

FELLBACH®

The principle of the double acting actuator

If the port '2' is under pressure and port '4' evacuated, the both pistons are moving into the endpositions and a turning of the drive shaft is the result (a turning of the drive shaft in its opposite is possible through a turned mounting of the pistons -> type DL).

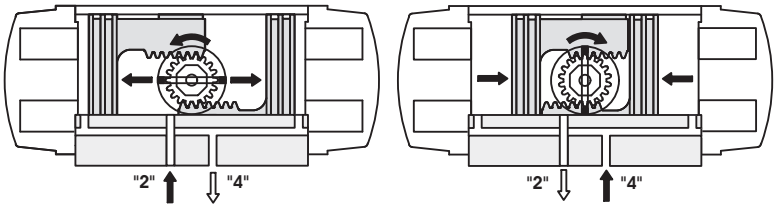


Fig. DR02: Top view and principle of a double acting actuator under pressure

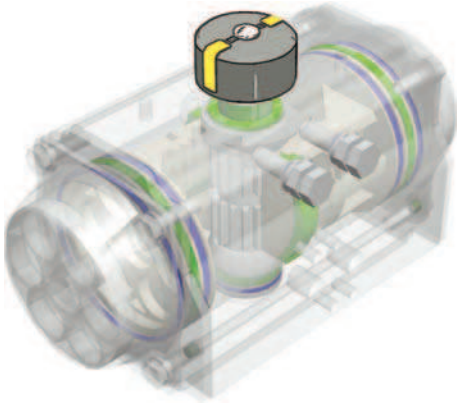


Fig. DR01:
Principle of a doubleacting actuator

If the port '4' is under pressure and the port '2' evacuated, the pistons are moving into the middle position. This also has as result a turning of the drive shaft (a turning of the drive shaft in its opposite is possible through a turned mounting of the pistons).

With rack and pinion construction the output torque of an actuator is obtained by multiplying the piston force (given by air supply pressure) by the pitch shaft radius (lever arm) as shown in fig. DR03 less the force lost for friction (efficiency). Because of this concept, the output torque is linear as shown in the diagram DR04 in both clockwise and counterclockwise rotation.
The suggested safety factor for double acting actuators in normal working conditions is 15-20%.

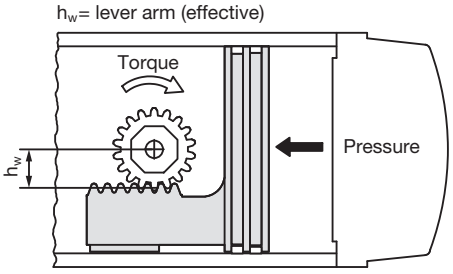


Fig. DR03: Top view of a double acting actuator under pressure

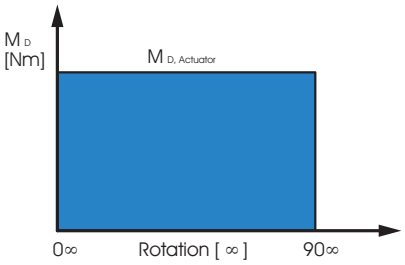


Fig. DR04: Principle of the torque (double acting)

Sizing example for double-acting actuator (data see datasheet):

Published butterfly valve torque	= 40 Nm
Safety factor	= 40 Nm + 20 % = 48 Nm
Air supply pressure available	= 5 bar

The double acting DR Series actuator that produces a minimum of 48 Nm at 5 bar is the DR60.

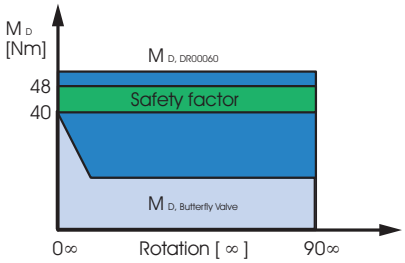


Fig. DR05:
Principle of the sizing a double-acting actuator

Protection and Serviceability

Representation	Type	Part and Protection				suitable for
		Body	End Caps	Drive Shaft	Pistons	
	**A**	ALODUR	chromatized and polyester coated	carbon steel ENP	normal anodized	general service
	Coating Colour	30 - 35 µm bright S.S.	80 - 90 µm S.S. Ral 9007	25 - 30 µm	15 - 20 µm black	
	**B**	ALODUR + PTFE coating	chromatized and polyester coated	carbon steel ENP	normal anodized	general service, acid or basic solutions in low concentration
	Coating Colour	30-35/25-30 µm light grey	80 - 90 µm S.S. Ral 9007	25 - 30 µm	15 - 20 µm black	
	**D**	ALODUR +PTFE coating	chromatized and PTFE coating	carbon steel ENP	normal anodized	aggressive environment, acid or basic solutions
	Coating Colour	30-35/25-30 µm light grey	80 - 90 µm light grey	25 - 30 µm	15 - 20 µm black	
	**E**	ALODUR +PTFE coating	chromatized and PTFE coating	stainless steel	normal anodized	acid or basic solutions, seawater
	Coating Colour	30-35/25-30 µm light grey	80 - 90 µm light grey		15 - 20 µm black	
	**P**	ALODUR	resin impregnated + hard anodized	carbon steel ENP	normal anodized	acid or basic solutions, seawater
	Coating Colour	30-35 µm bright S.S.	30 - 35 µm bright S.S.	25 - 30 µm	15 - 20 µm black	
	**EC**	ALODUR+ EPOXY	chromatiert + EPOXY	Edelstahl	normal anodized	general service, acid or basic solutions in low concentration
	Coating Colour	80-95 µm blue grey	80 - 95 µm blue grey		15 - 20 µm black	

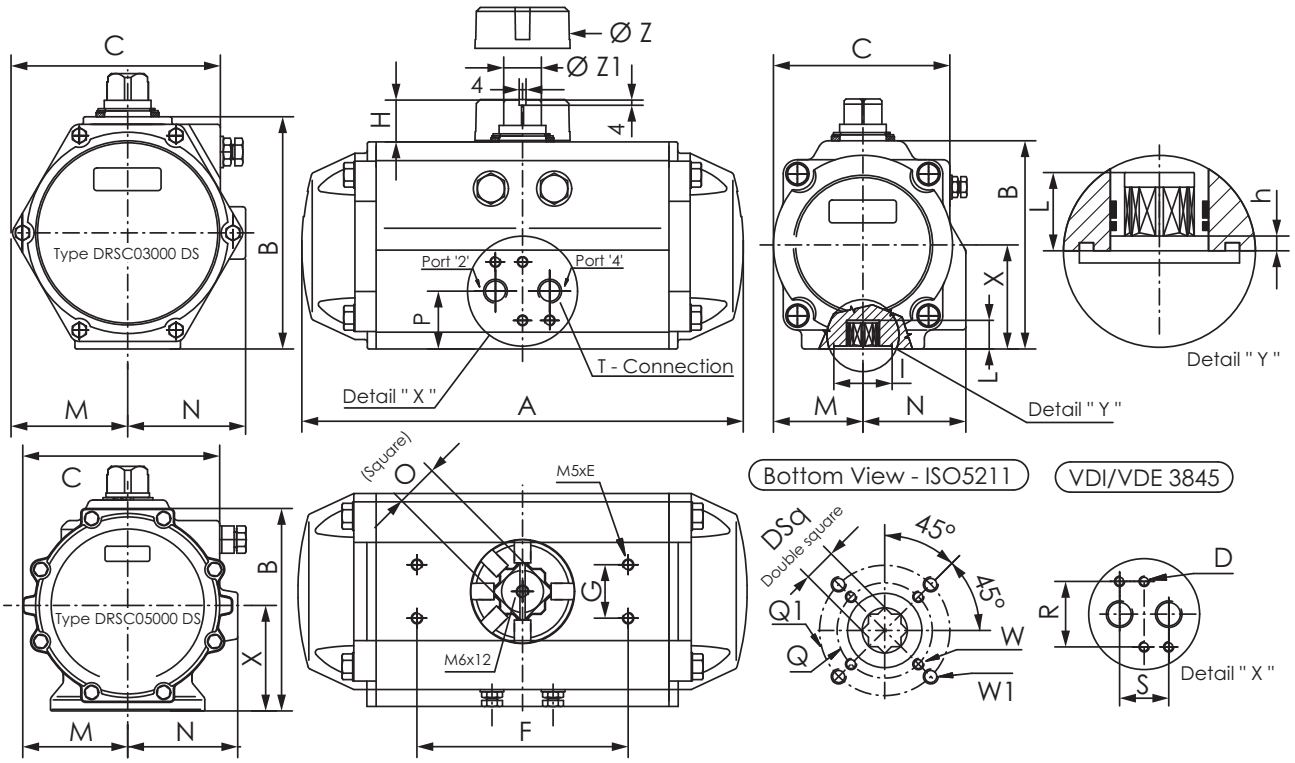
DR/SC05000 only available in protection A or P

conditions of usage

air supply	temperature range according to design		max. press.	turning range ±4° adjustable
filtered, lubricated or dry air, non corrosive media, Dp -20°C (Dew Point) (Dp min. 10°C < T area), particle size < 30 µm	standard	-20°C bis +80°C	8 bar	90° 120°-135°-180° a.A.
	low temperature	-40°C bis +80°C		
	high temperature	-15°C bis +150°C		

DR	output torque for double acting actuators												
	2,5bar	3bar	3,5bar	4bar	4,2 bar	4,5bar	5bar	5,5bar	6bar	6,5bar	7bar	7,5bar	8bar
00006	3,0	3.6	4.2	4.8	5.1	5.4	6.1	6.7	7.3	7.9	8.5	9.1	9.7
00015	8.3	10	11.6	13.3	14	15	16.6	18.3	19.9	21.6	23.3	24.9	26.6
00030	14.7	17.6	20.5	23.5	24.6	26.4	29.3	32	35.2	38.1	41	44	46.9
00060	29.1	34.9	40.7	46.5	48.9	52.4	58.2	64	69.8	75.6	81.4	87.3	93.1
00100	45.8	54.9	64.1	73.2	76.9	82.4	91.5	101	110	120	128	138	146
00150	66.5	79.8	93.1	106	112	120	133	146	160	173	186	199	213
00220	107	129	150	172	181	193	215	236	258	279	301	322	344
00300	138	166	194	222	233	249	277	305	332	360	388	415	443
00450	217	261	304	348	365	391	435	478	522	565	609	652	696
00600	284	340	397	454	477	511	567	624	681	737	794	851	908
00900	383	459	536	613	643	689	766	**842**	919	996	1072	1149	1225
01200	532	638	745	851	893	957	1064	1170	1276	1383	1489	1595	1702
02000	893	1072	1251	1430	1501	1608	1787	1966	2144	2318	2502	2684	2859
03000	1297	1556	1815	2075	2179	2334	2594	2853	3112	3372	3631	3890	4150
05000	2252	2703	3153	3604	3784	4054	4504	4955	5405	5855	6306		
10000	4169	5003	5837	6671	7005	7505	8339	9173	10007	10841	11674		

example of layout DR900 at 5,5bar air supply -> 842Nm output torque



Type	00015	00030	00060	00100	00150	00220	00300	00450	00600	00900	01200	02000	03000	05000	10000
	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC	DR/SC
ISO Flange	(F03) F04	F05-07	F05-07	F05-07	F07-10	F07-10	F07-10	F10-12	F10-12	(F12) F14	(F12) F14	(F14) F16	(F14) F16	(F16) F25	(F25) F30
ISO Flange*	F03	F05	F05	F07	F07	F10	F10	F12	F12	F14	F14	F16	F16	F25	F30
DSQ	(9) 11	(11) 14	14 (17)	17	17 (22)	22	22 (27)	27	27	(27) 36	(27) 36	(36) 46	(36) 46	(46) 55	(55) 75
T-ISO228	1/8"	1/8"	1/8"	1/8"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	3/8"	1/2"	1/2"	1/2"
A	140.5	158.5	210.5	247.5	268.5	315	345	408.5	437.5	487	543	621	728	876	856
B	69	85	102	115	127	145	157	177	196	220.5	245	298.5	330	410	525
C	59	72	84.5	97.5	111	127	136	156.5	169	190.7	213	251	298.5	383	515**
D	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M6x10	M6x10	M6x10	M6x10
E	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8
F	80	80	80	80	80	80	80	80	80	130	130	130	130	130	200
G	30	30	30	30	30	30	30	30	30	30	30	30	30	30	50
H	20	20	20	20	20	30	30	30	30	50	50	50	50	50	80
I	(25) 30	(30) 35	35	55	55	70	70	85	85	100	100	130	130	200	230
L min	12	16	16	19	19	24	24	29	29	38	38	48	48	57	77
M	29	36	42.5	49.5	56	64	69.5	80	88	99	110	131	163.5	204	-
N	41.5	47	52	56.8	67	77	82	91.5	99	105	112	131	166	214	-
O	11	11	17	17	17	27	27	27	27	36	36	36	36	36	36
P	26.5	30	30.5	32.5	37.5	42.5	45	47	52	58	62	78.5	165	185	185
Q*	(36) 42	(42) **50**	**50**	50	**70**	70	70	102	102	140	140	165	165	254	298
Q1*	-	-	70	**70**	102	**102**	**102**	**125**	**125**	-	-	-	-	-	-
R	32	32	32	32	32	32	32	32	32	32	32	45	45	45	45
S	24	24	24	24	24	24	24	24	24	24	24	40	40	40	40
W*	M5	(M5) **M6**	**M6**	M6	**M8**	M8	M8	M10	M10	M16	M16	M20	M20	8xM16	8xM20
W1*	-	-	M8	**M8**	M10	**M10**	**M10**	**M12**	**M12**	-	-	-	-	-	-
ø d f8 (A)	30	35	35	55	55	70	70	85	85	100	100	130	130	200	230
h1 max(A)	2	3	3	3	3	3	3	3	3	4	4	5	5	5	5
h min	0.5	0.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2.5	2.5	2.5	2.5
ø Z 1	13.5	13.5	21	21	21	35	35	35	35	46	46	46	46	46	46
ø Z	40	40	40	40	40	56 (65)	56 (65)	65	65	80 (115)	(80) 115	115	115	115	115

* Protection C, D, E, P only one flange (bold printed); (A) and data in brackets -> on request;