





DS series

DS

STANDARD SOLUTION

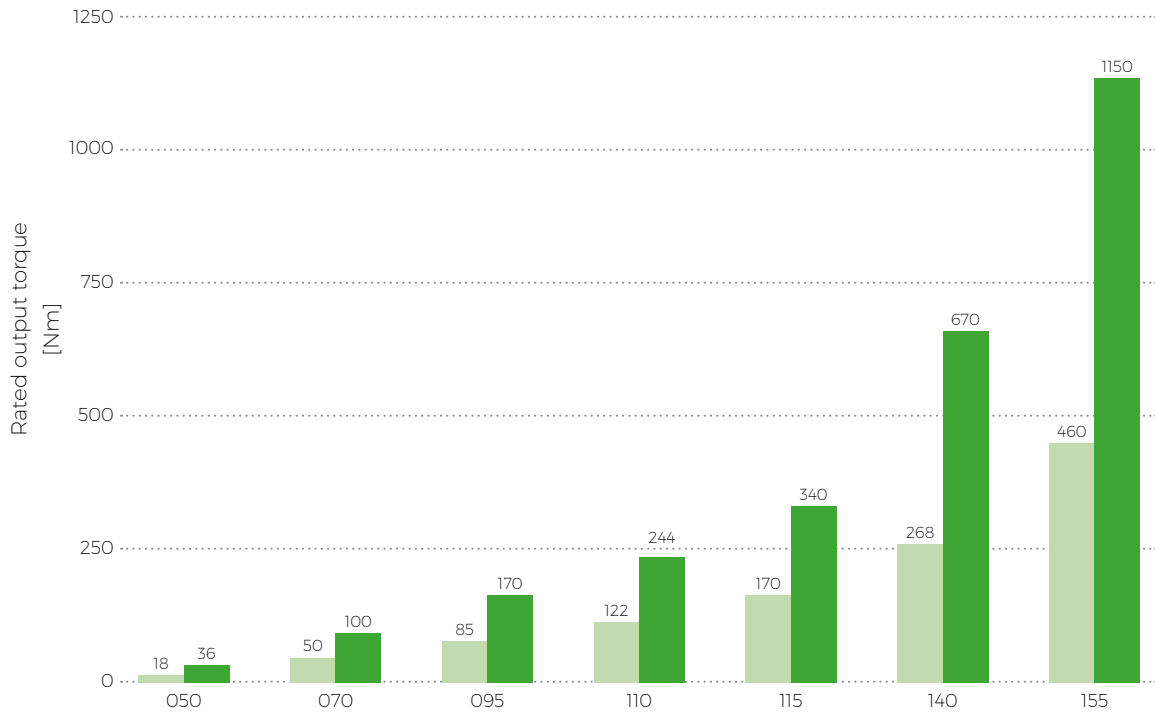
8.1 DS series



Advantages

- low lost motion
- low moment of inertia
- high reduction ratio
- high kinematic accuracy
- high moment overload capacity
- high capacity of the integrated radial-axial output bearings
- high dynamic performance

The **DriveSpin® DS** electric rotary actuators, as the basic type of actuators, provide rotary motion and transfer output torque with high radial-axial load capacity, and are the most accurate and precise solution in their category. The DS actuators are characterized by high dynamics, high flexible drive solution, guaranteed by an AC servomotor, and high robustness and overload capacity of TwinSpin® reduction gear. DriveSpin® high variability of voltage, brake feedback and electrical connections will satisfy customer requirements in many cases. Rated output torque range of the DS is from 18 Nm to 460 Nm.

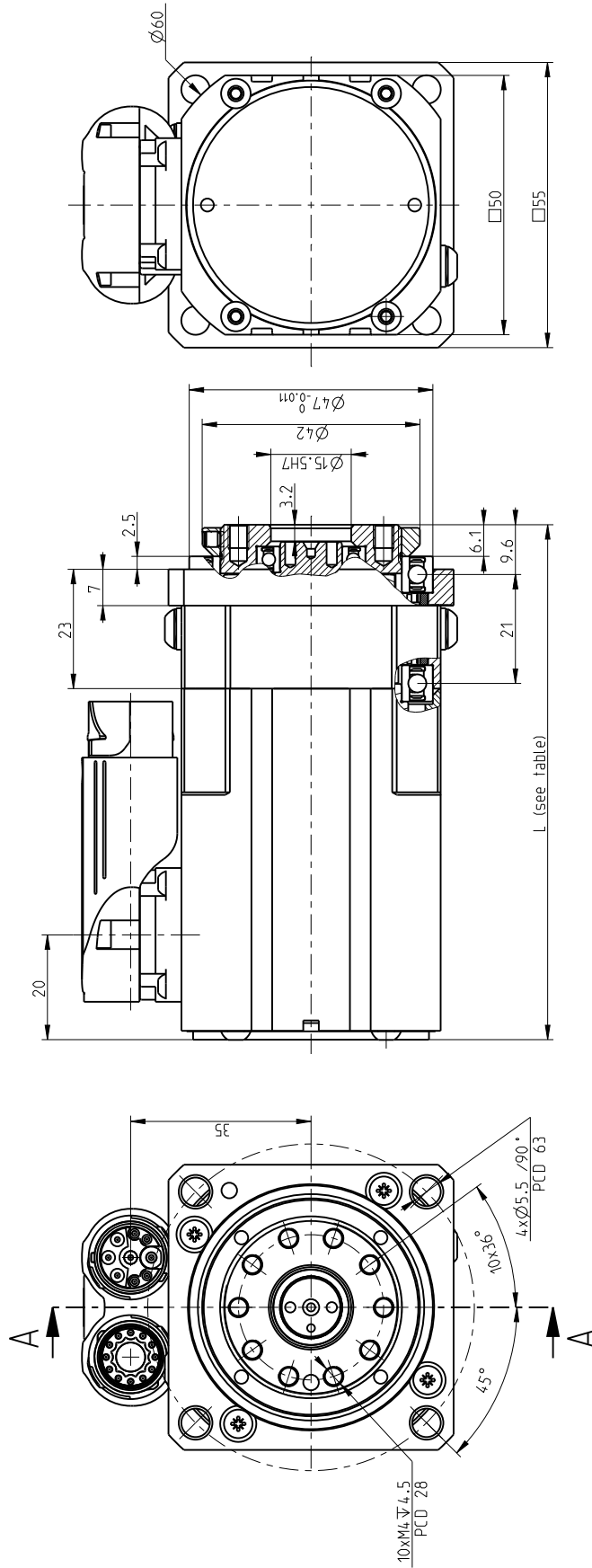


DS

Tab. 8.1.a: Rated output torque

Size		050	070	095	110	115	140	155
Rated output torque	T_R [Nm]	18	50	85	122	170	268	460
Acceleration/braking output torque	T_{acc} [Nm]	36	100	170	244	340	670	1150

DS 050 - i - abcde-fg-xy

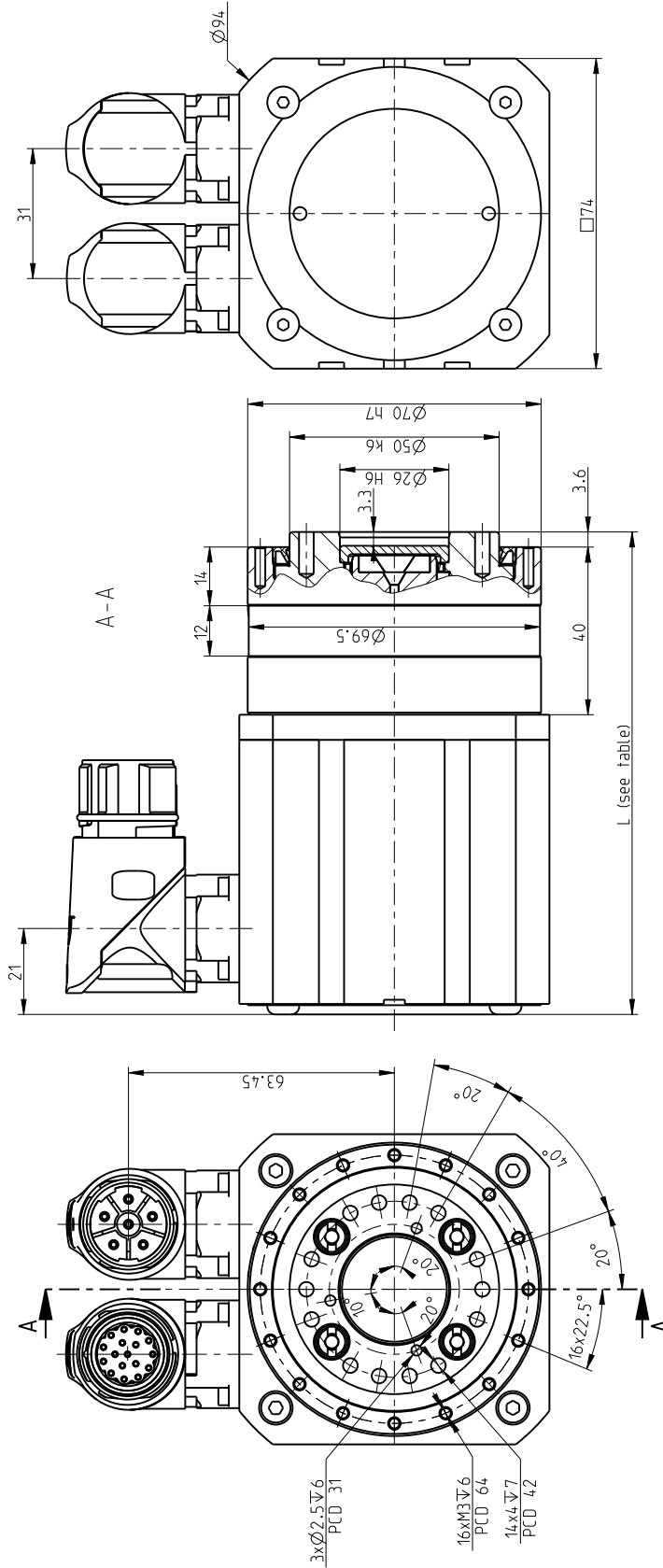


Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg] *	Dimension L ± 0.5 [mm]	Weight m [kg] *
DS 050	OA	99	0.9	135	1.4
	OB,OC	107	1.2	138	1.4
	OD,DE	106	1.2	133	1.3
	OG	130	1.2	-	-
	OK,OL	144	1.2	155	1.4

DS 050 - i - abcde-fg-xy

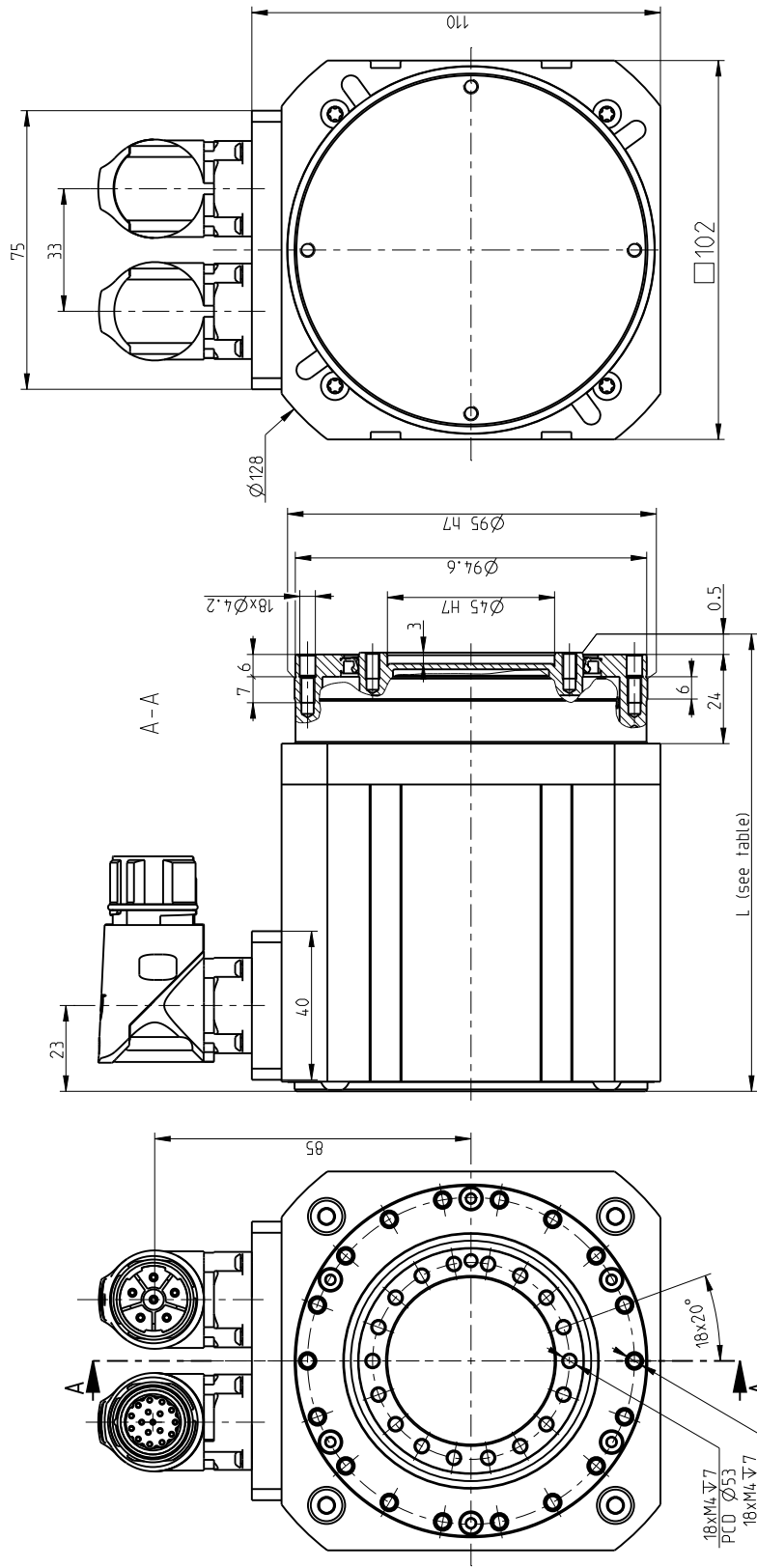
DS 070 - i - abcde-fg-xy

DS 070 - i - abcde-fg-xy



Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg]	Dimension L ± 0.5 [mm]	Weight m [kg]
DS 070	OA	115	2.3	194	3.4
	OB,OC	137	2.4	178	3.4
	OD,OE	148	2.6	195	3.5
	OH	148	2.6	195	3.5
	OP,OQ	-	-	137	2.4

DS 095 - i - abcde-fg-xy

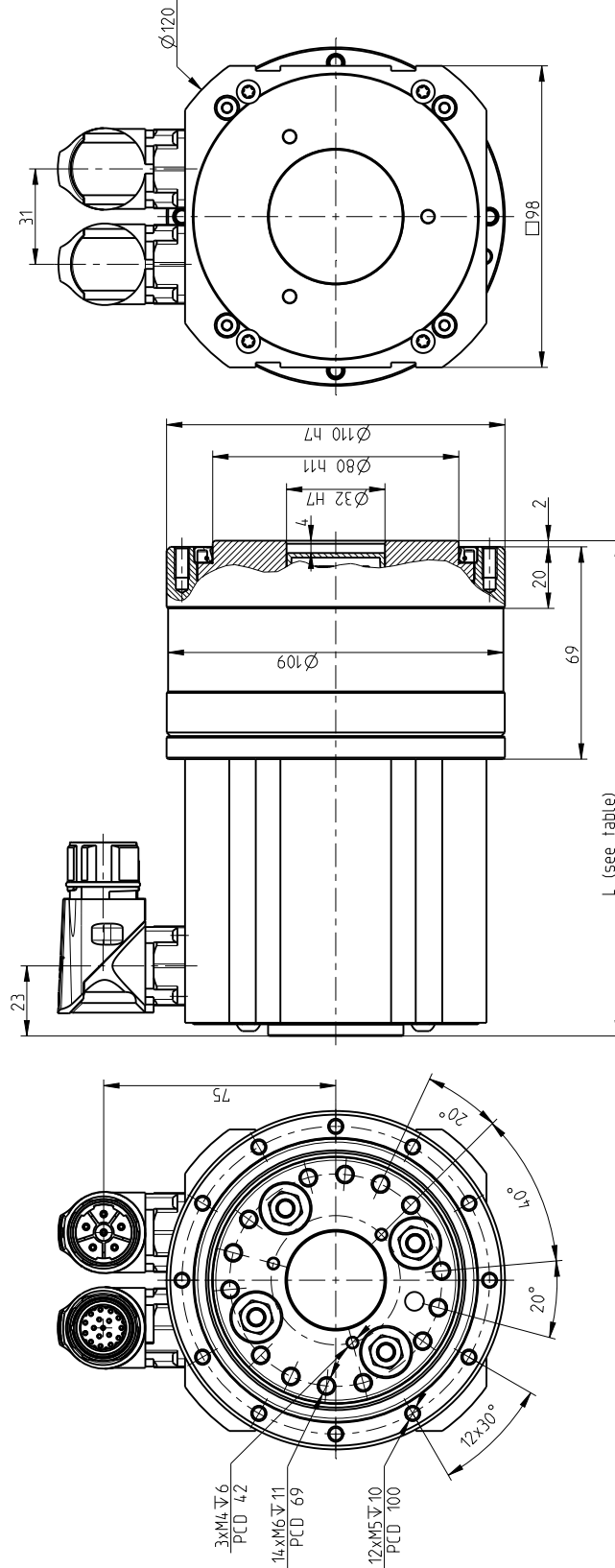


Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg] •	Dimension L ± 0.5 [mm]	Weight m [kg] •
DS 095	OA	118	4.9	138	5.8
	OH	146	5.4	161	6.2
	OB, OC	139	5.2	149	5.9
	OD, OE	127	5.0	141	5.8
	OG, OH, OF	146	5.4	161	6.2
	OD, OE	127	5.0	141	5.8
	OP, OQ	139	5.2	149	5.9
	OK, OL	139	5.2	149	5.9

DS 095 - i - abcde-fg-xy

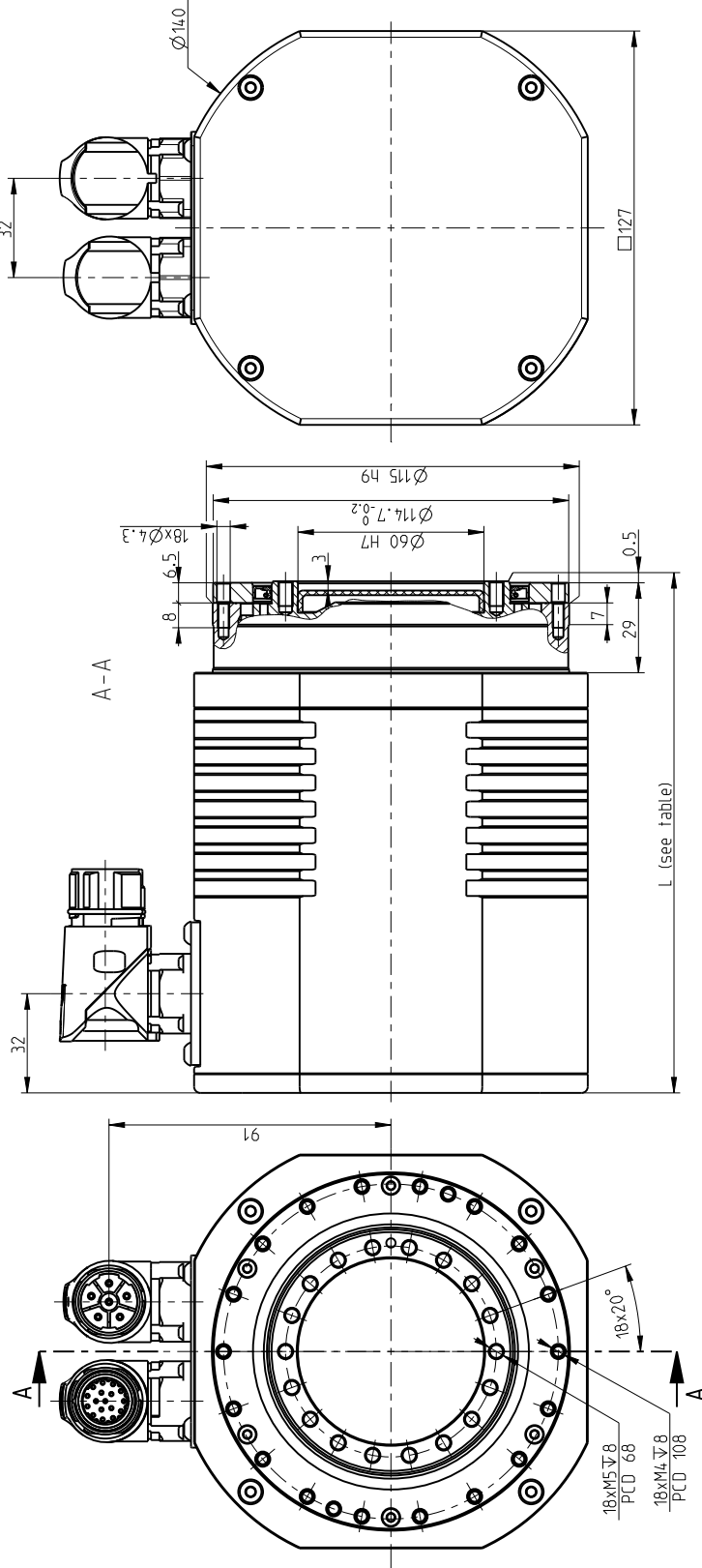
DS 110 - i - abcde-fg-xy

DS 110 - i - abcde-fg-xy



Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg]•	Dimension L ± 0.5 [mm]	Weight m [kg]•
DS 110	OA	161	8.2	213	9.1
	OB,OC	193	8.8	245	9.7
	OD,OE	202	8.6	242	9.6
	OH	202	8.6	242	9.6

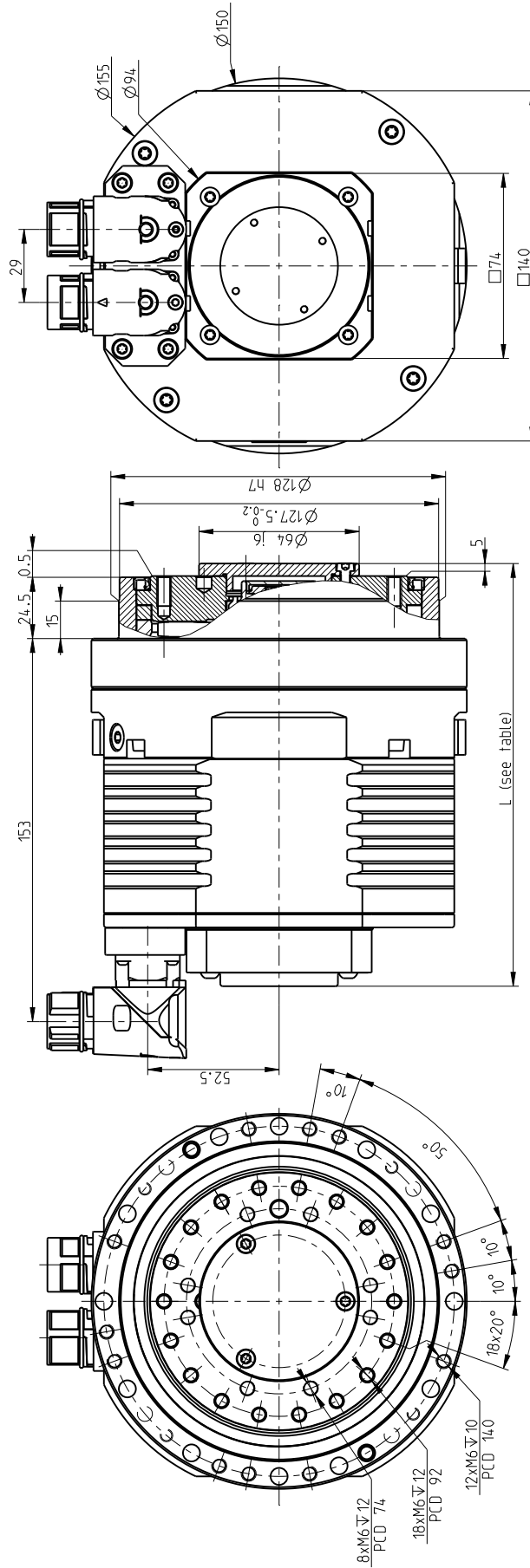
DS 115 - i - abcde-fg-xy



Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg]•	Dimension L ± 0.5 [mm]	Weight m [kg]•
DS115	OA	165	8.6	165	9.0
	OB,OC	165	8.6	165	9.0
	OD,OE	165	8.6	165	9.0
	OH	175	8.6	175	9.0
	OJ	165	8.6	165	9.0
	OK,OL	165	8.6	165	9.0
ON		165	8.6	165	9.0

DS 115 - i - abcde-fg-xy

DS 140 – i – abcde-fg-xy

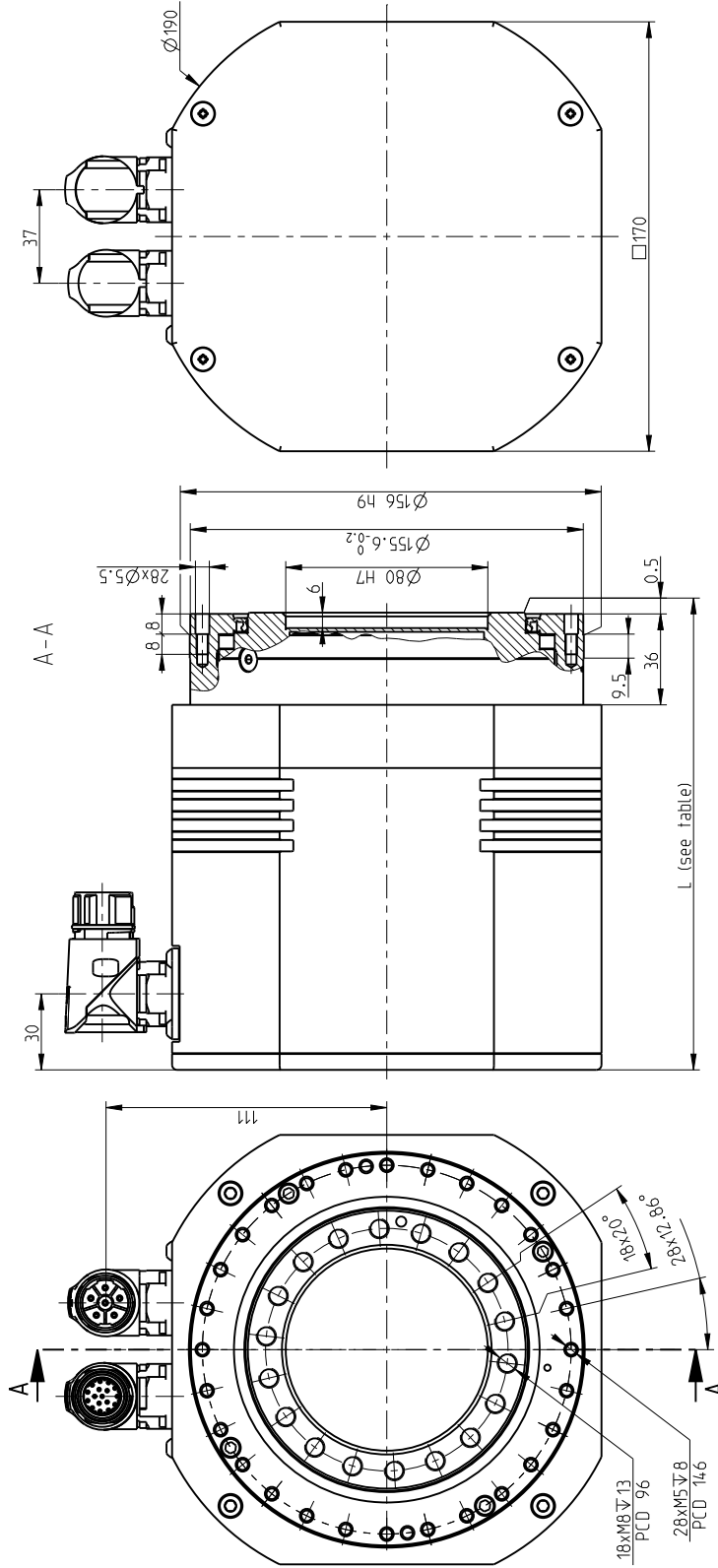


DS 140 - i - abcde-fg-xy

Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg]	Dimension L ± 0.5 [mm]	Weight m [kg]
DS 140	OA	148	11	181	12.1
	OB,OC	165	11	208	12.1
	OD,OE	165	11	208	12.1
	OH	199	11	226	12.1

DS

DS 155 - i - abcde-fg-xy



DS 155 - i - abcde-fg-xy

Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg]	Dimension L ± 0.5 [mm]	Weight m [kg]
DS 155	OA	181	14,2	181	16,2
	OB,OC	181	14,4	181	16,2
	OD,OE	181	14,4	181	16,2
	OH	181	14,7	181	16,5
	OK,OL	181	14,6	181	16,4
	ON	181	14,4	181	16,2



Tab. 8.1b: DS series technical data table

Reduction Gear parameters		Tolerance		DS 050		
Reduction ratio	i			63		
Rated output torque	T_R [Nm]			18		
Acceleration/braking output torque	T_{acc} [Nm]			36		
Rated input speed	n_i [rpm]			2 000		
Maximum allowable input speed ⁹⁾	n_{max} [rpm]			5 000		
Allowable moment ²⁾³⁾	M_{cmax} [Nm]			44		
Tilting stiffness ¹⁾⁶⁾	M_t [Nm/arcmin]			4		
Torsional stiffness ¹⁾⁷⁾	k_t [Nm/arcmin]			2.5		
Lost motion	LM [arcmin]			< 1.5		
Hysteresis	H [arcmin]			< 1.5		
Rated radial force ²⁾	F_{rR} [kN]			1.44 ⁸⁾		
Maximum axial force ²⁾⁴⁾	F_{amax} [kN]			1.9		
Gear lubrication				Grease Castrol TRIBOL GR TT 1 PD		
Reduction gear limit temperature	[°C]			60 °C		
Standard ambient temperature range	[°C]			-10 °C to +40 °C		
Motor parameters						
DC BUS voltage	U_{dc} [V _{dc}]	+/- 10%	24	320	560	
Motor rated speed	n_n [rpm]		3 500	3 500	3 500	
Motor rated torque	M_n [Nm]	+/- 10%	0.23	0.23	0.23	
Motor rated current	I_n [A _{rms}]		7.1	0.58	0.58	
Motor stall torque	M_o [Nm]	+/- 10%	0.24	0.24	0.24	
Motor stall current	I_o [A _{rms}]		7.4	0.6	0.6	
Motor peak torque	M_{max} [Nm]	+/- 10%	1	1	1	
Motor peak current	I_{max} [A]		30.8	2.5	2.5	
Motor back-EMF constant	K_E [V _{peak} /krpm]	+/- 10%	2.7	36	36	
Motor torque constant	K_T [Nm/A _{rms}]	+/- 10%	0.032	0.4	0.4	
Terminal resistance (L-L)	R_{2ph} [Ω]	+/- 10%	0.2	36	36	
Terminal inductance (L-L)	L_{2ph} [mH]	+/- 20%	0.2	36	36	
Number of poles	2p		6	6	6	
Electromagnetic brake DC supply	[V _{dc}]		24. Special			
Electromagnetic brake torque at input	[Nm]		0.4			
Protection class			IP 64			
Motor Insulation class			F			
Paint			RAL 9005			
Motor number of phases			3			
Motor type of connection			Y(star-configuration)			

1) Mean statistical value

2) Load at output speed 32 rpm for size 050, other sizes at 15 rpm

3) Moment M_c max at $F_a=0$. If $F_a \neq 0$ see Glossary

4) Axial force F_a max for $M_c=0$ (In case of size 050 also $F_r=0$ condition has to be fulfilled). If $M_c \neq 0$ see Glossary

5) 3 900 rpm for ratio 67 ; 4 500 rpm for ratios 89, 119

6) The parameter depends on the high precision reduction gear version.

7) The parameter depends on the version, ratio and lost motion of the high precision reduction gear.

8) For size 050 it is value of MAXIMUM RADIAL FORCE F_{rmax} for $a_2=0$; $F_a=0$ and at 32 rpm output speed. For $a_2>0$; $F_a=0$ at 32 rpm output speed

$F_{rmax} = 0.044/(a_2+0.0305)$ [kN]. a_2 represents the distance of the radial force centre from the front of the output flange in meters see Glossary.

9) Instantaneous speed peak that may occur within the working cycle. Note please the temperature on the gear case that should not significantly exceed 60°C

10) 4 500 rpm for ratio 73 ; 4 800 rpm for ratio 95

11) 4 000 rpm for ratio 55 ; 4 500 rpm for ratio 103

12) 3 400 rpm for ratio 63 ; 3 800 rpm for ratio 109 ; 4 200 rpm for ratio 133

Tab. 8.1b: DS series technical data table - continued

DS 070			DS 095			DS 110		
57, 75			73, 95			67, 89, 119		
50			85			122		
100			170			244		
2 000			2 000			2 000		
5 000			4 500 / 4 800 ¹⁰⁾			3 900 / 4 500 ⁵⁾		
142			410			740		
35			120			150		
7			15			22		
< 1.5			< 1			< 1		
< 1.5			< 1			< 1		
2.8			3.5			9.3		
4.1			11.1			13.1		
Grease Castrol TRIBOL GR TT 1 PD			Grease Castrol TRIBOL GR TT 1 PD			Grease Castrol TRIBOL GR TT 1 PD		
60 °C			60 °C			60 °C		
-10 °C to +40 °C			-10 °C to +40 °C			-10 °C to +40 °C		
24	320	560	24	320	560	24	320	560
2 500	4 500	4 500	4 000	4 000	4 000	2 500	3 000	3 000
0.88	0.76	0.76	1.4	1.4	1.4	3.4	3.2	3.2
13	1.2	0.7	27	5.6	3.1	37	4.9	2.8
0.9	0.9	0.9	1.6	1.6	1.6	3.8	3.8	3.8
13.3	1.42	0.83	31	6.4	3.5	41	6	3
3	3	3	5.5	5.5	5.5	11	11	11
44.3	4.7	2.8	106.1	22	12.1	120	17	10
5.7	68.3	105.6	4.4	25	47	8	57	103
0.0677	0.63	1.09	0.052	0.25	0.46	0.09	0.65	1.14
0.13	17	40.5	0.052	1.2	4.36	0.027	1.4	4.5
0.25	34.4	87	0.11	2.84	8.71	0.15	7.4	24
10	10	10	10	10	10	10	10	10
24. Special			24. Special			24. Special		
4.5			2			4.5		
IP 64			IP 64			IP 64		
F			F			F		
RAL 9005			RAL 9005			RAL 9005		
3			3			3		
Y(star-configuration)			Y(star-configuration)			Y(star-configuration)		

IMPORTANT NOTES:

- Load values in the table are valid for the nominal life of $L_{10} = 6\,000$ hours. Service life for average torque T_a and average speed n_a other than T_p, n_p can be calculated. Please contact manufacturer with estimated duty cycle.
- High precision reduction gears are preferred for intermittent duty cycles (S3-S8): the output speed in applications is an inverted variable. The S1 continuous duty cycle should to be consulted with manufacturer
- Please consult maximum speed in duty cycle with the manufacturer
- The values in the table refer to ambient temperature within 20 °C - 25 °C
- For ambient temperatures lower than -10 °C pre-heating might be considered - please consult manufacturer

Tab. 8.1b: DS series technical data table - continued

Reduction Gear parameters		Tolerance		DS 115		
Reduction ratio	i			55, 103		
Rated output torque	T_R [Nm]			170		
Acceleration/braking output torque	T_{acc} [Nm]			340		
Rated input speed	n_i [rpm]			2 000		
Maximum allowable input speed ⁹⁾	n_{max} [rpm]			4 000 / 4 500 ¹¹⁾		
Allowable moment ²⁾³⁾	M_{cmax} [Nm]			550		
Tilting stiffness ¹⁾⁶⁾	M_t [Nm/arcmin]			220		
Torsional stiffness ¹⁾⁷⁾	k_t [Nm/arcmin]			32		
Lost motion	LM [arcmin]			< 0.5		
Hysteresis	H [arcmin]			< 1		
Rated radial force ²⁾	F_{rR} [kN]			4		
Maximum axial force ²⁾⁴⁾	F_{amax} [kN]			12		
Gear lubrication				Grease Castrol TRIBOL GR TT 1 PD		
Reduction gear limit temperature	[°C]			60 °C		
Standard ambient temperature range	[°C]			-10 °C to +40 °C		
Motor parameters						
DC BUS voltage	U_{dc} [V _{dc}]	+/- 10%	24	320	560	
Motor rated speed	n_n [rpm]		3 000	4 000	4 000	
Motor rated torque	M_n [Nm]	+/- 10%	4	4	4	
Motor rated current	I_n [A _{rms}]		84	6.33	3.8	
Motor stall torque	M_o [Nm]	+/- 10%	4	4	4	
Motor stall current	I_o [A _{rms}]		84	6.33	3.8	
Motor peak torque	M_{max} [Nm]	+/- 10%	10	10	10	
Motor peak current	I_{max} [A]		231	15.82	10.45	
Motor back-EMF constant	K_E [V _{peak} /krpm]	+/- 10%	4.1	54.1	93.3	
Motor torque constant	K_T [Nm/A _{rms}]	+/- 10%	0.05	0.63	1.05	
Terminal resistance (L-L)	R_{2ph} [Ω]	+/- 10%	0.011	0.83	2.3	
Terminal inductance (L-L)	L_{2ph} [mH]	+/- 20%	0.02	3.65	10.5	
Number of poles	2p		10	10	10	
Electromagnetic brake DC supply	[V _{dc}]			24, Special		
Electromagnetic brake torque at input	[Nm]			4.5		
Protection class				IP 64		
Motor Insulation class				F		
Paint				RAL 9005		
Motor number of phases				3		
Motor type of connection				Y(star-configuration)		

1) Mean statistical value

2) Load at output speed 32 rpm for size 050, other sizes at 15 rpm

3) Moment M_c max at $F_a=0$. If $F_a \neq 0$ see Glossary

4) Axial force F_a max for $M_c=0$ (In case of size 050 also $F_r=0$ condition has to be fulfilled). If $M_c \neq 0$ see Glossary

5) 3 900 rpm for ratio 67 ; 4 500 rpm for ratios 89, 119

6) The parameter depends on the version of high precision reduction gear.

7) The parameter depends on the version, ratio and lost motion of the high precision reduction gear.

8) For size 050 this is value of MAXIMUM RADIAL FORCE $F_{r,max}$ for $a_2=0$; $F_a=0$ and at 32 rpm output speed. For $a_2>0$; $F_a=0$ at 32 rpm output speed
 $F_{r,max} = 0.044/(a_2+0.0305)$ [kN]. a_2 represents the distance of the radial force centre from the front of the output flange in meters see Glossary.

9) Instantaneous speed peak that may occur within the working cycle. Note please the temperature on the gear case that should not exceed significantly 60°C

10) 4 500 rpm for ratio 73 ; 4 800 rpm for ratio 95

11) 4 000 rpm for ratio 55 ; 4 500 rpm for ratio 103

12) 3 400 rpm for ratio 63 ; 3 800 rpm for ratio 109 ; 4 200 rpm for ratio 133

Tab. 8.1b: DS series technical data table - continued

DS 140			DS 155		
69, 115			63, 109, 133		
268			460		
670			1 150		
2 000			2 000		
4 500			3 400 / 3 800 / 4 200 ¹²⁾		
1 160			1 640		
380			900		
62			87		
< 1			< 0.5		
< 1			< 1		
11.5			8.3		
17			26		
Grease Castrol TRIBOL GR TT 1 PD			Grease Castrol TRIBOL GR TT 1 PD		
60 °C			60 °C		
-10 °C to +40 °C			-10 °C to +40 °C		
24	320	560	24	320	560
4 000	4 000	4 000	On request	4 000	4 000
4	4	4		5	5
74.1	5.6	3.2		10	6
4.5	4.5	4.5		11	11
83.3	6.3	3.6		21.9	13.5
13.5	13.5	13.5		23	23
250	18.8	11		45.9	27.6
4.76	63	111		44	77
0.054	0.72	1.26		0.5	0.83
0.0055	1	3		0.15	0.4
0.04	7	22		0.57	1.7
10	10	10	24	24	
24. Special			24. Special		
4.5			12		
IP 64			IP 64		
F			F		
RAL 9005			RAL 9005		
3			3		
Y(star-configuration)			Y(star-configuration)		

IMPORTANT NOTES:

- Load values in the table are valid for the nominal life of $L_{10} = 6\,000$ hours. Service life for average torque T_a and average speed n_a other than T_p, n_p can be calculated. Please contact manufacturer with estimated duty cycle.
- High precision reduction gears are preferred for intermittent duty cycles (S3-S8): the output speed in applications is an inverted variable. The S1 continuous duty cycle should to be consulted with manufacturer
- Please consult maximum speed in duty cycle with the manufacturer
- The values in the table refer to ambient temperature within 20°C - 25°C
- For ambient temperatures lower than -10°C pre-heating might be considered - please consult manufacturer

Tab. 8.1c: Inertia at input (DS actuator without brake)

Feedback type (d)	$J_{w/o\ brake}$	DS 050	DS 070	DS 095	DS 110	DS 115	DS 140	DS 155
OA	10 ⁻⁴ kgm ²	0.080	0.509	1.657	1.825	5.803	5.745	16.069
OB	10 ⁻⁴ kgm ²	0.061	0.488	1.646	1.814	5.784	5.736	16.039
OC	10 ⁻⁴ kgm ²	0.061	0.488	1.646	1.814	5.784	5.736	16.039
OD	10 ⁻⁴ kgm ²	0.062	0.504	1.640	1.830	5.780	5.728	16.085
OE	10 ⁻⁴ kgm ²	0.062	0.504	1.640	1.830	5.780	5.728	16.085
OF	10 ⁻⁴ kgm ²	-	-	1.661	-	-	-	-
OG	10 ⁻⁴ kgm ²	0.061	-	1.661	-	-	-	-
OH	10 ⁻⁴ kgm ²	-	0.504	1.661	1.830	5.903	5.770	16.085
OJ	10 ⁻⁴ kgm ²	-	-	-	-	5.903	-	-
OK	10 ⁻⁴ kgm ²	0.060	-	1.640	-	5.788	-	16.039
OL	10 ⁻⁴ kgm ²	0.060	-	1.640	-	5.788	-	16.039
ON	10 ⁻⁴ kgm ²	-	-	-	-	5.795	-	16.082
OP	10 ⁻⁴ kgm ²	-	0.484	1.640	-	-	-	-
OQ	10 ⁻⁴ kgm ²	-	0.484	1.640	-	-	-	-
OR	10 ⁻⁴ kgm ²	-	-	-	-	-	-	-
OS	10 ⁻⁴ kgm ²	-	-	-	-	-	-	-

Tab. 8.1d: Inertia at input (DS actuator with brake)

Feedback type (d)	$J_{w\ brake}$	DS 050	DS 070	DS 095	DS 110	DS 115	DS 140	DS 155
OA	10 ⁻⁴ kgm ²	0.121	0.878	1.707	2.193	5.926	12.100	16.210
OB	10 ⁻⁴ kgm ²	0.101	0.856	1.695	2.182	5.907	12.120	16.230
OC	10 ⁻⁴ kgm ²	0.101	0.856	1.695	2.182	5.907	12.120	16.230
OD	10 ⁻⁴ kgm ²	0.101	0.871	1.689	2.196	5.903	12.100	16.210
OE	10 ⁻⁴ kgm ²	0.101	0.871	1.689	2.196	5.903	12.100	16.210
OF	10 ⁻⁴ kgm ²	-	-	1.711	-	-	-	-
OG	10 ⁻⁴ kgm ²	-	-	1.711	-	-	-	-
OH	10 ⁻⁴ kgm ²	-	0.871	1.711	2.196	5.926	12.100	16.450
OJ	10 ⁻⁴ kgm ²	-	-	-	-	5.926	-	-
OK	10 ⁻⁴ kgm ²	0.100	-	1.690	-	5.901	-	16.360
OL	10 ⁻⁴ kgm ²	0.100	-	1.690	-	5.901	-	16.360
ON	10 ⁻⁴ kgm ²	-	-	-	-	5.918	-	16.180
OP	10 ⁻⁴ kgm ²	-	-	1.690	-	-	-	-
OQ	10 ⁻⁴ kgm ²	-	-	1.690	-	-	-	-
OR	10 ⁻⁴ kgm ²	-	-	-	-	-	-	-
OS	10 ⁻⁴ kgm ²	-	-	-	-	-	-	-

