

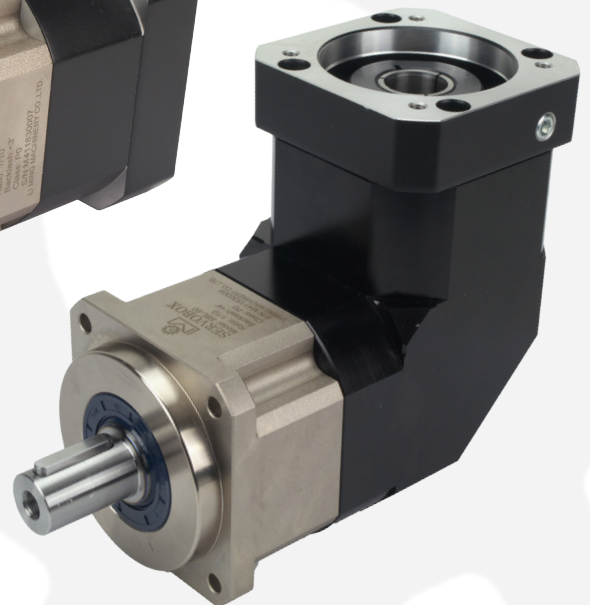
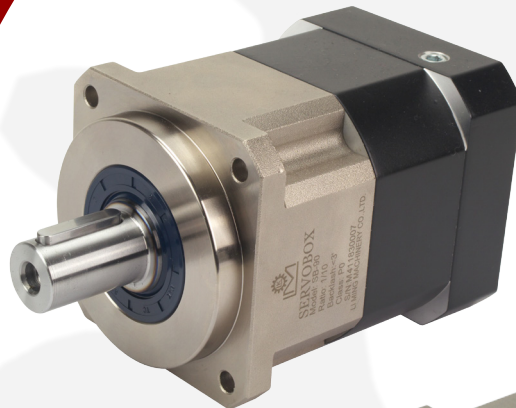
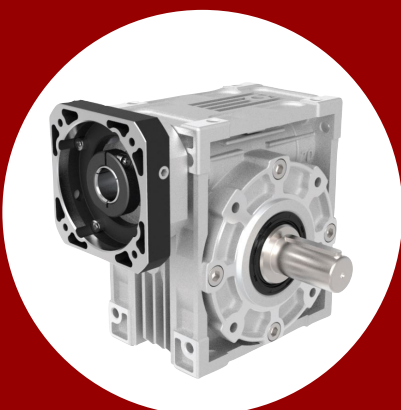


"Part of your drive"

SERVOBOX GEARBOXES

STOCK CATALOGUE

EDITION 02



**www.apex-trans.co.uk
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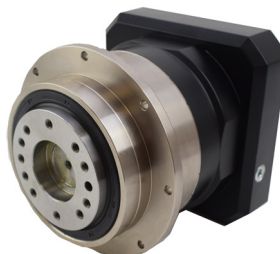
SB Series

**In-line Precision
Gearbox with Square
B5 Mounting Flange**



SBL Series

**Right Angle Precision
Gearbox with Square
B5 Mounting Flange**



SD Series

**In-line Precision
Gearbox with ISO 9409
Rotary Output Flange**



SDL Series

**Right Angle Precision
Gearbox with ISO 9409
Rotary Output Flange**



SE Series

**In-line Precision
Gearbox with Round
B14 Mounting Flange**



SEL Series

**Right Angle Precision
Gearbox with Round
B14 Mounting Flange**



SF Series

**In-line Precision
Gearbox Taper Bearings
B5 Mounting Flange**



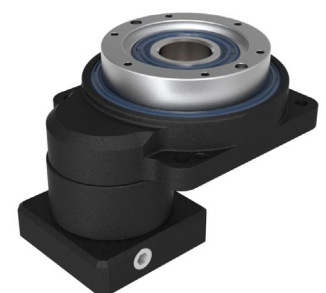
SFL Series

**Right Angle Precision
Gearbox Taper Bearings
B5 Mounting Flange**



SN Series

**In-line Economy
Gearbox with Round
B14 Mounting Flange**



GT Series

**Precision Rotary Tables
Ball or Roller Bearings
Hollow Through Bore**



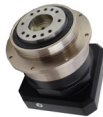
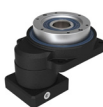
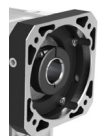
WE Series

**Precision Worm Gearbox
Solid Shaft, Hollow or
Clamp Output Options**



ST Series

**Precision Bevel Gearbox
Solid Shaft, Hollow or
Clamp Output Options**

SB / SBL Series Precision Planetary Gearboxes – B5 Mounting	05 – 24	
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WE Series Precision Worm Gearboxes	127 – 140	
Configuration Motor Adapter Flanges & sizing information	141 – 147	

Here at **APEX**, we are dedicated to quality customer service, high quality products and fast delivery. We pride ourselves on next day delivery on stock items and delivery of non stock or special built gearboxes in a few weeks.

With years of commercial experience, ISO 9001/2008 accreditation and a highly skilled workforce from the shop floor through to management, you can be confident in choosing **APEX** for all your planetary gearhead needs.

APEX specialise in the handling, design and supply of low backlash precision helical gearboxes for servo driven applications including:

- In-line & right angle planetary gearheads -
- Rotary output gearheads to ISO 9409 -
- Low backlash spiral bevel gearboxes -
- Hypoid right angle gearheads -
- Up to 1000:1 reduction ratio -

Here at **APEX**, we offer unrivalled linear motion services such as:

- Express dispatch of stock products -
- Design of planetary gearbox applications -
- Short lead times on non stock gearboxes -
- Cutting & butt jointing linear rails -
- In-house design & machining of ballscrews -
- Selection & service lifetime calculations -
- Design & modification of special guides -
- Cutting & building of aluminium profile & panels -
- Design of bespoke rack drive systems -

Our in-house, fully equipped CNC machine shop combined with years of industry experience gives us the capability to tailor products to suit specific customer requirements – contact our professional sales team today.





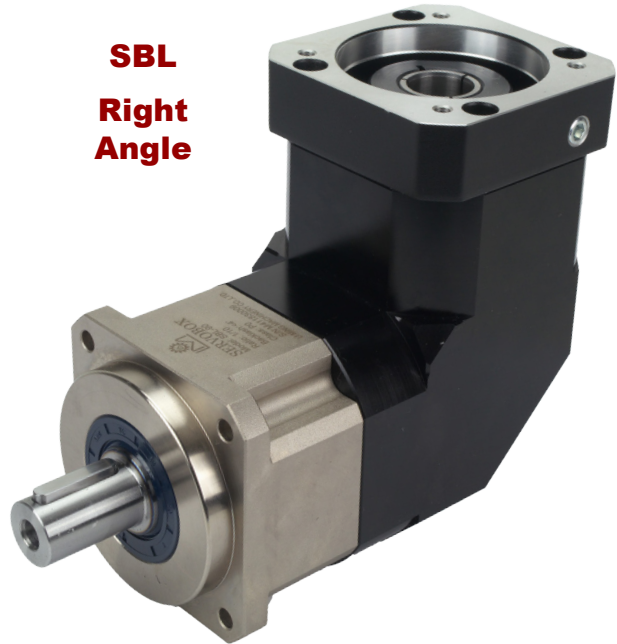
ServoBox – SB Series

Precision Range – In-line & Right Angle

SB In-line



**SBL
Right
Angle**



The benchmark of our precision planetary gearhead range

Helical hardened & ground gearing for greater wear resistance

Square B5 output flange with solid output shaft for easy mounting

9 standard gearbox frame sizes from 042 up to 330 frame

**From 3:1 up to 200:1 reduction ratio across the range with
1000:1 reduction ratio possible on selected frame sizes**

Up to 8790 Nm nominal & 15820 Nm peak output torque

Backlash options starting from as low as ≤ 1 arcmin

Power transmission efficiency of up to $\geq 97\%$

Operating noise levels as low as 56 dB

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



SB Series – In-line

Precision Range – Performance Overview

Parameter	Stage / Ratio	SB 044	SB 062	SB 090	SB 120	SB 142	SB 180	SB 220	SB 270	SB 330	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	19	59	165	335	625	1206	2030	4770	8790
		4:1	16	51	146	300	555	1069	1804	4730	8730
		5:1	16	48	160	333	618	1189	2010	4680	8660
		6:1	15	45	151	311	583	1118	1911	-	-
		7:1	15	45	149	309	573	1108	1870	4570	8520
		8:1	14	43	143	298	553	1070	1824	-	-
		9:1	13	44	145	278	516	993	1694	-	-
		10:1	14	43	141	294	549	1059	1779	4420	8310
	Double Stage (2 & 2A)	15:1	19	59	165	335	625	1206	2030	4770	8790
		20:1	16	51	146	300	555	1069	1804	4730	8730
		25:1	16	48	160	333	618	1189	2010	4680	8660
		30:1	15	45	151	311	583	1118	1911	4620	8610
		35:1	15	45	149	309	573	1108	1870	4570	8520
		40:1	14	43	143	298	553	1070	1824	4520	8440
		50:1	16	48	160	333	618	1189	2010	4680	8660
		60:1	15	45	151	311	583	1118	1911	-	-
		70:1	15	45	149	309	573	1108	1870	4570	8520
		80:1	14	43	143	298	553	1070	1824	-	-
		90:1	13	44	145	278	516	993	1694	-	-
		100:1	14	43	141	294	549	1059	1779	4420	8310
	Triple Stage (3 & 3A)	125:1	-	48	160	333	618	1189	2010	-	-
		150:1	-	59	165	335	583	1206	2030	-	-
		175:1	-	45	149	309	573	1108	1870	-	-
		200:1	-	51	146	300	555	1069	1804	-	-
		250:1	-	48	160	333	618	1189	2010	-	-
		300:1	-	45	151	311	583	1118	1911	-	-
		350:1	-	45	149	309	573	1108	1870	-	-
		400:1	-	43	143	298	553	1070	1824	-	-
		450:1	-	44	145	278	516	993	1694	-	-
		500:1	-	48	160	333	618	1189	2010	-	-
		600:1	-	45	151	311	583	1118	1911	-	-
		700:1	-	45	149	309	573	1108	1870	-	-
		800:1	-	43	143	298	553	1070	1824	-	-
		900:1	-	44	145	278	516	993	1694	-	-
		1000:1	-	43	141	294	549	1059	1779	-	-
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	2000	2000	2000	
Maximum Input Speed (rpm)	ALL	6000	6000	6000	5000	5000	4000	3000	3000	3000	
Torsional Rigidity (Nm/moa)	ALL	3	6	14	27	60	140	240	510	980	
Max. Radial Output Load (N)*	ALL	380	1180	3200	6800	9300	15600	51000	107100	224910	
Max. Axial Output Load (N)*	ALL	190	590	1600	3400	4650	7800	25500	53550	112455	
Maximum Noise Level (dB)**	ALL	≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70	≤ 72	≤ 74	
PS Super Backlash (arcmin)	1	-	-	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	
	2	-	-	-	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	
	3	-	-	-	≤ 5	≤ 5	≤ 5	≤ 5	-	-	
P0 Micro Backlash (arcmin)	1	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	
	2	(≤ 5)	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
	3	-	(≤ 7)	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	-	-	
P1 Reduced Backlash (arcmin)	1	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
	2	(≤ 7)	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
	3	-	(≤ 9)	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	-	-	
P2 Standard Backlash (arcmin)	1	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
	2	(≤ 9)	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	
	3	-	(≤ 11)	≤ 11	≤ 11	≤ 11	≤ 11	≤ 11	-	-	
Gearbox Weight ± 3% (kg)	1	0.6	1.3	3.7	8	14.3	28.3	42.5	97	190	
	2	(0.8)	1.7 (2)	4.7 (5.5)	9.5 (11)	17.2 (21)	34.1 (42)	57.3 (59)	137 (146)	270	
	3	-	(4)	5.2 (6.5)	10 (13)	18.1 (30)	35.0 (57)	63.7 (87)	-	-	



SBL Series – Right Angle

Precision Range – Performance Overview

Parameter	Stage / Ratio	SBL 044	SBL 062	SBL 090	SBL 120	SBL 142	SBL 180	SBL 220	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	19	59	165	335	625	1206	2030
		4:1	16	51	146	300	555	1069	1804
		5:1	16	48	160	333	618	1189	2010
		6:1	15	45	151	311	583	1118	1911
		7:1	15	45	149	309	573	1108	1870
		8:1	14	43	143	298	553	1070	1824
		9:1	13	44	145	278	516	993	1694
		10:1	14	43	141	294	549	1059	1779
		12:1	15	45	151	311	583	1118	1911
		14:1	15	45	149	309	573	1108	1870
		16:1	14	43	143	298	553	1070	1824
		18:1	13	44	145	278	516	993	1694
		20:1	14	43	141	294	549	1059	1779
	Double Stage (2 & 2A)	15:1	19	59	165	335	625	1206	2030
		25:1	16	48	160	333	618	1189	2010
		30:1	15	45	151	311	583	1118	1911
		35:1	15	45	149	309	573	1108	1870
		40:1	14	43	143	298	553	1070	1824
		50:1	16	48	160	333	618	1189	2010
		60:1	15	45	151	311	583	1118	1911
		70:1	15	45	149	309	573	1108	1870
		80:1	14	43	143	298	553	1070	1824
		90:1	13	44	145	278	516	993	1694
		100:1	14	43	141	294	549	1059	1779
		120:1	15	45	151	311	583	1118	1911
		140:1	15	45	149	309	573	1108	1870
160:1	14	43	143	298	553	1070	1824		
180:1	13	44	145	278	516	993	1694		
200:1	14	43	141	294	549	1059	1779		
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	2000	
Maximum Input Speed (rpm)	ALL	6000	6000	6000	5000	5000	4000	3000	
Torsional Rigidity (Nm/moa)	ALL	3	6	14	27	60	140	240	
Max. Radial Output Load (N)*	ALL	380	1180	3200	6800	9300	15600	51000	
Max. Axial Output Load (N)*	ALL	190	590	1600	3400	4650	7800	25500	
Maximum Noise Level (dB)**	ALL	≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70	
PS Super Backlash (arcmin)	1	-	-	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	
	2	-	-	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	
P0 Micro Backlash (arcmin)	1	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	
	2	(≤ 7)	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
P1 Reduced Backlash (arcmin)	1	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	
	2	(≤ 9)	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	
P2 Standard Backlash (arcmin)	1	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	
	2	(≤ 12)	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	
Gearbox Weight ± 3% (kg)	1	1.0	2.3	6.6	13.2	22.3	50	75.2	
	2	(1.4)	2 (3)	5.5 (8.2)	12.5 (14.5)	23.2 (25.2)	44.4 (52.4)	79.5 (94.8)	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

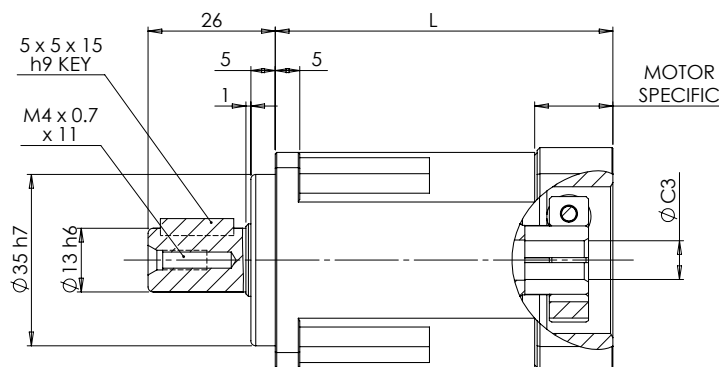
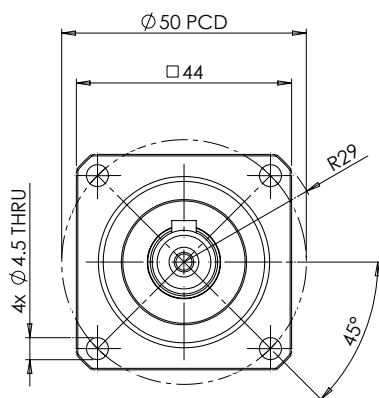
NOTE: Values shown in brackets (above & left) only apply to type 2A and 3A gearboxes with enlarged primary stage gearing

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SB044

Precision Range – In-line



NOTE: See page 082 for economy equivalent PB044

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	19	34	57	0.03
	4:1	16	28	48	0.03
	5:1	16	28	48	0.03
	6:1	15	27	45	0.03
	7:1	15	27	45	0.03
	8:1	14	25	42	0.03
	9:1	13	23	39	0.03
	10:1	14	25	42	0.03
Double Stage (2A Only)	15:1	19	34	57	0.03
	20:1	16	28	48	0.03
	25:1	16	28	48	0.03
	30:1	15	27	45	0.03
	35:1	15	27	45	0.03
	40:1	14	25	42	0.03
	50:1	16	28	48	0.03
	60:1	15	27	45	0.03
	70:1	15	27	45	0.03
	80:1	14	25	42	0.03
	90:1	13	23	39	0.03
	100:1	14	25	42	0.03

Design Parameter	Stage vs Value	
	1	2A
Dimension L Min. (mm)	69	95
Gearbox Weight ± 3% (kg)	0.6	0.8
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft ØC3 (mm)	Ø11	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	3	
Max. Radial Output Load (N)*	380	
Max. Axial Output Load (N)*	190	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 56	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

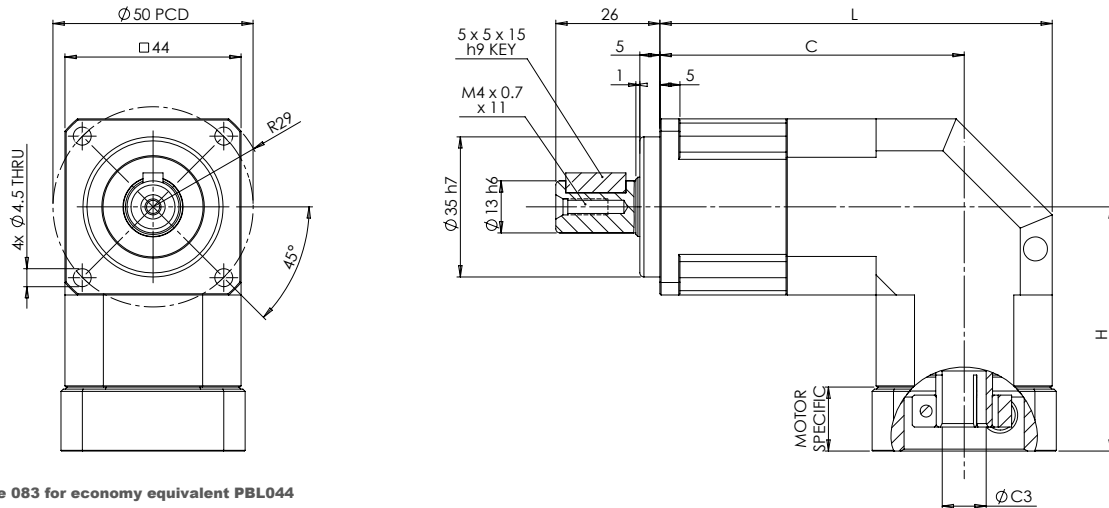
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	-	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SBL044

Precision Range – Right Angle



NOTE: See page 083 for economy equivalent PBL044

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	19	34	57	0.09
	4:1	16	28	48	0.09
	5:1	16	28	48	0.09
	6:1	15	27	45	0.09
	7:1	15	27	45	0.09
	8:1	14	25	42	0.09
	9:1	13	23	39	0.09
	10:1	14	25	42	0.09
	12:1	15	27	45	0.03
	14:1	15	27	45	0.03
	16:1	14	25	42	0.03
	18:1	13	23	39	0.03
Double Stage (2A Only)	20:1	14	25	42	0.03
	15:1	19	34	57	0.09
	25:1	16	28	48	0.09
	30:1	15	27	45	0.09
	35:1	15	27	45	0.09
	40:1	14	25	42	0.09
	50:1	16	28	48	0.09
	60:1	15	27	45	0.09
	70:1	15	27	45	0.09
	80:1	14	25	42	0.09
	90:1	13	23	39	0.09
	100:1	14	25	42	0.09
	120:1	15	27	45	0.03
	140:1	15	27	45	0.03
	160:1	14	25	42	0.03
	180:1	13	23	39	0.03
	200:1	14	25	42	0.03

Design Parameter	Stage vs Value	
	1	2 A
Dimension L (mm)	98	124
Dimension C (mm)	76	102
Dimension H Min. (mm)	61	
Gearbox Weight $\pm$ 3% (kg)	1	1.4
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing 11$	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	3	
Max. Radial Output Load (N)*	380	
Max. Axial Output Load (N)*	190	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 65	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

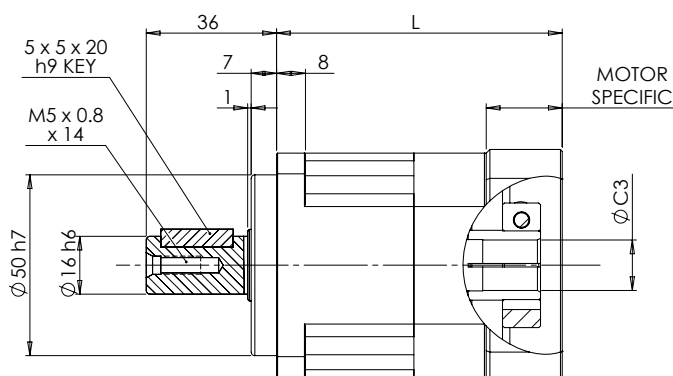
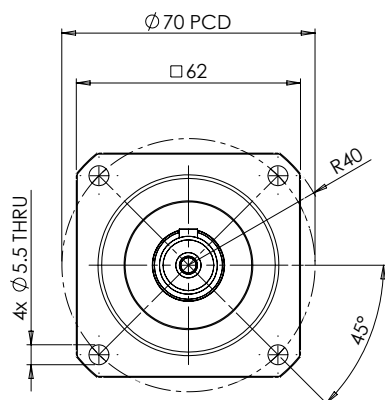
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	-	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SB062

Precision Range – In-line



NOTE: See page 084 for economy equivalent PB062

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	59	106	177	0.16
	4:1	51	91	153	0.14
	5:1	48	86	144	0.13
	6:1	45	81	135	0.13
	7:1	45	81	135	0.13
	8:1	43	77	129	0.13
	9:1	44	79	132	0.13
	10:1	43	77	129	0.13
Double Stage (2 & 2A)	15:1	59	106	177	0.03 (0.14)
	20:1	51	91	153	0.03 (0.14)
	25:1	48	86	144	0.03 (0.14)
	30:1	45	81	135	0.03 (0.14)
	35:1	45	81	135	0.03 (0.14)
	40:1	43	77	129	0.03 (0.14)
	50:1	48	86	144	0.03 (0.14)
	60:1	45	81	135	0.03 (0.14)
	70:1	45	81	135	0.03 (0.14)
	80:1	43	77	129	0.03 (0.14)
	90:1	44	79	132	0.03 (0.14)
	100:1	43	77	129	0.03 (0.14)
Triple Stage (3A Only)	125:1	48	86	144	0.01
	150:1	59	106	177	0.01
	175:1	45	81	135	0.01
	200:1	51	91	153	0.01
	300:1	45	81	135	0.01
	400:1	43	77	129	0.01
	500:1	48	86	144	0.01
	600:1	45	81	135	0.01
	700:1	45	81	135	0.01
	800:1	43	77	129	0.01
	900:1	44	79	132	0.01
	1000:1	43	77	129	0.01

Design Parameter	Stage vs Value			
	1	2A	2	3A
Dimension L Min. (mm)	79	112	103	129
Gearbox Weight ± 3% (kg)	1.3	2	1.7	4
Minimum Efficiency (%)	≥ 97	≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø19		Ø11	
Set Collar Bolt Torque (Nm)	10		4.8	
Nom. Input Speed (rpm)	3000			
Max. Input Speed (rpm)	6000			
Torsional Rigidity (Nm/moa)	6			
Max. Radial Output Load (N)*	1180			
Max. Axial Output Load (N)*	590			
Operating Temp Range (°C)	- 25 / + 90			
Protection Rating (IP)	IP65			
Max. Noise Level (dB)**	≤ 58			

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	-	-	-

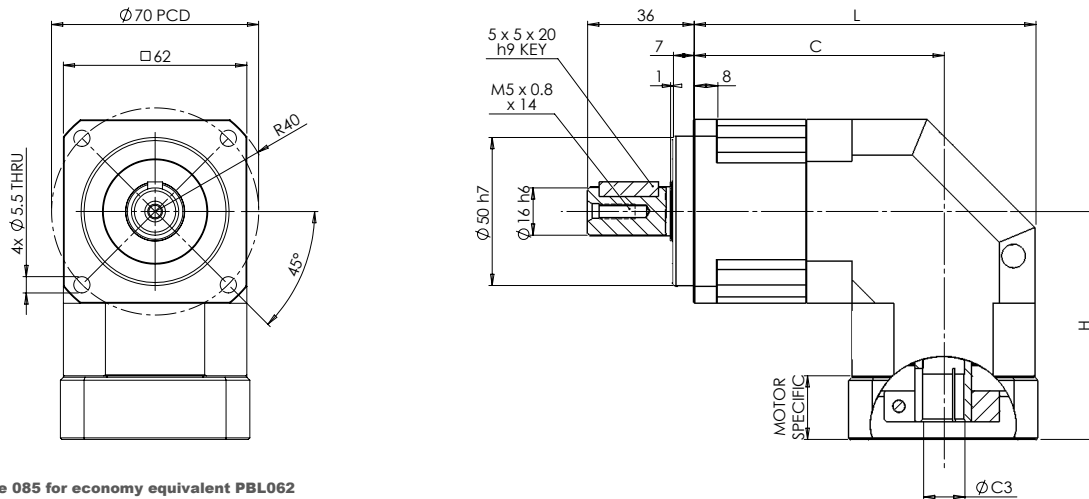
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SBL062

Precision Range – Right Angle



NOTE: See page 085 for economy equivalent PBL062

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	59	106	177	0.36
	4:1	51	91	153	0.36
	5:1	48	86	144	0.36
	6:1	45	81	135	0.36
	7:1	45	81	135	0.36
	8:1	43	77	129	0.36
	9:1	44	79	132	0.36
	10:1	43	77	129	0.08
	12:1	45	81	135	0.08
	14:1	45	81	135	0.08
	16:1	43	77	129	0.08
	18:1	44	79	132	0.08
Double Stage (2 & 2A)	20:1	43	77	129	0.08
	15:1	59	106	177	0.09 (0.36)
	25:1	48	86	144	0.09 (0.36)
	30:1	45	81	135	0.09 (0.36)
	35:1	45	81	135	0.09 (0.36)
	40:1	43	77	129	0.09 (0.36)
	50:1	48	86	144	0.09 (0.36)
	60:1	45	81	135	0.09 (0.36)
	70:1	45	81	135	0.09 (0.36)
	80:1	43	77	129	0.09 (0.36)
	90:1	44	79	132	0.09 (0.36)
	100:1	43	77	129	0.09 (0.36)
	120:1	45	81	135	0.03 (0.08)
	140:1	45	81	135	0.03 (0.08)
	160:1	43	77	129	0.03 (0.08)
	180:1	44	79	132	0.03 (0.08)
	200:1	43	77	129	0.03 (0.08)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	115.5	149.3	132.5
Dimension C (mm)	84.5	118.3	110.5
Dimension H Min. (mm)	77		61
Gearbox Weight ± 3% (kg)	2.3	3	2
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø19		Ø11
Set Collar Bolt Torque (Nm)	10		4.8
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	6		
Max. Radial Output Load (N)*	1180		
Max. Axial Output Load (N)*	590		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 68		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	-	-

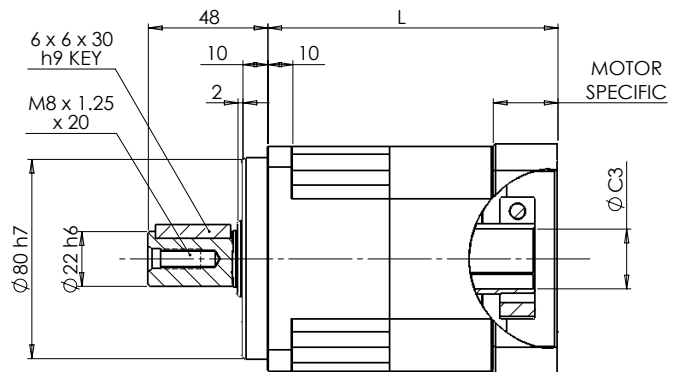
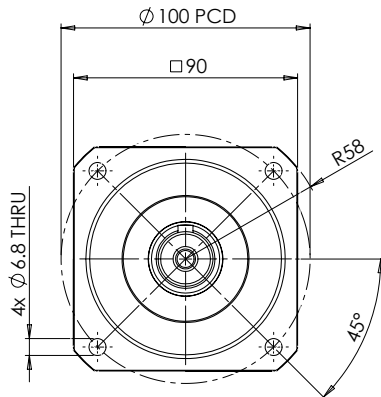
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SB090

Precision Range – In-line



NOTE: See page 086 for economy equivalent PB090

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	165	297	495	0.61
	4:1	146	262	438	0.48
	5:1	160	288	480	0.47
	6:1	151	271	453	0.45
	7:1	149	268	447	0.45
	8:1	143	257	429	0.44
	9:1	145	261	435	0.44
	10:1	141	253	423	0.44
Double Stage (2 & 2A)	15:1	165	297	495	0.14 (0.46)
	20:1	146	262	438	0.14 (0.46)
	25:1	160	288	480	0.14 (0.46)
	30:1	151	271	453	0.14 (0.46)
	35:1	149	268	447	0.14 (0.44)
	40:1	143	257	429	0.14 (0.44)
	50:1	160	288	480	0.14 (0.44)
	60:1	151	271	453	0.14 (0.43)
	70:1	149	268	447	0.14 (0.43)
	80:1	143	257	429	0.14 (0.43)
	90:1	145	261	435	0.14 (0.43)
	100:1	141	253	423	0.14 (0.43)
Triple Stage (3 & 3A)	125:1	160	288	480	0.01
	150:1	165	297	495	0.01
	175:1	149	268	447	0.01
	200:1	146	262	438	0.01
	300:1	151	271	453	0.01
	400:1	143	257	429	0.01
	500:1	160	288	480	0.01
	600:1	151	271	453	0.01
	700:1	149	268	447	0.01
	800:1	143	257	429	0.01
	900:1	145	261	435	0.01
	1000:1	141	253	423	0.01

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	116	160	124	158	149
Gearbox Weight ± 3% (kg)	3.7	5.5	4.7	6.5	5.2
Minimum Efficiency (%)	≥ 97		≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø24		Ø19		Ø11
Set Collar Bolt Torque (Nm)	16.3		10		4.8
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	6000				
Torsional Rigidity (Nm/moa)	14				
Max. Radial Output Load (N)*	3200				
Max. Axial Output Load (N)*	1600				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 60				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	-	-

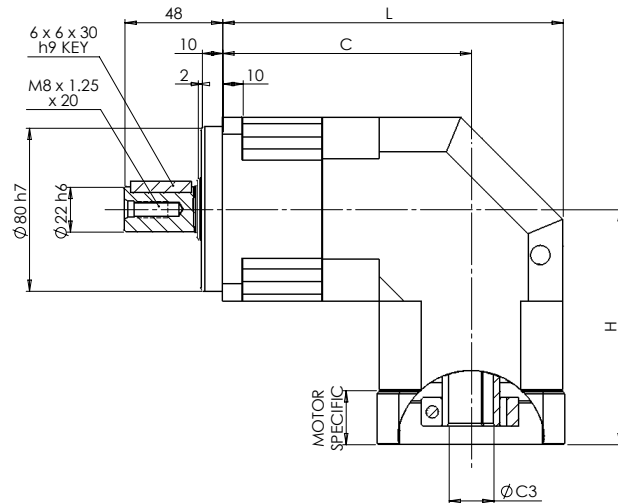
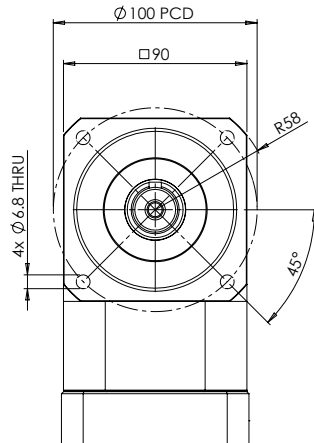
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SBL090

Precision Range – Right Angle



NOTE: See page 087 for economy equivalent PBL090

NOTE: Output shaft available without keyway as an option

Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	165	297	495
	4:1	146	262	438
	5:1	160	288	480
	6:1	151	271	453
	7:1	149	268	447
	8:1	143	257	429
	9:1	145	261	435
	10:1	141	253	423
	12:1	151	271	453
	14:1	149	268	447
	16:1	143	257	429
	18:1	145	261	435
Double Stage (2 & 2A)	20:1	141	253	423
	15:1	165	297	495
	25:1	160	288	480
	30:1	151	271	453
	35:1	149	268	447
	40:1	143	257	429
	50:1	160	288	480
	60:1	151	271	453
	70:1	149	268	447
	80:1	143	257	429
	90:1	145	261	435
	100:1	141	253	423
	120:1	151	271	453
	140:1	149	268	447
	160:1	143	257	429
	180:1	145	261	435
	200:1	141	253	423

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	167.1	210.6	161
Dimension C (mm)	122.1	165.6	130
Dimension H Min. (mm)	115		77
Gearbox Weight ± 3% (kg)	6.6	8.2	5.5
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø24		Ø19
Set Collar Bolt Torque (Nm)	16.3		10
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	14		
Max. Radial Output Load (N)*	3200		
Max. Axial Output Load (N)*	1600		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 70		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
P2	Standard	≤ 8
P1	Reduced	≤ 6
P0	Micro	≤ 4
PS	Super	≤ 2

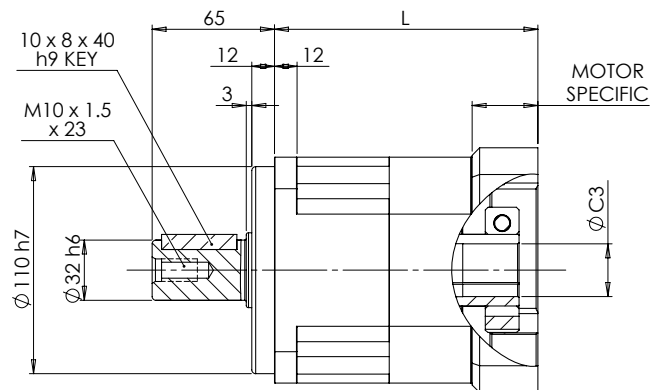
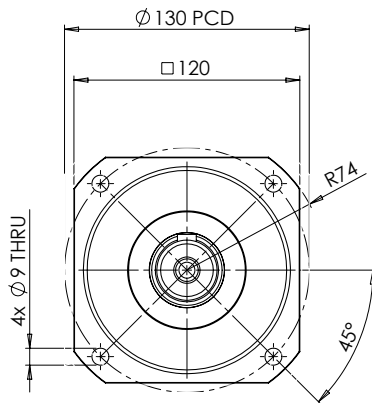
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SB120

Precision Range – In-line



NOTE: See page 088 for economy equivalent PB120
NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	335	603	1005	3.25
	4:1	300	540	900	2.74
	5:1	333	599	999	2.71
	6:1	311	559	933	2.65
	7:1	309	556	927	2.62
	8:1	298	536	894	2.58
	9:1	278	500	834	2.57
	10:1	294	529	882	2.57
Double Stage (2 & 2A)	15:1	335	603	1005	0.46 (2.63)
	20:1	300	540	900	0.46 (2.63)
	25:1	333	599	999	0.46 (2.63)
	30:1	311	559	933	0.46 (2.63)
	35:1	309	556	927	0.44 (2.43)
	40:1	298	536	894	0.44 (2.43)
	50:1	333	599	999	0.44 (2.43)
	60:1	311	559	933	0.43 (2.39)
	70:1	309	556	927	0.43 (2.39)
	80:1	298	536	894	0.43 (2.39)
Triple Stage (3 & 3A)	90:1	278	500	834	0.43 (2.39)
	100:1	294	529	882	0.43 (2.39)
	125:1	333	599	999	0.04
	150:1	335	603	1005	0.04
	175:1	309	556	927	0.04
	200:1	300	540	900	0.04
	300:1	311	559	933	0.04
	400:1	298	536	894	0.04
	500:1	333	599	999	0.04
	600:1	311	559	933	0.04
	700:1	309	556	927	0.04
	800:1	298	536	894	0.04
	900:1	278	500	834	0.04
	1000:1	294	529	882	0.04

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	140	196	176	219	184
Gearbox Weight $\pm$ 3% (kg)	8	11	9.5	13	10
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94		$\geq$ 90	
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 32		$\varnothing$ 24		$\varnothing$ 19
Set Collar Bolt Torque (Nm)	41		16.3		10
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	5000				
Torsional Rigidity (Nm/moa)	27				
Max. Radial Output Load (N)*	6800				
Max. Axial Output Load (N)*	3400				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	$\leq$ 63				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	$\leq$ 7	$\leq$ 9	$\leq$ 11
P1	Reduced	$\leq$ 5	$\leq$ 7	$\leq$ 9
P0	Micro	$\leq$ 3	$\leq$ 5	$\leq$ 7
PS	Super	$\leq$ 1	$\leq$ 3	$\leq$ 5

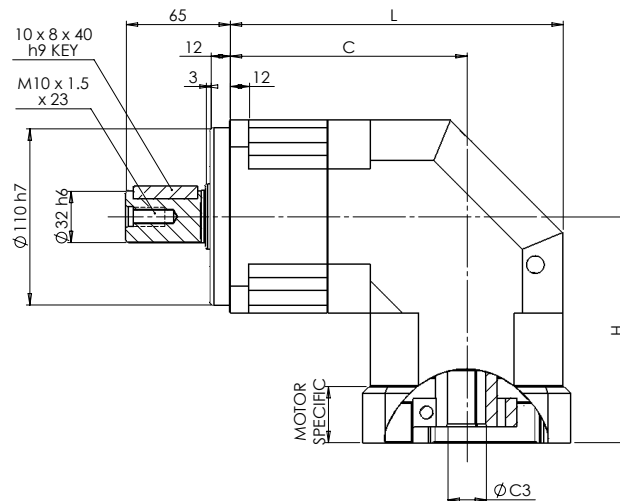
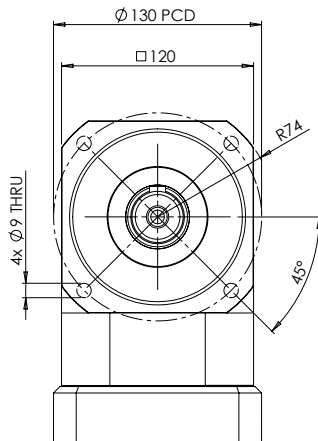
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SBL120

Precision Range – Right Angle



NOTE: See page 089 for economy equivalent PBL120

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	335	603	1005	6.85
	4:1	300	540	900	6.85
	5:1	333	599	999	6.85
	6:1	311	559	933	6.85
	7:1	309	556	927	6.85
	8:1	298	536	894	6.85
	9:1	278	500	834	6.85
	10:1	294	529	882	6.85
	12:1	311	559	933	6.20
	14:1	309	556	927	6.20
	16:1	298	536	894	6.20
	18:1	278	500	834	6.20
Double Stage (2 & 2A)	20:1	294	529	882	6.20
	15:1	335	603	1005	2.28 (6.85)
	25:1	333	599	999	2.28 (6.85)
	30:1	311	559	933	2.28 (6.85)
	35:1	309	556	927	2.28 (6.85)
	40:1	298	536	894	2.28 (6.85)
	50:1	333	599	999	2.28 (6.85)
	60:1	311	559	933	2.28 (6.85)
	70:1	309	556	927	2.28 (6.85)
	80:1	298	536	894	2.28 (6.85)
	90:1	278	500	834	2.28 (6.85)
	100:1	294	529	882	2.28 (6.85)
	120:1	311	559	933	1.88 (6.20)
	140:1	309	556	927	1.88 (6.20)
	160:1	298	536	894	1.88 (6.20)
	180:1	278	500	834	1.88 (6.20)
	200:1	294	529	882	1.88 (6.20)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	208	264	266.6
Dimension C (mm)	148	204	181.6
Dimension H Min. (mm)	141		115
Gearbox Weight ± 3% (kg)	13.2	14.5	12.5
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø32		Ø24
Set Collar Bolt Torque (Nm)	41		16.3
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	27		
Max. Radial Output Load (N)*	6800		
Max. Axial Output Load (N)*	3400		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 72		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

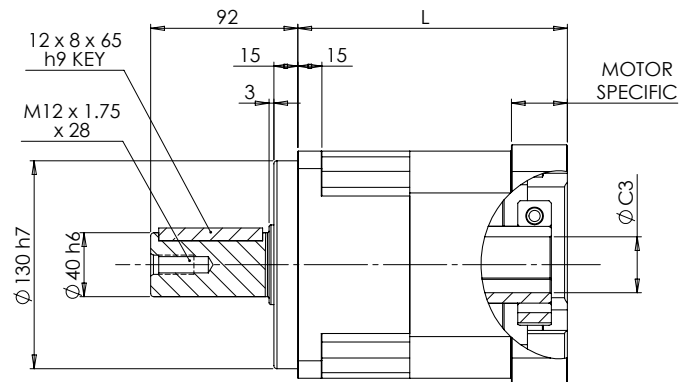
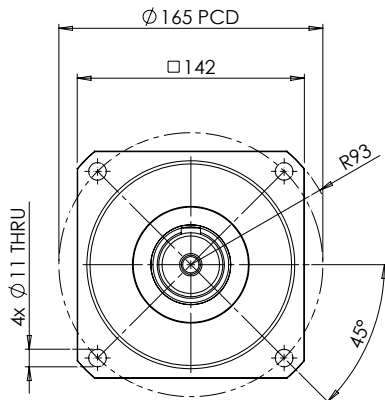
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SB142

Precision Range – In-line



NOTE: See page 090 for economy equivalent PB142

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	625	1125	1875	9.21
	4:1	555	999	1665	7.54
	5:1	618	1112	1854	7.42
	6:1	583	1049	1749	7.25
	7:1	573	1031	1719	7.14
	8:1	553	995	1659	7.07
	9:1	516	928	1548	7.04
	10:1	549	988	1647	7.03
Double Stage (2 & 2A)	15:1	625	1125	1875	2.63 (7.30)
	20:1	555	999	1665	2.63 (7.30)
	25:1	618	1112	1854	2.63 (7.10)
	30:1	583	1049	1749	2.43 (7.10)
	35:1	573	1031	1719	2.43 (7.10)
	40:1	553	995	1659	2.43 (6.92)
	50:1	618	1112	1854	2.43 (6.92)
	60:1	583	1049	1749	2.39 (6.72)
	70:1	573	1031	1719	2.39 (6.72)
	80:1	553	995	1659	2.39 (6.72)
	90:1	516	928	1548	2.39 (6.72)
	100:1	549	988	1647	2.39 (6.72)
Triple Stage (3 & 3A)	125:1	618	1112	1854	0.71
	150:1	583	1049	1749	0.51
	175:1	573	1031	1719	0.40
	200:1	555	999	1665	0.21
	300:1	583	1049	1749	0.09
	400:1	553	995	1659	0.09
	500:1	618	1112	1854	0.08
	600:1	583	1049	1749	0.08
	700:1	573	1031	1719	0.08
	800:1	553	995	1659	0.08
	900:1	516	928	1548	0.08
	1000:1	549	988	1647	0.08

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	168	235	206	262	242
Gearbox Weight ± 3% (kg)	14.3	21	17.2	30	18.1
Minimum Efficiency (%)	≥ 97		≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø38		Ø32		Ø24
Set Collar Bolt Torque (Nm)	81		41		16.3
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	5000				
Torsional Rigidity (Nm/moa)	60				
Max. Radial Output Load (N)*	9300				
Max. Axial Output Load (N)*	4650				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 65				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	≤ 3	≤ 5

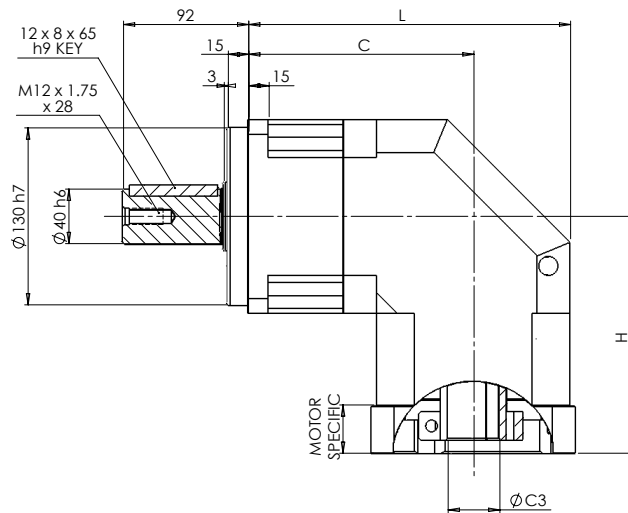
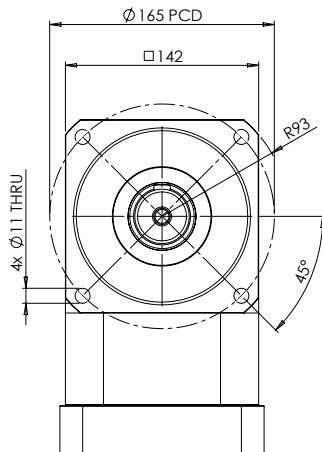
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SBL142

Precision Range – Right Angle



NOTE: See page 091 for economy equivalent PBL142

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	625	1125	1875	23.5
	4:1	555	999	1665	23.5
	5:1	618	1112	1854	23.5
	6:1	583	1049	1749	23.5
	7:1	573	1031	1719	23.5
	8:1	553	995	1659	23.5
	9:1	516	928	1548	23.5
	10:1	549	988	1647	23.5
	12:1	583	1049	1749	21.8
	14:1	573	1031	1719	21.8
	16:1	553	995	1659	21.8
	18:1	516	928	1548	21.8
	20:1	549	988	1647	21.8
Double Stage (2 & 2A)	15:1	625	1125	1875	6.85 (23.5)
	25:1	618	1112	1854	6.85 (23.5)
	30:1	583	1049	1749	6.85 (23.5)
	35:1	573	1031	1719	6.85 (23.5)
	40:1	553	995	1659	6.85 (23.5)
	50:1	618	1112	1854	6.85 (23.5)
	60:1	583	1049	1749	6.85 (23.5)
	70:1	573	1031	1719	6.85 (23.5)
	80:1	553	995	1659	6.85 (23.5)
	90:1	516	928	1548	6.85 (23.5)
	100:1	549	988	1647	6.85 (23.5)
	120:1	583	1049	1749	6.20 (21.8)
	140:1	573	1031	1719	6.20 (21.8)
	160:1	553	995	1659	6.20 (21.8)
	180:1	516	928	1548	6.20 (21.8)
	200:1	549	988	1647	6.20 (21.8)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	236.5	303	274.5
Dimension C (mm)	165.5	232	214.5
Dimension H Min. (mm)	174		141
Gearbox Weight ± 3% (kg)	22.3	25.2	23.2
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø38		Ø32
Set Collar Bolt Torque (Nm)	81		41
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	60		
Max. Radial Output Load (N)*	9300		
Max. Axial Output Load (N)*	4650		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 74		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

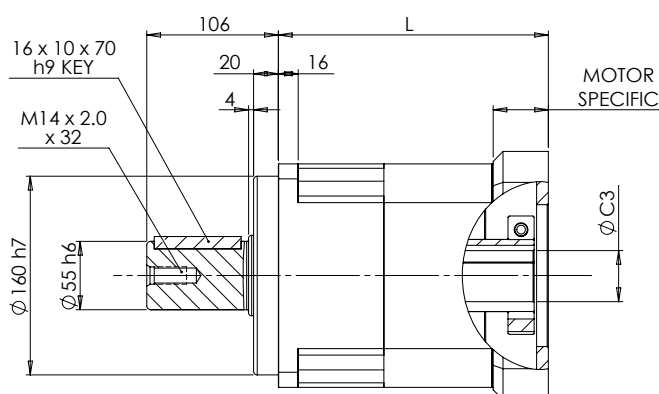
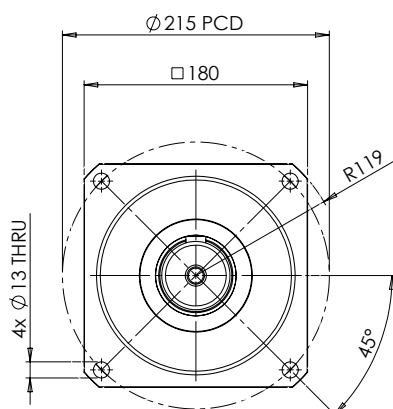
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SB180

Precision Range – In-line



NOTE: See page 092 for economy equivalent PB180
NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1206	2170	3618	28.98
	4:1	1069	1924	3207	23.67
	5:1	1189	2140	3567	23.29
	6:1	1118	2012	3354	22.75
	7:1	1108	1994	3324	22.48
	8:1	1070	1926	3210	22.59
	9:1	993	1787	2979	22.53
	10:1	1059	1906	3177	22.51
Double Stage (2 & 2A)	15:1	1206	2170	3618	7.30 (22.79)
	20:1	1069	1924	3207	7.30 (22.79)
	25:1	1189	2140	3567	7.10 (22.79)
	30:1	1118	2012	3354	7.10 (22.59)
	35:1	1108	1994	3324	7.10 (22.59)
	40:1	1070	1926	3210	6.92 (22.59)
	50:1	1189	2140	3567	6.92 (22.59)
	60:1	1118	2012	3354	6.72 (22.83)
	70:1	1108	1994	3324	6.72 (21.83)
	80:1	1070	1926	3210	6.72 (21.83)
	90:1	993	1787	2979	6.72 (21.60)
	100:1	1059	1906	3177	6.72 (21.83)
Triple Stage (3 & 3A)	125:1	1189	2140	3567	1.42
	150:1	1206	2170	3618	0.92
	175:1	1108	1994	3324	0.83
	200:1	1069	1924	3207	0.65
	300:1	1118	2012	3354	0.21
	400:1	1070	1926	3210	0.21
	500:1	1189	2140	3567	0.12
	600:1	1118	2012	3354	0.12
	700:1	1108	1994	3324	0.12
	800:1	1070	1926	3210	0.12
	900:1	993	1787	2979	0.12
	1000:1	1059	1906	3177	0.12

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	217	298	252	319	290
Gearbox Weight ± 3% (kg)	28.3	42	34.1	57	35
Minimum Efficiency (%)	≥ 97	≥ 94		≥ 90	
Max. Input Shaft ØC3 (mm)	Ø55		Ø38		Ø32
Set Collar Bolt Torque (Nm)	81		81		41
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	4000				
Torsional Rigidity (Nm/moa)	140				
Max. Radial Output Load (N)*	15600				
Max. Axial Output Load (N)*	7800				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 67				

* Applied at shaft centre @ 100 rpm output
 ** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	$\leq$ 7	$\leq$ 9	$\leq$ 11
P1	Reduced	$\leq$ 5	$\leq$ 7	$\leq$ 9
P0	Micro	$\leq$ 3	$\leq$ 5	$\leq$ 7
PS	Super	$\leq$ 1	$\leq$ 3	$\leq$ 5

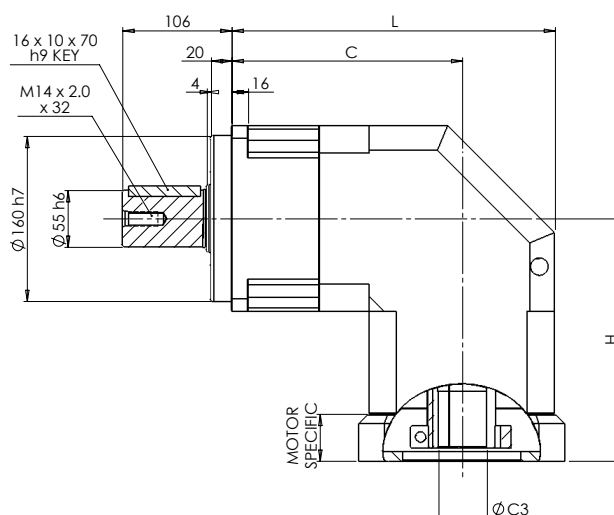
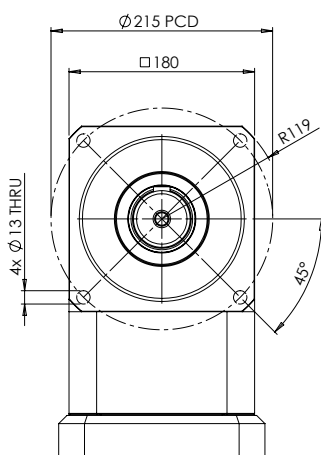
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SBL180

Precision Range – Right Angle



NOTE: See page 093 for economy equivalent PBL180

NOTE: Output shaft available without keyway as an option

Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1206	2170	68.2
	4:1	1069	1924	68.2
	5:1	1189	2140	68.2
	6:1	1118	2012	68.2
	7:1	1108	1994	68.2
	8:1	1070	1926	68.2
	9:1	993	1787	68.2
	10:1	1059	1906	68.2
	12:1	1118	2012	65.5
	14:1	1108	1994	65.5
	16:1	1070	1926	65.5
	18:1	993	1787	65.5
Double Stage (2 & 2A)	20:1	1059	1906	65.5
	15:1	1206	2170	26.2 (55.2)
	25:1	1189	2140	23.1 (50.4)
	30:1	1118	2012	23.1 (50.4)
	35:1	1108	1994	23.1 (50.4)
	40:1	1070	1926	23.1 (50.4)
	50:1	1189	2140	23.1 (50.4)
	60:1	1118	2012	23.1 (50.4)
	70:1	1108	1994	23.1 (50.4)
	80:1	1070	1926	23.1 (50.4)
	90:1	993	1787	23.1 (50.4)
	100:1	1059	1906	23.1 (50.4)
	120:1	1118	2012	21.2 (48.7)
	140:1	1108	1994	21.2 (48.7)
	160:1	1070	1926	21.2 (48.7)
	180:1	993	1787	21.2 (48.7)
	200:1	1059	1906	21.2 (48.7)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	313.6	394.6	320.5
Dimension C (mm)	223.6	304.6	249.5
Dimension H Min. (mm)	235		174
Gearbox Weight ± 3% (kg)	50	52.4	44.4
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø55		Ø38
Set Collar Bolt Torque (Nm)	81		81
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	4000		
Torsional Rigidity (Nm/moa)	140		
Max. Radial Output Load (N)*	15600		
Max. Axial Output Load (N)*	7800		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 76		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

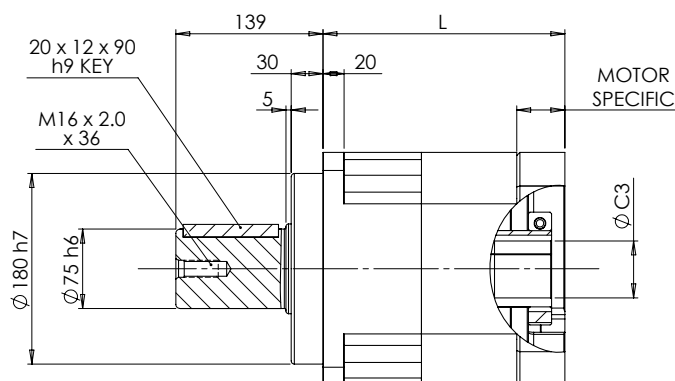
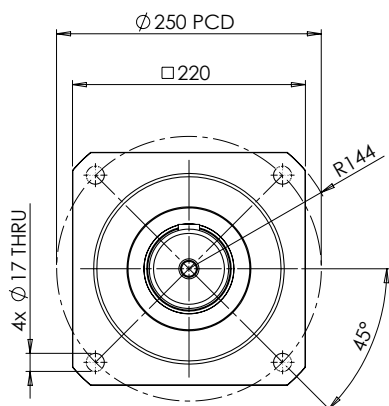
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SB220

Precision Range – In-line



NOTE: See page 094 for economy equivalent PB220

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	2030	3654	6090	59.61
	4:1	1804	3247	5412	54.37
	5:1	2010	3618	6030	53.27
	6:1	1911	3439	5733	51.72
	7:1	1870	3366	5610	50.97
	8:1	1824	3283	5472	50.84
	9:1	1694	3049	5082	50.63
	10:1	1779	3202	5337	50.56
Double Stage (2 & 2A)	15:1	2030	3654	6090	22.79 (56.98)
	20:1	1804	3247	5412	22.79 (56.98)
	25:1	2010	3618	6030	22.79 (56.98)
	30:1	1911	3439	5733	22.59 (56.48)
	35:1	1870	3366	5610	22.59 (56.48)
	40:1	1824	3283	5472	22.59 (56.48)
	50:1	2010	3618	6030	22.59 (56.48)
	60:1	1911	3439	5733	22.83 (54.58)
	70:1	1870	3366	5610	21.83 (54.58)
	80:1	1824	3283	5472	21.83 (54.58)
	90:1	1694	3049	5082	21.60 (54.00)
	100:1	1779	3202	5337	21.60 (54.58)
Triple Stage (3 & 3A)	125:1	2010	3618	6030	3.29
	150:1	2030	3654	6090	2.15
	175:1	1870	3366	5610	1.26
	200:1	1804	3247	5412	0.98
	300:1	1911	3439	5733	0.82
	400:1	1824	3283	5472	0.82
	500:1	2010	3618	6030	0.51
	600:1	1911	3439	5733	0.25
	700:1	1870	3366	5610	0.25
	800:1	1824	3283	5472	0.25
	900:1	1694	3049	5082	0.25
	1000:1	1779	3202	5337	0.25

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	228	321	307	388	342
Gearbox Weight ± 3% (kg)	42.5	59	57.3	87	63.7
Minimum Efficiency (%)	≥ 97		≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø55			Ø38	
Set Collar Bolt Torque (Nm)	81			81	
Nom. Input Speed (rpm)	2000				
Max. Input Speed (rpm)	3000				
Torsional Rigidity (Nm/moa)	240				
Max. Radial Output Load (N)*	51000				
Max. Axial Output Load (N)*	25500				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 70				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	≤ 3	≤ 5

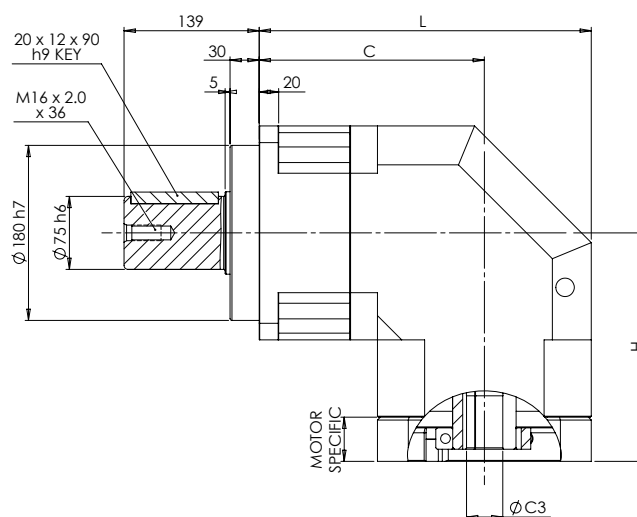
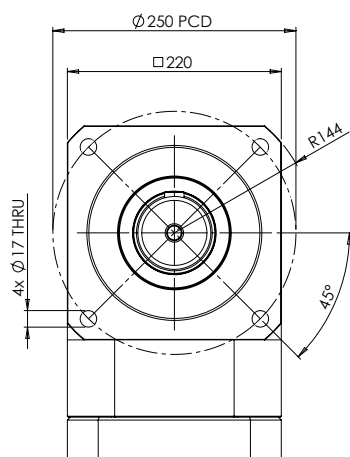
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SBL220

Precision Range – Right Angle



NOTE: See page 095 for economy equivalent PBL220

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	2030	3654	6090	135.0
	4:1	1804	3247	5412	135.0
	5:1	2010	3618	6030	135.0
	6:1	1911	3439	5733	135.0
	7:1	1870	3366	5610	135.0
	8:1	1824	3283	5472	135.0
	9:1	1694	3049	5082	135.0
	10:1	1779	3202	5337	135.0
	12:1	1911	3439	5733	119.2
	14:1	1870	3366	5610	119.2
	16:1	1824	3283	5472	119.2
	18:1	1694	3049	5082	119.2
	20:1	1779	3202	5337	119.2
Double Stage (2 & 2A)	15:1	2030	3654	6090	70.1 (80.2)
	25:1	2010	3618	6030	68.2 (76.5)
	30:1	1911	3439	5733	68.2 (76.5)
	35:1	1870	3366	5610	68.2 (76.5)
	40:1	1824	3283	5472	68.2 (76.5)
	50:1	2010	3618	6030	68.2 (76.5)
	60:1	1911	3439	5733	68.2 (76.5)
	70:1	1870	3366	5610	68.2 (76.5)
	80:1	1824	3283	5472	68.2 (76.5)
	90:1	1694	3049	5082	68.2 (76.5)
	100:1	1779	3202	5337	68.2 (76.5)
	120:1	1911	3439	5733	65.1 (74.2)
	140:1	1870	3366	5610	65.1 (74.2)
	160:1	1824	3283	5472	65.1 (74.2)
	180:1	1694	3049	5082	65.1 (74.2)
	200:1	1779	3202	5337	65.1 (74.2)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	341.6	434.6	403.6
Dimension C (mm)	231.6	324.6	313.6
Dimension H Min. (mm)	235		
Gearbox Weight ± 3% (kg)	75.2	94.8	79.5
Minimum Efficiency (%)	≥ 95	≥ 92	
Max. Input Shaft ØC3 (mm)	Ø55		
Set Collar Bolt Torque (Nm)	81		
Nom. Input Speed (rpm)	2000		
Max. Input Speed (rpm)	3000		
Torsional Rigidity (Nm/moa)	240		
Max. Radial Output Load (N)*	51000		
Max. Axial Output Load (N)*	25500		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 78		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

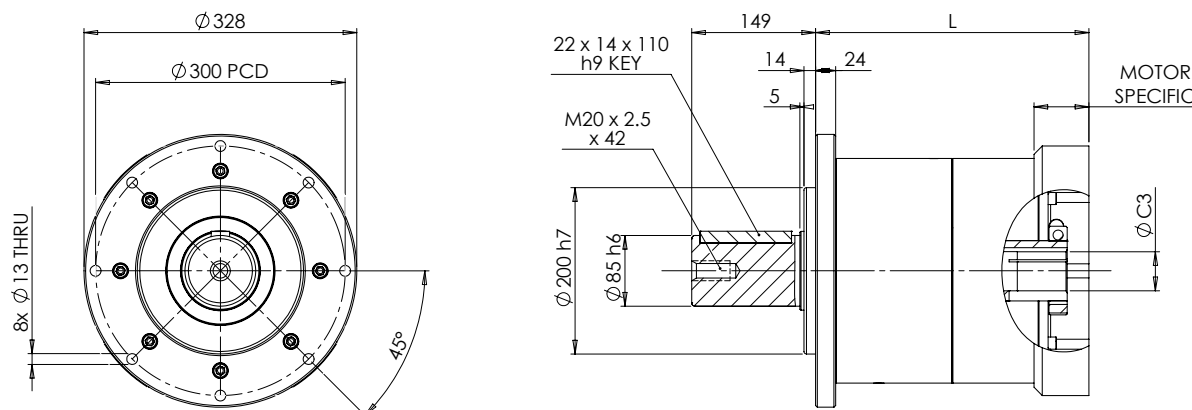
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SB270

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	4770	8586	14310	122.20
	4:1	4730	8514	14190	111.46
	5:1	4680	8424	14040	109.20
	7:1	4570	8226	13710	104.49
	10:1	4420	7956	13260	103.65
Double Stage (2 & 2A)	15:1	4770	8586	14310	63.81 (65.74)
	20:1	4730	8514	14190	63.81 (65.74)
	25:1	4680	8424	14040	63.81 (65.74)
	30:1	4620	8316	13860	63.25 (64.86)
	35:1	4570	8226	13710	63.25 (64.86)
	40:1	4520	8136	13560	63.25 (64.86)
	50:1	4680	8424	14040	63.25 (64.86)
	70:1	4570	8226	13710	61.12 (62.62)
	100:1	4420	7956	13260	60.48 (61.17)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	326	437	395
Gearbox Weight $\pm$ 3% (kg)	97	146	137
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94	
Max. Input Shaft ØC3 (mm)	Ø70		Ø55
Set Collar Bolt Torque (Nm)	110		81
Nom. Input Speed (rpm)	2000		
Max. Input Speed (rpm)	3000		
Torsional Rigidity (Nm/moa)	510		
Max. Radial Output Load (N)*	107100		
Max. Axial Output Load (N)*	53550		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	$\leq$ 72		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	$\leq$ 7	$\leq$ 9
P1	Reduced	$\leq$ 5	$\leq$ 7
P0	Micro	$\leq$ 3	$\leq$ 5
PS	Super	$\leq$ 1	$\leq$ 3

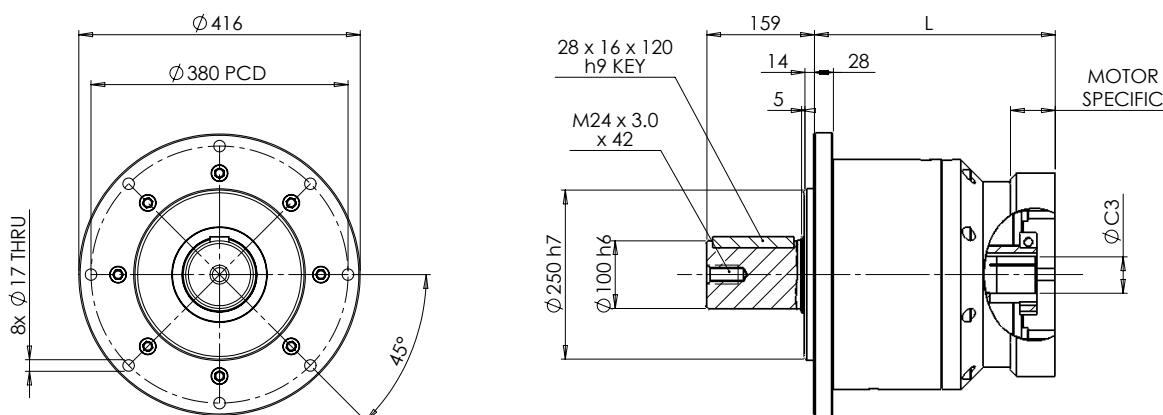
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SB330

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	8790	15822	26370	252.96
	4:1	8730	15714	26190	230.72
	5:1	8660	15588	25980	226.05
	7:1	8520	15336	25560	216.29
	10:1	8310	14958	24930	214.55
Double Stage (2 Only)	15:1	8790	15822	26370	185.05
	20:1	8730	15714	26190	185.05
	25:1	8660	15588	25980	185.05
	30:1	8610	15498	25830	183.43
	35:1	8520	15336	25560	183.43
	40:1	8440	15192	25320	183.43
	50:1	8660	15588	25980	183.43
	70:1	8520	15336	25560	177.26
	100:1	8310	14958	24930	175.39

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	353	466
Gearbox Weight $\pm$ 3% (kg)	190	270
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94
Max. Input Shaft ØC3 (mm)	Ø75	Ø70
Set Collar Bolt Torque (Nm)	110	110
Nom. Input Speed (rpm)	2000	
Max. Input Speed (rpm)	3000	
Torsional Rigidity (Nm/moa)	980	
Max. Radial Output Load (N)*	224910	
Max. Axial Output Load (N)*	112455	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 74	

* Applied at shaft centre @ 100 rpm output

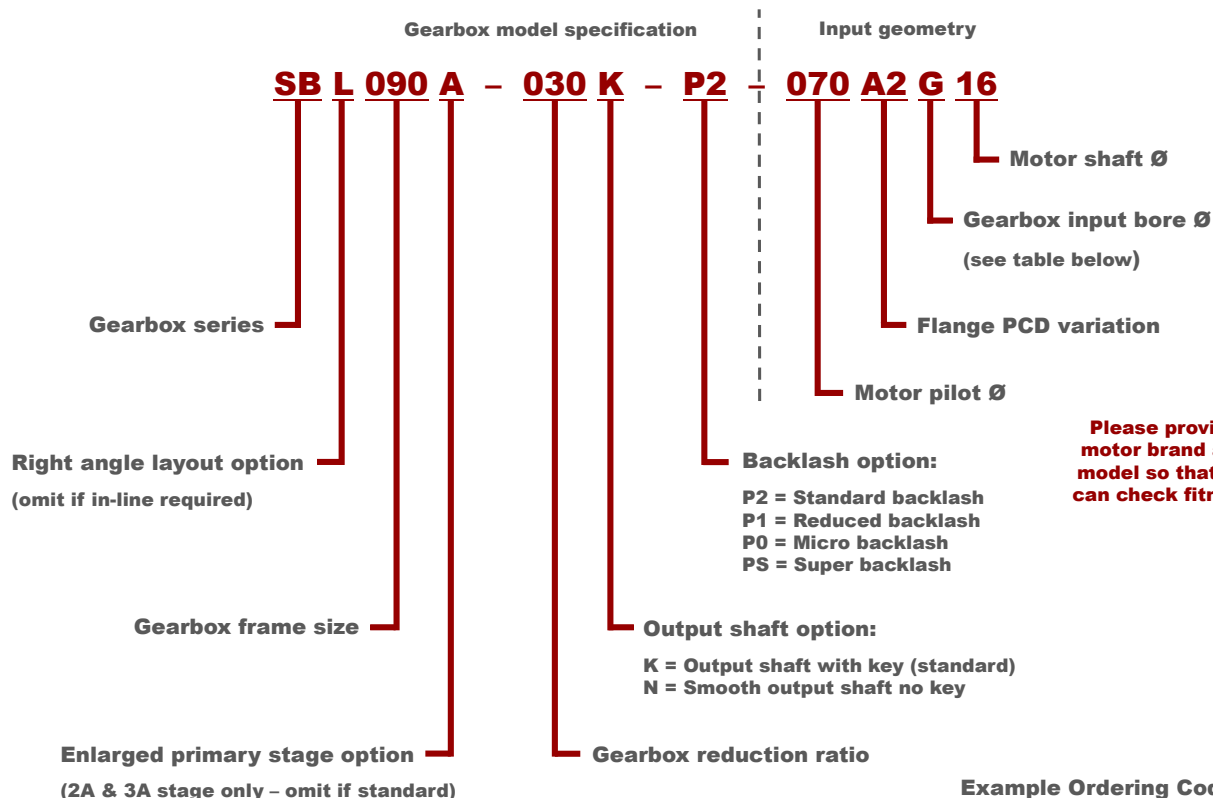
** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	$\leq$ 7	$\leq$ 9
P1	Reduced	$\leq$ 5	$\leq$ 7
P0	Micro	$\leq$ 3	$\leq$ 5
PS	Super	$\leq$ 1	$\leq$ 3

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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SB Series – Order Codes



Example Ordering Code:
SB062-010N-P0-060A1F14

SB Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes																	
Frame	Stage	B 8	C 9	E 11	F 14	G 19	H 22	J 24	K 28	L 32	M 35	N 38	P 42	Q 48	R 55	S 60	T 65	V 70	W 75
044	1 & 2A	X	X	X															
	1 & 2A				X	X													
	2 & 3A	X	X	X															
062	3 Only																		
	1 & 2A					X	X	X											
	2 & 3A				X	X													
090	3 Only	X	X	X															
	1 & 2A							X	X	X									
	2 & 3A					X	X	X											
120	3 Only				X	X													
	1 & 2A									X	X	X							
	2 & 3A																		
142	3 Only					X	X	X											
	1 & 2A																		
	2 & 3A																		
180	3 Only																		
	1 & 2A																		
	2 & 3A									X	X	X							
220	3 Only																		
	1 & 2A																		
	2 & 3A																		
270	3 Only									X	X	X							
	1 & 2A																		
	2 Only																		
330	3 Only																		
	1 & 2A																		
	2 Only																		

FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



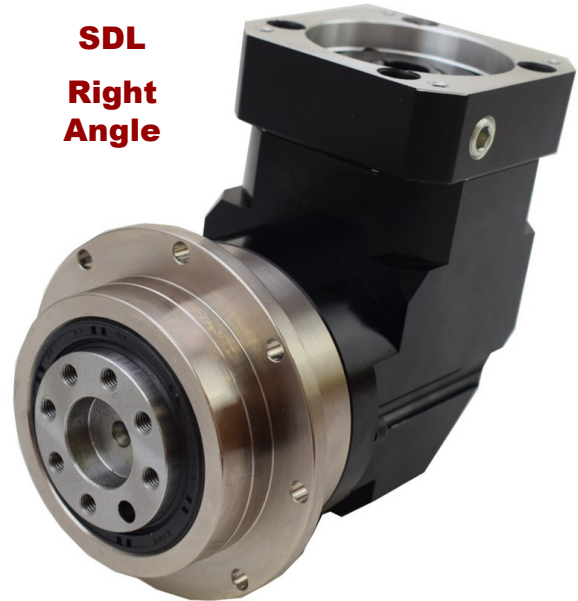
ServoBox – SD Series

Precision Range – In-line & Right Angle

SD In-line



**SDL
Right
Angle**



ISO 9409 rotary output flanges ideal for flange pinion mounting

Helical hardened & ground gearing for greater wear resistance

Option of standard ball bearings or taper roller bearings on output

7 standard gearbox frame sizes from 047 up to 255 frame

From 4:1 up to 200:1 reduction ratio across the range

Up to 2020 Nm nominal & 6360 Nm peak output torque

Backlash options starting from as low as ≤ 1 arcmin

Power transmission efficiency of up to $\geq 97\%$

Operating noise levels as low as 56 dB

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



SD Series – In-line

Precision Range – Performance Overview

Parameter	Stage / Ratio		SD 047	SD 064	SD 090	SD 110	SD 140	SD 200	SD 255
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single (1)	4:1	22	60	160	335	650	1200	2020
		5:1	20	50	155	333	618	1189	2010
		7:1	19	47	143	309	573	1108	1870
		10:1	16	43	136	294	549	1059	1779
	Double Stage (2)	20:1	22	60	160	335	650	1200	2020
		25:1	20	50	155	333	618	1189	2010
		35:1	19	47	143	309	573	1108	1870
		40:1	22	60	160	335	650	1200	2020
		50:1	20	50	155	333	618	1189	2010
		70:1	19	47	142	309	573	1108	1870
		100:1	16	43	136	294	549	1059	1779
Nominal Input Speed (rpm)	ALL		3000	3000	3000	3000	3000	3000	2000
Maximum Input Speed (rpm)	ALL		6000	6000	6000	6000	5000	4000	3000
Torsional Rigidity (Nm/moa)	ALL		6	14	30	86	155	450	1126
Max. Radial Ball Bearing (N)*	ALL		2040	2520	8460	12720	14070	35200	39600
Max. Axial Ball Bearing (N)*	ALL		1020	1260	4230	6360	7035	17600	19800
Max. Radial Taper Roller (N)*	ALL		-	-	14660	23000	37200	73600	107200
Max. Axial Taper Roller (N)*	ALL		-	-	7330	11500	18600	36800	53600
Maximum Noise Level (dB)**	ALL		≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70
PS Super Backlash (arcmin)	1		-	-	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
	2		-	-	-	≤ 3	≤ 3	≤ 3	≤ 3
P0 Micro Backlash (arcmin)	1		≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3
	2		≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
P1 Reduced Backlash (arcmin)	1		≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
	2		≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
P2 Standard Backlash (arcmin)	1		≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
	2		≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9
Gearbox Weight ± 3% (kg)	1		0.7	1.4	4.2	7.4	13.9	32.4	55
	2		1.0	1.9	4.8	9.4	16.7	40.1	64

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



SDL Series – Right Angle

Precision Range – Performance Overview

Parameter	Stage / Ratio	SDL 047	SDL 064	SDL 090	SDL 110	SDL 140	SDL 200	SDL 255	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	4:1	22	60	160	335	650	1200	2020
		5:1	20	50	155	333	618	1189	2010
		7:1	19	47	142	309	573	1108	1870
		10:1	20	50	136	294	549	1059	1779
		14:1	19	47	142	309	573	1108	1870
		20:1	16	43	136	294	549	1059	1779
	Double Stage (2)	25:1	20	50	155	333	618	1189	2010
		35:1	19	47	142	309	573	1108	1870
		40:1	22	60	160	335	650	1200	2020
		50:1	20	50	155	333	618	1189	2010
		70:1	19	47	142	309	573	1108	1870
		100:1	16	43	136	294	549	1059	1779
		140:1	19	47	142	309	573	1108	1870
		200:1	16	43	136	294	549	1059	1779
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	2000	
Maximum Input Speed (rpm)	ALL	6000	6000	6000	6000	5000	4000	3000	
Torsional Rigidity (Nm/moa)	ALL	6	14	30	86	155	450	1126	
Max. Radial Ball Bearing (N)*	ALL	2040	2520	8460	12720	14070	35200	39600	
Max. Axial Ball Bearing (N)*	ALL	1020	1260	4230	6360	7035	17600	19800	
Max. Radial Taper Roller (N)*	ALL	-	-	14660	23000	37200	73600	107200	
Max. Axial Taper Roller (N)*	ALL	-	-	7330	11500	18600	36800	53600	
Maximum Noise Level (dB)**	ALL	≤ 65	≤ 68	≤ 70	≤ 72	≤ 74	≤ 76	≤ 78	
PS Super Backlash (arcmin)	1	-	-	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	
	2	-	-	-	≤ 4	≤ 4	≤ 4	≤ 4	
P0 Micro Backlash (arcmin)	1	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	
	2	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
P1 Reduced Backlash (arcmin)	1	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	
	2	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	
P2 Standard Backlash (arcmin)	1	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	
	2	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	
Gearbox Weight ± 3% (kg)	1	1.1	2.3	6.9	13.4	23.0	51.2	81.6	
	2	1.4	2.0	6.0	11.8	22.3	48.5	97.5	

* Applied at shaft centre @ 100 rpm output

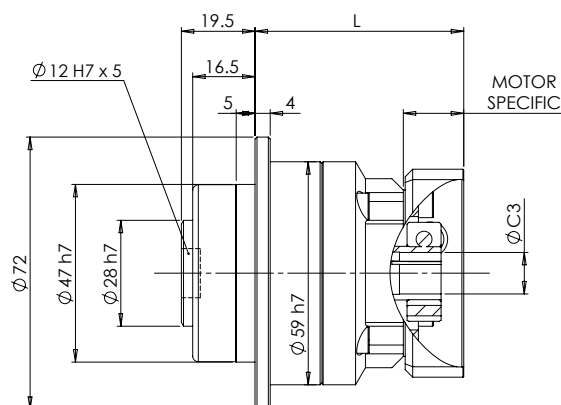
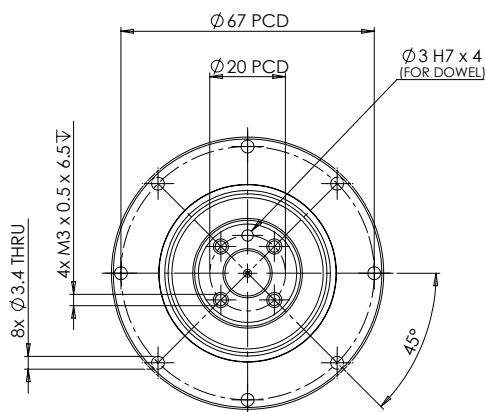
** Based on 10:1 ratio no load @ 3000 rpm input

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SD047

Precision Range – In-line



NOTE: Flange dimensions according to ISO 9409

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single (1)	4:1	22	39	66	0.03
	5:1	20	36	60	0.03
	7:1	19	34	57	0.03
	10:1	16	28	48	0.03
Double Stage (2)	20:1	22	39	66	0.03
	25:1	20	36	60	0.03
	35:1	19	34	57	0.03
	40:1	22	39	66	0.03
	50:1	20	36	60	0.03
	70:1	19	34	57	0.03
	100:1	16	28	48	0.03

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	55	81
Gearbox Weight $\pm$ 3% (kg)	0.7	1
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft ØC3 (mm)	Ø11	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	6	
Max. Radial Ball Bearing (N)*	2040	
Max. Axial Ball Bearing (N)*	1020	
Max. Radial Taper Roller (N)*	-	
Max. Axial Taper Roller (N)*	-	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 56	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

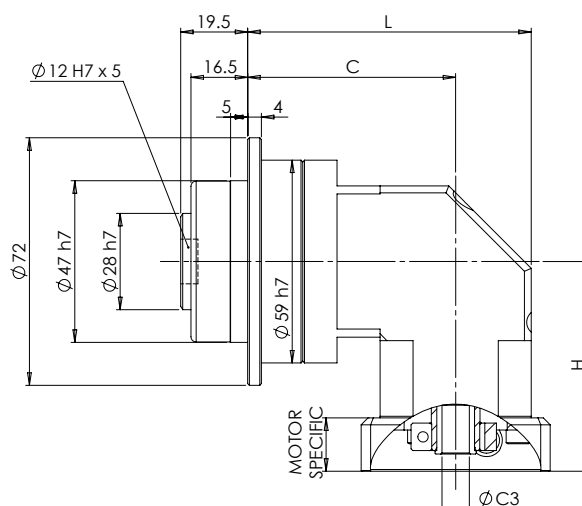
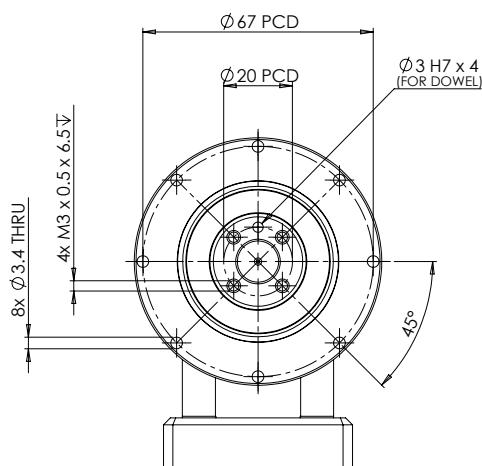
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	-	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SDL047

Precision Range – Right Angle



NOTE: Flange dimensions according to ISO 9409

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	4:1	22	39	66	0.09
	5:1	20	36	60	0.09
	7:1	19	34	57	0.09
	10:1	20	36	60	0.09
	14:1	19	34	57	0.03
	20:1	16	28	48	0.03
Double Stage (2)	25:1	20	36	60	0.09
	35:1	19	34	57	0.09
	40:1	22	39	66	0.09
	50:1	20	36	60	0.09
	70:1	19	34	57	0.09
	100:1	16	28	48	0.09
	140:1	19	34	57	0.03
	200:1	16	28	48	0.03

Design Parameter	Stage vs Value	
	1	2
Dimension L (mm)	82.5	108.5
Dimension C (mm)	60.5	86.5
Dimension H Min. (mm)	61	
Gearbox Weight ± 3% (kg)	1.1	1
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø11	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	6	
Max. Radial Ball Bearing (N)*	2040	
Max. Axial Ball Bearing (N)*	1020	
Max. Radial Taper Roller (N)*	-	
Max. Axial Taper Roller (N)*	-	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 65	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

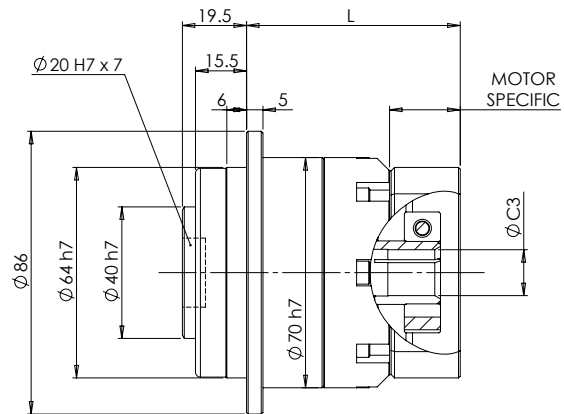
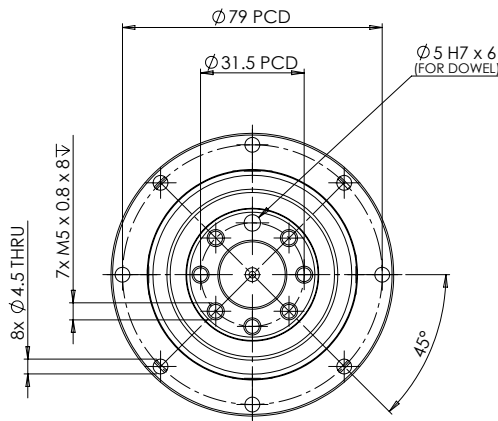
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	-	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SD064

Precision Range – In-line



NOTE: Flange dimensions according to ISO 9409

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single (1)	4:1	60	108	180	0.13
	5:1	50	90	150	0.12
	7:1	47	84	141	0.12
	10:1	43	77	129	0.12
Double Stage (2)	20:1	60	108	180	0.03
	25:1	50	90	150	0.03
	35:1	47	84	141	0.03
	40:1	60	108	180	0.03
	50:1	50	90	150	0.03
	70:1	47	84	141	0.03
	100:1	43	77	129	0.03

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	65	89
Gearbox Weight $\pm$ 3% (kg)	1.4	1.9
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94
Max. Input Shaft ØC3 (mm)	Ø19	Ø11
Set Collar Bolt Torque (Nm)	10	4.8
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	14	
Max. Radial Ball Bearing (N)*	2520	
Max. Axial Ball Bearing (N)*	1260	
Max. Radial Taper Roller (N)*	-	
Max. Axial Taper Roller (N)*	-	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 58	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

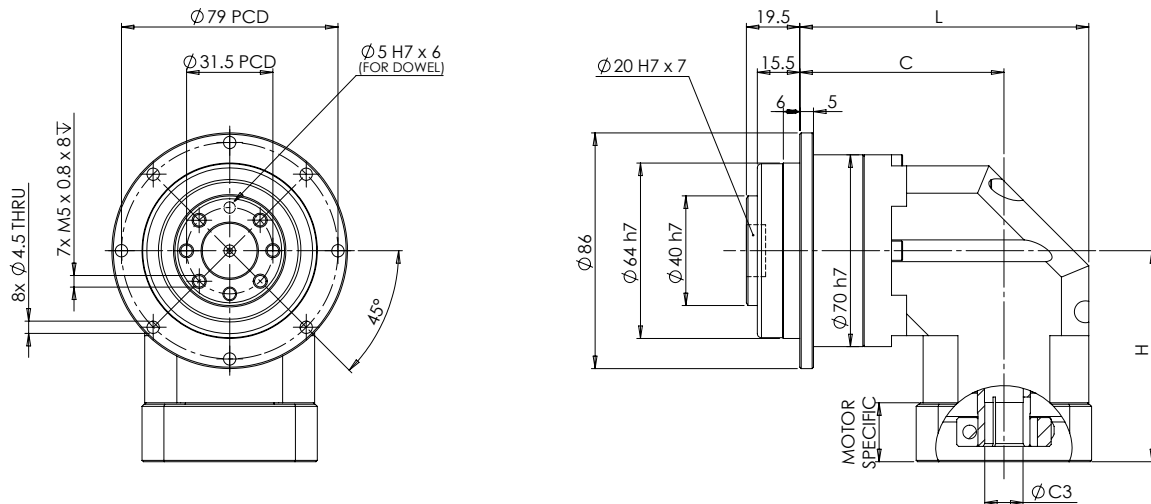
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	$\leq$ 7	$\leq$ 9
P1	Reduced	$\leq$ 5	$\leq$ 7
P0	Micro	$\leq$ 3	$\leq$ 5
PS	Super	-	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SDL064

Precision Range – Right Angle



NOTE: Flange dimensions according to ISO 9409

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	4:1	60	108	180	0.36
	5:1	50	90	150	0.36
	7:1	47	84	141	0.36
	10:1	50	90	150	0.36
	14:1	47	84	141	0.08
	20:1	43	77	129	0.08
Double Stage (2)	25:1	50	90	150	0.36
	35:1	47	84	141	0.36
	40:1	60	108	180	0.36
	50:1	50	90	150	0.36
	70:1	47	84	141	0.36
	100:1	43	77	129	0.36
	140:1	47	84	141	0.08
	200:1	43	77	129	0.08

Design Parameter	Stage vs Value	
	1	2
Dimension L (mm)	105.5	118.5
Dimension C (mm)	74.5	96.5
Dimension H Min. (mm)	77	61
Gearbox Weight ± 3% (kg)	2.3	2
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø19	Ø11
Set Collar Bolt Torque (Nm)	10	4.8
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	14	
Max. Radial Ball Bearing (N)*	2520	
Max. Axial Ball Bearing (N)*	1260	
Max. Radial Taper Roller (N)*	-	
Max. Axial Taper Roller (N)*	-	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 68	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

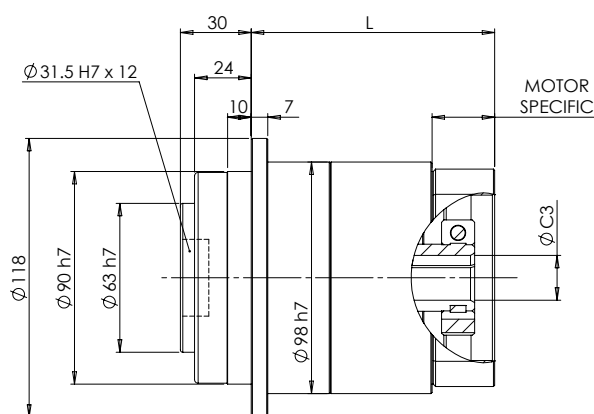
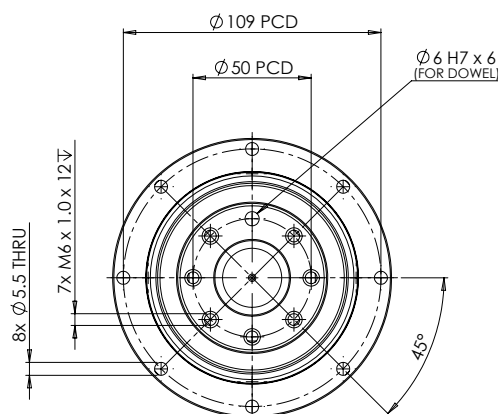
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	-	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SD090

Precision Range – In-line



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single (1)	4:1	160	288	480	0.47
	5:1	155	279	465	0.45
	7:1	142	256	426	0.45
	10:1	136	244	408	0.43
Double Stage (2)	20:1	160	288	480	0.15
	25:1	155	279	465	0.15
	35:1	142	256	426	0.15
	40:1	160	288	480	0.15
	50:1	155	279	465	0.14
	70:1	142	256	426	0.14
	100:1	136	244	408	0.14

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	103	114
Gearbox Weight ± 3% (kg)	4.2	4.8
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft ØC3 (mm)	Ø24	Ø19
Set Collar Bolt Torque (Nm)	16.3	10
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	30	
Max. Radial Ball Bearing (N)*	8460	
Max. Axial Ball Bearing (N)*	4230	
Max. Radial Taper Roller (N)*	14660	
Max. Axial Taper Roller (N)*	7330	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 60	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

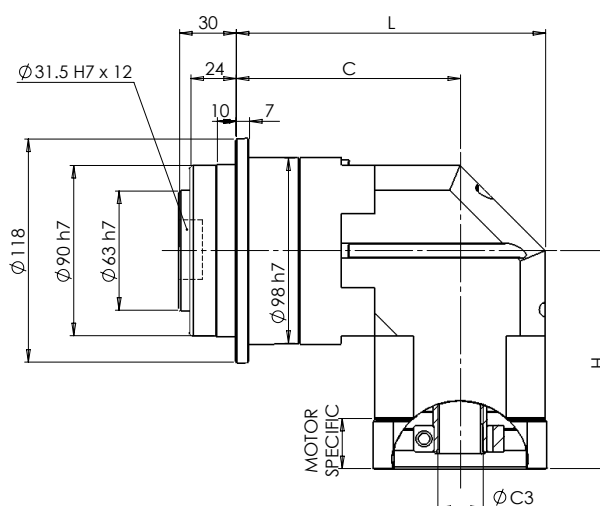
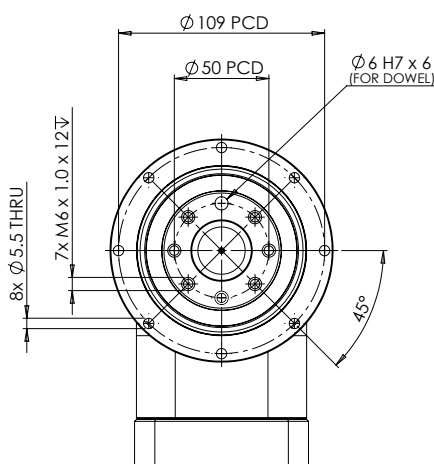
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SDL090

Precision Range – Right Angle



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	4:1	160	288	480	2.28
	5:1	155	279	465	2.28
	7:1	142	256	426	2.28
	10:1	136	244	408	2.28
	14:1	142	256	426	1.88
	20:1	136	244	408	1.88
Double Stage (2)	25:1	155	279	465	2.28
	35:1	142	256	426	2.28
	40:1	160	288	480	2.28
	50:1	155	279	465	2.28
	70:1	142	256	426	2.28
	100:1	136	244	408	2.28
	140:1	142	256	426	1.88
	200:1	136	244	408	1.88

Design Parameter	Stage vs Value	
	1	2
Dimension L (mm)	163.6	151
Dimension C (mm)	118.6	120
Dimension H Min. (mm)	115	77
Gearbox Weight ± 3% (kg)	6.9	6
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø24	Ø19
Set Collar Bolt Torque (Nm)	16.3	10
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	30	
Max. Radial Ball Bearing (N)*	8460	
Max. Axial Ball Bearing (N)*	4230	
Max. Radial Taper Roller (N)*	14660	
Max. Axial Taper Roller (N)*	7330	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 70	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

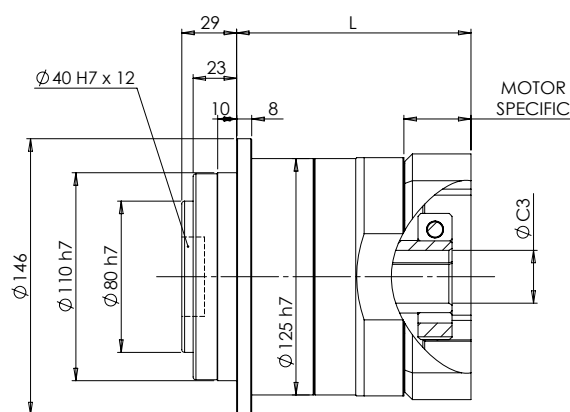
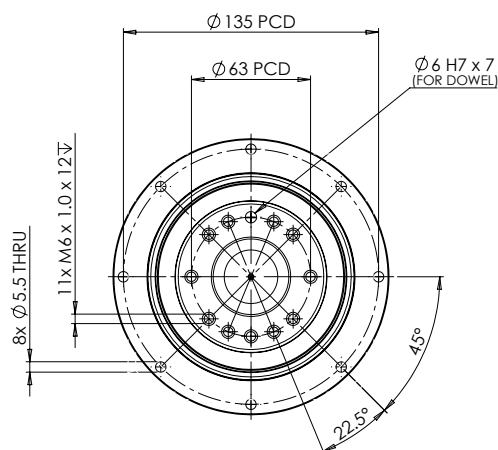
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	-

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SD110

Precision Range – In-line



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single (1)	4:1	335	603	1005	2.75
	5:1	333	599	999	2.70
	7:1	309	556	927	2.64
	10:1	294	529	882	2.56
Double Stage (2)	20:1	335	603	1005	0.45
	25:1	333	599	999	0.45
	35:1	309	556	927	0.45
	40:1	335	603	1005	0.45
	50:1	333	599	999	0.40
	70:1	309	556	927	0.40
	100:1	294	529	882	0.40

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	124	160
Gearbox Weight ± 3% (kg)	7.4	9.4
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft ØC3 (mm)	Ø32	Ø24
Set Collar Bolt Torque (Nm)	41	16.3
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	86	
Max. Radial Ball Bearing (N)*	12720	
Max. Axial Ball Bearing (N)*	6360	
Max. Radial Taper Roller (N)*	23000	
Max. Axial Taper Roller (N)*	11500	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 63	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

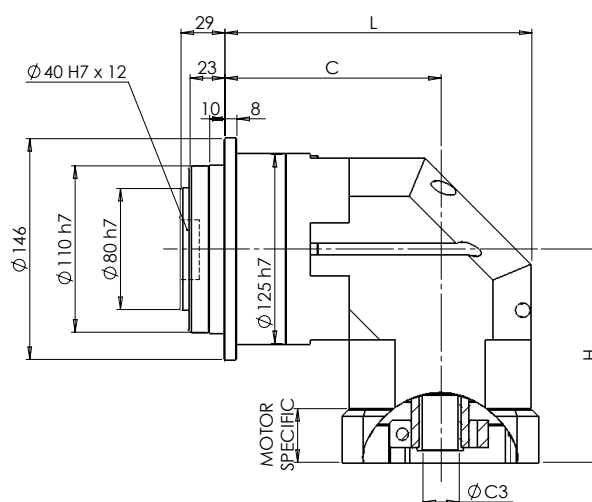
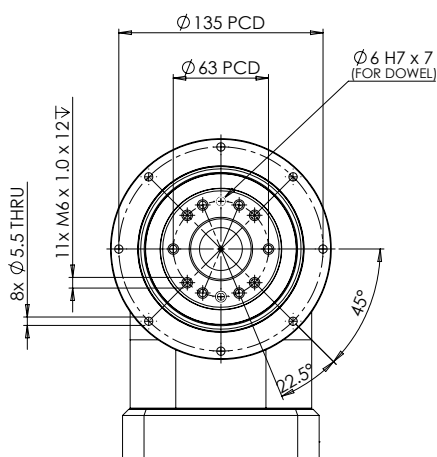
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	≤ 3

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SDL110

Precision Range – Right Angle



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	4:1	335	603	1005	6.85
	5:1	333	599	999	6.85
	7:1	309	556	927	6.85
	10:1	294	529	882	6.85
	14:1	309	556	927	6.20
	20:1	294	529	882	6.20
Double Stage (2)	25:1	333	599	999	6.85
	35:1	309	556	927	6.85
	40:1	335	603	1005	6.85
	50:1	333	599	999	6.85
	70:1	309	556	927	6.85
	100:1	294	529	882	6.85
	140:1	309	556	927	6.20
	200:1	294	529	882	6.20

Design Parameter	Stage vs Value	
	1	2
Dimension L (mm)	203	210.6
Dimension C (mm)	143	165.6
Dimension H Min. (mm)	141	115
Gearbox Weight ± 3% (kg)	13.4	11.8
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø32	Ø24
Set Collar Bolt Torque (Nm)	41	16.3
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	86	
Max. Radial Ball Bearing (N)*	12720	
Max. Axial Ball Bearing (N)*	6360	
Max. Radial Taper Roller (N)*	23000	
Max. Axial Taper Roller (N)*	11500	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 72	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

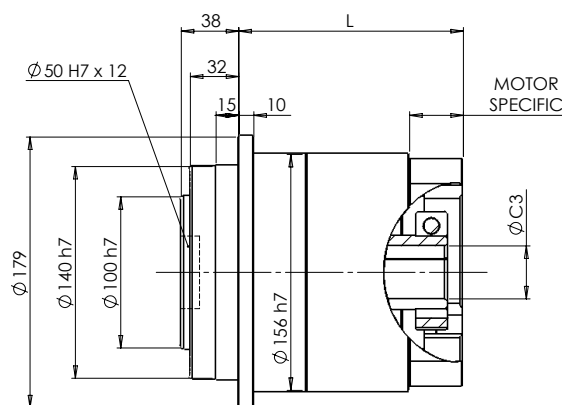
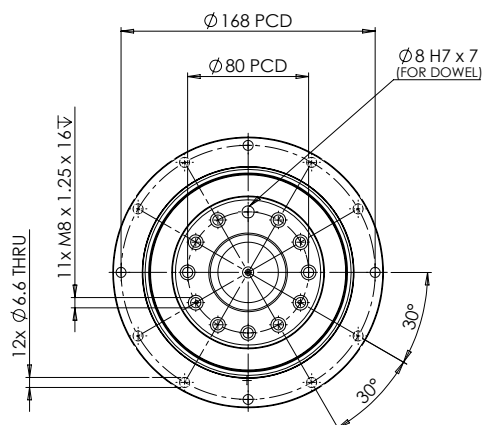
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SD140

Precision Range – In-line



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single (1)	4:1	650	1170	1950	7.46
	5:1	618	1112	1854	7.41
	7:1	573	1031	1719	7.12
	10:1	549	988	1647	7.01
Double Stage (2)	20:1	650	1170	1950	2.70
	25:1	618	1112	1854	2.70
	35:1	573	1031	1719	2.70
	40:1	650	1170	1950	2.70
	50:1	618	1112	1854	2.60
	70:1	573	1031	1716	2.60
	100:1	549	988	1647	2.60

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	148	186
Gearbox Weight $\pm$ 3% (kg)	13.9	16.7
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94
Max. Input Shaft ØC3 (mm)	Ø38	Ø32
Set Collar Bolt Torque (Nm)	81	41
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/moa)	155	
Max. Radial Ball Bearing (N)*	14070	
Max. Axial Ball Bearing (N)*	7035	
Max. Radial Taper Roller (N)*	37200	
Max. Axial Taper Roller (N)*	18600	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 65	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

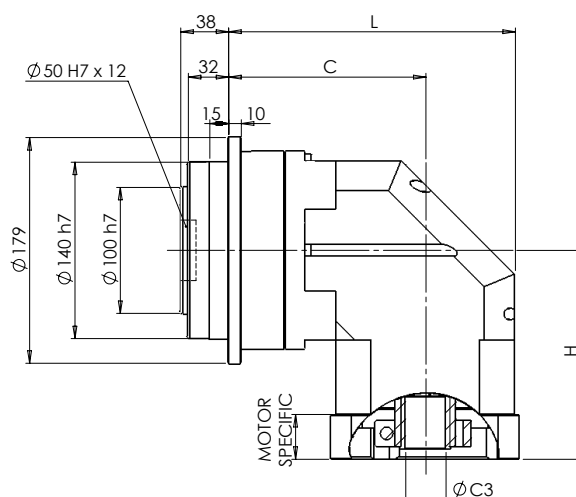
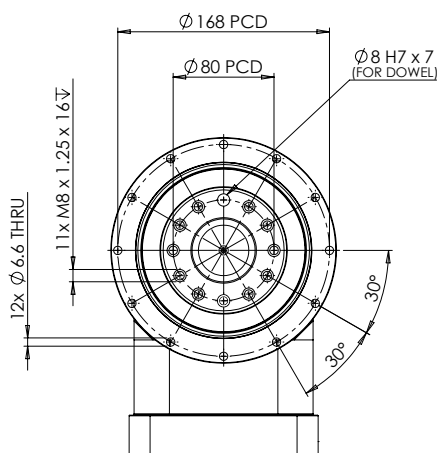
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	$\leq$ 7	$\leq$ 9
P1	Reduced	$\leq$ 5	$\leq$ 7
P0	Micro	$\leq$ 3	$\leq$ 5
PS	Super	$\leq$ 1	$\leq$ 3

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SDL140

Precision Range – Right Angle



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	4:1	650	1170	23.5
	5:1	618	1112	23.5
	7:1	573	1031	23.5
	10:1	549	988	23.5
	14:1	573	1031	21.8
	20:1	549	988	21.8
Double Stage (2)	25:1	618	1112	23.5
	35:1	573	1031	23.5
	40:1	650	1170	23.5
	50:1	618	1112	23.5
	70:1	573	1031	23.5
	100:1	549	988	23.5
	140:1	573	1031	21.8
	200:1	549	988	21.8

Design Parameter	Stage vs Value	
	1	2
Dimension L (mm)	227.5	254.5
Dimension C (mm)	156.5	194.5
Dimension H Min. (mm)	165	141
Gearbox Weight ± 3% (kg)	23	22.3
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø38	Ø32
Set Collar Bolt Torque (Nm)	81	41
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/moa)	155	
Max. Radial Ball Bearing (N)*	14070	
Max. Axial Ball Bearing (N)*	7035	
Max. Radial Taper Roller (N)*	37200	
Max. Axial Taper Roller (N)*	18600	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 74	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

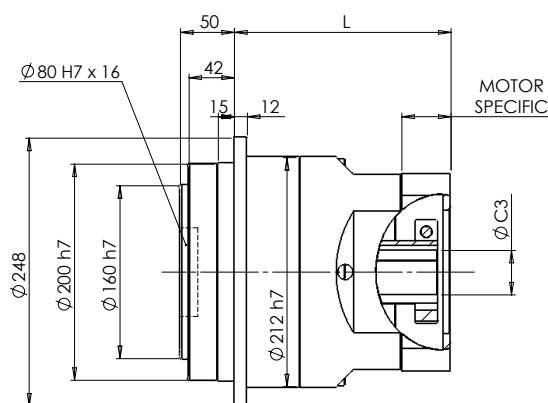
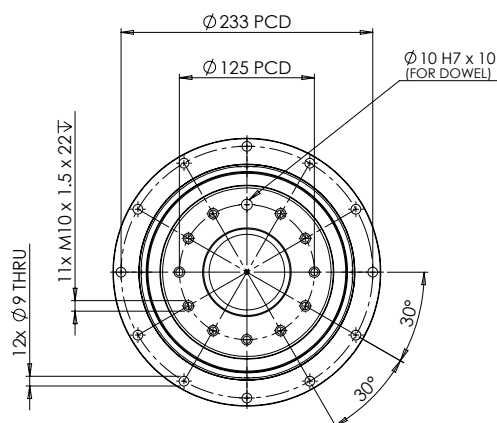
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SD200

Precision Range – In-line



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single (1)	4:1	1200	2160	3600	24.00
	5:1	1189	2140	3567	23.23
	7:1	1108	1994	3324	22.11
	10:1	1059	1906	3177	22.11
Double Stage (2)	20:1	1200	2160	3600	7.22
	25:1	1189	2140	3567	7.22
	35:1	1108	1994	3324	7.22
	40:1	1200	2160	3600	7.22
	50:1	1189	2140	3567	7.05
	70:1	1108	1994	3324	7.05
	100:1	1059	1906	3177	7.01

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	200	240
Gearbox Weight ± 3% (kg)	32.4	40.1
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft ØC3 (mm)	Ø55	Ø38
Set Collar Bolt Torque (Nm)	81	81
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	4000	
Torsional Rigidity (Nm/moa)	450	
Max. Radial Ball Bearing (N)*	35200	
Max. Axial Ball Bearing (N)*	17600	
Max. Radial Taper Roller (N)*	73600	
Max. Axial Taper Roller (N)*	36800	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 67	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

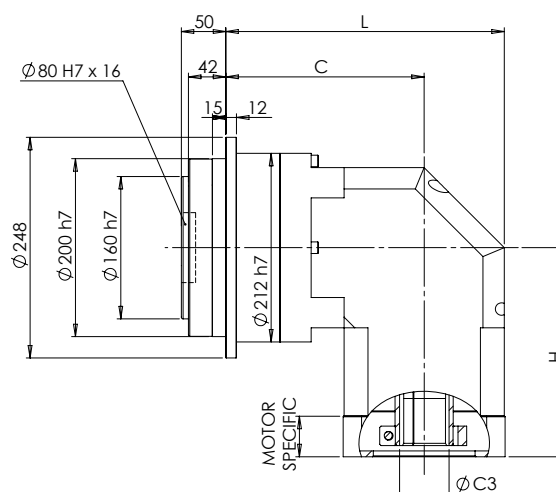
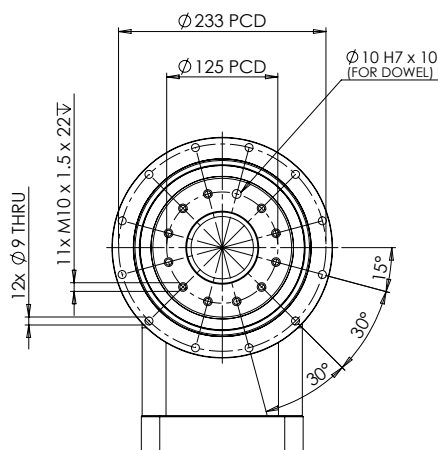
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	≤ 3

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SDL200

Precision Range – Right Angle



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	4:1	1200	2160	3600	68.1
	5:1	1189	2140	3567	68.1
	7:1	1108	1994	3324	68.1
	10:1	1059	1906	3177	68.1
	14:1	1108	1994	3324	66.5
	20:1	1059	1906	3177	66.3
Double Stage (2)	25:1	1189	2140	3567	22.8
	35:1	1108	1994	3324	22.8
	40:1	1200	2160	3600	22.8
	50:1	1189	2140	3567	22.8
	70:1	1108	1994	3324	22.8
	100:1	1059	1906	3177	22.8
	140:1	1108	1994	3324	21.1
	200:1	1059	1906	3177	21.1

Design Parameter	Stage vs Value	
	1	2
Dimension L (mm)	313	308.5
Dimension C (mm)	223	237.5
Dimension H Min. (mm)	235	165
Gearbox Weight ± 3% (kg)	51.2	48.5
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø55	Ø38
Set Collar Bolt Torque (Nm)	81	81
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	4000	
Torsional Rigidity (Nm/moa)	450	
Max. Radial Ball Bearing (N)*	35200	
Max. Axial Ball Bearing (N)*	17600	
Max. Radial Taper Roller (N)*	73600	
Max. Axial Taper Roller (N)*	36800	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 76	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

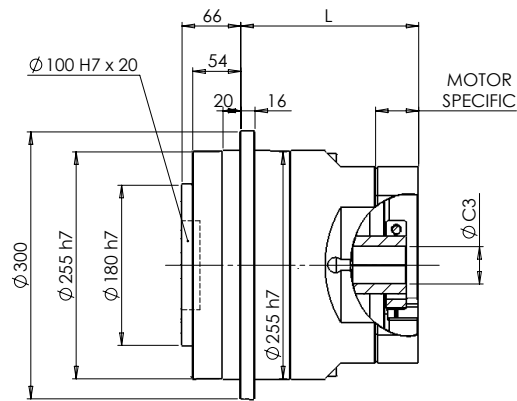
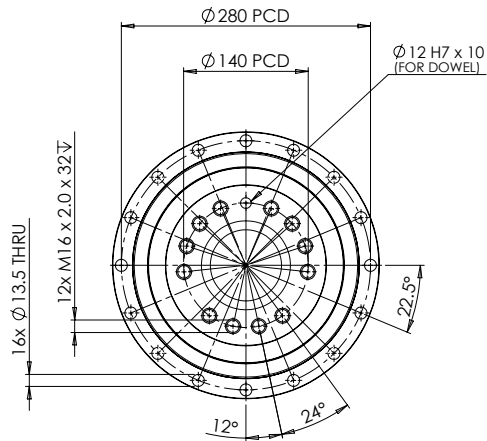
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SD255

Precision Range – In-line



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single (1)	4:1	2020	3636	6060	55.00
	5:1	2010	3618	6030	53.19
	7:1	1870	3366	5610	50.78
	10:1	1779	3202	5337	50.50
Double Stage (2)	20:1	2020	3636	6060	23.22
	25:1	2010	3618	6030	23.22
	35:1	1870	3366	5610	23.22
	40:1	2020	3636	6060	23.22
	50:1	2010	3618	6030	23.07
	70:1	1870	3366	5610	23.07
	100:1	1779	3202	5337	22.67

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	197	283
Gearbox Weight $\pm$ 3% (kg)	55	64
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft ØC3 (mm)	Ø55	
Set Collar Bolt Torque (Nm)	81	
Nom. Input Speed (rpm)	2000	
Max. Input Speed (rpm)	3000	
Torsional Rigidity (Nm/moa)	1126	
Max. Radial Ball Bearing (N)*	39600	
Max. Axial Ball Bearing (N)*	19800	
Max. Radial Taper Roller (N)*	107200	
Max. Axial Taper Roller (N)*	53600	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 70	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

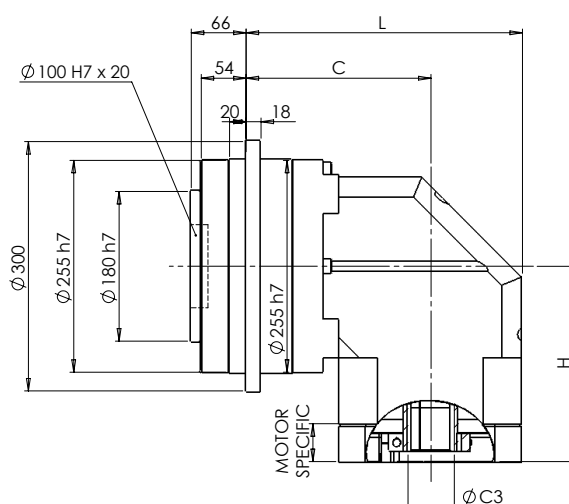
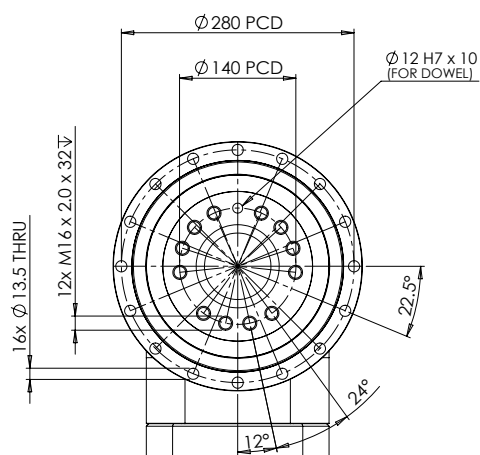
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	≤ 3

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SDL255

Precision Range – Right Angle



NOTE: Flange dimensions according to ISO 9409

NOTE: Ball bearings as standard – taper roller bearings optional

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	4:1	2020	3636	6060	134.8
	5:1	2010	3618	6030	134.8
	7:1	1870	3366	5610	134.8
	10:1	1779	3202	5337	134.8
	14:1	1870	3366	5610	120.2
	20:1	1779	3202	5337	118.8
Double Stage (2)	25:1	2010	3618	6030	68.2
	35:1	1870	3366	5610	68.2
	40:1	2020	3636	6060	68.2
	50:1	2010	3618	6030	68.2
	70:1	1870	3366	5610	68.2
	100:1	1779	3202	5337	68.2
	140:1	1870	3366	5610	64.9
	200:1	1779	3202	5337	64.9

Design Parameter	Stage vs Value	
	1	2
Dimension L (mm)	332.5	379.1
Dimension C (mm)	222.5	289.1
Dimension H Min. (mm)	235	
Gearbox Weight ± 3% (kg)	81.6	97.5
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø55	
Set Collar Bolt Torque (Nm)	81	
Nom. Input Speed (rpm)	2000	
Max. Input Speed (rpm)	3000	
Torsional Rigidity (Nm/moa)	1126	
Max. Radial Ball Bearing (N)*	39600	
Max. Axial Ball Bearing (N)*	19800	
Max. Radial Taper Roller (N)*	107200	
Max. Axial Taper Roller (N)*	53600	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 78	

* Applied at shaft centre @ 100 rpm output

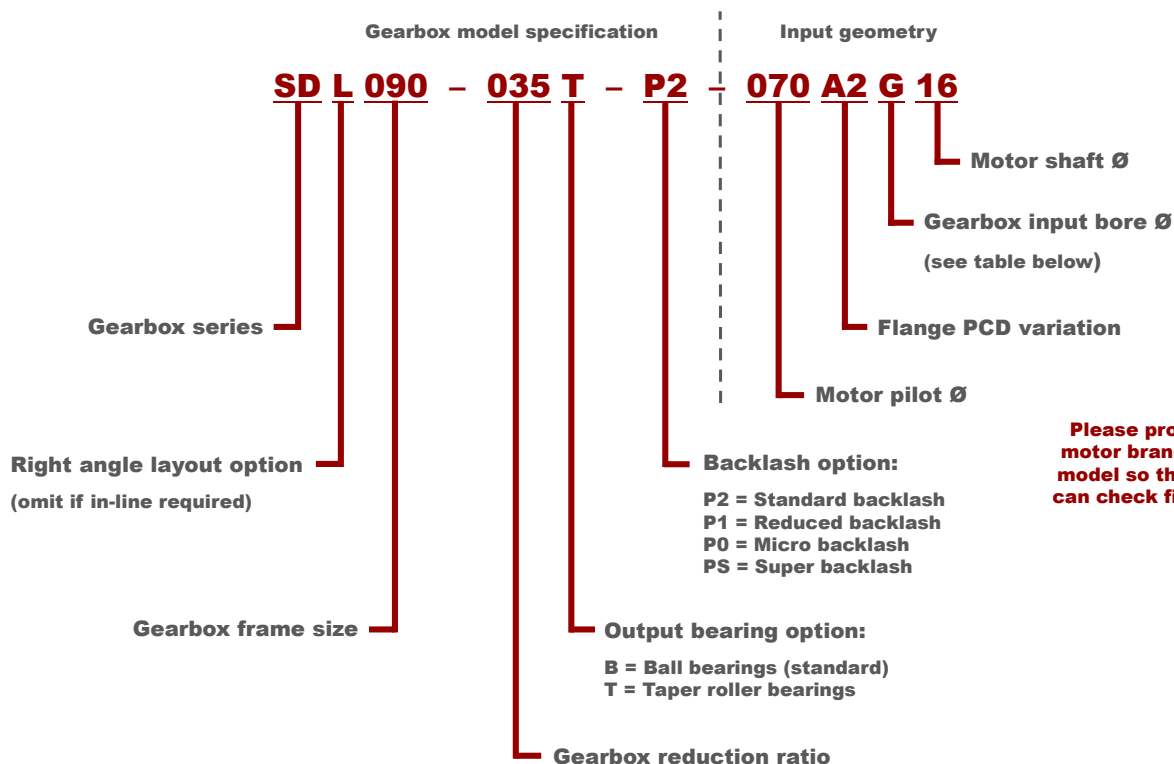
** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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SD Series – Order Codes



Example Ordering Code:
SD064-010B-P0-060A1F14

SD Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes													
Frame	Stage	B 8	C 9	E 11	F 14	G 19	H 22	J 24	K 28	L 32	M 35	N 38	P 42	Q 48	R 55
047	1 & 2	X	X	X											
064	1 Only				X	X									
	2 Only	X	X	X											
090	1 Only					X	X	X							
	2 Only				X	X									
110	1 Only							X	X	X					
	2 Only					X	X	X							
140	1 Only								X	X	X	X			
	2 Only							X	X	X	X				
200	1 Only											X	X	X	X
	2 Only								X	X	X	X			
255	1 Only												X	X	X
	2 Only											X	X	X	X

FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



ServoBox – SE Series

Precision Range – In-line & Right Angle

SE In-line



**SEL
Right
Angle**



The benchmark of our precision planetary gearhead range

Helical hardened & ground gearing for greater wear resistance

Round B14 output flange with solid output shaft for easy mounting

9 standard gearbox frame sizes from 042 up to 330 frame

**From 3:1 up to 200:1 reduction ratio across the range with
1000:1 reduction ratio possible on selected frame sizes**

Up to 8790 Nm nominal & 15820 Nm peak output torque

Backlash options starting from as low as ≤ 1 arcmin

Power transmission efficiency of up to $\geq 97\%$

Operating noise levels as low as 56 dB

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



SE Series – In-line

Precision Range – Performance Overview

Parameter	Stage / Ratio	SE 044	SE 062	SE 090	SE 120	SE 142	SE 180	SE 220	SE 270	SE 330	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	19	59	165	335	625	1206	2030	4770	8790
		4:1	16	51	146	300	555	1069	1804	4730	8730
		5:1	16	48	160	333	618	1189	2010	4680	8660
		6:1	15	45	151	311	583	1118	1911	-	-
		7:1	15	45	149	309	573	1108	1870	4570	8520
		8:1	14	43	143	298	553	1070	1824	-	-
		9:1	13	44	145	278	516	993	1694	-	-
	Double Stage (2 & 2A)	10:1	14	43	141	294	549	1059	1779	4420	8310
		15:1	19	59	165	335	625	1206	2030	4770	8790
		20:1	16	51	146	300	555	1069	1804	4730	8730
		25:1	16	48	160	333	618	1189	2010	4680	8660
		30:1	15	45	151	311	583	1118	1911	4620	8610
		35:1	15	45	149	309	573	1108	1870	4570	8520
		40:1	14	43	143	298	553	1070	1824	4520	8440
		50:1	16	48	160	333	618	1189	2010	4680	8660
		60:1	15	45	151	311	583	1118	1911	-	-
		70:1	15	45	149	309	573	1108	1870	4570	8520
		80:1	14	43	143	298	553	1070	1824	-	-
		Triple Stage (3 & 3A)	90:1	13	44	145	278	516	993	1694	-
	100:1		14	43	141	294	549	1059	1779	4420	8310
	125:1		-	48	160	333	618	1189	2010	-	-
	150:1		-	59	165	335	583	1206	2030	-	-
	175:1		-	45	149	309	573	1108	1870	-	-
	200:1		-	51	146	300	555	1069	1804	-	-
	250:1		-	48	160	333	618	1189	2010	-	-
	300:1		-	45	151	311	583	1118	1911	-	-
	350:1		-	45	149	309	573	1108	1870	-	-
	400:1		-	43	143	298	553	1070	1824	-	-
	450:1		-	44	145	278	516	993	1694	-	-
	500:1		-	48	160	333	618	1189	2010	-	-
	600:1		-	45	151	311	583	1118	1911	-	-
	700:1		-	45	149	309	573	1108	1870	-	-
	800:1		-	43	143	298	553	1070	1824	-	-
	900:1	-	44	145	278	516	993	1694	-	-	
	1000:1	-	43	141	294	549	1059	1779	-	-	
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	2000	2000	2000	
Maximum Input Speed (rpm)	ALL	6000	6000	6000	5000	5000	4000	3000	3000	3000	
Torsional Rigidity (Nm/moa)	ALL	3	6	14	27	60	140	240	510	980	
Max. Radial Output Load (N)*	ALL	380	1180	3200	6800	9300	15600	51000	107100	224910	
Max. Axial Output Load (N)*	ALL	190	590	1600	3400	4650	7800	25500	53550	112455	
Maximum Noise Level (dB)**	ALL	≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70	≤ 72	≤ 74	
PS Super Backlash (arcmin)	1	-	-	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	
	2	-	-	-	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	
	3	-	-	-	≤ 5	≤ 5	≤ 5	≤ 5	-	-	
P0 Micro Backlash (arcmin)	1	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	
	2	(≤ 5)	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
	3	-	(≤ 7)	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	-	-	
P1 Reduced Backlash (arcmin)	1	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
	2	(≤ 7)	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
	3	-	(≤ 9)	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	-	-	
P2 Standard Backlash (arcmin)	1	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
	2	(≤ 9)	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	
	3	-	(≤ 11)	≤ 11	≤ 11	≤ 11	≤ 11	≤ 11	-	-	
Gearbox Weight ± 3% (kg)	1	0.6	1.3	3.4	7.9	14	29.2	39	88	172	
	2	(0.9)	1.7 (2)	4.4 (6)	9.3 (10.2)	15.5 (23)	34.8 (42)	56.5 (59)	128 (135)	258	
	3	-	(2.5)	4.9 (6.5)	10 (13)	23 (26)	47 (56.5)	70 (86)	-	-	



SEL Series – Right Angle

Precision Range – Performance Overview

Parameter	Stage / Ratio	SEL 044	SEL 062	SEL 090	SEL 120	SEL 142	SEL 180	SEL 220	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	19	59	165	335	625	1206	2030
		4:1	16	51	146	300	555	1069	1804
		5:1	16	48	160	333	618	1189	2010
		6:1	15	45	151	311	583	1118	1911
		7:1	15	45	149	309	573	1108	1870
		8:1	14	43	143	298	553	1070	1824
		9:1	13	44	145	278	516	993	1694
		10:1	14	43	141	294	549	1059	1779
		12:1	15	45	151	311	583	1118	1911
		14:1	15	45	149	309	573	1108	1870
		16:1	14	43	143	298	553	1070	1824
		18:1	13	44	145	278	516	993	1694
	20:1	14	43	141	294	549	1059	1779	
	Double Stage (2 & 2A)	15:1	19	59	165	335	625	1206	2030
		25:1	16	48	160	333	618	1189	2010
		30:1	15	45	151	311	583	1118	1911
		35:1	15	45	149	309	573	1108	1870
		40:1	14	43	143	298	553	1070	1824
		50:1	16	48	160	333	618	1189	2010
		60:1	15	45	151	311	583	1118	1911
		70:1	15	45	149	309	573	1108	1870
		80:1	14	43	143	298	553	1070	1824
		90:1	13	44	145	278	516	993	1694
		100:1	14	43	141	294	549	1059	1779
		120:1	15	45	151	311	583	1118	1911
140:1		15	45	149	309	573	1108	1870	
160:1	14	43	143	298	553	1070	1824		
180:1	13	44	145	278	516	993	1694		
200:1	14	43	141	294	549	1059	1779		
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	2000	
Maximum Input Speed (rpm)	ALL	6000	6000	6000	5000	5000	4000	3000	
Torsional Rigidity (Nm/moa)	ALL	3	6	14	27	60	140	240	
Max. Radial Output Load (N)*	ALL	380	1180	3200	6800	9300	15600	51000	
Max. Axial Output Load (N)*	ALL	190	590	1600	3400	4650	7800	25500	
Maximum Noise Level (dB)**	ALL	≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70	
PS Super Backlash (arcmin)	1	-	-	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	
	2	-	-	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	
P0 Micro Backlash (arcmin)	1	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	
	2	(≤ 7)	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
P1 Reduced Backlash (arcmin)	1	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	
	2	(≤ 9)	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	
P2 Standard Backlash (arcmin)	1	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	
	2	(≤ 12)	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	
Gearbox Weight ± 3% (kg)	1	0.8	2.8	6.3	9.2	22.5	52.3	75	
	2	(1.4)	1.8 (2.9)	5.8 (8)	12 (13)	22.8 (22.6)	43.9 (51.7)	78.5 (94.5)	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

NOTE: Values shown in brackets (above & left) only apply to type 2A and 3A gearboxes with enlarged primary stage gearing

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD

Precision Range – In-line



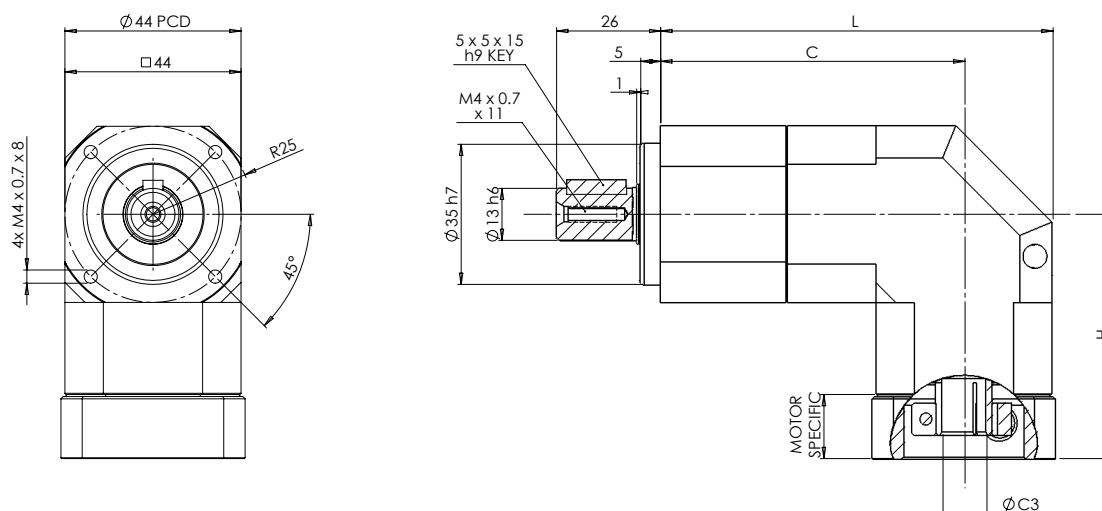
Design Parameter	Stage vs Value	
	1	2A
Dimension L Min. (mm)	69	95
Gearbox Weight $\pm$ 3% (kg)	0.6	0.9
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing 11$	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	3	
Max. Radial Output Load (N)*	380	
Max. Axial Output Load (N)*	190	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 56	

**** Based on 10:1 ratio no load @ 3000 rpm input**



APEX
TRANSMISSIONS LTD

Precision Range – Right Angle



	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
Single Stage (1)	3:1	19	34	57	0.09
	4:1	16	28	48	0.09
	5:1	16	28	48	0.09
	6:1	15	27	45	0.09
	7:1	15	27	45	0.09
	8:1	14	25	42	0.09
	9:1	13	23	39	0.09
	10:1	14	25	42	0.09
	12:1	15	27	45	0.03
	14:1	15	27	45	0.03
	16:1	14	25	42	0.03
	18:1	13	23	39	0.03
Double Stage (2A Only)	20:1	14	25	42	0.03
	15:1	19	34	57	0.09
	25:1	16	28	48	0.09
	30:1	15	27	45	0.09
	35:1	15	27	45	0.09
	40:1	14	25	42	0.09
	50:1	16	28	48	0.09
	60:1	15	27	45	0.09
	70:1	15	27	45	0.09
	80:1	14	25	42	0.09
	90:1	13	23	39	0.09
	100:1	14	25	42	0.09
	120:1	15	27	45	0.03
	140:1	15	27	45	0.03
	160:1	14	25	42	0.03
	180:1	13	23	39	0.03
200:1	14	25	42	0.03	

Design Parameter	Stage vs Value	
	1	2 A
Dimension L (mm)	98	124
Dimension C (mm)	76	102
Dimension H Min. (mm)	61	
Gearbox Weight ± 3% (kg)	0.8	1.4
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø11	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	3	
Max. Radial Output Load (N)*	380	
Max. Axial Output Load (N)*	190	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 65	

**** Based on 10:1 ratio no load @ 3000 rpm input**

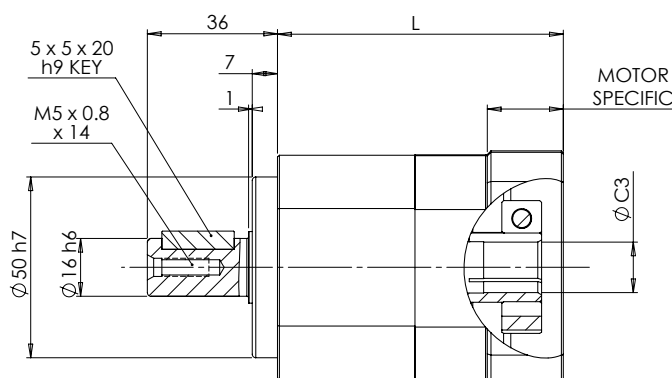
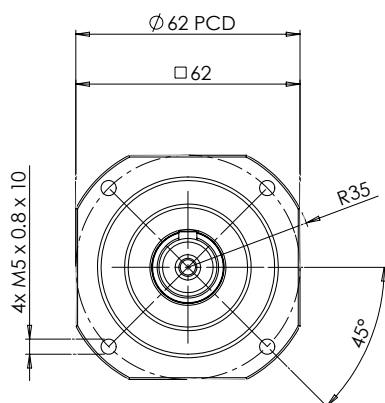
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	-	-

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ServoBox – SE062

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	59	106	177	0.16
	4:1	51	91	153	0.14
	5:1	48	86	144	0.13
	6:1	45	81	135	0.13
	7:1	45	81	135	0.13
	8:1	43	77	129	0.13
	9:1	44	79	132	0.13
	10:1	43	77	129	0.13
Double Stage (2 & 2A)	15:1	59	106	177	0.03 (0.14)
	20:1	51	91	153	0.03 (0.14)
	25:1	48	86	144	0.03 (0.14)
	30:1	45	81	135	0.03 (0.14)
	35:1	45	81	135	0.03 (0.14)
	40:1	43	77	129	0.03 (0.14)
	50:1	48	86	144	0.03 (0.14)
	60:1	45	81	135	0.03 (0.14)
	70:1	45	81	135	0.03 (0.14)
	80:1	43	77	129	0.03 (0.14)
	90:1	44	79	132	0.03 (0.14)
	100:1	43	77	129	0.03 (0.14)
Triple Stage (3A Only)	125:1	48	86	144	0.01
	150:1	59	106	177	0.01
	175:1	45	81	135	0.01
	200:1	51	91	153	0.01
	300:1	45	81	135	0.01
	400:1	43	77	129	0.01
	500:1	48	86	144	0.01
	600:1	45	81	135	0.01
	700:1	45	81	135	0.01
	800:1	43	77	129	0.01
	900:1	44	79	132	0.01
	1000:1	43	77	129	0.01

Design Parameter	Stage vs Value			
	1	2A	2	3A
Dimension L Min. (mm)	79	112	103	129
Gearbox Weight ± 3% (kg)	1.3	2	1.7	2.5
Minimum Efficiency (%)	≥ 97	≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø19		Ø11	
Set Collar Bolt Torque (Nm)	10		4.8	
Nom. Input Speed (rpm)	3000			
Max. Input Speed (rpm)	6000			
Torsional Rigidity (Nm/moa)	6			
Max. Radial Output Load (N)*	1180			
Max. Axial Output Load (N)*	590			
Operating Temp Range (°C)	- 25 / + 90			
Protection Rating (IP)	IP65			
Max. Noise Level (dB)**	≤ 58			

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	-	-	-

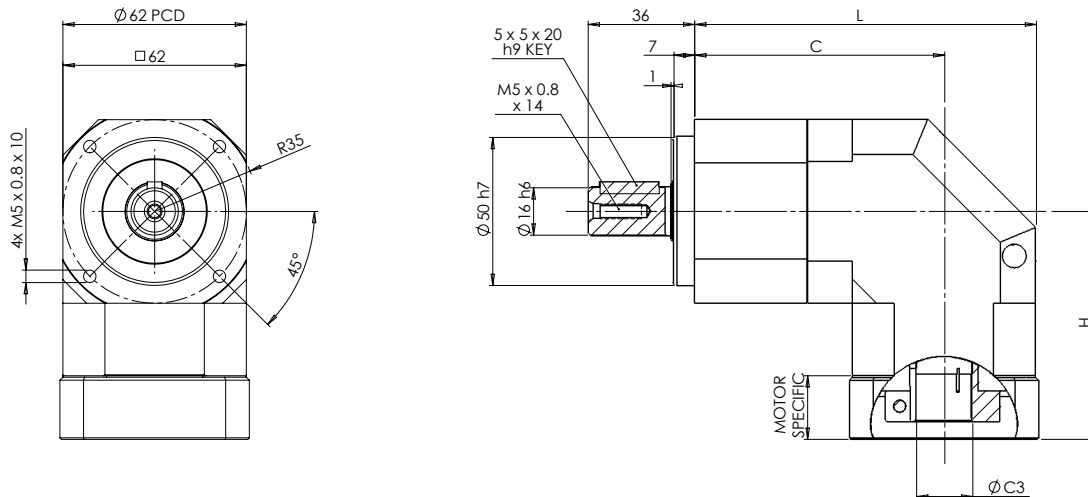
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SEL062

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	59	106	177	0.36
	4:1	51	91	153	0.36
	5:1	48	86	144	0.36
	6:1	45	81	135	0.36
	7:1	45	81	135	0.36
	8:1	43	77	129	0.36
	9:1	44	79	132	0.36
	10:1	43	77	129	0.08
	12:1	45	81	135	0.08
	14:1	45	81	135	0.08
	16:1	43	77	129	0.08
	18:1	44	79	132	0.08
Double Stage (2 & 2A)	20:1	43	77	129	0.08
	15:1	59	106	177	0.09 (0.36)
	25:1	48	86	144	0.09 (0.36)
	30:1	45	81	135	0.09 (0.36)
	35:1	45	81	135	0.09 (0.36)
	40:1	43	77	129	0.09 (0.36)
	50:1	48	86	144	0.09 (0.36)
	60:1	45	81	135	0.09 (0.36)
	70:1	45	81	135	0.09 (0.36)
	80:1	43	77	129	0.09 (0.36)
	90:1	44	79	132	0.09 (0.36)
	100:1	43	77	129	0.09 (0.36)
	120:1	45	81	135	0.03 (0.08)
	140:1	45	81	135	0.03 (0.08)
	160:1	43	77	129	0.03 (0.08)
	180:1	44	79	132	0.03 (0.08)
	200:1	43	77	129	0.03 (0.08)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	115.5	149.3	132.5
Dimension C (mm)	84.5	118.3	110.5
Dimension H Min. (mm)	77		61
Gearbox Weight ± 3% (kg)	2.8	2.9	1.8
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø19		Ø11
Set Collar Bolt Torque (Nm)	10		4.8
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	6		
Max. Radial Output Load (N)*	1180		
Max. Axial Output Load (N)*	590		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 68		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	-	-

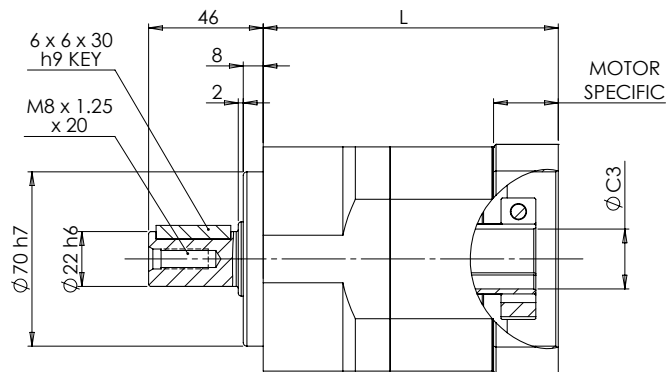
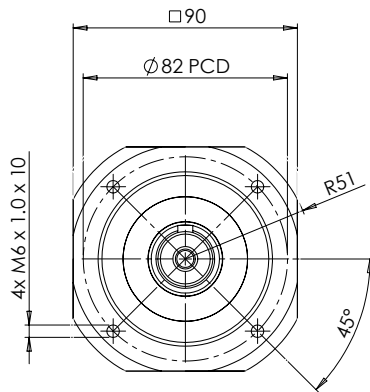
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SE090

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	165	297	495	0.61
	4:1	146	262	438	0.48
	5:1	160	288	480	0.47
	6:1	151	271	453	0.45
	7:1	149	268	447	0.45
	8:1	143	257	429	0.44
	9:1	145	261	435	0.44
	10:1	141	253	423	0.44
Double Stage (2 & 2A)	15:1	165	297	495	0.14 (0.46)
	20:1	146	262	438	0.14 (0.46)
	25:1	160	288	480	0.14 (0.46)
	30:1	151	271	453	0.14 (0.46)
	35:1	149	268	447	0.14 (0.44)
	40:1	143	257	429	0.14 (0.44)
	50:1	160	288	480	0.14 (0.44)
	60:1	151	271	453	0.14 (0.43)
	70:1	149	268	447	0.14 (0.43)
	80:1	143	257	429	0.14 (0.43)
	90:1	145	261	435	0.14 (0.43)
	100:1	141	253	423	0.14 (0.43)
Triple Stage (3 & 3A)	125:1	160	288	480	0.01
	150:1	165	297	495	0.01
	175:1	149	268	447	0.01
	200:1	146	262	438	0.01
	300:1	151	271	453	0.01
	400:1	143	257	429	0.01
	500:1	160	288	480	0.01
	600:1	151	271	453	0.01
	700:1	149	268	447	0.01
	800:1	143	257	429	0.01
	900:1	145	261	435	0.01
	1000:1	141	253	423	0.01

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	118	162	126	158	149
Gearbox Weight ± 3% (kg)	3.4	6	4.4	6.5	4.9
Minimum Efficiency (%)	≥ 97		≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø24		Ø19		Ø11
Set Collar Bolt Torque (Nm)	16.3		10		4.8
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	6000				
Torsional Rigidity (Nm/moa)	14				
Max. Radial Output Load (N)*	3200				
Max. Axial Output Load (N)*	1600				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 60				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	-	-

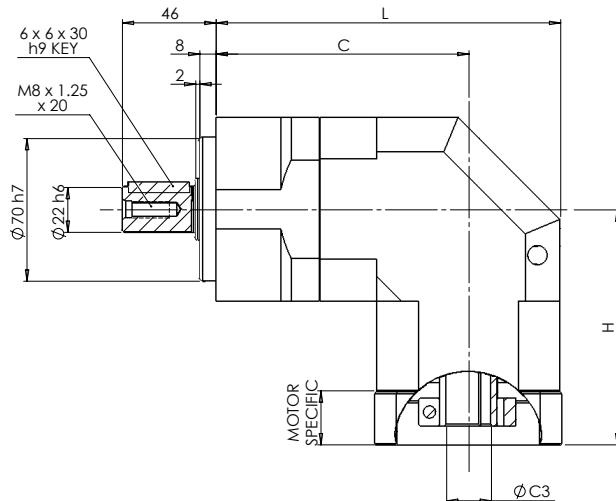
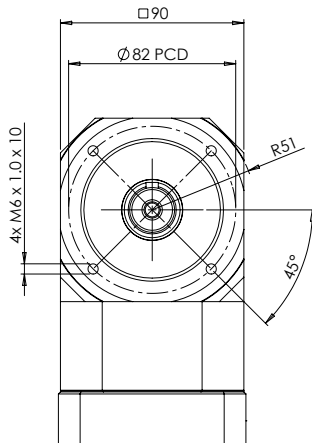
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SEL090

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	165	297	495	2.28
	4:1	146	262	438	2.28
	5:1	160	288	480	2.28
	6:1	151	271	453	2.28
	7:1	149	268	447	2.28
	8:1	143	257	429	2.28
	9:1	145	261	435	2.28
	10:1	141	253	423	2.28
	12:1	151	271	453	1.88
	14:1	149	268	447	1.88
	16:1	143	257	429	1.88
	18:1	145	261	435	1.88
Double Stage (2 & 2A)	20:1	141	253	423	1.88
	15:1	165	297	495	0.36 (2.28)
	25:1	160	288	480	0.36 (2.28)
	30:1	151	271	453	0.36 (2.28)
	35:1	149	268	447	0.36 (2.28)
	40:1	143	257	429	0.36 (2.28)
	50:1	160	288	480	0.36 (2.28)
	60:1	151	271	453	0.36 (2.28)
	70:1	149	268	447	0.36 (2.28)
	80:1	143	257	429	0.36 (2.28)
	90:1	145	261	435	0.36 (2.28)
	100:1	141	253	423	0.36 (2.28)
	120:1	151	271	453	0.10 (1.88)
	140:1	149	268	447	0.10 (1.88)
	160:1	143	257	429	0.10 (1.88)
	180:1	145	261	435	0.10 (1.88)
	200:1	141	253	423	0.10 (1.88)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	167.1	212.6	163
Dimension C (mm)	122.1	167.6	132
Dimension H Min. (mm)	115		77
Gearbox Weight ± 3% (kg)	6.3	8	5.8
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø24		Ø19
Set Collar Bolt Torque (Nm)	16.3		10
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	14		
Max. Radial Output Load (N)*	3200		
Max. Axial Output Load (N)*	1600		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 70		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

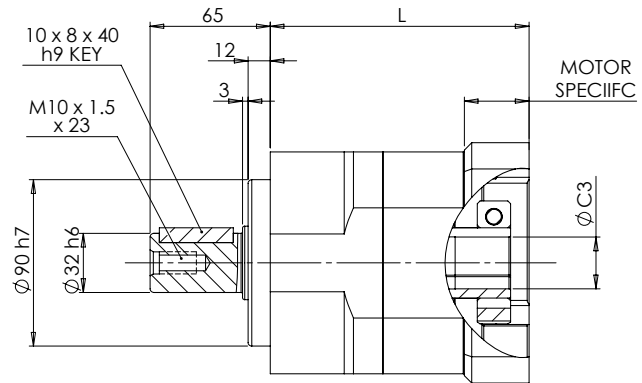
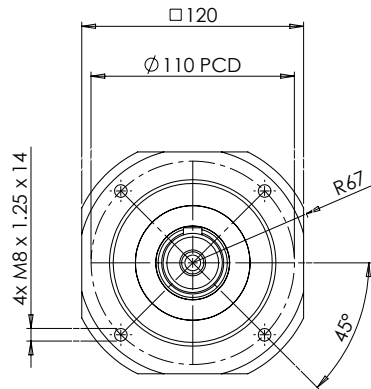
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SE120

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	335	603	1005	3.25
	4:1	300	540	900	2.74
	5:1	333	599	999	2.71
	6:1	311	559	933	2.65
	7:1	309	556	927	2.62
	8:1	298	536	894	2.58
	9:1	278	500	834	2.57
	10:1	294	529	882	2.57
Double Stage (2 & 2A)	15:1	335	603	1005	0.46 (2.63)
	20:1	300	540	900	0.46 (2.63)
	25:1	333	599	999	0.46 (2.63)
	30:1	311	559	933	0.46 (2.63)
	35:1	309	556	927	0.44 (2.43)
	40:1	298	536	894	0.44 (2.43)
	50:1	333	599	999	0.44 (2.43)
	60:1	311	559	933	0.43 (2.39)
	70:1	309	556	927	0.43 (2.39)
	80:1	298	536	894	0.43 (2.39)
	90:1	278	500	834	0.43 (2.39)
	100:1	294	529	882	0.43 (2.39)
Triple Stage (3 & 3A)	125:1	333	599	999	0.04
	150:1	335	603	1005	0.04
	175:1	309	556	927	0.04
	200:1	300	540	900	0.04
	300:1	311	559	933	0.04
	400:1	298	536	894	0.04
	500:1	333	599	999	0.04
	600:1	311	559	933	0.04
	700:1	309	556	927	0.04
	800:1	298	536	894	0.04
	900:1	278	500	834	0.04
	1000:1	294	529	882	0.04

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	140	196	176	219	184
Gearbox Weight ± 3% (kg)	7.9	10.2	9.3	13	10
Minimum Efficiency (%)	≥ 97		≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø32		Ø24		Ø19
Set Collar Bolt Torque (Nm)	41		16.3		10
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	5000				
Torsional Rigidity (Nm/moa)	27				
Max. Radial Output Load (N)*	6800				
Max. Axial Output Load (N)*	3400				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 63				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	≤ 3	≤ 5

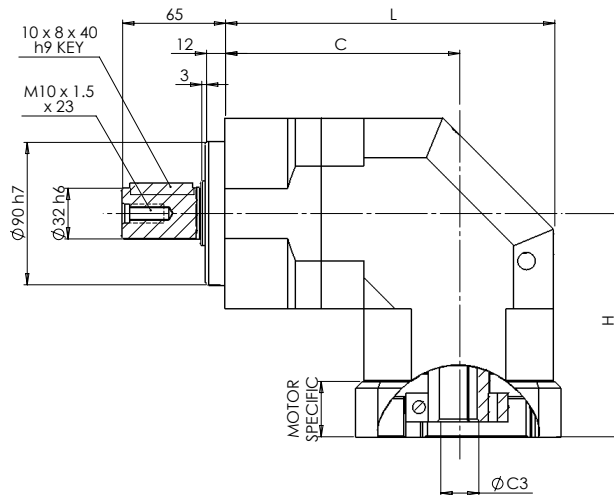
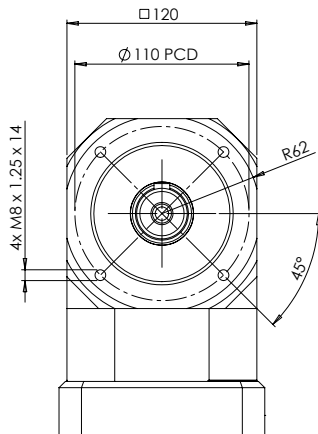
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SEL120

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	335	603	1005	6.85
	4:1	300	540	900	6.85
	5:1	333	599	999	6.85
	6:1	311	559	933	6.85
	7:1	309	556	927	6.85
	8:1	298	536	894	6.85
	9:1	278	500	834	6.85
	10:1	294	529	882	6.85
	12:1	311	559	933	6.20
	14:1	309	556	927	6.20
	16:1	298	536	894	6.20
	18:1	278	500	834	6.20
Double Stage (2 & 2A)	20:1	294	529	882	6.20
	15:1	335	603	1005	2.28 (6.85)
	25:1	333	599	999	2.28 (6.85)
	30:1	311	559	933	2.28 (6.85)
	35:1	309	556	927	2.28 (6.85)
	40:1	298	536	894	2.28 (6.85)
	50:1	333	599	999	2.28 (6.85)
	60:1	311	559	933	2.28 (6.85)
	70:1	309	556	927	2.28 (6.85)
	80:1	298	536	894	2.28 (6.85)
	90:1	278	500	834	2.28 (6.85)
	100:1	294	529	882	2.28 (6.85)
	120:1	311	559	933	1.88 (6.20)
	140:1	309	556	927	1.88 (6.20)
	160:1	298	536	894	1.88 (6.20)
	180:1	278	500	834	1.88 (6.20)
	200:1	294	529	882	1.88 (6.20)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	208	264	226.6
Dimension C (mm)	148	204	181.6
Dimension H Min. (mm)	141		115
Gearbox Weight ± 3% (kg)	9.2	13	12
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø32		Ø24
Set Collar Bolt Torque (Nm)	41		16.3
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	27		
Max. Radial Output Load (N)*	6800		
Max. Axial Output Load (N)*	3400		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 72		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

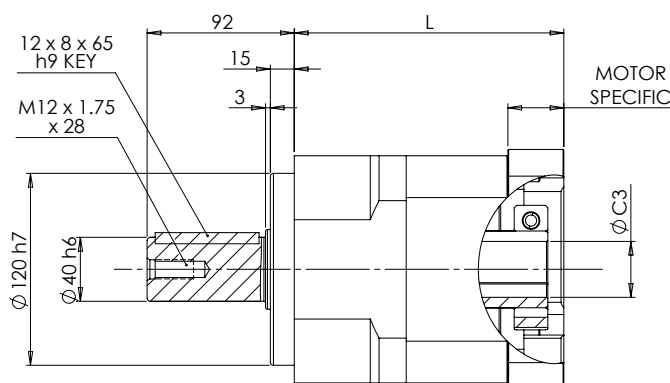
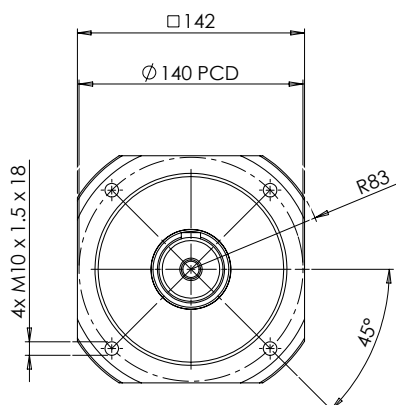
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SE142

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	625	1125	1875	9.21
	4:1	555	999	1665	7.54
	5:1	618	1112	1854	7.42
	6:1	583	1049	1749	7.25
	7:1	573	1031	1719	7.14
	8:1	553	995	1659	7.07
	9:1	516	928	1548	7.04
	10:1	549	988	1647	7.03
Double Stage (2 & 2A)	15:1	625	1125	1875	2.63 (7.30)
	20:1	555	999	1665	2.63 (7.30)
	25:1	618	1112	1854	2.63 (7.10)
	30:1	583	1049	1749	2.43 (7.10)
	35:1	573	1031	1719	2.43 (7.10)
	40:1	553	995	1659	2.43 (6.92)
	50:1	618	1112	1854	2.43 (6.92)
	60:1	583	1049	1749	2.39 (6.72)
	70:1	573	1031	1719	2.39 (6.72)
	80:1	553	995	1659	2.39 (6.72)
	90:1	516	928	1548	2.39 (6.72)
	100:1	549	988	1647	2.39 (6.72)
Triple Stage (3 & 3A)	125:1	618	1112	1854	0.71
	150:1	583	1049	1749	0.51
	175:1	573	1031	1719	0.40
	200:1	555	999	1665	0.21
	300:1	583	1049	1749	0.09
	400:1	553	995	1659	0.09
	500:1	618	1112	1854	0.08
	600:1	583	1049	1749	0.08
	700:1	573	1031	1719	0.08
	800:1	553	995	1659	0.08
	900:1	516	928	1548	0.08
	1000:1	549	988	1647	0.08

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	168	235	206	262	242
Gearbox Weight ± 3% (kg)	14	22.5	15.5	26	23
Minimum Efficiency (%)	≥ 97		≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø38		Ø32		Ø24
Set Collar Bolt Torque (Nm)	81		41		16.3
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	5000				
Torsional Rigidity (Nm/moa)	60				
Max. Radial Output Load (N)*	9300				
Max. Axial Output Load (N)*	4650				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 65				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	≤ 3	≤ 5

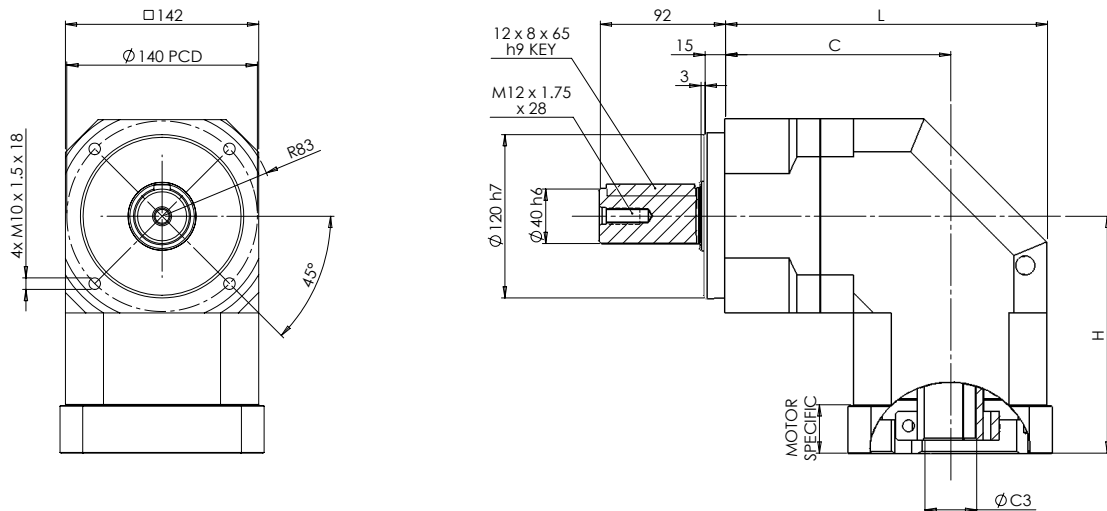
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SEL142

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	625	1125	1875	23.5
	4:1	555	999	1665	23.5
	5:1	618	1112	1854	23.5
	6:1	583	1049	1749	23.5
	7:1	573	1031	1719	23.5
	8:1	553	995	1659	23.5
	9:1	516	928	1548	23.5
	10:1	549	988	1647	23.5
	12:1	583	1049	1749	21.8
	14:1	573	1031	1719	21.8
	16:1	553	995	1659	21.8
	18:1	516	928	1548	21.8
Double Stage (2 & 2A)	20:1	549	988	1647	21.8
	15:1	625	1125	1875	6.85 (23.5)
	25:1	618	1112	1854	6.85 (23.5)
	30:1	583	1049	1749	6.85 (23.5)
	35:1	573	1031	1719	6.85 (23.5)
	40:1	553	995	1659	6.85 (23.5)
	50:1	618	1112	1854	6.85 (23.5)
	60:1	583	1049	1749	6.85 (23.5)
	70:1	573	1031	1719	6.85 (23.5)
	80:1	553	995	1659	6.85 (23.5)
	90:1	516	928	1548	6.85 (23.5)
	100:1	549	988	1647	6.85 (23.5)
	120:1	583	1049	1749	6.20 (21.8)
	140:1	573	1031	1719	6.20 (21.8)
	160:1	553	995	1659	6.20 (21.8)
	180:1	516	928	1548	6.20 (21.8)
	200:1	549	988	1647	6.20 (21.8)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	236.5	303	274.5
Dimension C (mm)	165.5	232	214.5
Dimension H Min. (mm)	174		141
Gearbox Weight $\pm$ 3% (kg)	22.5	22.6	22.8
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 38		$\varnothing$ 32
Set Collar Bolt Torque (Nm)	81		41
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	60		
Max. Radial Output Load (N)*	9300		
Max. Axial Output Load (N)*	4650		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 74		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

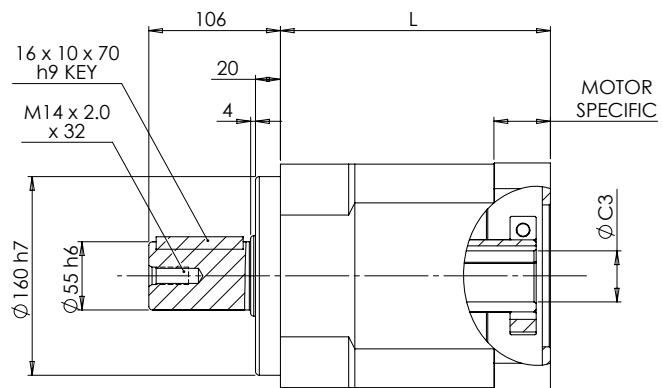
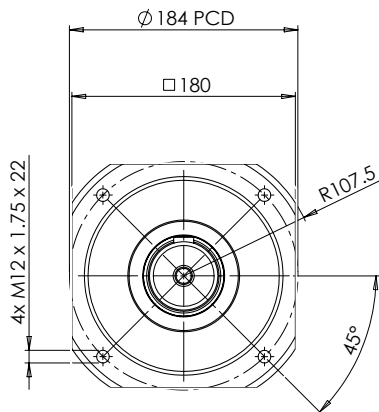
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SE180

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1206	2170	3618	28.98
	4:1	1069	1924	3207	23.67
	5:1	1189	2140	3567	23.29
	6:1	1118	2012	3354	22.75
	7:1	1108	1994	3324	22.48
	8:1	1070	1926	3210	22.59
	9:1	993	1787	2979	22.53
	10:1	1059	1906	3177	22.51
Double Stage (2 & 2A)	15:1	1206	2170	3618	7.30 (22.79)
	20:1	1069	1924	3207	7.30 (22.79)
	25:1	1189	2140	3567	7.10 (22.79)
	30:1	1118	2012	3354	7.10 (22.59)
	35:1	1108	1994	3324	7.10 (22.59)
	40:1	1070	1926	3210	6.92 (22.59)
	50:1	1189	2140	3567	6.92 (22.59)
	60:1	1118	2012	3354	6.72 (22.83)
	70:1	1108	1994	3324	6.72 (21.83)
	80:1	1070	1926	3210	6.72 (21.83)
	90:1	993	1787	2979	6.72 (21.60)
	100:1	1059	1906	3177	6.72 (21.83)
Triple Stage (3 & 3A)	125:1	1189	2140	3567	1.42
	150:1	1206	2170	3618	0.92
	175:1	1108	1994	3324	0.83
	200:1	1069	1924	3207	0.65
	300:1	1118	2012	3354	0.21
	400:1	1070	1926	3210	0.21
	500:1	1189	2140	3567	0.12
	600:1	1118	2012	3354	0.12
	700:1	1108	1994	3324	0.12
	800:1	1070	1926	3210	0.12
	900:1	993	1787	2979	0.12
	1000:1	1059	1906	3177	0.12

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	217	298	252	319	290
Gearbox Weight ± 3% (kg)	29.2	42	34.8	56.5	47
Minimum Efficiency (%)	≥ 97		≥ 94		≥ 90
Max. Input Shaft ØC3 (mm)	Ø55		Ø38		Ø32
Set Collar Bolt Torque (Nm)	81		81		41
Nom. Input Speed (rpm)	3000				
Max. Input Speed (rpm)	4000				
Torsional Rigidity (Nm/moa)	140				
Max. Radial Output Load (N)*	15600				
Max. Axial Output Load (N)*	7800				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 67				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	≤ 3	≤ 5

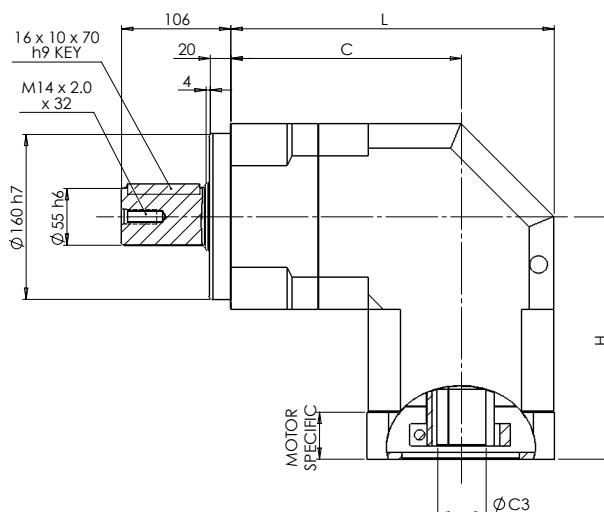
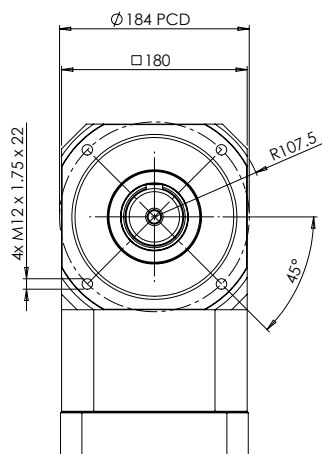
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SEL180

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1206	2170	68.2
	4:1	1069	1924	68.2
	5:1	1189	2140	68.2
	6:1	1118	2012	68.2
	7:1	1108	1994	68.2
	8:1	1070	1926	68.2
	9:1	993	1787	68.2
	10:1	1059	1906	68.2
	12:1	1118	2012	65.5
	14:1	1108	1994	65.5
	16:1	1070	1926	65.5
	18:1	993	1787	65.5
Double Stage (2 & 2A)	20:1	1059	1906	65.5
	15:1	1206	2170	26.2 (55.2)
	25:1	1189	2140	23.1 (50.4)
	30:1	1118	2012	23.1 (50.4)
	35:1	1108	1994	23.1 (50.4)
	40:1	1070	1926	23.1 (50.4)
	50:1	1189	2140	23.1 (50.4)
	60:1	1118	2012	23.1 (50.4)
	70:1	1108	1994	23.1 (50.4)
	80:1	1070	1926	23.1 (50.4)
	90:1	993	1787	23.1 (50.4)
	100:1	1059	1906	23.1 (50.4)
	120:1	1118	2012	21.2 (48.7)
	140:1	1108	1994	21.2 (48.7)
	160:1	1070	1926	21.2 (48.7)
	180:1	993	1787	21.2 (48.7)
	200:1	1059	1906	21.2 (48.7)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	313.6	394.6	320.5
Dimension C (mm)	223.6	304.6	249.5
Dimension H Min. (mm)	235		174
Gearbox Weight ± 3% (kg)	52.3	51.7	43.9
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø55		Ø38
Set Collar Bolt Torque (Nm)	81		81
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	4000		
Torsional Rigidity (Nm/moa)	140		
Max. Radial Output Load (N)*	15600		
Max. Axial Output Load (N)*	7800		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 76		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

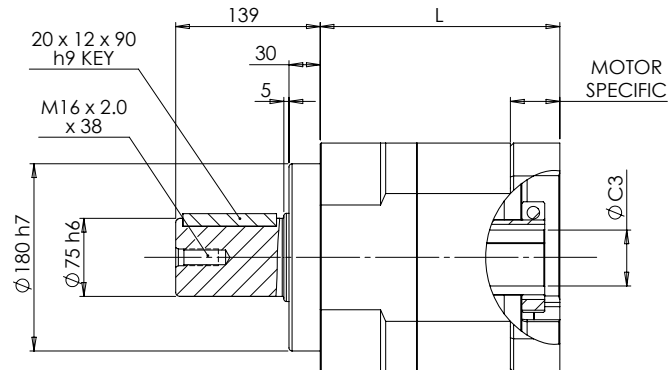
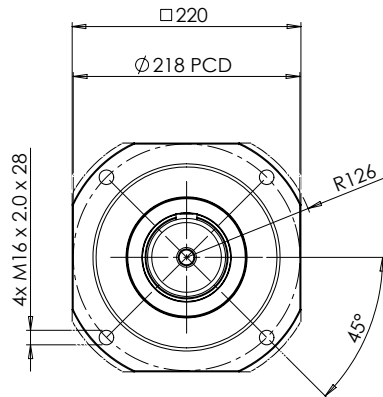
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SE220

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	2030	3654	6090	59.61
	4:1	1804	3247	5412	54.37
	5:1	2010	3618	6030	53.27
	6:1	1911	3439	5733	51.72
	7:1	1870	3366	5610	50.97
	8:1	1824	3283	5472	50.84
	9:1	1694	3049	5082	50.63
	10:1	1779	3202	5337	50.56
Double Stage (2 & 2A)	15:1	2030	3654	6090	22.79 (56.98)
	20:1	1804	3247	5412	22.79 (56.98)
	25:1	2010	3618	6030	22.79 (56.98)
	30:1	1911	3439	5733	22.59 (56.48)
	35:1	1870	3366	5610	22.59 (56.48)
	40:1	1824	3283	5472	22.59 (56.48)
	50:1	2010	3618	6030	22.59 (56.48)
	60:1	1911	3439	5733	22.83 (54.58)
	70:1	1870	3366	5610	21.83 (54.58)
	80:1	1824	3283	5472	21.83 (54.58)
	90:1	1694	3049	5082	21.60 (54.00)
	100:1	1779	3202	5337	21.60 (54.58)
Triple Stage (3 & 3A)	125:1	2010	3618	6030	3.29
	150:1	2030	3654	6090	2.15
	175:1	1870	3366	5610	1.26
	200:1	1804	3247	5412	0.98
	300:1	1911	3439	5733	0.82
	400:1	1824	3283	5472	0.82
	500:1	2010	3618	6030	0.51
	600:1	1911	3439	5733	0.25
	700:1	1870	3366	5610	0.25
	800:1	1824	3283	5472	0.25
	900:1	1694	3049	5082	0.25
	1000:1	1779	3202	5337	0.25

Design Parameter	Stage vs Value				
	1	2A	2	3A	3
Dimension L Min. (mm)	228	321	307	388	342
Gearbox Weight ± 3% (kg)	39	59	56.5	86	70
Minimum Efficiency (%)	≥ 97	≥ 94		≥ 90	
Max. Input Shaft ØC3 (mm)	Ø55			Ø38	
Set Collar Bolt Torque (Nm)	81			81	
Nom. Input Speed (rpm)	2000				
Max. Input Speed (rpm)	3000				
Torsional Rigidity (Nm/moa)	240				
Max. Radial Output Load (N)*	51000				
Max. Axial Output Load (N)*	25500				
Operating Temp Range (°C)	- 25 / + 90				
Protection Rating (IP)	IP65				
Max. Noise Level (dB)**	≤ 70				

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash		
		Single	Double	Triple
P2	Standard	≤ 7	≤ 9	≤ 11
P1	Reduced	≤ 5	≤ 7	≤ 9
P0	Micro	≤ 3	≤ 5	≤ 7
PS	Super	≤ 1	≤ 3	≤ 5

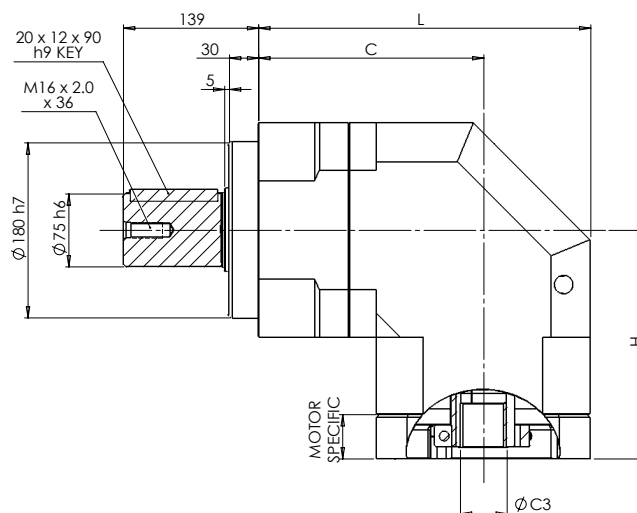
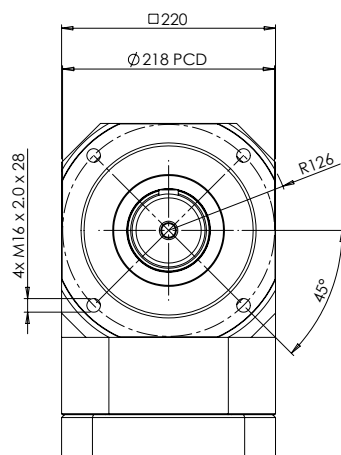
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SEL220

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	2030	3654	6090	135.0
	4:1	1804	3247	5412	135.0
	5:1	2010	3618	6030	135.0
	6:1	1911	3439	5733	135.0
	7:1	1870	3366	5610	135.0
	8:1	1824	3283	5472	135.0
	9:1	1694	3049	5082	135.0
	10:1	1779	3202	5337	135.0
	12:1	1911	3439	5733	119.2
	14:1	1870	3366	5610	119.2
	16:1	1824	3283	5472	119.2
	18:1	1694	3049	5082	119.2
Double Stage (2 & 2A)	20:1	1779	3202	5337	119.2
	15:1	2030	3654	6090	70.1 (80.2)
	25:1	2010	3618	6030	68.2 (76.5)
	30:1	1911	3439	5733	68.2 (76.5)
	35:1	1870	3366	5610	68.2 (76.5)
	40:1	1824	3283	5472	68.2 (76.5)
	50:1	2010	3618	6030	68.2 (76.5)
	60:1	1911	3439	5733	68.2 (76.5)
	70:1	1870	3366	5610	68.2 (76.5)
	80:1	1824	3283	5472	68.2 (76.5)
	90:1	1694	3049	5082	68.2 (76.5)
	100:1	1779	3202	5337	68.2 (76.5)
	120:1	1911	3439	5733	65.1 (74.2)
	140:1	1870	3366	5610	65.1 (74.2)
	160:1	1824	3283	5472	65.1 (74.2)
	180:1	1694	3049	5082	65.1 (74.2)
	200:1	1779	3202	5337	65.1 (74.2)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	341.6	434.6	403.6
Dimension C (mm)	231.6	324.6	313.6
Dimension H Min. (mm)	235		
Gearbox Weight ± 3% (kg)	75	94.5	78.5
Minimum Efficiency (%)	≥ 95	≥ 92	
Max. Input Shaft ØC3 (mm)	Ø55		
Set Collar Bolt Torque (Nm)	81		
Nom. Input Speed (rpm)	2000		
Max. Input Speed (rpm)	3000		
Torsional Rigidity (Nm/moa)	240		
Max. Radial Output Load (N)*	51000		
Max. Axial Output Load (N)*	25500		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 78		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

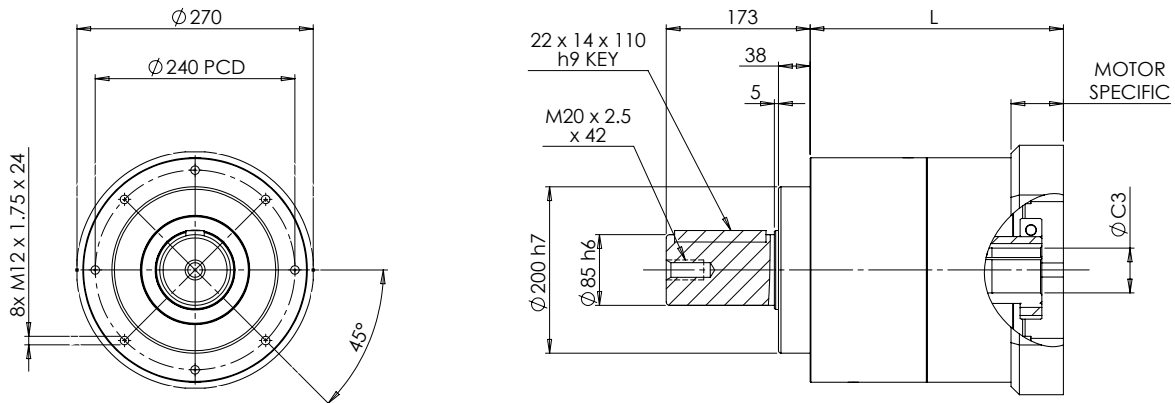
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SE270

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	4770	8586	14310	122.20
	4:1	4730	8514	14190	111.46
	5:1	4680	8424	14040	109.20
	7:1	4570	8226	13710	104.49
	10:1	4420	7956	13260	103.65
Double Stage (2 & 2A)	15:1	4770	8586	14310	63.81 (65.74)
	20:1	4730	8514	14190	63.81 (65.74)
	25:1	4680	8424	14040	63.81 (65.74)
	30:1	4620	8316	13860	63.25 (64.86)
	35:1	4570	8226	13710	63.25 (64.86)
	40:1	4520	8136	13560	63.25 (64.86)
	50:1	4680	8424	14040	63.25 (64.86)
	70:1	4570	8226	13710	61.12 (62.62)
	100:1	4420	7956	13260	60.48 (61.17)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	302	413	371
Gearbox Weight $\pm$ 3% (kg)	88	135	128
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 70		$\varnothing$ 55
Set Collar Bolt Torque (Nm)	110		81
Nom. Input Speed (rpm)	2000		
Max. Input Speed (rpm)	3000		
Torsional Rigidity (Nm/moa)	510		
Max. Radial Output Load (N)*	107100		
Max. Axial Output Load (N)*	53550		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 72		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	≤ 3

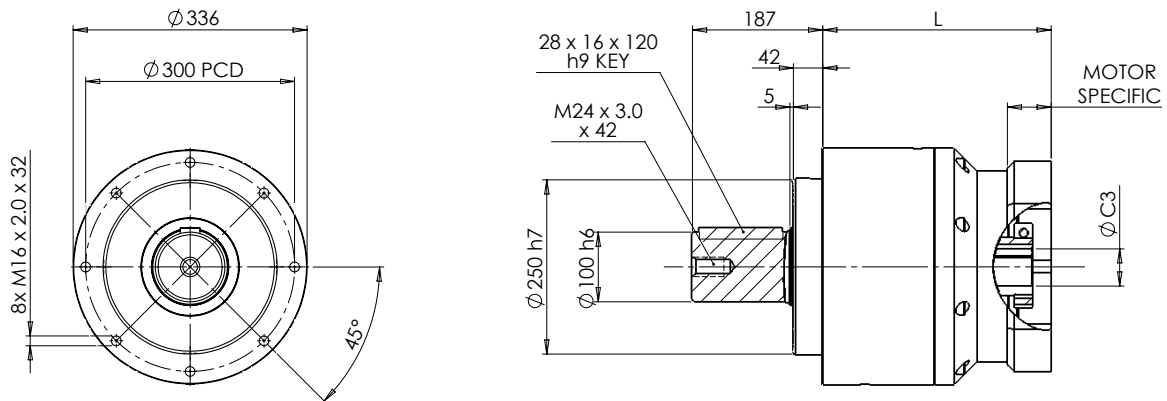
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SE330

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	8790	15822	26370	252.96
	4:1	8730	15714	26190	230.72
	5:1	8660	15588	25980	226.05
	7:1	8520	15336	25560	216.29
	10:1	8310	14958	24930	214.55
Double Stage (2 Only)	15:1	8790	15822	26370	185.05
	20:1	8730	15714	26190	185.05
	25:1	8660	15588	25980	185.05
	30:1	8610	15498	25830	183.43
	35:1	8520	15336	25560	183.43
	40:1	8440	15192	25320	183.43
	50:1	8660	15588	25980	183.43
	70:1	8520	15336	25560	177.26
	100:1	8310	14958	24930	175.39

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	325	438
Gearbox Weight $\pm$ 3% (kg)	172	256
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 75	$\varnothing$ 70
Set Collar Bolt Torque (Nm)	110	110
Nom. Input Speed (rpm)	2000	
Max. Input Speed (rpm)	3000	
Torsional Rigidity (Nm/moa)	980	
Max. Radial Output Load (N)*	224910	
Max. Axial Output Load (N)*	112455	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 74	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

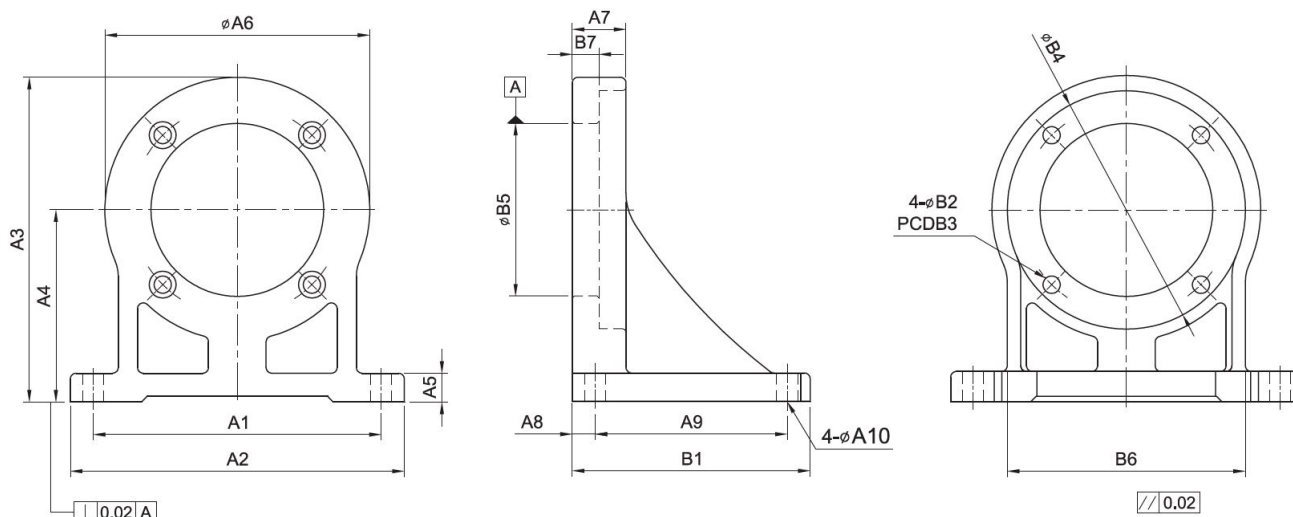
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	$\leq$ 7	$\leq$ 9
P1	Reduced	$\leq$ 5	$\leq$ 7
P0	Micro	$\leq$ 3	$\leq$ 5
PS	Super	$\leq$ 1	$\leq$ 3

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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SE Series – Type L Brackets

Foot Mount Style Base Kits



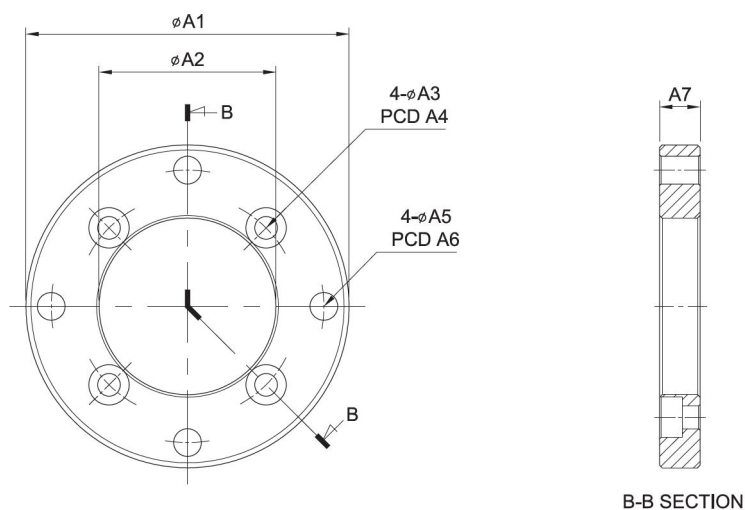
DIM	SE 044 - LB	SE 062 - LB	SE 090 - LB	SE 120 - LB	SE 142 - LB	SE 180 - LB	SE 220 - LB
A1	70	90	110	150	190	240	280
A2	88	108	130	176	220	276	330
A3	75	96	127	170	208	274	334
A4	45	55	75	100	120	160	200
A5	8	9	11	16	19	24	30
A6	60	81	104	140	175	228	268
A7	13	16	21	28	35	45	60
A8	10	10	11	14	16	19	26
A9	40	50	75	100	120	160	200
A10	7	7	9	11	13	17	21
B1	60	70	97	128	152	198	252
B2	4.5	5.5	6.8	9	11	13	17
B3	44	62	82	110	140	184	218
B4	50	70	92	124	155	205	242
B5	35	50	70	90	120	160	180
B6	50	70	90	125	156	200	230
B7	6	8	9	14	16	21	30
Mass (kg)	0.4	0.7	1.6	3.9	6.4	13.5	27.7

FOOT MOUNT TYPE L BRACKETS ARE MADE FROM CAST IRON AND CAN BE USED WITH BOTH IN-LINE SE OR RIGHT ANGLE SEL GEARBOXES OF THE SAME FRAME SIZE



SE Series – Front Plates

B5 To B14 Connecting Plates

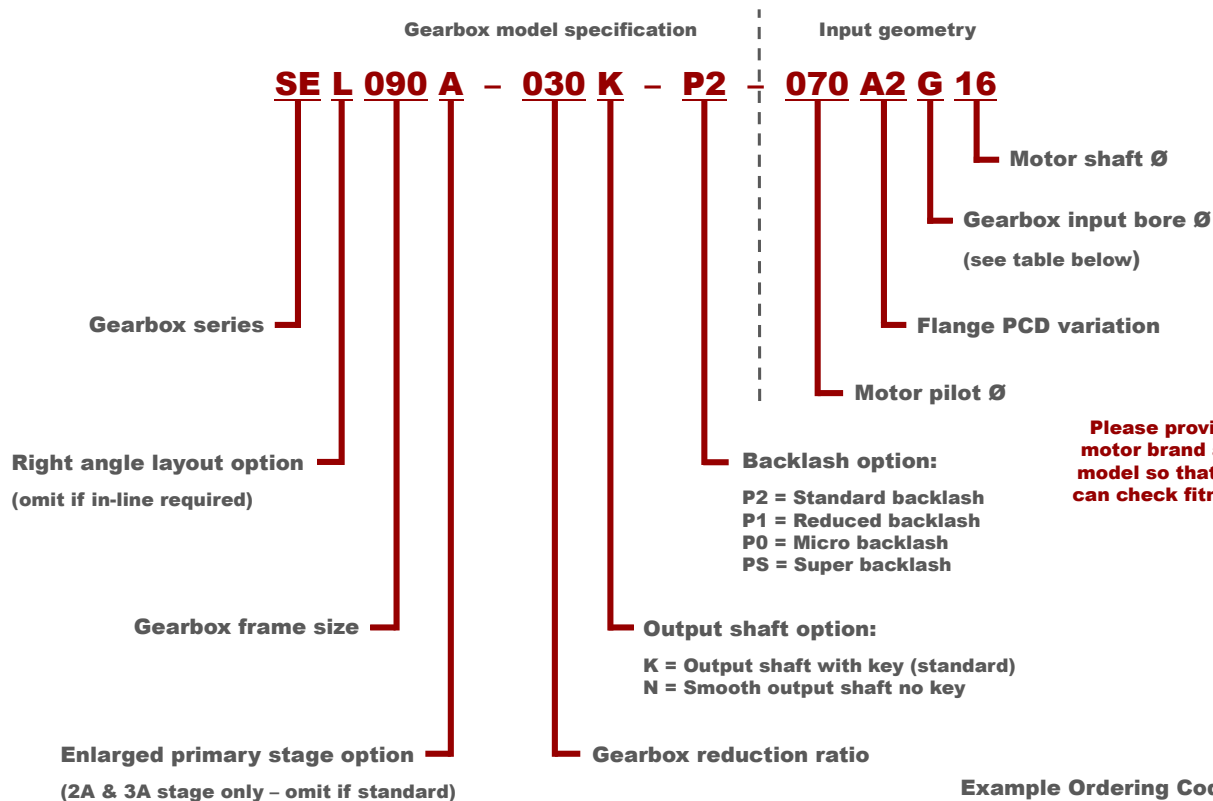


DIM	SE 044 - FP	SE 062 - FP	SE 090 - FP	SE 120 - FP	SE 142 - FP	SE 180 - FP	SE 220 - FP
A1	64	88	123	158	188	238	298
A2	35	50	70	90	120	160	180
A3	4.5	5.5	6.8	9	11	13	17
A4	44	62	82	110	140	184	218
A5	5.5	6.8	9	11	13	15	17
A6	54	75	106	140	165	210	260
A7	8	9	11	14	17	22	30

FRONT CONNECTING PLATES ARE MADE FROM ALUMINIUM AND CAN BE USED WITH BOTH IN-LINE SE OR RIGHT ANGLE SEL GEARBOXES OF THE SAME FRAME SIZE



SE Series – Order Codes



Example Ordering Code:
SE062-010N-P0-060A1F14

SE Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes																	
Frame	Stage	B 8	C 9	E 11	F 14	G 19	H 22	J 24	K 28	L 32	M 35	N 38	P 42	Q 48	R 55	S 60	T 65	V 70	W 75
044	1 & 2A	X	X	X															
	1 & 2A				X	X													
	2 & 3A	X	X	X															
062	3 Only																		
	1 & 2A					X	X	X											
	2 & 3A				X	X													
090	3 Only	X	X	X															
	1 & 2A							X	X	X									
	2 & 3A					X	X	X											
120	3 Only				X	X													
	1 & 2A									X	X	X							
	2 & 3A							X	X	X									
142	3 Only					X	X	X											
	1 & 2A											X	X	X	X				
	2 & 3A											X	X	X	X				
180	3 Only							X	X	X									
	1 & 2A											X	X	X	X				
	2 & 3A									X	X	X							
220	3 Only												X	X	X				
	1 & 2A												X	X	X				
	2 & 3A											X	X	X	X				
270	3 Only									X	X	X							
	1 & 2A												X	X	X	X	X	X	
	2 Only												X	X	X				
330	1 Only													X	X	X			X
	2 Only													X	X	X		X	

FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



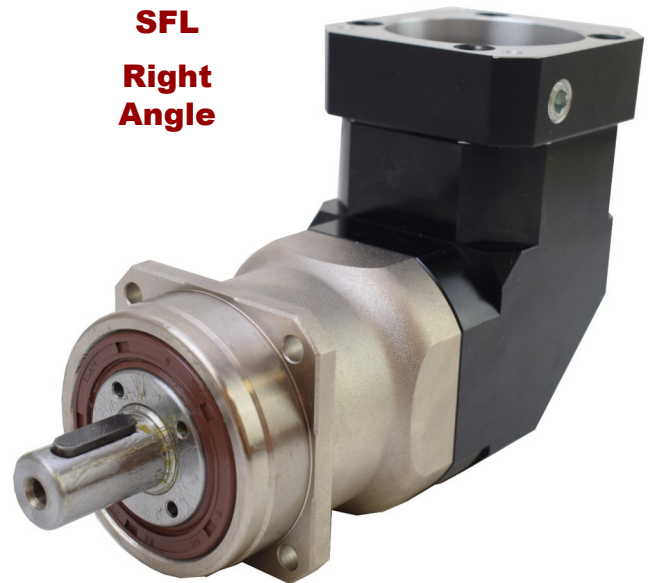
ServoBox – SF Series

Precision Range – In-line & Right Angle

SF In-line



**SFL
Right
Angle**



Taper roller bearings on output shaft for greater axial & radial loads

Helical hardened & ground gearing for greater wear resistance

Square B5 output flange with solid output shaft for easy mounting

5 standard gearbox frame sizes from 062 up to 180 frame

From 3:1 up to 200:1 reduction ratio across the range

Up to 1210 Nm nominal & 2170 Nm peak output torque

Backlash options starting from as low as ≤ 1 arcmin

Power transmission efficiency of up to $\geq 97\%$

Operating noise levels as low as 58 dB

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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SF Series – In-line

Precision Range – Performance Overview

Parameter	Stage / Ratio	SF 062	SF 075	SF 100	SF 142	SF 180	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	59	165	216	625	1206
		4:1	51	146	208	555	1069
		5:1	48	155	333	618	1189
		6:1	45	150	315	583	1118
		7:1	45	142	309	573	1108
		8:1	43	141	305	553	1070
		9:1	44	140	293	516	993
	Double Stage (2 & 2A)	10:1	43	136	294	549	1059
		15:1	59	142	298	625	1206
		20:1	51	126	267	555	1069
		25:1	48	158	296	618	1189
		30:1	45	130	278	583	1118
		35:1	45	128	275	573	1108
		40:1	43	123	265	553	1070
		50:1	48	138	296	618	1189
		60:1	45	130	277	583	1118
		70:1	45	128	275	573	1108
		80:1	43	123	265	553	1070
		90:1	44	125	247	516	993
		100:1	43	121	262	549	1059
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	
Maximum Input Speed (rpm)	ALL	6000	6000	5000	5000	4000	
Torsional Rigidity (Nm/moa)	ALL	8	15	27	60	140	
Max. Radial Output Load (N)*	ALL	2240	4150	8760	12750	17860	
Max. Axial Output Load (N)*	ALL	1920	3780	7500	10840	15180	
Maximum Noise Level (dB)**	ALL	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	
PS Super Backlash (arcmin)	1	-	≤ 1	≤ 1	≤ 1	≤ 1	
	2	-	-	≤ 3	≤ 3	≤ 3	
P0 Micro Backlash (arcmin)	1	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	
	2	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
P1 Reduced Backlash (arcmin)	1	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
	2	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
P2 Standard Backlash (arcmin)	1	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
	2	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	
Gearbox Weight ± 3% (kg)	1	1.7	4.5	8.3	16.7	34.3	
	2	2 (2.6)	4.8 (8.2)	9.7 (11.5)	19.2 (25.6)	37.3 (43)	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

NOTE: Values shown in brackets in the above table only apply to type 2A gearboxes with enlarged primary stage gearing

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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SFL Series – Right Angle

Precision Range – Performance Overview

Parameter	Stage / Ratio	SFL 062	SFL 075	SFL 100	SFL 142	SFL 180	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	59	165	216	625	1206
		4:1	51	146	208	555	1069
		5:1	48	155	333	618	1189
		6:1	45	150	315	583	1118
		7:1	45	142	309	573	1108
		8:1	44	141	305	553	1070
		9:1	44	140	293	551	993
		10:1	43	138	291	549	1059
		12:1	45	150	315	583	1118
		14:1	45	142	309	573	1108
		16:1	44	141	305	553	1070
	18:1	44	140	293	551	993	
	20:1	43	138	291	549	1059	
	Double Stage (2 & 2A)	15:1	59	142	216	625	1206
		25:1	48	158	296	618	1189
		30:1	45	130	278	583	1118
		35:1	45	128	275	573	1108
		40:1	43	123	208	553	1070
		50:1	48	138	296	618	1189
		60:1	45	130	277	583	1118
		70:1	45	128	275	573	1108
		80:1	43	123	208	553	1070
		90:1	44	125	247	516	993
100:1		43	121	262	549	1059	
120:1		45	130	277	583	1118	
140:1	45	128	275	573	1108		
160:1	43	123	265	553	1070		
180:1	44	125	247	516	993		
200:1	43	121	262	549	1059		
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	
Maximum Input Speed (rpm)	ALL	6000	6000	5000	5000	4000	
Torsional Rigidity (Nm/moa)	ALL	8	15	27	60	140	
Max. Radial Output Load (N)*	ALL	2240	4150	8760	12750	17860	
Max. Axial Output Load (N)*	ALL	1920	3780	7500	10840	15180	
Maximum Noise Level (dB)**	ALL	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	
PS Super Backlash (arcmin)	1	-	≤ 2	≤ 2	≤ 2	≤ 2	
	2	-	-	≤ 4	≤ 4	≤ 4	
P0 Micro Backlash (arcmin)	1	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	
	2	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	
P1 Reduced Backlash (arcmin)	1	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	
	2	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	
P2 Standard Backlash (arcmin)	1	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	
	2	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	
Gearbox Weight ± 3% (kg)	1	2.7	7.5	10.9	25.6	57.9	
	2	2.2 (3.5)	8.7 (11.1)	11.4 (16.8)	26.2 (29.9)	54.4 (66.1)	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

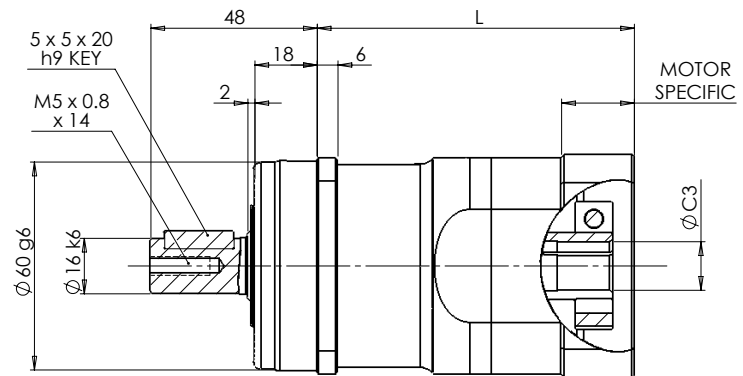
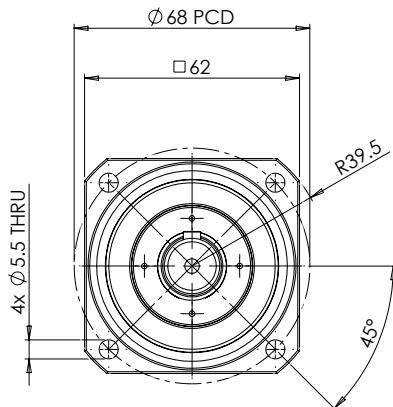
NOTE: Values shown in brackets in the above table only apply to type 2A gearboxes with enlarged primary stage gearing

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SF062

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	59	106	177	0.16
	4:1	51	91	153	0.14
	5:1	48	86	144	0.13
	6:1	45	81	135	0.13
	7:1	45	81	135	0.13
	8:1	43	77	129	0.13
	9:1	44	79	132	0.13
	10:1	43	77	129	0.13
Double Stage (2 & 2A)	15:1	59	106	177	0.03 (0.15)
	20:1	51	91	153	0.03 (0.14)
	25:1	48	86	144	0.03 (0.13)
	30:1	45	81	135	0.03 (0.15)
	35:1	45	81	135	0.03 (0.12)
	40:1	43	77	129	0.03 (0.14)
	50:1	48	86	144	0.03 (0.13)
	60:1	45	81	135	0.03
	70:1	45	81	135	0.03 (0.12)
	80:1	43	77	129	0.03
	90:1	44	79	132	0.03
	100:1	43	77	129	0.03 (0.12)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	91	125	116
Gearbox Weight $\pm$ 3% (kg)	1.7	2.6	2
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94	
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 19		$\varnothing$ 11
Set Collar Bolt Torque (Nm)	10		4.8
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	8		
Max. Radial Output Load (N)*	2240		
Max. Axial Output Load (N)*	1920		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	$\leq$ 58		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	$\leq$ 7	$\leq$ 9
P1	Reduced	$\leq$ 5	$\leq$ 7
P0	Micro	$\leq$ 3	$\leq$ 5
PS	Super	-	-

NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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Precision Range – Right Angle



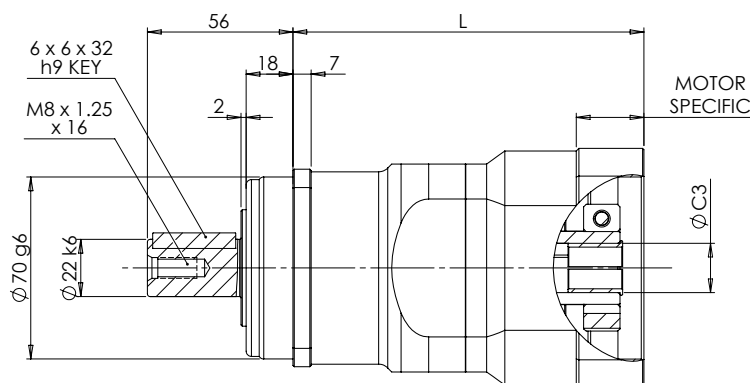
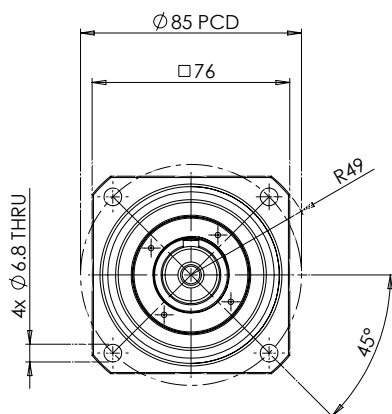
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SF075

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	165	297	495	0.60
	4:1	146	262	438	0.51
	5:1	155	279	465	0.45
	6:1	150	270	450	0.45
	7:1	142	255	426	0.42
	8:1	141	253	423	0.42
	9:1	140	252	420	0.42
	10:1	136	244	408	0.42
Double Stage (2 & 2A)	15:1	142	255	426	0.13 (0.60)
	20:1	126	226	378	0.13 (0.51)
	25:1	158	284	474	0.13 (0.45)
	30:1	130	234	390	0.13 (0.60)
	35:1	128	230	384	0.13 (0.42)
	40:1	123	221	369	0.13 (0.51)
	50:1	138	248	414	0.13 (0.45)
	60:1	130	234	390	0.13
	70:1	128	230	384	0.13 (0.42)
	80:1	123	221	369	0.13
	90:1	125	225	375	0.13
	100:1	121	217	363	0.13 (0.42)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	135	158	142
Gearbox Weight ± 3% (kg)	4.5	8.2	4.8
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft ØC3 (mm)	Ø24		Ø19
Set Collar Bolt Torque (Nm)	16.3		10
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	15		
Max. Radial Output Load (N)*	4150		
Max. Axial Output Load (N)*	3780		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 60		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	-

NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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Precision Range – Right Angle



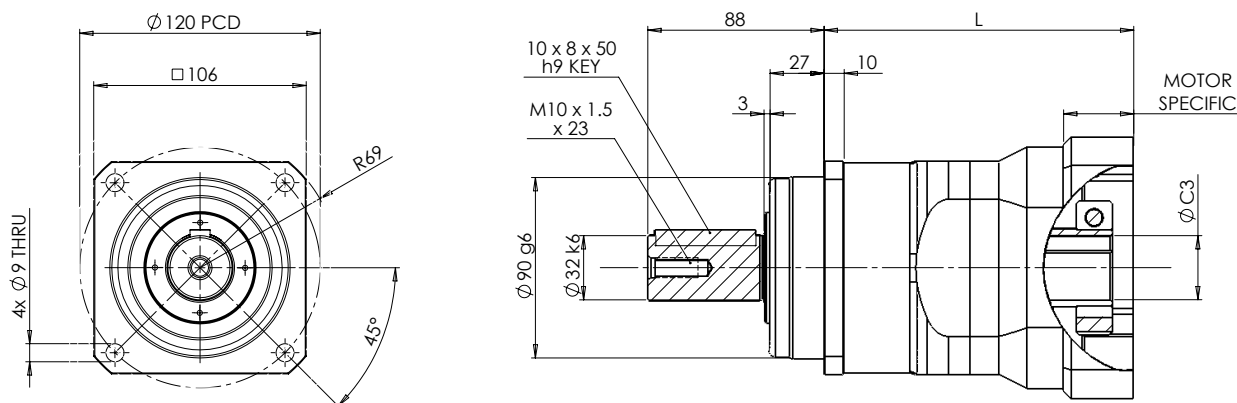
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SF100

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	216	388	648	3.21
	4:1	208	374	624	2.80
	5:1	333	599	999	2.71
	6:1	315	567	945	2.65
	7:1	309	556	927	2.54
	8:1	305	549	915	2.51
	9:1	293	527	879	2.51
	10:1	294	529	882	2.51
Double Stage (2 & 2A)	15:1	298	536	894	0.47 (3.21)
	20:1	267	480	801	0.47 (2.80)
	25:1	296	532	888	0.47 (2.71)
	30:1	278	500	834	0.47 (3.21)
	35:1	275	495	825	0.47 (2.54)
	40:1	265	477	795	0.47 (2.80)
	50:1	296	532	888	0.47 (2.71)
	60:1	277	498	831	0.44
	70:1	275	495	825	0.44 (2.54)
	80:1	265	477	795	0.44
	90:1	247	444	741	0.44
	100:1	262	471	786	0.44 (2.51)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	154	194	190
Gearbox Weight $\pm$ 3% (kg)	8.3	11.5	9.7
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94	
Max. Input Shaft ØC3 (mm)	Ø32		Ø24
Set Collar Bolt Torque (Nm)	41		16.3
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	27		
Max. Radial Output Load (N)*	8760		
Max. Axial Output Load (N)*	7500		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	$\leq$ 63		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	$\leq$ 7	$\leq$ 9
P1	Reduced	$\leq$ 5	$\leq$ 7
P0	Micro	$\leq$ 3	$\leq$ 5
PS	Super	$\leq$ 1	$\leq$ 3

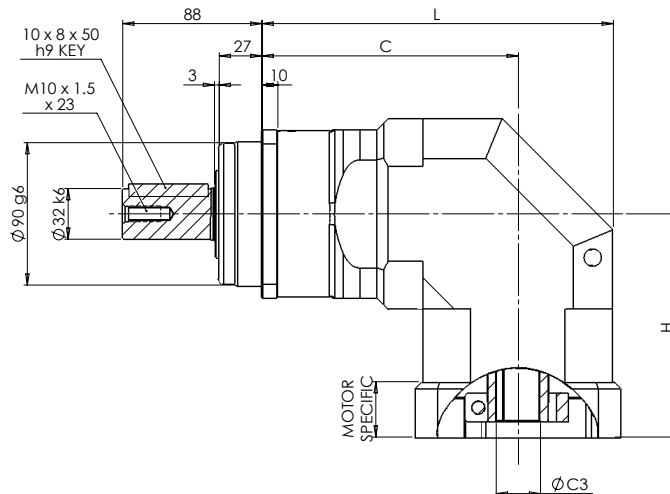
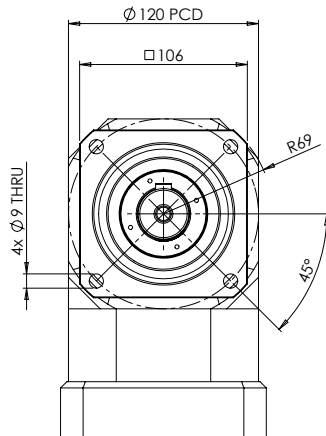
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SFL100

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	216	388	648	6.42
	4:1	208	374	624	5.61
	5:1	333	599	999	5.42
	6:1	315	567	945	5.33
	7:1	309	556	927	5.09
	8:1	305	549	915	5.06
	9:1	293	527	879	5.04
	10:1	291	523	873	5.02
	12:1	315	567	945	4.98
	14:1	309	556	927	4.95
	16:1	305	549	915	4.91
	18:1	293	527	879	4.87
Double Stage (2 & 2A)	20:1	291	523	873	4.75
	15:1	216	388	648	2.20 (3.21)
	25:1	296	532	888	2.20 (2.71)
	30:1	278	500	834	2.20 (2.66)
	35:1	275	495	825	2.20 (2.54)
	40:1	208	374	624	2.20 (2.80)
	50:1	296	532	888	2.20 (2.71)
	60:1	277	498	831	2.20 (2.66)
	70:1	275	495	825	2.20 (2.54)
	80:1	208	374	624	2.20 (2.80)
	90:1	247	444	741	2.20
	100:1	262	471	786	2.20 (2.71)
	120:1	277	498	831	1.86
	140:1	275	495	825	1.86 (2.54)
	160:1	265	477	795	1.86
	180:1	247	444	741	1.86
	200:1	262	471	786	1.86 (2.48)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	222	266	240.6
Dimension C (mm)	162	206	195.6
Dimension H Min. (mm)	141		115
Gearbox Weight $\pm$ 3% (kg)	10.9	16.8	11.4
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø32		Ø24
Set Collar Bolt Torque (Nm)	41		16.3
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	27		
Max. Radial Output Load (N)*	8760		
Max. Axial Output Load (N)*	7500		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 72		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

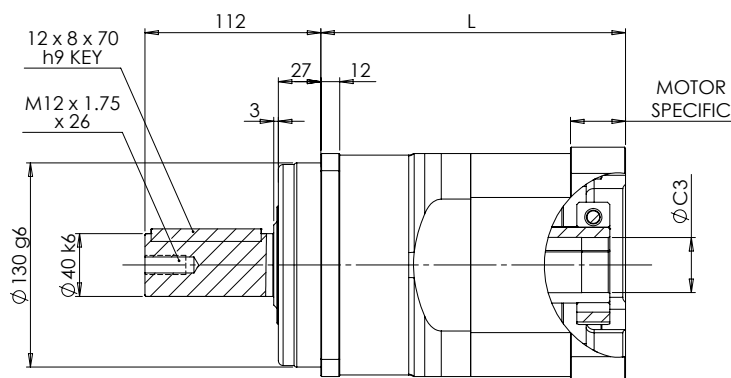
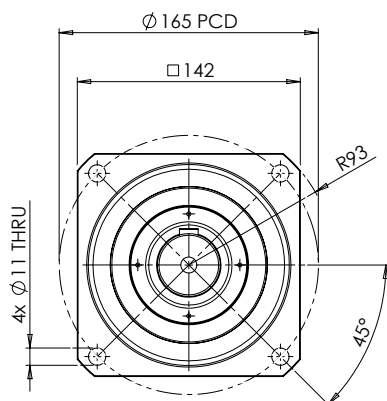
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SF142

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	625	1125	1875	9.18
	4:1	555	999	1665	7.51
	5:1	618	1112	1854	7.40
	6:1	583	1049	1749	7.15
	7:1	573	1031	1719	7.15
	8:1	553	995	1659	7.01
	9:1	516	928	1548	7.01
	10:1	549	988	1647	7.01
Double Stage (2 & 2A)	15:1	625	1125	1875	2.63 (9.18)
	20:1	555	999	1665	2.63 (7.51)
	25:1	618	1112	1854	2.63 (7.40)
	30:1	583	1049	1749	2.43 (9.18)
	35:1	573	1031	1719	2.43 (7.15)
	40:1	553	995	1659	2.43 (7.51)
	50:1	618	1112	1854	2.43 (7.40)
	60:1	583	1049	1749	2.39
	70:1	573	1031	1719	2.39 (7.15)
	80:1	553	995	1659	2.39
	90:1	516	928	1548	2.39
	100:1	549	988	1647	2.39 (7.01)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	194	261	232
Gearbox Weight ± 3% (kg)	16.7	25.6	19.2
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft ØC3 (mm)	Ø38		Ø32
Set Collar Bolt Torque (Nm)	81		41
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	60		
Max. Radial Output Load (N)*	12750		
Max. Axial Output Load (N)*	10840		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 65		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	≤ 3

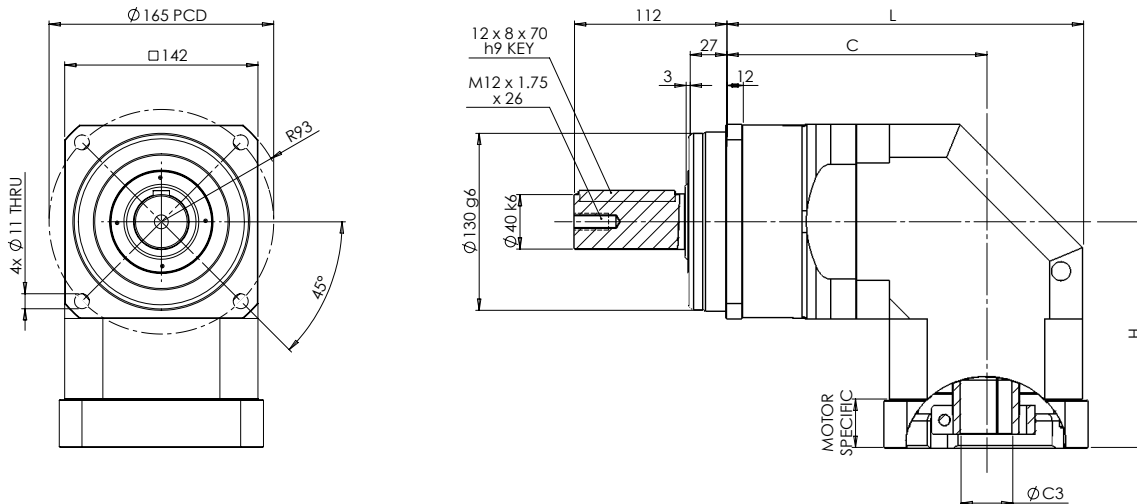
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – SFL142

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	625	1125	1875	18.36
	4:1	555	999	1665	18.02
	5:1	618	1112	1854	17.21
	6:1	583	1049	1749	16.50
	7:1	573	1031	1719	15.85
	8:1	553	995	1659	14.94
	9:1	551	991	1653	14.61
	10:1	549	988	1647	14.02
	12:1	583	1049	1749	13.86
	14:1	573	1031	1719	13.53
	16:1	553	995	1659	13.03
	18:1	551	991	1653	12.57
Double Stage (2 & 2A)	20:1	549	988	1647	12.11
	15:1	625	1125	1875	6.85 (9.18)
	25:1	618	1112	1854	6.85 (7.40)
	30:1	583	1049	1749	6.85 (7.32)
	35:1	573	1031	1719	6.85 (7.15)
	40:1	553	995	1659	6.85 (7.51)
	50:1	618	1112	1854	6.85 (7.40)
	60:1	583	1049	1749	6.85 (7.32)
	70:1	573	1031	1719	6.85 (7.15)
	80:1	553	995	1659	6.85 (7.51)
	90:1	516	928	1548	6.85
	100:1	549	988	1647	6.85 (7.40)
	120:1	583	1049	1749	6.20
	140:1	573	1031	1719	6.20 (7.15)
	160:1	553	995	1659	6.20
	180:1	516	928	1548	6.20
	200:1	549	988	1647	6.20 (7.02)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	262	329	300
Dimension C (mm)	191	258	240
Dimension H Min. (mm)	165		141
Gearbox Weight ± 3% (kg)	25.6	29.9	26.2
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø38		Ø32
Set Collar Bolt Torque (Nm)	81		41
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	60		
Max. Radial Output Load (N)*	12750		
Max. Axial Output Load (N)*	10840		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 74		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

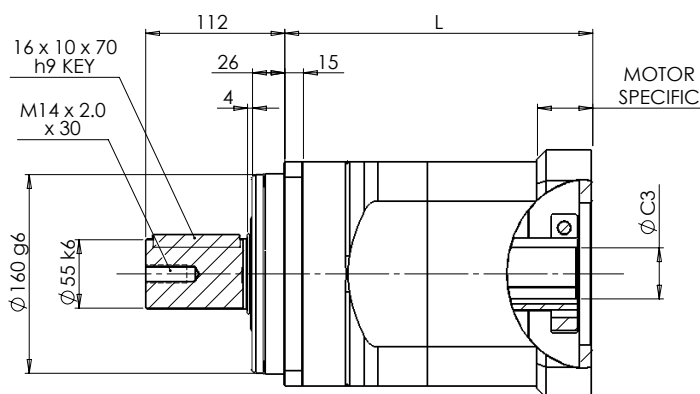
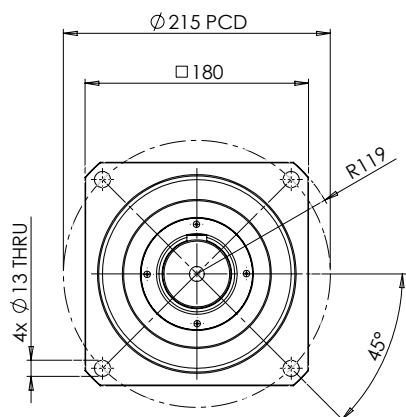
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SF180

Precision Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1206	2170	3618	28.82
	4:1	1069	1924	3207	23.56
	5:1	1189	2140	3567	23.74
	6:1	1118	2012	3354	22.65
	7:1	1108	1994	3324	22.40
	8:1	1070	1926	3210	22.35
	9:1	993	1787	2979	22.35
	10:1	1059	1906	3177	22.35
Double Stage (2 & 2A)	15:1	1206	2170	3618	7.30 (28.82)
	20:1	1069	1924	3207	7.30 (23.56)
	25:1	1189	2140	3567	7.10 (23.24)
	30:1	1118	2012	3354	7.10 (28.82)
	35:1	1108	1994	3324	7.10 (22.40)
	40:1	1070	1926	3210	6.92 (23.56)
	50:1	1189	2140	3567	6.92 (23.24)
	60:1	1118	2012	3354	6.72
	70:1	1108	1994	3324	6.72 (22.40)
	80:1	1070	1926	3210	6.72
	90:1	993	1787	2979	6.72
	100:1	1059	1906	3177	6.72 (22.35)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	248	329	283
Gearbox Weight ± 3% (kg)	34.3	43	37.3
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft ØC3 (mm)	Ø55		Ø38
Set Collar Bolt Torque (Nm)	81		81
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	4000		
Torsional Rigidity (Nm/moa)	140		
Max. Radial Output Load (N)*	17860		
Max. Axial Output Load (N)*	15180		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 67		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 7	≤ 9
P1	Reduced	≤ 5	≤ 7
P0	Micro	≤ 3	≤ 5
PS	Super	≤ 1	≤ 3

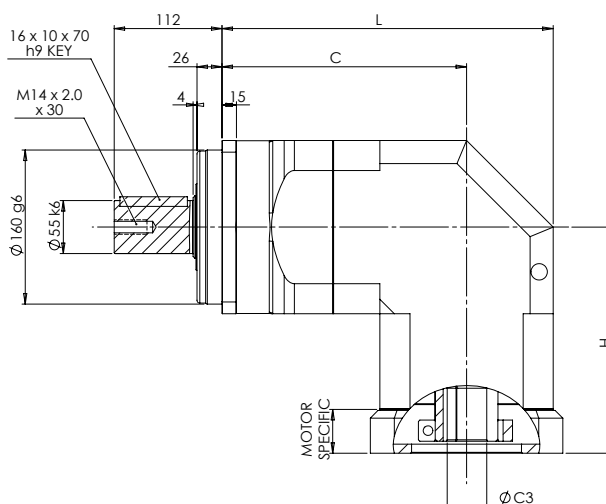
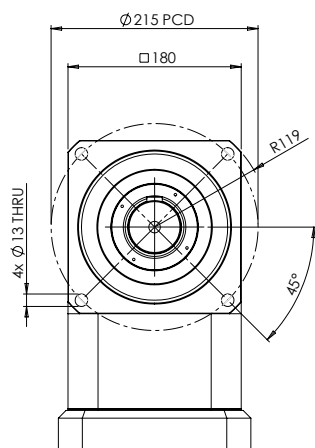
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SFL180

Precision Range – Right Angle



NOTE: Output shaft available without keyway as an option

Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1206	2170	3618
	4:1	1069	1924	3207
	5:1	1189	2140	3567
	6:1	1118	2012	3354
	7:1	1108	1994	3324
	8:1	1070	1926	3210
	9:1	993	1787	2979
	10:1	1059	1906	3177
	12:1	1118	2012	3354
	14:1	1108	1994	3324
	16:1	1070	1926	3210
	18:1	993	1787	2979
Double Stage (2 & 2A)	20:1	1059	1906	3177
	15:1	1206	2170	3618
	25:1	1189	2140	3567
	30:1	1118	2012	3354
	35:1	1108	1994	3324
	40:1	1070	1926	3210
	50:1	1189	2140	3567
	60:1	1118	2012	3354
	70:1	1108	1994	3324
	80:1	1070	1926	3210
	90:1	993	1787	2979
	100:1	1059	1906	3177
	120:1	1118	2012	3354
	140:1	1108	1994	3324
	160:1	1070	1926	3210
	180:1	993	1787	2979
	200:1	1059	1906	3177

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	344.1	425.1	351
Dimension C (mm)	254.1	335.1	280
Dimension H Min. (mm)	235		165
Gearbox Weight ± 3% (kg)	57.9	66.1	54.4
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø55		Ø38
Set Collar Bolt Torque (Nm)	81		81
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	4000		
Torsional Rigidity (Nm/moa)	150		
Max. Radial Output Load (N)*	17860		
Max. Axial Output Load (N)*	15180		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 76		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

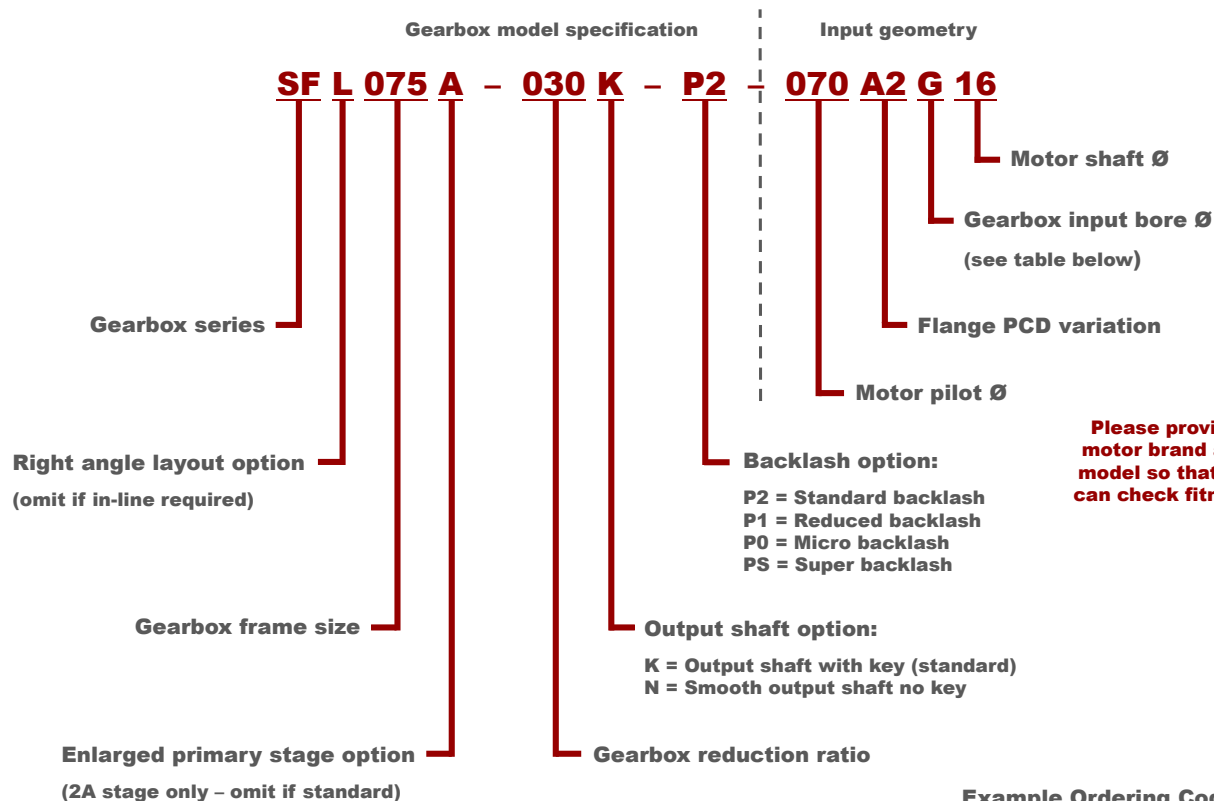
Backlash Option (arcmin)		Stage vs Backlash	
		Single	Double
P2	Standard	≤ 8	≤ 12
P1	Reduced	≤ 6	≤ 9
P0	Micro	≤ 4	≤ 7
PS	Super	≤ 2	≤ 4

NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



SF Series – Order Codes



Example Ordering Code:
SF062-010N-P0-060A1F14

SF Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes													
Frame	Stage	B	C	E	F	G	H	J	K	L	M	N	P	Q	R
		8	9	11	14	19	22	24	28	32	35	38	42	48	55
062	1 & 2A				X	X									
	2 Only	X	X	X											
075	1 & 2A					X	X	X							
	2 Only				X	X									
100	1 & 2A							X	X	X					
	2 Only					X	X	X							
142	1 & 2A									X	X	X			
	2 Only							X	X	X					
180	1 & 2A											X	X	X	X
	2 Only									X	X	X			

FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



ServoBox – PB Series

Economy Range – In-line & Right Angle

PB In-line



**PBL
Right
Angle**



Identical dimensions to the precision SB series but with more economical coating and gearing resulting in reduced unit cost

Helical hardened & milled gearing for greater wear resistance

Square B5 output flange with solid output shaft for easy mounting

7 standard gearbox frame sizes from 042 up to 220 frame

From 3:1 up to 200:1 reduction ratio across the range

Up to 1780 Nm nominal & 3210 Nm peak output torque

Backlash from ≤ 8 arcmin for in-line & ≤ 10 arcmin for right angle

Power transmission efficiency of up to $\geq 97\%$

Operating noise levels as low as 56 dB

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



PB Series – In-line

Economy Range – Performance Overview

Parameter	Stage / Ratio	PB 044	PB 062	PB 090	PB 120	PB 142	PB 180	PB 220	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	17	54	145	301	553	1067	1786
		4:1	15	48	128	269	491	940	1587
		5:1	14	45	132	278	510	1050	1770
		6:1	13	41	125	252	466	985	1680
		7:1	13	41	123	258	473	975	1645
		8:1	12	39	115	241	442	942	1605
		9:1	11	40	120	227	412	875	1490
		10:1	12	40	116	246	452	930	1565
	Double Stage (2 & 2A)	15:1	17	54	145	301	553	1067	1786
		20:1	15	48	128	269	491	940	1587
		25:1	14	45	132	278	510	1050	1770
		30:1	13	41	125	252	466	985	1680
		35:1	13	41	123	258	473	975	1645
		40:1	12	39	115	241	442	942	1605
		50:1	14	45	132	278	510	1050	1770
		60:1	13	41	125	252	466	985	1680
		70:1	13	41	123	258	473	975	1645
		80:1	12	40	115	241	442	942	1605
		90:1	11	40	120	227	412	975	1490
		100:1	12	40	116	246	452	930	1565
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	2000	
Maximum Input Speed (rpm)	ALL	6000	6000	6000	5000	5000	4000	3000	
Torsional Rigidity (Nm/moa)	ALL	3	6	14	27	60	140	240	
Max. Radial Output Load (N)*	ALL	360	1120	3040	6460	8830	14820	48450	
Max. Axial Output Load (N)*	ALL	180	560	1520	3230	4410	7410	24225	
Maximum Noise Level (dB)**	ALL	≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70	
Standard Backlash (arcmin)	1	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	
	2	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	
Gearbox Weight ± 3% (kg)	1	0.6	1.4	3.7	8.6	14.6	28.3	42.5	
	2	0.9	1.6 (2)	4.1 (5.5)	9.5 (10)	17 (21.4)	34.1 (42.5)	57.3 (59)	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

NOTE: Values shown in brackets in the above table only apply to type 2A gearboxes with enlarged primary stage gearing

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



PBL Series – Right Angle

Economy Range – Performance Overview

Parameter	Stage / Ratio	PBL 044	PBL 062	PBL 090	PBL 120	PBL 142	PBL 180	PBL 220	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	17	54	145	301	553	1067	1786
		4:1	15	48	128	269	491	940	1587
		5:1	14	45	132	278	510	1050	1770
		6:1	13	41	125	252	466	985	1680
		7:1	13	41	123	258	473	975	1645
		8:1	12	39	115	241	442	942	1605
		9:1	11	40	120	227	412	875	1490
		10:1	12	40	116	246	452	930	1565
		12:1	13	41	125	252	466	985	1680
		14:1	13	41	123	258	473	975	1645
		16:1	12	39	115	241	442	942	1605
		18:1	11	40	120	227	412	875	1490
	20:1	12	40	116	246	452	930	1565	
	Double Stage (2 & 2A)	15:1	17	54	145	301	553	1067	1786
		25:1	14	45	132	278	510	1050	1770
		30:1	13	41	125	252	466	985	1680
		35:1	13	41	123	258	473	975	1645
		40:1	12	39	115	241	442	942	1605
		50:1	11	45	132	278	510	1050	1770
		60:1	12	41	125	252	466	985	1680
		70:1	13	41	123	258	473	975	1645
		80:1	13	40	115	241	442	942	1605
		90:1	12	40	120	227	412	875	1490
100:1		11	40	116	246	452	930	1565	
120:1	12	41	125	252	466	985	1680		
140:1	13	41	123	258	473	975	1645		
160:1	13	40	115	241	442	942	1605		
180:1	12	40	120	227	412	875	1490		
200:1	11	40	116	246	452	930	1565		
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	2000	
Maximum Input Speed (rpm)	ALL	6000	6000	6000	5000	5000	4000	3000	
Torsional Rigidity (Nm/moa)	ALL	3	6	14	27	60	140	240	
Max. Radial Output Load (N)*	ALL	360	1120	3040	6460	8830	14820	48450	
Max. Axial Output Load (N)*	ALL	180	560	1520	3230	4410	7410	24225	
Maximum Noise Level (dB)**	ALL	≤ 65	≤ 68	≤ 70	≤ 72	≤ 74	≤ 76	≤ 78	
Standard Backlash (arcmin)	1	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	
	2	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	
Gearbox Weight ± 3% (kg)	1	1.0	2.1	6.9	12.5	23.2	51	75.2	
	2	(1.5)	2 (3)	6.1 (8.2)	12.4 (13.9)	23.4 (29.4)	41.4 (52.4)	73 (94.5)	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

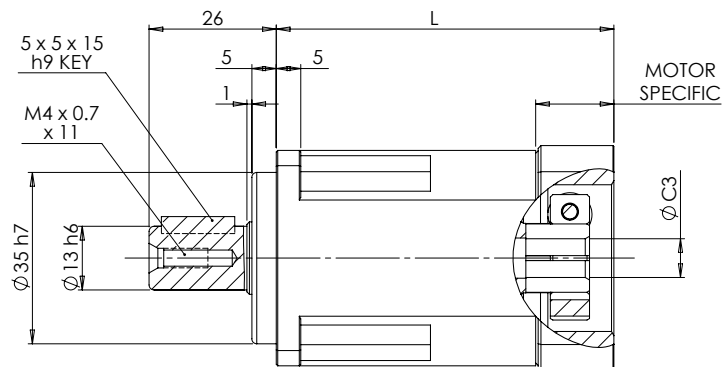
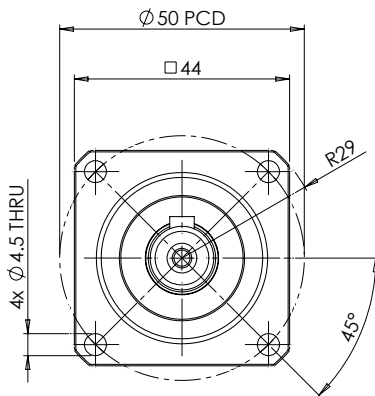
NOTE: Values shown in brackets in the above table only apply to type 2A gearboxes with enlarged primary stage gearing

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PB044

Economy Range – In-line



NOTE: See page 008 for precision equivalent SB044

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	17	30	51	0.03
	4:1	15	27	45	0.03
	5:1	14	25	42	0.03
	6:1	13	23	39	0.03
	7:1	13	23	39	0.03
	8:1	12	21	36	0.03
	9:1	11	19	33	0.03
	10:1	12	21	36	0.03
	15:1	17	30	51	0.03
	20:1	15	27	45	0.03
Double Stage (2A Only)	25:1	14	14	42	0.03
	30:1	13	23	39	0.03
	35:1	13	23	39	0.03
	40:1	12	21	36	0.03
	50:1	14	14	42	0.03
	60:1	13	23	39	0.03
	70:1	13	23	39	0.03
	80:1	12	21	36	0.03
	90:1	11	19	33	0.03
	100:1	12	21	36	0.03

Design Parameter	Stage vs Value	
	1	2A
Dimension L Min. (mm)	69	95
Gearbox Weight ± 3% (kg)	0.6	0.9
Minimum Efficiency (%)	≥ 97	≥ 94
Max. Input Shaft ØC3 (mm)	Ø11	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	3	
Max. Radial Output Load (N)*	360	
Max. Axial Output Load (N)*	180	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 56	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

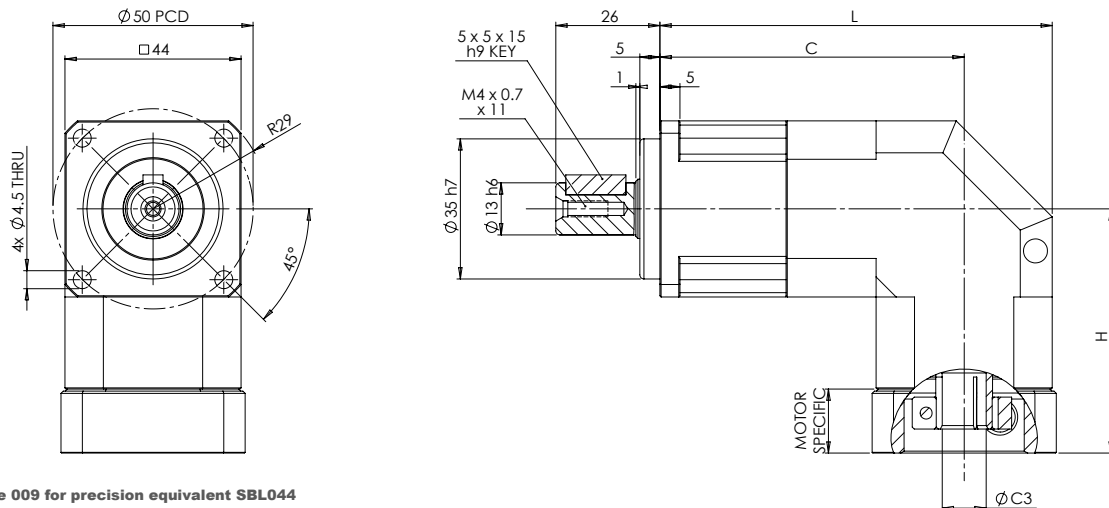
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 8	≤ 10

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PBL044

Economy Range – Right Angle



NOTE: See page 009 for precision equivalent SBL044

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	17	30	51	0.09
	4:1	15	27	45	0.09
	5:1	14	25	42	0.09
	6:1	13	23	39	0.09
	7:1	13	23	39	0.09
	8:1	12	21	36	0.09
	9:1	11	19	33	0.09
	10:1	12	21	36	0.09
	12:1	13	23	39	0.03
	14:1	13	23	39	0.03
	16:1	12	21	36	0.03
	18:1	11	19	33	0.03
Double Stage (2A Only)	20:1	12	21	36	0.03
	15:1	17	30	51	0.09
	25:1	14	25	42	0.09
	30:1	13	23	39	0.09
	35:1	13	23	39	0.09
	40:1	12	21	36	0.09
	50:1	11	19	33	0.09
	60:1	12	21	36	0.09
	70:1	13	23	39	0.09
	80:1	13	23	39	0.09
	90:1	12	21	36	0.09
	100:1	11	19	33	0.09
	120:1	12	21	36	0.03
	140:1	13	23	39	0.03
	160:1	13	23	39	0.03
	180:1	12	21	36	0.03
	200:1	11	19	33	0.03

Design Parameter	Stage vs Value	
	1	2 A
Dimension L (mm)	98	124
Dimension C (mm)	76	102
Dimension H Min. (mm)	61	
Gearbox Weight ± 3% (kg)	1	1.5
Minimum Efficiency (%)	≥ 95	≥ 92
Max. Input Shaft ØC3 (mm)	Ø11	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	6000	
Torsional Rigidity (Nm/moa)	3	
Max. Radial Output Load (N)*	360	
Max. Axial Output Load (N)*	180	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 65	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

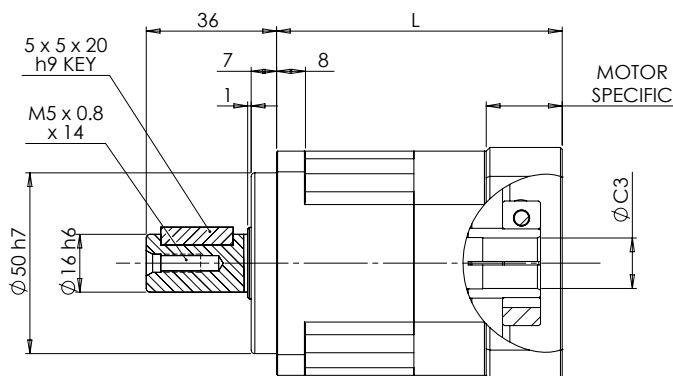
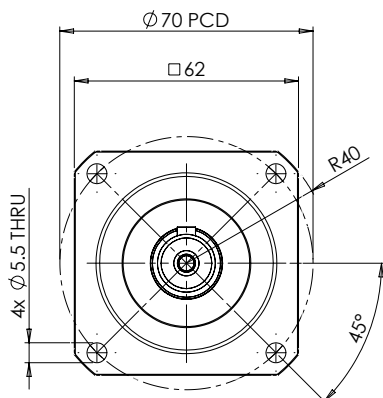
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 10	≤ 12

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PB062

Economy Range – In-line



NOTE: See page 010 for precision equivalent SB062

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	54	97	162	0.16
	4:1	48	86	144	0.14
	5:1	45	81	135	0.13
	6:1	41	73	123	0.13
	7:1	41	73	123	0.13
	8:1	39	70	117	0.13
	9:1	40	72	120	0.13
	10:1	40	72	120	0.13
	15:1	54	97	162	0.03 (0.14)
	20:1	48	86	144	0.03 (0.14)
Double Stage (2 & 2A)	25:1	45	81	135	0.03 (0.14)
	30:1	41	73	123	0.03 (0.14)
	35:1	41	73	123	0.03 (0.14)
	40:1	39	70	117	0.03 (0.14)
	50:1	45	81	135	0.03 (0.14)
	60:1	41	73	123	0.03 (0.14)
	70:1	41	73	123	0.03 (0.14)
	80:1	40	72	120	0.03 (0.14)
	90:1	40	72	120	0.03 (0.14)
	100:1	40	72	120	0.03 (0.14)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	79	112	103
Gearbox Weight $\pm$ 3% (kg)	1.4	2	1.6
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft ØC3 (mm)	Ø19		Ø11
Set Collar Bolt Torque (Nm)	10		4.8
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	6		
Max. Radial Output Load (N)*	1120		
Max. Axial Output Load (N)*	560		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 58		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 8	≤ 10

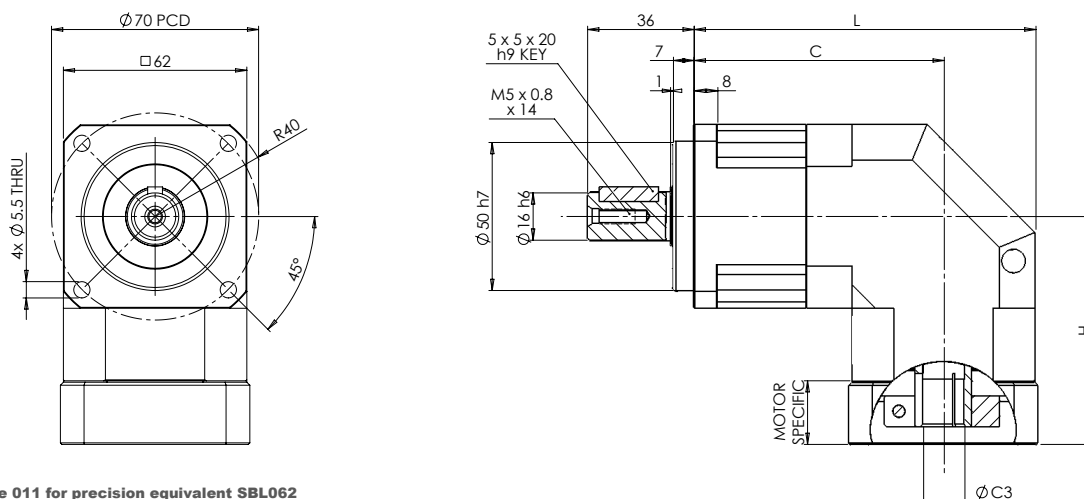
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PBL062

Economy Range – Right Angle



NOTE: See page 011 for precision equivalent SBL062

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	54	97	162	0.36
	4:1	48	86	144	0.36
	5:1	45	81	135	0.36
	6:1	41	73	123	0.36
	7:1	41	73	123	0.36
	8:1	39	70	117	0.36
	9:1	40	72	120	0.36
	10:1	40	72	120	0.08
	12:1	41	73	123	0.08
	14:1	41	73	123	0.08
	16:1	39	70	117	0.08
	18:1	40	72	120	0.08
Double Stage (2 & 2A)	20:1	40	72	120	0.08
	15:1	54	97	162	0.09 (0.36)
	25:1	45	81	135	0.09 (0.36)
	30:1	41	73	123	0.09 (0.36)
	35:1	41	73	123	0.09 (0.36)
	40:1	39	70	117	0.09 (0.36)
	50:1	45	81	135	0.09 (0.36)
	60:1	41	73	123	0.09 (0.36)
	70:1	41	73	123	0.09 (0.36)
	80:1	40	72	120	0.09 (0.36)
	90:1	40	72	120	0.09 (0.36)
	100:1	40	72	120	0.09 (0.36)
	120:1	41	73	123	0.03 (0.08)
	140:1	41	73	123	0.03 (0.08)
	160:1	40	72	120	0.03 (0.08)
	180:1	40	72	120	0.03 (0.08)
	200:1	40	72	120	0.03 (0.08)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	115.5	149.3	132.5
Dimension C (mm)	84.5	118.3	110.5
Dimension H Min. (mm)	77		61
Gearbox Weight ± 3% (kg)	2.1	3	2
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø19		Ø11
Set Collar Bolt Torque (Nm)	10		4.8
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	6		
Max. Radial Output Load (N)*	1120		
Max. Axial Output Load (N)*	560		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 68		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 10	≤ 12

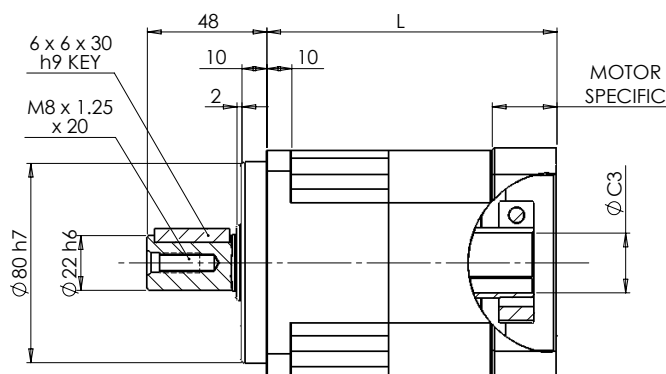
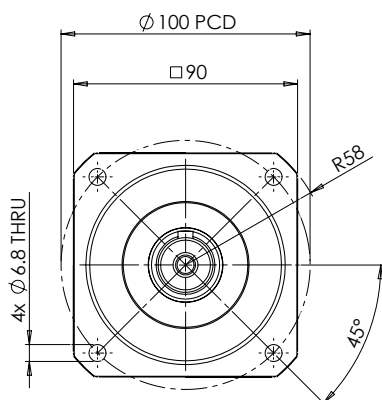
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – PB090

Economy Range – In-line



NOTE: See page 012 for precision equivalent SB090

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	145	261	435	0.61
	4:1	128	230	384	0.48
	5:1	132	237	396	0.47
	6:1	125	225	375	0.45
	7:1	123	221	369	0.45
	8:1	115	207	345	0.44
	9:1	120	216	360	0.44
	10:1	116	208	348	0.44
Double Stage (2 & 2A)	15:1	145	261	435	0.14 (0.46)
	20:1	128	230	384	0.14 (0.46)
	25:1	132	237	396	0.14 (0.46)
	30:1	125	225	375	0.14 (0.46)
	35:1	123	221	369	0.14 (0.44)
	40:1	115	207	345	0.14 (0.44)
	50:1	132	237	396	0.14 (0.44)
	60:1	125	225	375	0.14 (0.43)
	70:1	123	221	369	0.14 (0.43)
	80:1	115	207	345	0.14 (0.43)
	90:1	120	216	360	0.14 (0.43)
	100:1	116	208	348	0.14 (0.43)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	116	160	124
Gearbox Weight $\pm$ 3% (kg)	3.7	5.5	4.1
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94	
Max. Input Shaft ØC3 (mm)	Ø24		Ø19
Set Collar Bolt Torque (Nm)	16.3		10
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	14		
Max. Radial Output Load (N)*	3040		
Max. Axial Output Load (N)*	1520		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	$\leq$ 60		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	$\leq$ 8	$\leq$ 10

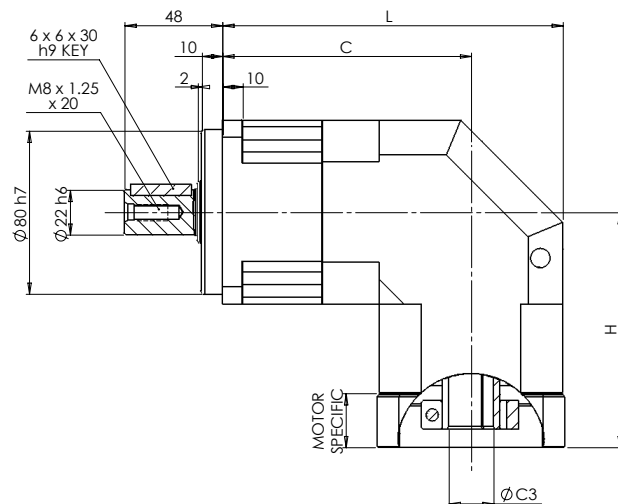
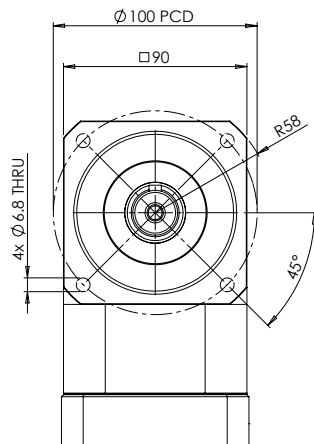
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PBL090

Economy Range – Right Angle



NOTE: See page 013 for precision equivalent SBL090

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	145	261	435	2.28
	4:1	128	230	384	2.28
	5:1	132	237	396	2.28
	6:1	125	225	375	2.28
	7:1	123	221	369	2.28
	8:1	115	207	345	2.28
	9:1	120	216	360	2.28
	10:1	116	208	348	2.28
	12:1	125	225	375	1.88
	14:1	123	221	369	1.88
	16:1	115	207	345	1.88
	18:1	120	216	360	1.88
Double Stage (2 & 2A)	20:1	116	208	348	1.88
	15:1	145	261	435	0.36 (2.28)
	25:1	132	237	396	0.36 (2.28)
	30:1	125	225	375	0.36 (2.28)
	35:1	123	221	369	0.36 (2.28)
	40:1	115	207	345	0.36 (2.28)
	50:1	132	237	396	0.36 (2.28)
	60:1	125	225	375	0.36 (2.28)
	70:1	123	221	369	0.36 (2.28)
	80:1	115	207	345	0.36 (2.28)
	90:1	120	216	360	0.36 (2.28)
	100:1	116	208	348	0.36 (2.28)
	120:1	125	225	375	0.10 (1.88)
	140:1	123	221	369	0.10 (1.88)
	160:1	115	207	345	0.10 (1.88)
	180:1	120	216	360	0.10 (1.88)
	200:1	116	208	348	0.10 (1.88)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	167.1	210.6	161
Dimension C (mm)	122.1	165.6	130
Dimension H Min. (mm)	115		77
Gearbox Weight $\pm$ 3% (kg)	6.9	8.2	6.1
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø24		Ø19
Set Collar Bolt Torque (Nm)	16.3		10
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	6000		
Torsional Rigidity (Nm/moa)	14		
Max. Radial Output Load (N)*	3040		
Max. Axial Output Load (N)*	1520		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 70		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 10	≤ 12

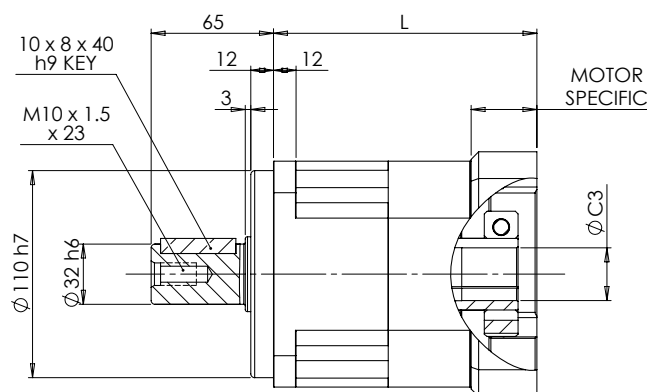
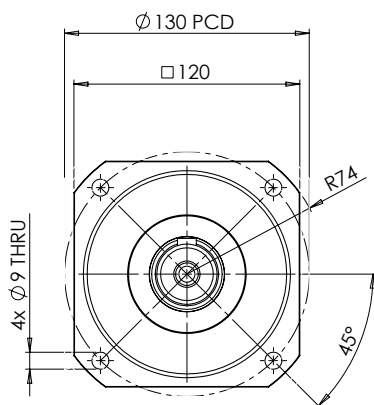
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PB120

Economy Range – In-line



NOTE: See page 014 for precision equivalent SB120

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	301	541	903	3.25
	4:1	269	484	807	2.74
	5:1	278	500	834	2.71
	6:1	252	453	756	2.65
	7:1	258	464	774	2.62
	8:1	241	433	723	2.58
	9:1	227	408	681	2.57
	10:1	246	442	738	2.57
Double Stage (2 & 2A)	15:1	301	541	903	0.46 (2.63)
	20:1	269	484	807	0.46 (2.63)
	25:1	278	500	834	0.46 (2.63)
	30:1	252	453	756	0.46 (2.63)
	35:1	258	464	774	0.44 (2.43)
	40:1	241	433	723	0.44 (2.43)
	50:1	278	500	834	0.44 (2.43)
	60:1	252	453	756	0.43 (2.39)
	70:1	258	464	774	0.43 (2.39)
	80:1	241	433	723	0.43 (2.39)
	90:1	227	408	681	0.40 (2.39)
	100:1	246	442	738	0.40 (2.39)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	140	196	176
Gearbox Weight $\pm$ 3% (kg)	8.6	10	9.5
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 94	
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 32		$\varnothing$ 24
Set Collar Bolt Torque (Nm)	41		16.3
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	27		
Max. Radial Output Load (N)*	6460		
Max. Axial Output Load (N)*	3230		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	$\leq$ 63		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	$\leq$ 8	$\leq$ 10

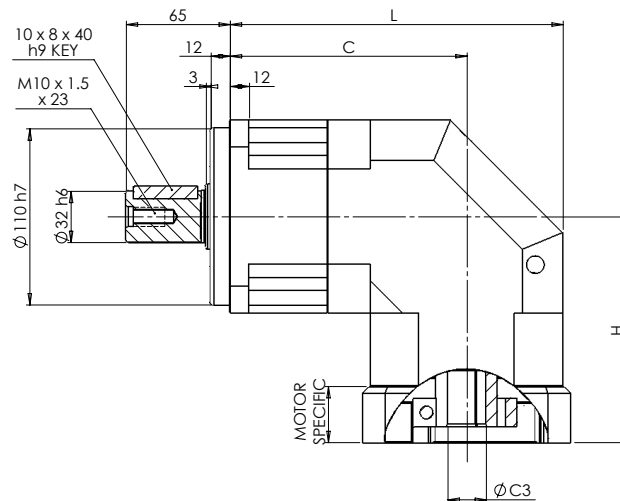
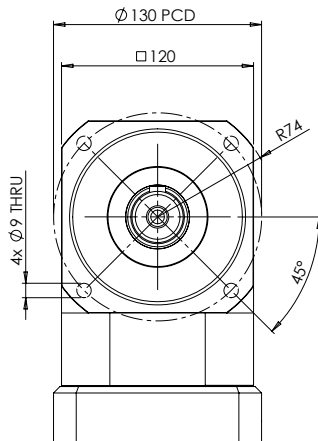
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PBL120

Economy Range – Right Angle



NOTE: See page 015 for precision equivalent SBL120

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	301	541	903	6.85
	4:1	269	484	807	6.85
	5:1	278	500	834	6.85
	6:1	252	453	756	6.85
	7:1	258	464	774	6.85
	8:1	241	433	723	6.85
	9:1	227	408	681	6.85
	10:1	246	442	738	6.85
	12:1	252	453	756	6.20
	14:1	258	464	774	6.20
	16:1	241	433	723	6.20
	18:1	227	408	681	6.20
Double Stage (2 & 2A)	20:1	246	442	738	6.20
	15:1	301	541	903	2.28 (6.85)
	25:1	278	500	834	2.28 (6.85)
	30:1	252	453	756	2.28 (6.85)
	35:1	258	464	774	2.28 (6.85)
	40:1	241	433	723	2.28 (6.85)
	50:1	278	500	834	2.28 (6.85)
	60:1	252	453	756	2.28 (6.85)
	70:1	258	464	774	2.28 (6.85)
	80:1	241	433	723	2.28 (6.85)
	90:1	227	408	681	2.28 (6.85)
	100:1	246	442	738	2.28 (6.85)
	120:1	252	453	756	1.88 (6.20)
	140:1	258	464	774	1.88 (6.20)
	160:1	241	433	723	1.88 (6.20)
	180:1	227	408	681	1.88 (6.20)
	200:1	246	442	738	1.88 (6.20)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	208	264	266.6
Dimension C (mm)	148	204	181.6
Dimension H Min. (mm)	141		115
Gearbox Weight $\pm$ 3% (kg)	12.5	12.4	13.9
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø32		Ø24
Set Collar Bolt Torque (Nm)	41		16.3
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	27		
Max. Radial Output Load (N)*	6460		
Max. Axial Output Load (N)*	3230		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 72		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 10	≤ 12

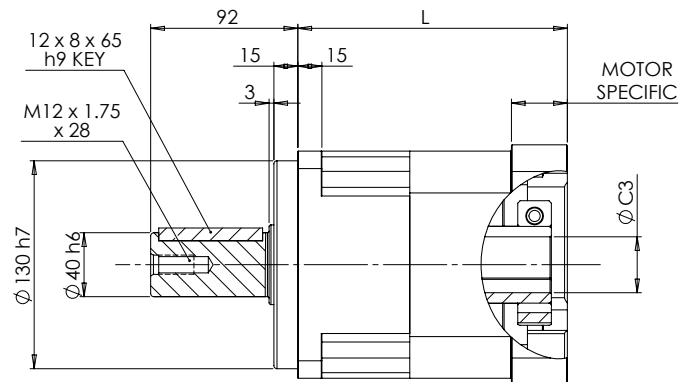
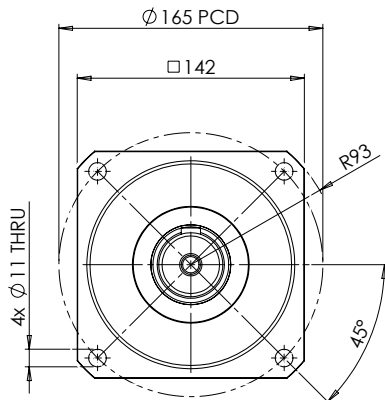
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PB142

Economy Range – In-line



NOTE: See page 016 for precision equivalent SB142

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	553	995	1659	9.21
	4:1	491	883	1473	7.54
	5:1	510	918	1530	7.42
	6:1	466	838	1398	7.25
	7:1	473	851	1419	7.14
	8:1	442	795	1326	7.07
	9:1	412	741	1236	7.04
	10:1	452	813	1356	7.03
Double Stage (2 & 2A)	15:1	553	995	1659	2.63 (7.30)
	20:1	491	883	1473	2.63 (7.30)
	25:1	510	918	1530	2.63 (7.10)
	30:1	466	838	1398	2.43 (7.10)
	35:1	473	851	1419	2.43 (7.10)
	40:1	442	795	1326	2.43 (6.92)
	50:1	510	918	1530	2.43 (6.92)
	60:1	466	838	1398	2.39 (6.72)
	70:1	473	851	1419	2.39 (6.72)
	80:1	442	795	1326	2.39 (6.72)
	90:1	412	741	1236	2.39 (6.72)
	100:1	452	813	1356	2.39 (6.72)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	168	235	206
Gearbox Weight ± 3% (kg)	14.6	21.4	17
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft ØC3 (mm)	Ø38		Ø32
Set Collar Bolt Torque (Nm)	81		41
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	60		
Max. Radial Output Load (N)*	8830		
Max. Axial Output Load (N)*	4410		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 65		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 8	≤ 10

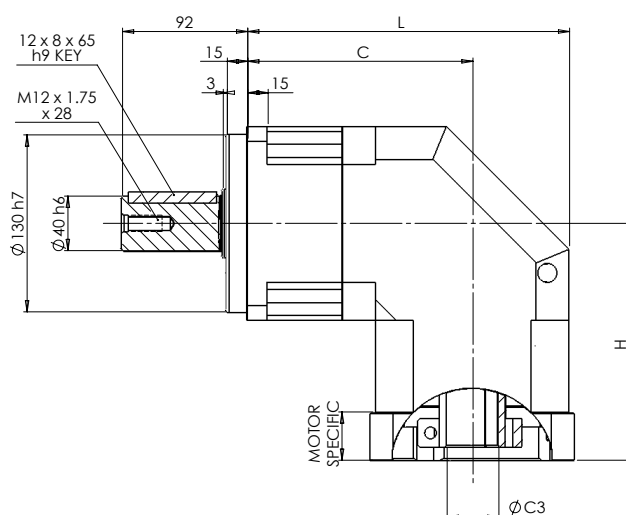
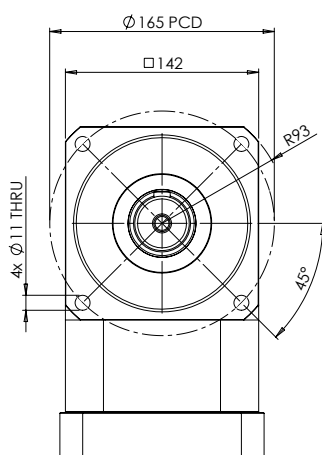
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – PBL142

Economy Range – Right Angle



NOTE: See page 017 for precision equivalent SBL142

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	553	995	1659	23.5
	4:1	491	883	1473	23.5
	5:1	510	918	1530	23.5
	6:1	466	838	1398	23.5
	7:1	473	851	1419	23.5
	8:1	442	795	1326	23.5
	9:1	412	741	1236	23.5
	10:1	452	813	1356	23.5
	12:1	466	838	1398	21.8
	14:1	473	851	1419	21.8
	16:1	442	795	1326	21.8
	18:1	412	741	1236	21.8
	20:1	452	813	1356	21.8
Double Stage (2 & 2A)	15:1	553	995	1659	6.85 (23.5)
	25:1	510	918	1530	6.85 (23.5)
	30:1	466	838	1398	6.85 (23.5)
	35:1	473	851	1419	6.85 (23.5)
	40:1	442	795	1326	6.85 (23.5)
	50:1	510	918	1530	6.85 (23.5)
	60:1	466	838	1398	6.85 (23.5)
	70:1	473	851	1419	6.85 (23.5)
	80:1	442	795	1326	6.85 (23.5)
	90:1	412	741	1236	6.85 (23.5)
	100:1	452	813	1356	6.85 (23.5)
	120:1	466	838	1398	6.20 (21.8)
	140:1	473	851	1419	6.20 (21.8)
	160:1	442	795	1326	6.20 (21.8)
	180:1	412	741	1236	6.20 (21.8)
	200:1	452	813	1356	6.20 (21.8)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	236.5	303	274.5
Dimension C (mm)	165.5	232	214.5
Dimension H Min. (mm)	174		141
Gearbox Weight $\pm 3\%$ (kg)	23.2	23.4	29.4
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø38		Ø32
Set Collar Bolt Torque (Nm)	81		41
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	5000		
Torsional Rigidity (Nm/moa)	60		
Max. Radial Output Load (N)*	8830		
Max. Axial Output Load (N)*	4410		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 74		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 10	≤ 12

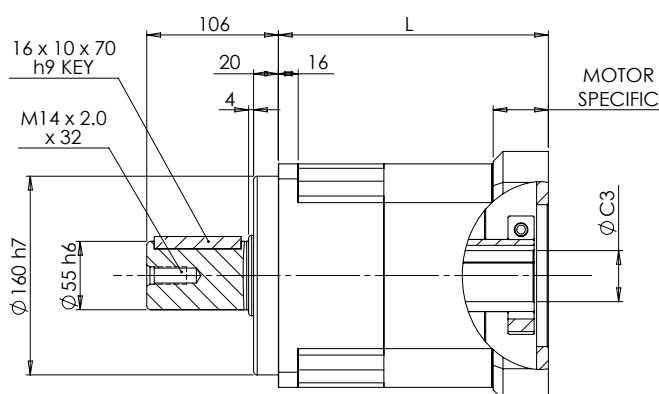
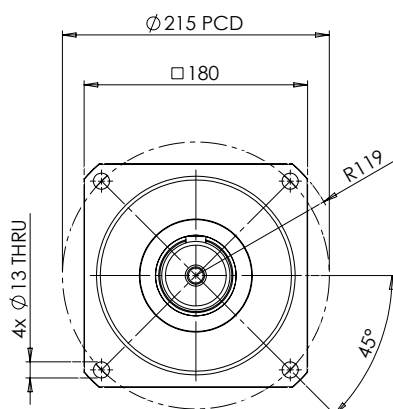
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

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ServoBox – PB180

Economy Range – In-line



NOTE: See page 018 for precision equivalent SB180

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1067	1920	3201	28.98
	4:1	940	1692	2820	23.67
	5:1	1050	1890	3150	23.29
	6:1	985	1773	2955	22.75
	7:1	975	1755	2925	22.48
	8:1	942	1695	2826	22.59
	9:1	875	1575	2625	22.53
	10:1	930	1674	2790	22.51
Double Stage (2 & 2A)	15:1	1067	1920	3201	7.30 (22.79)
	20:1	940	1692	2820	7.30 (22.79)
	25:1	1050	1890	3150	7.10 (22.79)
	30:1	985	1773	2955	7.10 (22.59)
	35:1	975	1755	2925	7.10 (22.59)
	40:1	942	1695	2826	6.92 (22.59)
	50:1	1050	1890	3150	6.92 (22.59)
	60:1	985	1773	2955	6.72 (22.83)
	70:1	975	1755	2925	6.72 (21.83)
	80:1	942	1695	2826	6.72 (21.83)
	90:1	875	1575	2625	6.72 (21.60)
	100:1	930	1674	2790	6.72 (21.83)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	217	298	252
Gearbox Weight ± 3% (kg)	28.3	42.5	34.1
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft ØC3 (mm)	Ø55		Ø38
Set Collar Bolt Torque (Nm)	81		81
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	4000		
Torsional Rigidity (Nm/moa)	140		
Max. Radial Output Load (N)*	14820		
Max. Axial Output Load (N)*	7410		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 67		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 8	≤ 10

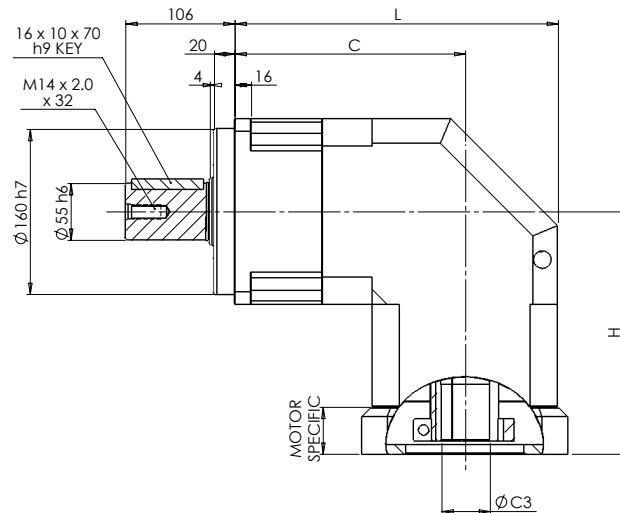
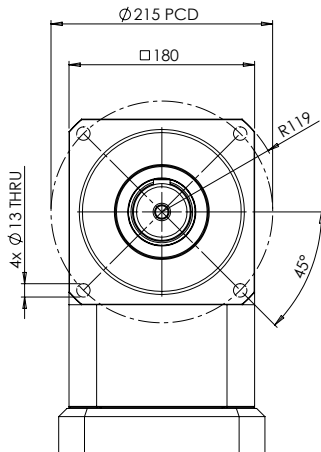
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – PBL180

Economy Range – Right Angle



NOTE: See page 019 for precision equivalent SBL180

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1067	1920	3201	68.2
	4:1	940	1692	2820	68.2
	5:1	1050	1890	3150	68.2
	6:1	985	1773	2955	68.2
	7:1	975	1755	2925	68.2
	8:1	942	1695	2826	68.2
	9:1	875	1575	2625	68.2
	10:1	930	1674	2790	68.2
	12:1	985	1773	2955	65.5
	14:1	975	1755	2925	65.5
	16:1	942	1695	2826	65.5
	18:1	875	1575	2625	65.5
Double Stage (2 & 2A)	20:1	930	1674	2790	65.5
	15:1	1067	1920	3201	26.2 (55.2)
	25:1	1050	1890	3150	23.1 (50.4)
	30:1	985	1773	2955	23.1 (50.4)
	35:1	975	1755	2925	23.1 (50.4)
	40:1	942	1695	2826	23.1 (50.4)
	50:1	1050	1890	3150	23.1 (50.4)
	60:1	985	1773	2955	23.1 (50.4)
	70:1	975	1755	2925	23.1 (50.4)
	80:1	942	1695	2826	23.1 (50.4)
	90:1	875	1575	2625	23.1 (50.4)
	100:1	930	1674	2790	23.1 (50.4)
	120:1	985	1773	2955	21.2 (48.7)
	140:1	975	1755	2925	21.2 (48.7)
	160:1	942	1695	2826	21.2 (48.7)
	180:1	875	1575	2625	21.2 (48.7)
	200:1	930	1674	2790	21.2 (48.7)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	313.6	394.6	320.5
Dimension C (mm)	223.6	304.6	249.5
Dimension H Min. (mm)	235		174
Gearbox Weight $\pm$ 3% (kg)	51	52.4	41.4
Minimum Efficiency (%)	≥ 95		≥ 92
Max. Input Shaft ØC3 (mm)	Ø55		Ø38
Set Collar Bolt Torque (Nm)	81		81
Nom. Input Speed (rpm)	3000		
Max. Input Speed (rpm)	4000		
Torsional Rigidity (Nm/moa)	140		
Max. Radial Output Load (N)*	14820		
Max. Axial Output Load (N)*	7410		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 76		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 10	≤ 12

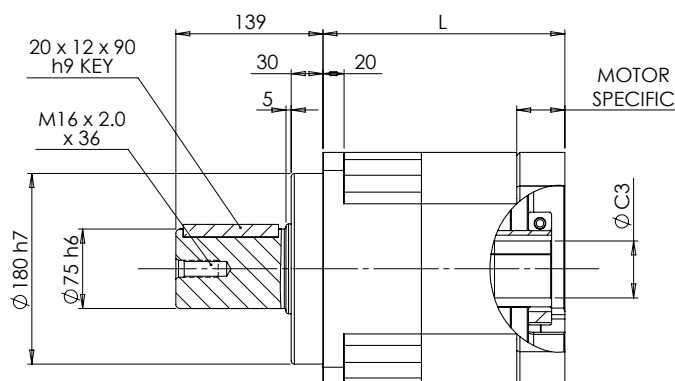
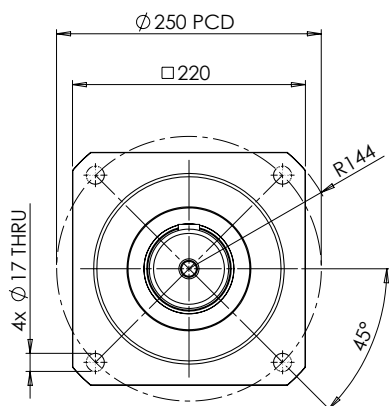
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – PB220

Economy Range – In-line



NOTE: See page 020 for precision equivalent SB220

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1786	3214	5358	59.61
	4:1	1587	2856	4761	54.37
	5:1	1770	3186	5310	53.27
	6:1	1680	3024	5040	51.72
	7:1	1645	2961	4935	50.97
	8:1	1605	2889	4815	50.84
	9:1	1490	2682	4470	50.63
	10:1	1565	2817	4695	50.56
Double Stage (2 & 2A)	15:1	1786	3214	5358	22.79 (56.98)
	20:1	1587	2856	4761	22.79 (56.98)
	25:1	1770	3186	5310	22.79 (56.98)
	30:1	1680	3024	5040	22.59 (56.48)
	35:1	1645	2961	4935	22.59 (56.48)
	40:1	1605	2889	4815	22.59 (56.48)
	50:1	1770	3186	5310	22.59 (56.48)
	60:1	1680	3021	5040	22.83 (54.58)
	70:1	1645	2961	4935	21.83 (54.58)
	80:1	1605	2889	4815	21.83 (54.58)
	90:1	1490	2682	4470	21.60 (54.00)
	100:1	1565	2817	4695	21.60 (54.58)

Design Parameter	Stage vs Value		
	1	2A	2
Dimension L Min. (mm)	228	321	307
Gearbox Weight ± 3% (kg)	42.5	59	57.3
Minimum Efficiency (%)	≥ 97	≥ 94	
Max. Input Shaft ØC3 (mm)	Ø55		
Set Collar Bolt Torque (Nm)	81		
Nom. Input Speed (rpm)	2000		
Max. Input Speed (rpm)	3000		
Torsional Rigidity (Nm/moa)	240		
Max. Radial Output Load (N)*	48450		
Max. Axial Output Load (N)*	24225		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 70		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 8	≤ 10

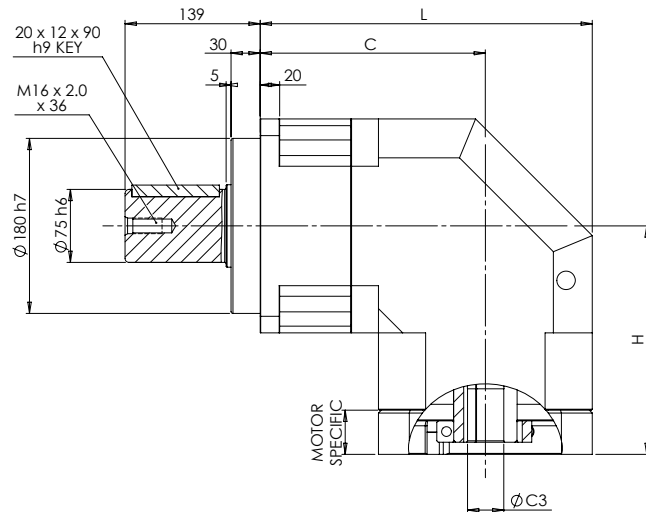
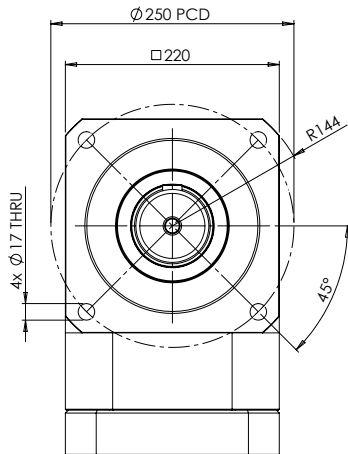
NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – PBL220

Economy Range – Right Angle



NOTE: See page 021 for precision equivalent SBL220

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage (1)	3:1	1786	3214	5358	135.0
	4:1	1587	2856	4761	135.0
	5:1	1770	3186	5310	135.0
	6:1	1680	3024	5040	135.0
	7:1	1645	2961	4935	135.0
	8:1	1605	2889	4815	135.0
	9:1	1490	2682	4470	135.0
	10:1	1565	2817	4695	135.0
	12:1	1680	3024	5040	119.2
	14:1	1645	2961	4935	119.2
	16:1	1605	2889	4815	119.2
	18:1	1490	2682	4470	119.2
Double Stage (2 & 2A)	20:1	1565	2817	4695	119.2
	15:1	1786	3214	5358	70.1 (80.2)
	25:1	1770	3186	5310	68.2 (76.5)
	30:1	1680	3024	5040	68.2 (76.5)
	35:1	1645	2961	4935	68.2 (76.5)
	40:1	1605	2889	4815	68.2 (76.5)
	50:1	1770	3186	5310	68.2 (76.5)
	60:1	1680	3024	5040	68.2 (76.5)
	70:1	1645	2961	4935	68.2 (76.5)
	80:1	1605	2889	4815	68.2 (76.5)
	90:1	1490	2682	4470	68.2 (76.5)
	100:1	1565	2817	4695	68.2 (76.5)
	120:1	1680	3024	5040	65.1 (74.2)
	140:1	1645	2961	4935	65.1 (74.2)
	160:1	1605	2889	4815	65.1 (74.2)
	180:1	1490	2682	4470	65.1 (74.2)
	200:1	1565	2817	4695	65.1 (74.2)

Design Parameter	Stage vs Value		
	1	2 A	2
Dimension L (mm)	341.6	434.6	403.6
Dimension C (mm)	231.6	324.6	313.6
Dimension H Min. (mm)	235		
Gearbox Weight ± 3% (kg)	75.2	94.5	73
Minimum Efficiency (%)	≥ 95	≥ 92	
Max. Input Shaft ØC3 (mm)	Ø55		
Set Collar Bolt Torque (Nm)	81		
Nom. Input Speed (rpm)	2000		
Max. Input Speed (rpm)	3000		
Torsional Rigidity (Nm/moa)	240		
Max. Radial Output Load (N)*	48450		
Max. Axial Output Load (N)*	24225		
Operating Temp Range (°C)	- 25 / + 90		
Protection Rating (IP)	IP65		
Max. Noise Level (dB)**	≤ 78		

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

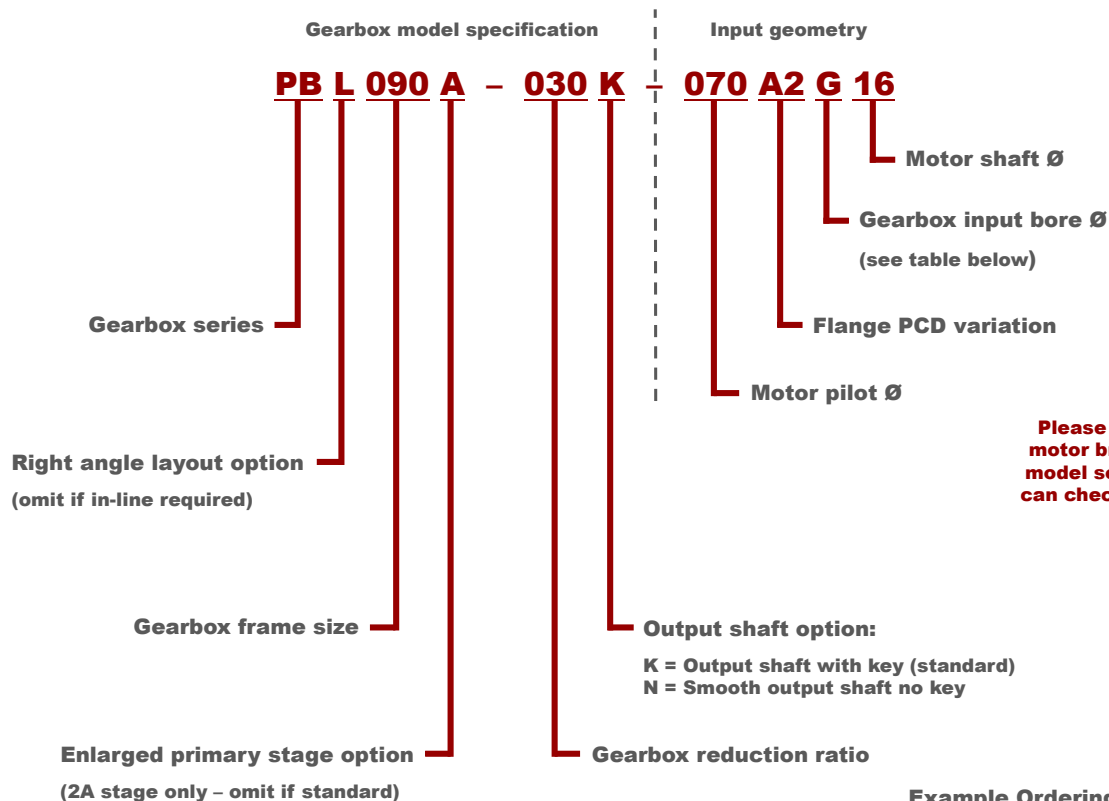
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 10	≤ 12

NOTE: Values shown in brackets (in table left) only apply to double stage type 2A gearboxes with enlarged primary stage gears

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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PB Series – Order Codes



Example Ordering Code:
PB062-010N-060A1F14

PB Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes													
Frame	Stage	B	C	E	F	G	H	J	K	L	M	N	P	Q	R
		8	9	11	14	19	22	24	28	32	35	38	42	48	55
044	1 & 2A	X	X	X											
062	1 & 2A				X	X									
	2 Only	X	X	X											
090	1 & 2A					X	X	X							
	2 Only				X	X									
120	1 & 2A							X	X	X					
	2 Only					X	X	X							
142	1 & 2A									X	X	X			
	2 Only							X	X	X					
180	1 & 2A											X	X	X	X
	2 Only									X	X	X			
220	1 & 2A												X	X	X
	2 Only											X	X	X	X

FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



ServoBox – SN Series

Economy Range – In-line Only

SN In-line



Entry level economy planetary gearhead range

Helical hardened & milled gearing for greater wear resistance

Round B14 output flange with solid output shaft for easy mounting

6 standard gearbox frame sizes from 050 up to 160 frame

From 3:1 up to 100:1 reduction ratio across the range

Up to 625 Nm nominal & 1125 Nm peak output torque

Backlash ≤ 8 arcmin single stage & ≤ 12 arcmin double stage

Power transmission efficiency of up to $\geq 97\%$

Operating noise levels as low as 58 dB

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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SN Series – In-line Only

Economy Range – Performance Overview

Parameter	Stage / Ratio	SN 050	SN 060	SN 070	SN 080	SN 115	SN 160	
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 1.8) (E-Stop = Nom x 3)	Single Stage (1)	3:1	17	28	54	112	165	625
		4:1	15	38	48	100	146	555
		5:1	14	40	45	108	160	618
		6:1	-	-	-	-	-	583
		7:1	13	35	41	105	149	573
		8:1	-	-	-	-	-	553
		9:1	-	-	-	-	-	516
		10:1	12	25	40	100	141	549
	Double Stage (2)	15:1	17	28	54	112	165	625
		20:1	15	38	48	110	146	555
		25:1	14	40	45	108	160	618
		30:1	13	28	41	112	165	583
		35:1	13	35	41	105	149	573
		40:1	12	38	39	110	146	553
		50:1	14	40	45	108	160	618
		60:1	-	-	-	-	-	583
		70:1	13	35	41	105	149	573
		80:1	-	-	-	-	-	553
		90:1	-	-	-	-	-	516
		100:1	12	25	40	100	141	549
Nominal Input Speed (rpm)	ALL	3000	3000	3000	3000	3000	3000	
Maximum Input Speed (rpm)	ALL	5000	5000	5000	5000	5000	5000	
Torsional Rigidity (Nm/moa)	ALL	3	4	5	12	14	60	
Max. Radial Output Load (N)*	ALL	320	460	800	1300	3200	9300	
Max. Axial Output Load (N)*	ALL	160	230	400	660	1600	4650	
Maximum Noise Level (dB)**	1	≤ 58	≤ 58	≤ 58	≤ 60	≤ 65	≤ 65	
	2	≤ 60	≤ 60	≤ 60	≤ 62	≤ 67	≤ 67	
Standard Backlash (arcmin)	1	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	
	2	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	≤ 12	
Gearbox Weight ± 2% (kg)	1	0.73	1.00	1.25	2.10	5.00	13.3	
	2	1.05	1.46	1.90	3.20	6.92	18.5	

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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SN Series – Range Expansion

Economy Range – In-line Only

4 Additional Frame Sizes:

Due to the popularity of the entry level SN series helical planetary gearboxes, the range will soon expand to include 4 additional frame sizes:

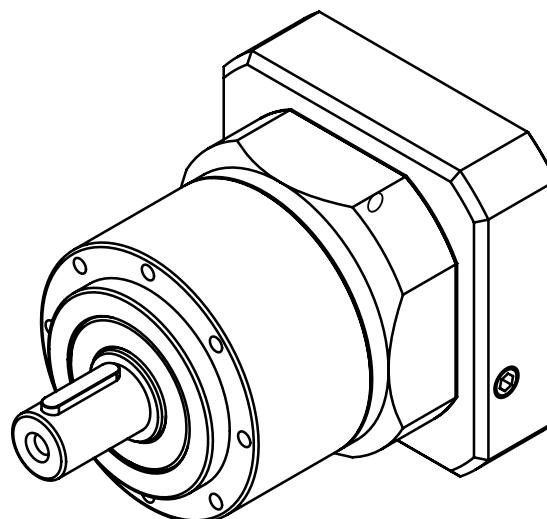
- SN 040
- SN 090
- SN 120
- SN 155

The new sizes will become available at the end of 2019 and full technical information will be published in the third edition of our ServoBox catalogue.

Super SN Series:

In addition to the new frame sizes of the standard SN series gearboxes, a revised range will also become available – the Super SN Series – featuring larger bearings on the output shaft for greater radial and axial thrust load capacities.

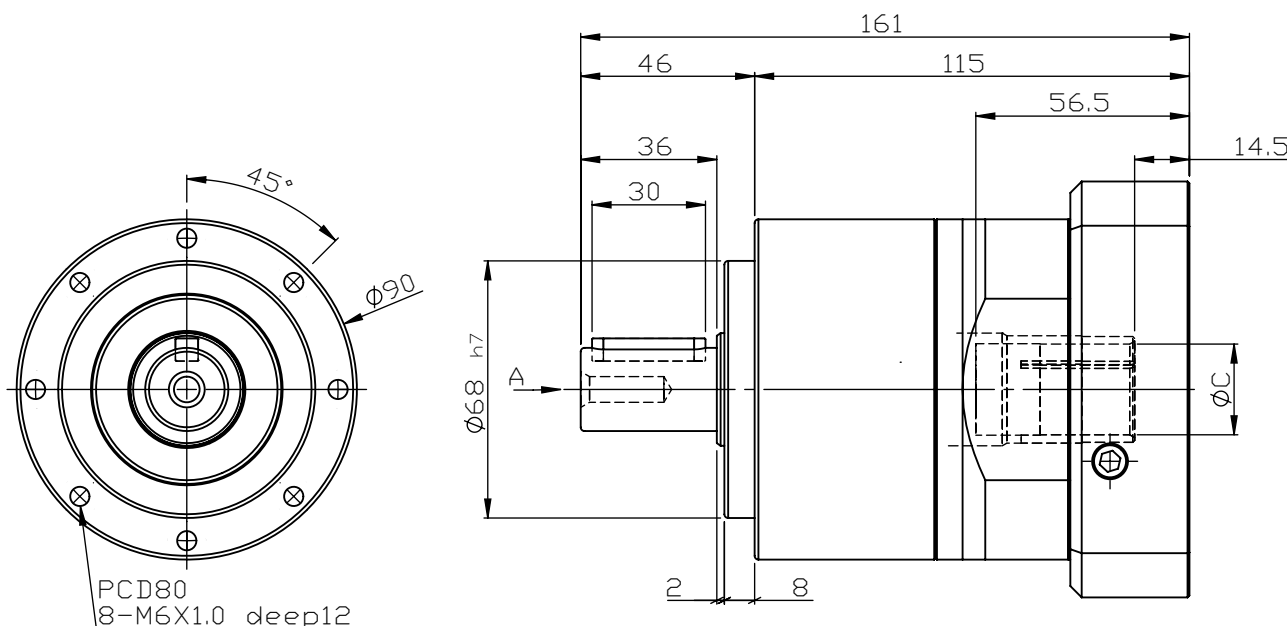
This range also features an additional bolt pattern on the output flange along side the standard SN series bolt pattern allowing for greater design and mounting flexibility as well as increased interchangeability with other planetary gearboxes on the market.



SUPER SN 090

Increased Load Capacity

Dual Mounting Bolt PCD

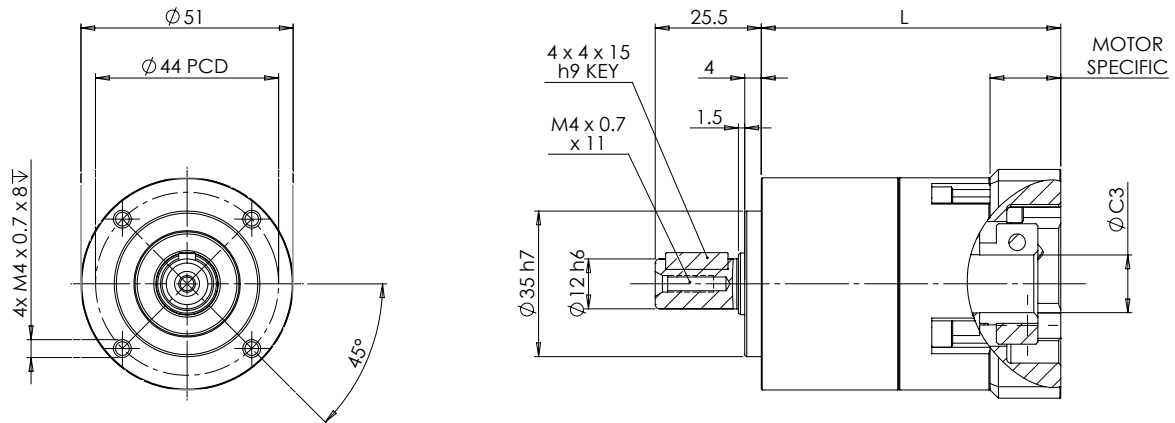


GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – SN050

Economy Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	17	31	51	0.03
	4:1	15	27	45	0.03
	5:1	14	25	42	0.03
	7:1	13	23	39	0.03
	10:1	12	22	36	0.03
Double Stage	15:1	17	31	51	0.03
	20:1	15	27	45	0.03
	25:1	14	25	42	0.03
	30:1	13	23	39	0.03
	35:1	13	23	39	0.03
	40:1	12	22	36	0.03
	50:1	14	25	42	0.03
	70:1	13	23	39	0.03
	100:1	12	22	36	0.03

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	71	97
Gearbox Weight ± 2% (kg)	0.73	1.05
Minimum Efficiency (%)	≥ 97	≥ 95
Max. Input Shaft ØC3 (mm)	Ø14	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/mt)	3	
Max. Radial Output Load (N)*	320	
Max. Axial Output Load (N)*	160	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 58	≤ 60

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

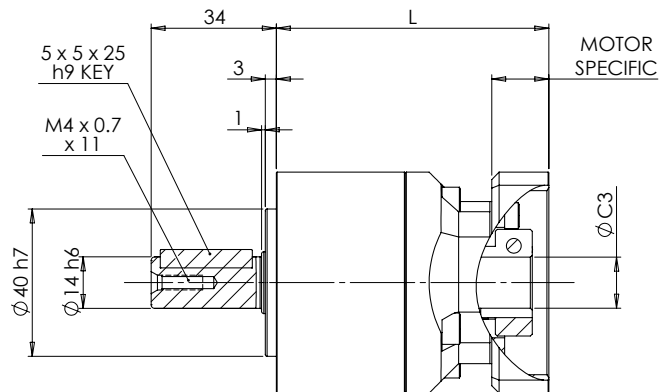
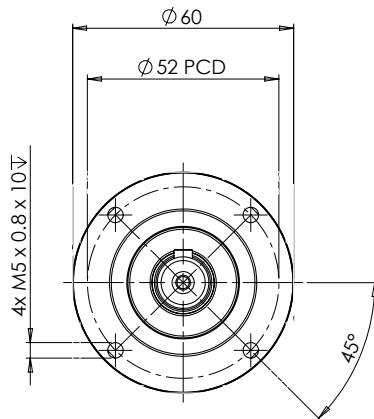
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 8	≤ 12

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SN060

Economy Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	28	50	84	0.06
	4:1	38	68	114	0.06
	5:1	40	72	120	0.06
	7:1	35	63	105	0.06
	10:1	25	45	75	0.06
Double Stage	15:1	28	50	84	0.06
	20:1	38	68	114	0.06
	25:1	40	72	120	0.06
	30:1	28	50	84	0.06
	35:1	35	63	105	0.06
	40:1	38	68	114	0.06
	50:1	40	72	120	0.06
	70:1	35	63	105	0.06
	100:1	25	45	75	0.06

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	74	100
Gearbox Weight $\pm$ 2% (kg)	1.00	1.46
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 95
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 14	
Set Collar Bolt Torque (Nm)	4.8	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/moa)	4	
Max. Radial Output Load (N)*	460	
Max. Axial Output Load (N)*	230	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 58	$\leq$ 60

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

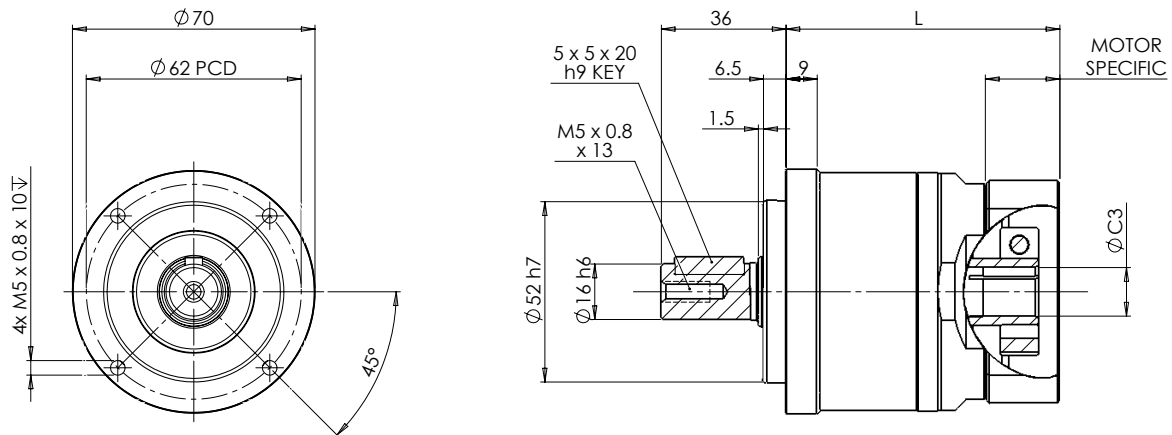
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	$\leq$ 8	$\leq$ 12

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SN070

Economy Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	54	97	162	0.13
	4:1	48	86	144	0.13
	5:1	45	81	135	0.13
	7:1	41	74	123	0.13
	10:1	40	72	120	0.13
Double Stage	15:1	54	97	162	0.13
	20:1	48	86	144	0.13
	25:1	45	81	135	0.13
	30:1	41	74	123	0.13
	35:1	41	74	123	0.13
	40:1	39	70	117	0.13
	50:1	45	81	135	0.13
	70:1	41	74	123	0.13
	100:1	40	72	120	0.13

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	79	112.8
Gearbox Weight $\pm$ 2% (kg)	1.25	1.90
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 95
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 19	
Set Collar Bolt Torque (Nm)	10	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/moa)	5	
Max. Radial Output Load (N)*	800	
Max. Axial Output Load (N)*	400	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 58	$\leq$ 60

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

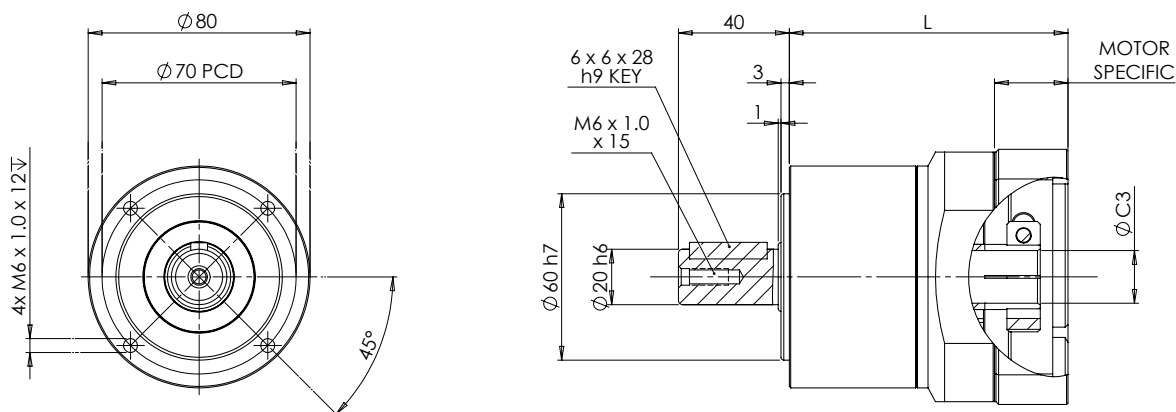
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	$\leq$ 8	$\leq$ 12

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SN080

Economy Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	112	202	336	0.48
	4:1	110	198	330	0.38
	5:1	108	194	324	0.38
	7:1	105	189	315	0.38
	10:1	100	180	300	0.35
Double Stage	15:1	112	202	336	0.41
	20:1	110	198	330	0.38
	25:1	108	194	324	0.38
	30:1	112	202	336	0.38
	35:1	105	189	315	0.38
	40:1	110	198	330	0.38
	50:1	108	194	324	0.38
	70:1	105	189	315	0.38
	100:1	100	180	300	0.38

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	100.5	135.5
Gearbox Weight $\pm$ 2% (kg)	2.10	3.20
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 95
Max. Input Shaft ØC3 (mm)	Ø19	
Set Collar Bolt Torque (Nm)	10	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/moa)	12	
Max. Radial Output Load (N)*	1300	
Max. Axial Output Load (N)*	660	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 60	$\leq$ 62

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

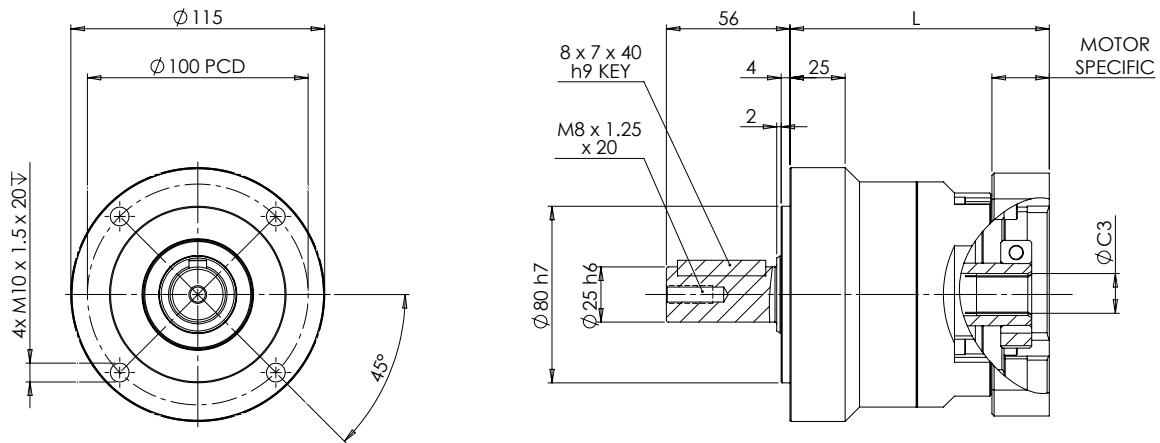
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	$\leq$ 8	$\leq$ 12

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SN115

Economy Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	165	297	495	0.60
	4:1	146	263	438	0.45
	5:1	160	288	480	0.45
	7:1	149	268	447	0.45
	10:1	141	254	423	0.41
Double Stage	15:1	165	297	495	0.45
	20:1	146	263	438	0.45
	25:1	160	288	480	0.45
	30:1	165	297	495	0.45
	35:1	149	268	447	0.45
	40:1	146	263	438	0.45
	50:1	160	288	480	0.45
	70:1	149	268	447	0.45
	100:1	141	254	423	0.45

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	117.5	161
Gearbox Weight $\pm$ 2% (kg)	5.00	6.92
Minimum Efficiency (%)	$\geq$ 97	$\geq$ 95
Max. Input Shaft $\varnothing$ C3 (mm)	$\varnothing$ 24	
Set Collar Bolt Torque (Nm)	16.3	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/moa)	14	
Max. Radial Output Load (N)*	3200	
Max. Axial Output Load (N)*	1600	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	$\leq$ 65	$\leq$ 67

* Applied at shaft centre @ 100 rpm output

** Based on 10:1 ratio no load @ 3000 rpm input

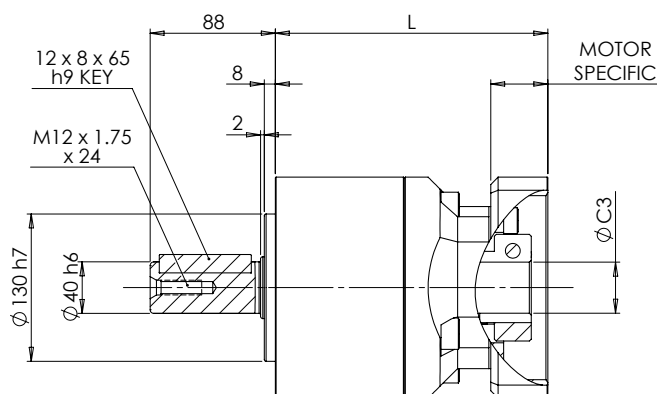
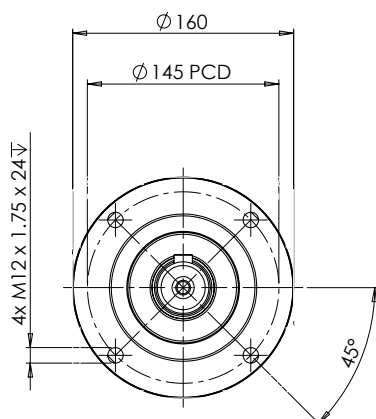
Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	$\leq$ 8	$\leq$ 12

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – SN160

Economy Range – In-line



NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm ²)
Single Stage	3:1	625	1125	1875	9.21
	4:1	555	999	1665	7.54
	5:1	618	1112	1854	7.42
	6:1	583	1049	1749	7.25
	7:1	573	1031	1719	7.14
	8:1	553	995	1659	7.07
	9:1	516	928	1548	7.04
	10:1	549	988	1647	7.03
Double Stage	15:1	625	1125	1875	2.63
	20:1	555	999	1665	2.63
	25:1	618	1112	1854	2.63
	30:1	583	1049	1749	2.43
	35:1	573	1031	1719	2.43
	40:1	553	995	1659	2.43
	50:1	618	1112	1854	2.43
	60:1	583	1049	1749	2.39
	70:1	573	1031	1719	2.39
	80:1	553	995	1659	2.39
	90:1	516	928	1548	2.39
	100:1	549	988	1647	2.39

Design Parameter	Stage vs Value	
	1	2
Dimension L Min. (mm)	150.5	210.5
Gearbox Weight ± 2% (kg)	13.3	18.5
Minimum Efficiency (%)	≥ 97	≥ 95
Max. Input Shaft ØC3 (mm)	Ø32	
Set Collar Bolt Torque (Nm)	41	
Nom. Input Speed (rpm)	3000	
Max. Input Speed (rpm)	5000	
Torsional Rigidity (Nm/moa)	60	
Max. Radial Output Load (N)*	9300	
Max. Axial Output Load (N)*	4650	
Operating Temp Range (°C)	- 25 / + 90	
Protection Rating (IP)	IP65	
Max. Noise Level (dB)**	≤ 65	≤ 67

* Applied at shaft centre @ 100 rpm output

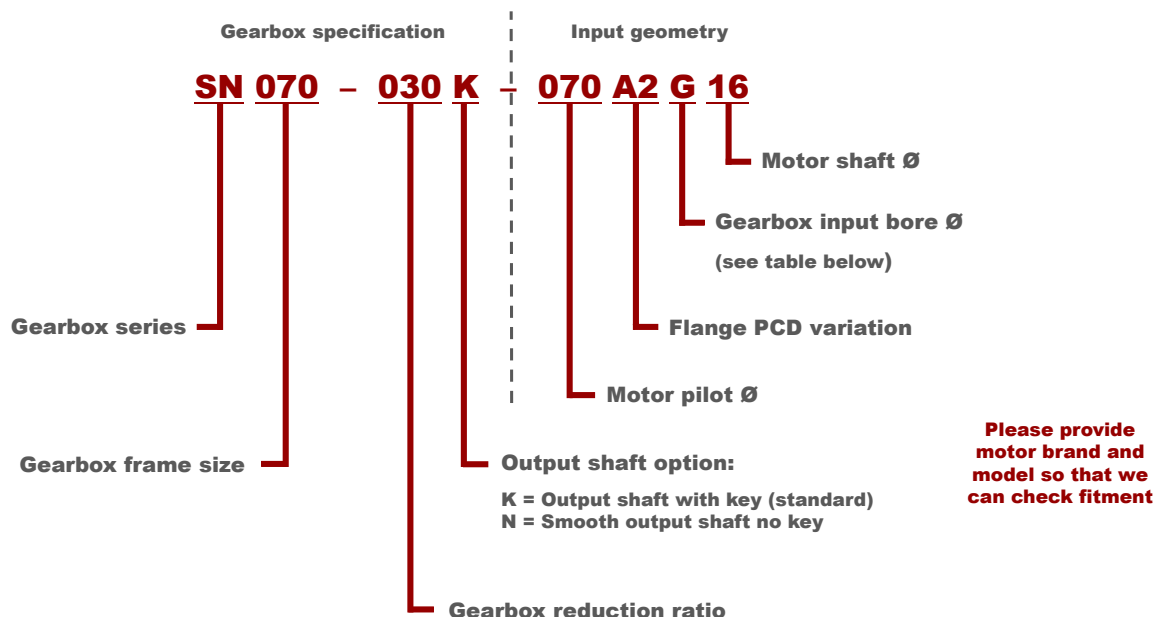
** Based on 10:1 ratio no load @ 3000 rpm input

Backlash Option (arcmin)	Stage vs Backlash	
	Single	Double
Standard	≤ 8	≤ 12

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



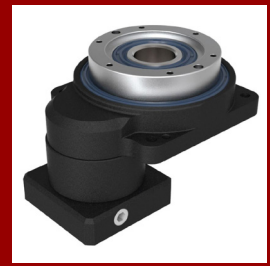
SN Series – Order Codes



Example Ordering Code:
SN060-010N-060A1F14

SN Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes						
Frame	Stage	C	E	F	G	J	K	L
		9	11	14	19	24	28	32
050	1 & 2	X	X	X				
060	1 & 2	X	X	X				
070	1 & 2			X	X			
080	1 & 2				X	X		
115	1 & 2				X	X		
160	1 & 2					X	X	X

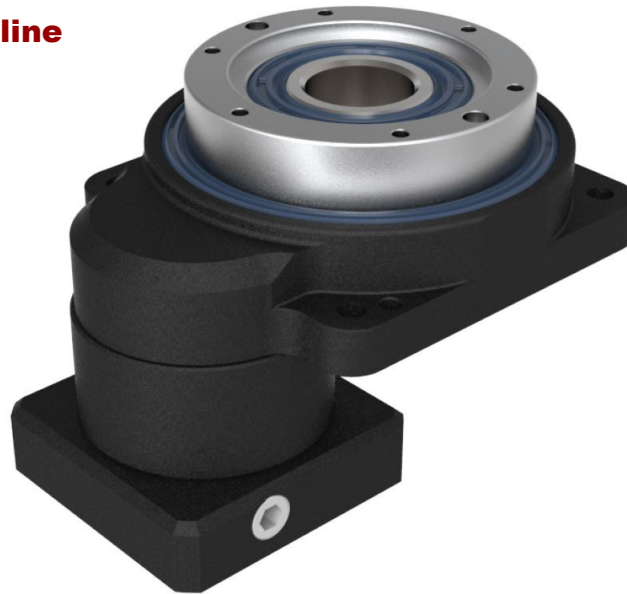
FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



ServoBox – GT Series

Precision Rotary Tables

GT In-line



Rotary output flange gearboxes for fine rotational positioning

Helical hardened & ground gearing for greater wear resistance

Hollow through bore for passing of utilities through axis of rotation

6 standard gearbox frame sizes from 060 up to 250 frame

From 5:1 up to 100:1 reduction ratio across the range

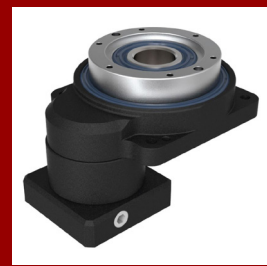
Up to 310 Nm nominal & 620 Nm peak output torque

Backlash of ≤ 1 arcmin for all available reduction ratios

Lightweight CNC machined aluminium housings

Power transmission efficiency of $\geq 98\%$

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



GT Series – In-line

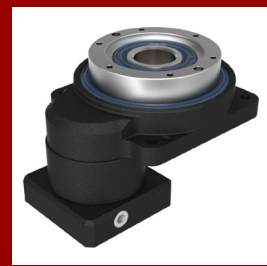
Precision Rotary Tables – Performance Overview

Parameter	Stage / Ratio		GT 060	GT 085	GT 110	GT 135	GT 200	GT 250
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 2) (E-Stop = Max. Accel.)	Single	5:1	5	18	33	43	142	-
		10:1	5	18	33	43	142	312
		18:1	5	18	33	43	142	312
	Double	25:1	5	18	33	43	142	-
		50:1	5	18	33	43	142	-
		100:1	5	18	33	43	142	-
Table Mass Inertia (kg/cm ²)	GT-B		0.78	12.68	15.62	29.18	290.72	-
	GT-C		0.74	12.03	14.83	27.72	276.19	-
	GT-H		0.78	12.03	14.83	27.72	276.19	535.51
Max. Output Speed (rpm)	GT-B		300	300	300	300	300	-
	GT-C		200	200	200	200	200	-
	GT-H		300	200	200	200	200	200
Max. Output Thrust Load (N)	GT-B		350	600	800	1450	2500	-
	GT-C		500	900	1200	2200	4000	-
	GT-H		350	900	1200	2200	4000	5060
Max. Bending Moment (Nm)	GT-B		7	12	16	30	50	-
	GT-C		10	18	24	45	80	-
	GT-H		7	18	24	45	120	200
Output Table Runout (mm)	ALL		0.010	0.010	0.015	0.015	0.020	0.025
Out. Table Parallelism (mm)	ALL		0.020	0.020	0.025	0.025	0.030	0.035
Standard Backlash (arcmin)*	ALL		≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
Lost Motion (arcmin)**	ALL		≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Repeatability (arcsec)	ALL		± 10	± 10	± 10	± 10	± 10	± 10
Gearbox Weight ± 3% (kg)	1	GT-B	0.6	1.2	2.5	3.8	10.1	-
		GT-C	0.6	1.1	2.1	3.1	8.7	-
		GT-H	0.6	1.1	2.5	3.1	10.1	14.8
	2	GT-B	1.1	2.0	3.8	4.9	11.8	-
		GT-C	1.1	1.8	3.5	4.2	10.3	-
		GT-H	1.1	1.8	3.8	4.2	11.8	-

* Measured whilst subject to 2% of rated output torque

** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



GT Series – In-line

Precision Rotary Tables – Performance Overview

Motor Connection:

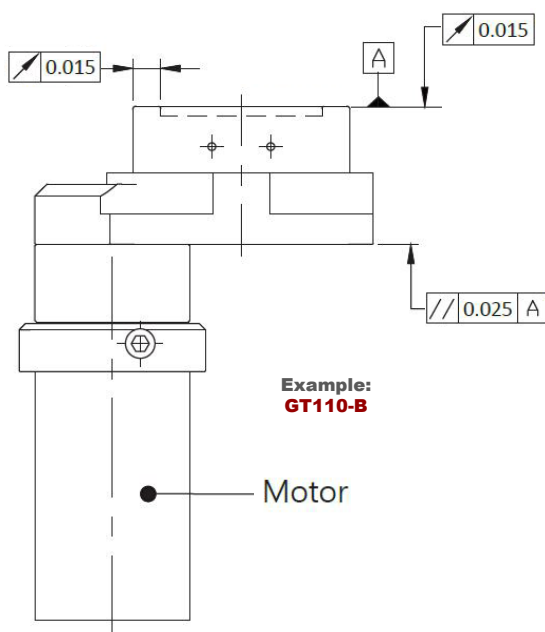
The modular design of the motor adapter plate is suitable for any brand of servo motor or stepper motor and can be tailored according to customer specifications. The motor output shaft is connected to the internal gearing via a backlash free clamping collet mechanism that has passed dynamic balancing analysis to ensure concentricity and thus minimise vibration and power losses.

Helical Gearing:

Our precision rotary tables utilise hardened & ground helical gears which provide a greater tooth mesh rate when compared to traditional spur gears thus ensuring smooth operation with reduced vibration and operating noise. The gear teeth are carburised to 58~60 HRC and ground to DIN6 specification ensuring high repeatability accuracy of ± 10 arcseconds and low torsional backlash of ≤ 1 arcminutes.

Workpiece Mounting:

The high accuracy, parallelism and low runout of the rotary output table allows for direct mounting of the workpiece. The output table features a hollow through bore which makes it possible to pass machine utilities through the axis of workpiece rotation which can otherwise be troublesome if no such facility is available.

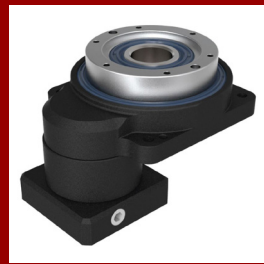


GT-B
With Ball Bearings



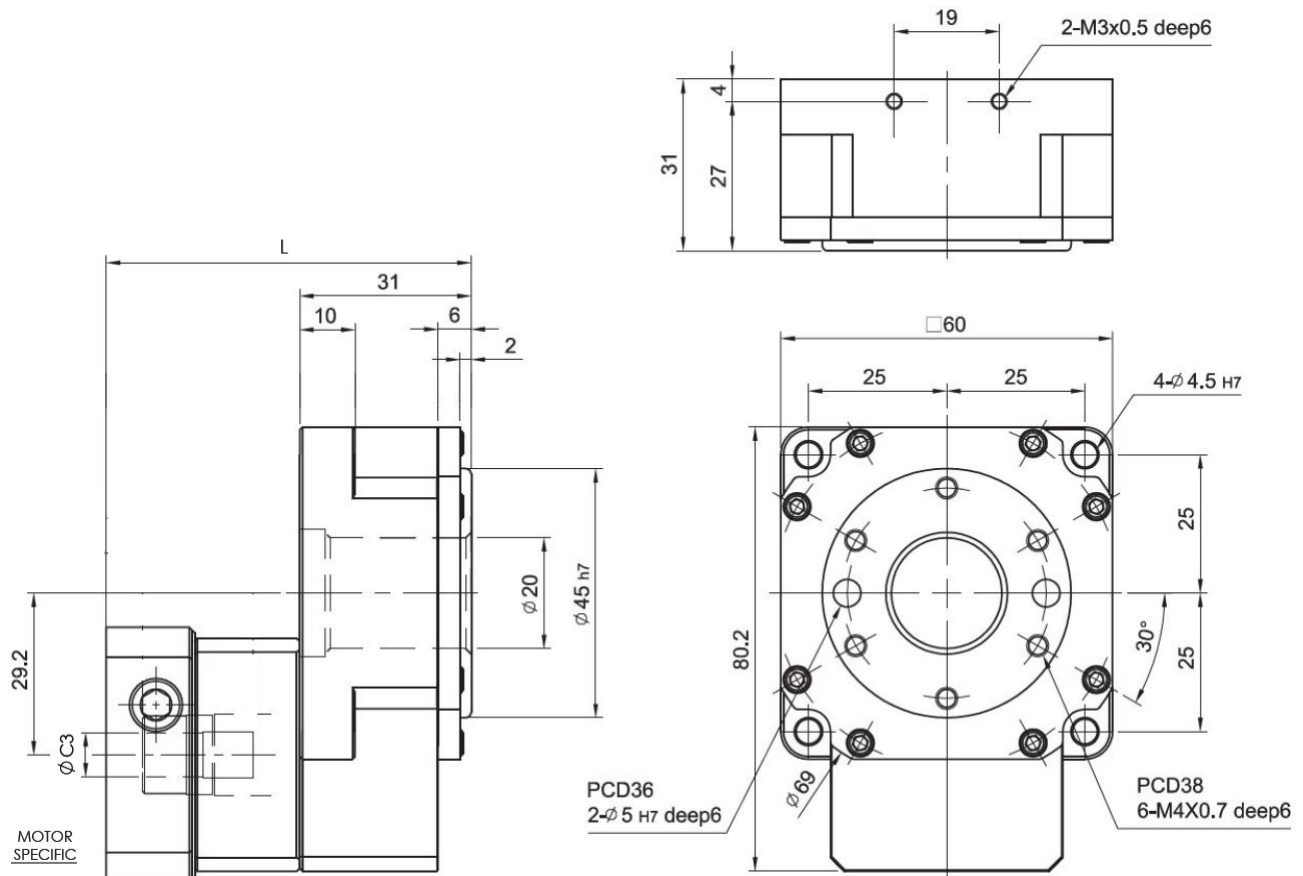
GT-C
With Roller Bearings

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT060B

Precision Rotary Table – Ball Bearing

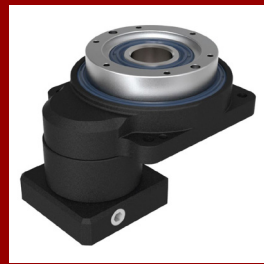


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	5	10	0.78
	10:1	5	10	0.78
	18:1	5	10	0.78
Double	25:1	5	10	0.78
	50:1	5	10	0.78
	100:1	5	10	0.78

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	66	103
Gearbox Weight $\pm 3\%$ (kg)	0.6	1.1
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø8	
Set Collar Bolt Torque (Nm)	4.8	
Max. Output Speed (rpm)	300	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	350	
Max. Bending Moment (Nm)	7	
Output Table Runout (mm)	0.01	
Out. Table Parallelism (mm)	0.02	
Protection Rating (IP)	IP65	
Output Bearing Type	Ball	

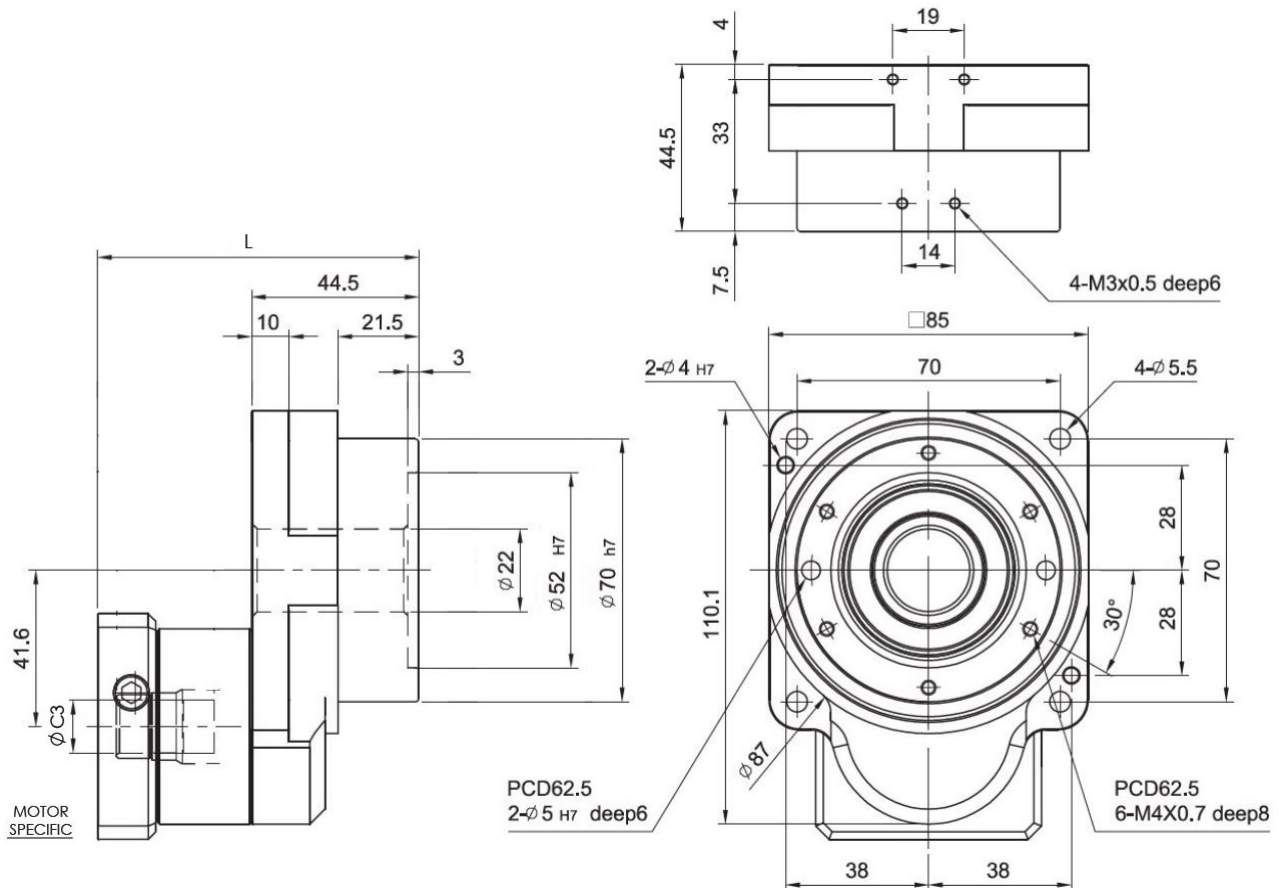
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT085B

Precision Rotary Table – Ball Bearing



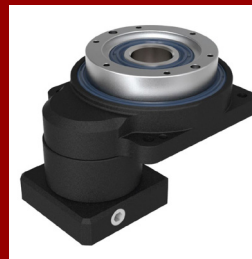
	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	18	36	12.68
	10:1	18	36	12.68
	18:1	18	36	12.68
Double	25:1	18	36	12.68
	50:1	18	36	12.68
	100:1	18	36	12.68

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	85	116
Gearbox Weight $\pm$ 3% (kg)	1.2	2
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø14	
Set Collar Bolt Torque (Nm)	4.8	
Max. Output Speed (rpm)	300	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	600	
Max. Bending Moment (Nm)	12	
Output Table Runout (mm)	0.01	
Out. Table Parallelism (mm)	0.02	
Protection Rating (IP)	IP65	
Output Bearing Type	Ball	

* Measured whilst subject to 2% of rated output torque

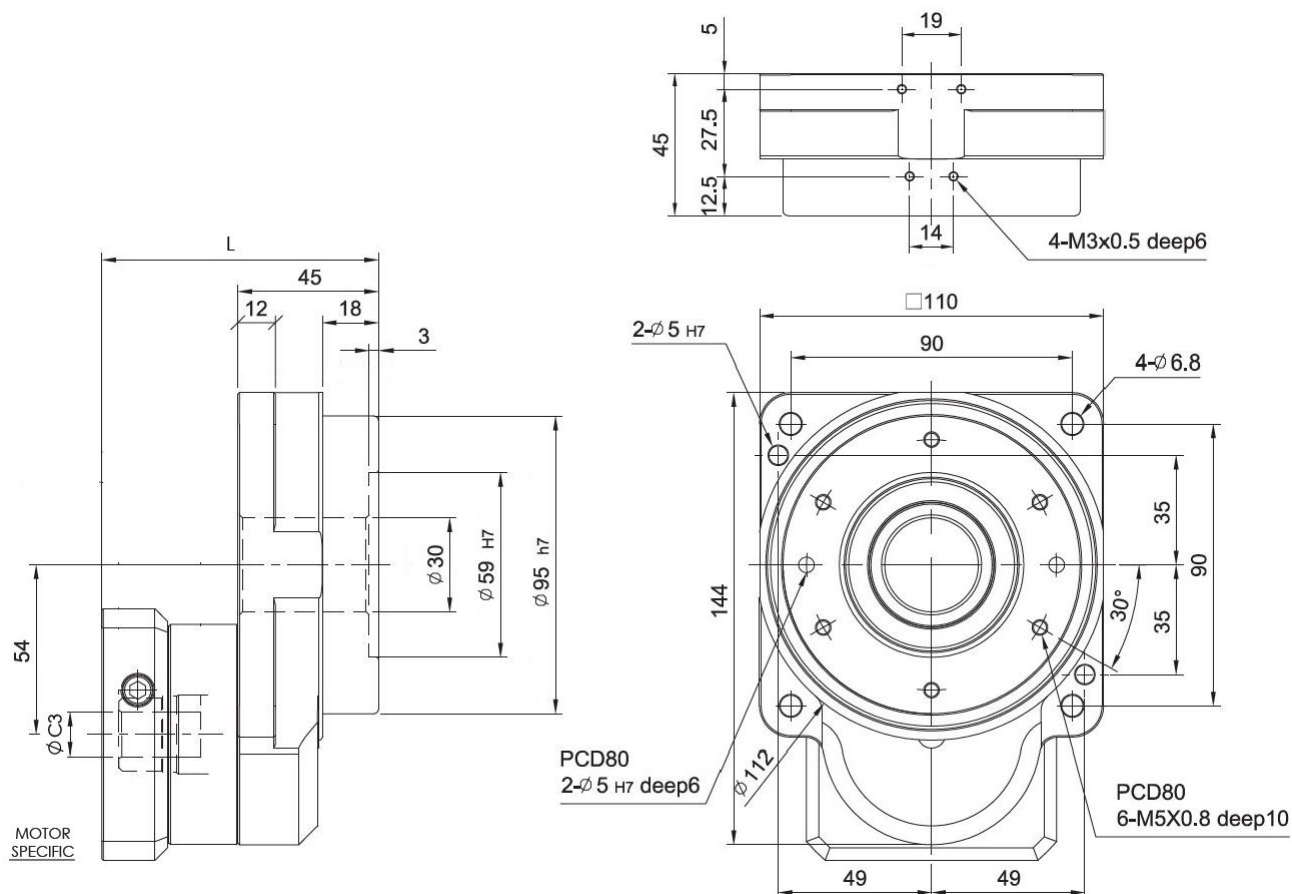
** Deviation between clockwise & anticlockwise directions

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ServoBox – GT110B

Precision Rotary Table – Ball Bearing



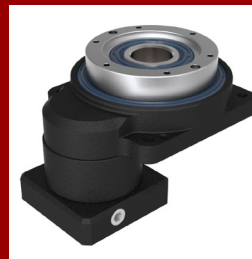
	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	33	66	15.62
	10:1	33	66	15.62
	18:1	33	66	15.62
Double	25:1	33	66	15.62
	50:1	33	66	15.62
	100:1	33	66	15.62

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	88	131
Gearbox Weight $\pm 3\%$ (kg)	2.5	3.8
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø14	
Set Collar Bolt Torque (Nm)	10	
Max. Output Speed (rpm)	300	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	800	
Max. Bending Moment (Nm)	16	
Output Table Runout (mm)	0.015	
Out. Table Parallelism (mm)	0.025	
Protection Rating (IP)	IP65	
Output Bearing Type	Ball	

* Measured whilst subject to 2% of rated output torque

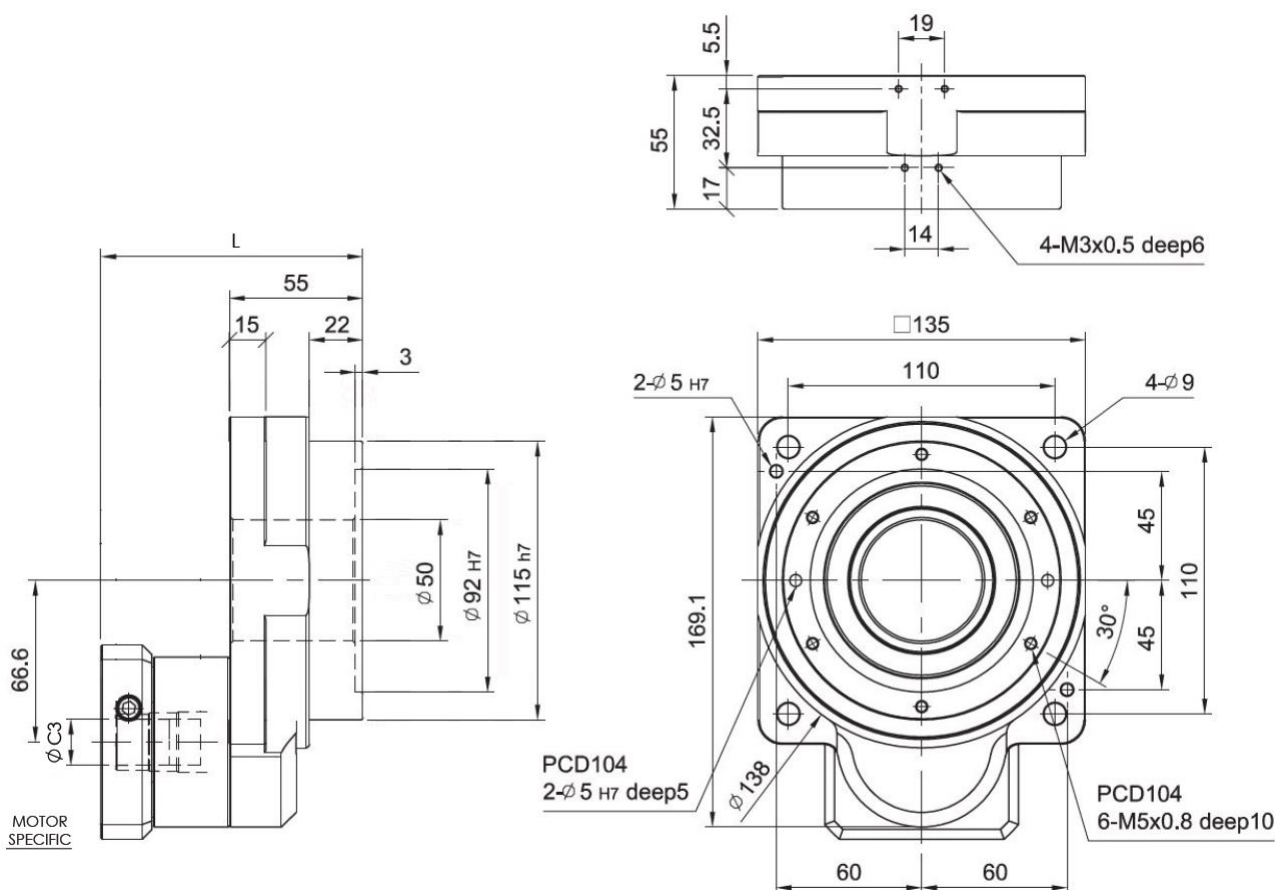
** Deviation between clockwise & anticlockwise directions

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ServoBox – GT135B

Precision Rotary Table – Ball Bearing

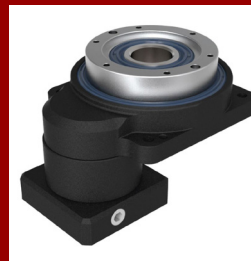


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	43	86	29.18
	10:1	43	86	29.18
	18:1	43	86	29.18
Double	25:1	43	86	29.18
	50:1	43	86	29.18
	100:1	43	86	29.18

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	108	141
Gearbox Weight $\pm$ 3% (kg)	3.8	4.9
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø19	Ø14
Set Collar Bolt Torque (Nm)	10	
Max. Output Speed (rpm)	300	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	1450	
Max. Bending Moment (Nm)	30	
Output Table Runout (mm)	0.015	
Out. Table Parallelism (mm)	0.025	
Protection Rating (IP)	IP65	
Output Bearing Type	Ball	

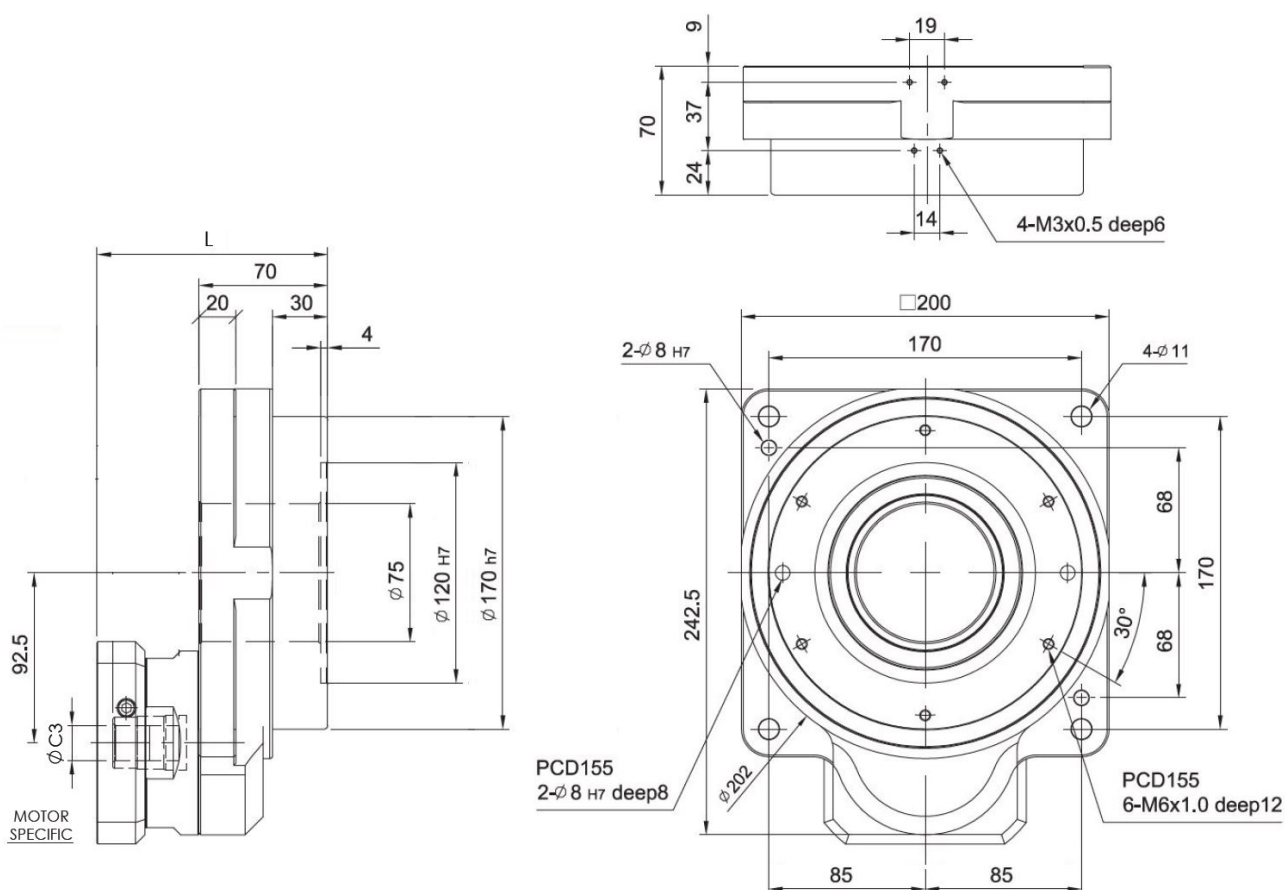
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

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ServoBox – GT200B

Precision Rotary Table – Ball Bearing



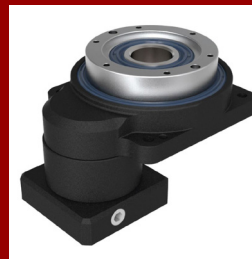
	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	142	284	290.72
	10:1	142	284	290.72
	18:1	142	284	290.72
Double	25:1	142	284	290.72
	50:1	142	284	290.72
	100:1	142	284	290.72

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	125	166
Gearbox Weight $\pm$ 3% (kg)	10.1	11.8
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø24	Ø19
Set Collar Bolt Torque (Nm)	16.3	10
Max. Output Speed (rpm)	300	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	2500	
Max. Bending Moment (Nm)	50	
Output Table Runout (mm)	0.02	
Out. Table Parallelism (mm)	0.03	
Protection Rating (IP)	IP65	
Output Bearing Type	Ball	

* Measured whilst subject to 2% of rated output torque

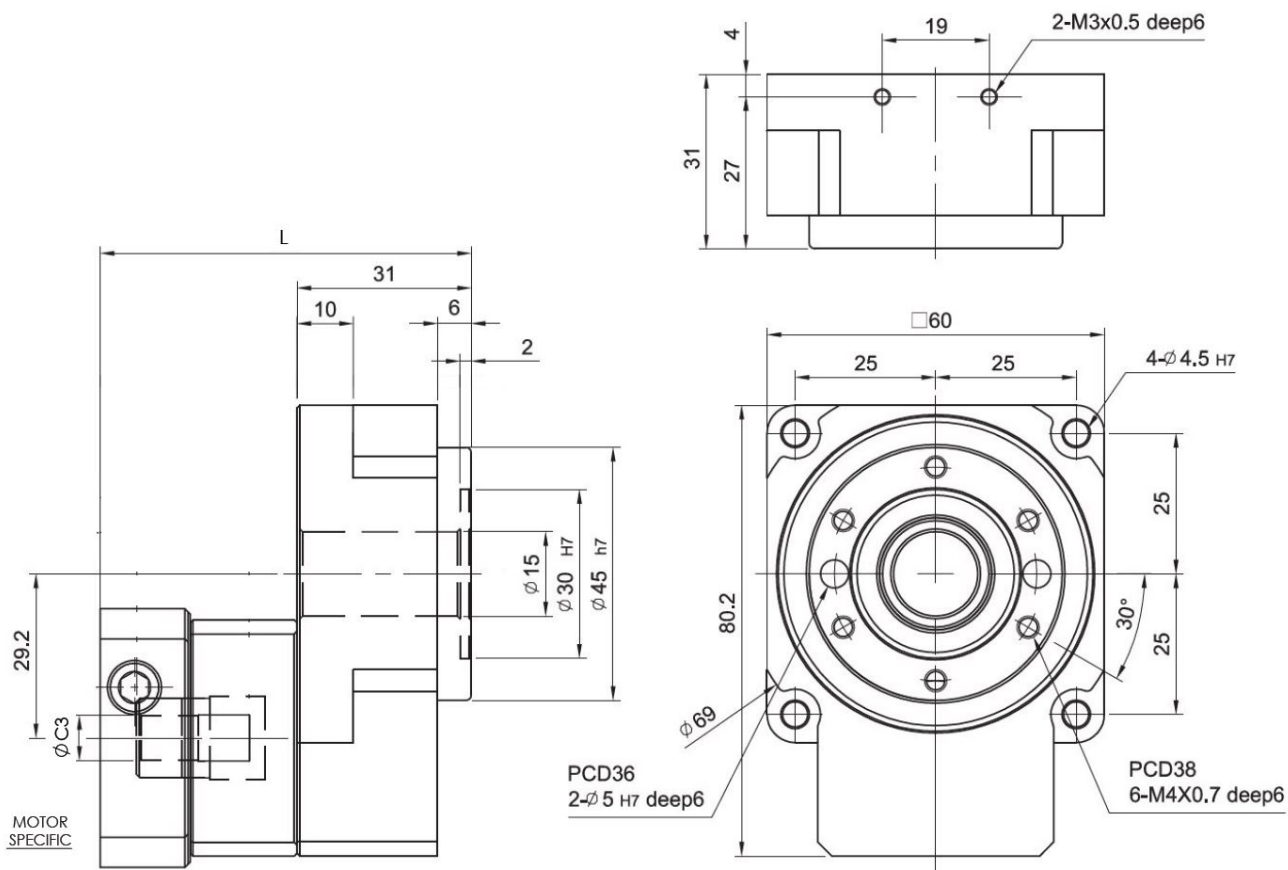
** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT060C

Precision Rotary Table – Cross Roller Bearing

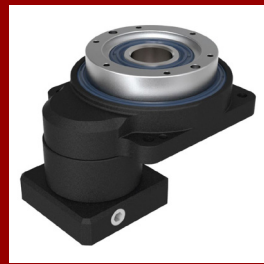


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	5	10	0.74
	10:1	5	10	0.74
	18:1	5	10	0.74
Double	25:1	5	10	0.74
	50:1	5	10	0.74
	100:1	5	10	0.74

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	66	103
Gearbox Weight $\pm$ 3% (kg)	0.6	1.1
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø8	
Set Collar Bolt Torque (Nm)	4.8	
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	500	
Max. Bending Moment (Nm)	10	
Output Table Runout (mm)	0.01	
Out. Table Parallelism (mm)	0.02	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

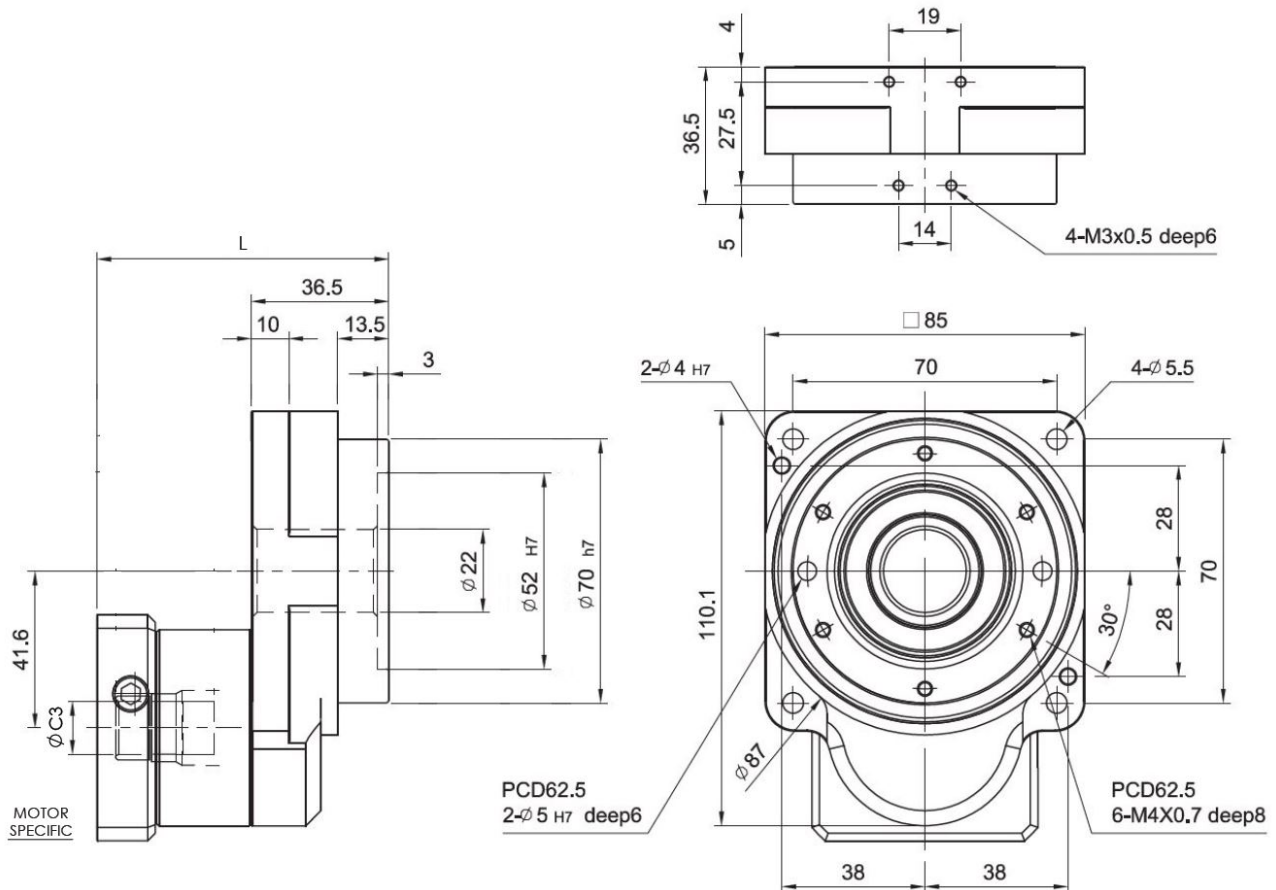
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
 AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – GT085C

Precision Rotary Table – Cross Roller Bearing

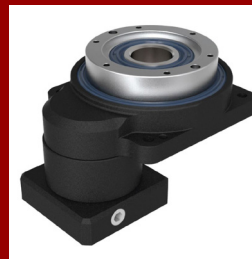


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	18	36	12.03
	10:1	18	36	12.03
	18:1	18	36	12.03
Double	25:1	18	36	12.03
	50:1	18	36	12.03
	100:1	18	36	12.03

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	77	108
Gearbox Weight $\pm$ 3% (kg)	1.1	1.8
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø14	
Set Collar Bolt Torque (Nm)	4.8	
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	900	
Max. Bending Moment (Nm)	18	
Output Table Runout (mm)	0.01	
Out. Table Parallelism (mm)	0.02	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

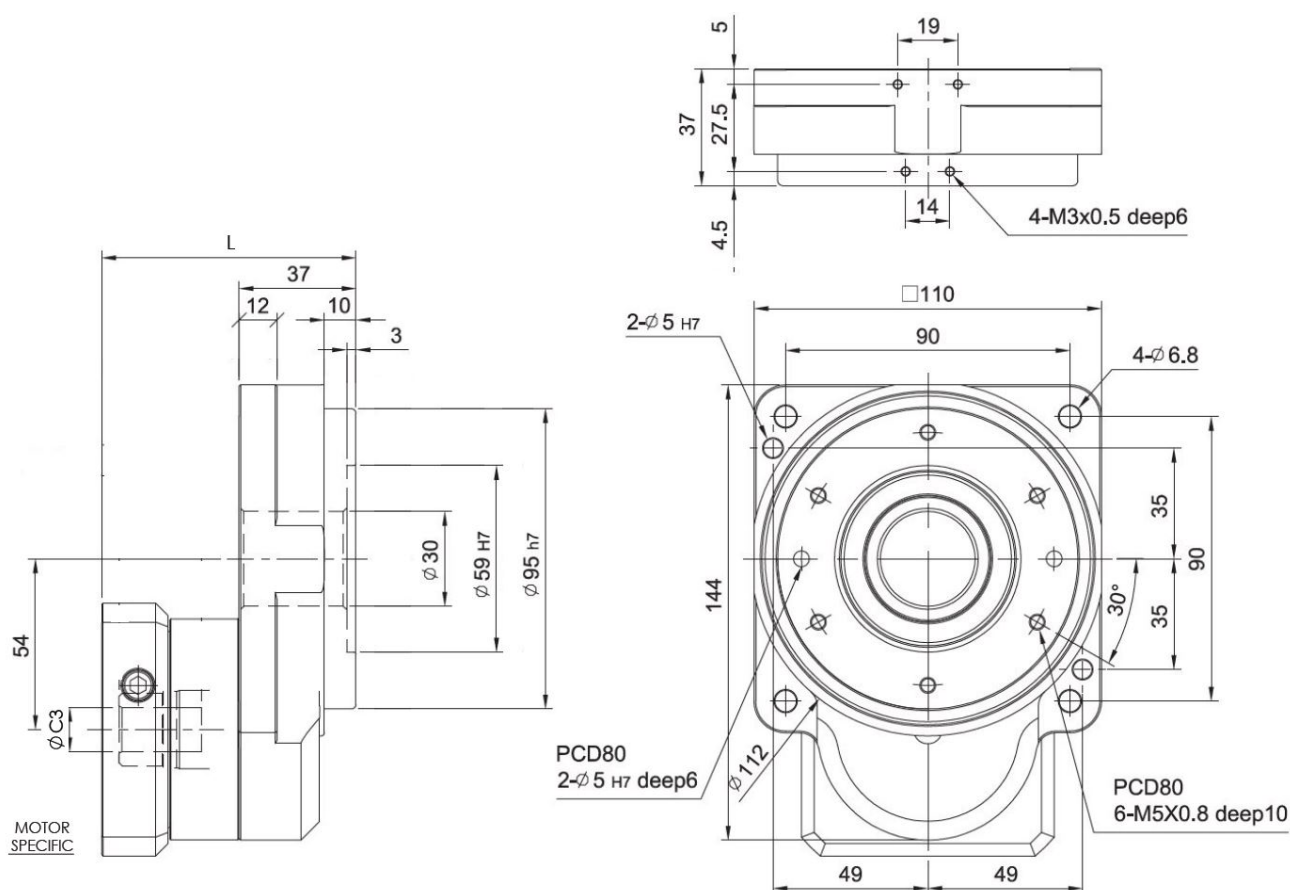
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT110C

Precision Rotary Table – Cross Roller Bearing



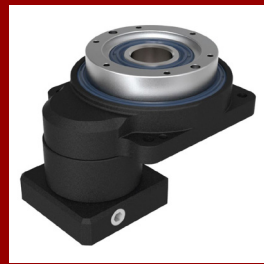
	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	33	66	14.83
	10:1	33	66	14.83
	18:1	33	66	14.83
Double	25:1	33	66	14.83
	50:1	33	66	14.83
	100:1	33	66	14.83

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	80	123
Gearbox Weight $\pm$ 3% (kg)	2.1	3.5
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø14	
Set Collar Bolt Torque (Nm)	10	
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	1200	
Max. Bending Moment (Nm)	24	
Output Table Runout (mm)	0.015	
Out. Table Parallelism (mm)	0.025	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

* Measured whilst subject to 2% of rated output torque

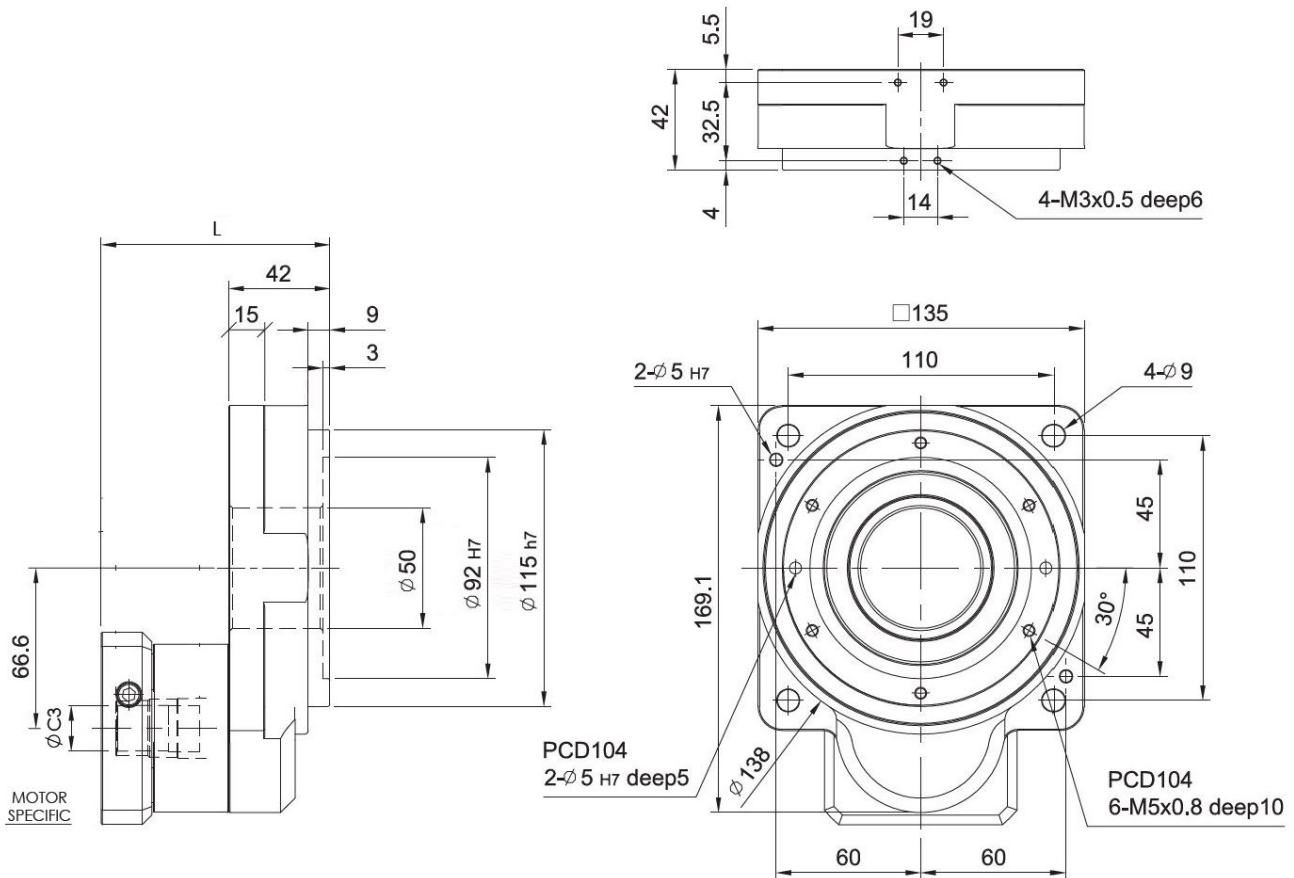
** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



ServoBox – GT135C

Precision Rotary Table – Cross Roller Bearing

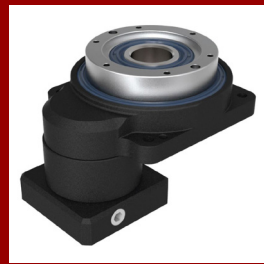


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	43	86	27.72
	10:1	43	86	27.72
	18:1	43	86	27.72
Double	25:1	43	86	27.72
	50:1	43	86	27.72
	100:1	43	86	27.72

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	95	128
Gearbox Weight $\pm$ 3% (kg)	3.1	4.2
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø19	Ø14
Set Collar Bolt Torque (Nm)	10	
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	2200	
Max. Bending Moment (Nm)	45	
Output Table Runout (mm)	0.015	
Out. Table Parallelism (mm)	0.025	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

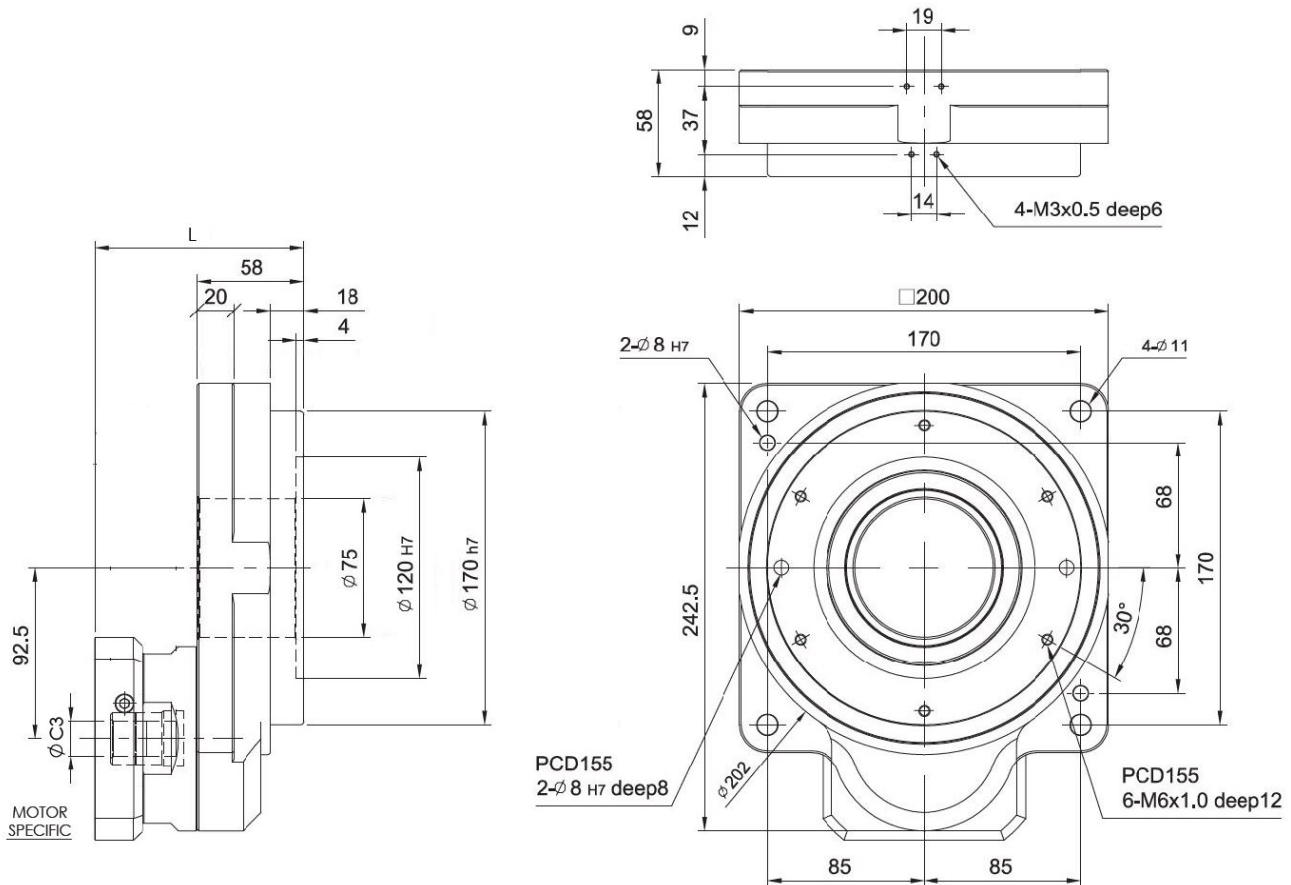
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

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ServoBox – GT200C

Precision Rotary Table – Cross Roller Bearing

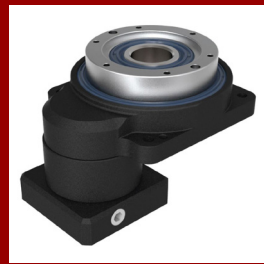


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	142	284	276.19
	10:1	142	284	276.19
	18:1	142	284	276.19
Double	25:1	142	284	276.19
	50:1	142	284	276.19
	100:1	142	284	276.19

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	113	154
Gearbox Weight ± 3% (kg)	8.7	10.3
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø24	Ø19
Set Collar Bolt Torque (Nm)	16.3	10
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	4000	
Max. Bending Moment (Nm)	80	
Output Table Runout (mm)	0.02	
Out. Table Parallelism (mm)	0.03	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

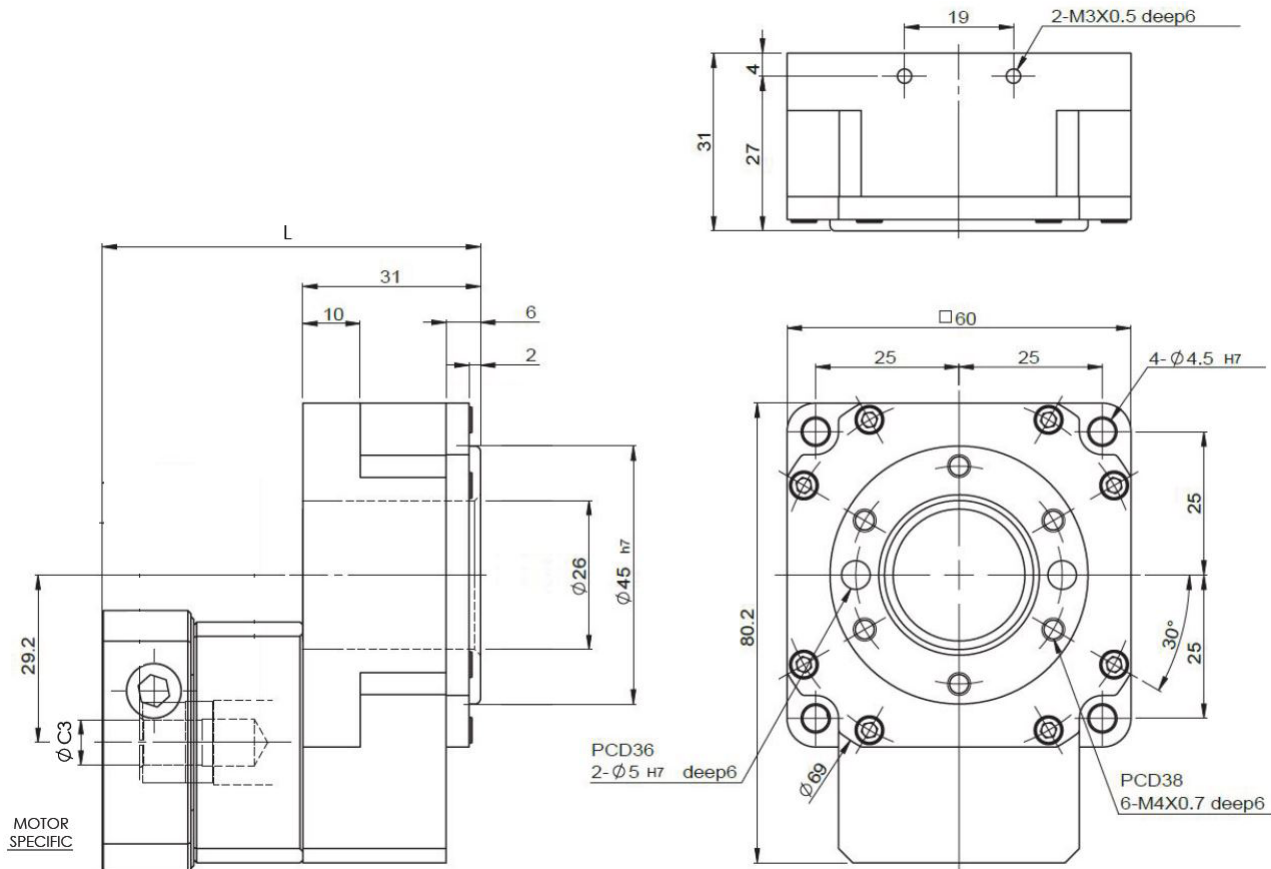
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

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ServoBox – GT060H

Precision Rotary Table – Increased Bore Size



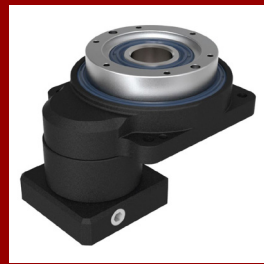
	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	-	-	-
	10:1	5	10	0.78
	18:1	5	10	0.78
Double	25:1	-	-	-
	50:1	5	10	0.78
	100:1	5	10	0.78

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	66	103
Gearbox Weight $\pm$ 3% (kg)	0.6	1.1
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø8	
Set Collar Bolt Torque (Nm)	4.8	
Max. Output Speed (rpm)	300	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	350	
Max. Bending Moment (Nm)	7	
Output Table Runout (mm)	0.01	
Out. Table Parallelism (mm)	0.02	
Protection Rating (IP)	IP65	
Output Bearing Type	Ball	

* Measured whilst subject to 2% of rated output torque

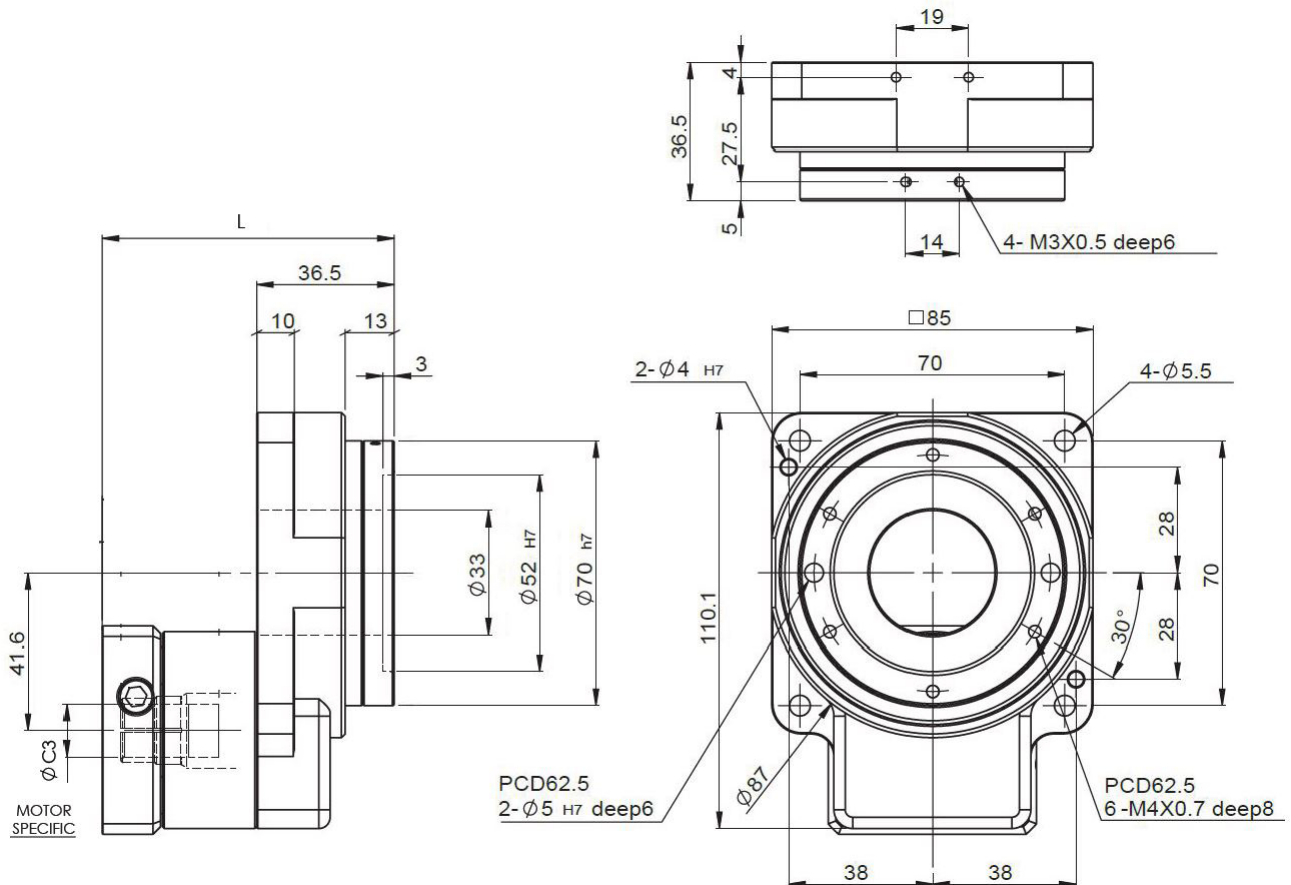
** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT085H

Precision Rotary Table – Increased Bore Size



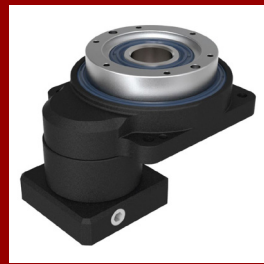
	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	-	-	-
	10:1	18	36	12.03
	18:1	18	36	12.03
Double	25:1	-	-	-
	50:1	18	36	12.03
	100:1	18	36	12.03

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	77	108
Gearbox Weight ± 3% (kg)	1.1	1.8
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø14	
Set Collar Bolt Torque (Nm)	4.8	
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	900	
Max. Bending Moment (Nm)	18	
Output Table Runout (mm)	0.01	
Out. Table Parallelism (mm)	0.02	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

* Measured whilst subject to 2% of rated output torque

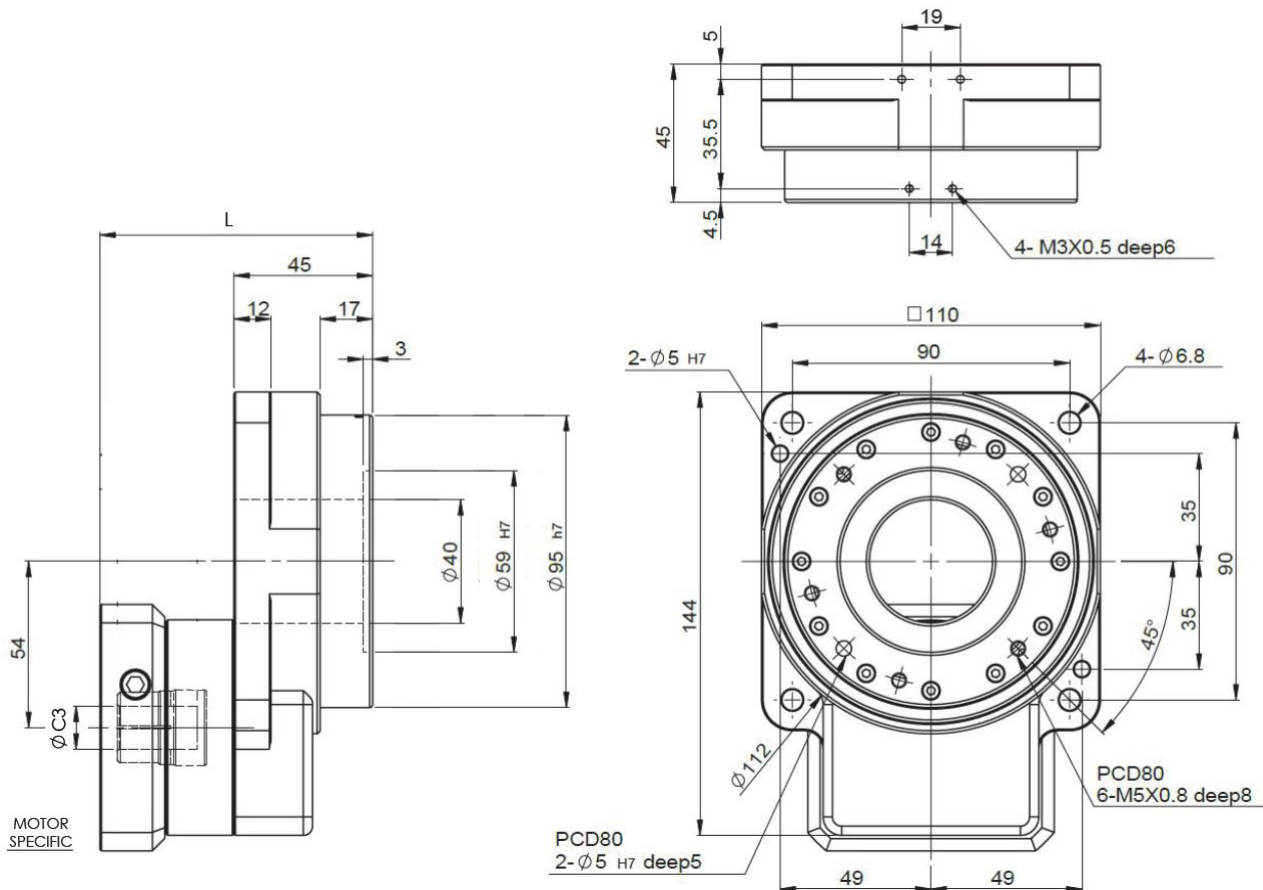
** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT110H

Precision Rotary Table – Increased Bore Size

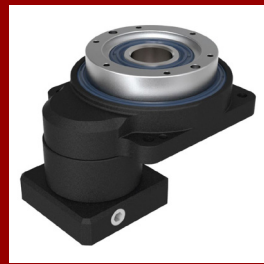


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	-	-	-
	10:1	33	66	14.83
	18:1	33	66	14.83
Double	25:1	-	-	-
	50:1	33	66	14.83
	100:1	33	66	14.83

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	88	131
Gearbox Weight $\pm$ 3% (kg)	2.5	3.8
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø14	
Set Collar Bolt Torque (Nm)	10	
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	1200	
Max. Bending Moment (Nm)	24	
Output Table Runout (mm)	0.015	
Out. Table Parallelism (mm)	0.025	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

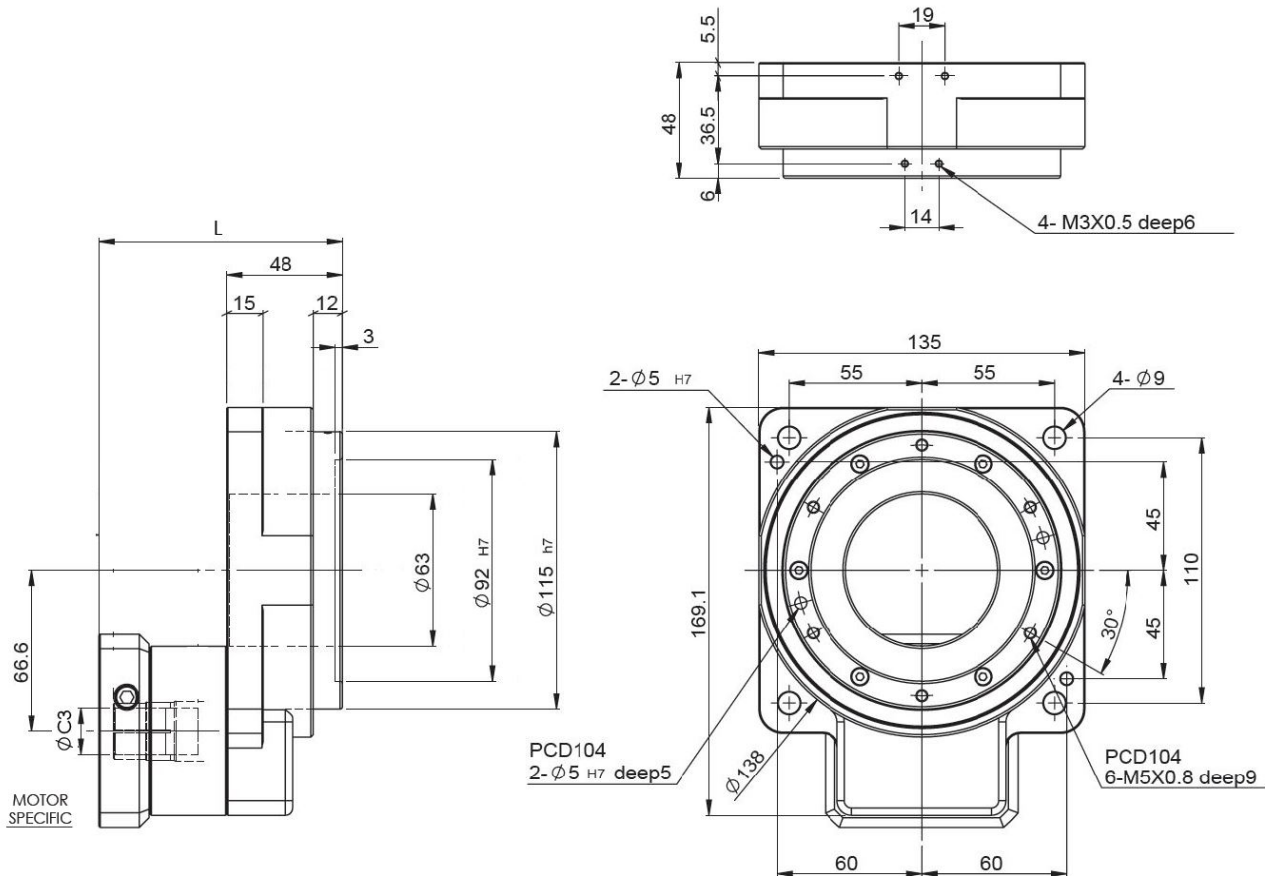
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT135H

Precision Rotary Table – Increased Bore Size



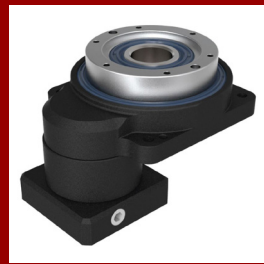
	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	-	-	-
	10:1	43	86	27.72
	18:1	43	86	27.72
Double	25:1	-	-	-
	50:1	43	86	27.72
	100:1	43	86	27.72

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	101	134
Gearbox Weight ± 3% (kg)	3.1	4.2
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø19	Ø14
Set Collar Bolt Torque (Nm)	10	
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	2200	
Max. Bending Moment (Nm)	45	
Output Table Runout (mm)	0.015	
Out. Table Parallelism (mm)	0.025	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

* Measured whilst subject to 2% of rated output torque

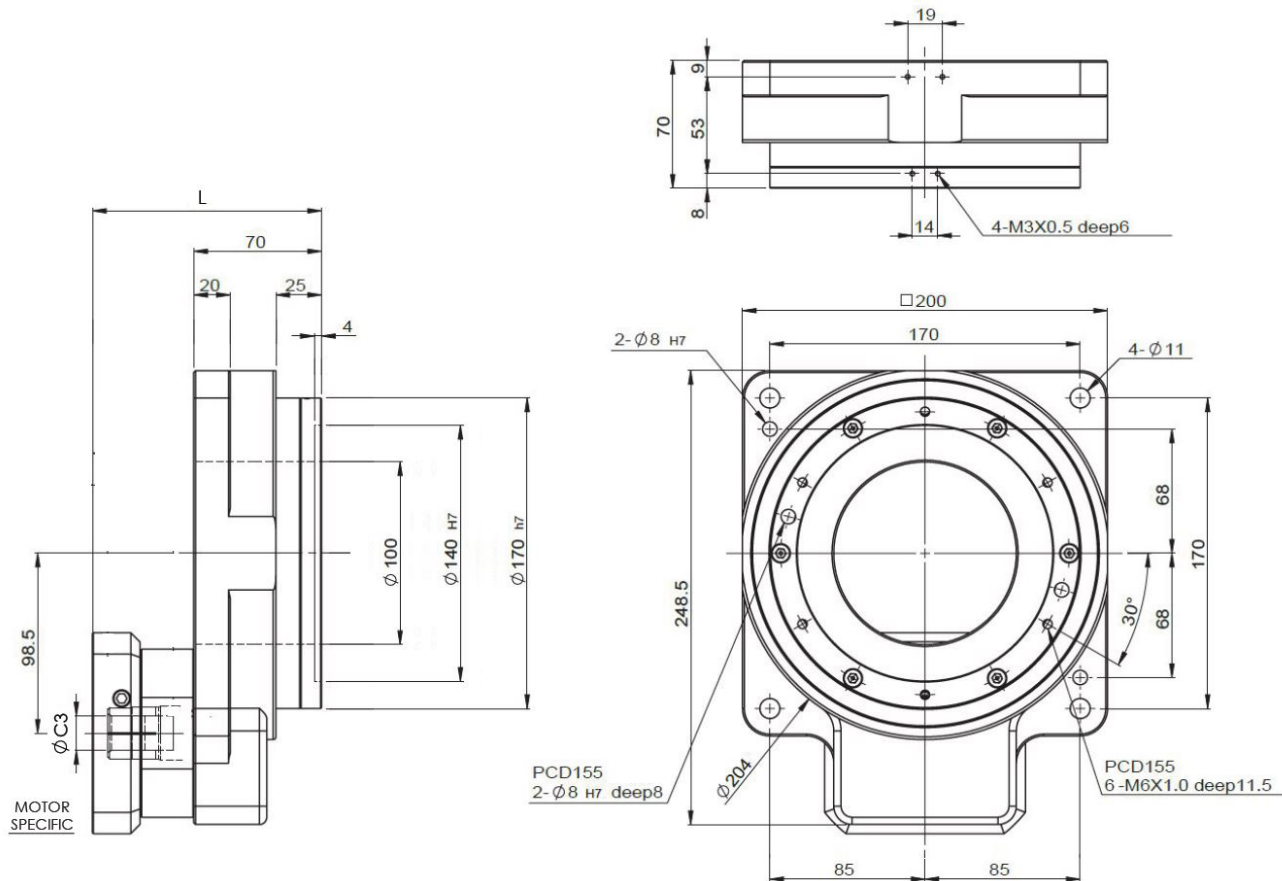
** Deviation between clockwise & anticlockwise directions

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ServoBox – GT200H

Precision Rotary Table – Increased Bore Size

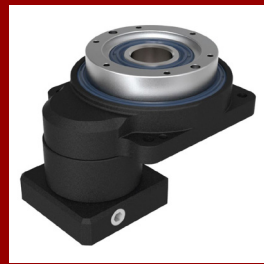


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	-	-	-
	10:1	142	284	276.19
	18:1	142	284	276.19
Double	25:1	-	-	-
	50:1	142	284	276.19
	100:1	142	284	276.19

Design Parameter	Stage vs Value	
	Single	Double
Dimension L Min. (mm)	113	166
Gearbox Weight $\pm 3\%$ (kg)	10.1	11.8
Minimum Efficiency (%)	≥ 98	
Max. Input Shaft ØC3 (mm)	Ø24	Ø19
Set Collar Bolt Torque (Nm)	16.3	10
Max. Output Speed (rpm)	200	
Torsional Backlash (arcmin)*	≤ 1	
Lost Motion (arcmin)**	≤ 2	
Repeatability (arcsec)	± 10	
Max. Output Thrust Load (N)	4000	
Max. Bending Moment (Nm)	120	
Output Table Runout (mm)	0.02	
Out. Table Parallelism (mm)	0.03	
Protection Rating (IP)	IP65	
Output Bearing Type	Roller	

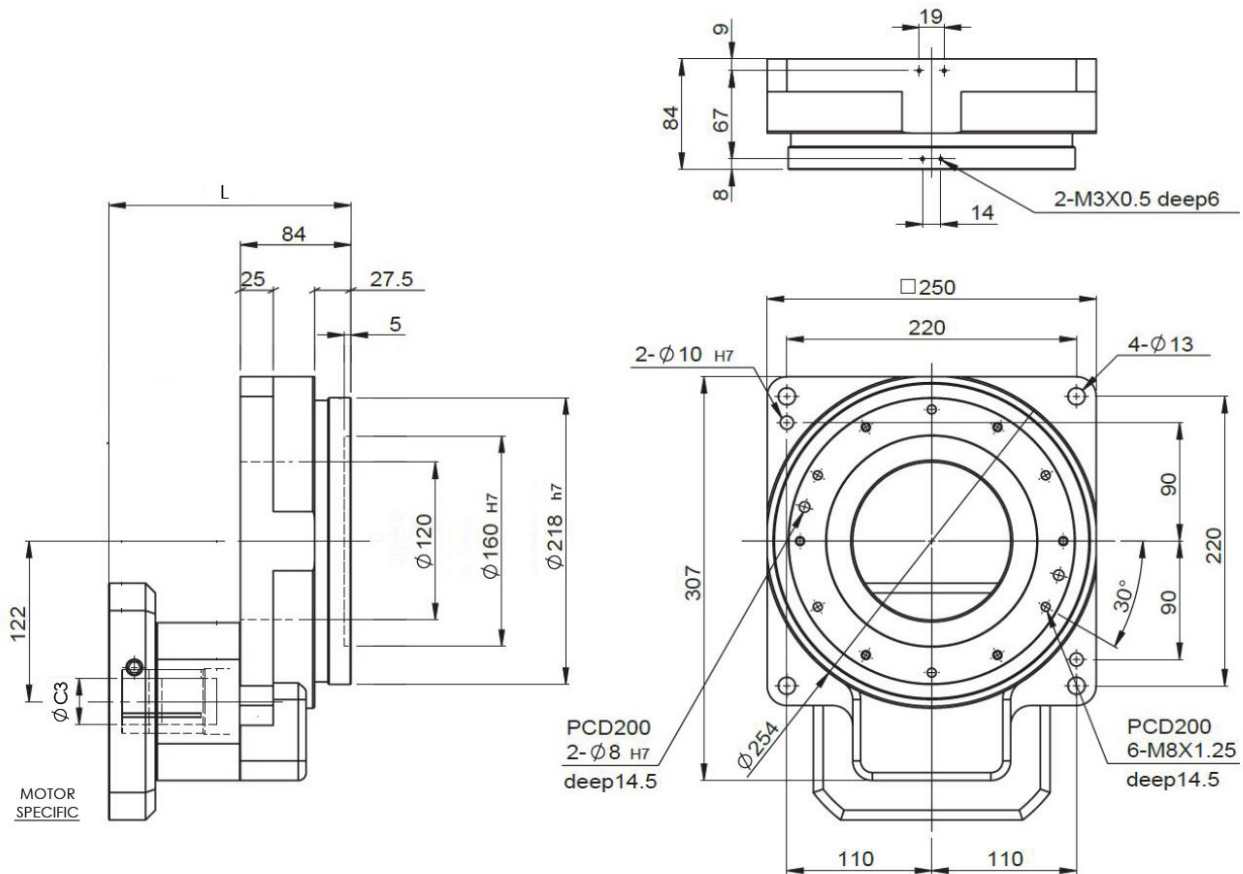
* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
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ServoBox – GT250H

Precision Rotary Table – Increased Bore Size

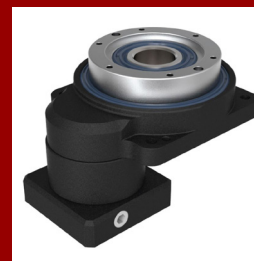


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Mass Moment of Inertia of Output Table (kg/cm ²)
Single	5:1	-	-	-
	10:1	312	624	535.51
	18:1	312	624	535.51

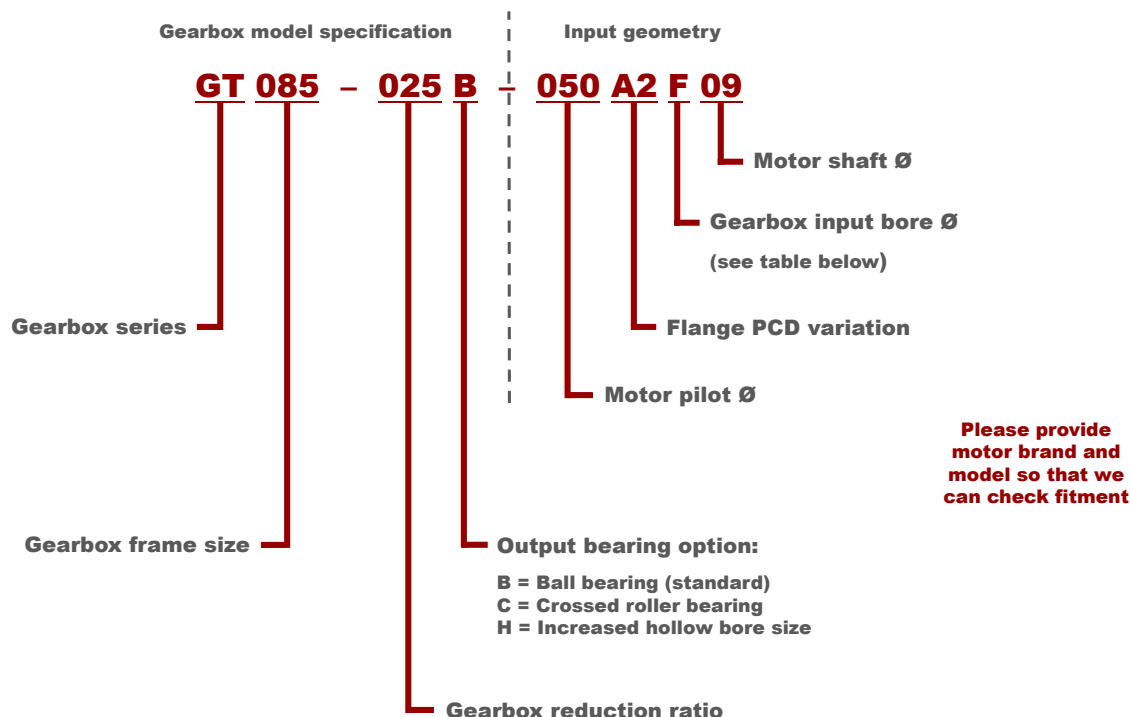
Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	184
Gearbox Weight $\pm$ 3% (kg)	14.8
Minimum Efficiency (%)	$\geq$ 98
Max. Input Shaft ØC3 (mm)	Ø35
Set Collar Bolt Torque (Nm)	81
Max. Output Speed (rpm)	200
Torsional Backlash (arcmin)*	$\leq$ 1
Lost Motion (arcmin)**	$\leq$ 2
Repeatability (arcsec)	$\pm$ 10
Max. Output Thrust Load (N)	5060
Max. Bending Moment (Nm)	200
Output Table Runout (mm)	0.025
Out. Table Parallelism (mm)	0.035
Protection Rating (IP)	IP65
Output Bearing Type	Roller

* Measured whilst subject to 2% of rated output torque
 ** Deviation between clockwise & anticlockwise directions

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GT Series – Order Codes



Example Ordering Code:
GT110-018C-050A1F14

GT Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes				
Frame	Stage	B	F	G	J	M
		8	14	19	24	35
060	1 & 2	X				
085	1 & 2	X	X			
110	1 & 2		X			
135	1 Only		X	X		
	2 Only		X			
200	1 Only			X	X	
	2 Only			X		
250	1 Only				X	X

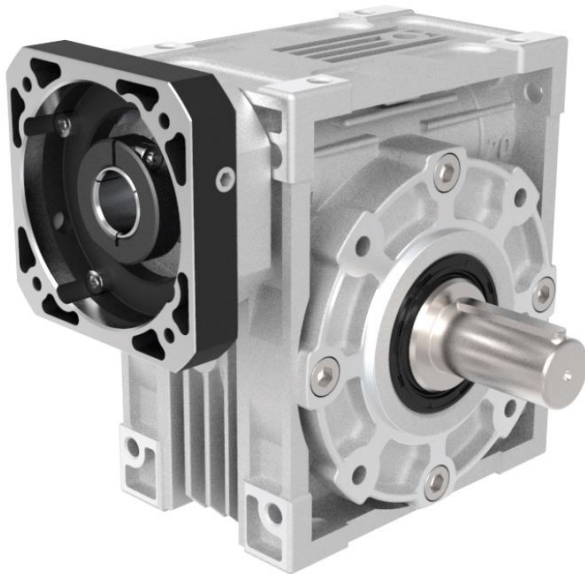
FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
 DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



ServoBox – WE Series

Precision Worm Gearboxes

WES Shaft



WEO Hollow



High precision low backlash servo worm gearboxes

Single or double shafts or hollow through bore output options

Clamp output and additional mounting flanges available on request

5 standard gearbox frame sizes from 30 up to 70 frame

From 5:1 up to 60:1 reduction ratio across the range

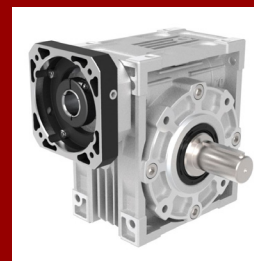
Up to 110 Nm nominal & 220 Nm peak output torque

Backlash of ≤ 8 arcmin for all frame sizes and reduction ratios

Lightweight cast aluminium housings

Power transmission efficiency of up to 90%

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT
LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



WE Series – Right Angle

Precision Worm Gearboxes – Performance

Parameter	Stage / Ratio	WE 30	WE 40	WE 50	WE 60	WE 70
Nominal Rated Output Torque (Nm) (Max. Accel = Nom x 2) (E-Stop = Max. Accel.)	5:1	8	22	30	41	70
	10:1	8	20	41	66	92
	15:1	11	26	40	64	90
	20:1	9	22	40	63	106
	30:1	12	27	43	67	95
	40:1	9	24	43	69	111
	50:1	10	24	43	69	105
	60:1	9	20	36	58	100
Power Transmission Efficiency (%)	5:1	90.3	92.3	92.6	92.6	93.6
	10:1	83.7	86.6	89.6	90.1	90.5
	15:1	81.9	83.7	85.3	86.1	86.6
	20:1	72.3	76.6	81.7	82.4	85.1
	30:1	69.6	72.3	74.5	75.9	76.7
	40:1	56.8	66.3	69.2	70.3	74.3
	50:1	58.7	64.6	67.7	68.9	71.2
	60:1	54.6	56.8	59.3	61.3	68.8
Nominal Input Speed (rpm)	ALL	2000	2000	2000	2000	2000
Maximum Input Speed (rpm)	ALL	3000	3000	3000	3000	3000
Lubricant Capacity (cc)	ALL	30	70	140	260	360
Max. Radial Output Load (N)*	ALL	1830	3490	4840	6270	7380
Max. Axial Output Load (N)*	ALL	915	1745	2420	3135	3690
Standard Backlash (arcmin)	ALL	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8

* Applied at output shaft centre @ 100 rpm

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WE Series – Right Angle

Precision Worm Gearboxes – Output Options



WES – Shaft



WESF – Shaft & Mounting Flange



WEO – Hollow



WEOF – Hollow & Mounting Flange



WEN – Clamp

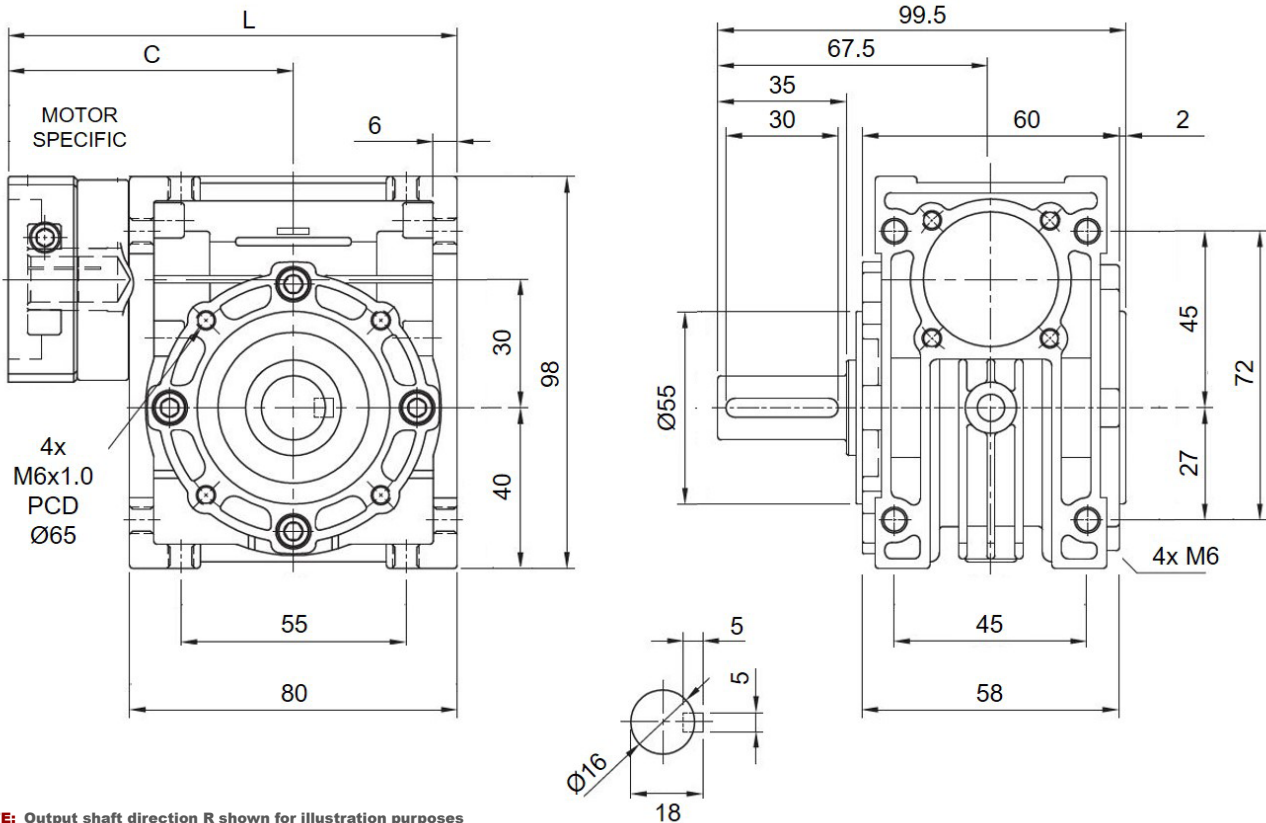


WENF – Clamp & Mounting Flange



ServoBox – WES 30

Precision Worm Gearbox – Shaft Output



NOTE: Output shaft direction R shown for illustration purposes

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	8	16	90.3
	10:1	8	16	83.7
	15:1	11	22	81.9
	20:1	9	18	72.3
	30:1	12	24	69.6
	40:1	9	18	56.8
	50:1	10	20	58.7
	60:1	9	18	54.6

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	108
Dimension C Min. (mm)	68
Lubricant Capacity (cc)	30
Max. Input Shaft ØC3 (mm)	Ø8
Set Collar Bolt Torque (Nm)	4.8
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	1830
Max. Axial Output Load (N)*	915
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

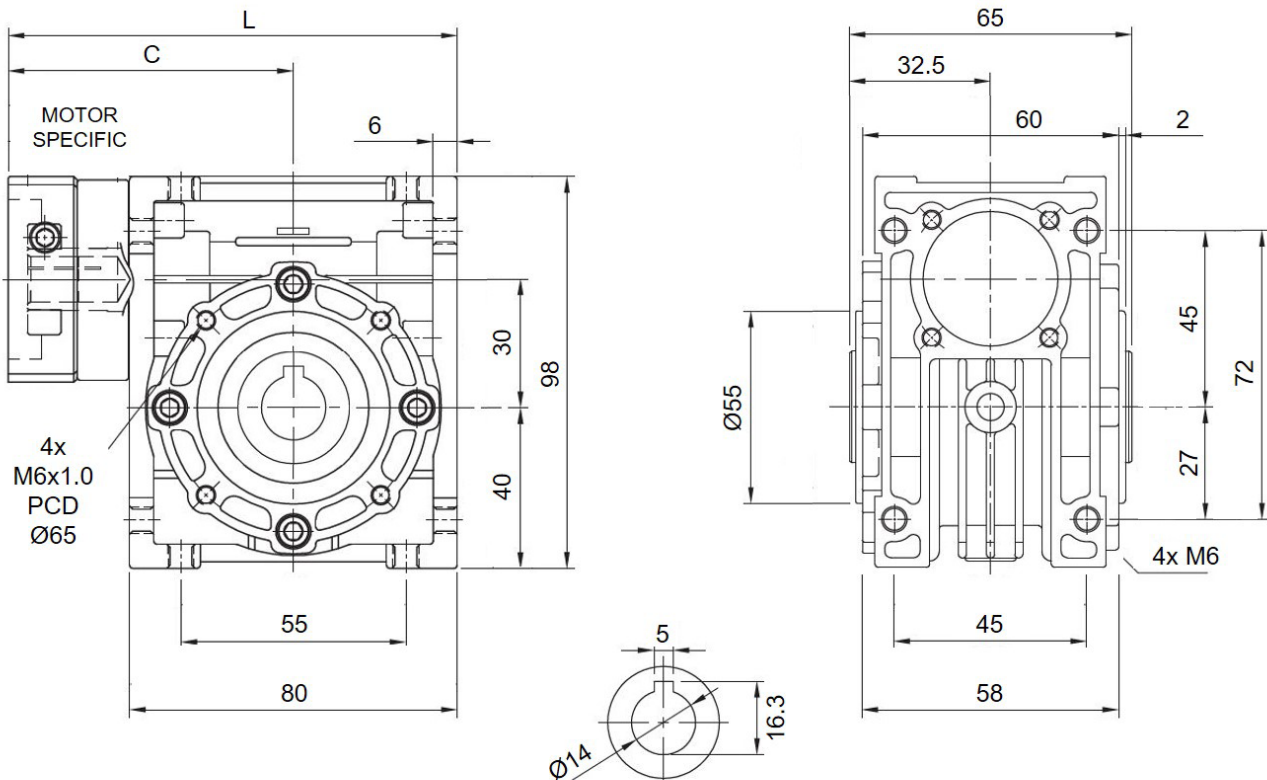
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WEO 30

Precision Worm Gearbox – Hollow Output



	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	8	16	90.3
	10:1	8	16	83.7
	15:1	11	22	81.9
	20:1	9	18	72.3
	30:1	12	24	69.6
	40:1	9	18	56.8
	50:1	10	20	58.7
	60:1	9	18	54.6

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	108
Dimension C Min. (mm)	68
Lubricant Capacity (cc)	30
Max. Input Shaft ØC3 (mm)	Ø8
Set Collar Bolt Torque (Nm)	4.8
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	1830
Max. Axial Output Load (N)*	915
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

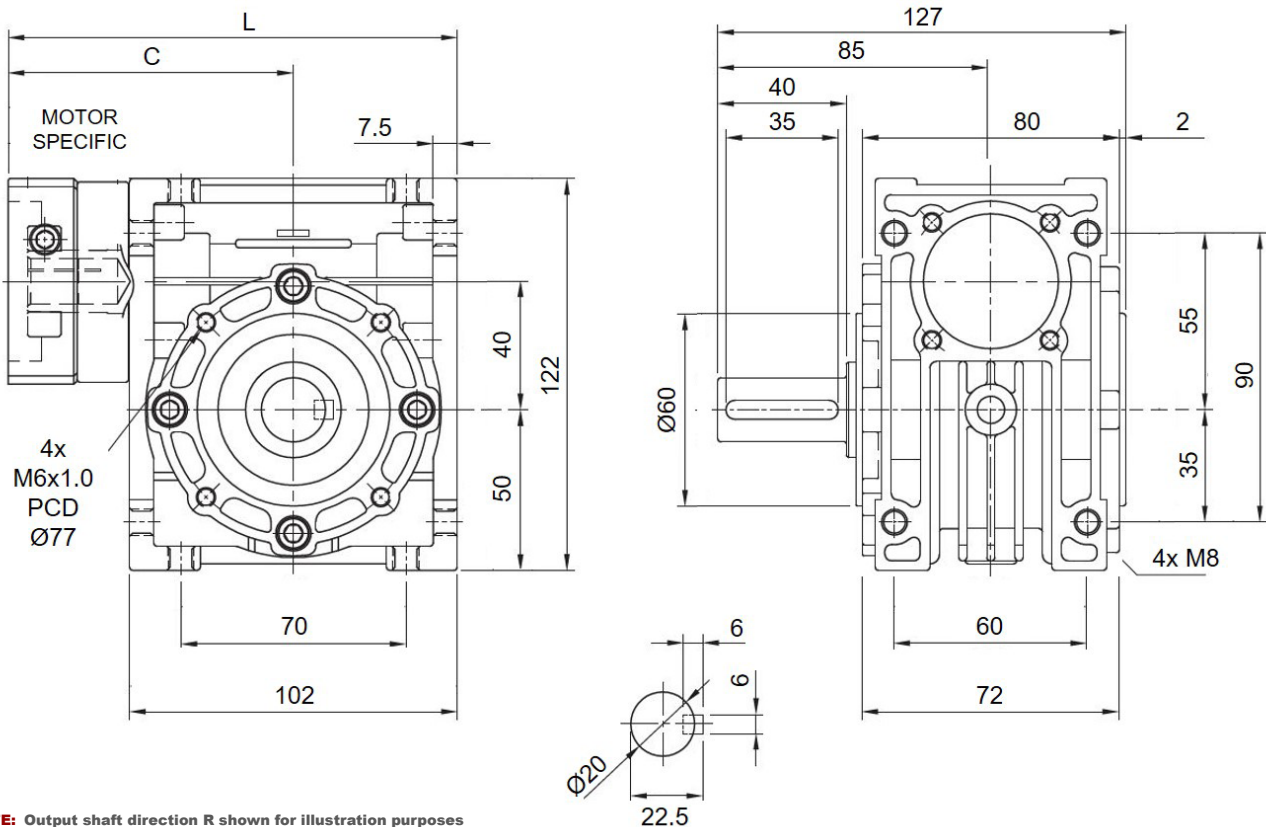
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WES 40

Precision Worm Gearbox – Shaft Output



NOTE: Output shaft direction R shown for illustration purposes

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	22	44	92.3
	10:1	20	40	86.6
	15:1	26	52	83.7
	20:1	22	44	76.6
	30:1	27	54	72.3
	40:1	24	48	66.3
	50:1	24	48	64.6
	60:1	20	40	56.8

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	140
Dimension C Min. (mm)	89
Lubricant Capacity (cc)	70
Max. Input Shaft ØC3 (mm)	Ø14
Set Collar Bolt Torque (Nm)	4.8
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	3490
Max. Axial Output Load (N)*	1745
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

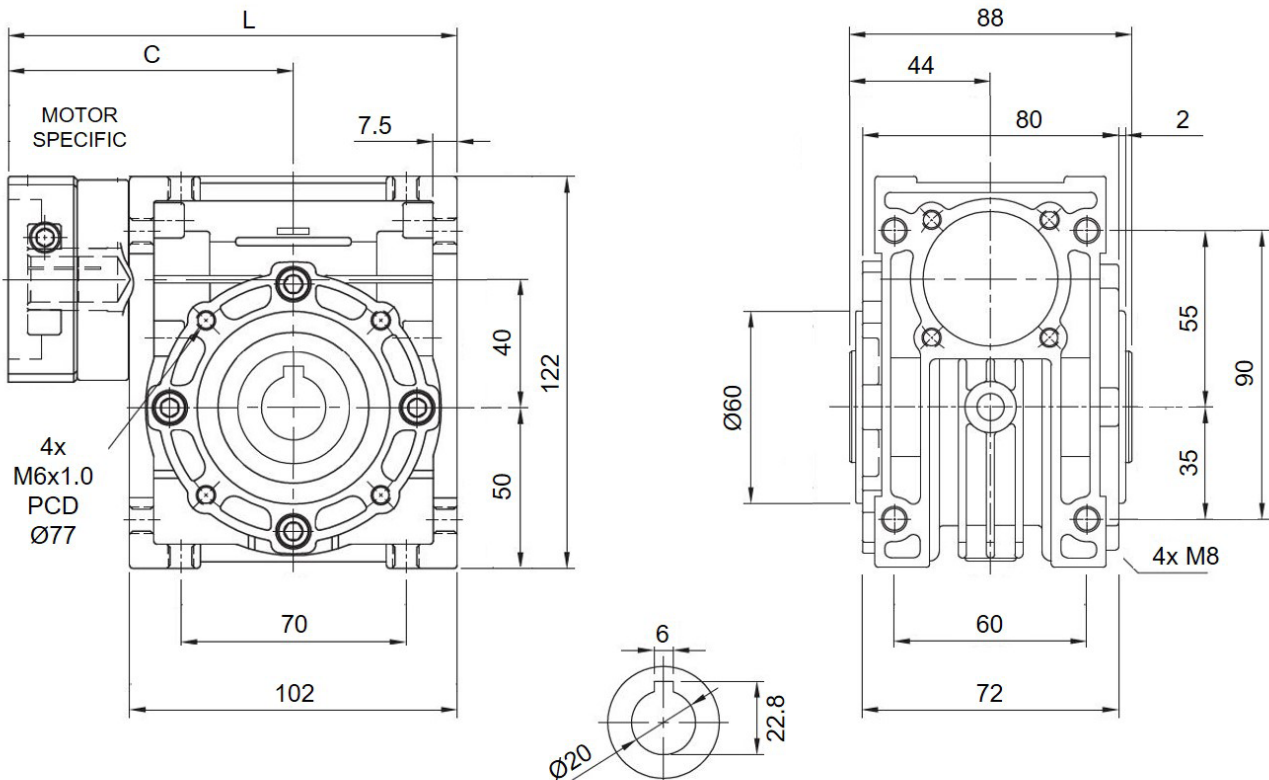
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WEO 40

Precision Worm Gearbox – Hollow Output



	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	22	44	92.3
	10:1	20	40	86.6
	15:1	26	52	83.7
	20:1	22	44	76.6
	30:1	27	54	72.3
	40:1	24	48	66.3
	50:1	24	48	64.6
	60:1	20	40	56.8

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	140
Dimension C Min. (mm)	89
Lubricant Capacity (cc)	70
Max. Input Shaft ØC3 (mm)	Ø14
Set Collar Bolt Torque (Nm)	4.8
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	3490
Max. Axial Output Load (N)*	1745
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

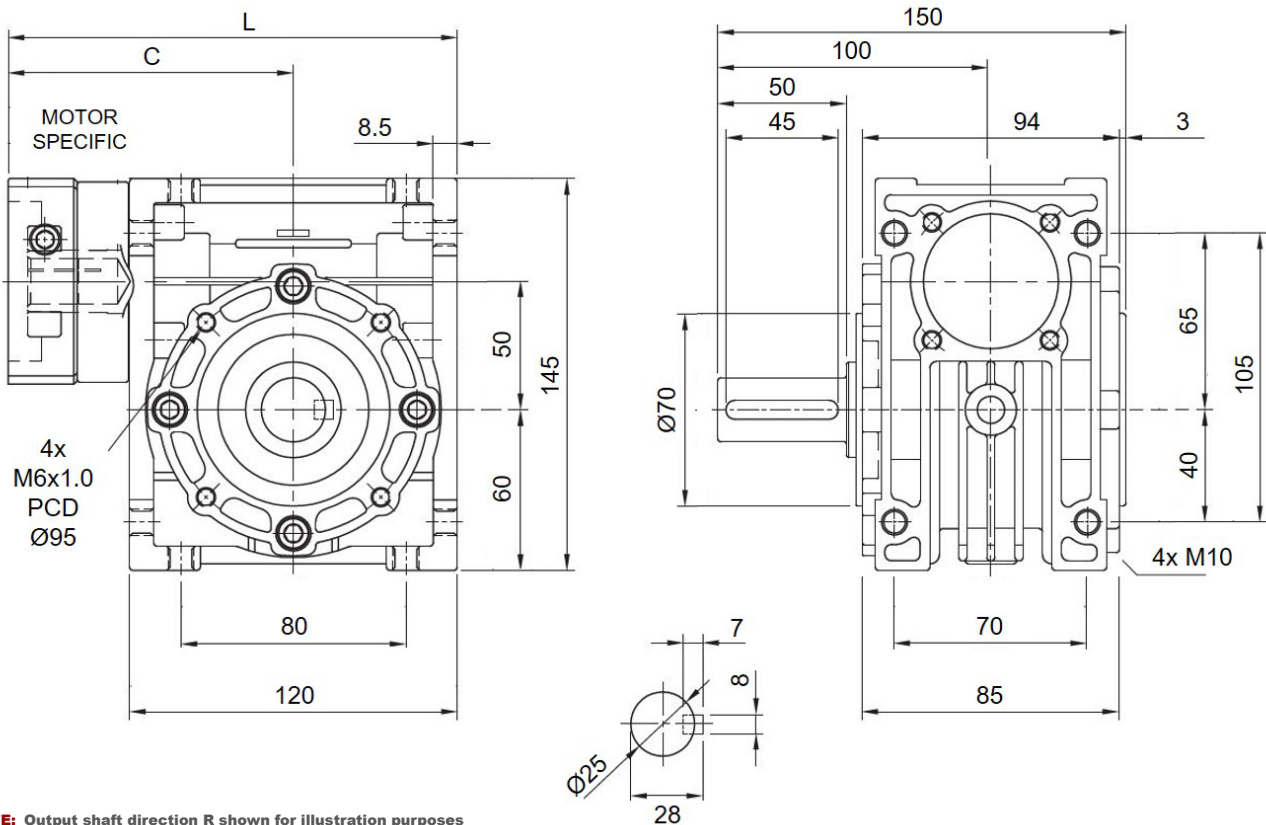
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WES 50

Precision Worm Gearbox – Shaft Output



NOTE: Output shaft direction R shown for illustration purposes

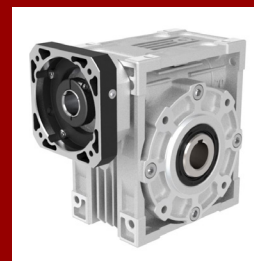
NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	30	60	92.6
	10:1	41	82	89.6
	15:1	40	80	85.3
	20:1	40	80	81.7
	30:1	43	86	74.5
	40:1	43	86	69.2
	50:1	43	86	67.7
	60:1	36	72	59.3

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	158
Dimension C Min. (mm)	98
Lubricant Capacity (cc)	140
Max. Input Shaft ØC3 (mm)	Ø19
Set Collar Bolt Torque (Nm)	10
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	4840
Max. Axial Output Load (N)*	2420
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

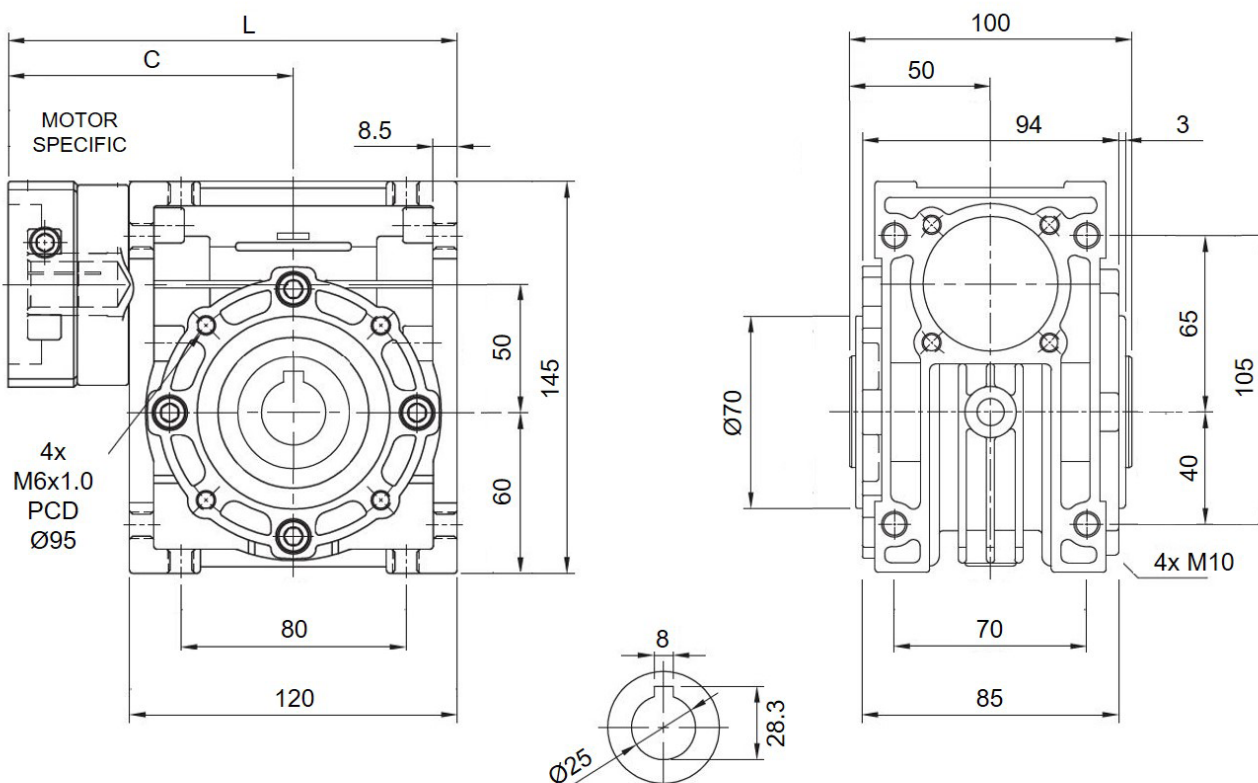
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WEO 50

Precision Worm Gearbox – Hollow Output



	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	30	60	92.6
	10:1	41	82	89.6
	15:1	40	80	85.3
	20:1	40	80	81.7
	30:1	43	86	74.5
	40:1	43	86	69.2
	50:1	43	86	67.7
	60:1	36	72	59.3

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	158
Dimension C Min. (mm)	98
Lubricant Capacity (cc)	140
Max. Input Shaft ØC3 (mm)	Ø19
Set Collar Bolt Torque (Nm)	10
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	4840
Max. Axial Output Load (N)*	2420
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

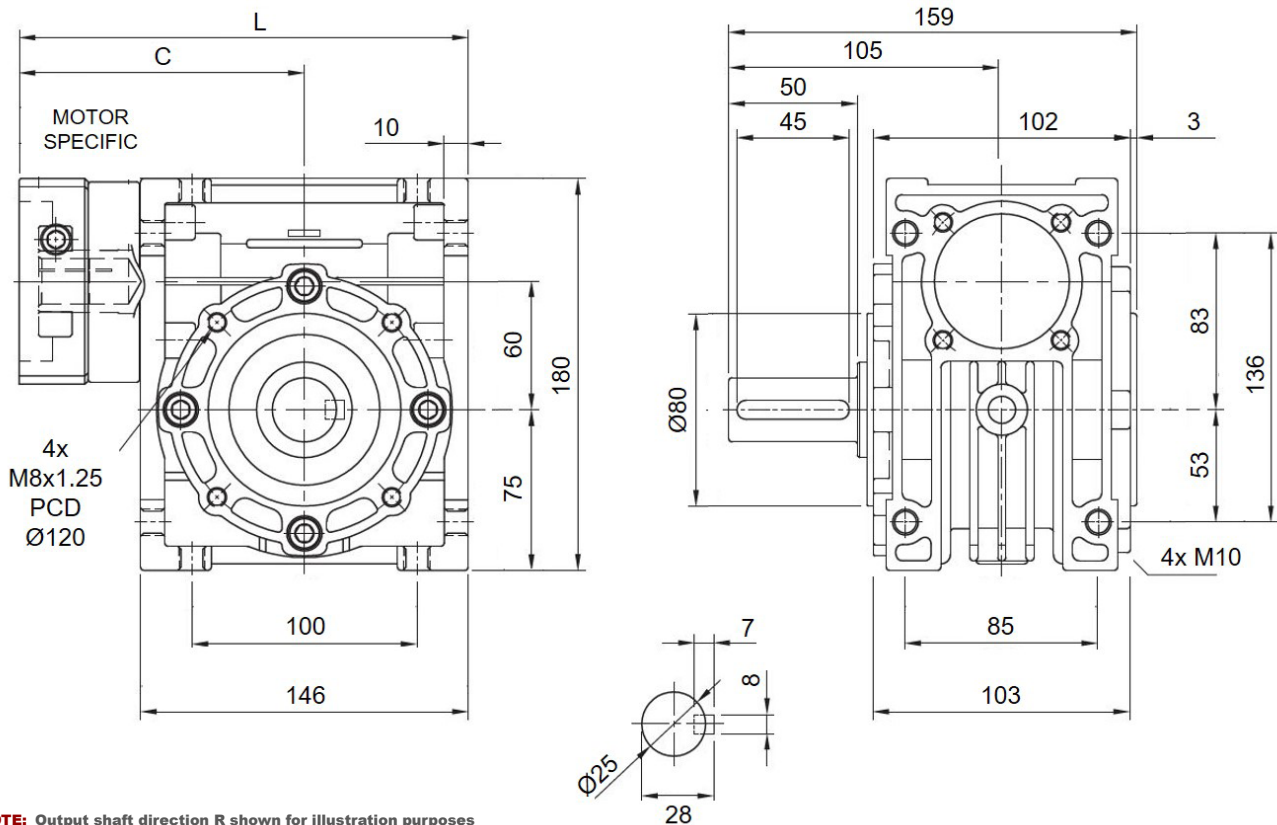
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WES 60

Precision Worm Gearbox – Shaft Output



NOTE: Output shaft direction R shown for illustration purposes

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	41	82	92.6
	10:1	66	132	90.1
	15:1	64	128	86.1
	20:1	63	126	82.4
	30:1	67	134	75.9
	40:1	69	138	70.3
	50:1	69	138	68.9
	60:1	58	116	61.3

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	195
Dimension C Min. (mm)	122
Lubricant Capacity (cc)	260
Max. Input Shaft ØC3 (mm)	Ø24
Set Collar Bolt Torque (Nm)	16.3
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	6270
Max. Axial Output Load (N)*	3135
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

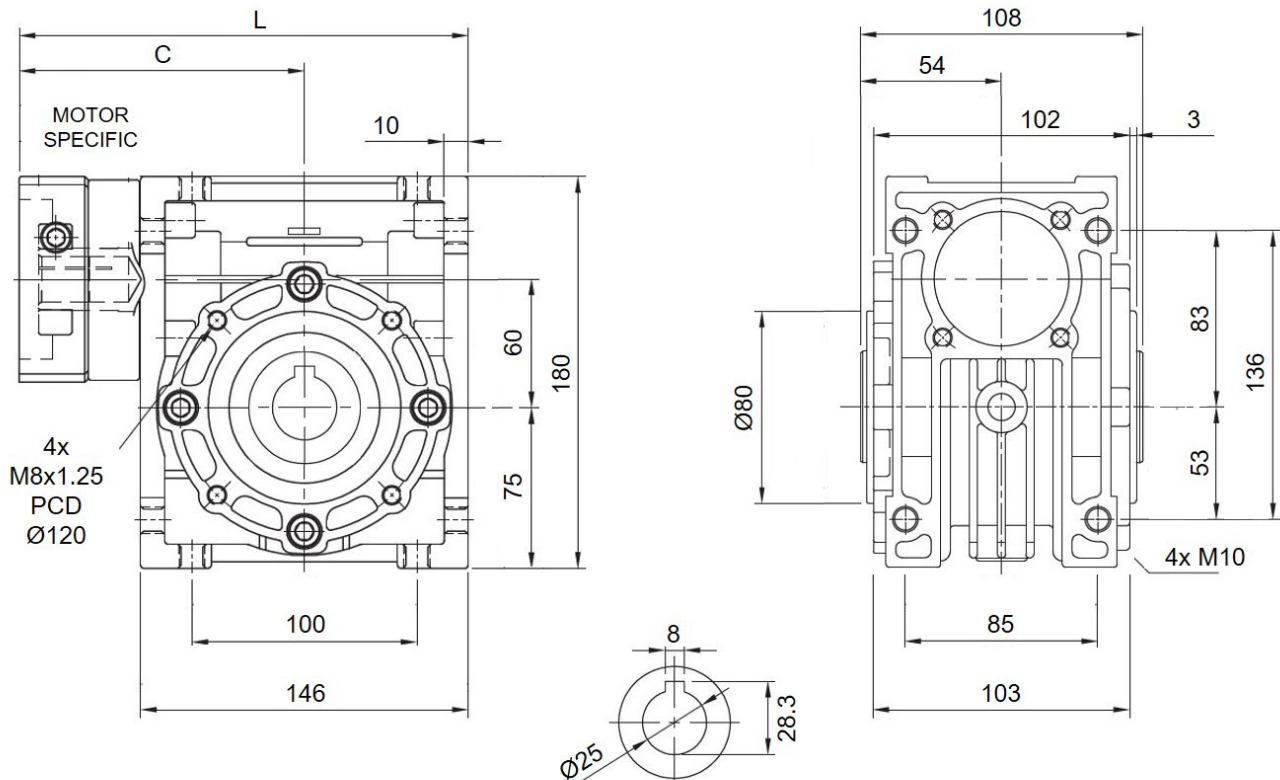
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WEO 60

Precision Worm Gearbox – Hollow Output



	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	41	82	92.6
	10:1	66	132	90.1
	15:1	64	128	86.1
	20:1	63	126	82.4
	30:1	67	134	75.9
	40:1	69	138	70.3
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Design Parameter	Stage vs Value
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Max. Radial Output Load (N)*	6270
Max. Axial Output Load (N)*	3135
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

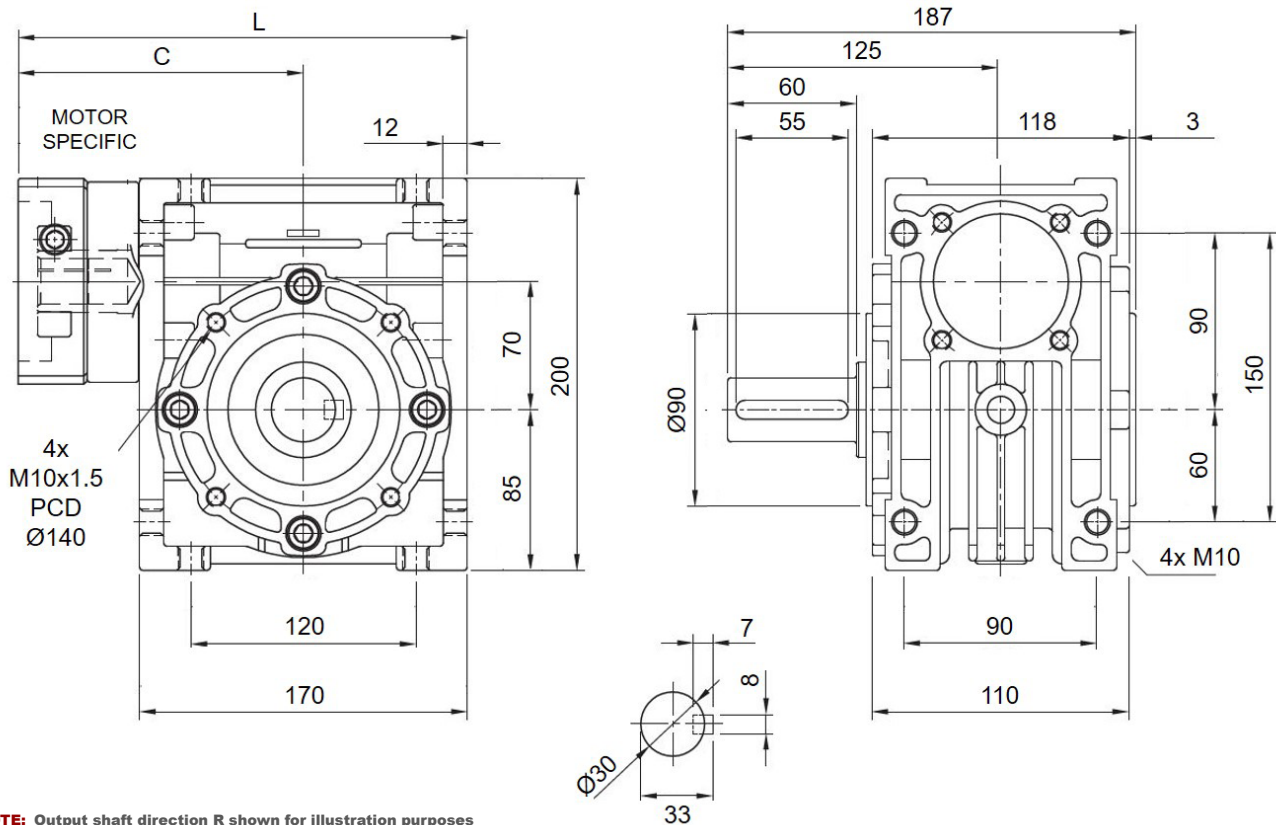
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WES 70

Precision Worm Gearbox – Shaft Output



NOTE: Output shaft direction R shown for illustration purposes

NOTE: Output shaft available without keyway as an option

	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	70	140	93.6
	10:1	92	184	90.5
	15:1	90	180	86.6
	20:1	106	212	85.1
	30:1	95	190	76.7
	40:1	111	222	74.3
	50:1	105	210	71.2
	60:1	100	200	68.8

Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	219
Dimension C Min. (mm)	134
Lubricant Capacity (cc)	360
Max. Input Shaft ØC3 (mm)	Ø24
Set Collar Bolt Torque (Nm)	16.3
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	7380
Max. Axial Output Load (N)*	3690
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

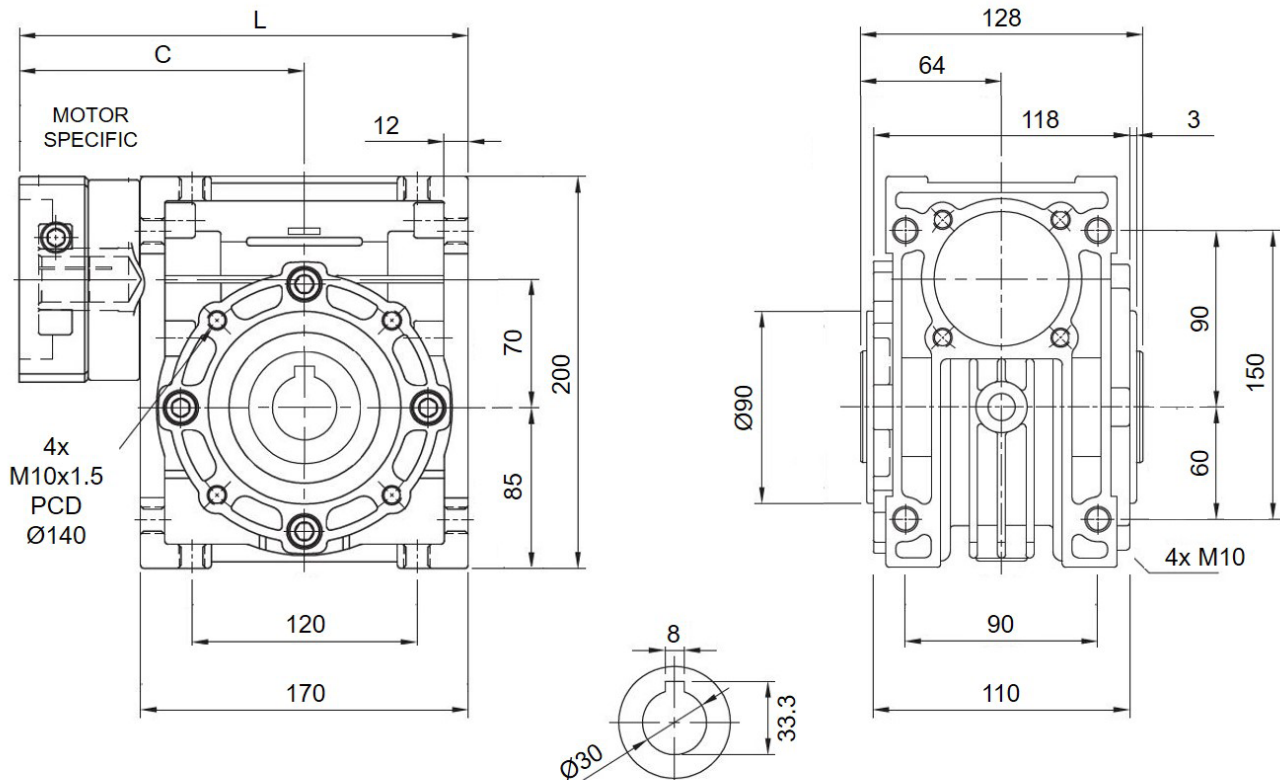
* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS



ServoBox – WEO 70

Precision Worm Gearbox – Hollow Output

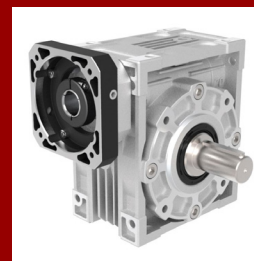


	Stage / Ratio	Nom. Output Torque (Nm)	Max. Acceleration & E-Stop Torque (Nm)	Power Transmission Efficiency (%)
Single Stage (1)	5:1	70	140	93.6
	10:1	92	184	90.5
	15:1	90	180	86.6
	20:1	106	212	85.1
	30:1	95	190	76.7
	40:1	111	222	74.3
	50:1	105	210	71.2
	60:1	100	200	68.8

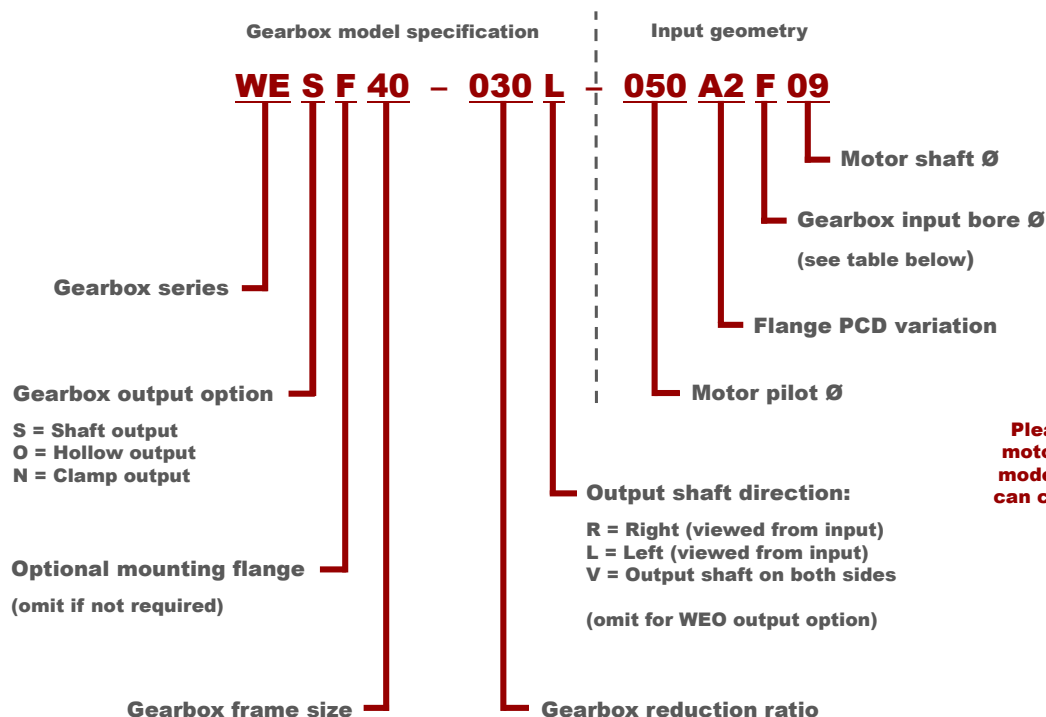
Design Parameter	Stage vs Value
	Single
Dimension L Min. (mm)	219
Dimension C Min. (mm)	134
Lubricant Capacity (cc)	360
Max. Input Shaft ØC3 (mm)	Ø24
Set Collar Bolt Torque (Nm)	16.3
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	3000
Torsional Backlash (arcmin)	≤ 8
Max. Radial Output Load (N)*	7380
Max. Axial Output Load (N)*	3690
Operating Temp Range (°C)	- 15 / + 45
Protection Rating (IP)	IP65

* Applied at output shaft centre @ 100 rpm output

WORM GEARBOXES ARE SUPPLIED PRE-LUBRICATED WITH SYNTHETIC GREASE BUT LIFE CAN BE EXTENDED BY RE-LUBRICATING AFTER 100 HOURS THEN EVERY 2000 HOURS

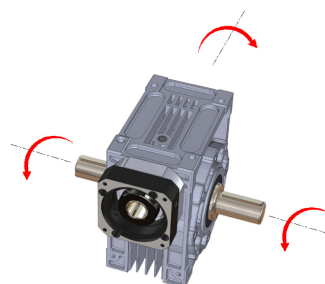
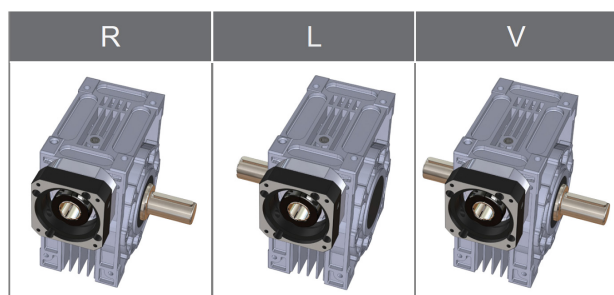


WE Series – Order Codes



Example Ordering Code:
WE050-020-050A1F14

WE Series		Gearbox Clamping Hub Bore Order Code vs Available Sizes			
Frame	Stage	B	F	G	J
		8	14	19	24
30	1	X			
40	1		X		
50	1			X	
60	1				X
70	1				X

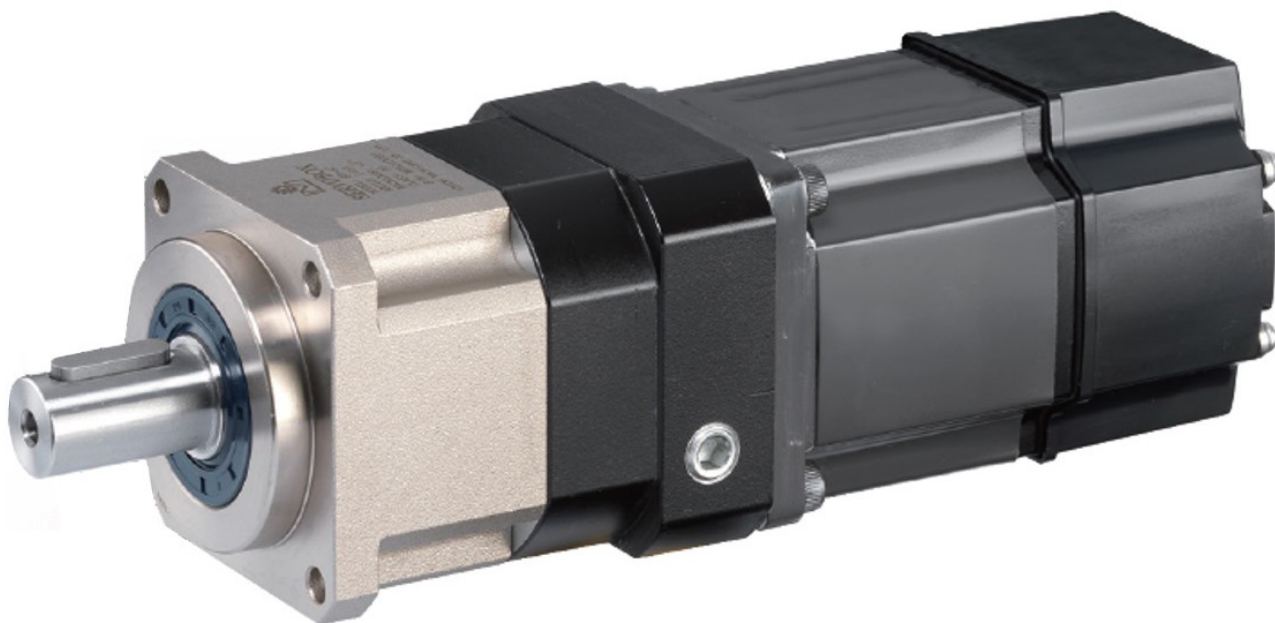


FOR MOTOR SHAFT DIAMETERS NOT LISTED, GEARBOXES WILL BE SUPPLIED WITH A BUSH TO SUIT.
DEPENDING ON STOCK, STANDARD BORE SIZES MAY BE SUPPLIED AS A LARGER BORE WITH A BUSH



ServoBox – Configuration

Motor Adapters & Bushings



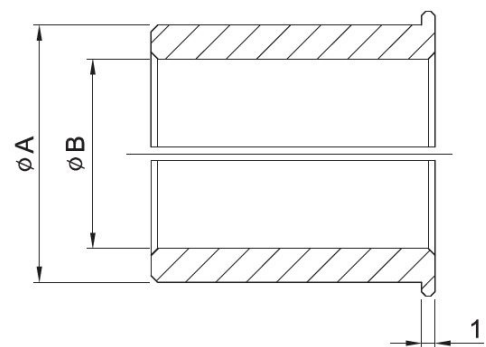
GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH SYNTHETIC GREASE
AND ARE ALSO DELIVERED WITH INDIVIDUAL TEST REPORTS AS STANDARD



Frame Sizes & Bushes

Adapter Frame	Single								Double								Double A			Triple		Triple A	
	SB	SD	SE	SF	PB	SN	GT	WE	SB	SD	SE	SF	PB	SN	GT		SB	SE	SF	SB	SE	SB	SE
044	044	047	044	-	044	050 060	060 085	030	062	064	062	062	062	050 060	060 085		044	044	-	090	090	062	062
062	062	064	062	062	062	070 080	110 135	040 050	090	090	090	075	090	070 080	110 135		062	062	062	120	120	090	090
090	090	090	090	075	090	115	200	060 070	120	110	120	100	120	115	200		090	090	075	142	142	120	120
120	120	110	120	100	120	160	-	-	142	140	142	142	142	160	-		120	120	100	180	180	142	142
142	142	140	142	142	142	-	250	-	180	200	180	180	180	-	-		142	142	142	220	220	180	180
180	180	200	180	180	180	-	-	-	220	255	220	-	220	-	-		180	180	180	-	-	220	220
220	220	255	220	-	220	-	-	-	270	-	270	-	270	-	-		220	220	-	-	-	-	-
270	270	-	270	-	-	-	-	-	330	-	330	-	-	-	-		270	270	-	-	-	-	-
330	330	-	330	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-

Bore Ø B	Bush Diameter Ø A											
	8	11	14	19	22	24	28	32	35	38	42	48
5	X											
5.65		X										
6	X	X	X									
6.35	X		X									
8		X	X									
9		X	X									
9.52				X								
10			X	X								
11			X	X								
12			X	X								
12.7			X	X								
14				X		X						
15.85				X								
16				X		X	X					
19					X	X	X					
22						X	X	X	X			
22.22										X		
24							X		X			
25							X					
28								X	X		X	
32									X	X		
35										X	X	
38											X	
42												X

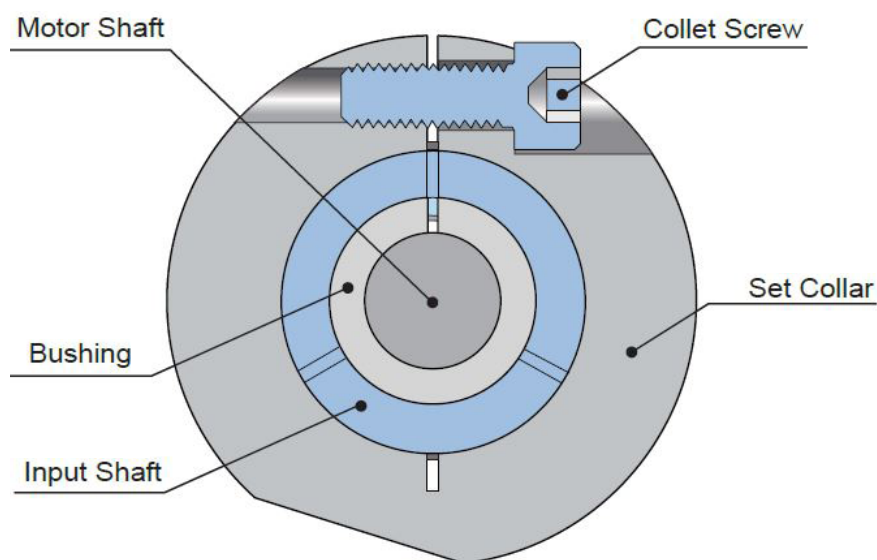


REFER TO THE ADAPTER FRAME SIZE WHEN SELECTING MOTOR ADAPTERS
EACH GEARBOX FRAME SIZE USES A DIFFERENT LENGTH BUSH



Clamp Collet Data

Gearbox Model (Based On Single Stage)								Collet Screw (12.9 Grade)	Tightening Torque (Nm)	Collet Slip Torque (Nm)	Keyed Input Bore ?
SB	SD	SE	SF	PB	SN	GT	WE				
044	044	044	-	044	050 060	060 085	030 040	M4 x 0.7	4.8	87	No
062	062	062	062	062	070 080	110	050	M5 x 0.8	10	164	No
090	090 120	090	075	090	115	135	060 070	M6 x 1.0	16.3	233	No
120	142	120	110	120	160	200	-	M8 x 1.25	41	423	No
142	180	142	142	142	-	-	-	M10 x 1.5	81	678	No
180 220	-	180 220	180	180 220	-	-	-	M10 x 1.5	81	678	Yes
270 330	-	270 330	-	-	-	-	-	M12 x 1.75	110	813	Yes



Input Bore Ø	Keyway Size
38	10 x 8
42	12 x 8
48	14 x 9
55	16 x 10
60	18 x 11
75	20 x 12

PLEASE ENSURE THE MOTOR SHAFT AND GEARBOX CLAMP COLLET BORE ARE CLEAN AND FREE FROM GREASE TO PREVENT SLIPPAGE



ServoBox – Motor Flanges

Frame	Pilot Ø	PCD	Mount Bolt	Flange Square	Note	Flange Code
044	30	45	M3	46		7MP-044A-030-A2
	30	46	M4	46		7MP-044A-030-A1
	30	48.5	M3	55		7MP-044A-030-A3
	38.15	66.67	M4	55	NEMA 23	7MP-044A-038-A1
	40	63	M4	55		7MP-044A-040-A2
	40	63	M5	55		7MP-044A-040-A1
	50	60	M4	55		7MP-044A-050-A1
	50	70	M4	60		7MP-044A-050-A3
	50	70	M5	60		7MP-044A-050-A2
	55	70	M5	60		7MP-044A-055-A1
	60	75	M5	70		7MP-044A-060-A1
062	70	90	M5	76		7MP-044A-070-A1
	30	45	M3	64		7MP-062A-030-A3
	30	46	M3	64		7MP-062A-030-A2
	30	46	M4	64		7MP-062A-030-A1
	38.15	66.67	M4	64	NEMA 23	7MP-062A-038-A1
	38.5	66.67	M4	64		7MP-062A-039-A1
	40	63	M5	64		7MP-062A-040-A1
	50	70	M4	64		7MP-062A-050-A2
	50	70	M5	64		7MP-062A-050-A1
	50	70	M5	64	THIN	7MP-062A-050-A3
	50	70	M5	64	THICK	7MP-062A-050-A5
	50	95	M6	82		7MP-062A-050-A4
	60	75	M5	70		7MP-062A-060-A2
	60	75	M6	70		7MP-062A-060-A1
	70	85	M6	80		7MP-062A-070-A1
	70	85	M6	80	THICK	7MP-062A-070-A4
	70	90	M5	80		7MP-062A-070-A3
	70	90	M6	80		7MP-062A-070-A2
	70	90	M6	80	THICK	7MP-062A-070-A5
	73	97.86	M5	80		7MP-062A-073-A1
	73	98.43	M5	80	NEMA 34	7MP-062A-073-A2
	80	100	M6	90	IEC 56 B5	7MP-062A-080-A1
	80	103	M6	90		7MP-062A-080-A2
	80	103	M6	90	THICK	7MP-062A-080-A3
		104	M8	90		7MP-062A-083-A2
	93.95	120	M8	110		7MP-062A-094-A1
090	50	70	M4	92		7MP-090A-050-A2
	50	70	M5	92		7MP-090A-050-A1
	50	95	M6	92		7MP-090A-050-A3
	55.5	125.6	M6	110	NEMA 42	7MP-090A-056-A1
	60	75	M5	92		7MP-090A-060-A1
	70	90	M4	92		7MP-090A-070-A3
	70	90	M5	92		7MP-090A-070-A2
	70	90	M6	92		7MP-090A-070-A1
	70	100	M6	92		7MP-090A-070-A4
	73	98.43	M5	92	NEMA 34	7MP-090A-073-A1
	80	100	M5	92		7MP-090A-080-A2
	80	100	M6	92	IEC 56 B5	7MP-090A-080-A1
	80	100	M6	92	THICK	7MP-090A-080-A3
	83	104	M6	92		7MP-090A-083-A1
	85	132	M8	130		7MP-090A-085-A2
	85	145	M8	130		7MP-090A-085-A1
	95	115	M6	110		7MP-090A-095-A1
	95	115	M6	110	THICK	7MP-090A-095-A5



ServoBox – Motor Flanges

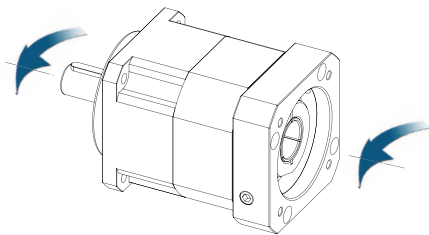
Frame	Pilot Ø	PCD	Mount Bolt	Flange Square	Note	Flange Code
090	95	115	M8	110	IEC 63 B5	7MP-090A-095-A2
	95	115	M8	110	THICK	7MP-090A-095-A6
	95	120	M8	110		7MP-090A-095-A4
	95	130	M8	110		7MP-090A-095-A3
	110	130	M8	130	IEC 71 B5	7MP-090A-110-A3
	110	130	M8	130	THICK	7MP-090A-110-A4
	110	145	M8	130		7MP-090A-110-A1
	110	145	M8	130	THICK	7MP-090A-110-A2
120	130	165	M10	142	IEC 80 90 B5	7MP-090A-130-A1
	56	124	M8	122		7MP-120A-056-A1
	70	90	M6	122		7MP-120A-070-A1
	80	100	M6	122	IEC 56 B5	7MP-120A-080-A1
	95	115	M6	122		7MP-120A-095-A1
	95	115	M8	122	IEC 63 B5	7MP-120A-095-A2
	95	130	M8	122		7MP-120A-095-A3
	110	130	M8	130	IEC 71 B5	7MP-120A-110-A3
	110	145	M8	130		7MP-120A-110-A1
	110	145	M8	130	THICK	7MP-120A-110-A2
	110	145	M10	130		7MP-120A-110-A4
	110	165	M10	150		7MP-120A-110-A5
	114.3	160	M10	135		7MP-120A-114-A1
	114.3	200	M12	180		7MP-120A-114-A2
	130	165	M10	150	IEC 80 90 B5	7MP-120A-130-A1
	130	174	M10	150		7MP-120A-130-A2
	150	185	M10	174		7MP-120A-150-A1
	180	215	M12	180	IEC 100 112 B5	7MP-120A-180-A1
142	95	115	M8	146	IEC 63 B5	7MP-142A-095-A1
	110	130	M8	146	IEC 71 B5	7MP-142A-110-A2
	110	145	M8	146		7MP-142A-110-A1
	114.3	200	M12	180		7MP-142A-114-A1
	114.3	215	M12	180		7MP-142A-114-A2
	114.3	235	M12	220		7MP-142A-114-A3
	130	165	M10	150	IEC 80 90 B5	7MP-142A-130-A1
	130	175	M10	150		7MP-142A-130-A2
	130	215	M12	190		7MP-142A-130-A3
	150	185	M10	150		7MP-142A-150-A1
	180	215	M12	180	IEC 100 112 B5	7MP-142A-180-A1
180	200	235	M12	200		7MP-142A-200-A1
	114.3	200	M12	182		7MP-180A-114-A1
	114.3	215	M12	200		7MP-180A-114-A2
	180	215	M12	200	IEC 100 112 B5	7MP-180A-180-A1
	200	235	M12	220		7MP-180A-200-A1
	230	265	M12	250	IEC 132 B5	7MP-180A-230-A1
	230	300	M14	265		7MP-180A-230-A2
220	250	300	M16	265	IEC 160 180 B5	7MP-180A-250-A1
	114.3	200	M12	222		7MP-220A-114-A1
	180	215	M12	220	IEC 100 112 B5	7MP-220A-180-A1
	200	235	M12	220		7MP-220A-200-A1
	230	265	M12	250	IEC 132 B5	7MP-220A-230-A1
	230	300	M14	265		7MP-220A-230-A2
	250	300	M16	265	IEC 160 180 B5	7MP-220A-250-A1
	280	325	M18	300		7MP-220A-280-A1
	300	350	M16	314	IEC 200 B5	7MP-220A-300-A1

STANDARD RANGE OF FLANGES SHOWN IN TABLES ABOVE AND LEFT
FOR ANY MOTOR DIMENSIONS NOT LISTED, PLEASE CONTACT US

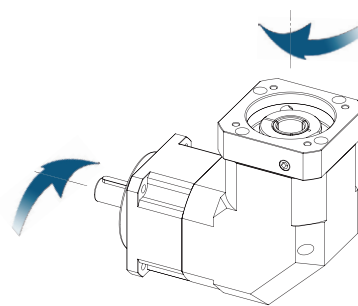


Rotation Directions

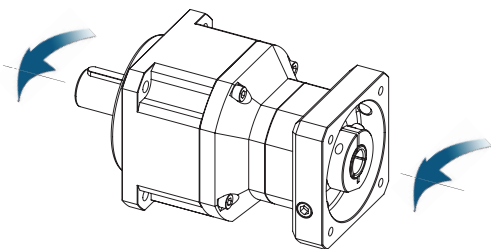
1-Stage Planetary Reducer



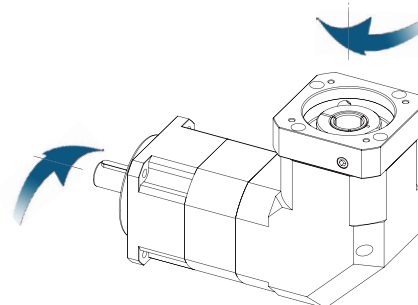
1-Stage Spiral Bevel Gear & Planetary Reducer



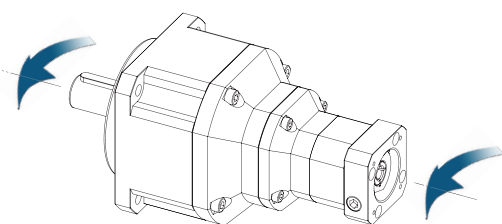
2-Stage Planetary Reducer



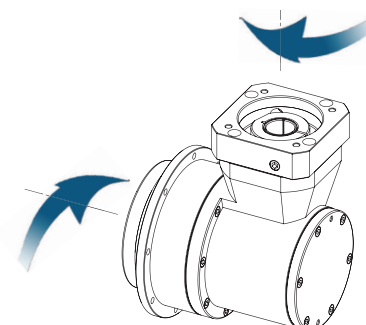
2-Stage Spiral Bevel Gear & Planetary Reducer



3-Stage Planetary Reducer

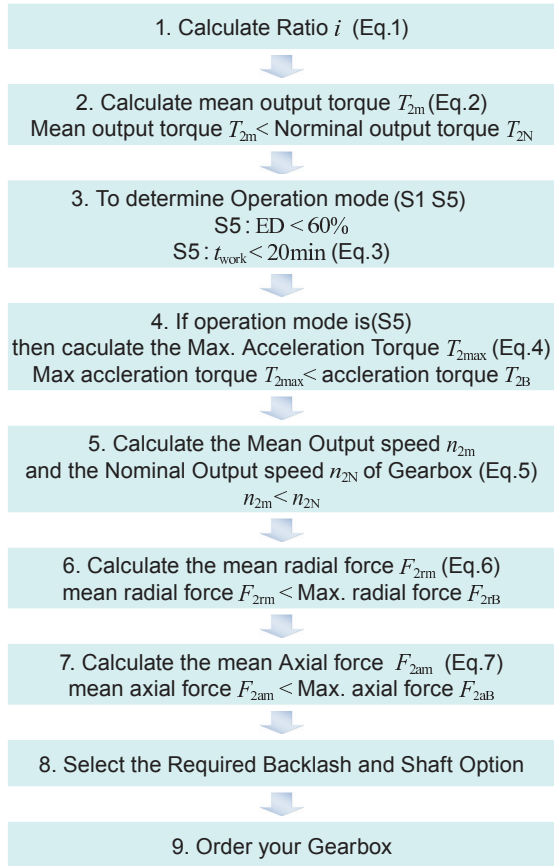


1-Stage Hypoid Gear & Planetary Reducer





ServoBox – Selection



Recommended (for S5 Cyclic Operation)

The general design is given for

$$\frac{J_L}{i^2} \leq 4 \cdot J_m$$

CONTINUOUS
RUNNING REDUCES
SERVICE LIFE BY 50%

The optimal design is given for

$$\frac{J_L}{i^2} \cong J_m$$

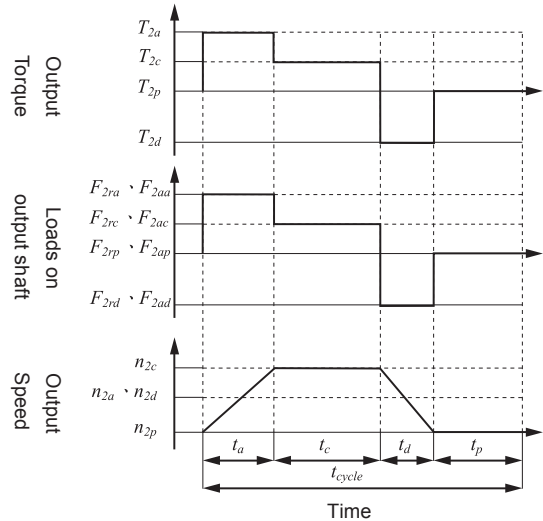
Where J_L is Load Inertia and J_m is Motor Inertia.

T_{2N} please reference catalog 「Rated Output Torque」

F_{2rB} please reference catalog 「Max. Radial Force」

$$\text{Eq.1} \quad i \cong \frac{n_m}{n_{\text{work}}}$$

n_m is output speed of the motor, n_{work} is working speed



$$\text{Eq.2} \quad T_{2m} = \sqrt[3]{\frac{n_{2a} \cdot t_a \cdot T_{2a}^3 + n_{2c} \cdot t_c \cdot T_{2c}^3 + n_{2d} \cdot t_d \cdot T_{2d}^3}{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}}$$

$$\text{Eq.3} \quad ED = \frac{t_a + t_c + t_d}{t_{\text{cycle}}}, t_{\text{work}} = t_a + t_c + t_d$$

t_a is the time for acceleration, t_c is constant travel,
 t_d is the time for deceleration and t_p is the time for pause.

$$\text{Eq.4} \quad T_{2\text{max}} = T_{mB} \cdot i \cdot k_s \cdot \eta$$

T_{mB} is the Max. output torque of the motor and η is the efficiency of the gearbox

K_s service factor

K_s	No. of Cycles / hr
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

$$\text{Eq.5} \quad n_{2a} = n_{2d} = \frac{n_{2c}}{2}$$

$$n_{2m} = \frac{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}{t_a + t_c + t_d}$$

$$n_{2N} = \frac{n_{1N}}{i}$$

$$\text{Eq.6} \quad F_{2rm} = \sqrt[3]{\frac{n_{2a} \cdot t_a \cdot F_{2ra}^3 + n_{2c} \cdot t_c \cdot F_{2rc}^3 + n_{2d} \cdot t_d \cdot F_{2rd}^3}{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}}$$

$$\text{Eq.7} \quad F_{2am} = \sqrt[3]{\frac{n_{2a} \cdot t_a \cdot F_{2aa}^3 + n_{2c} \cdot t_c \cdot F_{2ac}^3 + n_{2d} \cdot t_d \cdot F_{2ad}^3}{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}}$$



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