DATA SHEET TB 30a

BR 30a · Multi turn actuator

Single-acting pneumatic diaphragm multi-turn actuator

CE

Application

Single-acting pneumatic diaphragm multi-turn actuator for butterfly valves and other rotary valves:

- **Max. angle of rotation 90 ±3°**
- **Signal pressures 2,5 to 6 bar**
- **Temperatures -35 °C to 90 °C**
- **Torques from 15 Nm to 5619 Nm**

Single-acting pneumatic diaphragm multi-turn actuator for butterfly valves and other rotary valves:

The pneumatic BR 30a Multi-turn actuators are diaphragm actuators with rolling diaphragm and centrally arranged return springs.

The signal pressure generates a force at the diaphragm surface which opposes the compression springs arranged in the actuator.

The travel of the actuator shaft is transmitted via a lever mechanism onto the drive shaft.

Fig. 1: *BR 30a Multi-turn actuator*

- High positioning forces with fast stroking speed and minimum friction by using low-wear rolling diaphragms as well as clearance-free and maintenance-free bearings
- Direction of action (spring opens/spring closes) depending on how the actuator is mounted on the valve
- Externally adjustable stop screws to limit the angle of rotation
- Excellent control properties due to large stroke
- Attachments acc. to DIN ISO 5211 and VDI VDI 3845

Special designs

- With manual override
- With double square drive
- With NAMUR interface (standard with size 4)

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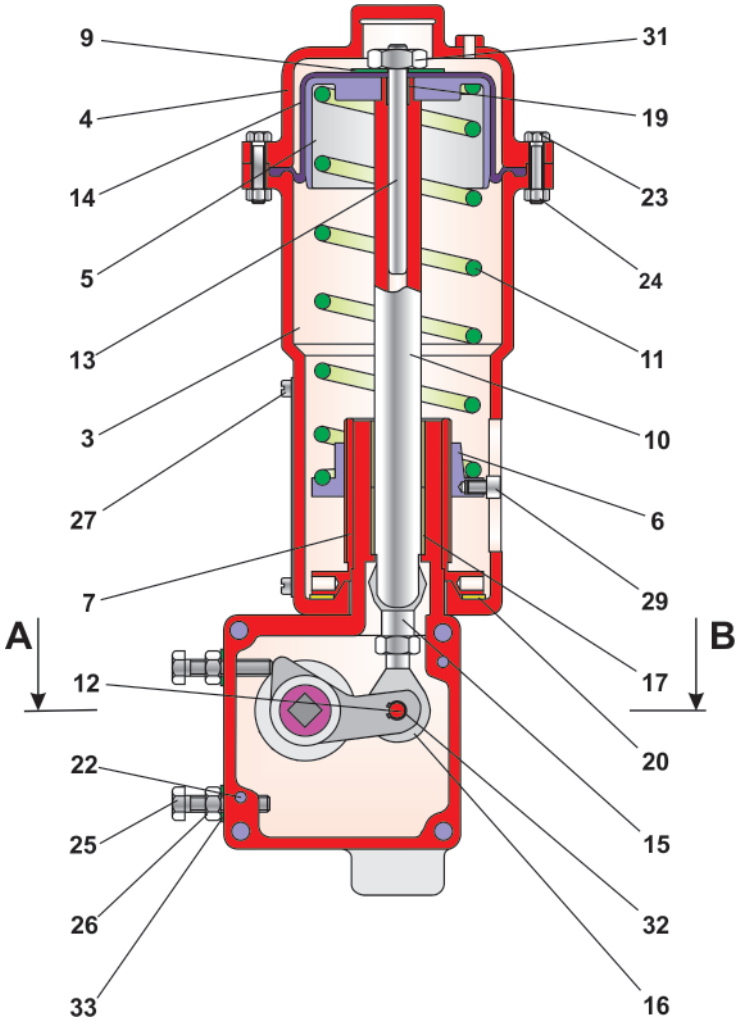

Fig. 2: *BR 30a Multi-turn actuator*

Table 1: *List of parts*

Item	Description
1	Bearing housing
2	Bearing cover
3	Actuator housing
4	Cover
5	Diaphragm plate
6	Spring plate
7	Plate stem
8	Lever shaft
9	Washer
10	Actuator shaft
11	Compression spring

Item	Description
12	Connection pin
13	Centering pin
14	Rolling diaphragm
15	Ball joint
16	Ball joint
17	Bushing
18	Bushing
19	Bushing
20	Bearing washer
21	O-ring
22	Tapered pin

Item	Description
23	Screw
24	Nut
25	Screw
26	Nut
27	Screw
29	Screw
30	Screw
31	Nut
32	Circlip
33	Spring washer

Principle of operation

The signal pressure generates a force at the diaphragm surface (14). This force opposes the force of the compression spring (11) in the actuator.

The diaphragm stroke H is transmitted over the actuator shaft (10) and the ball-and-socket heads (15 and 16) onto the lever shaft (8) where it is turned into a rotary motion.

Two external stop screws (25) allow the start and end of the angle of rotation to be limited.

The stroke H is proportional to the signal pressure.

The signal pressure range is determined by the spring rate and the spring compression, which can be altered within a wide range by turning the plate stem (7).

Each actuator size is equipped with two different standard springs. Spring 1 can be used for pressures up to 3.5 bar and spring 2 up to max. 6 bar.

The valve can be connected at either end of the lever shaft (8).

Both connections are designed as square drives in acc. with DIN EN ISO 5211. Optionally, the actuators are also available with a double square drive.

The connection determines the fail-safe position of the valve:

- **Fail-safe action "spring closes":**
  The spring (11) closes the valve when pressure is reduced on the diaphragm or in the case of power failure. As the signal pressure increases, the valve opens against the force of the spring.
- **Fail-safe action "spring opens":**
  The spring (11) opens the valve when pressure is reduced on the diaphragm or in the case of power failure. As the signal pressure increases, the valve closes against the force of the spring.

Table 2: *General technical data*

Operating mode		Single-acting
Max. perm. signal pressure	**Spring 1**	2.5 to 3.5 bar
	Spring 2	4.0 to 6.0 bar
Sizes		0 • 1 • 2 • 3 • 4 • 5 • 6
Perm. temperature range		-35 °C to 90 °C
Connection to valve		DIN EN ISO 5211

Table 3: *Materials*

Housing and cover	EN-JS 1049 (GGG 40.3)
Diaphragm	NBR (nitrile rubber) with fabric reinforcement
Actuator shaft	1.4104 / 1.4006
Lever shaft	1.0570 / 1.0601
Compression spring	1.8159
Bushings	PTFE
O-ring	Viton
Coating	Priming and wet painting / Two-component polyurethane, grey beige, RAL 1019

Table 4: *Torques*

Type	Supply air	2.5 bar	3 bar	3.5 bar	4 bar	4.5 bar	5 bar	5.5 bar	6 bar
	Spring (1=3.5 / 2=6):	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**2**
Size 0	Md Air min. [Nm]:	16	21	27	24	29	34	42	52
	Md Air max. [Nm]:	40	46	53	65	72	77	86	97
	Md Spring min. [Nm]:	15	21	25	24	29	34	36	36
	Md Spring max. [Nm]:	34	39	43	56	60	65	67	67
Size 1	Md Air min. [Nm]:	40	57	76	56	67	83	101	120
	Md Air max. [Nm]:	95	120	147	160	176	198	225	252
	Md Spring min. [Nm]:	40	42	42	56	67	72	72	72
	Md Spring max. [Nm]:	60	61	61	105	114	117	117	117
Size 2	Md Air min. [Nm]:	59	77	95	84	102	121	139	170
	Md Air max. [Nm]:	155	179	204	259	282	307	331	373
	Md Spring min. [Nm]:	59	77	95	83	102	121	139	139
	Md Spring max. [Nm]:	111	125	139	188	204	218	233	233
Size 3	Md Air min. [Nm]:	129	173	233	160	197	234	269	306
	Md Air max. [Nm]:	291	353	437	510	557	605	652	703
	Md Spring min. [Nm]:	128	149	149	160	197	233	269	302
	Md Spring max. [Nm]:	201	219	219	373	402	431	460	487
Size 4	Md Air min. [Nm]:	249	319	389	380	451	521	592	705
	Md Air max. [Nm]:	595	694	792	972	1068	1167	1265	1426
	Md Spring min. [Nm]:	249	319	389	379	451	521	592	600
	Md Spring max. [Nm]:	417	473	529	689	747	803	858	865
Size 5	Md Air min. [Nm]:	570	734	894	798	966	1131	1294	1458
	Md Air max. [Nm]:	1398	1629	1862	2352	2578	2807	3037	3268
	Md Spring min. [Nm]:	570	733	894	798	966	1130	1294	1457
	Md Spring max. [Nm]:	892	1013	1132	1546	1671	1794	1915	2037
Size 6	Md Air min. [Nm]:	926	1235	1536	1601	1904	2205	2502	3011
	Md Air max. [Nm]:	2464	2834	3211	3825	4199	4577	4957	5619
	Md Spring min. [Nm]:	926	1235	1535	1600	1903	2204	2502	2518
	Md Spring max. [Nm]:	2147	2427	2700	3294	3570	3842	4112	4127

Torque characteristic curves:

The progression of the torques is determined by the lifting geometry. A typical example is shown in Fig. 4.

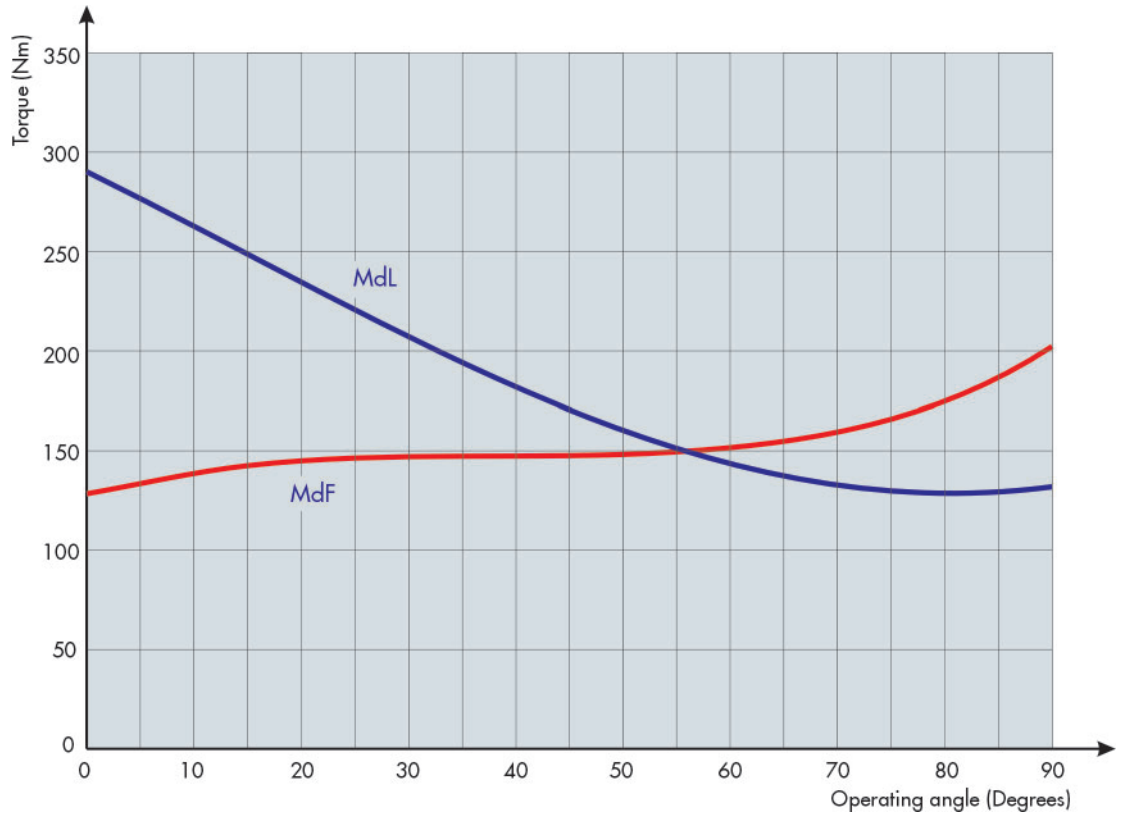

Fig. 3: *Example for torque characteristic for actuator size 3 with spring 1 at 2.5 bar supply air*

Table 5: *Max. transferable torques at DIN EN ISO 5211 connection*

Size	0	1	2	3	4	5	6
Md max. DIN EN ISO 5211 connection	115	217	553	1278	4748	4748	8732

Maximum transferable torques of DIN EN ISO connection on using bolts made of A2-70 (yield strength: 450 Nm/mm2)

Table 6: *Air volume:*

Size	0	1	2	3	4	5	6
Effective diaphragm area [cm²]	60	105	125	240	470	780	1300
Rated travel [mm]	55	60	90			120	
Travel volume at rated travel [dm³]	0.33	0.63	1.13	2.16	4.23	9.36	15.6

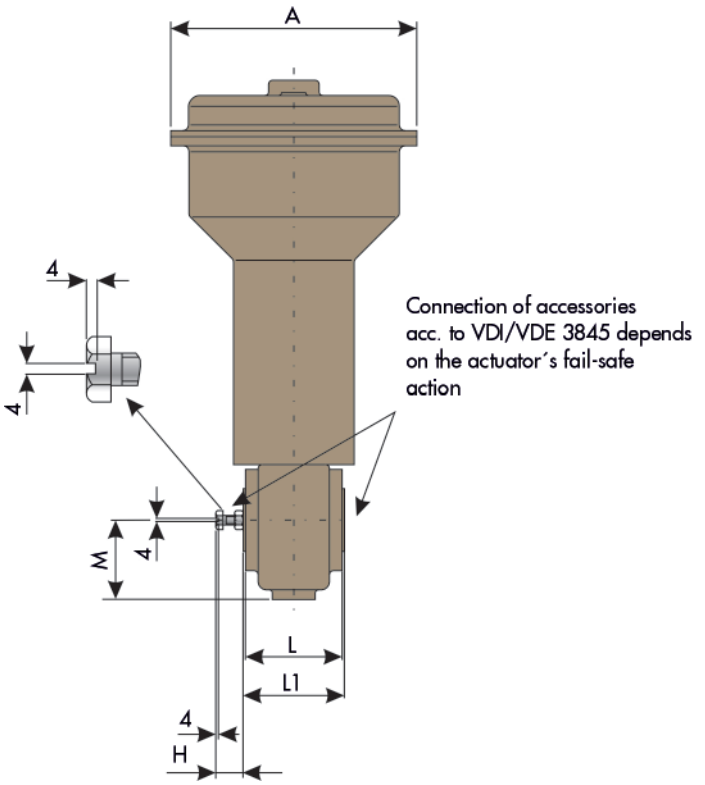

Fig. 4: *Dimensional drawing*

Table 7: *Dimensions in mm and weights in kg*

Size	0	1	2	3	4	5	6
Ø A	134	175	189	240	333	410	510
Ø B	90	114	120	150	198	244	250
C	364	453	550	570	706	989	1128
L	94	94	126	126	148	152	190
L1	100	100	132	132	156	160	200
L2	75	75	100	100	145	130	165
L3	40	40	56	56	64	80	90
M	60	76	95	95	104	145	145
a	G 1/4	G 1/4	G 1/4	G 1/4	G 3/8	G 1/2	G 1/2
SW	11	14	17	22	36	36	46
DIN 5211	F04	F05	F07	F10	F14	F14	F16
F	80	80	80	130	130	130	80
G	30	30	30	30	30	30	30
H	30	30	30	50	50	50	30
VDI/VDE	AA2	AA2	AA2	AA4	AA4	AA4	AA2
Weight in kg	10	16	22	30	70	120	190

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