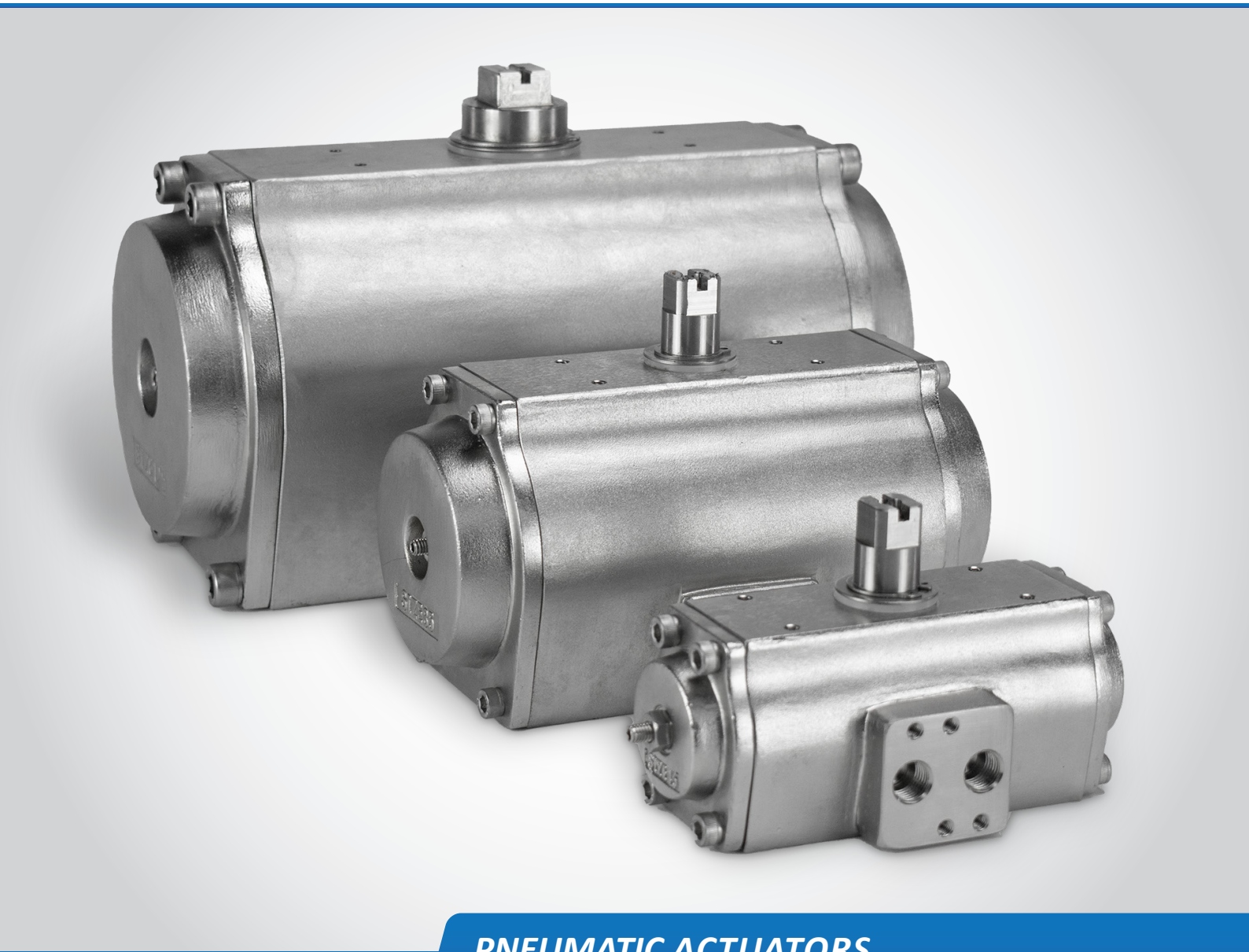
PROTACT



PNEUMATIC ACTUATORS

PT Series

Issued: 07/2024

Notes

Description

The PT series of pneumatic quarter-turn actuators combines a variety of specific features and, thanks to its wide range of torques, is the perfect solution for valve automation applications with high corrosion resistance requirements.

Thanks to the proven rack and pinion design, these actuators are extremely durable and reliable, even under the most extreme conditions. This design enables maximum torque output in a compact and lightweight design.

Thanks to their internal plain bearings, the PT drives require no maintenance. The design also ensures easy maintenance thanks to the drive principle and tethered safety springs.

The PT actuator series offers maximum modularity in combination with valves and accessory components such as solenoid valves, limit switches or positioners, as all common market standards for connection interfaces have been taken into account.

As high-quality stainless steel alloys are used, these actuators offer excellent protection against corrosion and can be used in demanding environmental conditions without any problems.

The PT series is also extremely flexible in terms of operating temperature and can be used at temperatures from -40°C to +80°C. The actuators are also equipped with a wide range of certifications, including ATEX, SIL or IECEx approvals for use in potentially explosive atmospheres and FDA conformity for hygienic applications.

In addition, the PT actuators offer high precision and repeatability of positioning, which contributes to an improved process flow. Thanks to their compact design, they can be easily accommodated in the tightest of installation spaces. In summary, the PT series of pneumatic quarter-turn actuators is an indispensable element of any valve automation solution due to its robust design, reliability and flexibility.

Function

Actuators of the PT series are pneumatic double-piston rotary actuators, which are primarily used for the automation of quarter-turn valves such as ball valves, butterfly valves or plug valves. They are generally provided in two different functions: single acting and double- acting.

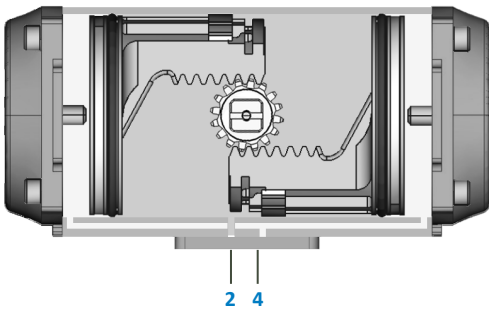
Double piston principle means that two pistons create two pressure chambers. By inflating one of these chambers the pistons are moved into opposite directions either towards or away from each other. The resulting force is provided to the central actuator pinion via toothed racks which are connected with the pistons and so creates a constant torque over the entire pivoting angle.

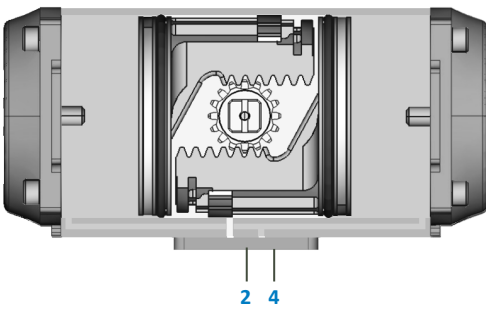
Double-acting function

In the double-acting actuator version, the movement in both directions gets generated by the control pressure.

Via connection port „A“ the pressure chamber between the two pistons gets pressurized and the pistons move out. The resulting force is transmitted to the pinion and effects a rotational movement.

Once the outer pressure chamber is pressurized via connection port “B”, the pistons move towards each other again and the rotation process is reversed..



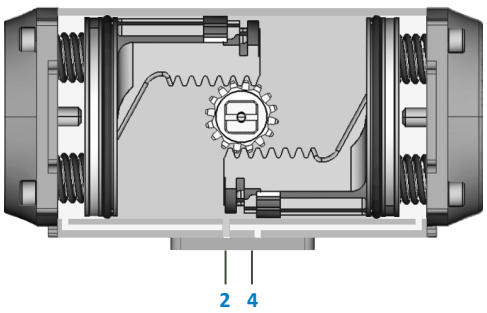


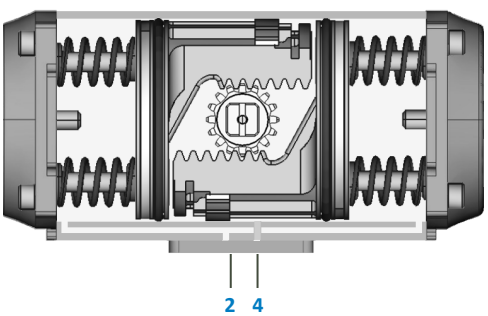
Single-acting function

In the single-acting actuator version, the movement into one rotation direction gets generated by the control pressure and the movement of the reverse rotation by integrated safety springs. Via connection port „A“ the pressure chamber bet- ween the two pistons gets pressurized, the pistons move out and compress the integrated spring cart- ridges. At the same time the force resulting at the pistons is transmitted to the pinion and effects a rotational movement.

Once the pressure chamber is vented via port „A“, the springs push the pistons towards each other and the rotation process is reversed.

The single acting actuator version thereby provides a safety function for the case of pressure loss.

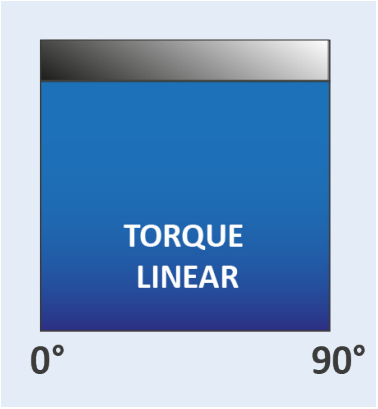




Torque

Torque diagram double-acting

The double-acting actuator version provides a linear and constant torque over the complete pivoting angle in both pivoting directions.



Size	Torque in Nm at control pressure in bar (g)												
	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7,5	8
045	6,0	7,6	9,1	10,6	12,1	13,6	15,1	16,6	18,1	19,6	21,1	22,7	24,2
060	14,2	17,8	21,3	24,9	28,4	32,0	35,5	39,1	42,6	46,2	49,7	53,3	56,8
085	30,8	38,5	46,2	53,9	61,6	69,4	77,1	84,8	92,5	100,2	107,9	115,6	123,3
105	65,8	82,2	98,7	115,2	131,6	148,0	164,4	180,9	197,3	213,8	230,2	246,7	263,1
125	103	128	154	180	205	231	256	282	308	334	359	385	410
140	175	219	263	307	351	395	439	482	526	570	614	658	702
160	267	334	401	468	535	601	668	735	802	869	935	1002	1069

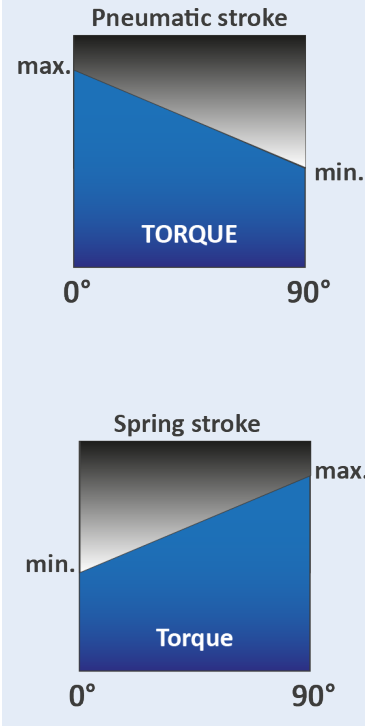
Torque diagram single-acting

Single-acting actuators don´t provide a consistent torque throughout the entire pivoting angle due to the integrated spring cartridges. We differentiate between the torque diagrams of the pneumatic stroke and the spring stroke.

At the beginning of the pneumatic stroke the springs are mostly relaxed and the maximum pneumatic torque is available for the valve-operation. In the course of the air stroke the springs get compressed and the rising spring force linearly reduces the available pneumatic torque to operate the valve. In the end position the torque of the air stroke reaches its minimum value, the so-called minimum pneumatic torque.

The spring stroke starts with maximum tensioned springs and accordingly offers the maximum spring torque at the beginning of the reverse movement. In the course of the spring stroke the springs progressively relax so that the actuator torque linearly reduces until it reaches the minimum spring torque in the end position.

Thus, at the starting point of each movement the maximum torque is available to overcome the breakaway torque.

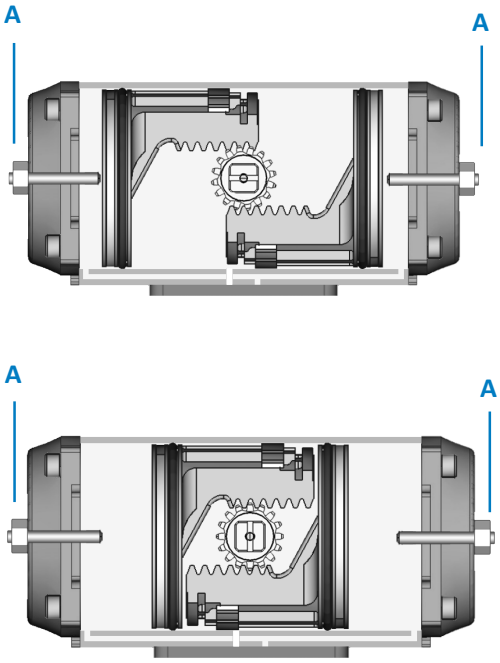


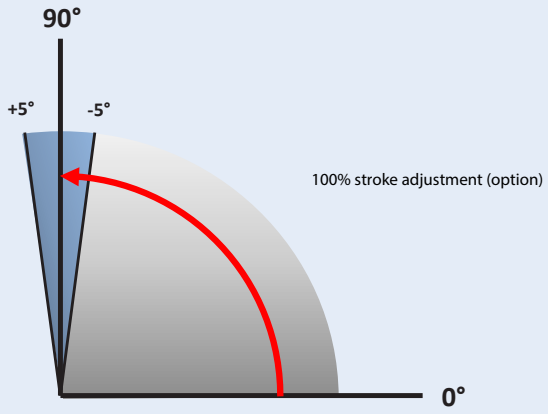
Torque

Size	Spring set	Torque spring stroke in Nm		Torque in Nm at control pressure in bar (g)																	
				3		3,5		4		4,5		5		5,5		6		7		8	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
045	5	4,6	2,9	6,0	4,3																
	6	5,5	3,5	5,4	3,3	6,9	4,8														
	7	6,5	4,1	4,8	2,3	6,3	3,8	7,8	5,3												
	8	7,4	4,6	4,2	1,3	5,7	2,8	7,2	4,3	8,7	5,8	10,2	7,3								
	9	8,3	5,2			5,1	1,9	6,6	3,4	8,1	4,9	9,6	6,4	11,1	7,9	12,6	9,4				
	10	9,2	5,8					6,0	2,4	7,5	3,9	9,0	5,4	10,5	6,9	12,0	8,4	15,0	11,4	18,1	14,5
	11	10,1	6,4							6,9	2,9	8,4	4,4	9,9	5,9	11,4	7,4	14,4	10,4	17,5	13,5
	12	11,1	7,0									7,8	3,5	9,3	5,0	10,8	6,5	13,8	9,5	16,9	12,6
060	5	10,4	6,8	14,2	10,3																
	6	12,5	8,2	12,7	8,1	16,2	11,7														
	7	14,6	9,6	11,2	5,9	14,8	9,5	18,3	13,0												
	8	16,7	10,9	9,8	3,7	13,4	7,3	16,9	10,8	20,5	14,4	24,0	17,9								
	9	18,8	12,3			11,9	5,1	15,4	8,6	19,0	12,2	22,5	15,7	26,1	19,3	29,6	22,8				
	10	20,9	13,7					14,0	6,4	17,6	10,0	21,1	13,5	24,7	17,1	28,2	20,6	35,3	27,7	42,4	34,8
	11	22,9	15,0							16,2	7,8	19,7	11,3	23,3	14,9	26,8	18,4	33,9	25,5	41,0	32,6
	12	25,0	16,4									18,2	9,1	21,8	12,7	25,3	16,2	32,4	23,3	39,5	30,4
085	5	23,0	15,8	29,5	21,9																
	6	27,6	19,0	26,2	17,1	33,9	24,9														
	7	32,2	22,1	22,9	12,3	30,6	20,0	38,3	27,7												
	8	36,8	25,3	19,6	7,4	27,3	15,1	35,0	22,8	42,8	30,6	50,5	38,3								
	9	41,4	28,5			23,9	10,3	31,6	18,0	39,4	25,8	47,1	33,5	54,8	41,2	62,5	48,9				
	10	46,0	31,6					28,3	13,2	36,1	21,0	43,8	28,7	51,5	36,4	59,2	44,1	74,6	59,5	90,0	74,9
	11	50,6	34,8							32,8	16,1	40,5	23,8	48,2	31,5	55,9	39,2	71,3	54,6	86,7	70,0
	12	55,2	38,0									37,1	19,0	44,8	26,7	52,5	34,4	67,9	49,8	83,3	65,2
105	5	49,2	31,6	65,3	46,8																
	6	59,1	38,0	58,7	36,5	75,3	53,1														
	7	68,9	44,3	52,1	26,2	68,6	42,7	85,0	59,1												
	8	78,7	50,6	45,4	15,8	61,9	32,3	78,3	48,7	94,7	65,1	111,1	81,5								
	9	88,6	56,9			55,3	22,0	71,7	38,4	88,1	54,8	104,5	71,2	121,0	87,7	137,4	104,1				
	10	98,4	63,3					65,0	28,0	81,4	44,4	97,8	60,8	114,3	77,3	130,7	93,7	163,6	126,6	196,5	159,5
	11	108,3	69,6							74,7	34,0	91,1	50,4	107,6	66,9	124,0	83,3	156,9	116,2	189,8	149,1
	12	118,1	75,9									84,5	40,1	101,0	56,6	117,4	73,0	150,3	105,9	183,2	138,8
125	5	78,4	52,4	99,0	71,5																
	6	94,1	62,8	87,9	55,0	113,3	80,5														
	7	109,7	73,3	76,8	38,5	102,3	64,0	127,8	89,5												
	8	125,4	83,8	65,8	22,0	91,3	47,5	116,8	73,0	142,3	98,5	167,8	124,0								
	9	141,1	94,2			80,3	31,0	105,8	56,5	131,3	82,0	156,8	107,5	182,8	133,5	208,8	159,5				
	10	156,8	104,7					94,8	40,0	120,3	65,5	145,8	91,0	171,8	117,0	197,8	143,0	248,8	194,0	299,8	245,0
	11	172,4	115,2							108,8	48,5	134,8	74,5	160,8	100,5	186,8	126,5	237,8	177,5	288,8	228,5
	12	188,1	125,7									123,7	58,0	149,7	84,0	175,7	110,0	226,7	161,0	277,7	212,0
140	5	129,0	85,8	172,6	127,2																
	6	154,8	102,9	154,6	100,1	198,7	144,2														
	7	180,5	120,1	136,6	73,0	180,6	117,0	224,6	161,0												
	8	206,3	137,3	118,5	45,8	162,5	89,8	206,5	133,8	250,5	177,8	294,5	221,8								
	9	232,1	154,4			144,5	62,7	188,5	106,7	232,5	150,7	276,5	194,7	320,0	238,2	363,5	281,7				
	10	257,9	171,6					170,4	79,5	214,4	123,5	258,4	167,5	301,9	211,0	345,4	254,5	433,4	342,5	521,4	430,5
	11	283,7	188,7							196,8	96,9	240,3	140,4	283,8	183,9	327,3	227,4	415,3	315,4	503,3	403,4
	12	309,5	205,9									222,3	113,2	265,8	156,7	309,3	200,2	397,3	288,2	485,3	376,2
160	5	208,3	139,7	254,0	181,8																
	6	250,0	168,0	224,6	137,9	291,6	204,8														
	7	292,0	196,0	195,2	94,0	262,2	161,0	329,2	228,0												
	8	333,0	223,0	165,8	50,2	232,8	117,2	299,8	184,2	366,3	250,7	432,8	317,2								
	9	375,0	251,0			203,9	73,8	270,4	140,3	336,9	206,8	403,4	273,3	470,4	340,3	537,4	407,3				
	10	417,0	279,0					241,0	96,4	307,5	163,0	374,0	229,5	441,0	296,5	508,0	363,5	641,0	496,5	775,0	630,5
	11	458,0	307,0							277,6	118,6	344,6	185,6	411,6	252,6	478,6	319,6	611,6	452,6	745,6	586,6
	12	500,0	335,0									315,2	141,7	382,2	208,7	449,2	275,7	582,2	408,7	716,2	542,7

Pivoting angle adjustment

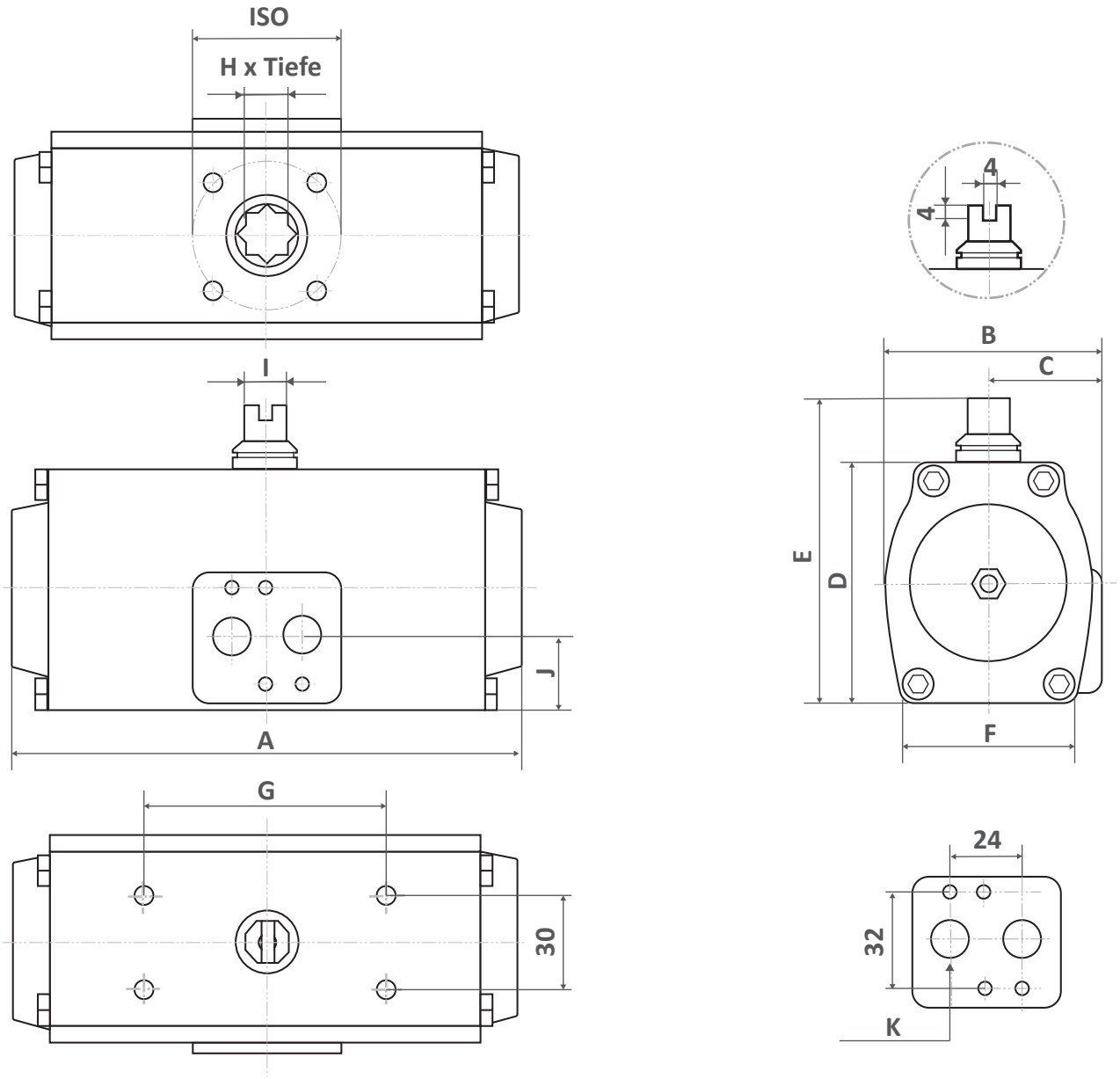
Actuators of the PT series feature a stroke limiting system which, in the switched position, provides an extended setting range of +5/-5 as standard, optionally even for the complete pivoting range (i.e. 100%).





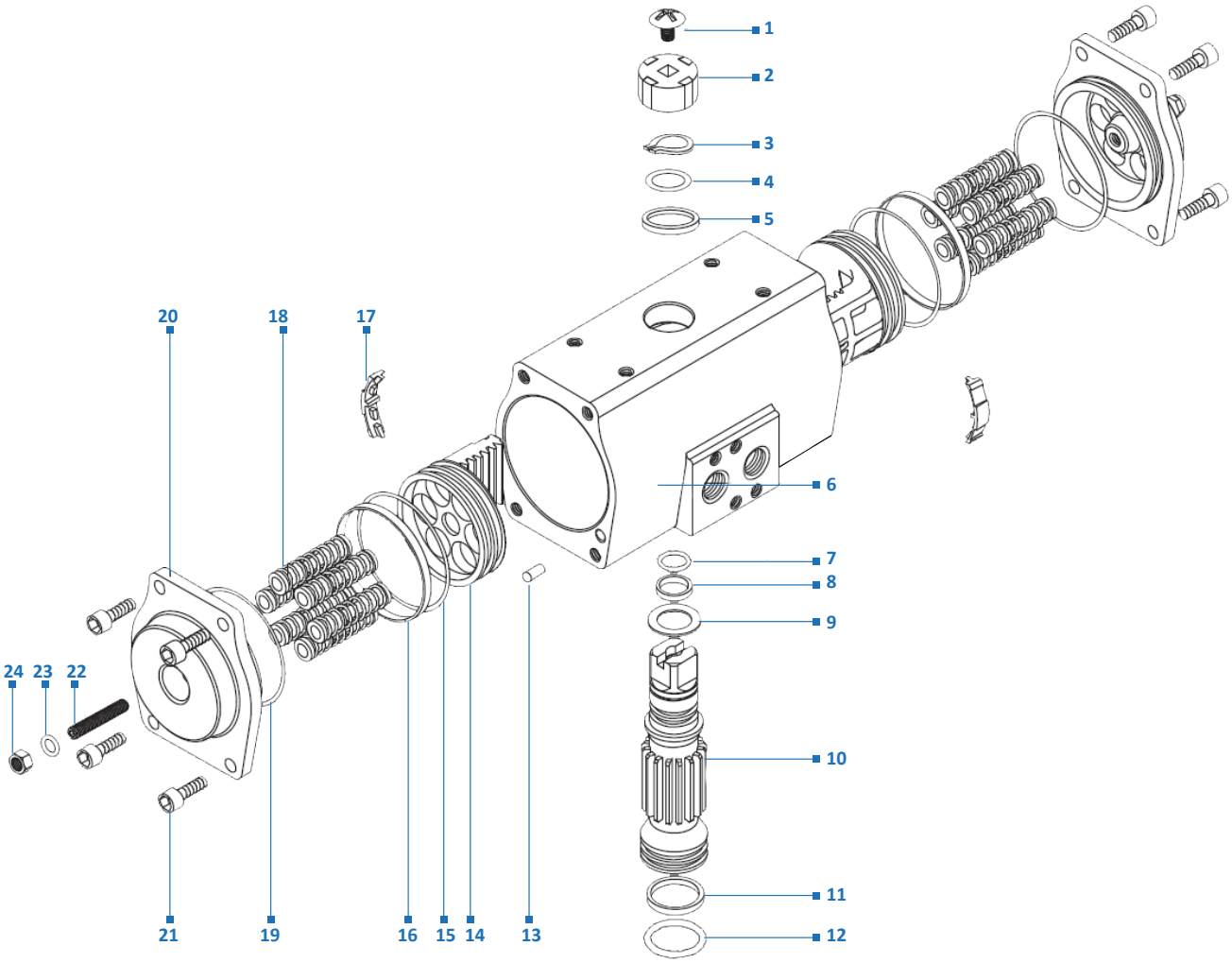
By turning the end-stop adjustment screws „A“, switch positions can be adjusted by +/-5° for a precise setting of the final valve position. The according settings are secured by tightening the lock nuts.

Dimensions



Size	A	B	C	D	E	F	G	ISO	H	I	J	K
045	148	70	41	65	95	48	80	F03 + F05	14x14	16	23	G1/4"
060	167	83	48	82	112	58	80	F05	14x18	16	23	G1/4"
085	197	102	54	108	138	75	80	F05 + F07	17x21	16	24	G1/4"
105	251	122	64	133	163	92	80	F07	17x26	16	24	G1/4"
125	284	140	72	155	185	96	130	F07 + F10	22x26	22	28	G1/4"
140	360	154	78	172	202	112	130	F10 + F12	27x31	22	34	G1/4"
160	420	173	86	197	227	127	130	F10 + F12	27x31	22	39	G1/4"

Parts & materials



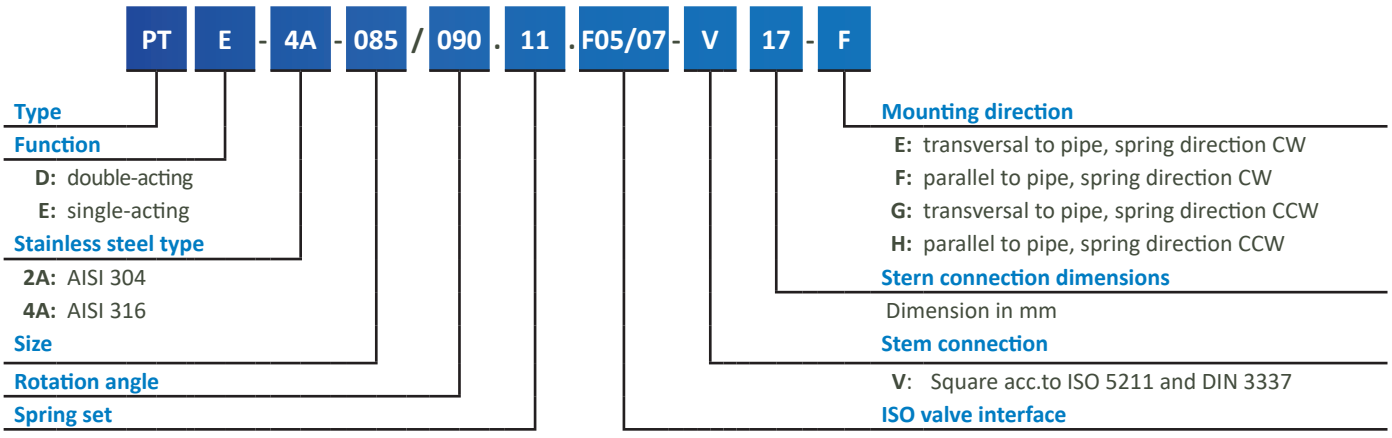
No.	Designation	Qty
1	Screw visual indicator	1
2	Visual indicator	1
3	Circlip	1
4	Thrust washer	1
5	Outside washer	1
6	Body	1
7	Inside washer	1
8	O-ring (pinion top)	1
9	Bearing (pinion top)	1
10	Pinion	1
11	Bearing (pinion bottom)	1
12	O-ring (pinion bottom)	1

No.	Designation	Qty
13	Plug	1
14	Piston	2
15	O-ring (piston)	2
16	Guidance ring (piston)	2
17	Guidance segment	2
18	Safety spring	0-12
19	O-ring end cap	2
20	End cap	2
21	Cap screw	2
22	O-ring (end adjustment screw)	2
23	O-ring (stroke adjustment screw)	2
24	Nut (end adjustment screw)	2

Technical data

Construction principle	Pneumatic double-piston rotary actuator in rack and pinion-design with self-centering pistons; double- and single-acting execution	
Materials	Stainless steel AISI 304 or AISI 316	
Temperature range	Standard	-20°C to +80°C
	Low temperature version	-40°C to +80°C
	High temperature version	-10°C to +150°C
Control pressure	2 to 8 bar	
Pressure media	dry, filtered air or inert gases in respect of remaining oil-, dust and water-content according to DIN ISO 8573-1 / class 4, maximum particle diameter 30µm, dew point minimum 10°C below ambient temperature	
Nominal rotation angle	90° Adjustable in switch position +/-5°, (optional 100% stroke adjustment)	
Torque range	double-acting up to 2100 Nm single-acting up to 625 Nm	
Standards	Interface actuator/feedback-unit	VDI/VDE 3845 bzw. NAMUR
	Interface actuator/control media supply	VDI/VDE 3845 bzw. NAMUR
	Interface actuator/valve	ISO 5211 und DIN 3337

Typecode



Notes

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