SPINEA
BY TIMKEN

DriveSpin®

DSH series

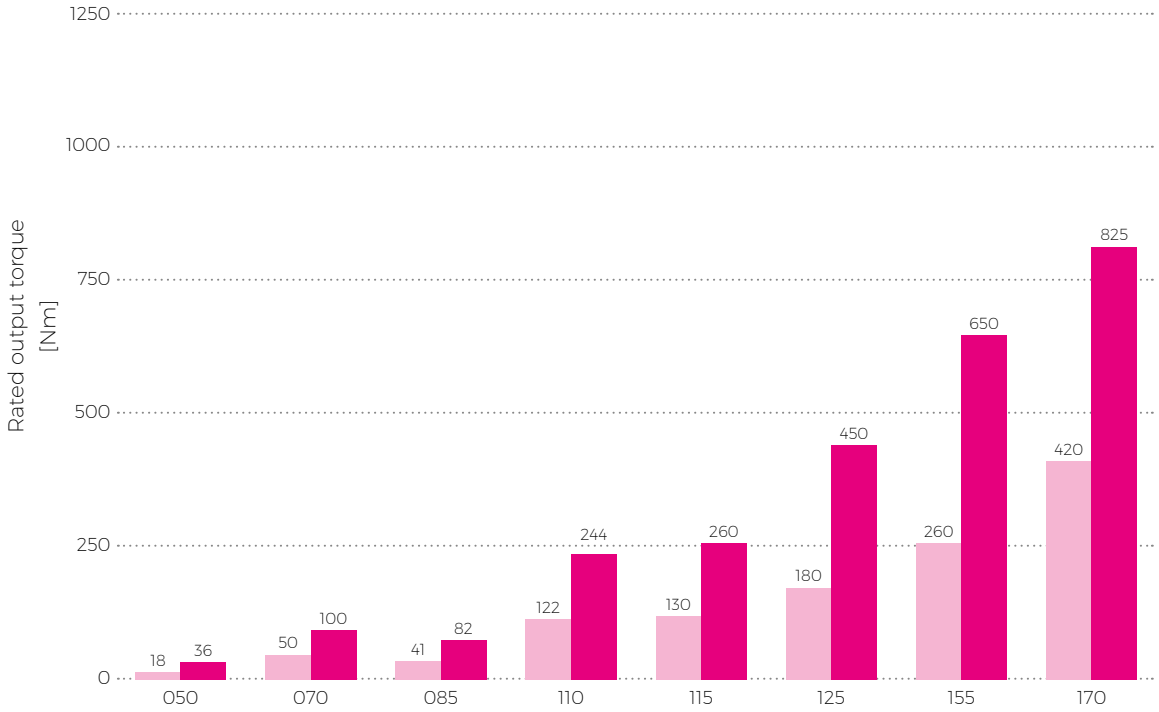
WHEN AIR IS BETTER THAN STEEL

8.2 DSH 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**

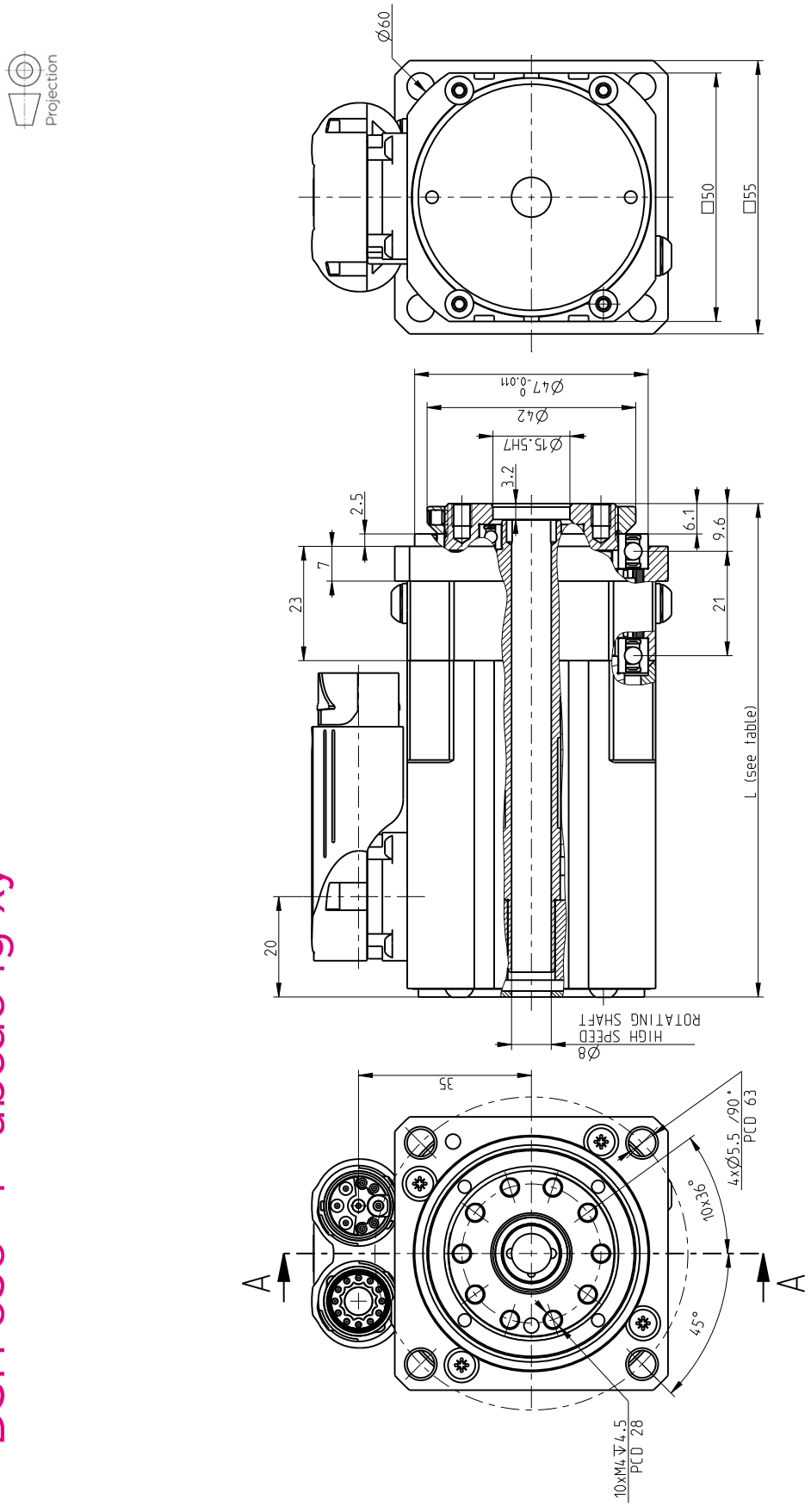
The **Drive**Spin® **DSH** electric actuators are characterized by the short axial length and by the possibility to use a through hole for routing cables, pipes, and drive shafts. Fully sealed compact actuators equipped with zero-backlash reduction gears have high power density and large hole inner diameter, from 8 to 40mm. Excellent positioning accuracy and positioning repeatability. DSH maintain radial-axial and torque load capacity and are known for high overload capacity of reduction gear and AC servomotor, featuring high dynamics. The voltage and feedback variability will widely satisfy all customers requirements. This allows even demanding tasks such as exact positioning or fast movement of heavy loads, to be performed with a high degree of repetitive accuracy. Rated output torque is within 18 Nm - 420 Nm.



Tab. 8.2a: Rated output torque

Size		050	070	085	110	115	125	155	170
Rated output torque	T_R [Nm]	18	50	41	122	130	180	260	420
Acceleration/ braking output torque	T_{acc} [Nm]	36	100	82	244	260	450	650	825

DSH 050 - i - abcde-fg-xy



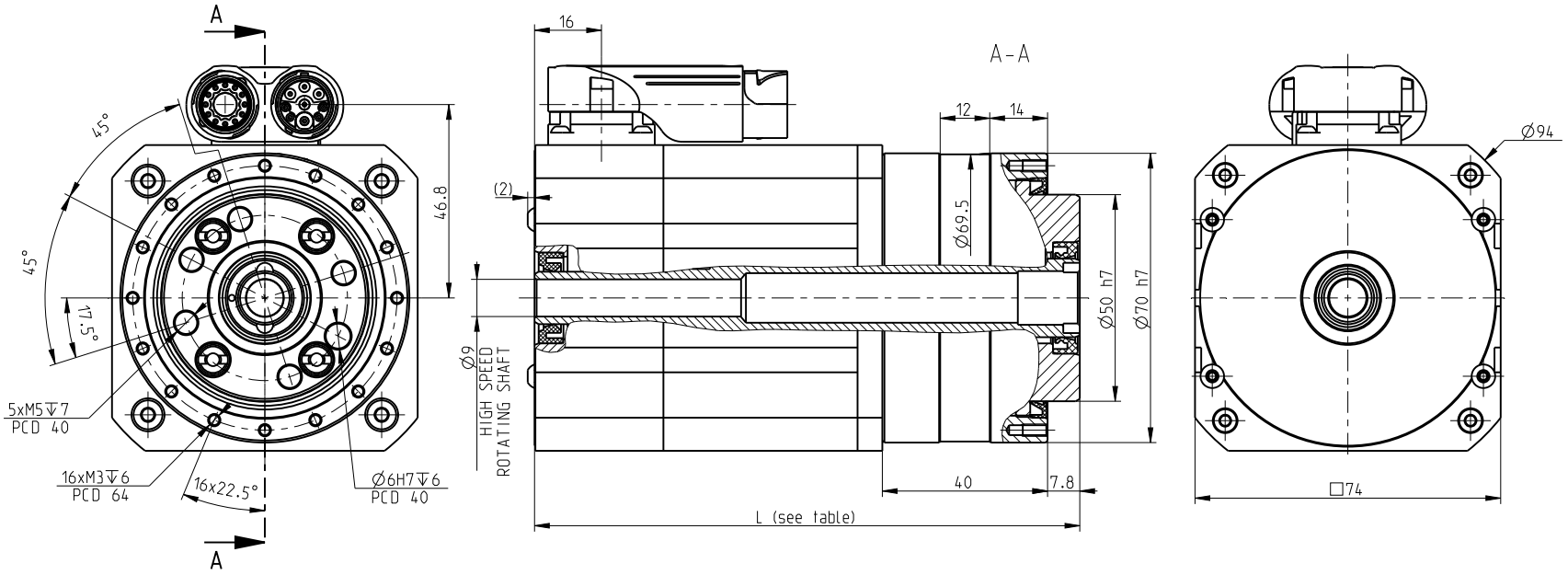
Size	Without brake		With brake	
	Feedback type (d)	Dimension L ± 0,5 [mm]	Weight m [kg] *	Dimension L ± 0,5 [mm]	Weight m [kg] *
DSH 050	0A	107	1.2	-	-

Hollowshaft rotates at motor speed

DSH 050 – i – abcde-fg-xy

DSH 070 – i – abcde-fg-xy

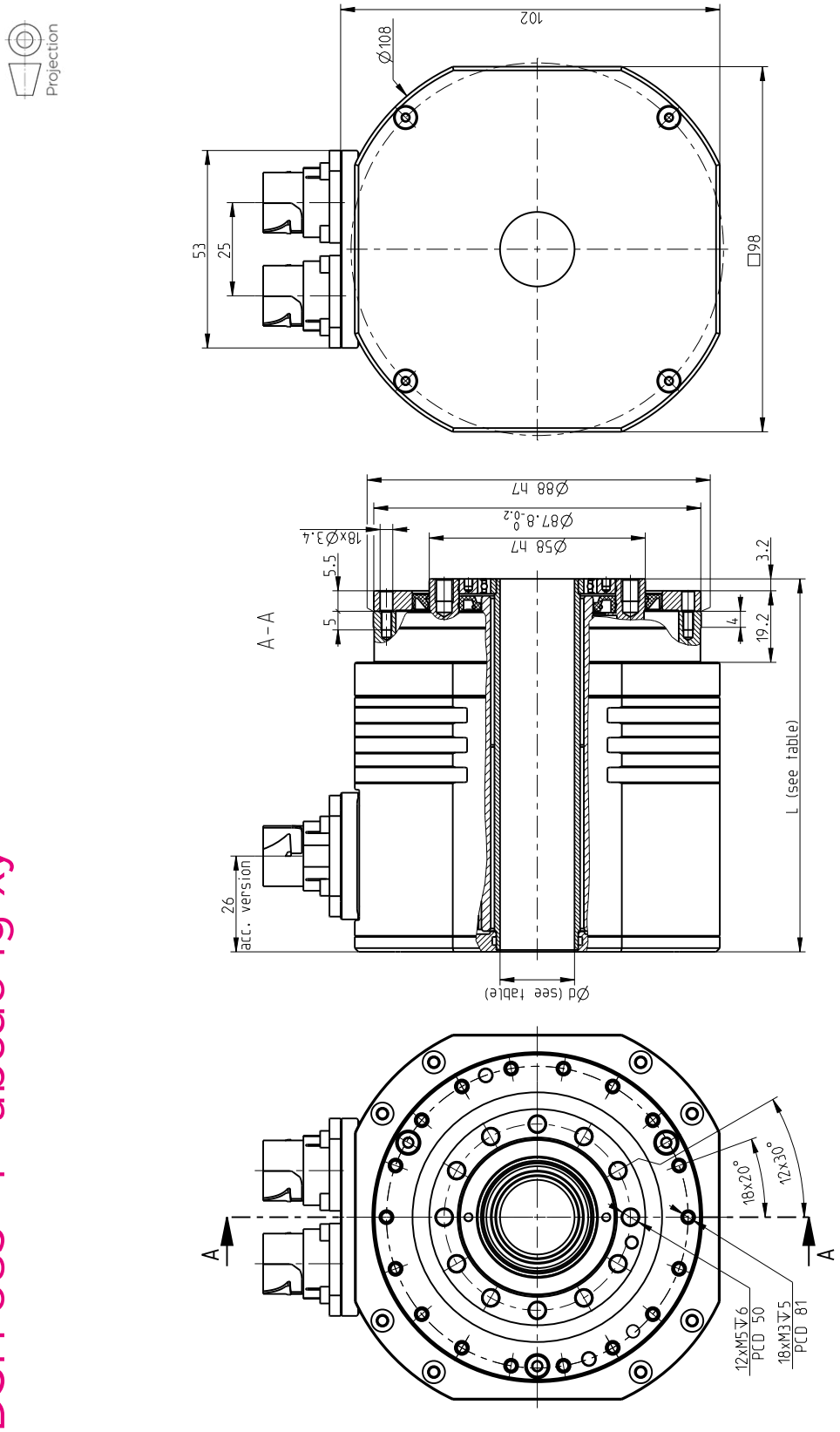
Projection



Hollowshaft rotates at motor speed

Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0,5 [mm]	Weight m [kg] *	Dimension L ± 0,5 [mm]	Weight m [kg] *
DSH 070	0A	153	2.3	–	–
	0B,0C	133	2.1	–	–

DSH 085 - i - abcde-fg-xy

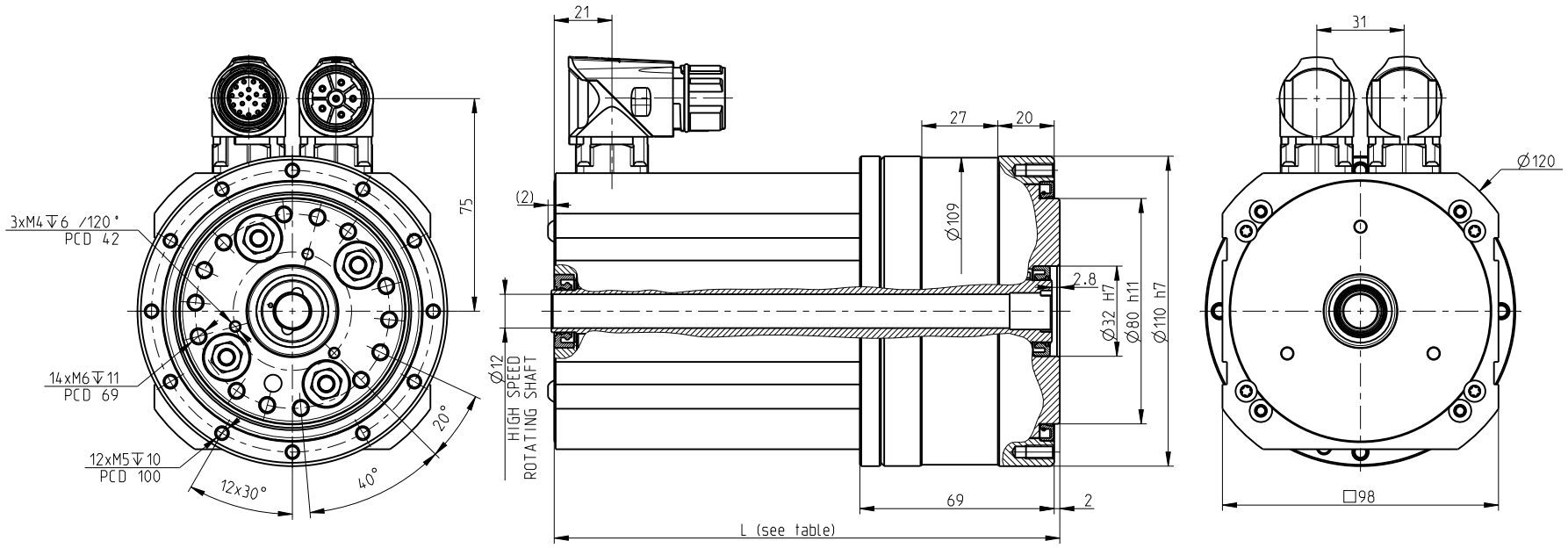


Size	Feedback type (d)	Hollowshaft diameter Ød [mm]	Without brake		With brake	
			Dimension L ± 0.5 [mm]	Weight m [kg] *	Dimension L ± 0.5 [mm]	Weight m [kg] *
DSH 085	0A	20	110	4.1	141	4.6
	0B,0C	14	108	3.8	138	4.4
	0D,0E	20	100	3.3	131	4.5
	0N	20	100	3.5	131	4.5

DSH 085 – i – abcde-fg-xy

DSH 110 – i – abcde-fg-xy

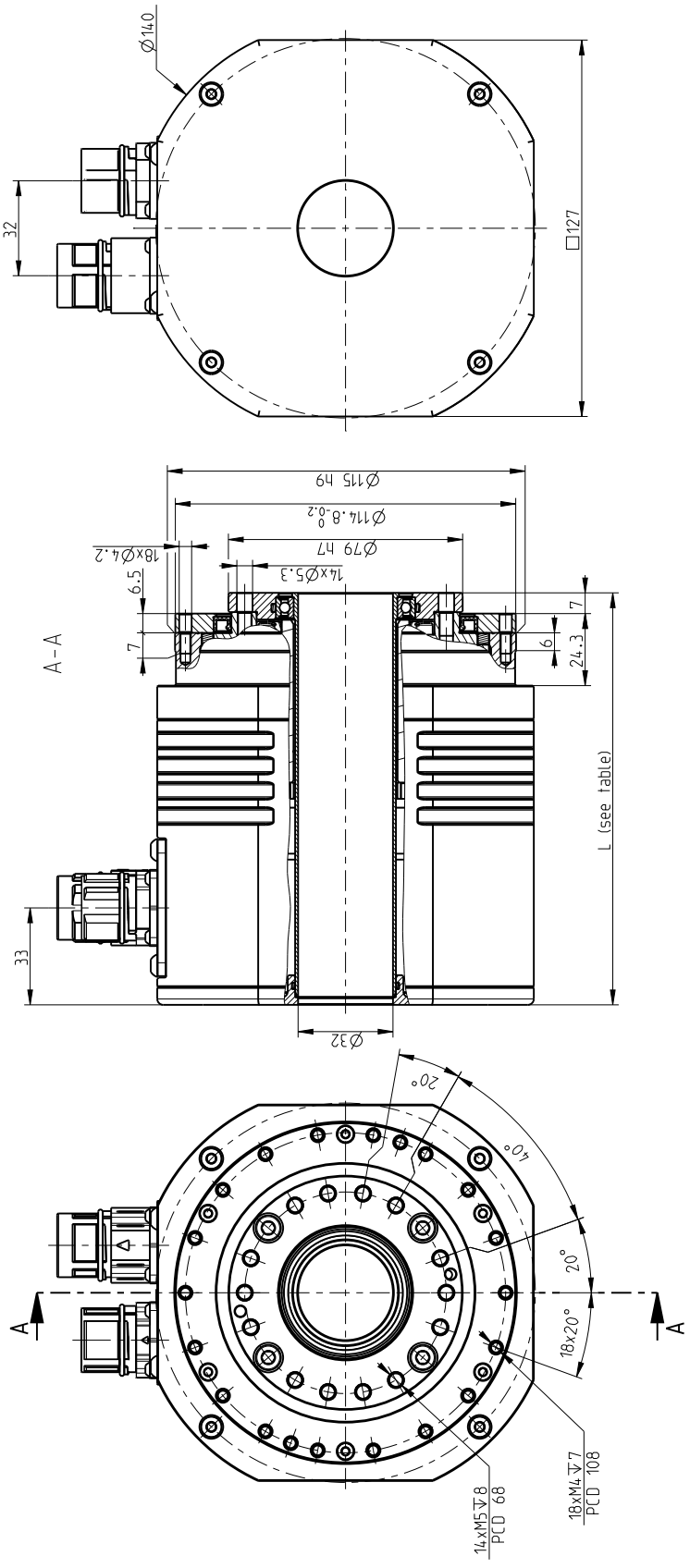
Projection



Hollowshaft rotates at motor speed

Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0,5 [mm]	Weight m [kg] *	Dimension L ± 0,5 [mm]	Weight m [kg] *
DSH 110	0A	181	8.7		

DSH 115 - i - abcde-fg-xy



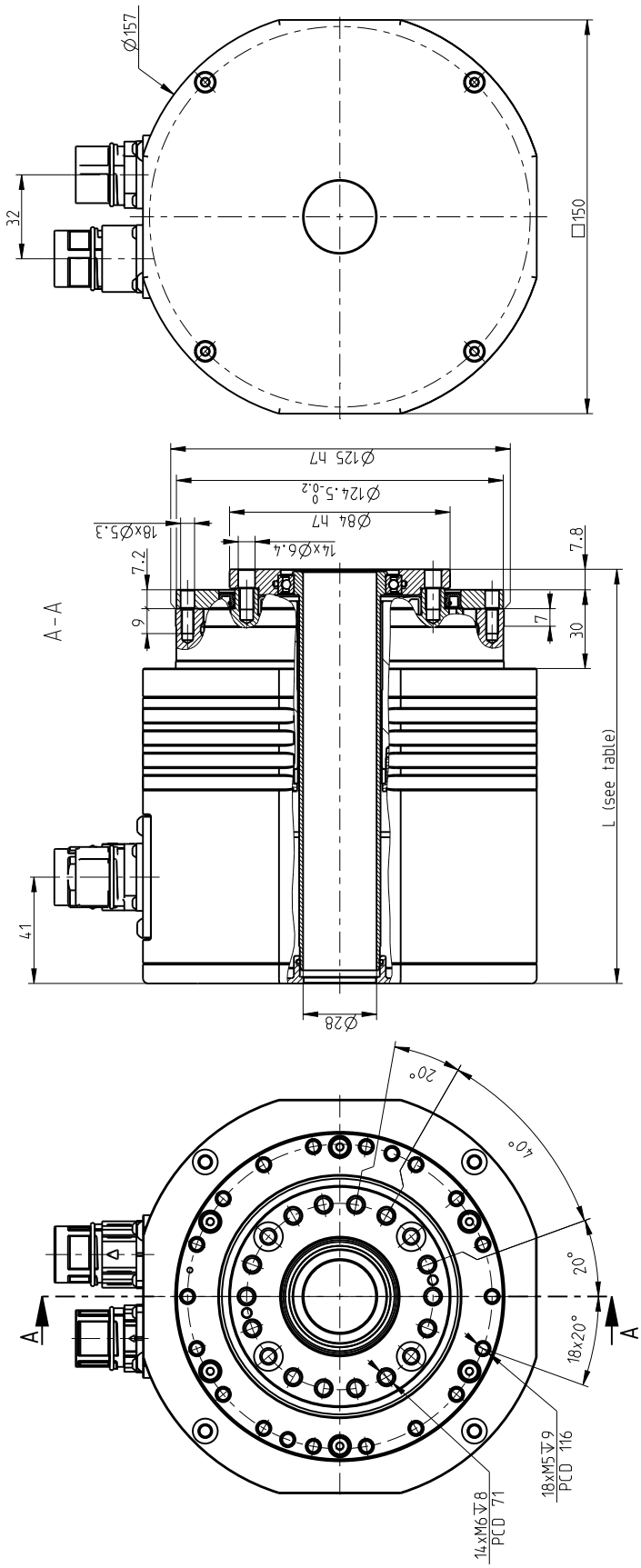
Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg] *	Dimension L ± 0.5 [mm]	Weight m [kg] *
DSH 115	OA	144	7.3	168	8.3
	OB	139	6.5	165	7.5
	OD.OE	139	6.5	165	7.5
	OF	139	6.5	165	7.5

DSH 115 – i – abcde-fg-xy

DSH 125 - i - abcde-fg-xy

DSH 125 – i – abcde-fg-xy

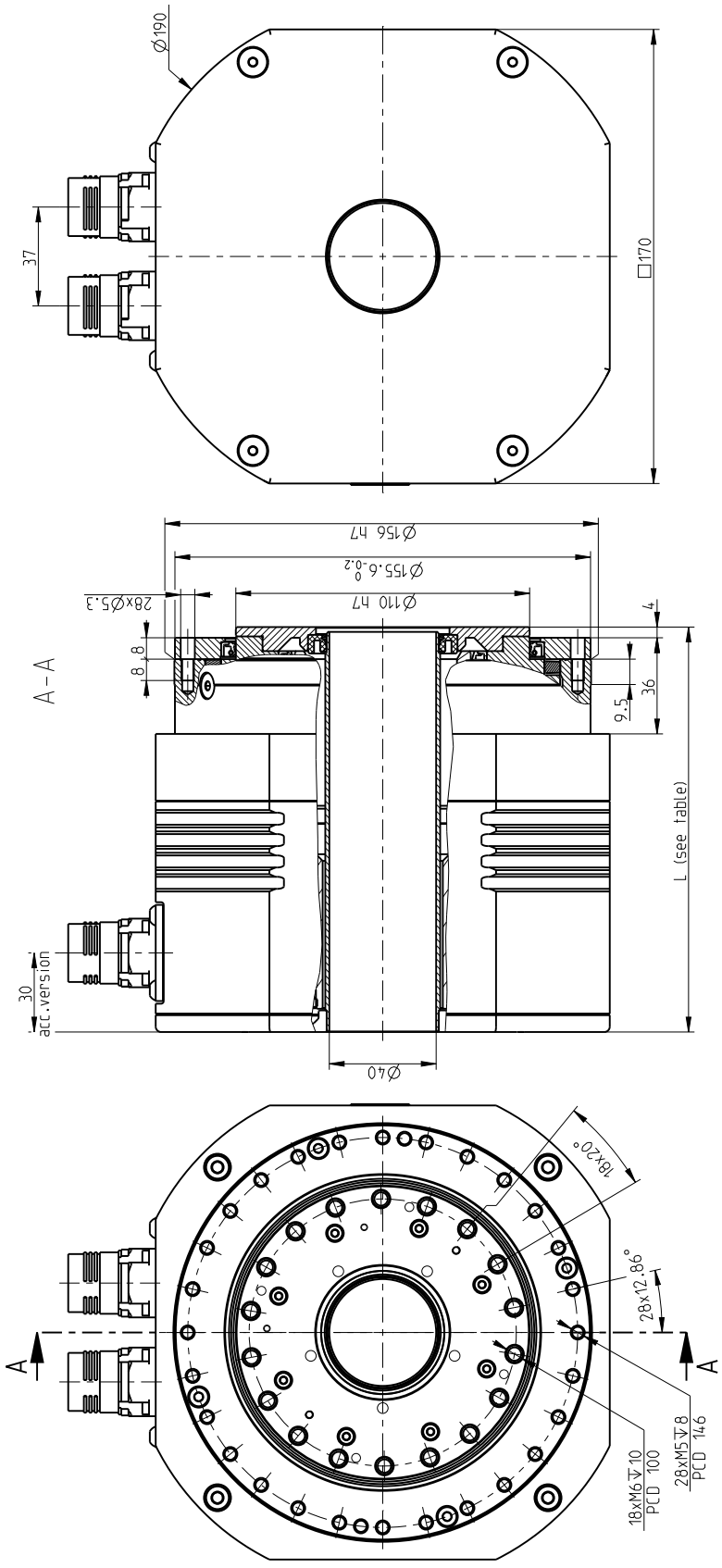
Projection



Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg] *	Dimension L ± 0.5 [mm]	Weight m [kg] *
DSH 125	OA	158	11.2	186	12.9
	OB.OC	158	10.4	186	11.7
	OD.OE	158	10.4	186	11.7
	ON	158	9.0	186	10.3

DSH

DSH 155 - i - abcde-fg-xy

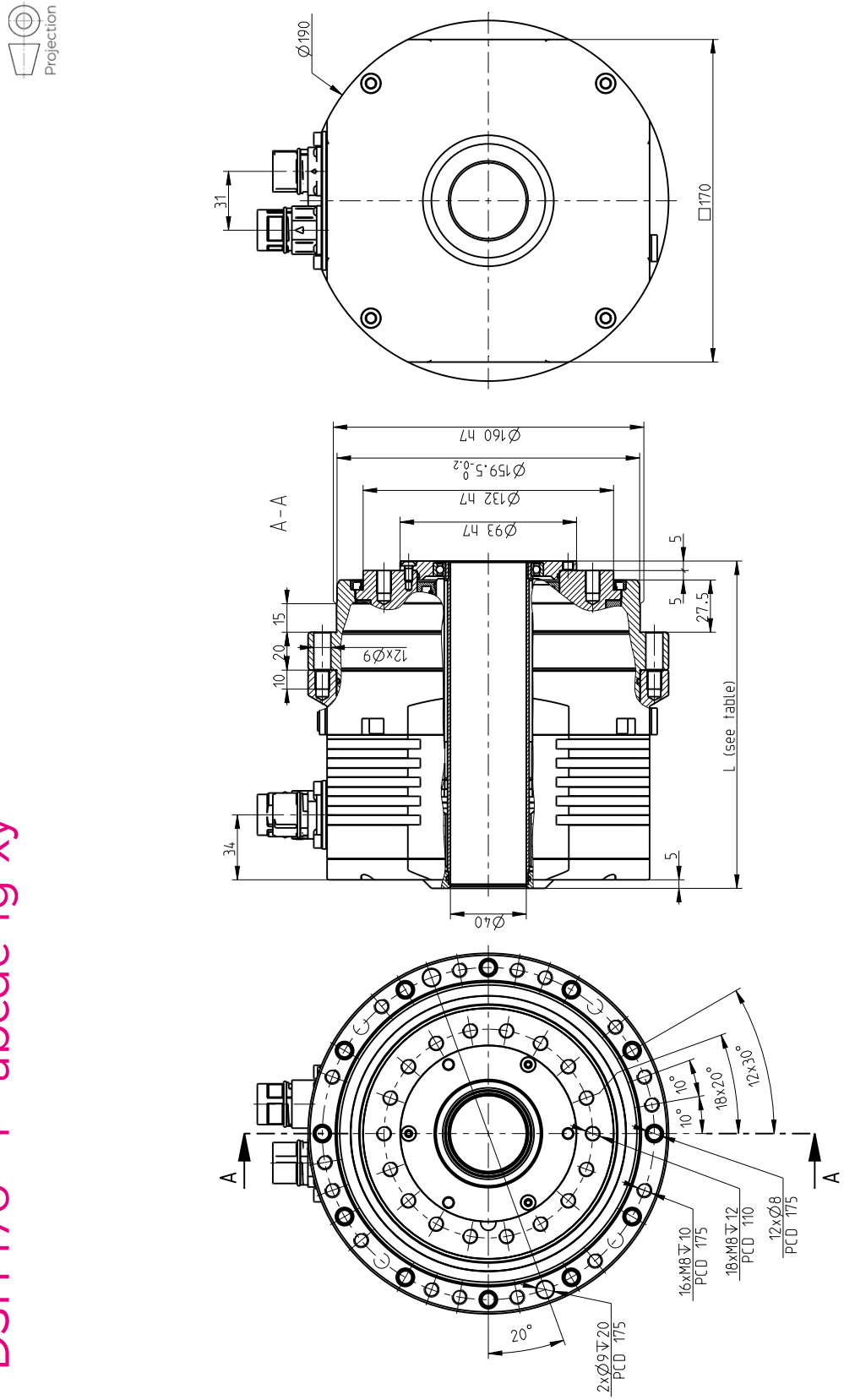


Size	Feedback type (d)	Without brake		With brake	
		Dimension L ± 0.5 [mm]	Weight m [kg] *	Dimension L ± 0.5 [mm]	Weight m [kg] *
DSH 155	OA	152	13.1	175	14.3
	OB	152	11.8	175	13.0
	OD.OE	152	11.6	175	13.7
	OF	152	11.6s	175	13.7

DSH 155 – i – abcde-fg-xy

DSH 170 - i - abcde-fg-xy

DSH 170 – 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] *
DSH 170	0A	188	26.0	235	27.0
	0B.0C	172	24.5	219	25.5
	0D.0E	172	24.0	219	25.0
	0N	172	22.0	219	23.0

DSH

Tab. 8.2b: DSH series technical data table

Reduction Gear parameters		Tolerance	DSH 050		
Reduction ratio	i		63		
Hollowshaft diameter	Ød [mm]		8 [14]		
Rated output torque	T_R [Nm]		18		
Acceleration/braking output torque	T_{acc} [Nm]		36		
Rated input speed	n_r [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]	$F_{a\,max}$ [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≠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 met). If M_c≠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 $F_{r\,max}$ 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 significantly exceed 60°C
10) 3 200 rpm for ratio 69 ; 3 700 rpm for ratio 125
11) 3 800 rpm for ratio 47 ; 4 500 rpm for ratio 85
12) 2 500 rpm for ratio 55 ; 3 400 rpm for ratio 103
13) 2 400 rpm for ratio 49 ; 3 800 rpm for ratio 99
14) Hollowshaft rotates at motor speed

Tab. 8.2b: DSH series technical data table - continued

DSH 070			DSH 085			DSH 110		
57, 75			47, 85			67, 89, 119		
9 [14] or 12 [14]			14 or 20			12 [14]		
50			41			122		
100			82			244		
2 000			2 000			2000		
5 000			3 800 / 4 500 [11]			3900 / 4500 [5]		
142			220			740		
35			85			150		
7			10			22		
< 1.5			< 1			< 1		
< 1.5			<1			< 1		
2.8			2			9.3		
4.1			6					
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	2 500	3 000	3 000	2 500	3 000	3 000
0.88	0.76	0.76	2.1	2.1	2.1	3.4	3.2	3.2
13	1.2	0.7	42	4.2	2.1	37	4.9	2.8
0.9	0.9	0.9	2.3	2.3	2.3	3.8	3.8	3.8
13.3	1.42	0.83	46	4.6	2.3	41	6	3
3	3	3	5.8	5.8	5.8	11	11	11
44.3	4.7	2.8	130	13.03	6.52	120	17	10
5.7	68.3	105.6	4.37	49.1	87.4	8	57	103
0.0677	0.63	1.09	0.05	0.5	1	0.09	0.65	1.14
0.13	17	40.5	0.017	2.1	6.7	0.027	1.4	4.5
0.25	34.4	87	0.04	5.2	17	0.15	7.4	24
10	10	10	16	16	16	10	10	10
24. Special			24. Special			24. Special		
4.5			1.5			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-configuaration)			Y (star-configuaration)		

IMPORTANT NOTES:

- Load values in the table apply to 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_R ,n_R can be calculated. Please contact manufacturer with estimated duty cycle.
- High precision reduction gears are preffered for intermittent duty cycles (S3-S8); the output speed in 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. 8.2b: DSH series technical data table - continued

Reduction Gear parameters		Tolerance	DSH 115		
Reduction ratio	i		55, 103		
Hollowshaft diameter	Ød [mm]		32		
Rated output torque	T_R [Nm]		130		
Acceleration/braking output torque	T_{acc} [Nm]		260		
Rated input speed	n_r [rpm]		2 000		
Maximum allowable input speed [9]	n_{max} [rpm]		2 500 / 3 400 [12]		
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]		23		
Lost motion	LM [arcmin]		< 1		
Hysteresis	H [arcmin]		< 1		
Rated radial force [2]	F_{rR} [kN]		4		
Maximum axial force [2][4]	$F_{a\,max}$ [kN]		12.5		
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%	2.9	2.9	2.9
Motor rated current	I_n [A_{rms}]		46	3.5	2
Motor stall torque	M_o [Nm]	+/- 10%	3	3	3
Motor stall current	I_o [A_{rms}]		47.6	3.6	2
Motor peak torque	M_{max} [Nm]	+/- 10%	8.5	8.5	8.5
Motor peak current	I_{max} [A]		135	10.1	5.8
Motor back-EMF constant	K_E [V_{peak}/krpm]	+/- 10%	5.6	75	131
Motor torque constant	K_T [Nm/A_{rms}]	+/- 10%	0.06	0.84	1.47
Terminal resistance (L-L)	R_{2ph} [Ω]	+/- 10%	0.011	2	6
Terminal inductance (L-L)	L_{2ph} [mH]	+/- 20%	0.03	5	16
Number of poles	2p		20	20	20
Electromagnetic brake DC supply	[V_{dc}]		24. Special		
Electromagnetic brake torque at input	[Nm]		5		
Protection class			IP 64		
Motor Insulation class			F		
Paint			RAL 9005		
Motor number of phases			3		
Motor type of connection			Y (star-configuaration)		

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≠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 met). If M_c≠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 $F_{r\,max}$ 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 significantly exceed 60°C
10) 3 200 rpm for ratio 69 ; 3 700 rpm for ratio 125
11) 3 800 rpm for ratio 47 ; 4 500 rpm for ratio 85
12) 2 500 rpm for ratio 55 ; 3 400 rpm for ratio 103
13) 2 400 rpm for ratio 49 ; 3 800 rpm for ratio 99
14) Hollowshaft rotates at motor speed

Tab. 8.2b: DSH series technical data table - continued

DSH 125			DSH 155			DSH 170		
49, 99			109			69, 125		
27			40			40		
180			260			420		
450			650			825		
2 000			2 000			2 000		
2 400 / 3 800 [13]			3 000			3 200 / 3 700 [10]		
880			1 640			2 000		
280			900			1 100		
29			67			110		
< 1			< 1			< 1		
< 1			< 1			< 1		
4.4			8			19.2		
13.8			26			27.9		
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
4 000	4 000	4 000	4 000	4 000	4 000	2 000	4 000	4 000
4	4	4	3.8	3.8	3.8	9	5	5
74.1	5.6	3.2	67.2	5	3	114,5	10	6
4.5	4.5	4.5	5	5	5	11	11	11
83.3	6.3	3.6	88	6.6	4	140	22	13,2
13.5	13.5	13.5	16	16	16	23	23	23
250	18.8	11	283	21.2	14	307	46	27,6
4.76	63	111	5	67	112	6,7	44	77
0.054	0.72	1.26	0.057	0.75	1.27	0,079	0,5	0,83
0.0055	1	3.3	0.005	1	2.5	0,004	0,15	0,4
0.04	7	22	0.014	2	7	0.0128	0,57	1,7
10	10	10	24	24	24	24	24	24
24, Special			24, Special			24, Special		
5			5			19		
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 apply to 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_R ,n_R can be calculated. Please contact manufacturer with estimated duty cycle.
- High precision reduction gears are preffered for intermittent duty cycles (S3-S8); the output speed in 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

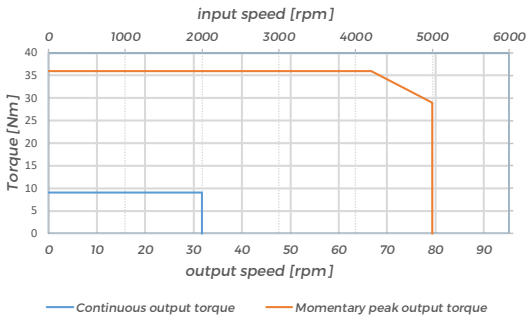
Tab. 8.2c: Inertia at input (DSH actuator without brake)

Feedback type (d)	$J_{w/o\ brake}$	DSH 050	DSH 070	DSH 085	DSH 110	DSH 115	DSH 125	DSH 155	DSH 170
0A	10^{-4} kgm²	0.110	0.630	1.960	2.040	13.977	14.516	19.340	57.987
0B	10^{-4} kgm²	–	0.483	1.840	–	8.757	9.336	10.600	34.490
0C	10^{-4} kgm²	–	0.483	1.840	–	8.757	9.336	10.600	34.430
0D	10^{-4} kgm²	–	–	2.360	–	9.097	9.636	10.460	34.790
0E	10^{-4} kgm²	–	–	2.360	–	9.097	9.636	10.460	34.790
0F	10^{-4} kgm²	–	–	–	–	9.097	9.636	10.460	34.790
0J	10^{-4} kgm²	0.091	–	–	–	–	–	–	–
0N	10^{-4} kgm²	0.105	–	2.060	–	–	10.624	–	34.101

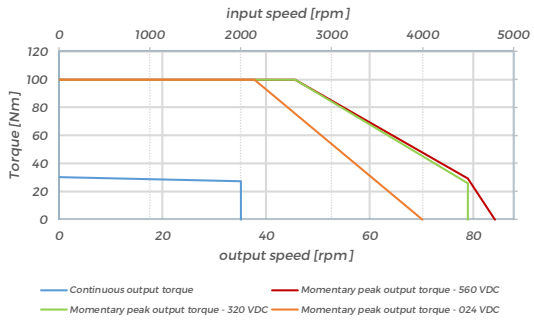
Tab. 8.2d: Inertia at input (DSH actuator with brake)

Feedback type (d)	$J_{w\ brake}$	DSH 050	DSH 070	DSH 085	DSH 110	DSH 115	DSH 125	DSH 155	DSH 170
0A	10^{-4} kgm²	0.143	–	2.380	–	15.080	15.937	24.428	72.253
0B	10^{-4} kgm²	–	–	2.200	–	9.860	15.757	15.249	47.734
0C	10^{-4} kgm²	–	–	2.200	–	9.860	10.757	15.249	47.674
0D	10^{-4} kgm²	–	–	2.810	–	10.200	11.057	15.550	48.034
0E	10^{-4} kgm²	–	–	2.810	–	10.200	11.057	15.550	48.034
0F	10^{-4} kgm²	–	–	–	–	10.200	11.057	15.550	48.034
0J	10^{-4} kgm²	0.125	–	–	–	–	–	–	–
0N	10^{-4} kgm²	0.138	–	2.520	–	–	12.044	–	47.346

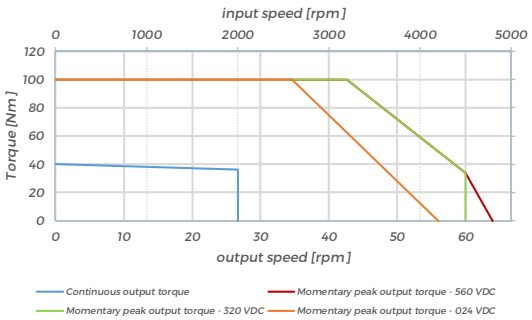
DSH 050-063



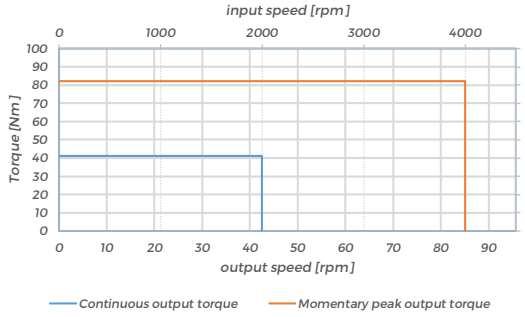
DSH 070-057



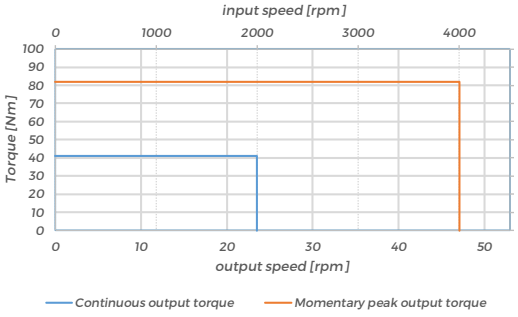
DSH 070-075



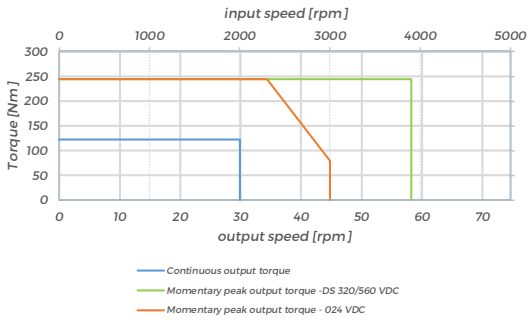
DSH 085-047



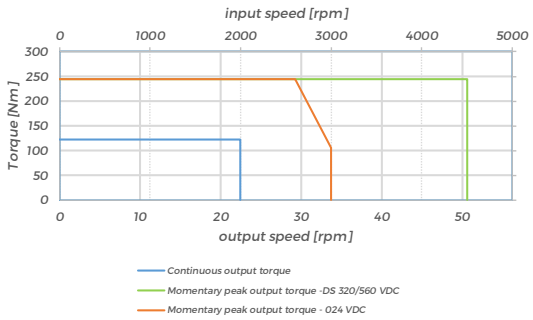
DSH 085-085



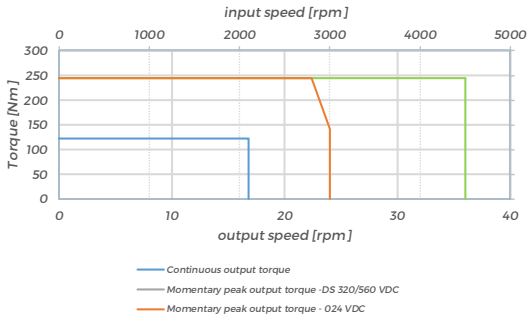
DSH 110-067



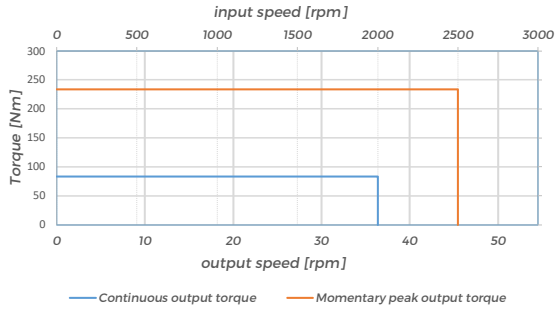
DSH 110-089



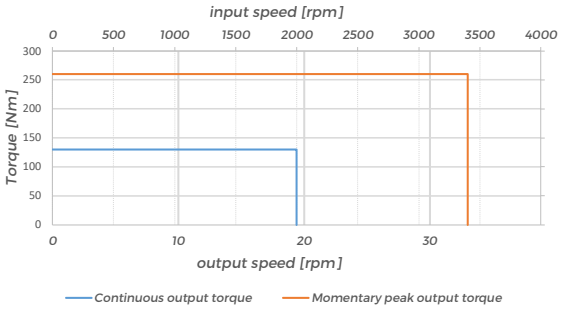
DSH 110-119



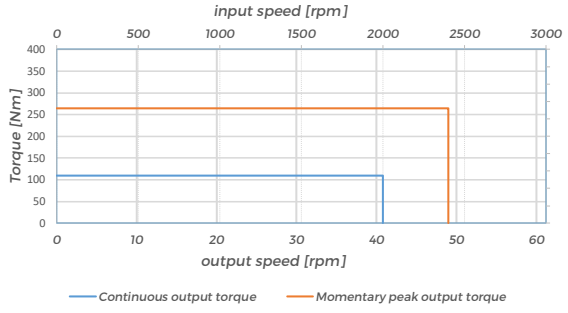
DSH 115-055



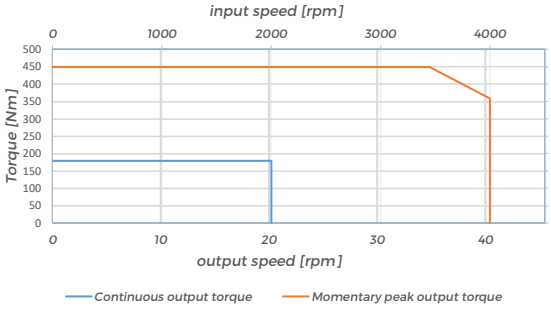
DSH 115-103



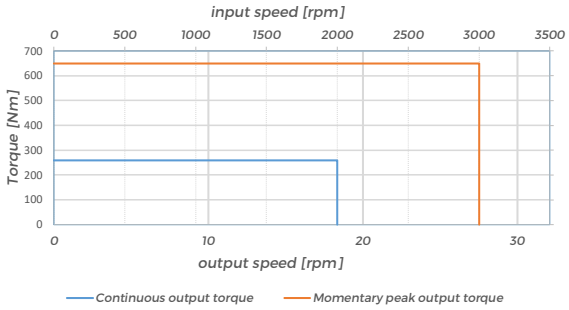
DSH 125-049



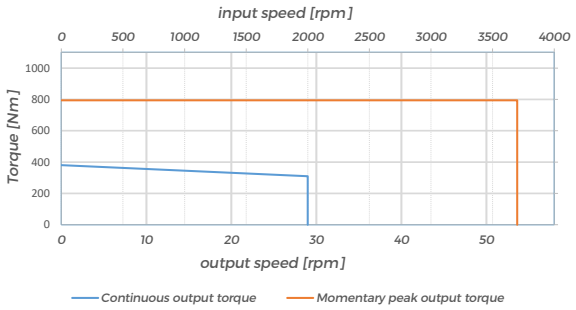
DSH 125-099



DSH 155-109



DSH 170-069



DSH 170-125