

GSA-250

Precision planetary servogearboxes

for general automation

Increase your design's value with GSA gearboxes



High performance on every axis

Due to its high value, GSA gearboxes are the ideal solution for OEMs that require the highest reliability at reasonable prices. Designed for use with servomotors, they are suitable for both continuous and intermittent duty cycles. They are suitable for all types of applications, from general automation to multi-axis machines and robotics.

GSA gearboxes are the natural evolution of the GE-Economy series, and offer notable improvements:

- Longer design life, up to 100000 hours.
- Higher load capacity on the output shaft.
- Thrice the torsional stiffness of GE-250.
- Smoother operation.

Highlights

Ratio	3 a 100
Max. Output Torque	287 Nm
Backlash	from <8' to <12' (arcmin)
Efficiency	up to 97%
Design Life	up to 100000 hours
Max. Radial Load	4500 N
Lifetime lubrication and maintenance-free	
Can be used in any mounting position.	
DIN-6885-1 keyed shaft with DIN-332-2 axial fixing bore	

High reliability

GSA series gearboxes employ high endurance limit steel gears with optimized tooth profiles, that grant them higher reliability even under the most stringent conditions.

High Value

GSA offers high quality at very reasonable prices. It is an ideal match for general automation applications where high precision is not fundamental, but high reliability is.

Effortless Motor Installation

Thanks to its modular design, GSA gearboxes have input flanges for any servo-motor. Motor installation is simple and effortless. Motor shaft connection is assured via a clamping hub with a side screw that offers a more secure fit than conventional alternatives.

Suitable for Rack & Pinion Systems

For linear motion applications, GSA gearboxes are the perfect match for Servotak Rack & Pinion systems, forming a cohesive whole that is greater than the sum of its parts.

GSA-250

The following technical specifications resulted from exhaustive calculations according to DIN, ISO and AGMA norms, years of research and experience, and Servotak's traditional reliability-first approach. This is why our gearboxes can offer a design life of over 40000 hours, twice the market standard, with total confidence.

Ideal for S5 intermittent duty

Instead of offering a single output torque value, and then asking engineers to apply service factors depending on cycles per hour, we present a tabulated list of output torques at most common cycle rate values.

The listed values for S5 intermittent duty assume general purpose applications. Specific duty cycles might allow for higher output torques. Should you think that your specific application's details don't fit our assumptions, please contact our engineers for a through study. We also offer an online tool to calculate the RMS average torque for complex cycles at https://servotak.eu/tools/duty_cycle_calculator.

A word about S1 continuous duty

Over 90% of the commonly available planetary gearboxes are designed for intermittent duty cycles. They are not designed for S1 continuous duty cycles. The reason being that one of the main advantages of planetary gearboxes is their compact design. While this offers great space savings, it also reduces the outer surface needed to radiate heat, and in S1 cycles, this reduces the amount of power they can transmit. Should you require such duty cycles out of a planetary gearbox, there are some things you need to remember:

- Ensure there is good airflow around the gearbox. Transmissible torque can be further increased by using active cooling methods on the gearbox, such as forced cooling.
- The gearbox mounting surface can also act as a heat sink. If possible, ensure it extends around the gearbox, is exposed, and receives good airflow.
- Brushless motors generate considerable amount of heat, and thus further reduce the gearbox's torque transmission capacity. Employ motors with built in cooling fins and cooling fans.
- Grease lubrication is a poor match for S1 cycles, as it does a poor job at cooling gears and bearings. Make sure you request gearboxes with oil lubrication if you intend to use them for continuous duty.
- Tapered roller bearings generate a considerable amount of heat in S1 continuous cycles.
- High input speeds further increase generated heat and thus further reduce torque transmission capacity.
- Specific S1-ready gearbox designs, such as Servotak's GSC and GSD exist.

Our engineers will be more than happy to advise you on the different caveats of gearboxes in S1 cycles.

Technical data for S5 intermittent service

GSA-250-M1 (1 stage)		Ratio			
		3	5	7	10
Max. Acceleration output torque for 40000 hour design life in S5 intermittent duty cycles, T_{2max} (Nm) S5 intermittent duty cycle Duty cycle ED<60%, Cycle duration t_{cycle} <20 min Average cycle speed $\leq n_{1TH}$ Maximum cycle speed $\leq n_{1max}$ As per DIN-3990 and ISO-6336	60 cycles/hour	251	287	246	232
	120 cycles/hour	226	263	212	215
	300 cycles/hour	201	233	197	191
	600 cycles/hour	195	228	192	180
	1500 cycles/hour	187	221	183	172
	3000 cycles/hour	160	213	177	166
	6000 cycles/hour	142	191	164	149
	9000 cycles/hour	139	171	158	137
RMS average torque for 40000 hour design life in a typical S5 duty cycle, T_{2TH} (Nm) S5 intermittent duty cycle Duty cycle ED<60%, Cycle duration t_{cycle} <20 min Average cycle speed n_{1TH} Maximum cycle speed $\leq n_{1max}$ As per DIN-3990 and ISO-6336	60 cycles/hour	126	143	123	116
	120 cycles/hour	113	131	106	108
	300 cycles/hour	100	116	98	96
	600 cycles/hour	97	114	96	90
	1500 cycles/hour	93	110	91	86
	3000 cycles/hour	80	106	89	83
	6000 cycles/hour	71	96	82	74
	9000 cycles/hour	69	85	79	69
12000 cycles/hour	67	80	76	66	
Emergency Stop Torque, T_{2E} (Nm) Up to 1000 times during product lifetime		505	607	607	505
Maximum input speed for S5 intermittent duty cycle operation, n_{1max} (rpm)		4000	4500	4500	4500
Average input speed for S5 intermittent service, n_{1TH} (rpm) Values for 20°C ambient temperature (For higher temperatures, reduce input speed).		2400	2500	2700	2700

Technical data for S1 continuous service

GSA-250-M1 (1 stage)		Ratio			
		3	5	7	10
Maximum start-up torque for S1 continuous duty, T_{2max} (Nm) S1 continuous duty Duty Cycle ED>60% Cycle Duration $t_{cycle}>20$ min Average cycle speed $\leq n_{1TH}$ Maximum cycle speed $\leq n_{1max}$ As per DIN-3990	5000 hours	216	230	221	175
	10000 hours	191	197	179	159
	25000 hours	179	172	159	144
	50000 hours	176	157	146	132
	100000 hours	164	148	141	128
S1 continuous duty output torque, T_{2TH} (Nm) S1 continuous duty Duty Cycle ED>60% Cycle Duration $t_{cycle}>20$ min Average cycle speed n_{1TH} Maximum cycle speed $\leq n_{1max}$ As per DIN-3990	5000 hours	158	139	167	106
	10000 hours	145	120	136	97
	25000 hours	136	104	121	87
	50000 hours	130	95	111	80
	100000 hours	124	92	106	77
Emergency Stop Torque T_{2E} (Nm) up to 1000 times during product lifetime		505	607	607	505
Maximum input speed for S1 continuous duty, n_{1max} (rpm) Only for short periods		2500	2500	2800	2800
Maximum rated input speed for S1 continuous duty, n_{1TH} (rpm) Assumes ambient temperature of 20°C (if >20°C, lower the input speed) This speed can be maintained for the whole cycle		2200	2200	2200	2200

General technical data

GSA-250-M1 (1 stage)		Ratio			
		3	5	7	10
Standard Torsional Backlash $\Delta\phi$ (arcmin)		<8	<8	<8	<10
Torsional Stiffness C (Nm / arcmin)		30	35	32	30
Efficiency η (%)		97%	97%	97%	97%
Inertia (kg·cm ²)		4,55	1,49	0,75	0,36
Inertia due to input shaft ϕ (kg·cm ²)	$\phi 11$ mm	1,58	1,58	1,58	1,58
	$\phi 14$ mm	1,56	1,56	1,56	1,56
	$\phi 19$ mm	2,32	2,32	2,32	2,32
	$\phi 24$ mm	2,64	2,64	2,64	2,64
	$\phi 32$ mm	3,68	3,68	3,68	3,68
Environmental conditions Values outside of this range available upon request		-15°C to 40°C			
Max. allowable housing temperature T (°C)		90°C			
Protection degree		IP 64			
Noise level, Unloaded, at $n_1=3000$ rpm, from a 1m distance		<69 dB(A)			
Lubrication		Lifetime grease lubrication			
Direction of rotation		Same as motor			
Weight (kg)		8			

Technical data for S5 intermittent service

GSA-250-M2 (2 stages)		Ratio							
		15	21	25	30	35	50	70	100
Max. Acceleration output torque for 40000 hour design life in S5 intermittent duty cycles, T_{2max} (Nm) S5 intermittent duty cycle Duty cycle ED<60%, Cycle duration $t_{cycle}<20$ min Average cycle speed $\leq n_{1TH}$ Maximum cycle speed $\leq n_{1max}$ As per DIN-3990 and ISO-6336	60 cycles/hour	251	251	287	251	287	287	246	232
	120 cycles/hour	226	226	263	226	263	263	212	215
	300 cycles/hour	201	201	233	201	233	233	197	191
	600 cycles/hour	195	195	228	195	228	228	192	180
	1500 cycles/hour	187	187	221	187	221	221	183	172
	3000 cycles/hour	160	160	213	160	213	213	177	166
	6000 cycles/hour	142	142	191	142	191	191	164	149
	9000 cycles/hour	139	139	171	139	171	171	158	137
	12000 cycles/hour	134	134	160	134	160	160	153	134
RMS average torque for 40000 hour design life in a typical S5 duty cycle, T_{2TH} (Nm) S5 intermittent duty cycle Duty cycle ED<60%, Cycle duration $t_{cycle}<20$ min Average cycle speed n_{1TH} Maximum cycle speed $\leq n_{1max}$ As per DIN-3990 and ISO-6336	60 cycles/hour	126	126	143	126	143	143	123	116
	120 cycles/hour	113	113	131	113	131	131	106	108
	300 cycles/hour	100	100	116	100	116	116	98	96
	600 cycles/hour	97	97	114	97	114	114	96	90
	1500 cycles/hour	93	93	110	93	110	110	91	86
	3000 cycles/hour	80	80	106	80	106	106	89	83
	6000 cycles/hour	71	71	96	71	96	96	82	74
	9000 cycles/hour	69	69	85	69	85	85	79	69
	12000 cycles/hour	67	67	80	67	80	80	76	66
Emergency Stop Torque, T_{2E} (Nm) Up to 1000 times during product lifetime		505	505	607	505	607	607	607	505
Maximum input speed for S5 intermittent duty cycle operation, n_{1max} (rpm)		4000	4000	4500	4000	4500	4500	4500	4500
Average input speed for S5 intermittent service, n_{1TH} (rpm) Values for 20°C ambient temperature (For higher temperatures, reduce input speed).		2400	2400	2500	2400	2500	2500	2700	2700

Technical data for S1 continuous service

GSA-250-M2 (2 stages)		Ratio							
		15	21	25	30	35	50	70	100
Maximum start-up torque for S1 continuous duty, T_{2max} (Nm) S1 continuous duty Duty Cycle ED>60% Cycle Duration $t_{cycle}>20$ min Average cycle speed $\leq n_{1TH}$ Maximum cycle speed $\leq n_{1max}$ As per DIN-3990	5000 hours	216	216	230	216	230	230	221	175
	10000 hours	191	191	197	191	197	197	179	159
	25000 hours	179	179	172	179	172	172	159	144
	50000 hours	176	176	157	176	157	157	146	132
	100000 hours	164	164	148	164	148	148	141	128
S1 continuous duty output torque, T_{2TH} (Nm) S1 continuous duty Duty Cycle ED>60% Cycle Duration $t_{cycle}>20$ min Average cycle speed n_{1TH} Maximum cycle speed $\leq n_{1max}$ As per DIN-3990	5000 hours	158	158	139	158	139	139	167	106
	10000 hours	145	145	120	145	120	120	136	97
	25000 hours	136	136	104	136	104	104	121	87
	50000 hours	130	130	95	130	95	95	111	80
	100000 hours	124	124	92	124	92	92	106	77
Emergency Stop Torque T_{2E} (Nm) up to 1000 times during product lifetime		505	505	607	505	607	607	607	505
Maximum input speed for S1 continuous duty, n_{1max} (rpm) Only for short periods		2500	2500	2500	2500	2500	2500	2800	2800
Maximum rated input speed for S1 continuous duty, n_{1TH} (rpm) Assumes ambient temperature of 20°C (if >20°C, lower the input speed) This speed can be maintained for the whole cycle		2200	2200	2200	2200	2200	2200	2200	2200

General technical data

GSA-250-M2 (2 stages)		Ratio							
		15	21	25	30	35	50	70	100
Standard Torsional Backlash $\Delta\phi$ (arcmin)		<12	<12	<12	<12	<12	<12	<12	<12
Torsional Stiffness C (Nm / arcmin)		30	30	35	30	35	35	32	30
Efficiency η (%)		97%	97%	97%	97%	97%	97%	97%	97%
Inertia (kg·cm ²)		1,35	1,49	0,75	0,21	0,38	0,19	0,18	0,18
Inertia due to input shaft ϕ (kg·cm ²)	$\phi 11$ mm	1,58	1,58	1,58	1,58	1,58	1,58	1,58	1,58
	$\phi 14$ mm	1,56	1,56	1,56	1,56	1,56	1,56	1,56	1,56
	$\phi 19$ mm	2,32	2,32	2,32	2,32	2,32	2,32	2,32	2,32
	$\phi 24$ mm	2,64	2,64	2,64	2,64	2,64	2,64	2,64	2,64
	$\phi 32$ mm	3,68	3,68	3,68	3,68	3,68	3,68	3,68	3,68
Environmental conditions Values outside of this range available upon request		-15°C to 40°C							
Max. allowable housing temperature T (°C)		90°C							
Protection degree		IP 64							
Noise level, Unloaded, at $n_1=3000$ rpm, from a 1m distance		<69 dB(A)							
Lubrication		Lifetime grease lubrication							
Direction of rotation		Same as motor							
Weight (kg)		10,5							

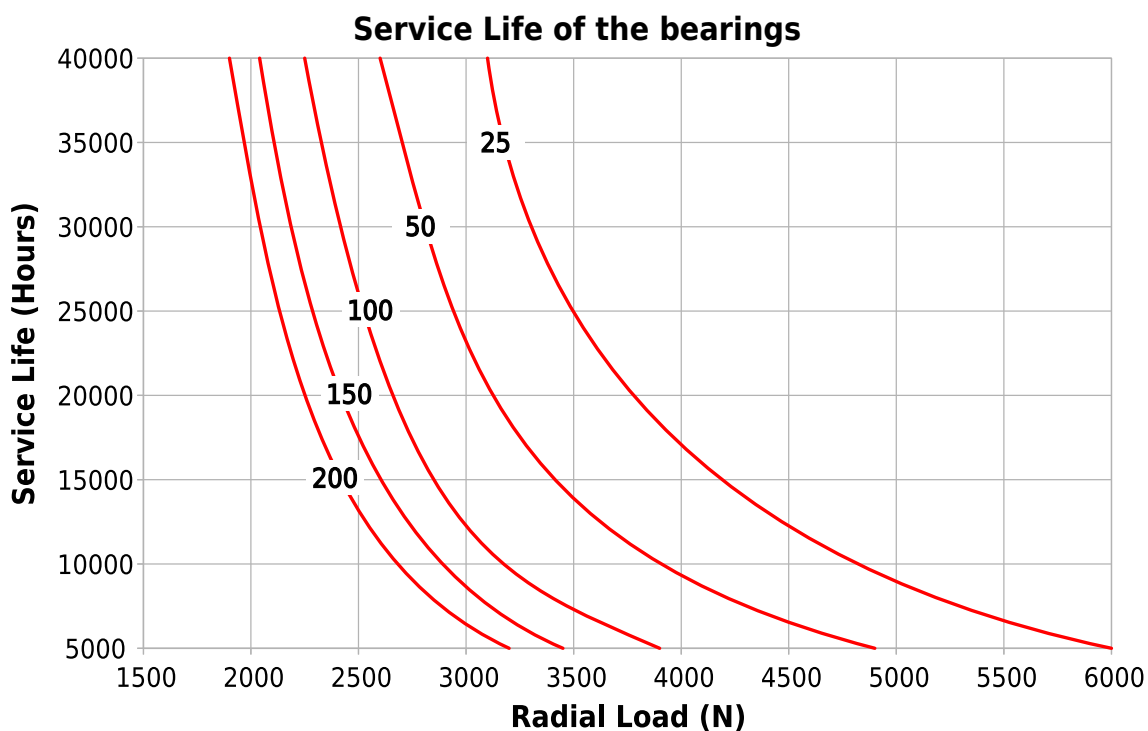
Bearings

Bearing service life depends mostly on output speed and axial load. Other factors, such as lubricant type, normally occurring impurities in the lubricant, operating temperature, etc. have also been taken into account. For the following chart, axial load is assumed to be in the middle of the output shaft. Contact our engineering team with your specific application.

Permitted shaft loads

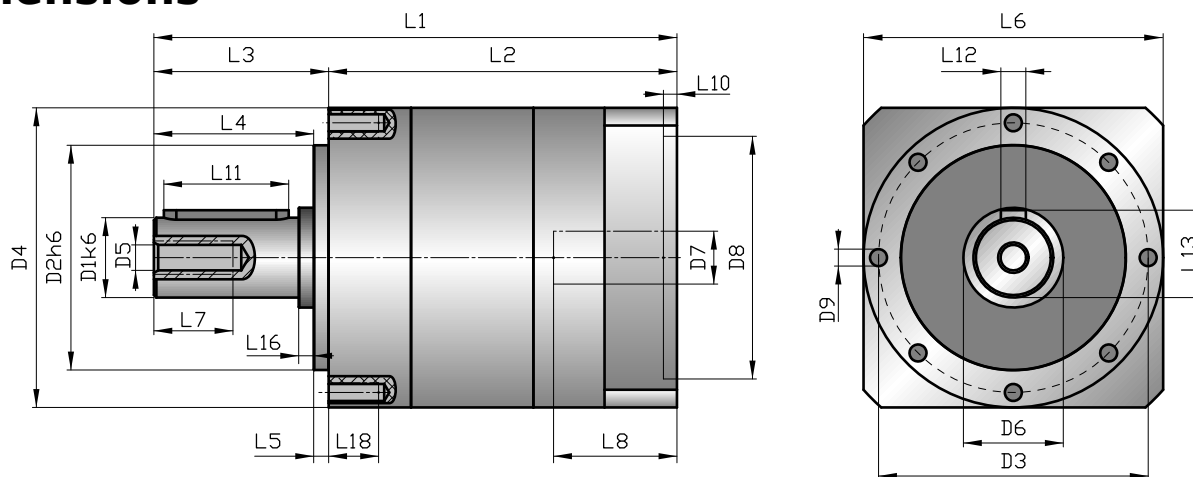
Based on nominal bearing lifetime (L_{nh} as per ISO 281)

	Maximum Value	10000 hour	20000 hour	30000 hour	40000 hour
F _{2R} (N) Allowable radial force (Applied to the middle of the output shaft and n ₂ =100 rpm)	4500	3100	2650	2400	2200
F _{2A} (N) Allowable axial force n ₂ =100rpm (For both push and pull)	5000	4000	3000	2500	2000
F _{2R} = F _{2A} (N) simultaneously. For other complex cases, please inquire.	4000	3000	2500	2200	2050



Bearing Service Life depending on radial load (N) and output speed (rpm)
Standard calculation as per DIN ISO 281

Dimensions



			GSA-250-M1	GSA-250-M2
D ₁	Output shaft diameter		25	25
D ₂	Pilot flange diameter		80	80
D ₃	Output flange fixing hole P.C.D.		100	100
D ₄	Output flange diameter		120	120
D ₅	DIN 332 hole diameter		M10	M10
D ₆	Output shaft root diameter		40	40
D ₇	Input shaft diameter	min	19	19
D ₇	Input shaft diameter	max	35	35
D ₈	Input pilot flange diameter	min	50	50
D ₈	Input pilot flange diameter	max	180	180
D ₉	Output flange fixing hole diameter		M8	M8
L ₁	Total length	min	199	235
L ₁	Total length	max	230	268
L ₂	Housing length	min	138	176
L ₂	Housing length	max	169	207
L ₃	Length from the output flange		61	61
L ₄	Output shaft length		56	56
L ₅	Pilot diameter width		5	5
L ₆	Input flange side	min	120	120
L ₆	Input flange side	max	180	180
L ₇	DIN 332 hole thread depth		22	22
L ₈	Input shaft length	min	40	40
L ₈	Input shaft length	max	80	80
L ₁₀	Input pilot flange height	min	4	4
L ₁₀	Input pilot flange height	max	7	7
L ₁₁	Key length		40	40
L ₁₂	Key width		8	8
L ₁₃	Height over shaft		28	28
L ₁₆	Output shaft root height		6	6
L ₁₈	Output flange fixing hole thread depth		18	18

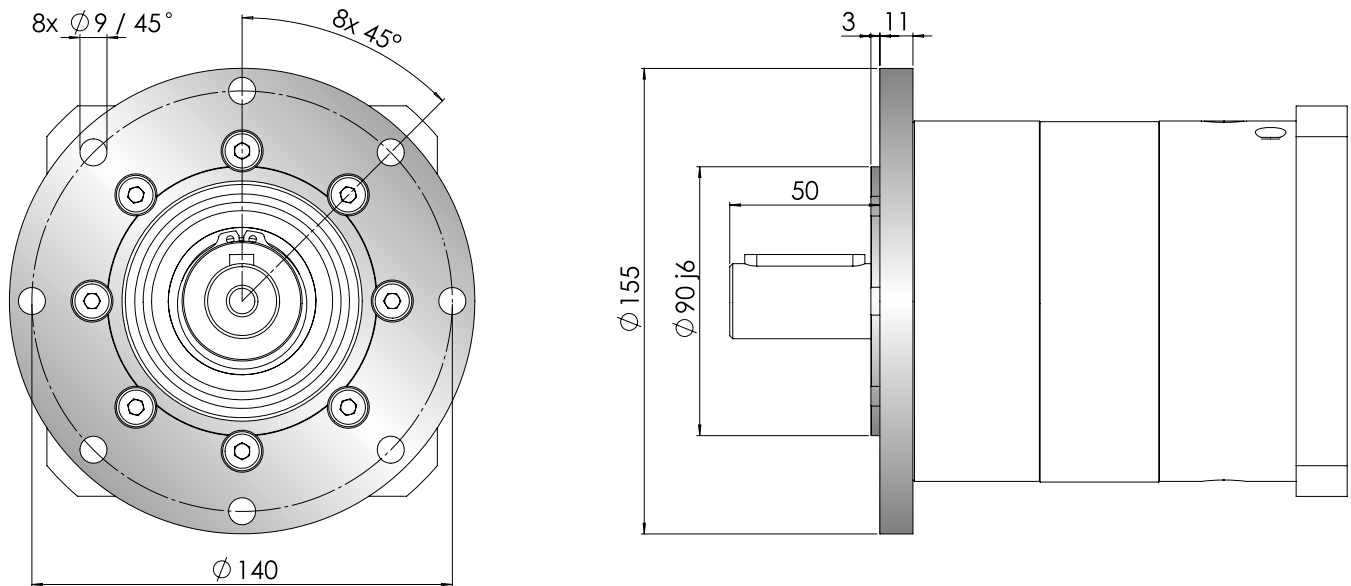
All dimensions are in mm.

Dimensions suitable for most motor models. For outliers, please inquire.

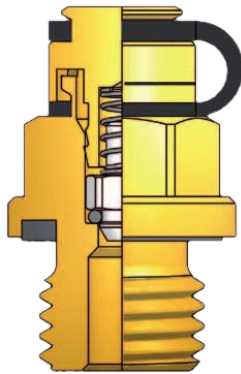
All values subject to change due to technical improvements without further notice.

Accessories

B5 / B14 Adapter Flange for GSA-250



All dimensions in mm. Other flange sizes available upon request.



Vent Plugs

VP-G vent plugs use state of the art technology in pressure relief systems for gearboxes. A stainless steel spring lets the relief valve release generated gases while blocking ingress of contaminants.

VP-G plugs are most often installed for gearboxes that will either work under S1 continuous duty conditions, or whose duty cycle requires it. They are factory installed at the right location for the gearbox's correct operation. A rubber gasket seals the plug during transportation to prevent oil leakage.