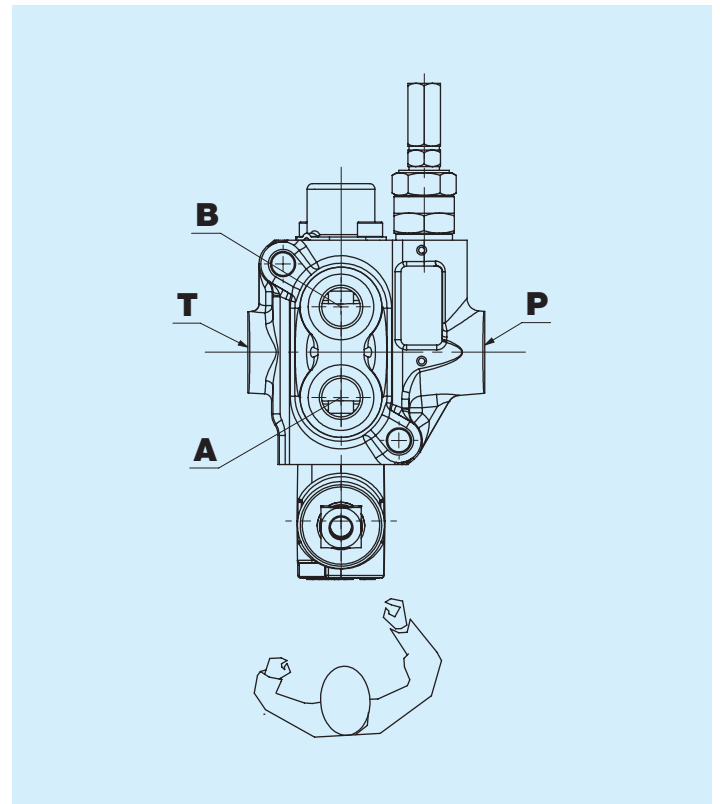


## Pressure drop P-A



## Pressure drop B-T



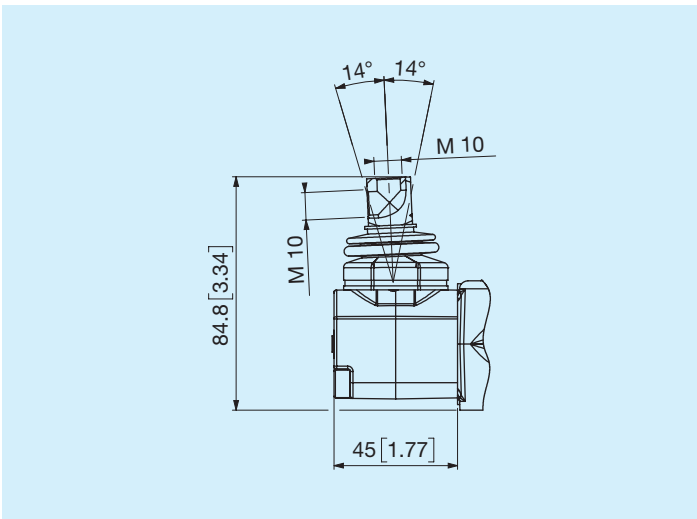
**S** Left (standard)**D** Right

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

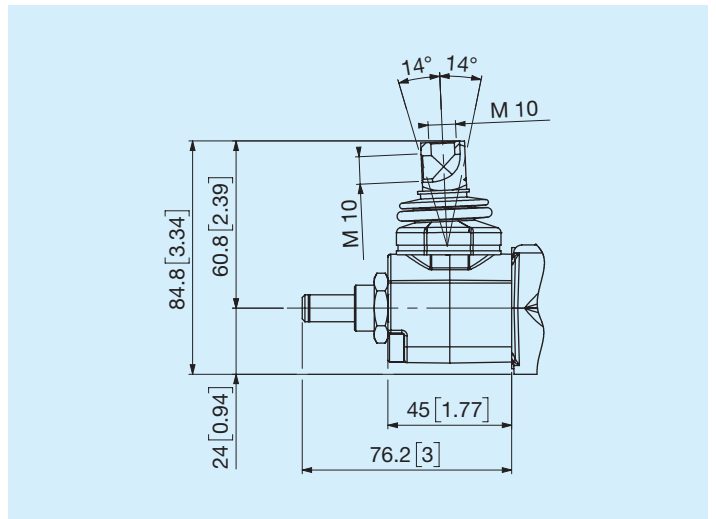
## Thread ports

Code	Type	Torque Nm
<b>B</b>	1/2" GAS ISO 1179	70
<b>A</b>	3/8" GAS ISO 1179	35
<b>T</b>	M16x1.5 ISO 9974	24
<b>C</b>	M18x1.5 ISO 9974	40
<b>E</b>	3/4" - 16 SAE ISO 11926	50
<b>P</b>	9/16" - 18 SAE ISO 11926	21

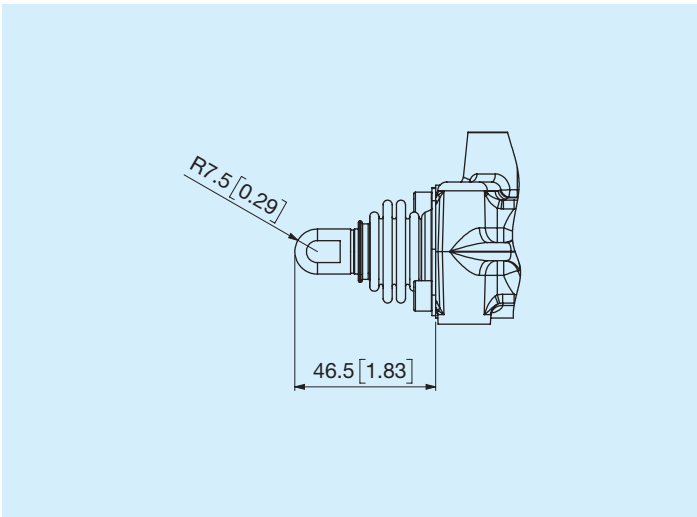
**L** Standard kit for lever holder



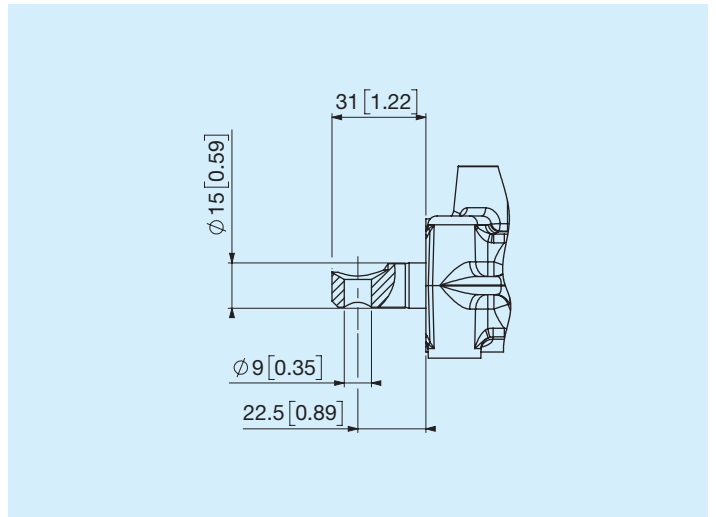
**Z** Lever holder with stroke limiter



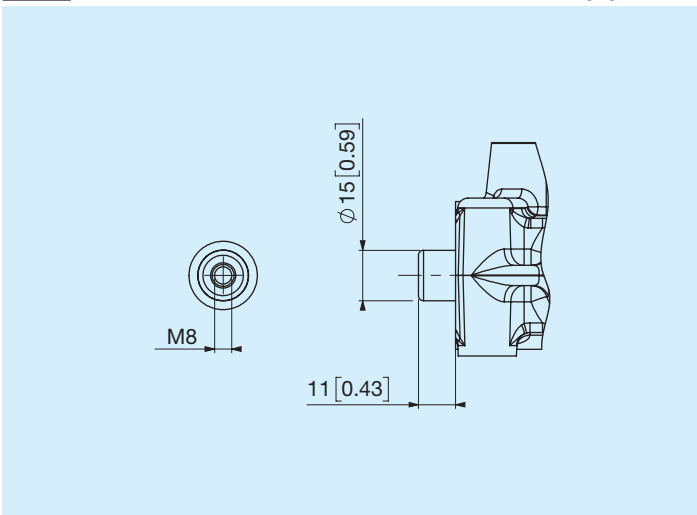
**9** Actuator with integrated ball



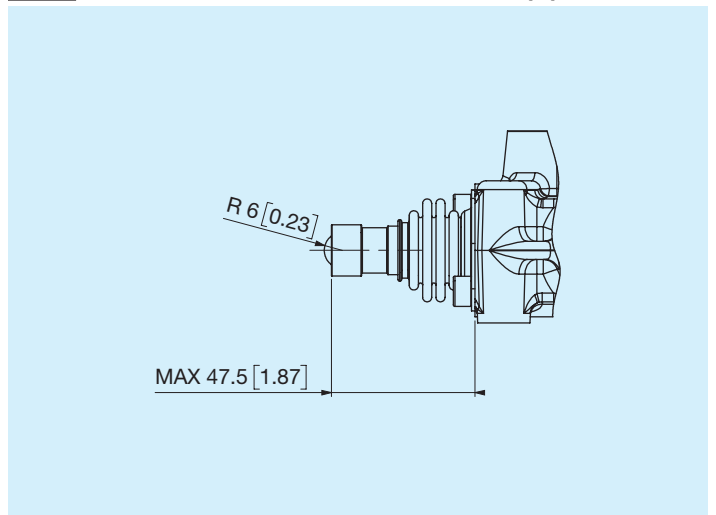
**A** Without lever holder, standard appendix



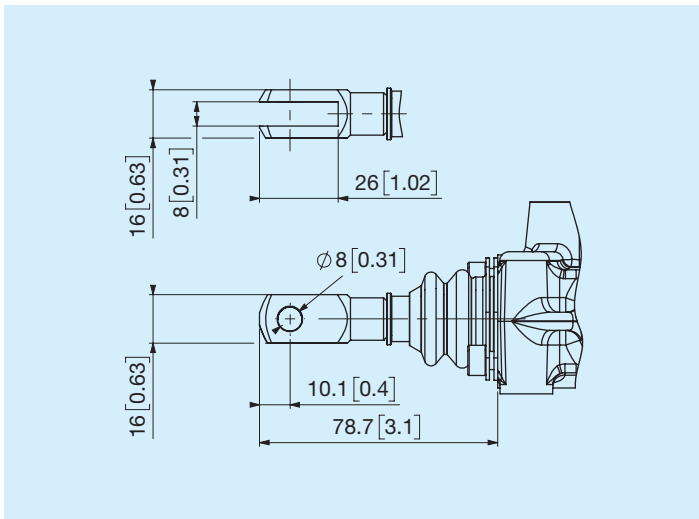
**B** Without lever holder, without appendix



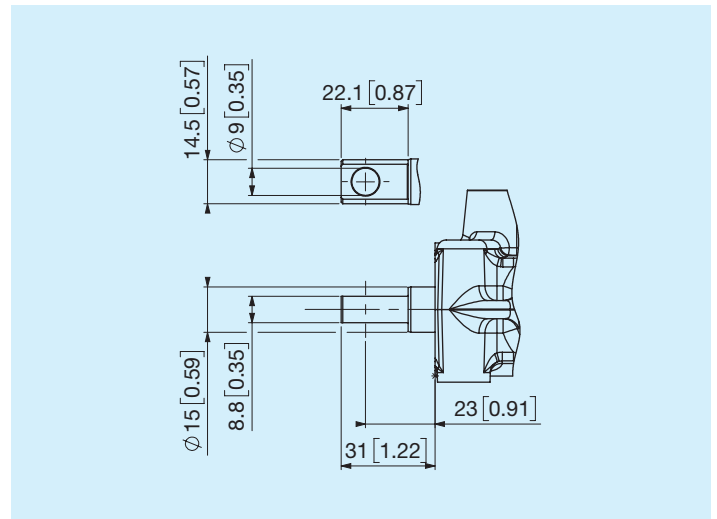
**1** Without lever holder, ball appendix



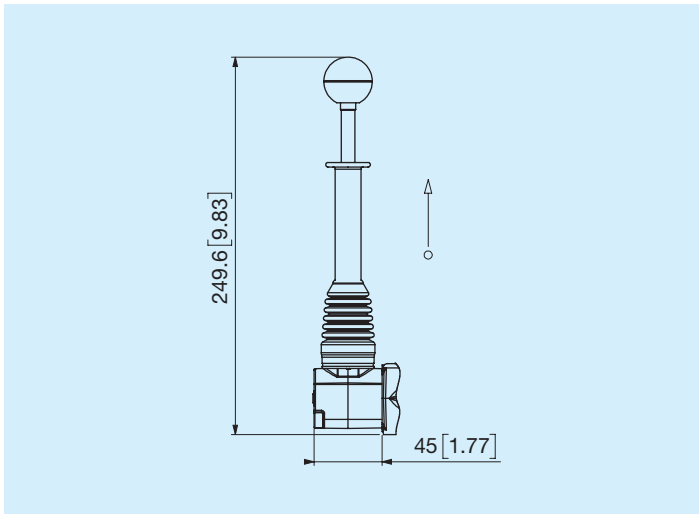
**F** Without lever holder, fork appendix



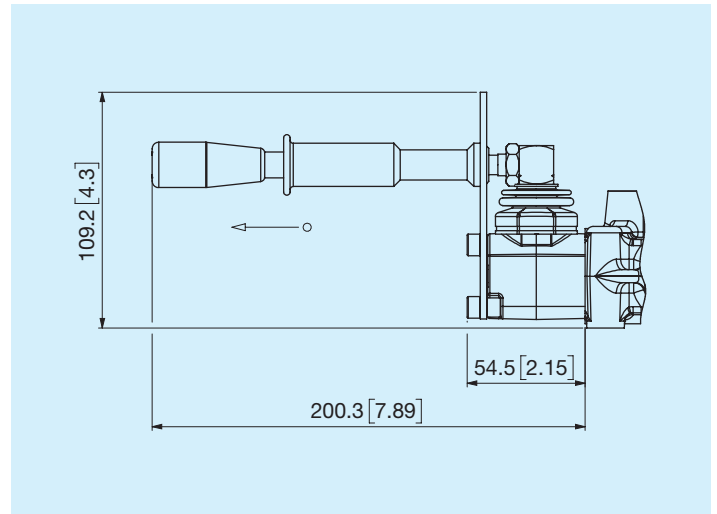
**C** Without lever holder, flat appendix



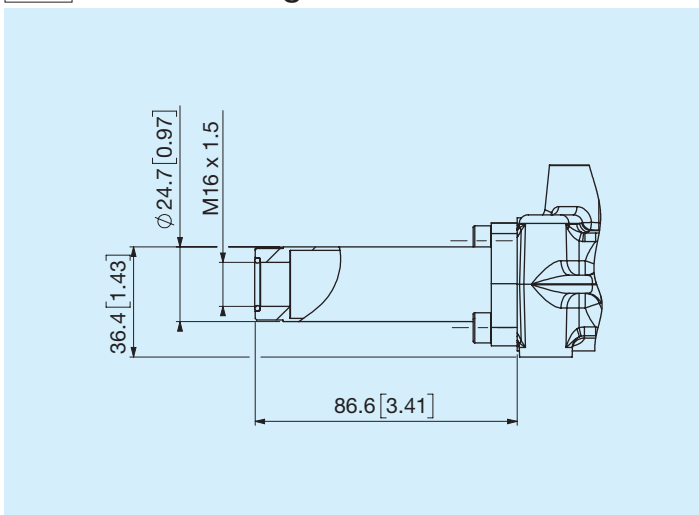
**V** Intentional, vertical



**O** Intentional, horizontal

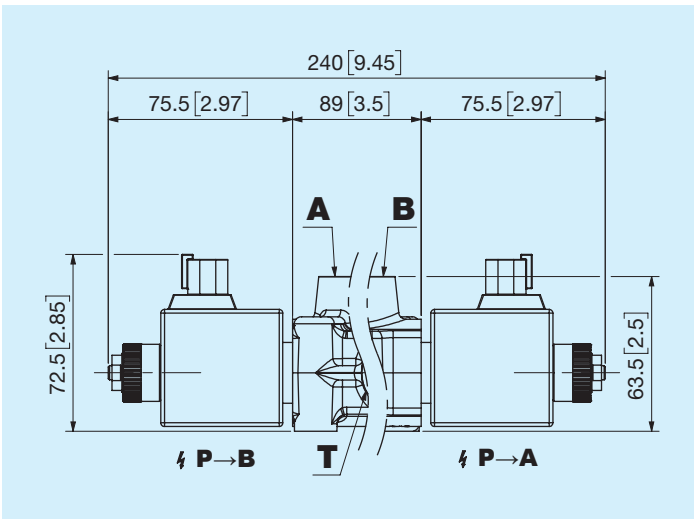


**T** Cable setting



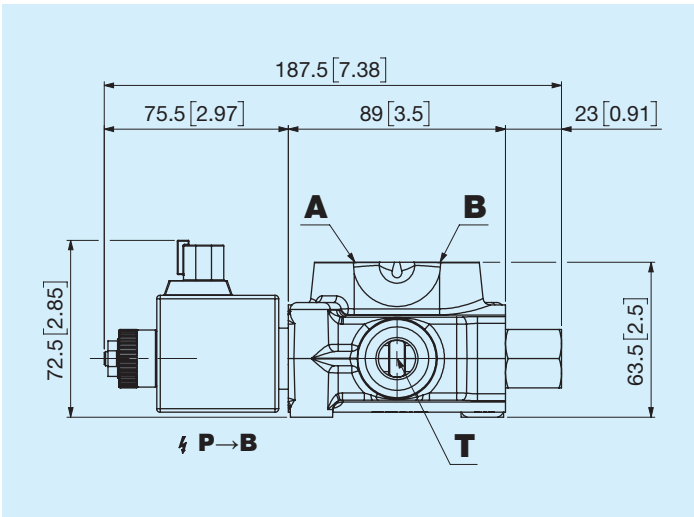


## E Dual effect electric control

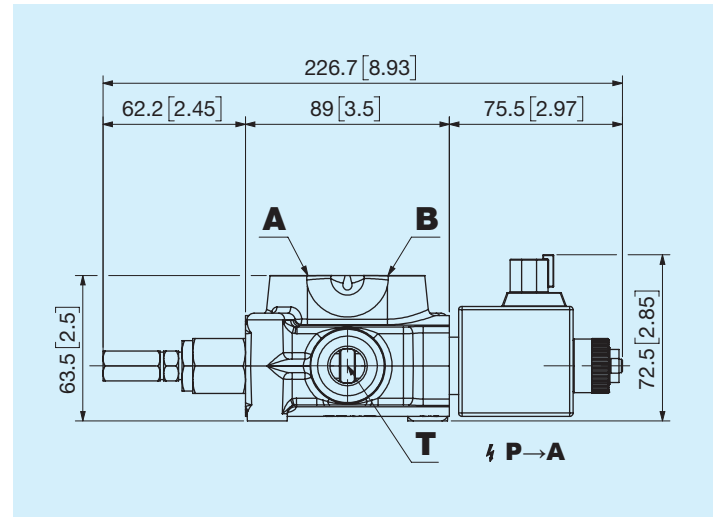


Type of coil	12V	24V	null
Resistance at 20°C	4	18	$\Omega (\pm 7\%)$
Absorbed current	3	1,2	A ( $\pm 5\%$ )
Power	36	30	W ( $\pm 5\%$ )

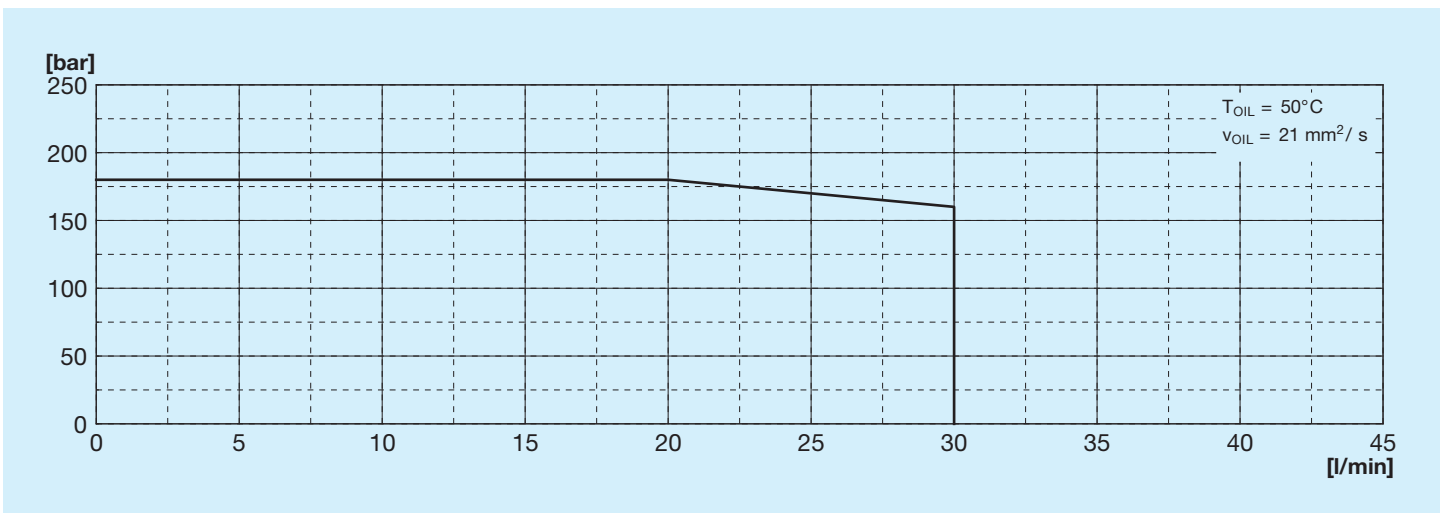
## D Single effect electric control port A side



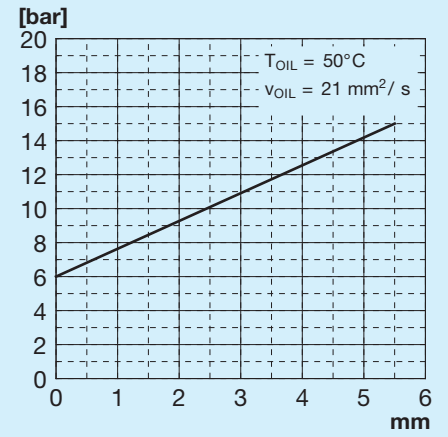
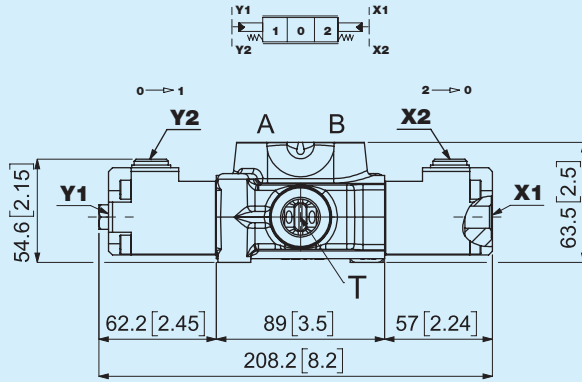
## J Single effect electric control port B side



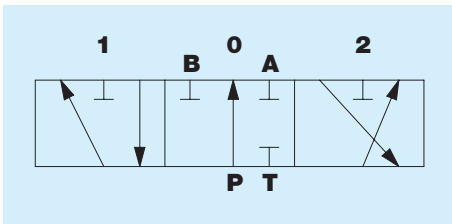
## Performance limits for electric actuator



## K Hydraulic control



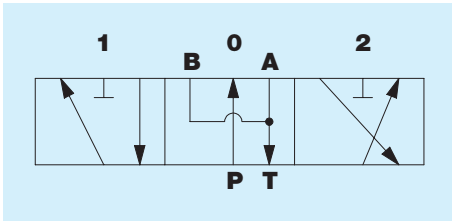
## 01 Spool type



### Positions

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

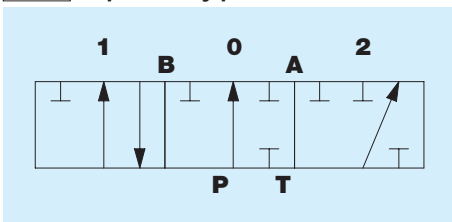
## 03 Spool type



### Positions

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

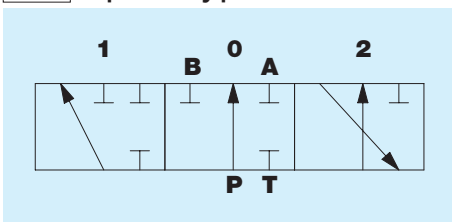
## 04 Spool type



### Positions

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

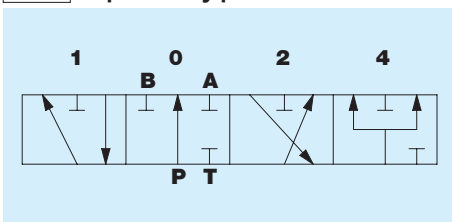
## 05 Spool type



### Positions

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

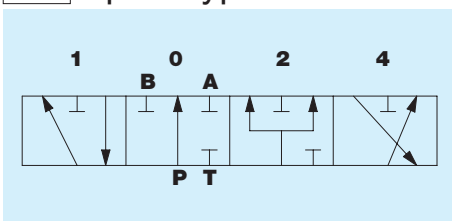
## 17 Spool type



### Positions

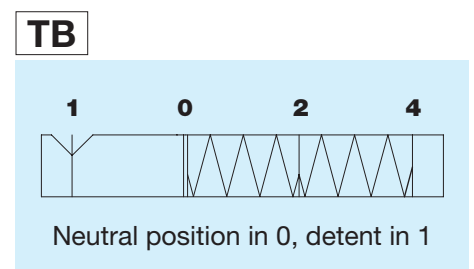
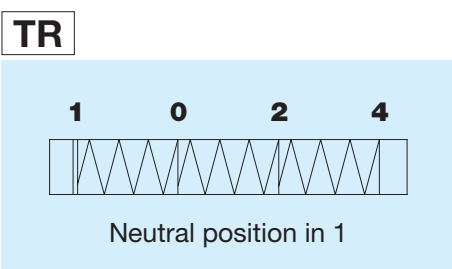
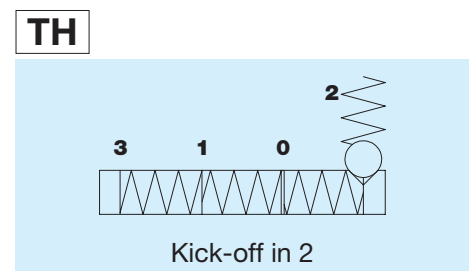
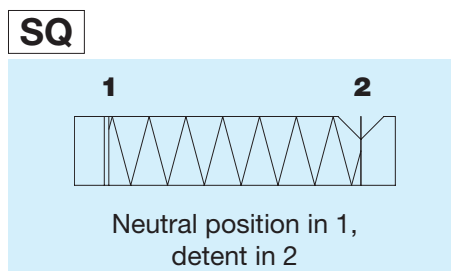
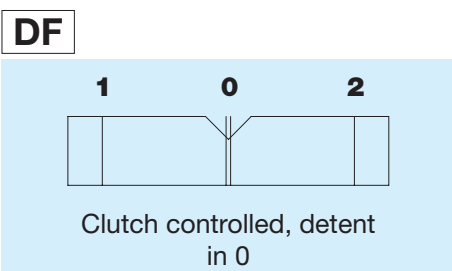
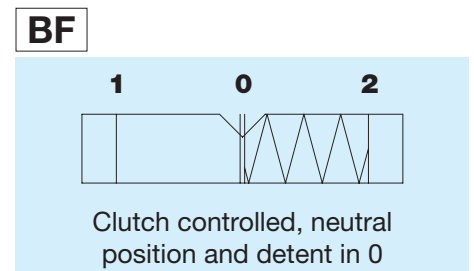
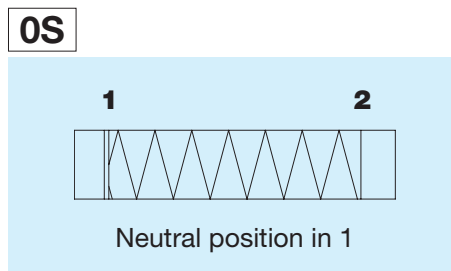
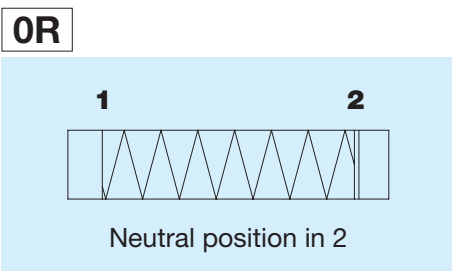
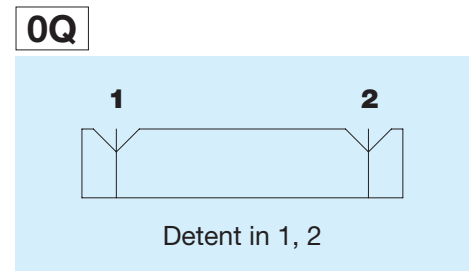
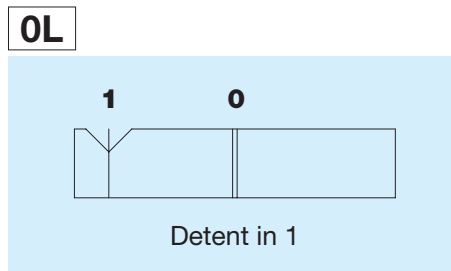
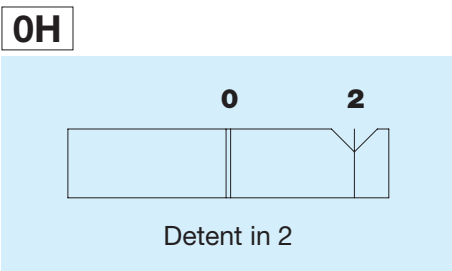
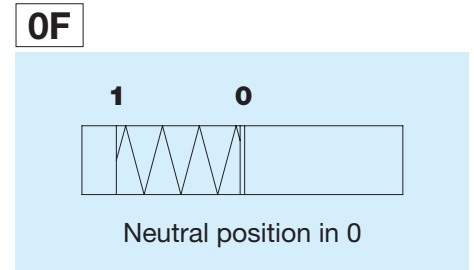
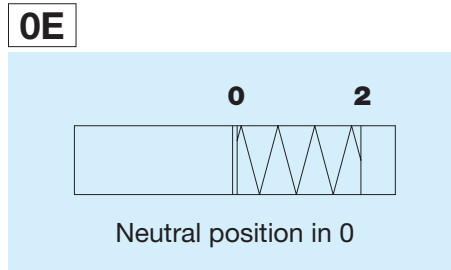
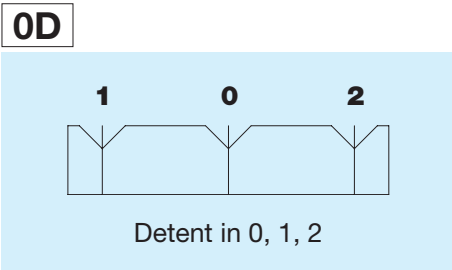
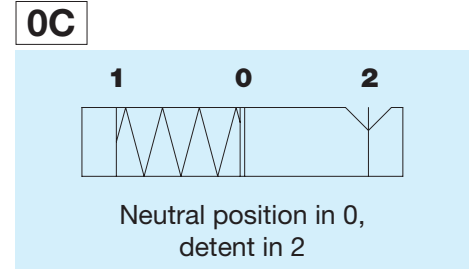
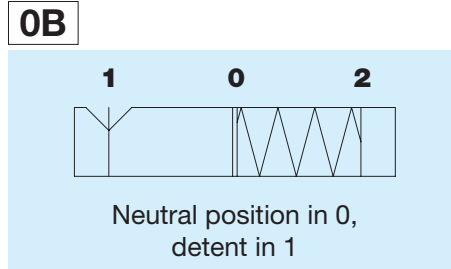
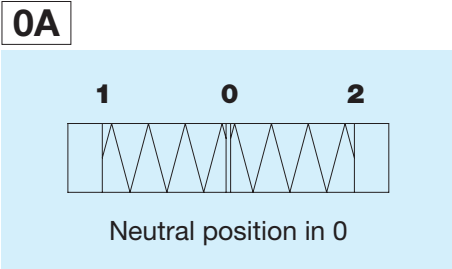
3	1	0	2	4
	P → B A → T BP —	A, B, T —  BP →	P → A B → T BP —	P → A, B T —  BP —

## 23 Spool type



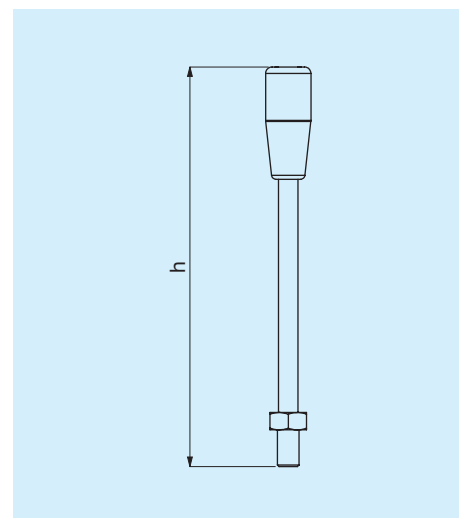
### Positions

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



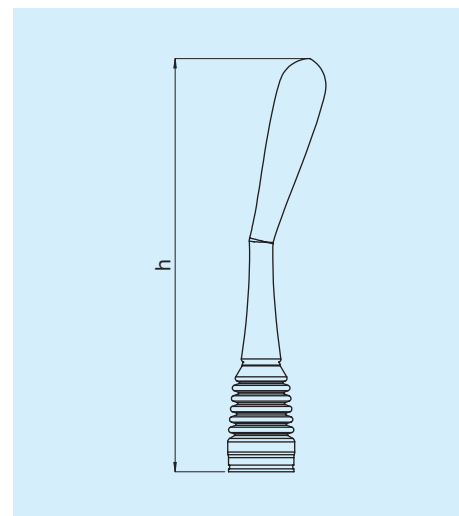
## Straight standard knob

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

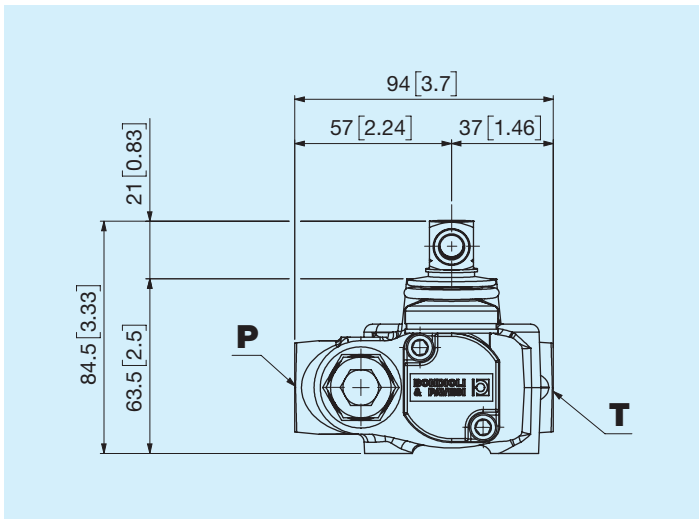


## Ergonomic lever

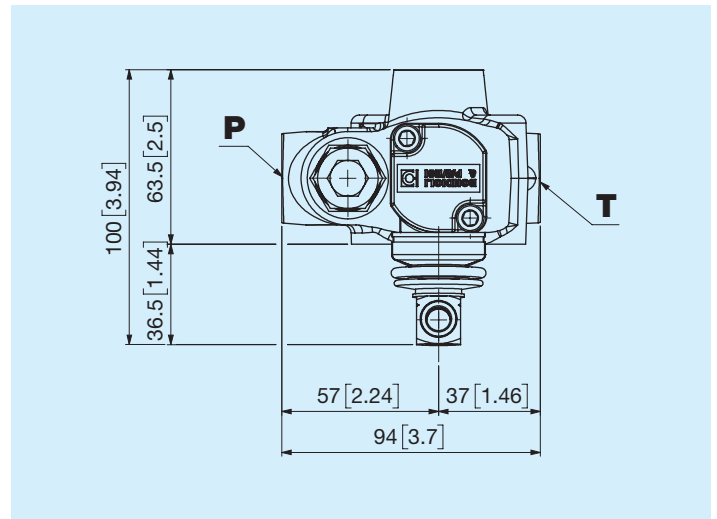
Code	Description	h [mm]	h [in]
<b>L</b>	Straight vertical	180	7.09
<b>O</b>	Bent 15° vertical	180	7.09
<b>R</b>	Bent 30° vertical	180	7.09
<b>M</b>	Straight horizontal	180	7.09
<b>Y</b>	Bent 15° horizontal	180	7.09
<b>Q</b>	Bent 30° horizontal	180	7.09



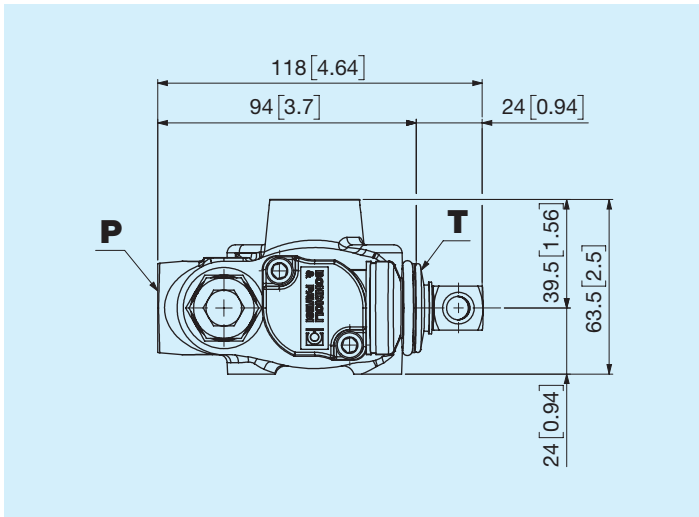
**A** Straight

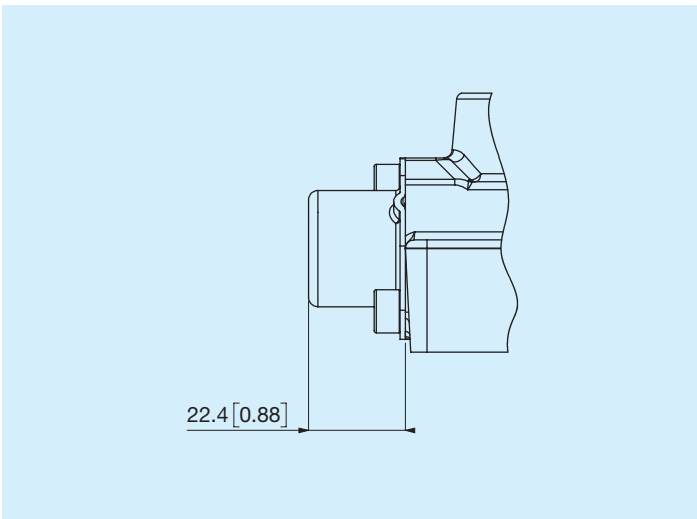
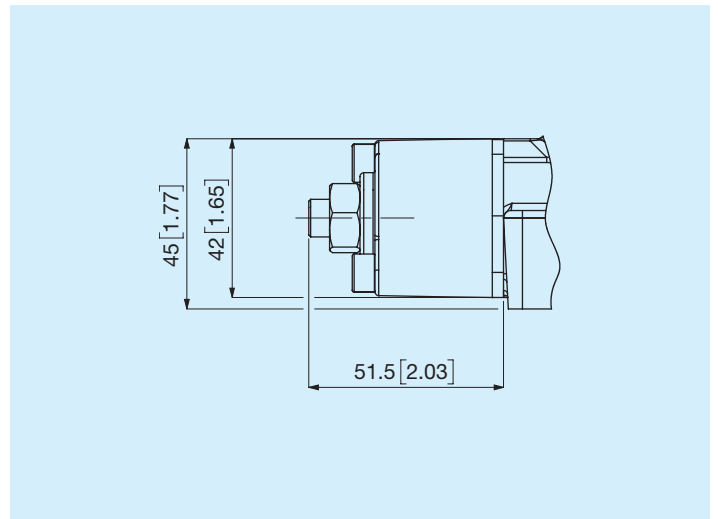


**C** Rotated 180°



**D** Rotated 90° towards T



**N** None**C** Stroke limiter

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
<b>MD1</b>																	
1	<b>General options</b>																
	<b>N</b> None					<b>V</b> Black paint											<b>Z</b> Zinc plating
2	<b>Type of inlet</b>																
	<b>S</b> Left (standard)					<b>D</b> Right											
3	<b>Thread port P</b>																
	<b>B</b> 1/2" GAS ISO 1179					<b>T</b> M16x1.5 ISO 9974											<b>E</b> 3/4" - 16 SAE ISO 11926
	<b>A</b> 3/8" GAS ISO 1179					<b>C</b> M18x1.5 ISO 9974											<b>P</b> 9/16" - 18 SAE ISO 11926
4 5	<b>Maximum pressure relief valve type</b>																
	<b>00</b> VMP replacement plug					<b>11</b> 110 bar											<b>17</b> 170 bar
	<b>06</b> 60 bar					<b>12</b> 120 bar											<b>18</b> 180 bar
	<b>07</b> 70 bar					<b>13</b> 130 bar											<b>19</b> 190 bar
	<b>08</b> 80 bar					<b>14</b> 140 bar											<b>20</b> 200 bar
	<b>09</b> 90 bar					<b>15</b> 150 bar											<b>21</b> 210 bar
	<b>10</b> 100 bar					<b>16</b> 160 bar											<b>22</b> 220 bar
																	<b>23</b> 230 bar
																	<b>24</b> 240 bar
																	<b>25</b> 250 bar
6	<b>Sealing type maximum pressure relief valve</b>																
	<b>G</b> Grub screw					<b>P</b> Sealed											<b>N</b> None
	<b>C</b> Cap					<b>R</b> Sealing provided											
7	<b>Thread ports A - B</b>																
	<b>B</b> 1/2" GAS ISO 1179					<b>T</b> M16x1.5 ISO 9974											<b>E</b> 3/4" - 16 SAE ISO 11926
	<b>A</b> 3/8" GAS ISO 1179					<b>C</b> M18x1.5 ISO 9974											<b>P</b> 9/16" - 18 SAE ISO 11926
8	<b>Actuators</b>																
	<b>N</b> None					<b>A</b> Without lever holder, standard appendix											<b>C</b> Without lever holder, flat appendix
	<b>L</b> Standard kit for lever holder					<b>B</b> Without lever holder, without appendix											<b>V</b> Intentional, vertical
	<b>Z</b> Lever holder with stroke limiter					<b>1</b> Without lever holder, ball appendix											<b>O</b> Intentional, horizontal
	<b>9</b> Actuator with integrated ball					<b>F</b> Without lever holder, fork appendix											<b>T</b> Cable setting
																	<b>E</b> Dual effect electric control
																	<b>D</b> Single effect electric control port A side
																	<b>J</b> Single effect electric control port B side
																	<b>K</b> Hydraulic control
9 10	<b>Spool types</b>																
	<b>01</b> Spool type					<b>04</b> Spool type											<b>17</b> Spool type
	<b>03</b> Spool type					<b>05</b> Spool type											<b>23</b> Spool type
11	<b>Spool options</b>																
	<b>A</b> Standard spool with negative coating					<b>B</b> Nickel-plated spool with negative coating											<b>C</b> Standard spool with positive coating
																	<b>D</b> Nickel-plated spool with positive coating
12 13	<b>Spool control</b>																
	<b>NN</b> None					<b>0E</b> Neutral position in 0											<b>0R</b> Neutral position in 2
	<b>0A</b> Neutral position in 0					<b>0F</b> Neutral position in 0											<b>0S</b> Neutral position in 1
	<b>0B</b> Neutral position in 0, detent in 1					<b>0H</b> Detent in 2											<b>BF</b> Clutch controlled, neutral position and detent in 0
	<b>0C</b> Neutral position in 0, detent in 2					<b>0L</b> Detent in 1											<b>DF</b> Clutch controlled, detent in 0
	<b>0D</b> Detent in 0, 1, 2					<b>0Q</b> Detent in 1, 2											<b>SQ</b> Neutral position in 1, detent in 2
																	<b>TH</b> Kick-off in 2
																	<b>TR</b> Neutral position in 1
																	<b>TB</b> Neutral position in 0, detent in 1
																	<b>...</b> For selection, see the relevant chapter



17  18

14

**Lever options**

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

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**Lever holder position**

<b>A</b> Straight	<b>C</b> Rotated 180°	<b>N</b> None
<b>B</b> Rotated 90° towards P (right inlet)	<b>D</b> Rotated 90° towards T	

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**Options spool control side**

<b>N</b> None	<b>C</b> Stroke limiter
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**Voltage and connector**

<b>N</b> None	<b>B</b> 24V DIN 43650	<b>H</b> 24V DEUTSCH DT04-2P
<b>A</b> 12V DIN 43650	<b>G</b> 12V DEUTSCH DT04-2P	

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**Thread Port T**

<b>B</b> 1/2" GAS ISO 1179	<b>T</b> M16x1.5 ISO 9974	<b>E</b> 3/4" - 16 SAE ISO 11926
<b>A</b> 3/8" GAS ISO 1179	<b>C</b> M18x1.5 ISO 9974	<b>P</b> 9/16" - 18 SAE ISO 11926