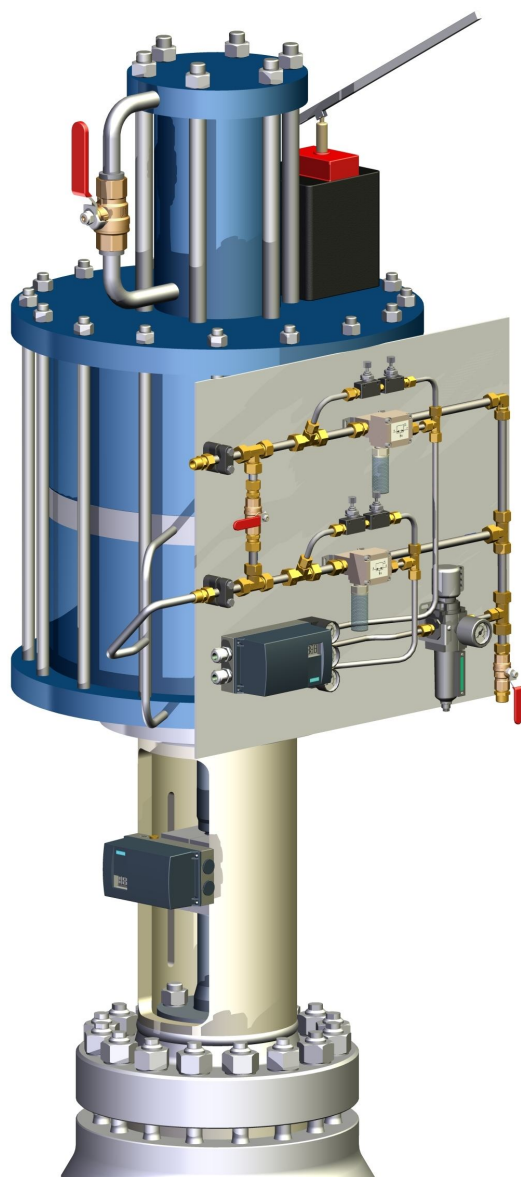


PNEUMATIC PISTON ACTUATORS





Application fields

The pneumatic piston actuators are designed for valves, whose actuator performs a linear motion. They are suitable for modulating as well as for on/off functions.

Application fields range from power plant technology, chemical industry, the food and beverage industry as well as for use in hazardous areas.

Actuator functions

- **Type PDA** Air closes – Air opens
- **Type PSC** Spring closes – Air opens
- **Type PSO** Air closes – Spring opens

Advantages

- Provide high actuating forces with short actuating time.
- Provide “fail safe” functions.
- Large strokes can be realized.
- Safety functions can be integrated in the control system.

Execution

- All actuators have double guided stem, to provide an optimum piston guide.
- Low maintenance due to lifetime lubrication.
- Depending on the required actuating forces, single or double piston can be applied.
- Connection flanges in accordance with DIN 3358 and DIN ISO 5210.
- The cylinder end position can be used as for stroke limitation.

Technical Data

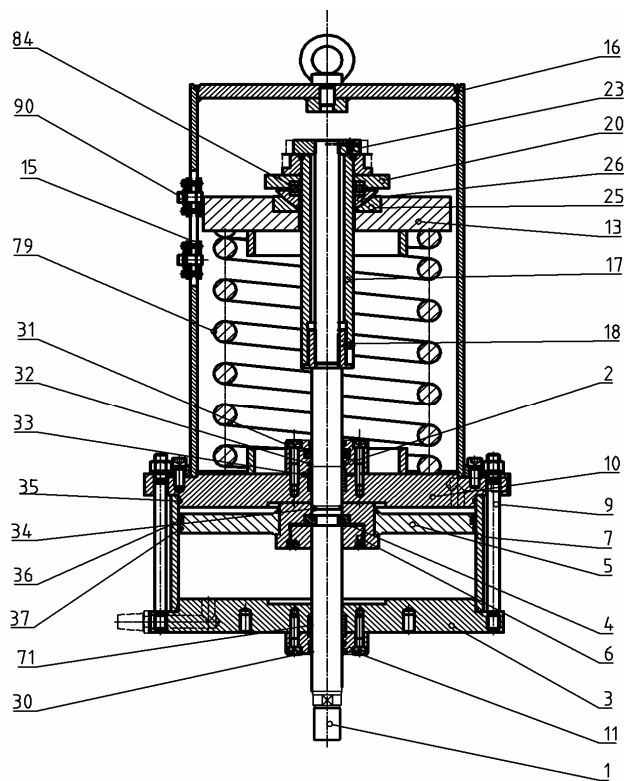
Nominal pressure:	p = 10 bar
Working pressure:	p = 2 – 8 bar
Piston diameter:	from 150mm to 700mm
Working medium:	Instrument air, dry or lubricated according to DIN / ISO 8573.1 with particle size of max. 5 µm, and quality class 3 Water content max. Dew point +2°C (quality class 4)
Mounting position:	any
Temperature range:	from -10°C to +80°C.

Optional

- Manual override with top mounted hand wheel.
- Manual override with handwheel gear box.
- Manual override via hydraulic cylinder with hand pump.
- Fail safe position via disc springs.
- Special surface coating.
- Made from special materials.
- Various control functions.
- Flange connections for quick ventilation.

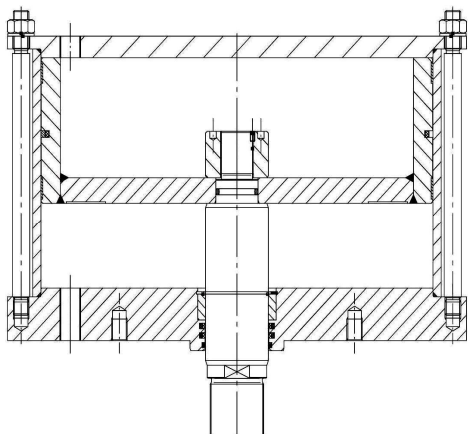
MATERIAL LIST OF MAIN COMPONENTS

Pos.	Name	Material
1	Piston rod	20MnV6 hard-chrome plated
2	Cover 1	S 355 J2
3	Cylinder head	S 355 J2
4	Split ring	42CrMo4V
5	Piston	S 355 J2
6	Nut	S 355 J2
7	Cylinder tube D150-320	AlMgSi - hard-anodized
7	Cylinder tube D350-700	S 355 J2 hard-chrome plated
9	Tension rod	C 45
10	Cylinder base	S 355 J2
11	Cover 2	S 355 J2
13	Spring plate	S 235 JR
15	Limit switch mounting	S 235 JR
16	Spring hood	S 235 JR
17	Draw tube	S 355 J2
18	Nut	CuAl10Ni5Fe
20	Bearing housing	S 355 J2
25	Conical seat	42CrMo4-nitrided
26	Spherical washer	42CrMo4-nitrided
30	Wiper	NBR
31	Rod seal	NBR
32	"O" Ring	NBR
33	"O" Ring	NBR
34	"O" Ring	NBR
35	"O" Ring	NBR
36	"O" Ring	NBR
37	Glide ring	PTFE-Bronze
71	Bushing	Bz+solid lubricant
79	Compression spring	Spring steel
84	Axial ball bearing	FAG / INA

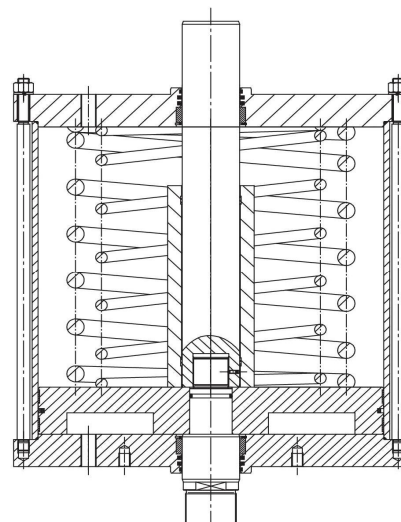


Depending on the application, operating conditions or customer requirements, other materials can be used.

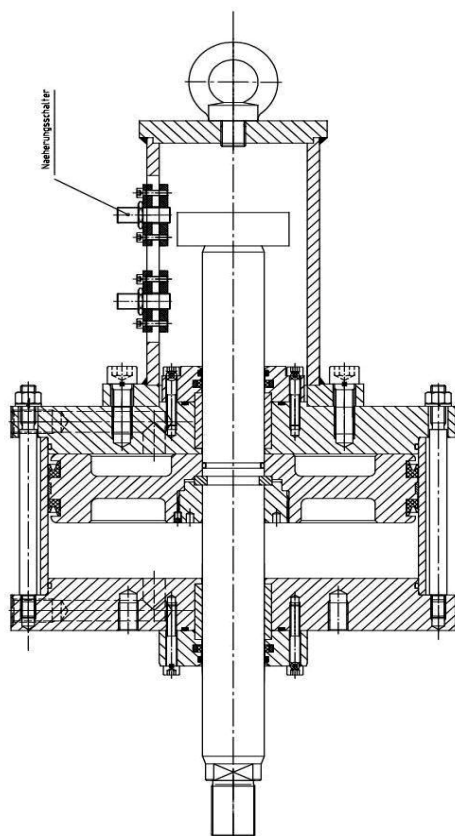
DESIGN VERSIONS



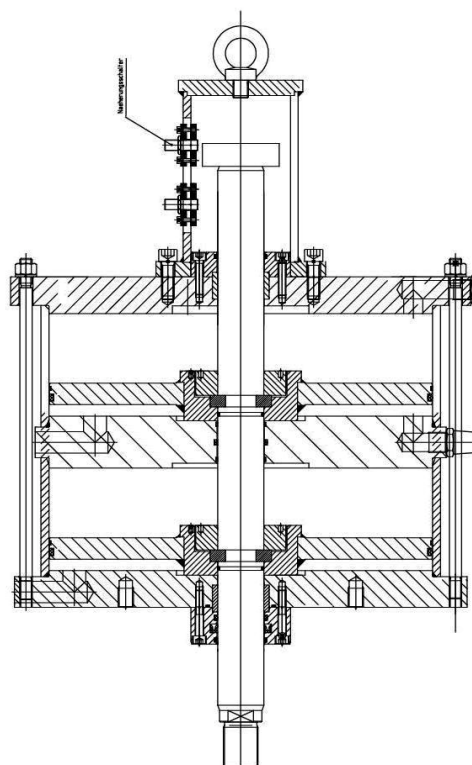
1. Double acting cylinder Type PDA-1



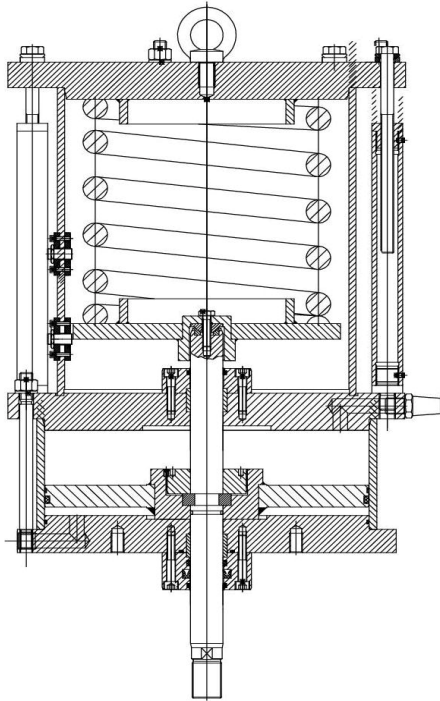
2. Single acting cylinder with closing spring Type PSC-1



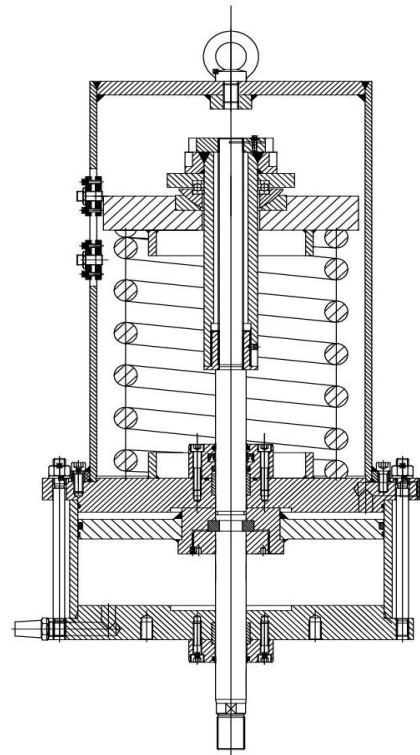
3. Double acting cylinder with proximity switch Type PDA-1



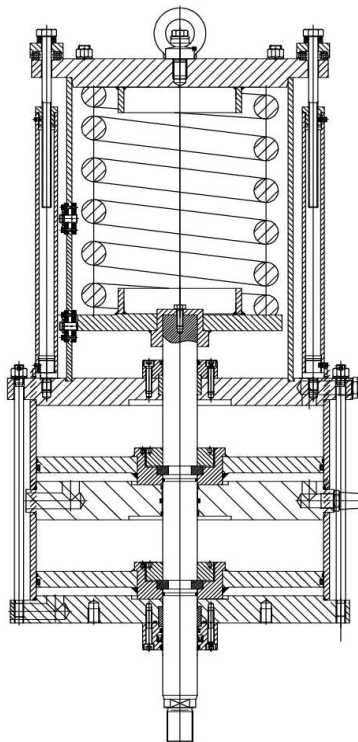
4. Double acting cylinder with double piston and proximity switch Type PDA-2



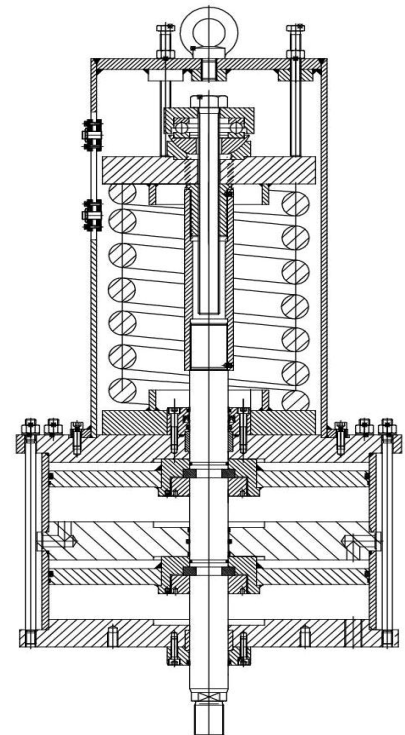
5. Single acting cylinder with closing spring Type PSC-2



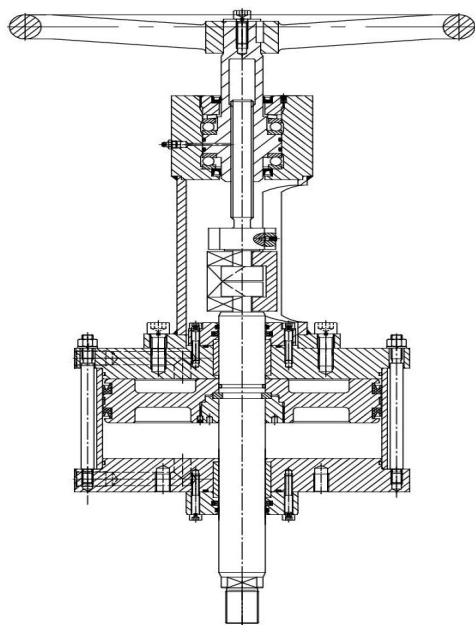
6. Single acting cylinder with opening spring Type PSO-1



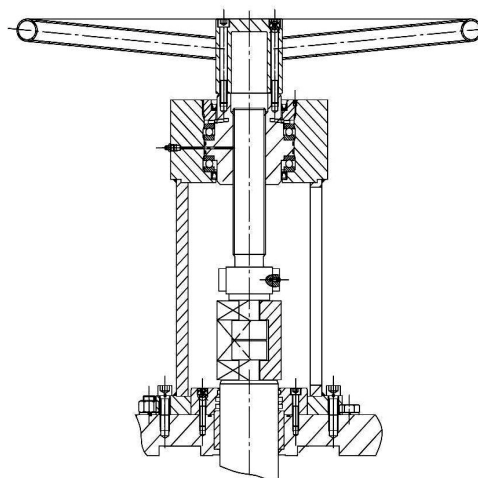
7. Double piston cylinder with closing spring Type PSC-2



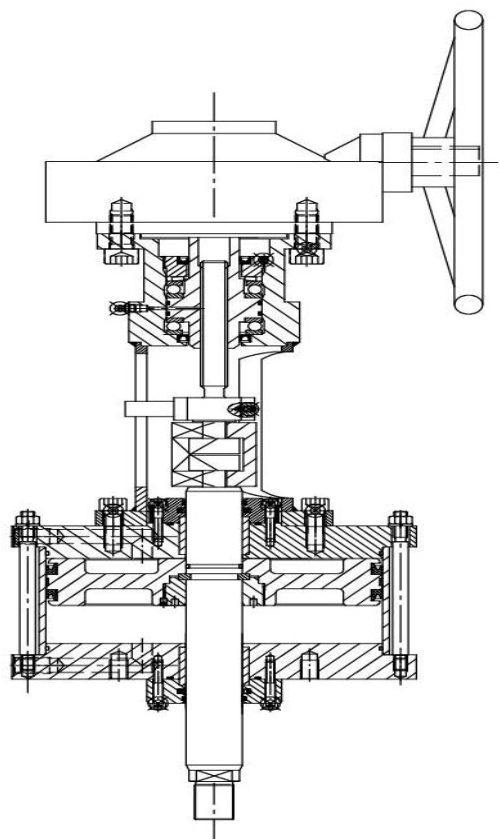
8. Double piston cylinder with opening spring Type PSO-2



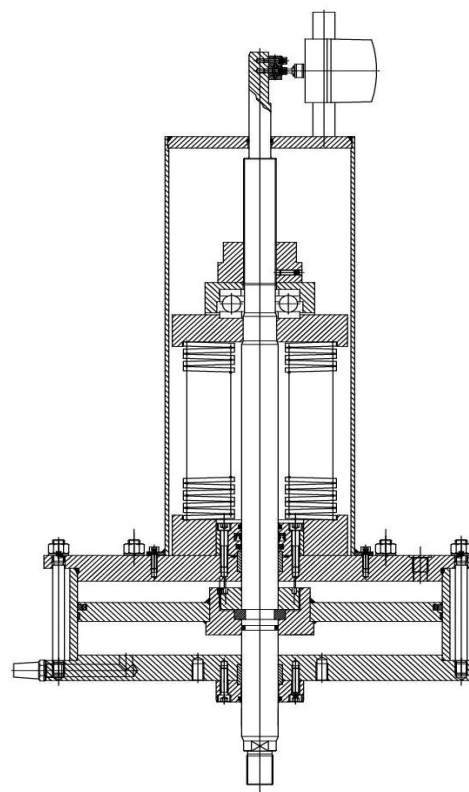
**9. Double acting cylinder
with manual override Type PDA-1**



10. Handwheel actuator



**11. Double acting cylinder
with handwheel gear box Type PDA-1**



**12. Double acting cylinder
with disc springs Type PSO-1**

DIMENSIONS

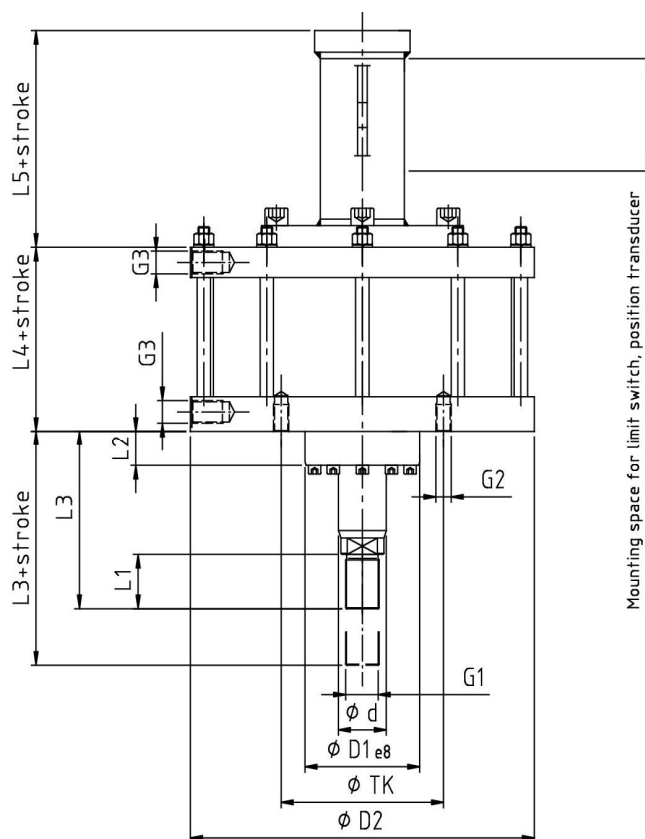
Double acting cylinder Type PDA-1

This version with double piston rod, ensures optimal piston guide. At the same time, this type of design is suitable for mounting of limit switches, and for the positioner for actuators with control function, on the upper side of the piston, which is located outside the hot zone of the fittings.

Through the robust design of these actuators, the end position of the pneumatic cylinder can be used for stroke limitation.

For actuators that have to achieve a quick function, the G2 medium connections are designed as flange type.

The double acting piston actuators are suitable for modulating as well as on/off function.



On customer request intermediate piston dimensions can be supplied between piston size Ø: 320, 420, 480, 520 and 620

TYPE	Ø Piston	d	D1	D2	TK	G1	nxG2	G3	L1	L2	L3	L4	L5	Weight
PDA-1-150	150	30	100	215	140	M24x2	4xM12	G1/4"	35	34	125	130	150	65 Kg
PDA-1-200	200	30	100	265	165	M24x2	6xM12	G1/4"	35	34	125	140	150	85 Kg
PDA-1-250	250	35	100	315	165	M28x2	6xM12	G1/2"	45	34	125	140	150	115 Kg
PDA-1-300	300	35	100	370	165	M28x2	6xM12	G1/2"	45	34	145	145	150	145 Kg
PDA-1-360	360	40	110	430	254	M32x2	6xM16	G1/2"	50	36	145	145	150	190 Kg
PDA-1-400	400	45	110	470	254	M36x2	6xM16	G1/2"	55	36	155	150	150	225 Kg
PDA-1-450	450	50	120	525	254	M42x2	8xM16	G1/2"	65	36	155	150	150	280 Kg
PDA-1-500	500	55	125	580	356	M48x2	8xM20	G3/4"	70	36	165	150	150	335 Kg
PDA-1-550	550	55	125	630	356	M48x2	8xM20	G3/4"	70	36	165	155	150	385 Kg
PDA-1-600	600	60	140	690	356	M52x2	8xM20	G3/4"	80	36	165	155	150	460 Kg
PDA-1-650	650	60	140	740	406	M52x2	12xM20	G3/4"	80	36	165	165	150	520 Kg
PDA-1-700	700	60	140	800	406	M52x2	12xM20	G3/4"	80	36	165	180	150	595 Kg

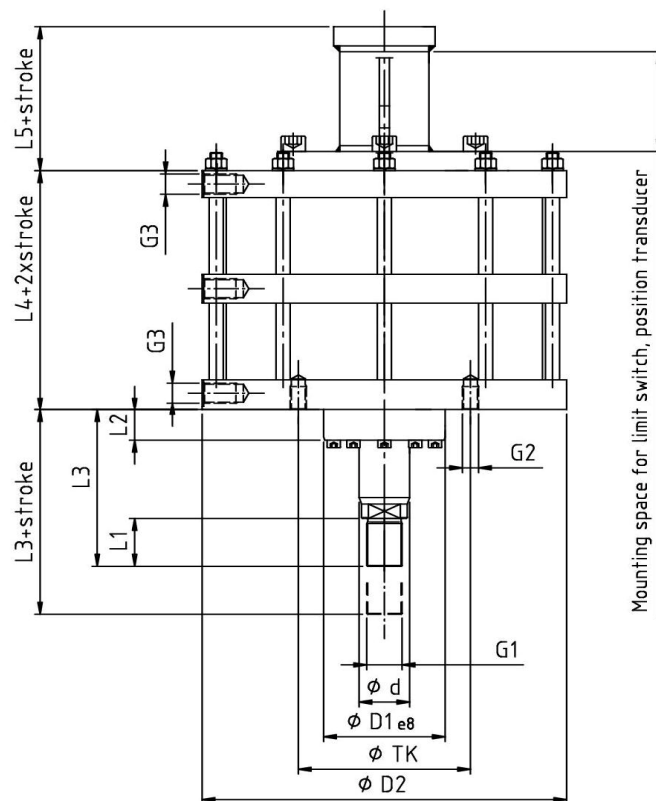
Double acting cylinder with double piston Type PDA-2

This version with double piston rod, ensures optimal piston guide. At the same time, this type of design is suitable for mounting of limit switches, and for the positioner for actuators with control function, on the upper side of the piston, which is located outside the hot zone of the fittings.

Through the robust design of these actuators, the end position of the pneumatic cylinder can be used for stroke limitation.

For actuators that have to achieve a quick function, the G2 medium connections are designed as flange type.

The double acting piston actuators are suitable for modulating as well as on/off function.



On customer request intermediate piston dimensions can be supplied between piston size Ø: 320, 420, 480, 520 and 620

TYPE	Ø Piston	d	D1	D2	TK	G1	nxG2	G3	L1	L2	L3	L4	L5	Weight
PDA-2-400	400	55	125	470	254	M48x2	8xM20	G1/2"	70	36	165	260	150	400 Kg
PDA-2-450	450	55	125	525	254	M48x2	18xM20	G1/2"	70	36	165	260	150	480 Kg
PDA-2-500	500	60	140	580	350	M52x2	12xM20	G3/4"	80	36	165	270	150	575 Kg
PDA-2-550	550	60	140	630	350	M52x2	12xM20	G3/4"	80	36	165	270	150	665 Kg
PDA-2-600	600	70	150	690	406	M60x2	12xM24	G3/4"	90	36	180	275	150	795 Kg
PDA-2-650	650	70	150	740	406	M60x2	12xM24	G3/4"	90	36	180	275	150	905 Kg
PDA-2-700	700	80	160	800	483	M72x2	12xM24	G3/4"	90	36	180	300	150	1060 Kg

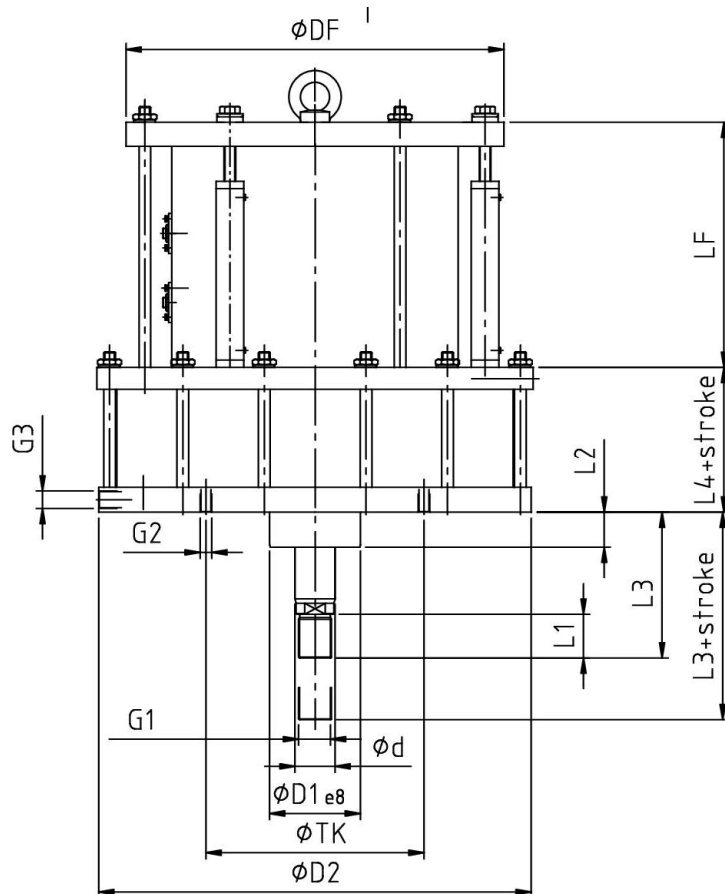
Single acting cylinder with closing / opening spring - function Type PSO-1 or PSC-1

The length of the spring hood **LF** and the hood diameter **Ø DF** depends on the necessary spring forces and the chosen spring type.

Actuators are available as closing spring type (PSC = safety position closed), or opening spring type (PSO = safety position open).

For actuators that have to achieve a quick function, the G2 medium connections are designed as flange type.

The single acting piston actuators with spring retraction are suitable for modulating as well as on/off function.



On customer request intermediate piston dimensions can be supplied between piston size Ø: 320, 420, 480, 520 and 620

The total weight of the actuator depends on the selected spring size and is specified on request.

TYPE	Ø Piston	d	D1	D2	TK	G1	nxG2	G3	L1	L2	L3	L4	L5
PSO / PSC -1-150	150	30	100	215	140	M24x2	4xM12	G1/4"	35	34	125	130	150
PSO / PSC -1-200	200	30	100	265	165	M24x2	6xM12	G1/4"	35	34	125	140	150
PSO / PSC -1-250	250	35	100	315	165	M28x2	6xM12	G1/2"	45	34	125	140	150
PSO / PSC -1-300	300	35	100	370	165	M28x2	6xM12	G1/2"	45	34	145	145	150
PSO / PSC -1-360	360	40	110	430	254	M32x2	6xM16	G1/2"	50	36	145	145	150
PSO / PSC -1-400	400	45	110	470	254	M36x2	6xM16	G1/2"	55	36	155	150	150
PSO / PSC -1-450	450	50	120	525	254	M42x2	8xM16	G1/2"	65	36	155	150	150
PSO / PSC -1-500	500	55	125	580	356	M48x2	8xM20	G3/4"	70	36	165	150	150
PSO / PSC -1-550	550	55	125	630	356	M48x2	8xM20	G3/4"	70	36	165	155	150
PSO / PSC -1-600	600	60	140	690	356	M52x2	8xM20	G3/4"	80	36	165	155	150
PSO / PSC -1-650	650	60	140	740	406	M52x2	12xM20	G3/4"	80	36	165	165	150
PSO / PSC -1-700	700	60	140	800	406	M52x2	12xM20	G3/4"	80	36	165	180	150

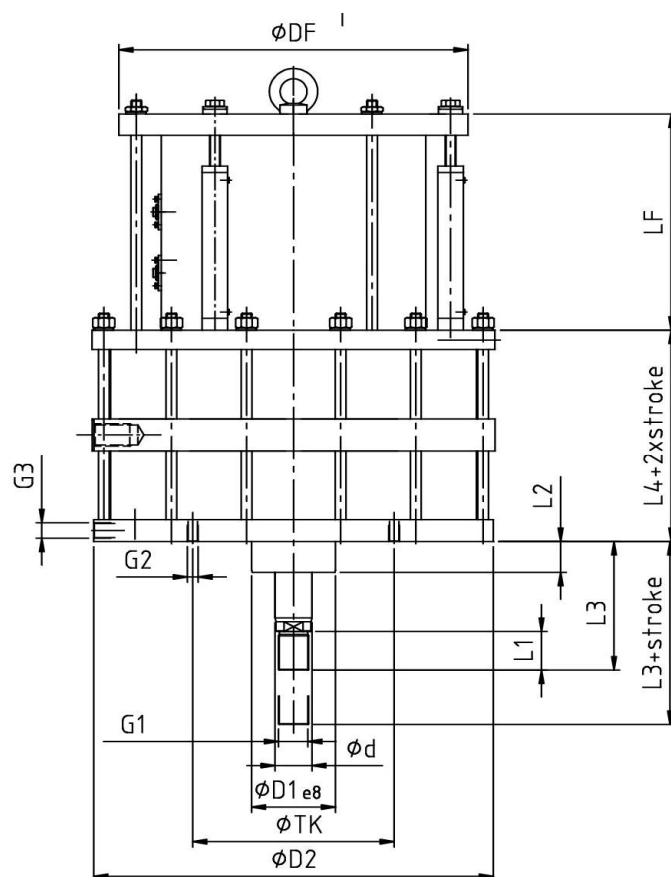
Single acting-double piston cylinder with closing / opening spring - function Type PSO-2 or PSC-2

The length of the spring hood **LF** and the hood diameter **Ø DF** depends on the necessary spring forces and the chosen spring type.

Actuators are available as closing spring type (PSC = safety position closed), or opening spring type (PSO = safety position open).

For actuators that have to achieve a quick function, the G2 medium connections are designed as flange type.

Single acting-double piston actuators with spring retraction are suitable for modulating as well as on/off function.



On customer request intermediate piston dimensions can be supplied between piston size Ø: 320, 420, 480, 520 and 620

The total weight of the actuator depends on the selected spring size and is specified on request

TYPE	Ø Piston	d	D1	D2	TK	G1	nxG2	G3	L1	L2	L3	L4	L5
PSO / PSC -2-400	400	55	125	470	254	M48x2	8xM20	G1/2"	70	36	165	260	150
PSO / PSC -2-450	450	55	125	525	254	M48x2	18xM20	G1/2"	70	36	165	260	150
PSO / PSC -2-500	500	60	140	580	350	M52x2	12xM20	G3/4"	80	36	165	270	150
PSO / PSC -2-550	550	60	140	630	350	M52x2	12xM20	G3/4"	80	36	165	270	150
PSO / PSC -2-600	600	70	150	690	406	M60x2	12xM20	G3/4"	90	36	180	275	150
PSO / PSC -2-650	650	70	150	740	406	M60x2	12xM24	G3/4"	90	36	180	275	150
PSO / PSC -2-700	700	80	160	800	483	M72x2	12xM24	G3/4"	90	36	180	300	150



S.C PRODMEC S.A



Stem forces of the pneumatic piston actuators with single piston Type PDA-1, PSO-1 and PSC-1

The shear forces are calculated at an efficiency of 95% of the actuator.

TYPE	Ø Piston	Piston area cm ²	Piston force (KN)						
			2 bar	3 bar	4 bar	5 bar	6 bar	7 bar	8 bar
PDA/PSO/PSC -1-150	150	169	3,21	5,07	6,42	8,45	9,63	11,24	12,85
PDA/PSO/PSC -1-200	200	311	5,90	8,86	11,80	14,77	17,72	20,68	23,63
PDA/PSO/PSC -1-250	250	481	9,12	13,7	18,28	22,84	27,42	31,98	36,55
PDA/PSO/PSC -1-300	300	697	13,25	19,86	26,48	33,10	39,73	46,35	52,97
PDA/PSO/PSC -1-360	360	1005	19,10	28,64	38,20	47,74	57,28	66,83	76,38
PDA/PSO/PSC -1-400	400	1240	23,56	35,34	47,12	58,90	70,68	82,46	94,24
PDA/PSO/PSC -1-450	450	1570	29,83	44,75	59,66	74,58	89,50	104,40	119,32
PDA/PSO/PSC -1-500	500	1939	36,84	55,26	73,68	92,10	110,52	128,94	147,36
PDA/PSO/PSC -1-550	550	2352	44,68	67,03	89,37	111,72	134,06	156,40	178,75
PDA/PSO/PSC -1-600	600	2799	53,18	79,78	106,36	132,95	159,54	186,14	212,72
PDA/PSO/PSC -1-650	650	3290	62,51	93,76	125,02	156,27	187,53	218,78	250,04
PDA/PSO/PSC -1-700	700	3820	72,58	108,87	145,16	181,45	217,74	254,03	290,32

Stem forces of the pneumatic piston actuators with double piston Type PDA-2, PSO-2 and PSC-2

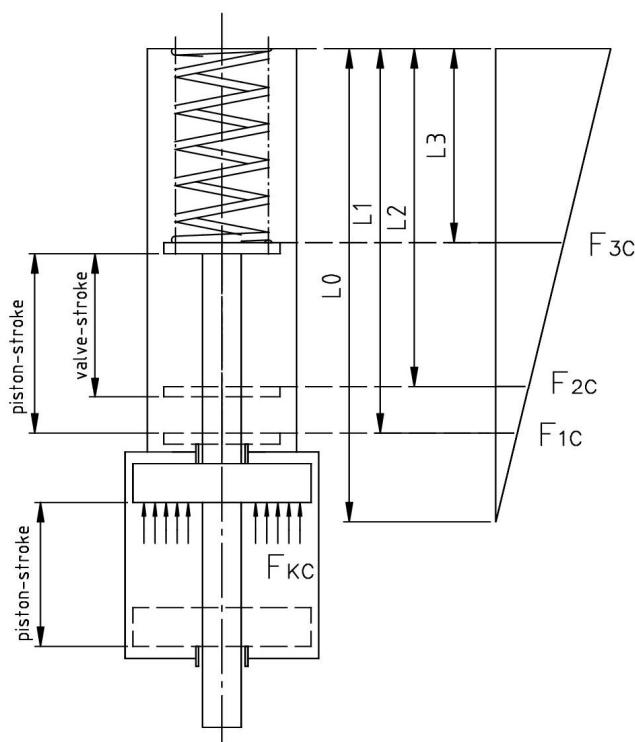
The shear forces are calculated at an efficiency of 95% of the actuator.

TYPE	Ø Piston	Piston area cm ²	Piston force (KN)						
			2 bar	3 bar	4 bar	5 bar	6 bar	7 bar	8 bar
PDA/PSO/PSC -2-400	2x400	2465	46,83	70,25	93,67	117,08	140,50	163,92	187,34
PDA/PSO/PSC -2-450	2x450	3133	59,52	89,29	119,05	148,81	178,58	208,34	238,10
PDA/PSO/PSC -2-500	2x500	3870	73,53	110,3	147,06	183,82	220,60	257,35	294,12
PDA/PSO/PSC -2-550	2x550	4695	89,20	133,80	178,41	223,00	267,60	312,20	356,82
PDA/PSO/PSC -2-600	2x600	5577	105,96	158,94	211,92	264,90	317,88	370,87	423,85
PDA/PSO/PSC -2-650	2x650	6559	124,62	187,95	250,61	313,26	375,90	438,56	501,22
PDA/PSO/PSC -2-700	2x700	7596	144,32	216,48	288,64	360,81	432,97	505,14	577,29

INTERPRETATION OF THE SPRING FORCES

Type PSC

Spring closes - Air opens



Mechanical spring forces

F_{1C} – Spring preload force [N]

F_{2C} – Spring closing force [N]

F_{3C} – Spring tension force [N]

R – Spring rate [N/mm]

$F_n = (L_0 - L_n) \times R$

Forces in the valve

F_M – Medium force on the spindel

F_S – Closing force on the seat

F_R – Friction force of the stuffing box packing

F_G – Weight force of the spindel

F_L – Breakaway force from the seat
(Friction force in the seat, sealing plates)

Required force of the actuator

F_{Kc} – Piston force of the actuator

K_s – Safety factor 1,15 – 1,20

$$F_{2C} = F_M + F_S + F_R$$

$$F_{K1} = (F_M + F_S + F_R + F_G + F_L + F_{2C}) \times K_s$$

$$F_{K2} = (F_M + F_R + F_G + F_{3C}) \times K_s$$

The higher of the two values F_{K1} or F_{K2} must be selected as a piston force (piston opening force) F_{Kc}

It's recommended to select the cylinder stroke approx. 10-20mm longer than the valve stroke.

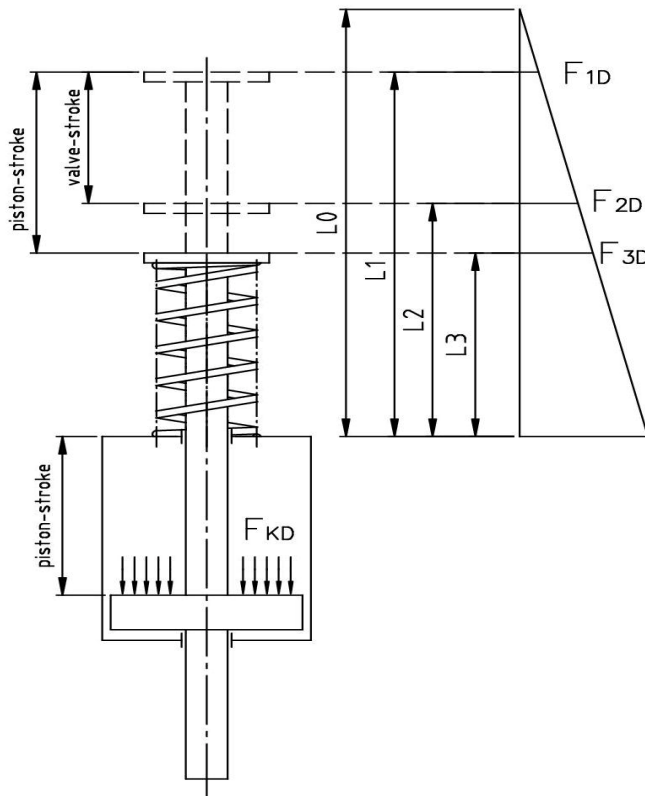
The valve seat closing position should not match the cylinder end position.

Between the valve seat closing position and the cylinder end position at least about 5mm margin must be foreseen.

The robust design of the pneumatic actuators, allow the cylinder end to be used as stroke limitation.

Type PSO

Air closes – Spring opens



Mechanical spring forces

F_{1D} – Spring preload force [N]

F_{2D} – Spring opening force [N]

F_{3D} – Spring tension force [N]

R – Spring rate [N/mm]

$F_n = (L_0 - L_n) \times R$

Forces in the valve

F_M – Medium force on the spindel

F_S – Closing force on the seat

F_G – Weight force of the spindel

F_R – Friction force of the stuffing box packing

F_L – Breakaway force from the seat

(Friction force in the seat, sealing plates)

Required force of the actuator

F_{KD} – Piston force of the actuator

K_S – Safety factor 1,15 – 1,20

$$F_{1D} = F_M + F_R + F_G$$

$$F_{2D} = F_M + F_S + F_R + F_L + F_G$$

$$F_{KD} = (F_M + F_S + F_R + F_{2D}) \times K_S$$

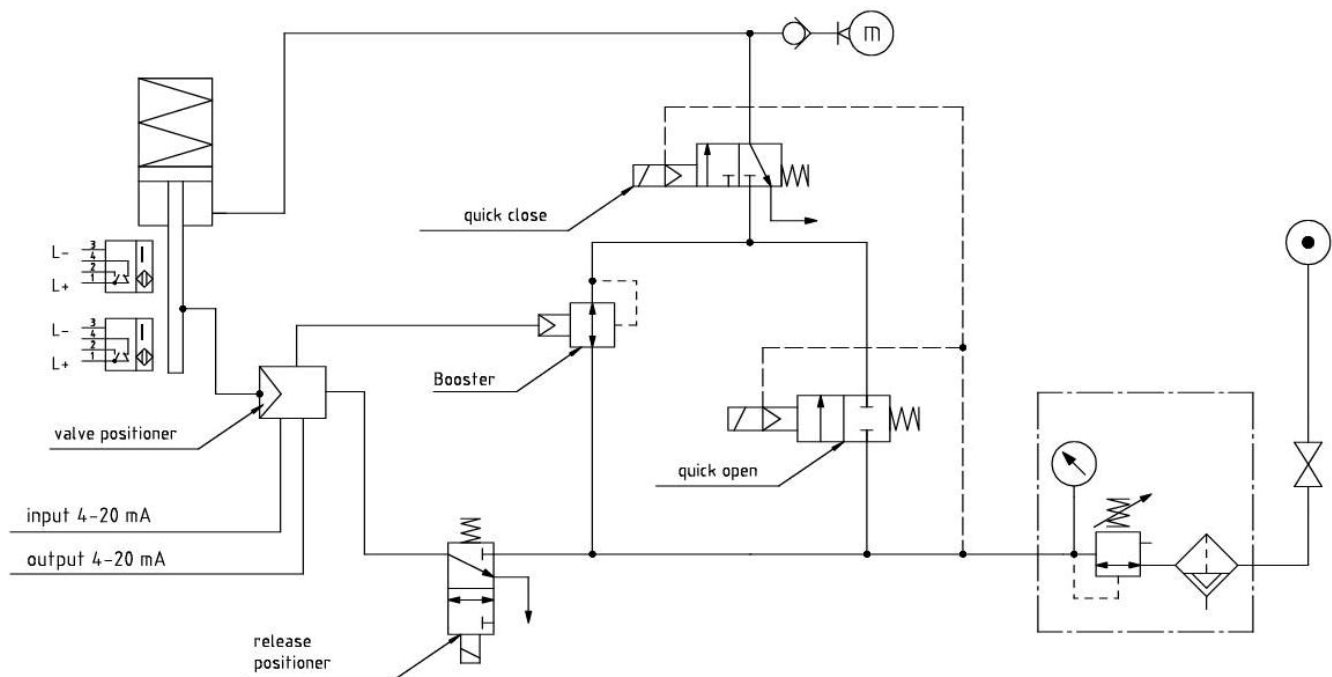
It's recommended to select the cylinder stroke approx. 10-20mm longer than the valve stroke.

The valve seat closing position should not match the cylinder end position.

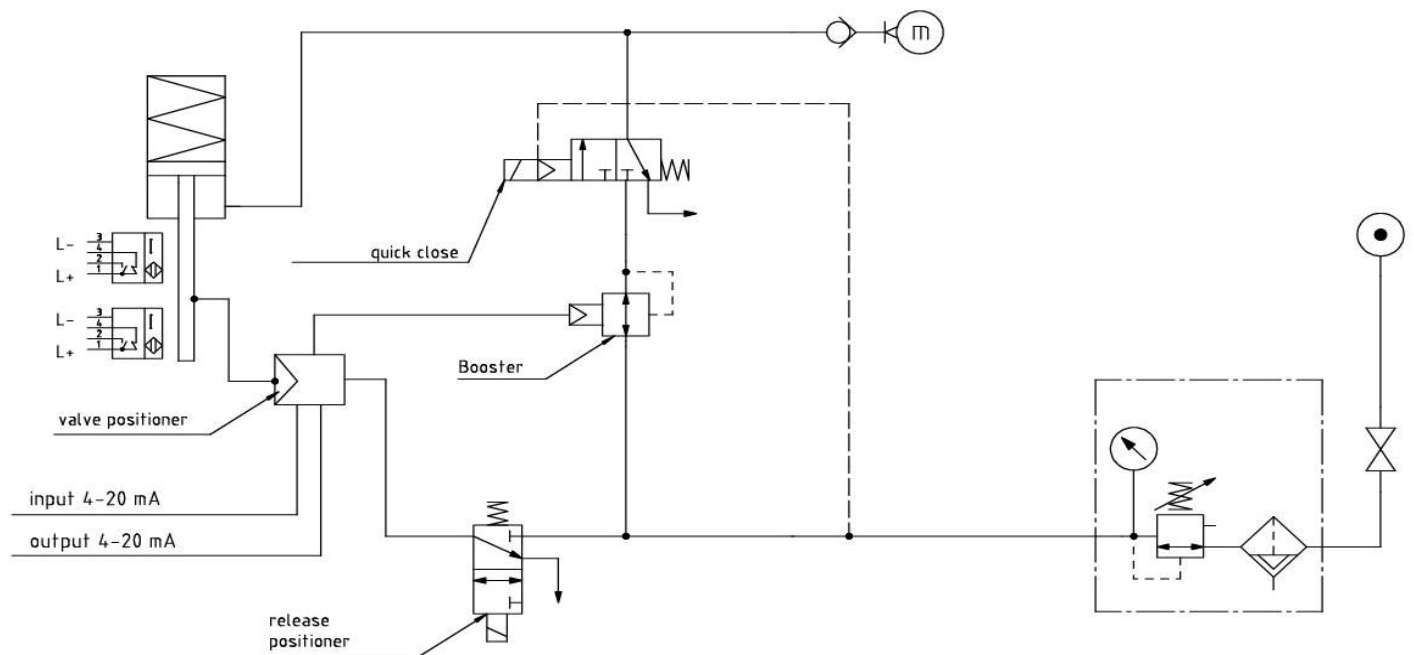
Between the valve seat closing position and the cylinder end position at least about 5mm margin must be foreseen.

The robust design of the pneumatic actuators, allow the cylinder end to be used as stroke limitation.

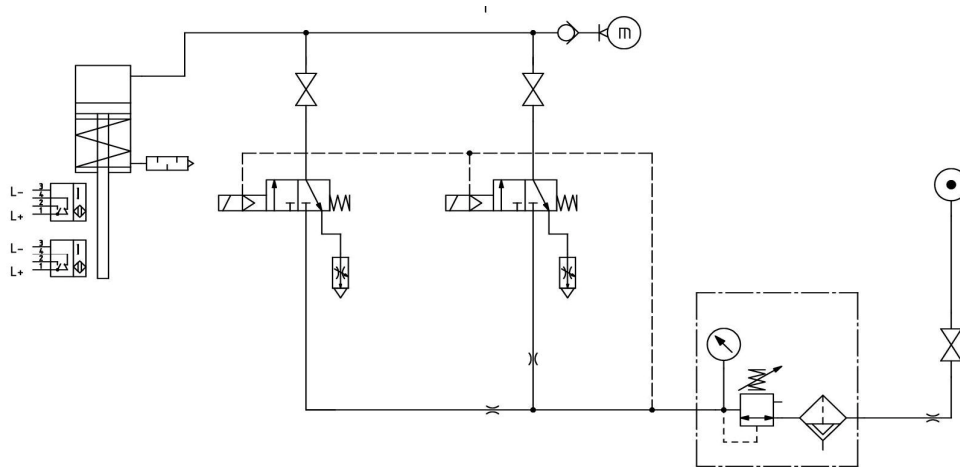
TYPICAL CIRCUIT DIAGRAMS



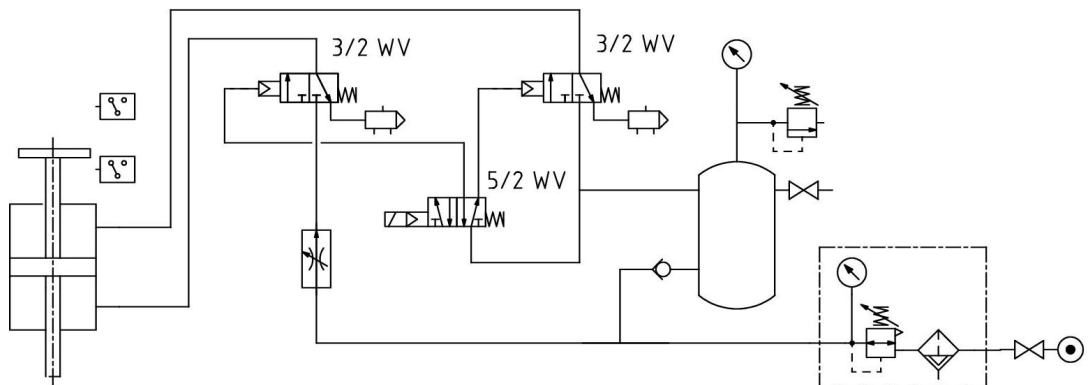
Control actuator with quick opening / quick closing function



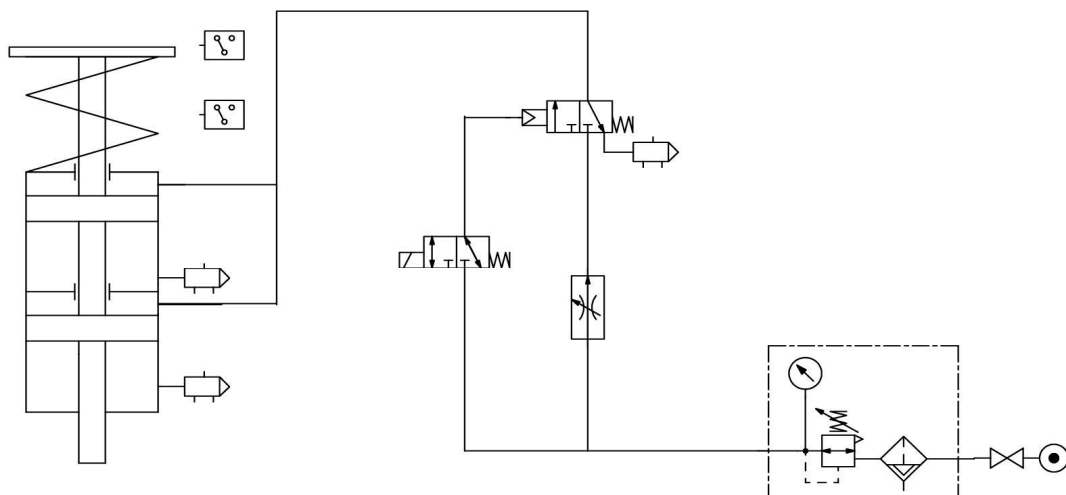
Control actuator with quick closing function



Quick opening function by spring with redundant 2-way solenoid valve



Quick closing function by air accumulator



Quick opening function by spring



ORDERING INFORMATION

Type:

- ☐ **Type PDA** Air closes – Air opens
- ☐ **Type PSC** Spring closes – Air opens
- ☐ **Type PSO** Air closes – Spring opens
- ☐ Single piston
- ☐ Double piston

Function:

- ☐ Modulating mode ☐ On / Off mode
- ☐ Quick close ☐ Quick open

Operating data:

- Minimum pressure of the air pressure network.....bar
- Valve stroke.....mm
- Cylinder stroke.....mm
- **for the modulating mode:** Full stroke.....sec
- **for quick closing function:** Quick closing time.....sec, Quick opening time.....sec
- **for quick opening function:** Quick opening time.....sec, Closing time.....sec
- **for PSC type:** Spring closing force (F_{2C}).....N
Piston force of the actuator (F_{KC}).....N
- **for PSO type:** Spring opening force (F_{2D}).....N
Piston force of the actuator (F_{KD}).....N

Optional:

- ☐ Manual override with hand wheel
- ☐ Manual override with hand wheel gear box
- ☐ Manual override via hydraulic cylinder with hand pump
- ☐ Safety position via disc springs
- ☐ Special surface coating.....
- ☐ Made from special materials.....
- ☐ Various control functions (plain text description).....
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