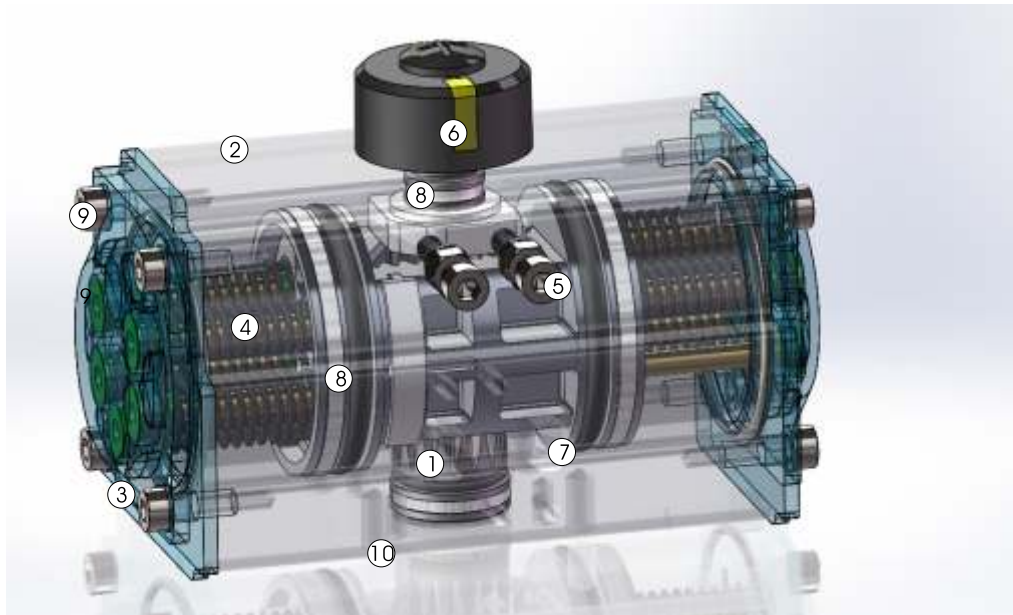


BT PNEUMATIC ACTUATOR



说明及型号编制 BTD/BTS040-300

BTD / BTS series of new valve pneumatic actuator BTD/BTS系列新型阀门气动执行器



BTD/BTS新型齿轮齿条式气动执行器综合了国内外最新技术，通过CAD三维模型创新优化设计，外形美观紧凑、现代化的造型；并采用实用新型材料、新工艺，使产品的质量、性能更加可靠；多规格选型更经济实惠；产品全面符合最新国际标准技术规范，满足现在和未来的需求。

- ① 齿轮齿条双活塞对称结构设计，动作快速平稳，精度高，输出功率大，通过简单的改变活塞装配位置可得到反方向旋转。
- ② 挤压的优质铝合金缸体，经精密加工的内孔和外部表面进行硬质阳极氧化处理(特殊情况下阳极氧化+特氟隆涂层)，使用寿命更长，摩擦系数低。
- ③ 一体式设计，所有的双作用和单作用执行器型号，都具有相同的缸体和端盖，很方便通过加装弹簧或拆除弹簧来改变作用方式。
- ④ 组合式预负安全弹簧组，不论在装配过程或使用现场中，都能方便而安全的安装或增减弹簧数量。
- ⑤ 外部侧面两个单独的调节螺钉对于已安装在阀门上的执行器更是精确方便，调节阀开和阀关位置，如需全行程调节时则另外在两个端盖处配置较长调节螺钉。
- ⑥ 多功能位置指示器，现场可视化指示，符合VDI/VDE3845、NAMUR标准槽，能安装并输出所有附件，如限位开关盒、电气定位器、位置传感器(倍加福、图尔克)。
- ⑦ 气源接口符合NAMUR标准，可直接安装NAMUR标准电磁阀。
- ⑧ 活塞背面的复合材料轴瓦和导向环以及输出轴的轴承等为防止金属对金属的摩擦，并且增加润滑，使其低摩擦、长寿命。
- ⑨ 所有的紧固件均采用不锈钢材料，长期抗腐蚀。
- ⑩ 连接部分符合全新国际标准规范ISO5211，DIN3337(F03-F25)使产品安装具有互换性、通用性。

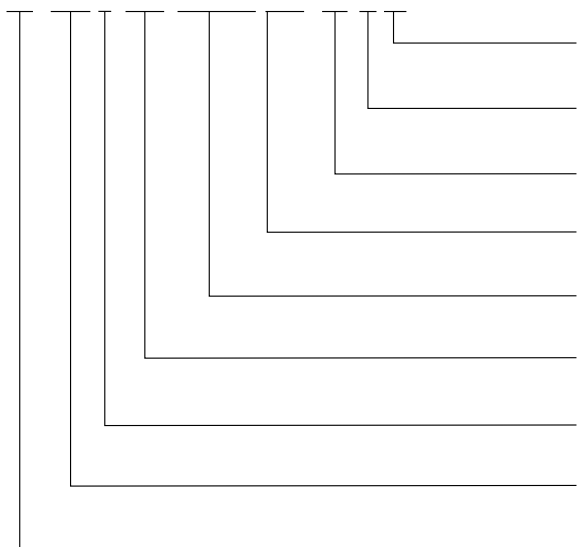
BTD/BTS new rack and pinion pneumatic actuator by the zhejiang KST company combines the latest technology at home and abroad, through the three-dimensional model of innovation and optimization of CAD design, beautiful shape compact, modern styling; and adopt practical new materials, new processes, so that the product quality, more reliable; more standard selection of more affordable; products fully meet the latest international standards, technical specifications, to meet current and future needs.

- ① dual piston rack and pinion design of symmetric structures, rapid and smooth movement, high precision, high output power by a simple change in the direction of the piston assembly positions available anti-rotation.
- ② high quality extruded aluminum alloy cylinder block, by precision machining the hole and the external surface of hard anodized (anodic oxidation under special circumstances + Teflon coating), longer life, low friction coefficient.
- ③ integrated design, all the double acting and single-function actuator models have the same cylinder and end caps, easily removed by installing a spring or spring to change the mode of action.
- ④ combined pre-spring break Hean whole group, whether in the assembly process or use on-site in both convenient and safe to install or change the
- ⑤ the external side of the two single independent adjustment screw has been number of springs. installed in the valve for the actuator is precisely to facilitate, control valve open and valve closed position, For the whole trip conditioned office is also configured in two cover a longer adjustment screws.
- ⑥ multi-position indicator, on-site visual instructions, consistent with VDI/VDE3845, NAMUR standard slot, the output can be installed and all the accessories, such as limit switch box, electric positioner, position sensor (Pepperl and Fuchs, Turck).
- ⑦ gas source interface line NAMURstandard, direct safety plaquesNAMUR standard solenoid valve.
- ⑧ rack on the back of the composite bearing and piston guide ring and the output shaft bearings to prevent metal on metal friction and increasing lubrication, so a low friction, long life.
- ⑨ All fasteners are stainless steel, long-term corrosion resistance.
- ⑩ connection part of the line with new international standard ISO5211, DIN3337 (F03-F25) makes products with interchangeable, versatile.

零部件及材料、防腐 BTD/BTS040-300

型号编制 Model preparation

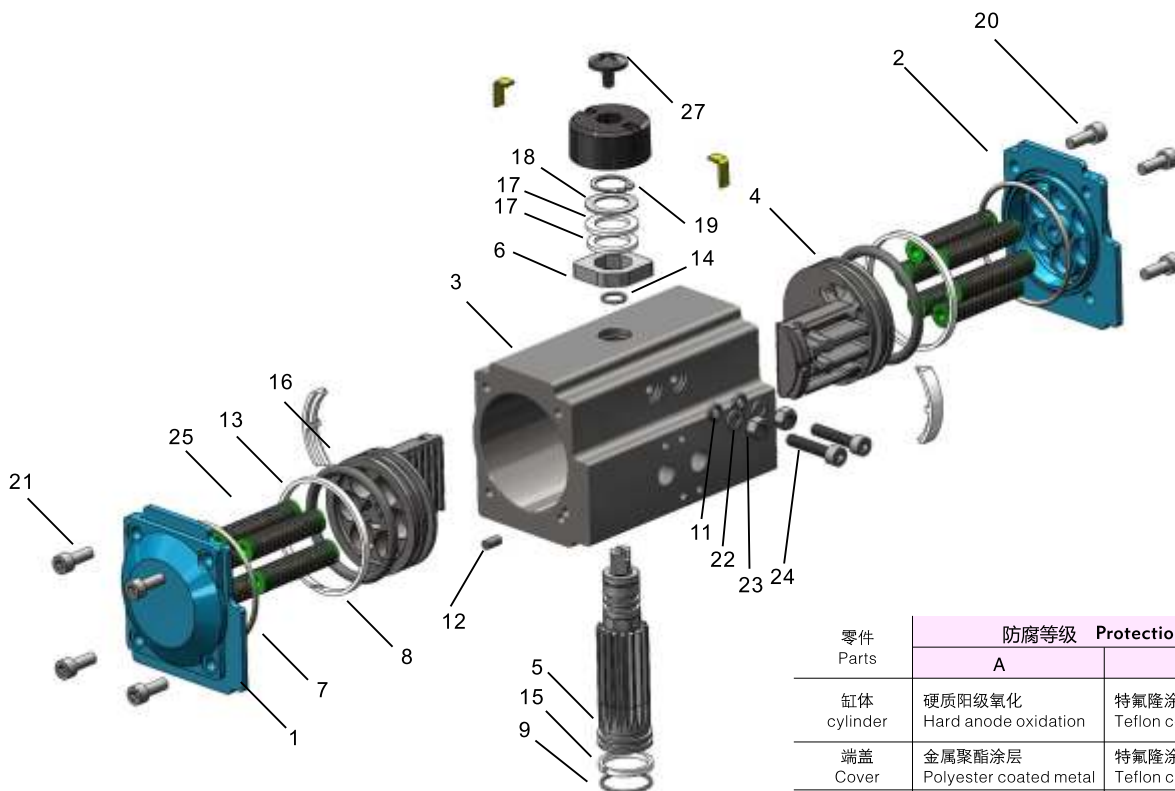
BT-160 S-K10 F10/12 P27-90-B-A



- ⑨.防腐等级：A、B
⑨. Corrosion Resistance Grade: A,B
- ⑧.环境温度：标准型-B, 低温型-D, 高温型-G
⑧. Ambient Temp.: Standard-B, Low Temp.: D, High Temp.: G
- ⑦.开关角度：0°~90°, 0°~120°, 0°~180°, 3P、0°~45°~90°
⑦. Rotation Angle：0°~90°, 0°~120°, 0°~180°, 3 Position
- ⑥.轴孔代号：P-八角孔, H-平行对边孔, W-两个键槽孔
⑥. Shaft Size Code: P-Star Square, H-Parallel Opposite Hole, W Two Key Hole
- ⑤.连接尺寸：ISO5211标准：法兰尺寸, F03~F16; 八角孔尺寸, 9~46
⑤. Connection: ISO5211 Standard, Flange Size, F03-F16, Star Square, 9-46
- ④.弹簧数量：K5/K6/K7/K8/K9/K10/K11/K12, 双作用无此参数
④. Spring QTY: K5/K6/K7/K8/K9/K10/K11/K12, Not Available for Double Acting
- ③.作用形式：D-双作用, S-单作用
③. Type: D-Double Acting, S-Spring Return
- ②.执行器缸径：40~300
②. Cylinder Size: 40~300
- ①. BT系列气动执行器
①. BT Series Pneumatic Actuator

Components and materials, corrosion

零部件及材料、防腐



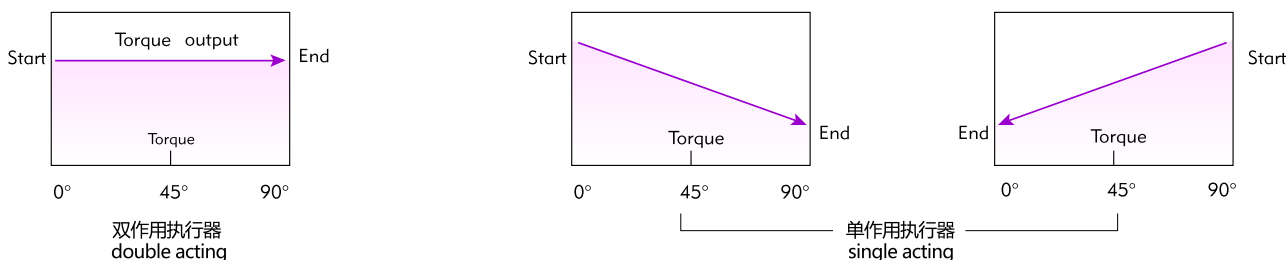
零件 Parts	防腐等级 Protection category	
	A	B
缸体 cylinder	硬质阳极氧化 Hard anode oxidation	特氟隆涂层+阳极硬化 Teflon coating+ Anode sclerosis
端盖 Cover	金属聚酯涂层 Polyester coated metal	特氟隆涂层 Teflon coating
输出轴 Output shaft	碳钢化学镀镍 Carbon steel electroless nickel plating	碳钢化学镀镍或不锈钢 Electroless nickel plating or stainless steel
使用场合 Use Occasion	一般场合 General situation	一般场合或低浓度酸性环境 General occasions or low concentrations of acidic environment

BT气动执行器

* 推荐维修用的零部件，包括在备件包中的零件。

零件号 Part Number	每台数量 Each number	零件名称 Part Name	标准材料 Standard Materials	选用材料 Selected materials
01	1	左端盖 Left Cover	压铸铝合金 Aluminum Die Casting	不锈钢 Stainless steel
02	1	右端盖 Right Cover	压铸铝合金 Aluminum Die Casting	不锈钢 Stainless steel
03	1	缸体 body	挤压铝合金 Aluminum extrusion	不锈钢 Stainless steel
04	2	活塞 Piston	压铸铝合金 Aluminum Die Casting	----
05	1	输出轴 Output shaft	碳钢 Carbon Steel	不锈钢 Stainless steel
06	1	调节凸轮 Cam adjustment	不锈钢 Stainless steel	----
07 *	2	O型圈 (端盖) O-ring (cover)	丁腈橡胶 NBR	氟或硅橡胶 Fluorine or silicone rubber
08 *	2	O型圈 (活塞) O-ring (Piston)	丁腈橡胶 NBR	氟或硅橡胶 Fluorine or silicone rubber
09 *	1	O型圈 (输出轴底部) O-ring (output shaft bottom)	丁腈橡胶 NBR	氟或硅橡胶 Fluorine or silicone rubber
10 *	1	O型圈 (输出轴顶部) O-ring (output shaft at the top)	丁腈橡胶 NBR	氟或硅橡胶 Fluorine or silicone rubber
11 *	2	O型圈 (调节螺栓) O-ring (adjusting screw)	丁腈橡胶 NBR	氟或硅橡胶 Fluorine or silicone rubber
12 *	2	塞头 (缸体) Plug (Cylinder)	丁腈橡胶 NBR	氟或硅橡胶 Fluorine or silicone rubber
13 *	2	轴承 (活塞) Bearing (Piston)	聚甲醛 (POM)	----
14 *	1	轴承 (输出轴顶部) Bearing (output shaft at the top)	聚甲醛 (POM)	----
15 *	1	轴承 (输出轴底部) Bearing (output shaft bottom)	聚甲醛 (POM)	----
16 *	1	导向轴承 (活塞背面) Guide with Bearing (Piston back)	聚甲醛 (POM)	----
17 *	2	推力轴承 (输出轴) Thrust bearings (output shaft)	聚甲醛 (POM)	----
18	2	垫片 (输出轴) Gasket (output shaft)	不锈钢 Stainless steel	----
19	1	弹性挡圈 Flexible file ring	弹簧钢 Spring steel	----
20	4	端盖螺栓 Cover bolt	不锈钢 Stainless steel	----
21	4	端盖垫片 Cover Gasket	不锈钢 Stainless steel	----
22	2	垫片 Gasket	不锈钢 Stainless steel	----
23	2	螺帽 Nut	不锈钢 Stainless steel	----
24	2	调节螺栓 Adjustment bolt	不锈钢 Stainless steel	----
25	5-12	弹簧组件 Spring Components	合金弹簧钢 Alloy spring steel	----
26	1	位置指示器 Position indicator	聚甲醛 (POM)	----
27	1	指示螺钉 Screw of indicator	聚甲醛 (POM)	----

扭矩图 Torque Diagram



双作用执行器操作原理图 Double Acting Operation

双作用执行器的选型

在正常工作条件下，双作用执行器考虑的安全系数为20%-30%。

例如：

- 阀门力矩=100 N.m
- 安全力矩=100 × (1 + 30%) =130 N.m
- 气源压力=5 Bar

对照双作用力矩表，选配双作用执行器最小规格为BT-105D.

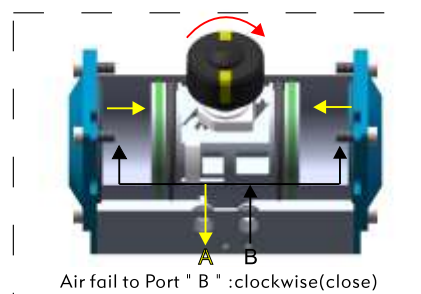
Selection of double action actuators

The suggested safety factor for double acting actuators under normal working conditions is 20%-30%

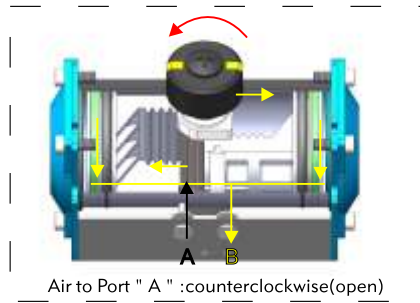
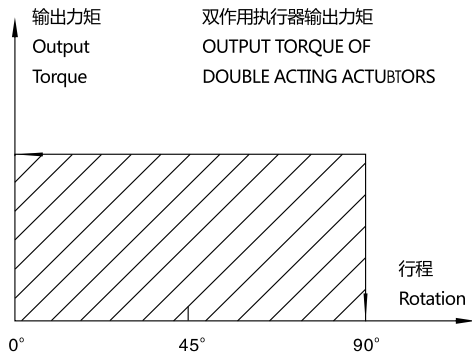
Example:

- The torque needed by valve=100 N.m
- The torque considered safety factor 100 × (1 + 30%) =130 N.m
- Air Supply=5 Bar

According to double acting torque table, we can choose the minimum model is BT-105.



BT气动执行器



Air to Port " A " :counterclockwise(open)
* Pistons must be inverted to reverse actuator rotation

单作用执行器操作原理图 Spring Return Operation

单作用执行器的选型

在正常工作条件下，单作用执行器考虑的安全系数为30%-50%。

例如：

阀门需要力矩=100N.m

安全力矩=100×(1+30%)=130 N.m

对照单作用执行器输出力矩表，我们可以查

BT-40SK10 输出力矩为

空气执行程0°=285N.m

空气执行程90°=164N.m

弹簧行程0°=193N.m

弹簧行程90°=314N.m

所有输出力矩均大于我们的需求

注意：

单作用执行器弹簧复位过程中，执行器B口通气不影响执行器输出力矩，相反帮助弹簧的复位。

Selection of single action actuators

Under normal operating conditions, a single actuator to consider the role of the safety factor of 30% -50%.

For example:

Valve required torque = 100N.m

Safety torque = 100×(1 + 30%) = 130N.m

according to single acting actuator output torque table, we can find BT-40SK10 Torque following

Implementation process 0° = 285N.m air

Implementation process 90° = 164 N.m air

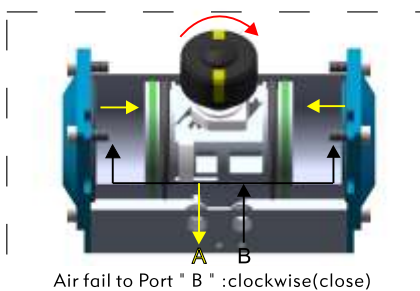
Spring stroke 0° = 193 N.m

Spring stroke 90° = 314 N.m

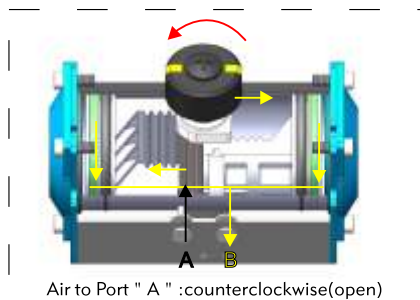
output Torque bigger than all our needs

Note:

Single action during the spring return actuators, actuator B hole ventilation does not affect actuator output torque.instead it`s helpful of spring return



Air fail to Port " B " :clockwise(close)



Air to Port " A " :counterclockwise(open)

* Spring force makes the actuator clokwise when the air is exhausted at port " A "

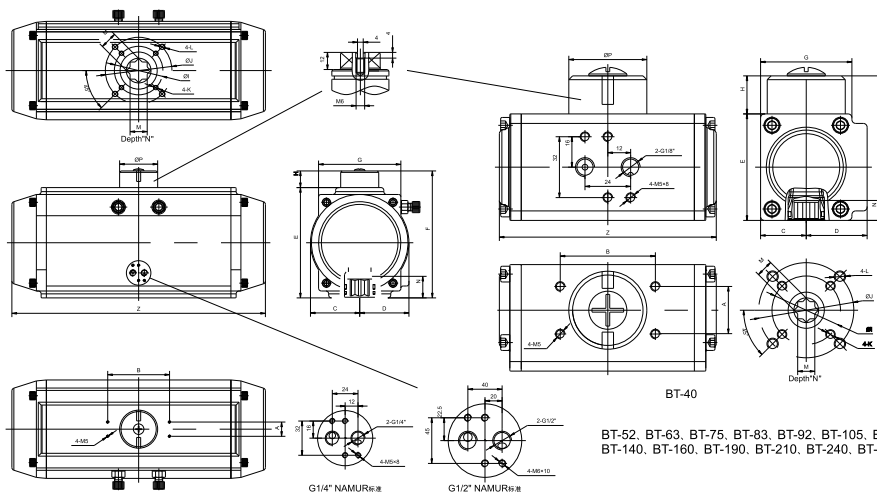
* When air fail to counterclockwise is required, the pistons must be inverted

BT气动执行器

双作用执行器输出扭矩表 Double Acting Actuator Output Torque(Nm)

输入气源压力 型号	气源压力 (Unit : Bar)								
	3bar	3.5bar	4bar	4.5bar	5bar	5.5bar	6bar	6.5bar	7bar
BT40	5.7	6.7	7.6	8.6	9.5	10.5	11.4	13.3	15.2
BT52	12.0	14.0	16.0	18.0	20.0	22.0	24.0	28.0	32.0
BT63	21.0	24.5	28.0	31.5	35.0	38.5	42.0	49.0	56.0
BT75	30.0	35.0	40.0	45.0	50.0	55.0	60.0	70.0	80.0
BT83	45.7	53.3	61.0	68.6	76.2	83.8	91.4	106.7	121.9
BT92	67.4	78.7	89.9	101.2	112.4	123.6	134.9	157.4	179.8
BT105	97.6	113.9	130.2	146.4	162.7	179.0	195.2	227.8	260.3
BT125	152.2	177.6	203.0	228.3	253.7	279.1	304.4	355.2	405.9
BT140	260.3	303.7	347.0	390.4	433.8	477.2	520.6	607.3	694.1
BT160	396.6	462.7	528.8	594.9	661.0	727.1	793.2	925.4	1057.6
BT190	639.3	745.9	852.4	959.0	1065.5	1172.1	1278.6	1491.7	1704.8
BT210	781.0	911.2	1041.4	1171.5	1301.7	1431.9	1562.0	1822.4	2082.7
BT240	1147.6	1338.8	1530.1	1721.3	1912.6	2103.9	2295.1	2677.6	3060.2
BT270	1742.9	2033.4	2323.8	2614.3	2904.8	3195.3	3485.8	4066.7	4647.7
BT300	2390.8	2789.3	3187.8	3586.2	3984.7	4383.2	4781.6	5578.6	6375.5

尺寸图 Dimensional Drawing



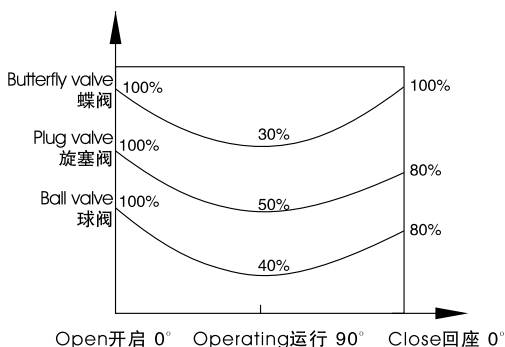
尺寸 Dimension

Unit (mm)

Model	A	B	C	D	E	F	G	H	I	I-1	J	J-1	K	L	M	N	P	Z	Air
BT-40	25	50	24	32	56	76	48	20	36	F03	50	F05	M5×8	M6×10	9	10	42	114	1/8"
BT-52	30	80	30	42.5	72.4	92.4	50.5	20	36	F03	50	F05	M5×8	M6×10	11	14	42	150	1/4"
BT-63	30	80	36	47	88.5	108.5	69.5	20	50	F05	70	F07	M6×10	M8×13	14	18	42	171	1/4"
BT-75	30	80	42.5	53	100	120	78	20	50	F05	70	F07	M6×10	M8×13	14	18	42	186	1/4"
BT-83	30	80	46.5	57	109.5	129.5	86	20	50	F05	70	F07	M6×10	M8×13	17	21	42	206	1/4"
BT-92	30	80	50	58	117	137	90	20	50	F05	70	F07	M6×10	M8×13	17	21	42	265	1/4"
BT-105	30	80	57.5	64	135	155	104.5	20	70	F07	102	F10	M8×13	M10×16	22	26	42	272	1/4"
BT-125	30	80	67.5	74.5	157	187	120.5	30	70	F07	102	F10	M8×13	M10×16	22	26	62	304	1/4"
BT-140	30	80	75.5	75.5	174	204	125	30	102	F10	125	F12	M10×16	M12×20	27	32	62	395	1/4"
BT-160	30	130	87	87	198	228	143	30	102	F10	125	F12	M10×16	M12×20	27	32	62	462	1/4"
BT-190	30	130	103	103	232	262	172	30			140	F14		M16×25	36	40	80	552	1/4"
BT-210	30	130	113	113	257	287	194	30			140	F14		M16×25	36	40	80	552	1/4"
BT-240	30	130	130	130	292	322	230	30			165	F16		M20×30	46	50	90	628	1/4"
BT-270	30	130	147	147	331	361	252	30			165	F16		M20×30	46	50	90	750	1/2"
BT-300	30	130	161	168	354	384	290	30	165	F16	215	F20	M20×30	M20×30	46	50	90	780	1/2"

选型与订购

选型与订购 Sizing information and How to order



例如：

蝶阀原最大扭矩= 80 N.m
 打开后扭矩 $80 \times 30\% = 24 \text{ N.m}$
 气源压力= 6 Bar

我们可以选择 BT-125SK10

空气行程 $0^\circ = 141 \text{ N.m} > 80 \text{ N.m}$
 空气行程 $90^\circ = 81 \text{ N.m} > 24 \text{ N.m}$
 弹簧行程 $90^\circ = 155 \text{ N.m} > 24 \text{ N.m}$
 弹簧行程 $0^\circ = 95.3 \text{ N.m} > 80 \text{ N.m}$
 以上数据显示可以满足该蝶阀的正常开启

Forexample:

Butterfly of the original maximum torque=80N.m
 Opened torque $80 \times 30\% = 24 \text{ N.m}$
 Airpressure = 6Bar

We can choose BT-125SK10

Air travel $0^\circ = 141 \text{ N.m} > 80 \text{ N.m}$
 Air travel $90^\circ = 81 \text{ N.m} > 24 \text{ N.m}$
 Spring stroke $90^\circ = 155 \text{ N.m} > 24 \text{ N.m}$
 Spring stroke $0^\circ = 95.3 \text{ N.m} > 80 \text{ N.m}$
 The above figures show opening meet of the butterfly valve

动作形式(单作用和双作用) Operating type (Double acting and spring return)

气源接口符合NAMUR标准，可简单方便地安装电磁阀。
 Air supply connection is designed in accordance with NAMUR Standard to install solenoid valves.



输出轴的NAMUR标准槽和缸体上部标准安装孔，可使限位开关、定位器直接啮合和安装。
 The Namur drive pinion and the Namur top mounting connection permit direct installation of accessories such as limit switch box and positioner.



底部安装孔设计符合ISO5211、DIN3337标准，可以直接安装离合器（气动手轮机构）或安装支架。
 Bottom mounting connection is designed in accordance with ISO5211、DIN3337 standards for direct mounting with valve gear boxes or mounting brackets.



工作技术条件 Operating conditions:

1. 工作介质

干燥或润滑的空气或无腐蚀性气体介质中杂质微粒小于 $30 \mu\text{m}$

2. 气源压力

最小气源压力2.5巴，最大气源压力8巴。

3. 介质环境温度

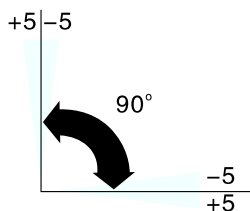
标准： $-20^\circ\text{C} \sim +80^\circ\text{C}$
 低温： $-40^\circ\text{C} \sim +80^\circ\text{C}$
 高温： $-15^\circ\text{C} \sim +150^\circ\text{C}$

4. 行程调节

$0^\circ - 90^\circ$ 两个位置有 $\pm 5^\circ$ 的调节范围

5. 应用

室内或户外



1. Operating media

Dry or lubricated air, or the non-corrosive gases
 The maximum particle diameter must less than $30 \mu\text{m}$

2. Air supply pressure

The minimum supply pressure is 2.5 Bar
 The maximum supply pressure is 8 Bar

3. Operating temperature

Standard: $-20^\circ\text{C} \sim +80^\circ\text{C}$
 Low temperature: $-40^\circ\text{C} \sim +80^\circ\text{C}$
 High temperature: $-15^\circ\text{C} \sim +150^\circ\text{C}$

4. Travel adjustment

Have adjustment range of $\pm 5^\circ$ for the rotation at 0° and 90°

5. Application

Either indoor or outdoor

耗气量计算

耗气量计算 Air Consumption

型号 Model	最大气源压力 Maximum pressure	旋转角度 The angle of rotation	操作温度(°C) Temperature	行程调节每1°圈数 1°the need to adjust the number of laps	气缸直径 Diameter	气缸容量(L) Internal volume		开关时间(秒)(A) On-off time		重量(kgs/per)Weight 每台 每根弹簧 A weight Spring weight	
						开向close	关向Open	开向close	关向Open		
BT-40S	干燥或润滑 的洁净压缩 空气8 bar Lubrication or dry of compressed air 8bar	(0°-90°) ± 5° 或全行程 0°-90° (0°-90°) ± 5° or full itinerary 0°-90°	ST(标准) 丁腈橡胶O型圈 -20--+80°C HT(高温) 氟橡胶O型圈 -15--+150°C LT(低温) 硅橡胶O型圈 -40+80°C ST(normal) NBR O-ring -20--+80°C HT(High Temperature) Viton O-ring -15--+150°C LT(Low Temperature) Silicone O-ring -40+80°C	1/6	40	0.1	0.2	DA0.2 SR0.3	DA0.3 SR0.3	DA1.1 SR1.2	0.01
BT-52S				1/6	52	0.2	0.3	DA0.3 SR0.3	DA0.3 SR0.4	DA1.6 SR1.8	0.02
BT-63S				1/5	63	0.3	0.5	DA0.3 SR0.4	DA0.4 SR0.5	DA2.8 SR3.2	0.03
BT-75S				1/5	75	0.5	0.8	DA0.4 SR0.5	DA0.5 SR0.6	DA4.0 SR4.7	0.06
BT-83S				1/5	83	0.7	1.1	DA0.5 SR0.7	DA0.6 SR0.9	DA5.9 SR6.7	0.07
BT-92S				1/4	92	1.2	1.8	DA0.7 SR1.0	DA0.9 SR1.2	DA8.4 SR9.8	0.10
BT-105S				1/4	105	1.5	2.3	DA0.9 SR1.2	DA1.1 SR1.4	DA10.7 SR12.5	0.13
BT-125S				1/4	125	2.4	3.8	DA1.2 SR1.5	DA1.4 SR1.8	DA15.5 SR18.3	0.25
BT-140S				1/4	140	3.1	4.9	DA1.5 SR1.8	DA1.7 SR2.1	DA19.5 SR23.3	0.36
BT-160S				1/4	160	4.5	7.3	DA2.0 SR2.4	DA2.2 SR2.8	DA26.7 SR32.8	0.5
BT-190S				1/4	190	6.8	11.2	DA2.8 SR3.0	DA3.0 SR3.4	DA34.6 SR44.2	0.5
BT-210S				1/4	210	10	15.2	SR3.5 DA3.5	SR4.0 DA4.0	SR43.6 DA58.2	0.62
BT-240S				1/4	240	14.5	21.4	SR4.1 DA4.0	SR4.6 DA4.5	SR71.0 DA78.8	1.12
BT-270S				1/4	270	23.8	29.7	SR4.5 DA	SR5.0 DA	SR96.5	1.56
BT-300S				1/4	300	35.1	46.3	SR DA	SR DA		

耗气量取决于供气气压、开关行程、体积及动作次数，计算如下：

Air consumption rest with Supply. Air volume and Action cycle times, expressions

升/分=气缸体积(开向体积+关向体积)×[(供气压力(Kpa)+101.3)÷101.3]×次数/分钟

L/Min=Air volume(Air volume Opening+Air volume closing)×[(Air Supply(Kpa)+101.3)÷101.3]×Action cycle times/(min)

常见故障及检查、排除方法 Common faults and inspection, troubleshooting

故障现象 Failure phenomenon	检查项目 Inspection Items	解决方法 Solution
气动阀门不能动作 Pneumatic valve can not move	1、电磁阀是否正常，线圈是否烧坏，电磁阀芯是否被脏物卡死 1, the electromagnetic valve is normal, coil is burned, Electromagnetic valve is stuck being stolen	更换电磁阀、更换线圈、清除脏物。 Solenoid valve replacement, replacement coils, remove stolen property.
	2、对气动执行器单独供气试验，检查密封圈及气缸是否是损坏。 2, a separate air supply pneumatic actuator test, check seals and Whether the cylinder is damaged.	更换已坏密封圈及气缸。 Replace a bad ring and cylinder.
	3、阀内有杂质将阀芯卡住。 3, there are impurities in the spool valve stuck.	清除杂质，更换已损件。 Remove impurities, replace damaged parts.
	4、手动机动的手柄处在手动位置。 4, the handle in a manual motor location.	将手柄转到气动位置 change the handle to pneumatic position
动作迟缓、爬行 Slow motion, crawling	1、气源压力不够。 1, supply pressure is not enough.	增加气源压力 (0.4-0.7Mpa) The increase of gas supply pressure [0.4-0.7Mpa]
	2、气动执行器输出扭矩过小。 2, pneumatic actuator output torque is too small.	增大气动执行器的型号规格。 Increase the pneumatic actuator Production.
	3、阀门阀芯或其他阀件装配太紧。 3, the valve spool or valve assembly too tight.	重新装配调整。 Re-assembly adjustments.
	4、气源管路堵塞，流量过小。 4, air supply pipe plug, flow is too small.	排除堵塞，更换过滤器滤芯。 Exclude plug, replace the filter cartridge.
回讯器没有信号 Reply devices without signal	1、电源线路短路或断路。 1, power line short circuit or open circuit.	检修电源线路。 Maintenance of power lines.
	2、回信内凸轮位置不准确。 2, reply within the cam position is not accurate.	调整凸轮至正确位置 Adjust the cam to the correct location
	3、微动开关损坏。 3, micro switch damaged.	更换微动开关 Replacement Micro Switch