



GPL Planetary Robotic Gearbox

- The new standard in zero-backlash (≤ 6 arcsec)
- 10x better than other zero-backlash gearboxes
- High positional accuracy without vibration
- See [page 12](#) for more information



GCL Cycloidal Robotic Gearbox

- Backlash ≤ 1 arcmin
- Impact resistance 5x nominal torque
- Integral pre-stage available
- See [page 26](#) for more information



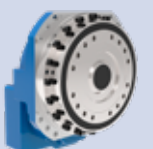
GSL Strain Wave Robotic Gearbox

- Backlash ≤ 0.5 arcmin
- Strain wave (harmonic) gearing for zero-backlash and high torque
- Simple design in small, lightweight gearbox
- See [page 40](#) for more information

► ZERO-BACKLASH & ROBOTIC FLANGE SELECTION GUIDE



GAM offers a full range gearboxes from planetary servo gearboxes through zero-backlash robotic gearboxes for a wide variety of applications.

INCREASING PRECISION - DECREASING BACKLASH →										
Gearbox	Planetary EPL		Helical Planetary SPH		Cycloidal GCL		Strain Wave GSL		Robotic Planetary GPL	
										
	Precision Inline for general servo applications		High precision inline for demanding servo applications		Zero-backlash cycloidal Available with integral pre-stage		Zero-backlash strain wave with high torque density and small, lightweight design for easy integration		Zero-backlash planetary with the lowest backlash. Vibration-free for high positional accuracy.	
Gearbox Type	Servo		Servo		Zero-Backlash Robotic Flange		Zero-Backlash Robotic Flange		Zero-Backlash Robotic Flange	
Features	Easily customizable		Precision Inline		Impact Resistance 5x nominal torque. Precision positioning and point-to-point motion		Small, lightweight design		Unique, revolutionary design maintains lifetime zero-backlash	
Advantages	Shaft, hollow or flange output Very high ratio		Quiet operation		Available with integral pre-stage for higher ratios		Quiet operation Easy integration		Very high precision Quiet operation Smooth, vibration-free motion	
Applications	Servo		Servo		Zero-Backlash		Zero-Backlash		Zero-Backlash	
Backlash	≤ 8-20 arcmin		≤ 1 - 3 arcmin		≤ 1 arcmin		≤ 0.5 arcmin (≤ 30 arcsec)		≤ 0.1 arcmin (≤ 6 arcsec)	
Ratio:	3:1 - 1000:1		3:1 - 1000:1		57:1 - 258:1 Integral pre-stage option for additional ratio		50:1 - 160:1		50:1 - 200:1 Integral pre-stage option for additional ratio	
Service Life	30,000 hours		20,000 hours		6000 hours		7000-15,000 hours		20,000 hours	
Torque Range (Nm)	Model	Nominal Torque (Nm)	Model	Nominal Torque (Nm)	Model	Nominal Torque (Nm)	Model	Nominal Torque (Nm)	Model	Nominal Torque (Nm)
≤ 15	EPL-F-047	14					GSL-CS-014 GSL-HS-014	12.7 14		
16-25							GSL-HS-017 GSL-HS-020 GSL-HS-025	17 20 25		
26 - 50	EPL-F-064	42					GSL-HS-032 GSL-HS-040 GSL-CS-017	32 40 45		
51 - 100	EPL-F-090	100	SPH-F-075	100			GSL-CS-020	56		
101 - 250	EPL-F-110	210	SPH-F-100	250	GCL-F-020	167	GSL-CS-025 GSL-CS-032	124 248		
251 - 500	EPL-F-140	340	SPH-F-140	450	GCL-F-040	412			GPL-F-056	445
501 - 1000					GCL-F-080	784			GPL-F-080	770
1001 - 2500					GCL-F-110 GCL-F-160	1078 1565			GPL-F-112 GPL-F-160 GPL-F-224	1165 1450 1820
2501 - 5000					GCLC-F-320 GCLC-F-450	3136 4500			GPL-F-300 GPL-F-400	2690 3505



Robotic Planetary Gearboxes

GAM's **GPL Series Robotic Planetary Gearboxes** provide the lowest backlash and high tilting rigidity for horizontal and vertical **robotic** and **motion control** applications.

- With a backlash of ≤ 0.1 arcmin, the GPL Series can be considered a **zero backlash** gearbox
- Best-in-the-market **torsional rigidity** for ≤ 0.6 arcmin lost motion
- Patented design guarantees the **backlash will not increase** over the life time of the gearbox
- Industry-accepted proven performance
- Seven sizes with nominal output torque of 445 to 3505 Nm and ratios of 50:1 to 200:1
- Flanged solid shaft output or flanged hollow shaft output (up to 75 mm through hole)
- Integrated motor adapter plate ready to mount your motor
- GPR with right angle input available - contact GAM

With seven sizes, two output options, and ratios up to 200:1, there is a GPL for your application.

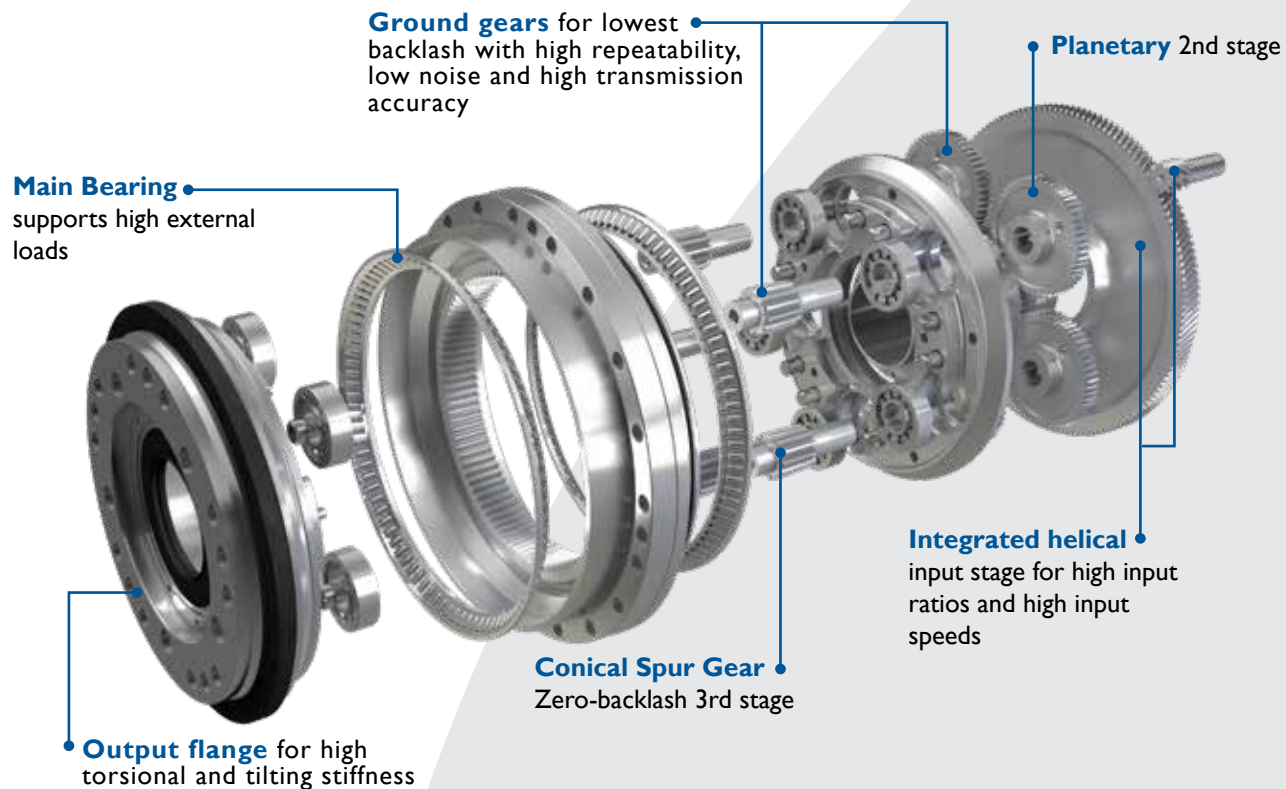
Features



Benefits

Zero Backlash ≤ 0.1 arcmin	Highest precision for your application
Lowest lost motion ≤ 0.6 arcmin High torsional rigidity	Superior accuracy even with low torque
Patented self-adjusting backlash system	Constant precision throughout the entire lifetime
High torque density 58-73 Nm/kg	Smaller gearbox, lighter overall system
Fully-loaded life 20,000 operating hours	Longer lifetime, reduced maintenance costs
Efficiency $> 90\%$	Lower power consumption, smaller motor
Quiet < 70 dB	Reduced workplace noise exposure
High output, acceleration and emergency stop torque	More security for your application
Superior tilting and torsional stiffness	Allows precise positioning
Low vibration	High repeatability
Lowest breakaway torque	Better control of the overall system
Standard mineral oil	Reduced lubrication cost
Low operating temperature	Longer component and lubricant life
Low moment of inertia	Excellent dynamic performance
Compact design, low weight	Lighter overall design
Input with Integrated motor adapter and clamp	Ready to mount your motor

Design Features



Superior Performance

The GPL Series provides superior performance compared to cycloidal gearboxes

Feature	GAM Planetary	Cycloidal
Backlash	<0.1 arcmin, remains constant throughout the lifetime of the gearbox	Backlash can increase after approximately one year, requiring adjustment
Torque	Torque of the gearbox rated with output speed $n_2=15$ rpm	Some published torques rated for output speed of $n_2=5$ rpm
Service Life	20,000 operating hours	6,000 hours
Efficiency	>90%	>85%
Power Density	Highest power density (Nm/kg) in comparison to other manufacturers' gearboxes	
Duty Cycle	S1 (continuous) duty cycle is possible as the teeth are in contact immediately when operation starts; high input speeds up to 6600 rpm are possible.	Lower input speeds per published catalog values



▶▶ GPL SERIES ROBOTIC PLANETARY GEARBOXES

Applications

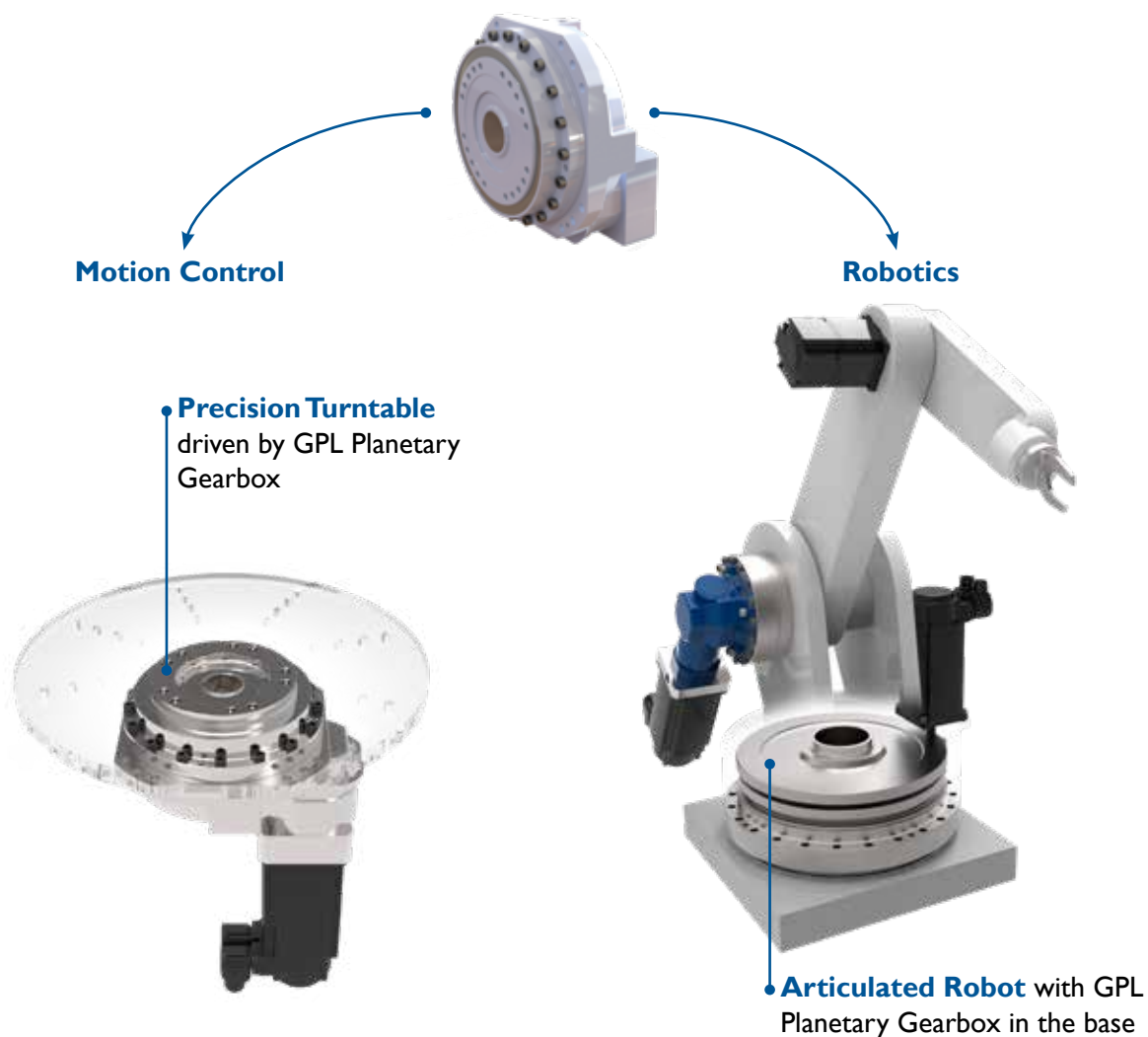
The GPL Series can be used in a variety of applications where zero-backlash, high tilting and torsional rigidity, and long life are required. With the large output mounting flange, through-hole option, and servo-ready mount, the GPL is ideal for many **robotic** and **motion control** applications:

- Robots
- Handling systems
- Tool changers
- Positioning
- Rack & pinion
- Pick & place
- Turntables
- and many more

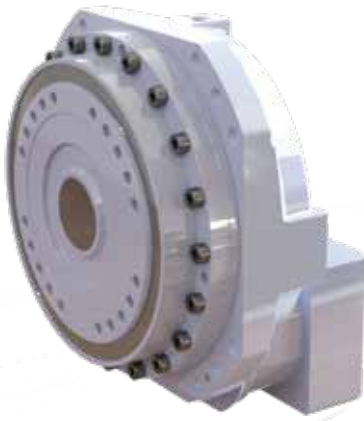
Industries

The GPL Series is ideal for many industries including:

- Robotics
- Automation
- Packaging Machines
- Machine tool builders
- Turntables
- Printing industry
- Welding Systems
- Medical
- Navigation
- and many more

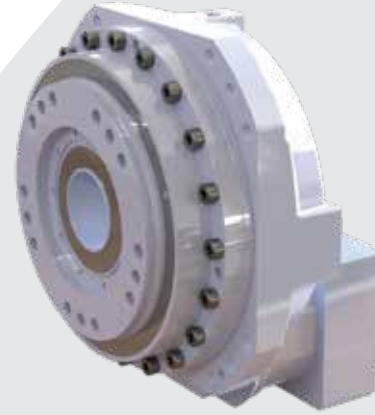


GPL Series Models



GPL-F

Solid Shaft Output with Flange



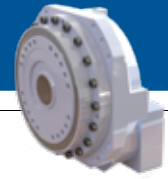
GPL-H

Hollow Shaft Output with Flange

Mass Moment of Inertia at Input

GPL-F		GPL-F-056	GPL-F-080	GPL-F-112	GPL-F-160	GPL-F-224	GPL-F-300	GPL-F-400
Mass Moment of Inertia (kgcm ²)	50:1	1.01	1.92	3.37	3.37	10.29	16.92	27.87
	63:1	0.75	1.43	2.52	2.52	7.69	12.64	20.83
	80:1	0.51	0.96	1.69	3.30	5.16	8.48	13.97
	100:1	0.35	0.67	1.19	2.31	3.62	5.95	9.80
	125:1	0.24	0.45	0.80	1.56	2.44	4.01	6.60
	160:1	0.16	0.31	0.54	1.05	1.64	2.70	4.45
	200:1	0.12	0.22	0.39	0.76	1.18	1.94	3.20

GPL-H		GPL-H-056	GPL-H-080	GPL-H-112	GPL-H-160	GPL-H-224	GPL-H-300	GPL-H-400
Mass Moment of Inertia (kgcm ²)	35.5:1	2.42	5.47	9.63	18.79	29.38	48.31	79.59
	45:1	1.89	3.58	6.31	12.31	19.25	31.65	52.13
	56:1	1.28	2.42	4.26	8.32	13.01	21.39	35.24
	71:1	0.86	1.64	2.89	5.63	8.81	14.49	23.87
	90:1	0.52	0.98	1.73	3.38	5.29	8.70	14.33
	125:1	0.32	0.61	1.08	2.10	3.29	5.40	8.90
	131.5:1	0.27	0.50	-	1.73	-	4.46	-



	Nominal	GPL-F-056	GPL-F-080	GPL-F-112	GPL-F-160	GPL-F-224	GPL-F-300	GPL-F-400
Exact Ratio	50	564788/11745	754/15	325367/6525	354928/6975	3531/70	6338/125	354928/6975
	63	85946/1305	33176/525	227143/3625	3169/50	1584/25	358097/5625	3169/50
	80	116641/1450	57304/735	6139/75	386618/4725	3828/49	186971/2250	34859/450
	100	239421/2465	1508/15	42973/435	15845/162	11880/119	383449/3825	9507/95
	125	3508/29	12818/105	834904/6525	136267/1050	12177/98	129929/1050	72887/600
	160	251699/1595	1508/9	853321/5220	415139/2700	162	434153/2700	224999/1350
	200	153475/783	107068/525	288533/1450	44366/225	2079/10	440491/2250	25352/125
Permanent Output Torque	Nm	575	980	1,480	1,850	2,325	3,435	4,495
Nominal Output Torque ^{1a}	Nm	445	770	1,165	1,450	1,820	2,690	3,505
Acceleration Torque ^{1b}	Nm	625	1,075	1,630	2,030	2,550	3,765	4,905
Emergency Stop Torque ^{1c}	Nm	1,545	2,530	3,780	4,800	6,090	8,990	11,980
Output Running Friction (Drag)	Nm	41	46	45	49	53	87	96
Breakaway Torque	Nm	1.0 - 1.5x running friction torque (depends on size, mounting position, oil level and operating temperature)						
Max. Output Speed ³	rpm	120	100	100	100	90	80	70
Permissible Average Input Speed ⁴	rpm	4,000	3,500	3,500	3,500	3,000	2,500	2,000
Maximum Input Speed ³	rpm	6,000	5,000	5,000	5,000	4,500	4,000	3,500
Permanet Bending Moment ^{2a}	Nm	1,070	1,280	2,410	2,750	3,060	4,800	6,080
Emergency Stop Bending Moment Max ^{1c}	Nm	3,645	4,345	5,910	7,800	9,280	11,410	13,750
Tilting Stiffness	Nm/arcmin	1,170	1,560	2,230	2,300	2,620	5,490	6,260
Torsion Stiffness ⁵	Nm/arcmin	165	260	430	570	680	1,130	1,350
Max. Axial Force (Static) ^{2b}	kN	152	168	270	292	315	400	535
Max. Radial Force (Static) ^{2c}	kN	55	57	85	97	100	140	170
Max. Axial Force (Dynamic) ^{2b}	kN	18	18.5	29.5	31	32	42.5	46
Max. Radial Force (Dynamic) ^{2c}	kN	11	11.5	18	19	20	26.5	29
Power Density	Nm/kg	57.8	68.8	73.3	72.9	65.7	71.9	69.7
Weight	kg	14.1	18.5	27.4	32.3	41.6	60.3	77.7
Backlash		≤0.1 arcmin						
Lost Motion		≤0.6 arcmin						
Angular Transmission Accuracy		≤50 arcsec						
Efficiency Under Full Load		≥90%						
Service Life		20,000 hours						
Noise		<70 dB						
Lubrication		Mineral Oil						

1a) 12 million times during lifetime

1b) 6 million times during lifetime

1c) 3,000 times during lifetime

2a) Permanent tilting moment for load case $F_a = 0$ and $F_r = 0$

2b) Max axial force for load case permanent tilting moment = 0 and $F_r = 0$

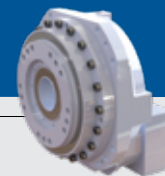
2c) Max radial force for load case permanent tilting moment = 0 and $F_a = 0$

3) Higher input speeds possible

4) At nominal torque and 20°C ambient temperature

5) At 50% to 100% nominal torque

Note: Calculations based on output speed $n_2 = 15$ rpm



	Nominal	GPL-H-056	GPL-H-080	GPL-H-112	GPL-H-160	GPL-H-224	GPL-H-300	GPL-H-400
Exact Ratio	35.5	2422/65	21614/611	25422/725	218327/6188	206719/5733	228342/6409	12544/351
	45	15224/325	82012/1833	26537/600	228342/5083	324046/7007	14021/312	504/11
	56	26296/455	169882/3055	27429/500	236354/4199	94979/1729	246369/4420	13440/247
	71	22836/325	43935/611	28321/400	244366/3315	681614/9555	274411/3757	4592/65
	90	5882/65	401273/4277	446/5	250375/2652	698375/7644	20030/221	1176/13
	125	4844/39	820120/6721	3122/25	292438/2431	776593/6370	2003/17	4816/39
	131.5	97572/715	8787/65	--	294441/2210	--	144216/1105	--
Permanent Output Torque	Nm	575	980	1480	1850	2325	3435	4495
Nominal Output Torque ^{1a}	Nm	445	770	1165	1450	1820	2690	3505
Acceleration Torque ^{1b}	Nm	625	1075	1630	2030	2550	3765	4905
Emergency Stop Torque ^{1c}	Nm	1545	2530	3780	4800	6090	8990	11980
Max. Output Speed ³	rpm	120	100	100	100	90	80	70
Output Running Friction (Drag)	Nm	41	46	45	49	53	87	96
Breakaway Torque	Nm	1.0 - 1.5x running friction torque (depends on size, mounting position, oil level and operating temperature)						
Permissible Average Input Speed ⁴	rpm	4000	3500	3500	3500	3000	2500	2000
Maximum Input Speed ³	rpm	6000	5000	5000	5000	4500	4000	3500
Permanet Bending Moment ^{2a}	Nm	1070	1280	2410	2750	3060	4800	6080
Emergency Stop Bending Moment Max ^{1c}	Nm	3645	4345	5910	7800	9280	11410	13750
Tilting Stiffness	Nm/arcmin	2090	2730	3315	3670	4100	8810	10250
Torsion Stiffness ⁵	Nm/arcmin	185	305	480	690	820	1240	1460
Max. Axial Force (Static) ^{2b}	kN	152	168	270	292	315	400	535
Max. Radial Force (Static) ^{2c}	kN	55	57	85	97	100	140	170
Max. Axial Force (Dynamic) ^{2b}	kN	18	18.5	29.5	31	32	42.5	46
Max. Radial Force (Dynamic) ^{2c}	kN	11	11.5	18	19	20	26.5	29
Power Density	Nm/kg	57.8	68.8	73.3	72.9	65.7	71.9	69.7
Weight ⁶	kg	14.1	18.5	27.4	32.3	41.6	60.3	77.7
Backlash		≤0.1 arcmin						
Lost Motion		≤0.6 arcmin						
Angular Transmission Accuracy		≤50 arcsec						
Efficiency Under Full Load		≥90%						
Service Life		20,000 hours						
Noise		<70 dB						
Lubrication		Mineral Oil						

1a) 12 million times during lifetime

1b) 6 million times during lifetime

1c) 3,000 times during lifetime

2a) Permanent tilting moment for load case $F_a = 0$ and $F_r = 0$

2b) Max axial force for load case permanent tilting moment = 0 and $F_r = 0$

2c) Max radial force for load case permanent tilting moment = 0 and $F_a = 0$

3) Higher input speeds possible

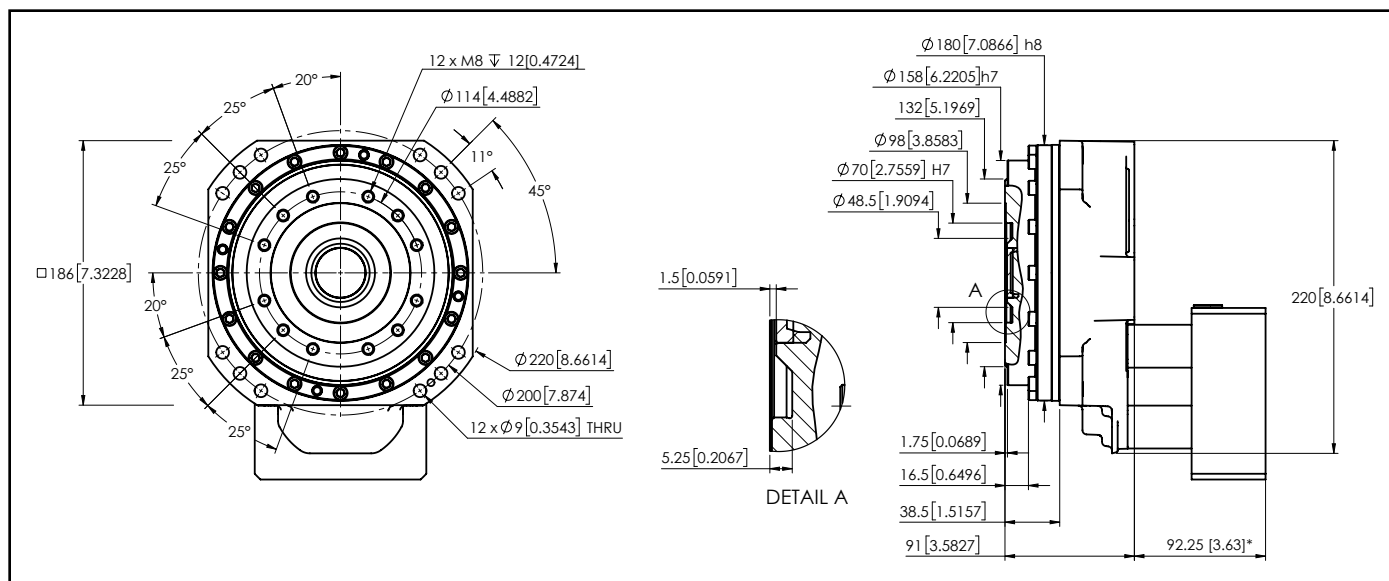
4) At nominal torque and 20°C ambient temperature

5) At 50% to 100% nominal torque

6) Weight vary depending on input and ratio

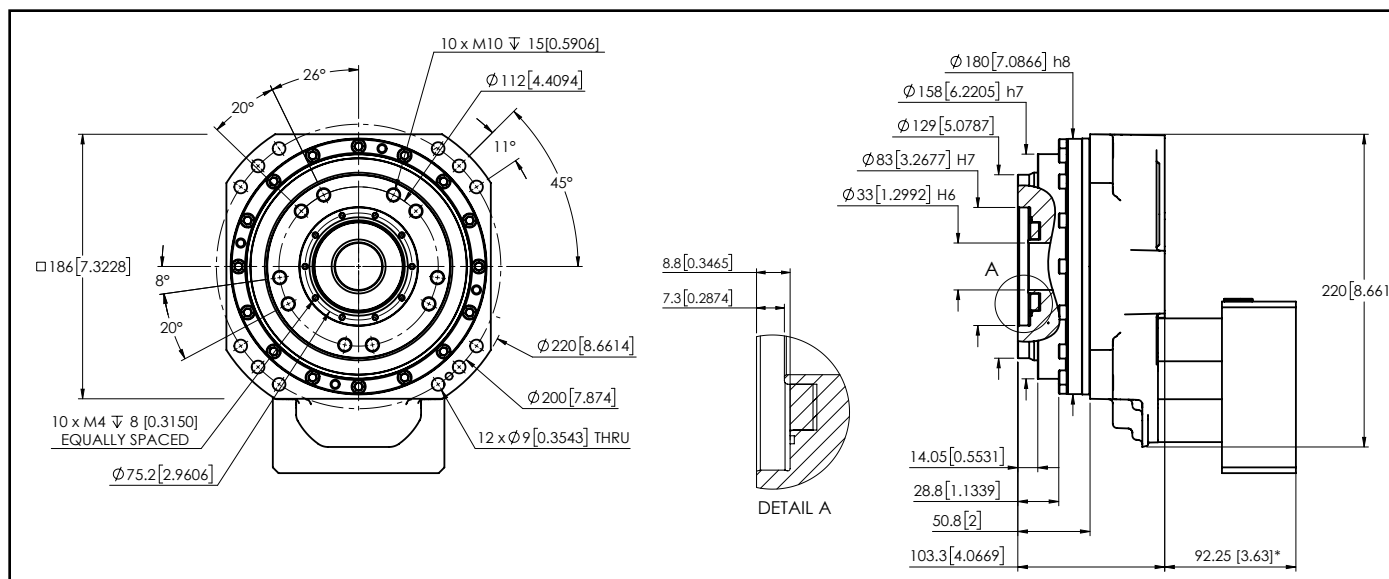
Note: Calculations based on output speed $n_2 = 15$ rpm

GPL-F-056



*Dimension may vary depending on motor

GPL-H-056

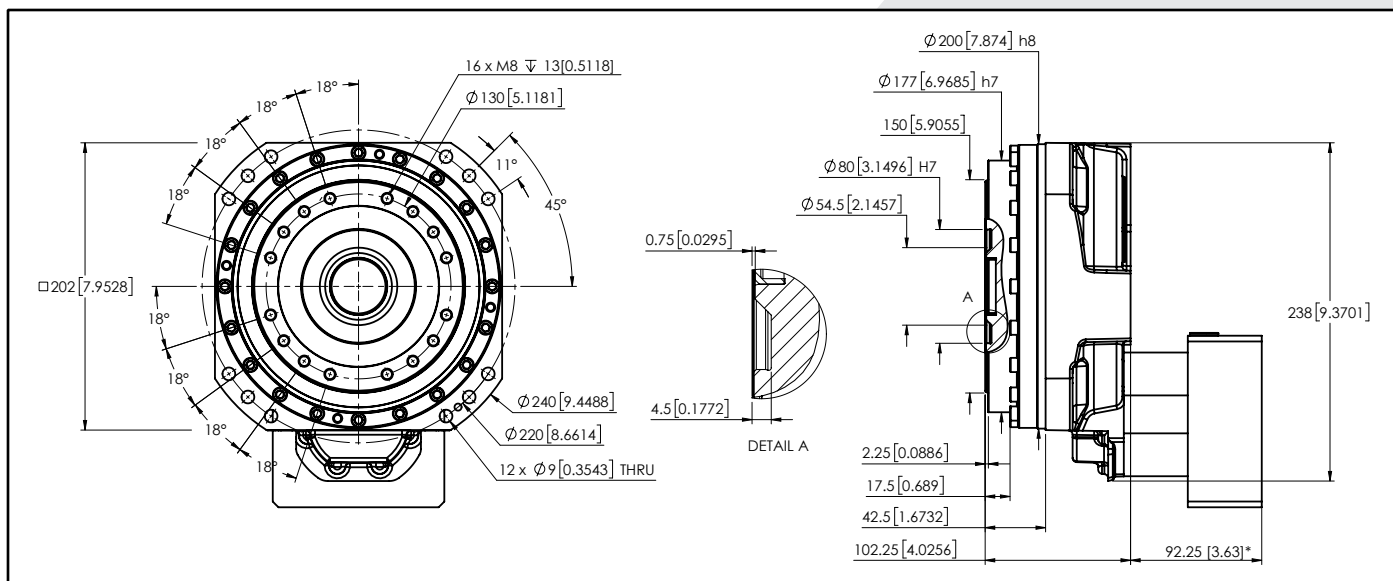


*Dimension may vary depending on motor

► GPL-080 DIMENSIONS

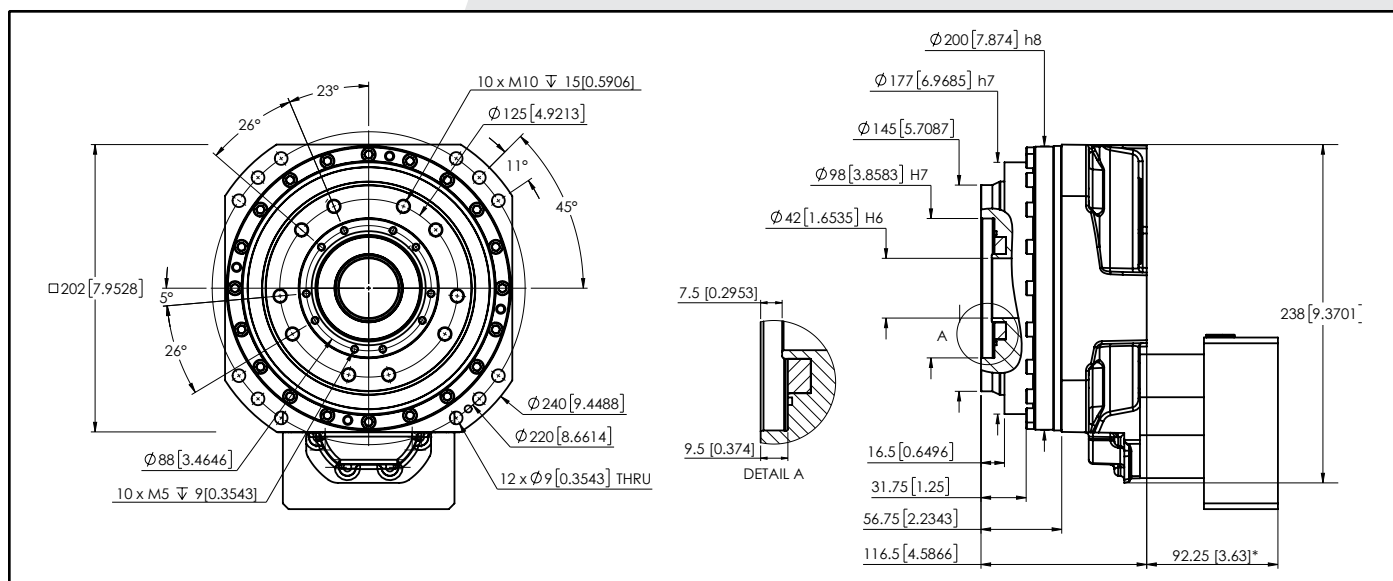
GPL

GPL-F-080



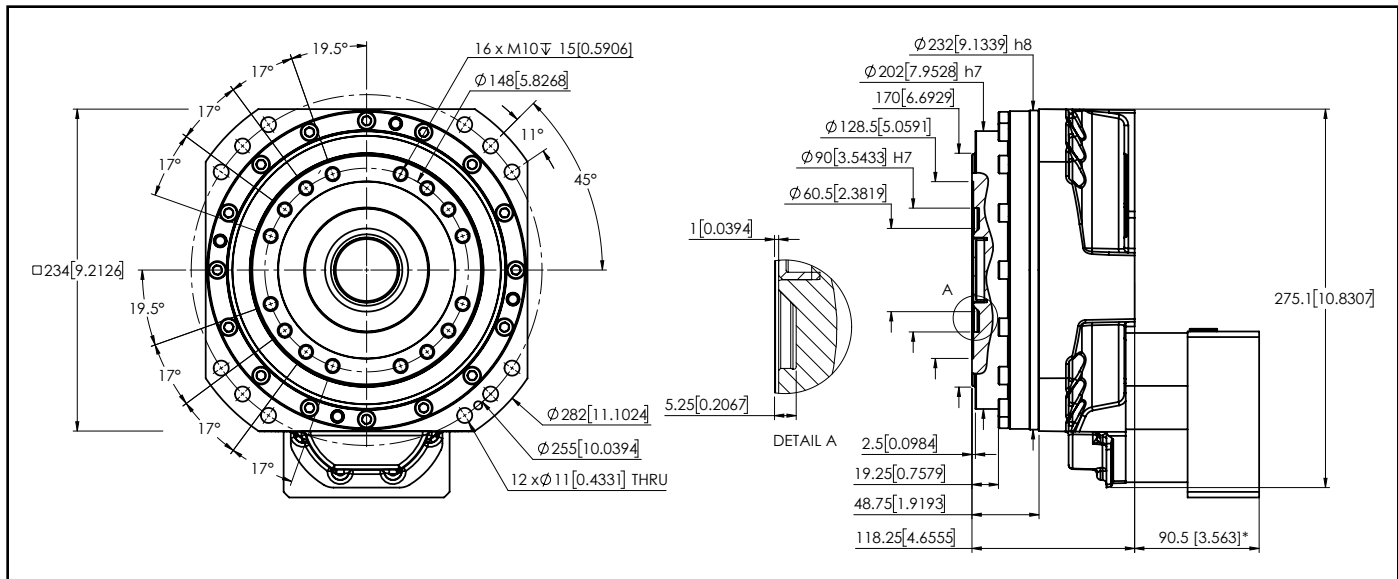
*Dimension may vary depending on motor

GPL-H-080



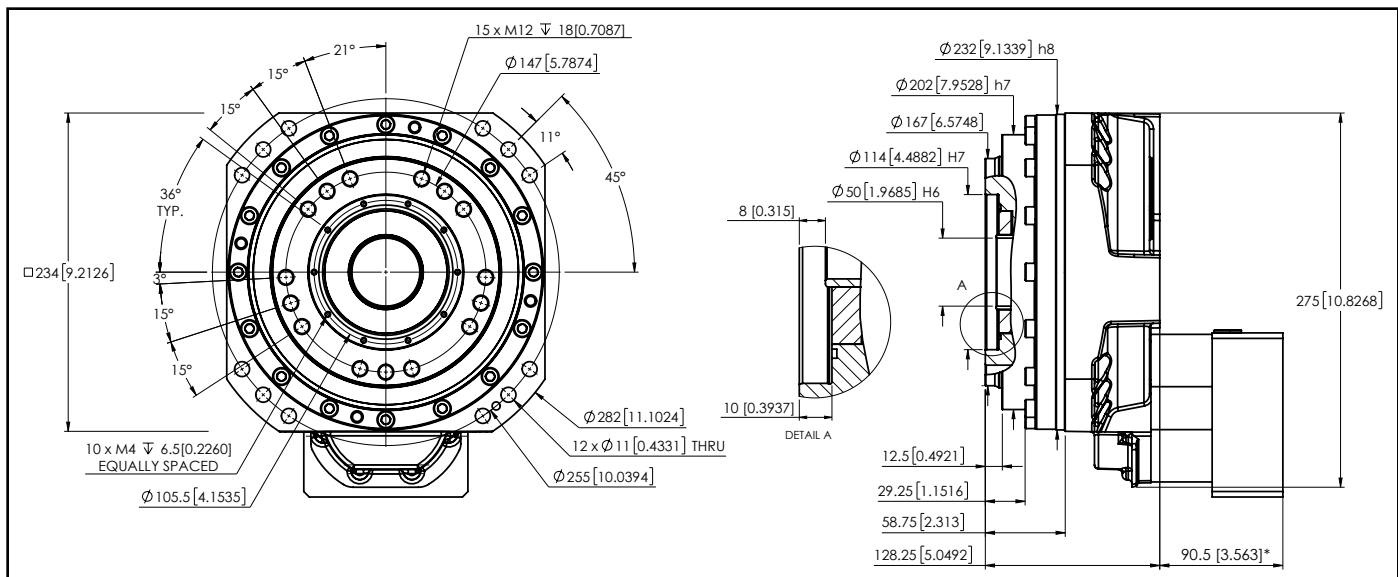
*Dimension may vary depending on motor

GPL-F-112



*Dimension may vary depending on motor

GPL-H-112

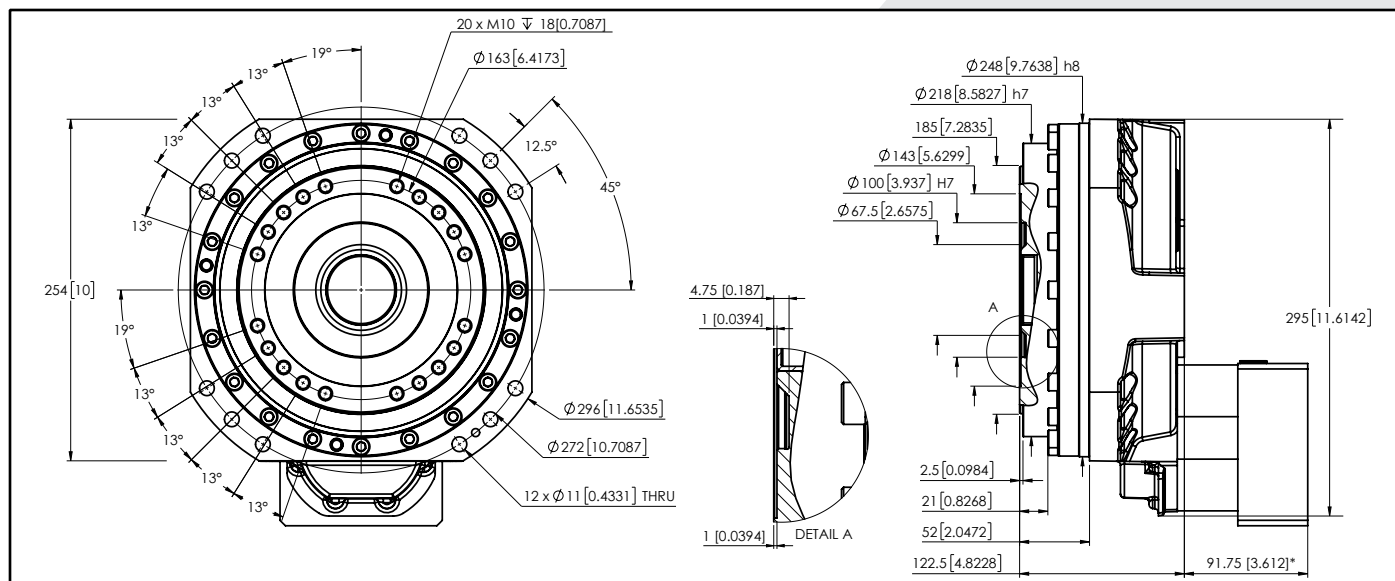


*Dimension may vary depending on motor

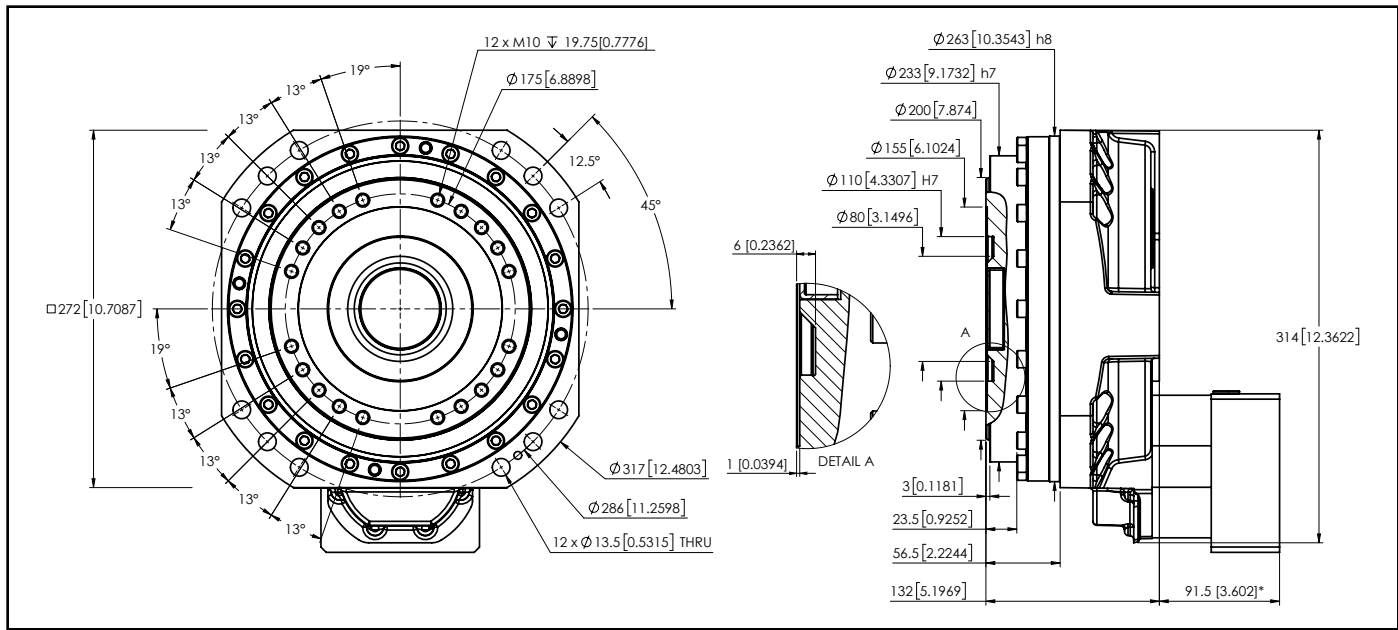
► GPL-160 DIMENSIONS

GPL

GPL-F-160

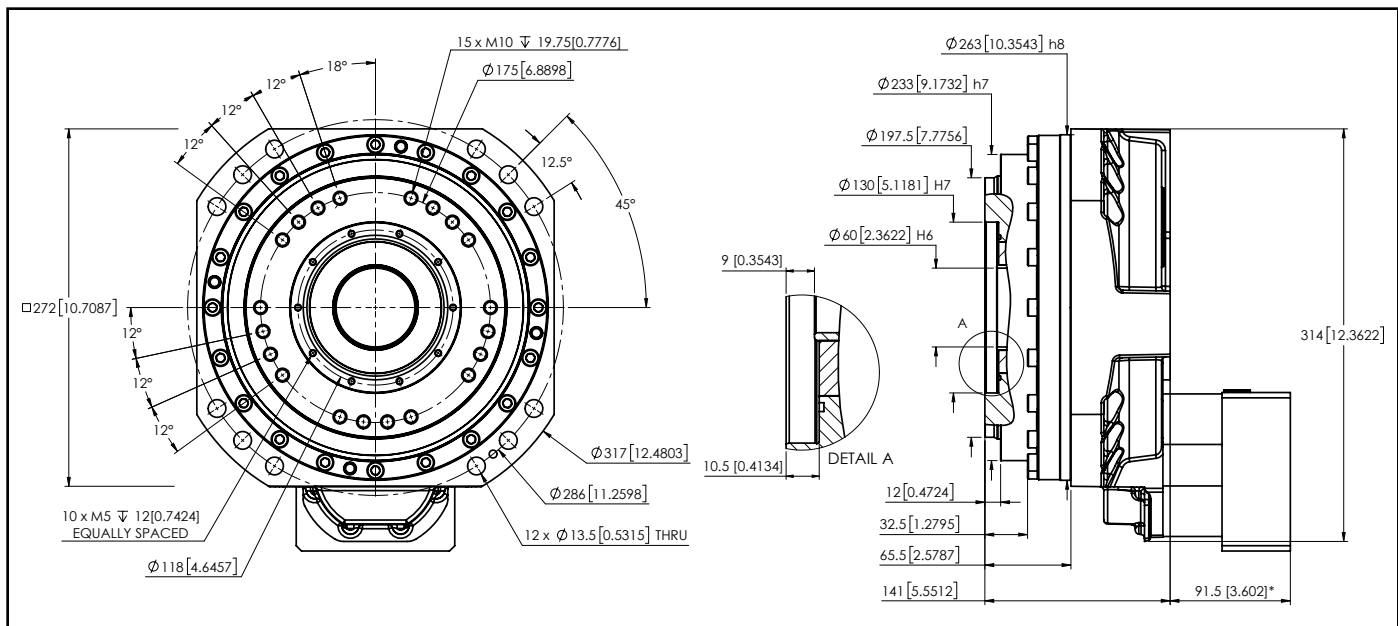


GPL-F-224



*Dimension may vary depending on motor

GPL-H-224

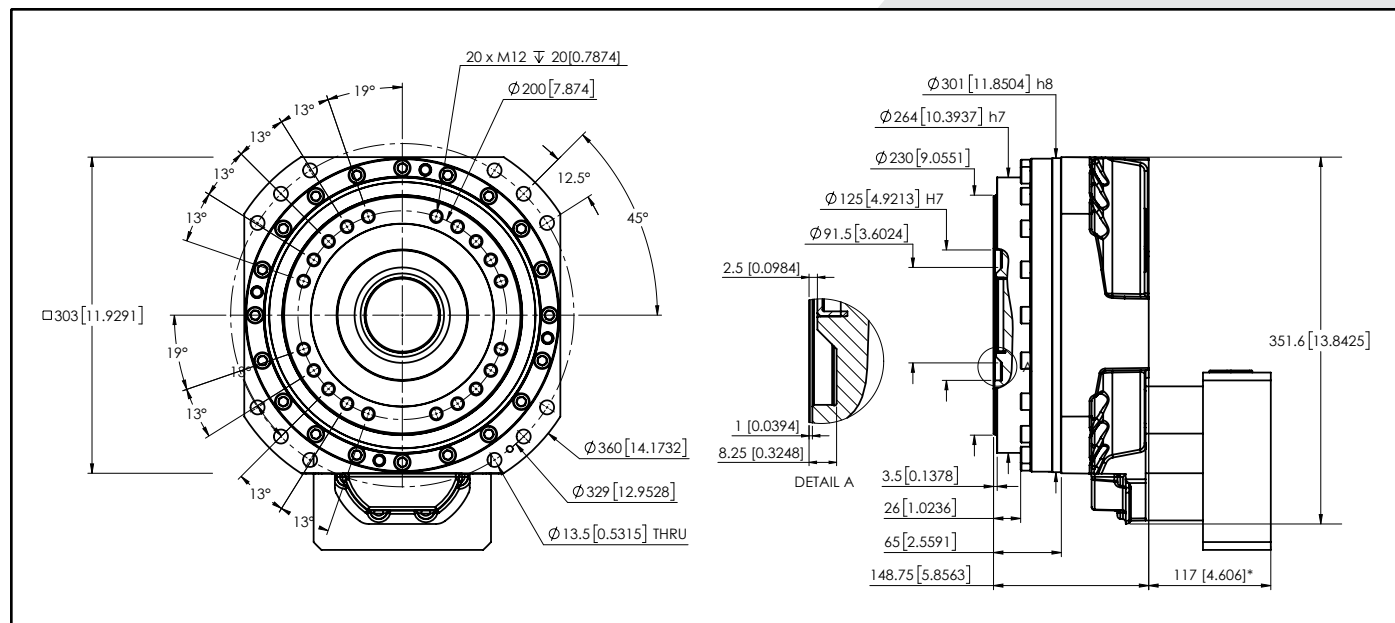


*Dimension may vary depending on motor

► GPL-300 DIMENSIONS

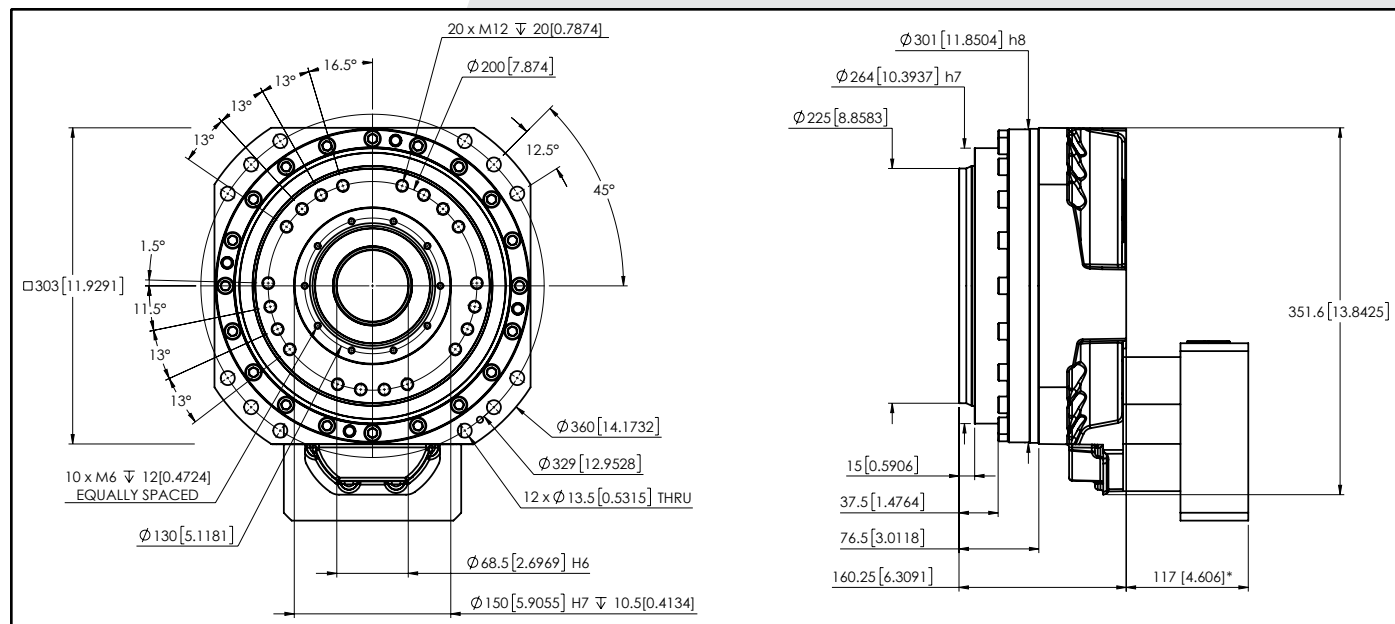
GPL

GPL-F-300



*Dimension may vary depending on motor

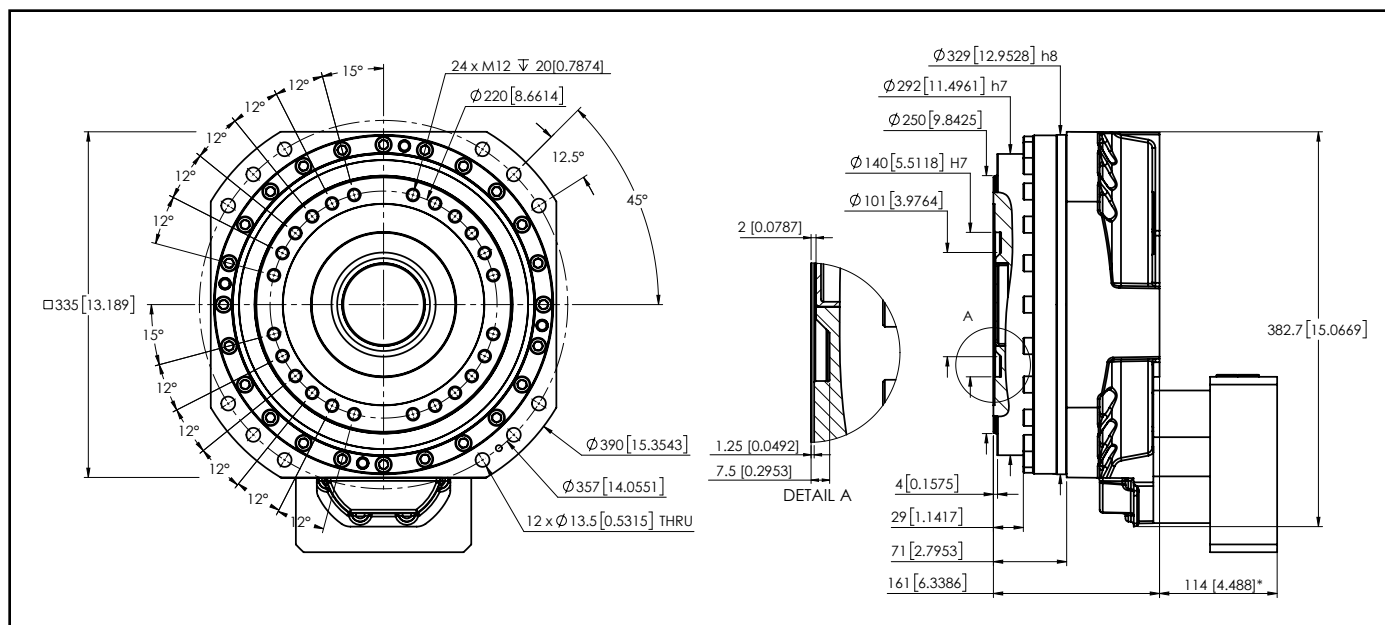
GPL-H-300



*Dimension may vary depending on motor

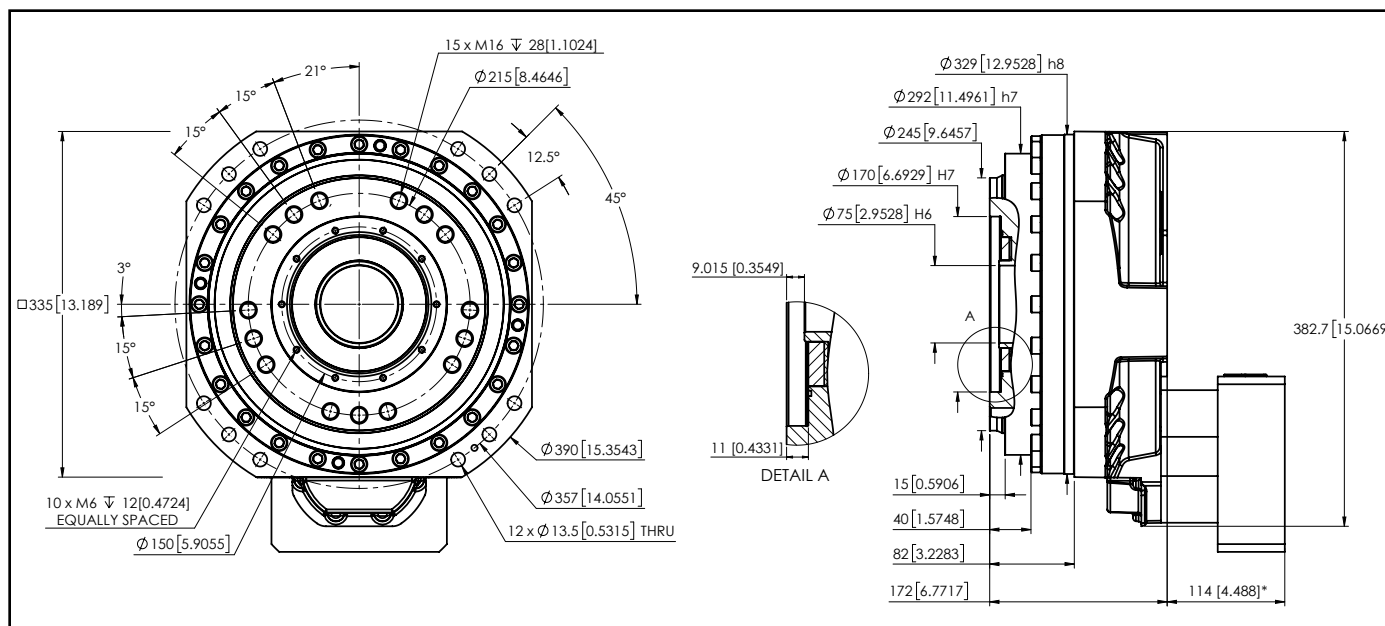
► GPL-400 DIMENSIONS

GPL-F-400



*Dimension may vary depending on motor

GPL-H-400

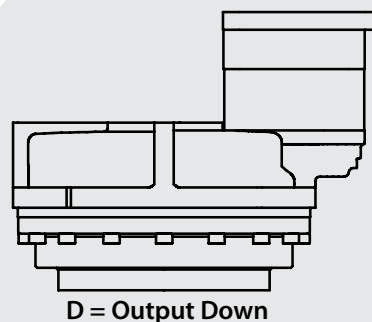
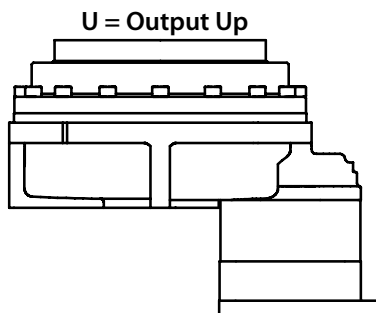


*Dimension may vary depending on motor

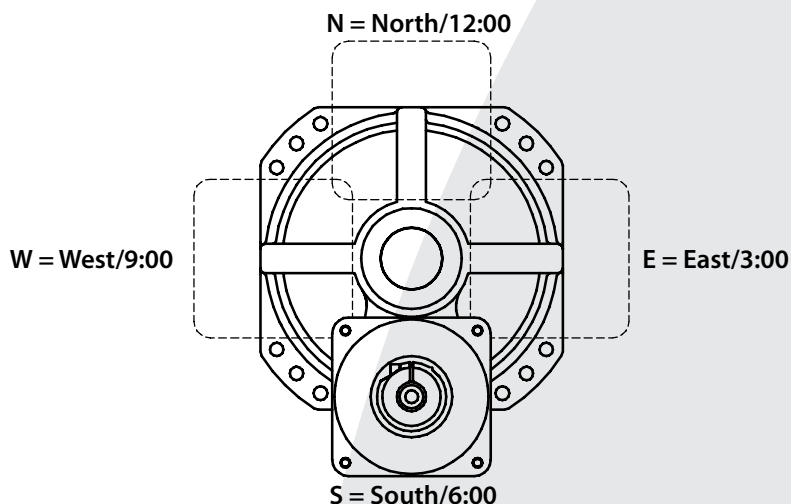
▶ GPL SERIES TYPE CODE

GPL Mounting Position

Output Vertical



Output Horizontal



TYPE CODES FOR GPL SERIES

Example: GPL - F - 056 - 200S - M0000 - H0000 - C0000

Gearbox Series

GPL = Inline
GPR = Right Angle

Gearbox Style

F = Solid Flange Output
H = Hollow Flange Output

Gearbox Size

056, 080, 112, 160, 224, 300, 400

Ratio

F Style = 050, 063, 080, 100, 125, 160, 200
H Style = 036 (35.5), 045, 056, 071, 090, 125, 132 (131.5)

Configuration Code

Assigned by GAM

Output Code

Assigned by GAM

Motor Code

Assigned by GAM

Mounting Position

Output Vertical:

U = Output Up

D = Output Down

Output Horizontal:

N = Input North/12:00

S = Input South/6:00

E = Input East/3:00

W = Input West/9:00



► GCL SERIES ROBOTIC CYCLOIDAL GEARBOXES



Robotic Cycloidal Gearboxes

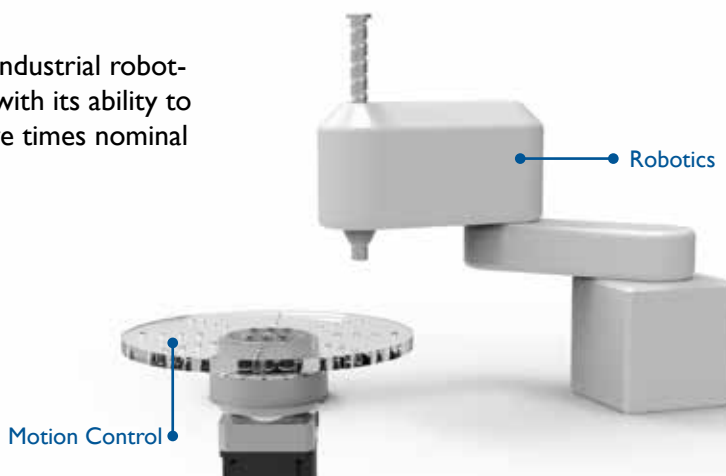
GAM's **GCL Series Robotic Cycloidal Gearboxes** provide low backlash and high rigidity for horizontal and vertical **robotic** and **motion control** applications.

- Backlash of ≤ 1 arcmin with lost motion of ≤ 1 arcmin
- Withstands the frequent start-stop impact loads of industrial robots with impact resistance 5x nominal torque
- Multi-tooth meshing for torsional rigidity
- Planetary gear for input speed reduction
- Flange output in 7 sizes with nominal output torque of 167 to 4410 Nm and ratios of 57:1 to 192.4:1
- Flanged hollow output in 6 sizes (up to 138 mm through hole) with nominal output torque of 490 to 4900 Nm
- Drops in for many competitors' products
- Integrated motor adapter plate ready to mount your motor

Applications

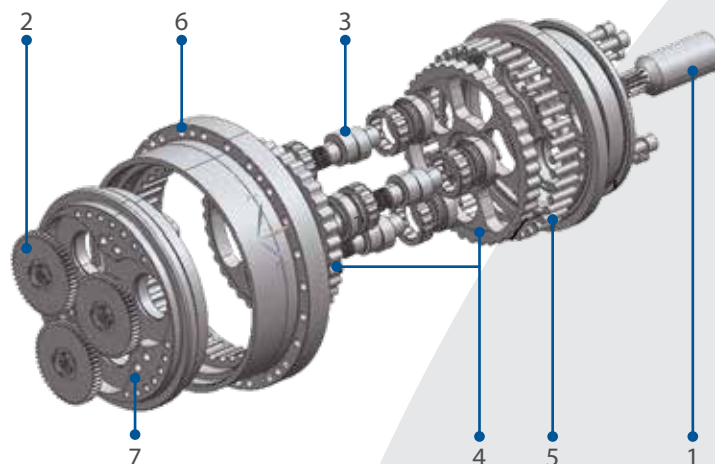
The GCL is well suited to high-end industrial robotics and motion control applications with its ability to withstand start-stop impact loads five times nominal torque.

- Robotics
- Tool changers
- Positioning
- Turntables
- Pick & Place



► GCL SERIES ROBOTIC CYCLOIDAL GEARBOXES

Drive Sequence



1. Input shaft/pinion
2. Planetary gear
3. Eccentric gearshaft
4. Cycloid gear
5. Pins
6. Pin Housing
7. Output

GCL Series Models

GCLC

Component Gearbox



GCLC-F
Solid Flange



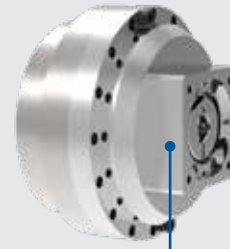
GCLC-H
Hollow Flange

GCL

Gearbox with cover & integrated input



GCL-F
Solid Flange



Integrated
Motor Mount



GCLC-F / GCL-F	Nominal	020		040		080		110		160		320*		450*	
Ratio Moment of Inertia	kgcm ²	57:1	0.0966	57:1	0.325	57:1	0.816	81:1	0.988	81:1	1.77	81:1	4.83	81:1	8.75
		81:1	0.0607	81:1	0.220	81:1	0.600	111:1	0.696	101:1	1.40	101:1	3.79	101:1	6.91
		105:1	0.0432	105:1	0.163	111:1	0.482	161:1	0.436	129:1	1.06	118.5:1	3.15	129:1	5.20
		121:1	0.0356	121:1	0.137	161:1	0.396	175.28:1	0.389	145:1	0.87	129:1	2.84	153	4.12
		141:1	0.0288	153:1	0.101	175.28:1	0.298			171:1	0.74	141:1	2.54	171:1	3.61
		161:1	0.0239									153:1	2.20	192.4:1	3.07
												171:1	1.97	201	2.90
												185:1	1.77	210.23	2.71
												201:1	1.60	257.84	2.03
Nominal Output Torque	Nm	167		412		784		1078		1568		3136		4410	
Acceleration Torque	Nm	412		1029		1960		2695		3920		7840		11,025	
Momentary Maximum Allowable Torque (Impact)	Nm	883		2058		3920		5390		7840		15,680		22,050	
Maximum Output Speed	rpm	75		70		70		50		45		35		25	
Allowable Bending Moment	Nm	882		1666		2156		2940		3920		7056		8820	
Momentary Allowable Bending Moment	Nm	1764		3332		4312		5880		7840		14,112		17,640	
Tilting Rigidity	Nm/arcmin	372		931		1176		1470		2940		4900		7448	
Torsion Stiffness	Nm/arcmin	49		108		196		294		392		980		1176	
Power Density	Nm/kg	33.4		45.8		60.3		63.4		60.3		71.3		66.8	
Weight (GCLC-F)	kg	4.7		9.3		13.1		17.4		26.4		44.3		66.4	
Weight (GCL-F)	kg	6.3		11.8		17.3		23.8		34.2		-		-	
Backlash Lost Motion		≤1.0 arcmin ≤1.0 arcmin													
Angular Transmission Accuracy		1.0 arcmin													
Service Life		6000 hours													
Lubrication		Molywhite RE00													

Speed/Torque Capacity

GCLC-F / GCL-F	Output Speed	020		040		080		110		160		320*		450*	
	RPM	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
Output Torque / Input Power	5	231	0.16	572	0.4	1088	0.76	1499	1.05	2176	11.52	4361	3.04	6135	4.28
	10	188	0.26	465	0.65	885	1.24	1215	1.7	1774	2.48	3538	4.94	4978	6.95
	15	167	0.35	412	0.86	784	1.64	1078	2.26	1568	3.28	3136	6.57	4410	9.24
	20	153	0.43	377	1.05	719	2.01	990	2.76	1441	4.02	2881	8.05	4047	11.3
	25	143	0.50	353	1.23	672	2.35	925	3.23	1343	4.69	2695	9.41	3783	13.2
	30	135	0.57	334	1.40	637	2.67	875	3.67	1274	5.34	2548	10.7		
	40	124	0.70	307	1.71	584	3.26	804	4.49						
	50	115	0.81	287	2.00	546	3.84								
	60	110	0.92	271	2.27	517	4.33								

* GCLC-F Only



GCLC-H	Nominal	050	120	200	320	400	500
Base Ratio *		32.54:1	36.75:1	34.86:1	35.61:1	35.61:1	37.34:1
Exact Base Ratio*		1985/61	36.75/1	1499/43	2778/78	2778/78	3099/38
Moment of Inertia (at Center Drive Gear)	kgcm ²	0.3812	1.0037	2.079	4.568	4.611	11.136
Nominal Output Torque	Nm	490	1176	1961	3136	3920	4900
Acceleration Torque	Nm	1225	3675	4900	7840	9800	12250
Momentary Maximum Allowable Torque (Impact)	Nm	2450	7350	9800	15680	19600	24500
Maximum Output Speed	rpm	50	40	30	25	20	20
Allowable Bending Moment	Nm	1764	3920	8820	20580	26460	34300
Momentary Allowable Bend- ing Moment	Nm	3528	7840	17640	39200	52920	78400
Tilting Rigidity	Nm/arcmin	1960	4263	9800	12740	17640	24500
Torsion Stiffness	Nm/arcmin	255	588	980	1960	2548	3430
Power Density	Nm/kg	32.7	56.0	35.0	39.2	35.6	31.8
Weight	kg	14.6	19.5	55.6	79.5	106	154
Backlash Lost Motion	≤1.0 arcmin ≤1.0 arcmin						
Angular Transmission Accuracy	1.0 arcmin						
Service Life	6000 hours						

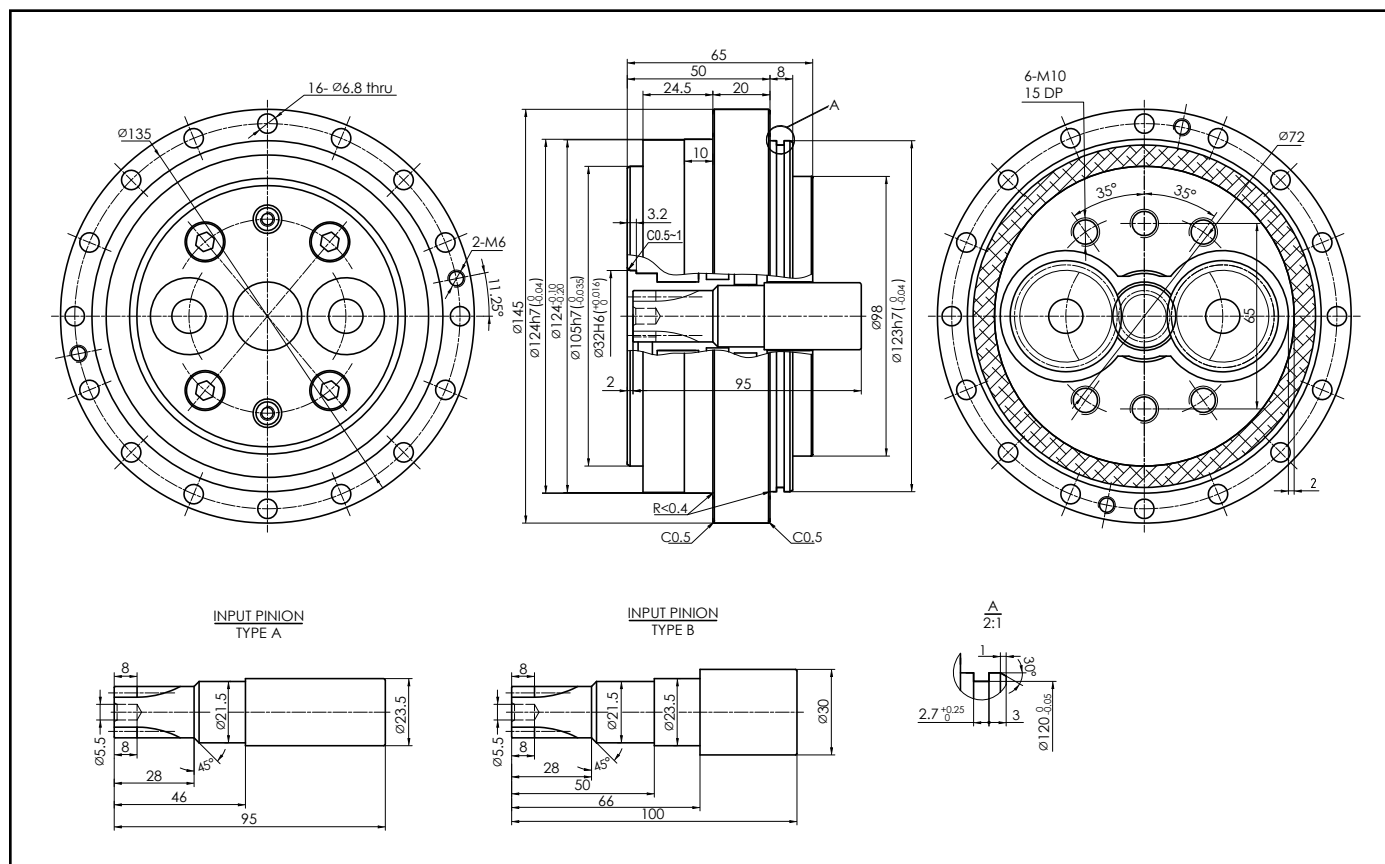
Note: Calculations based on output speed n₂ = 15 rpm

* Base ratio of gearbox, overall ratio determined by input pinion as specified by customer

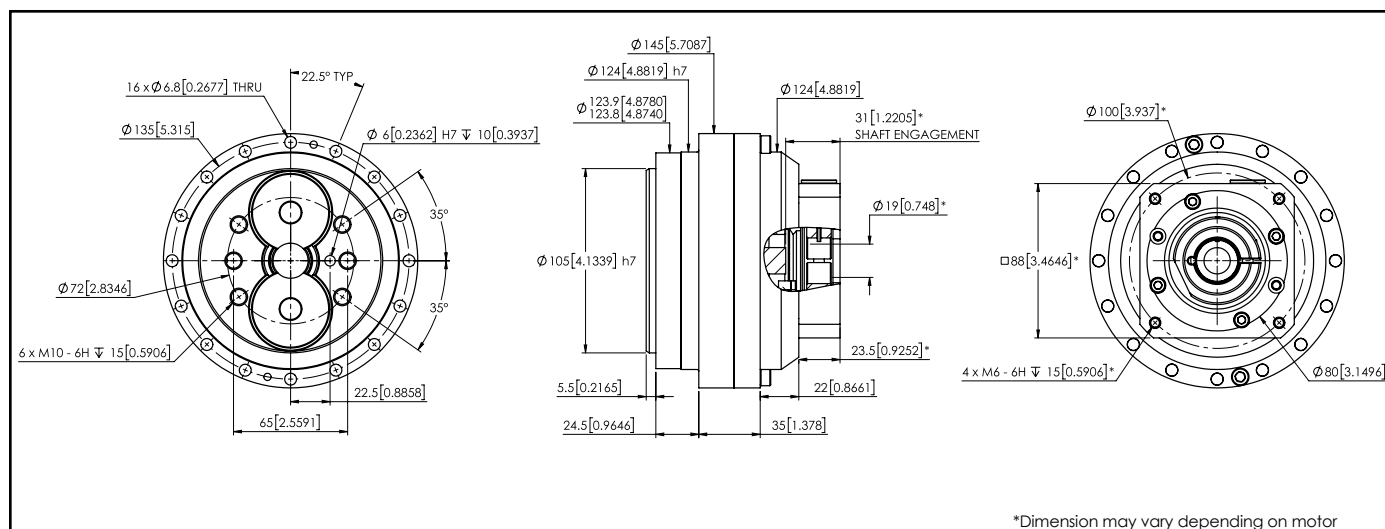
Speed/Torque Capacity

GCLC-H	Output Speed	050		120		200		320		400		500	
	RPM	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
Output Torque / Input Power	5	681	0.48	1634	1.14	2724	1.90	4361	3.04	5449	3.79	6811	4.75
	10	554	0.77	1328	1.85	2215	3.09	3538	4.94	4430	6.17	5537	7.73
	15	490	1.03	1176	2.46	1961	4.11	3136	6.57	3920	8.19	4900	10.26
	20	450	1.26	1079	3.00	1803	5.04	2881	8.05	3598	10.02	4489	12.56
	25	420	1.47	1009	3.51	1686	5.88	2690	9.41				
	30	398	1.67	955	3.99	1597	6.69						
	40	366	2.04	846	4.88								
	50	341	2.38										

GCLC-F-020



GCL-F-020

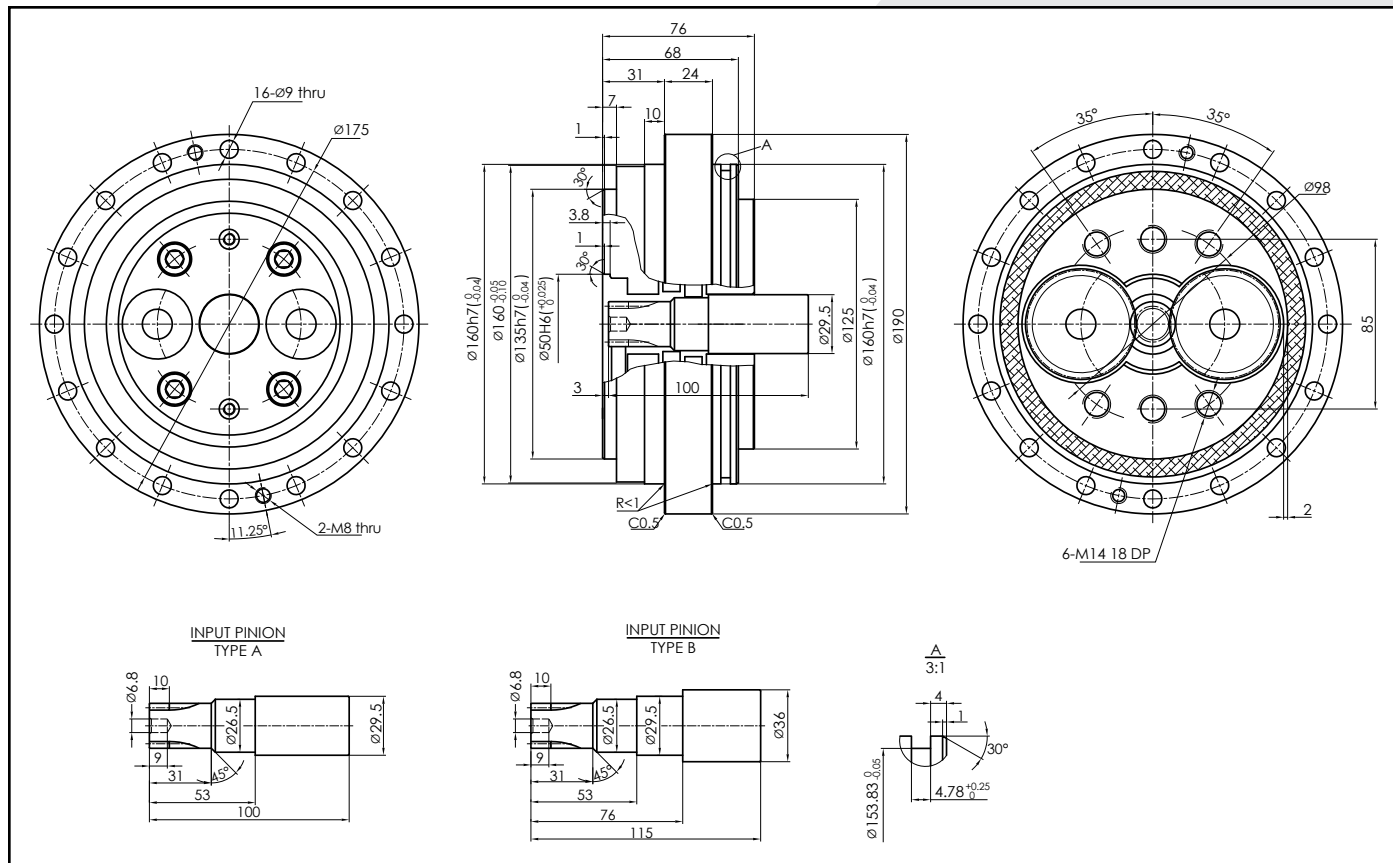


*Dimension may vary depending on motor

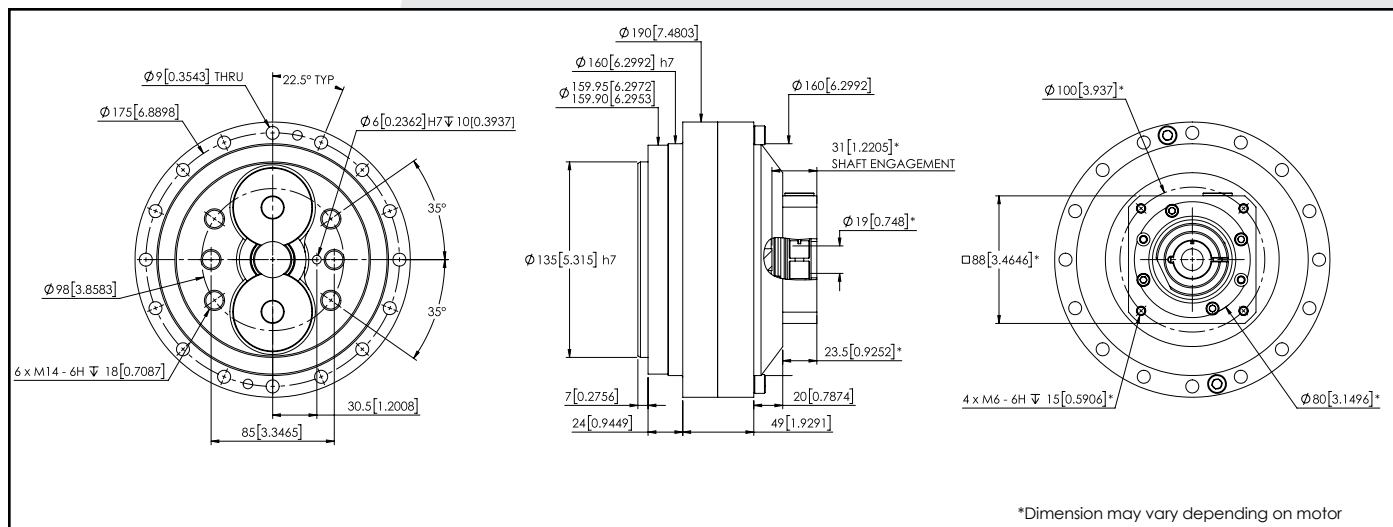
► GCLC-F / GCL-F GEARBOX DIMENSIONS



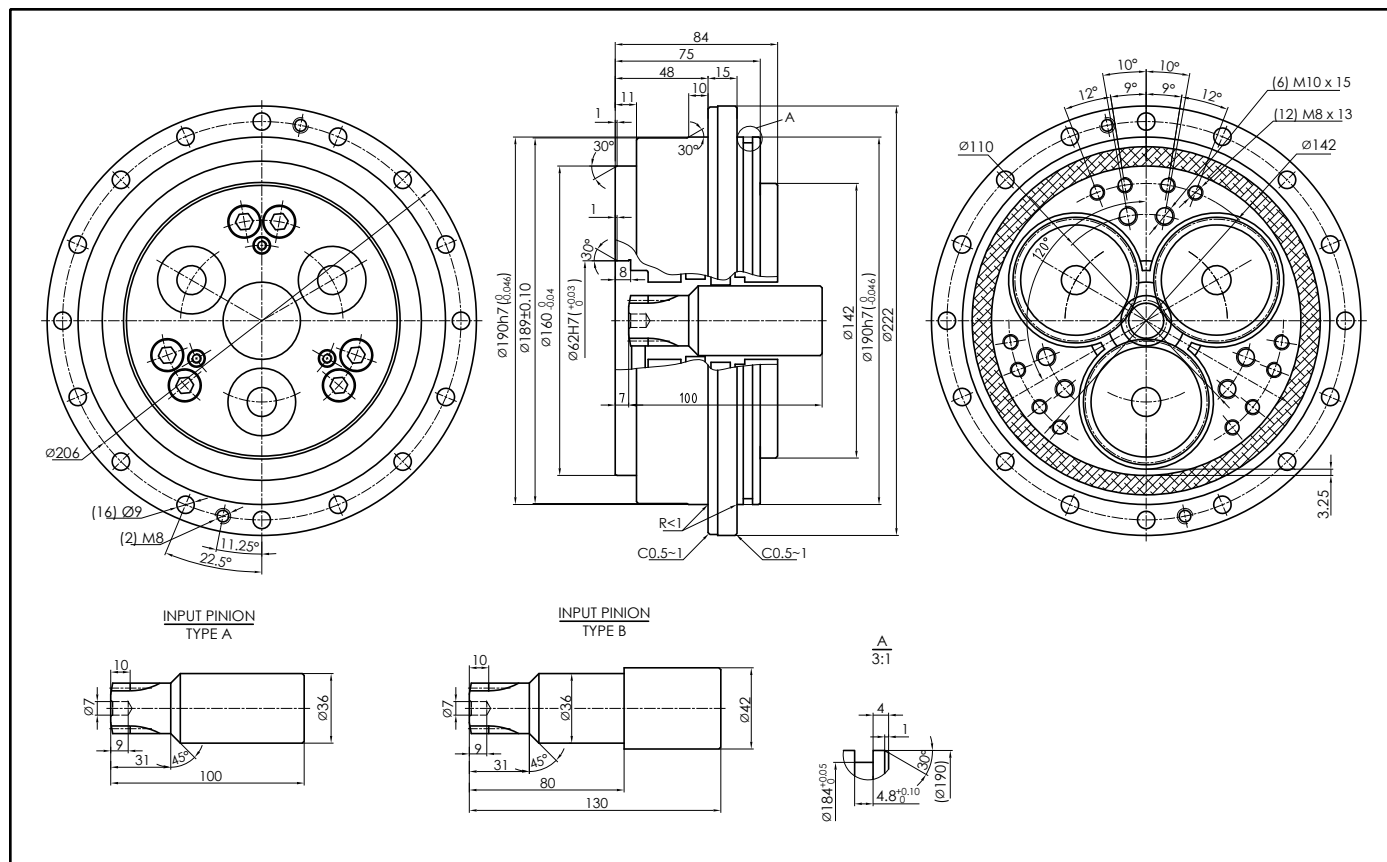
GCLC-F-040



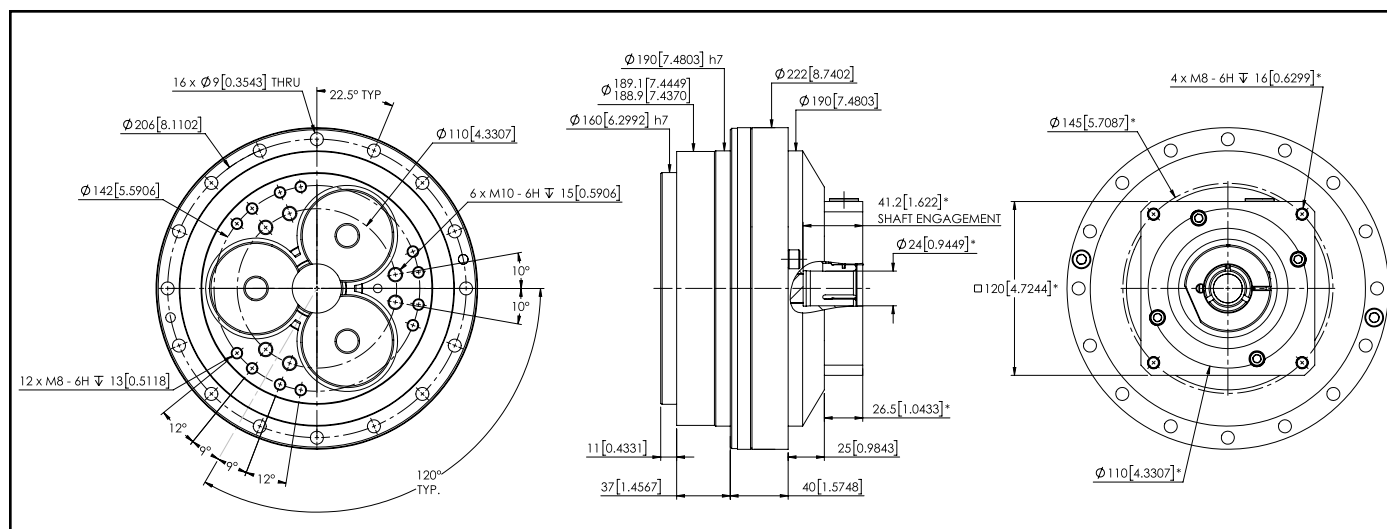
GCL-F-040



GCLC-F-080



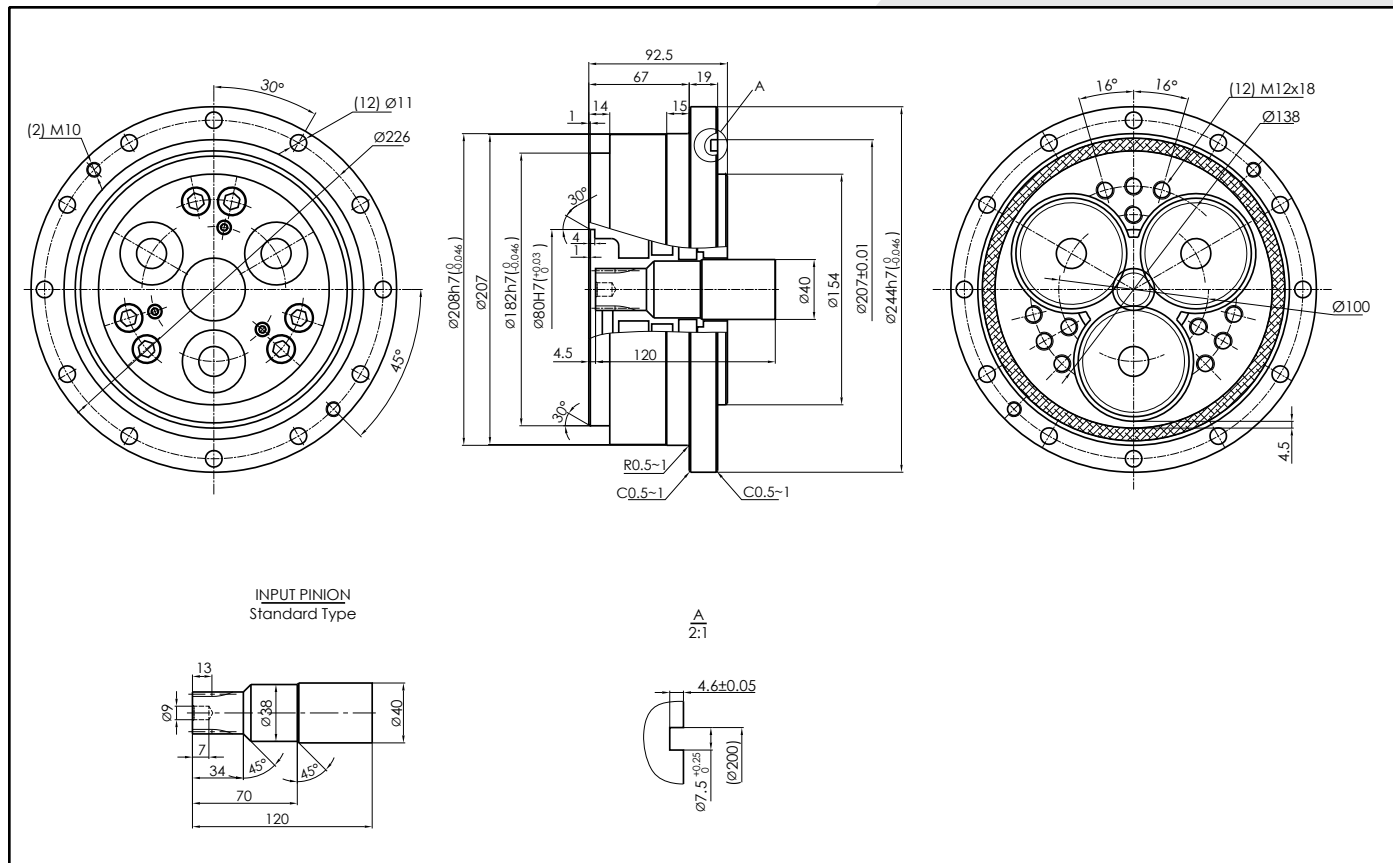
GCL-F-080



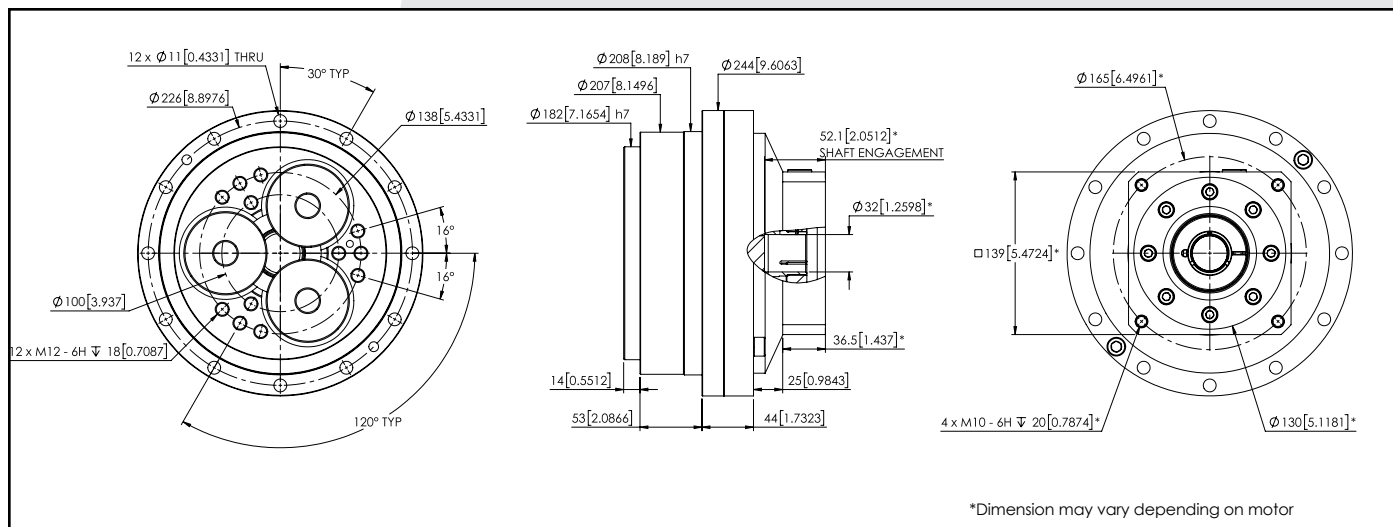
► GCLC-F / GCL-F GEARBOX DIMENSIONS



GCLC-F-110

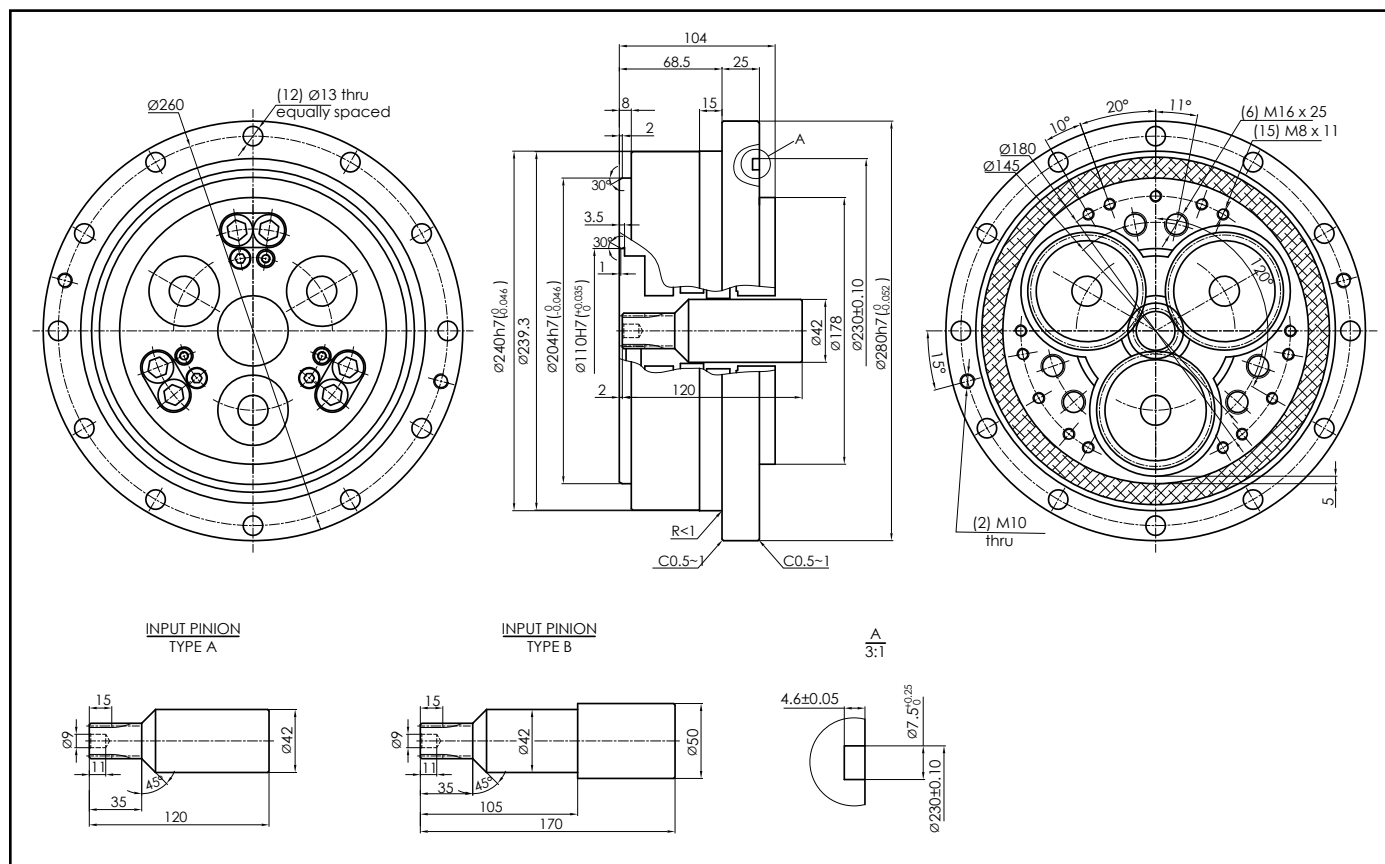


GCL-F-110

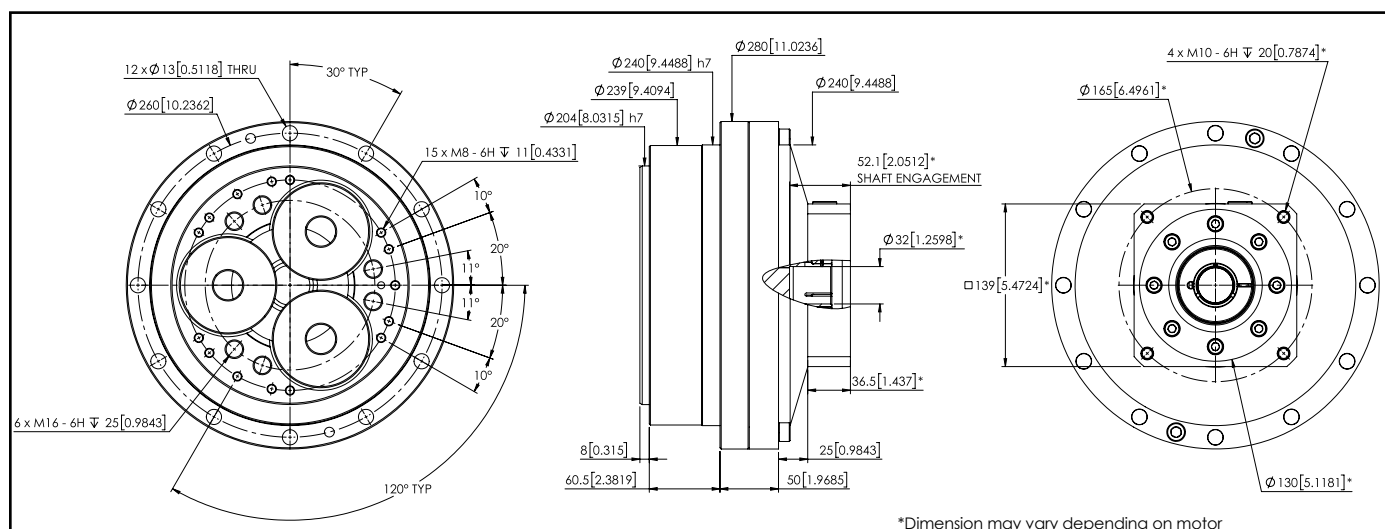


*Dimension may vary depending on motor

GCLC-F-160



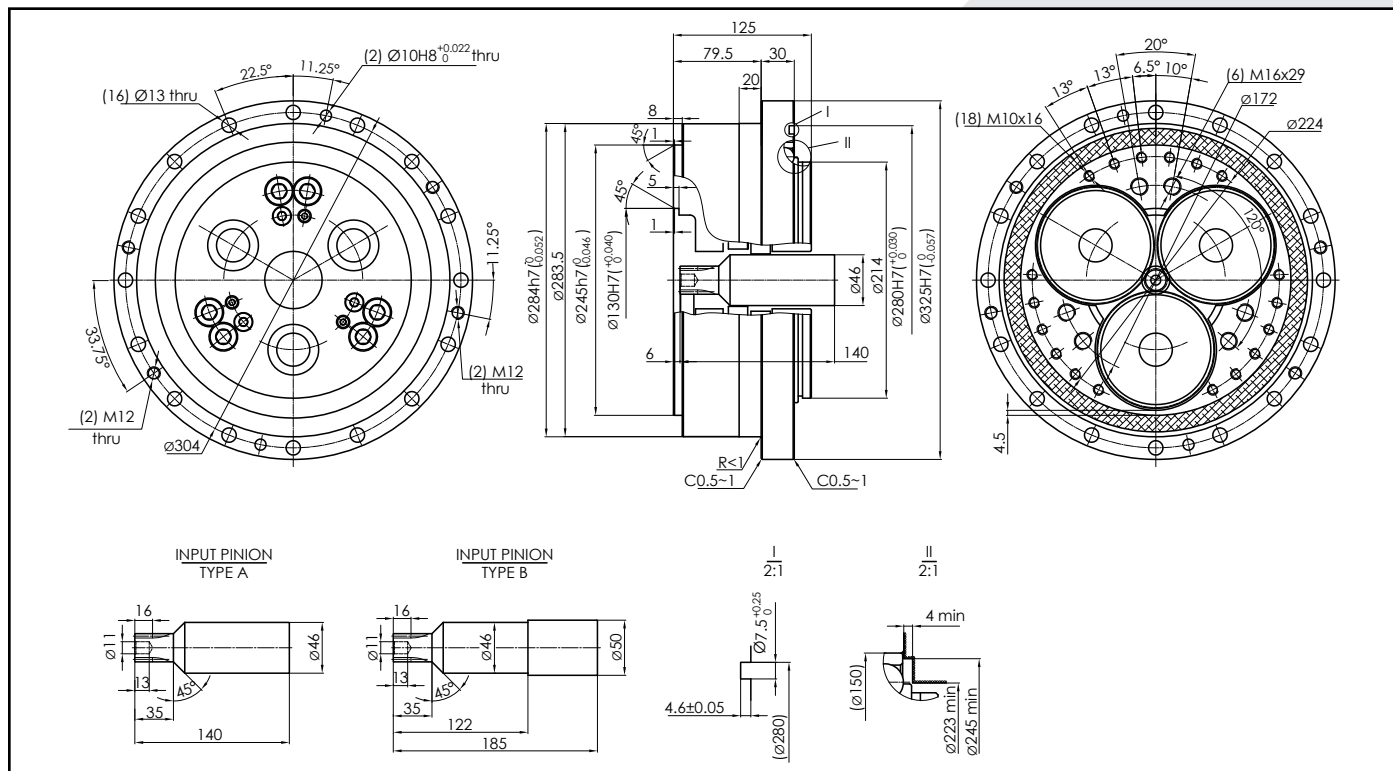
GCL-F-160



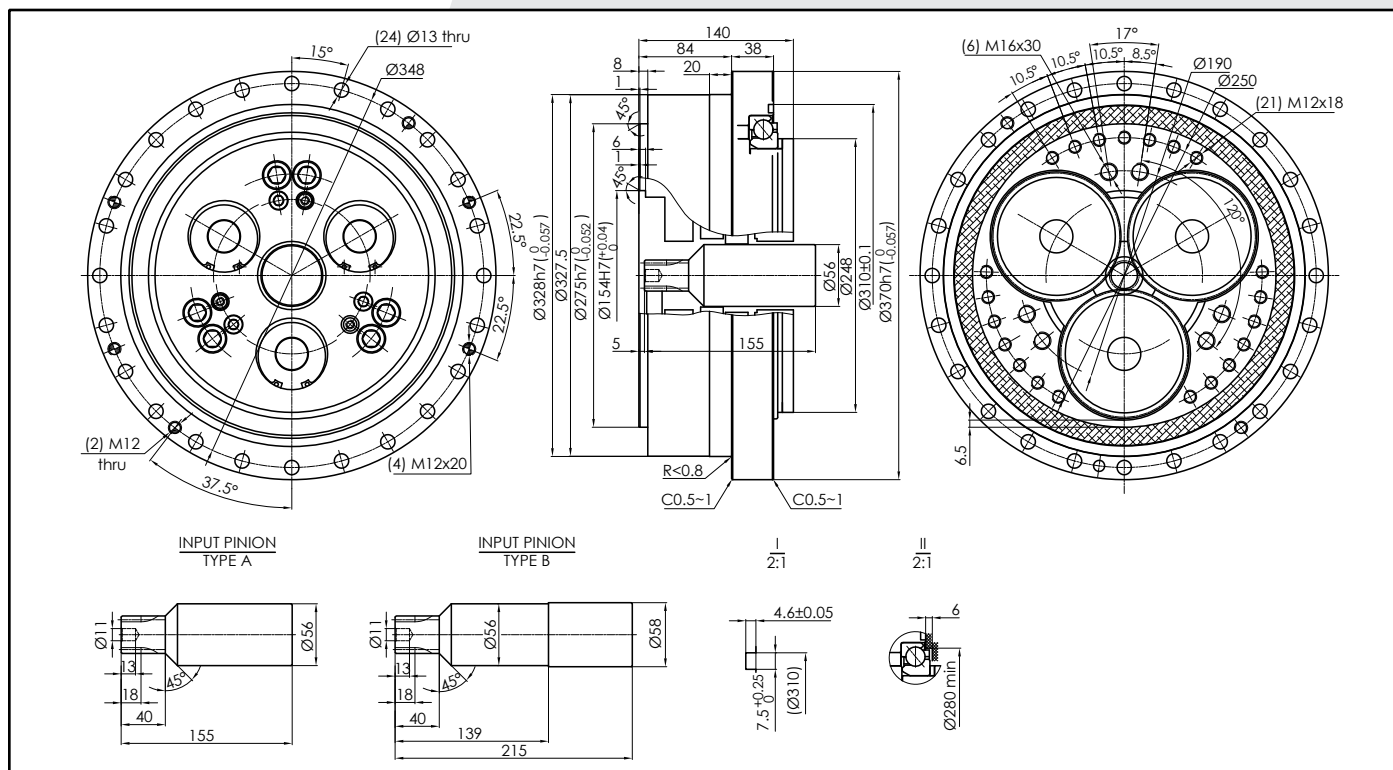
*Dimension may vary depending on motor

► GCLC-F / GCL-F GEARBOX DIMENSIONS

GCLC-F-320



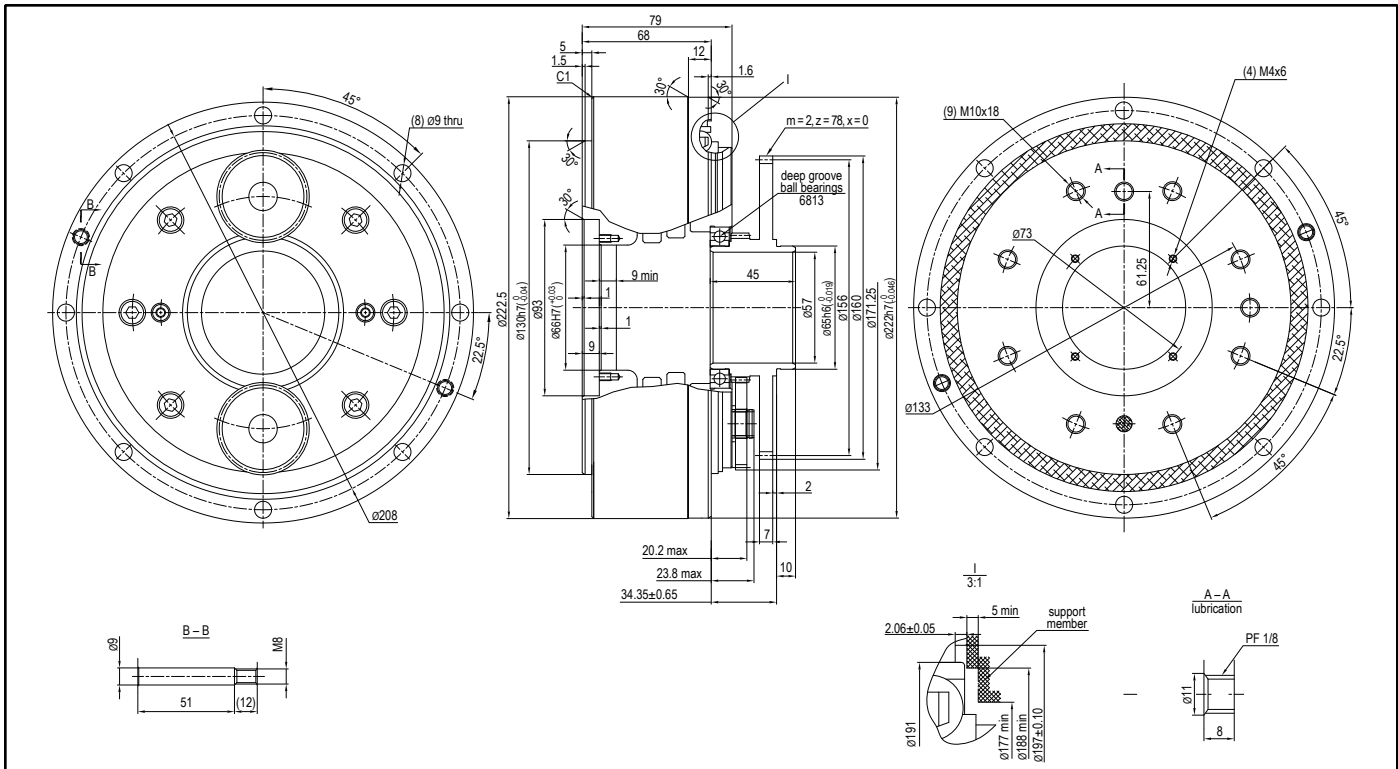
GCLC-F-450



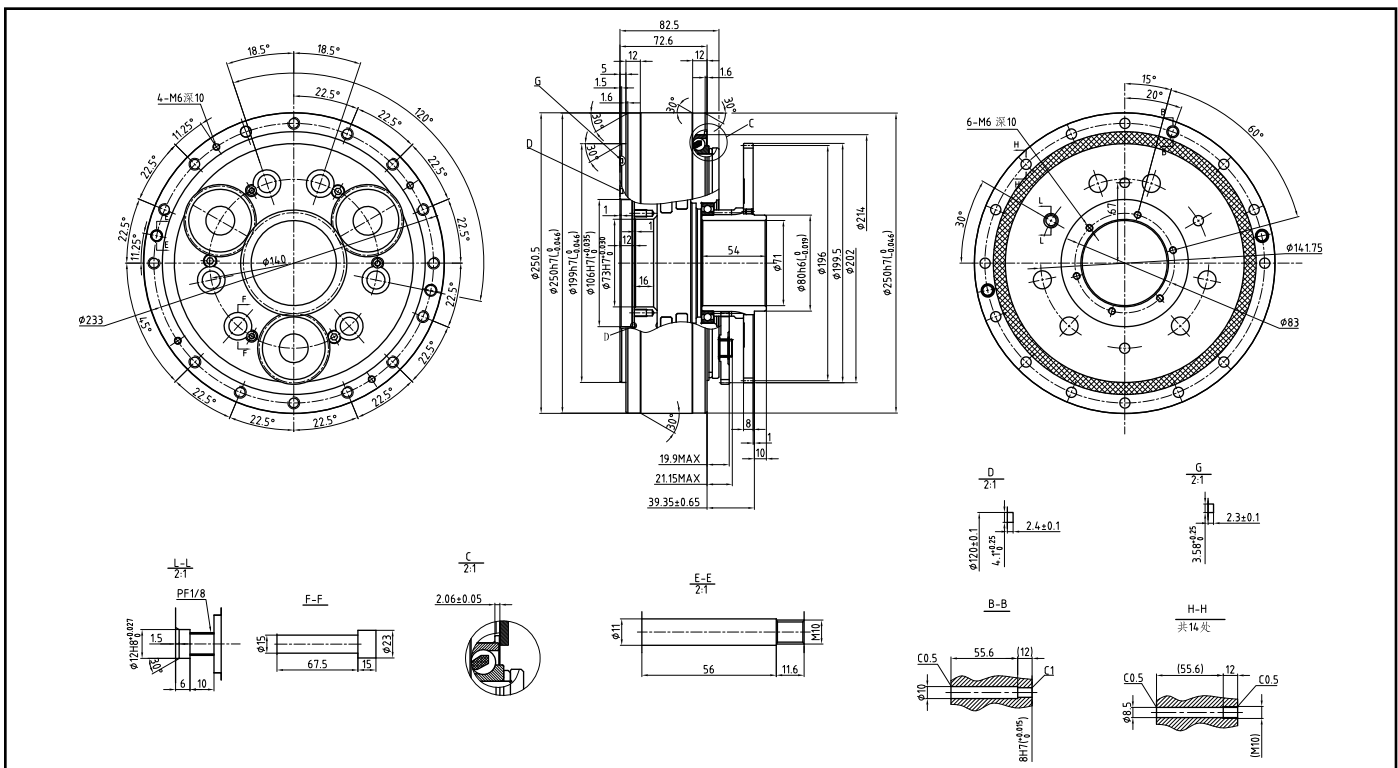


► GCL-H GEARBOX DIMENSIONS

GCLC-H-050

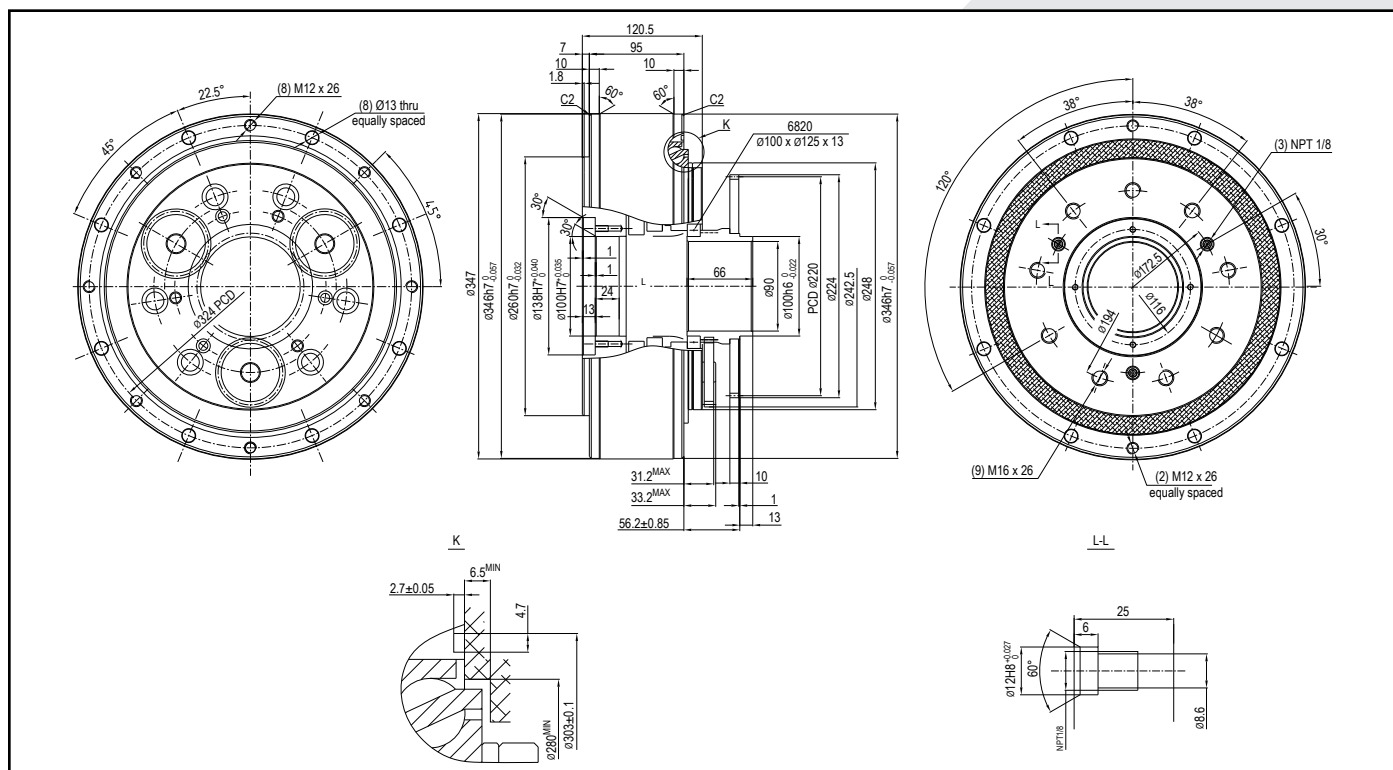


GCLC-H-120

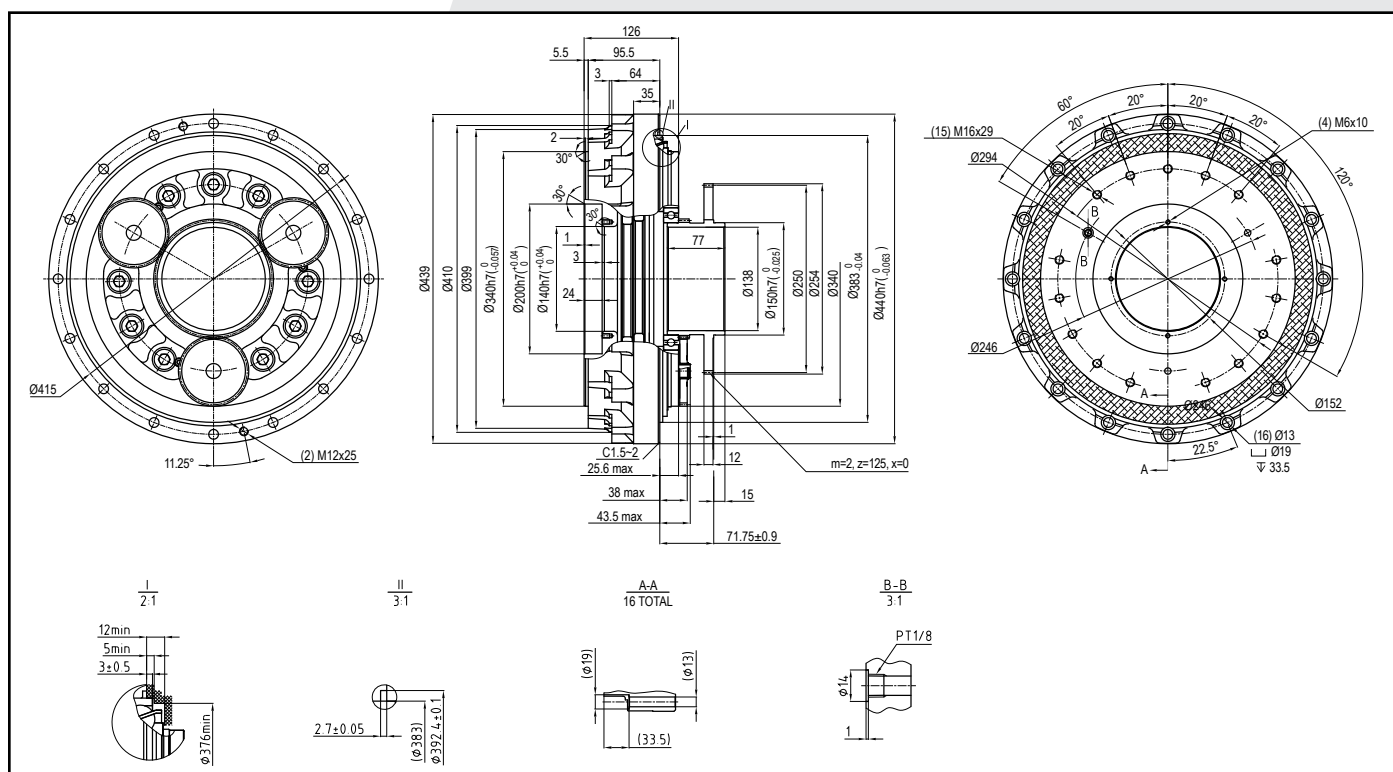


► GCL-H GEARBOX DIMENSIONS

GCLC-H-200



GCLC-H-320

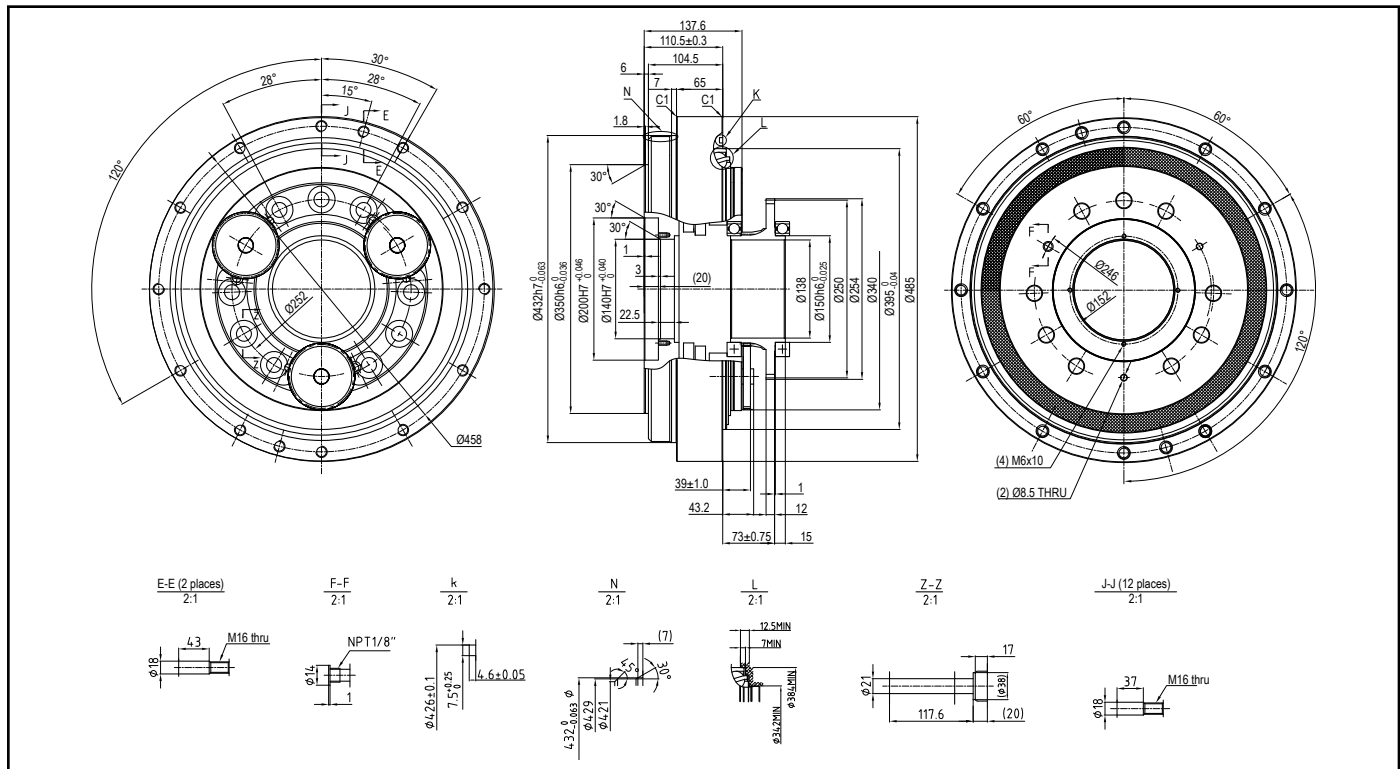




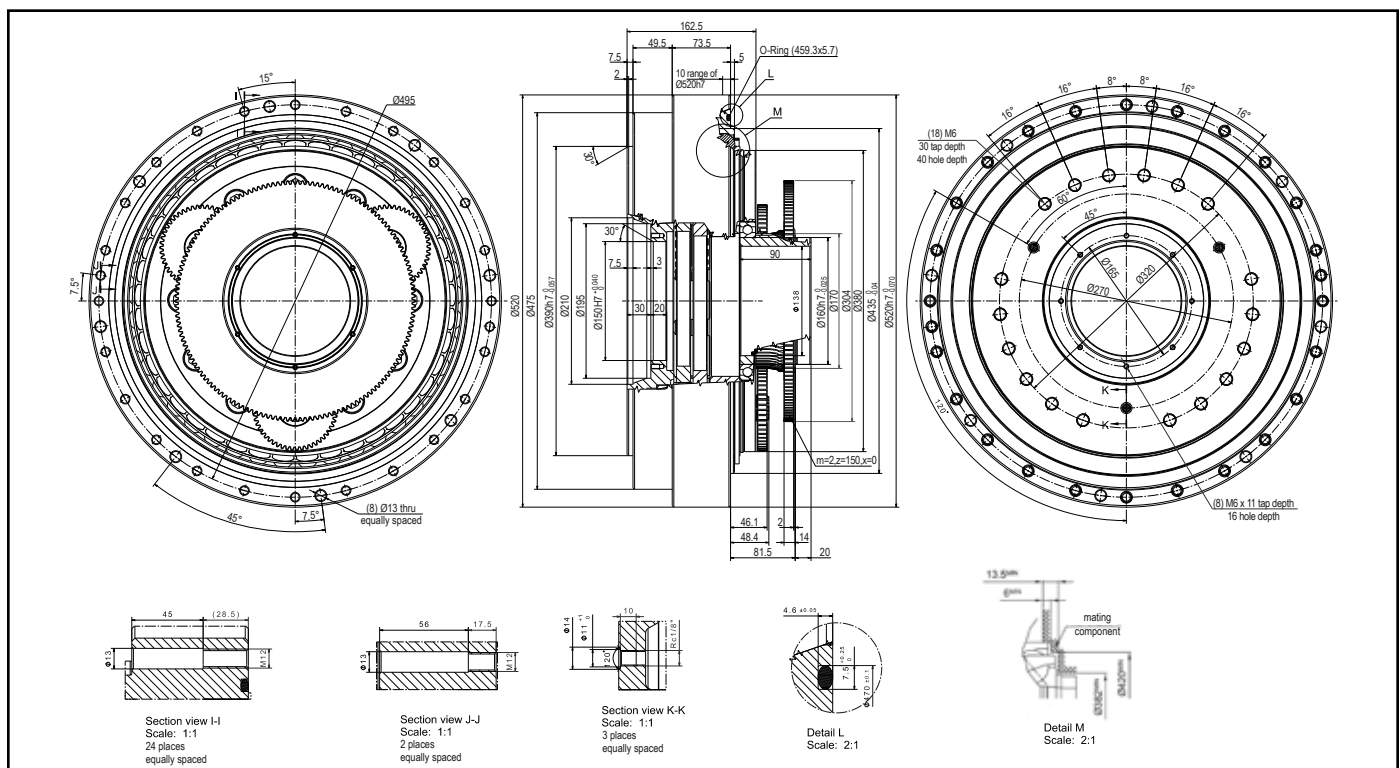
► GCL-H GEARBOX DIMENSIONS

GAM

GCLC-H-400



GCLC-H-500



► GCL SERIES TYPE CODE & MOUNTING OPTIONS

TYPE CODES FOR GCL SERIES

Example: GCL - F - 080 - 121C - M0000 - H0000 - C0000

Gearbox Series

GCL = Inline with cover & integrated input (-F only)
GCLC = Inline component with loose input pinion

Gearbox Style

F = Solid Flange Output
H = Hollow Flange Output

Gearbox Size

F: 020, 040, 080, 110, 160, 320, 450
H: 050, 120, 200, 320, 400, 500

Ratio

See tables below for available ratios and associated type code values

Configuration Code

Assigned by GAM

Output Code

Assigned by GAM

Motor Code

Assigned by GAM

Input Option (GCL-F Only)

C = Clamp

GCL-F Ratios (R:1)

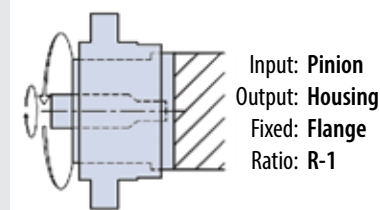
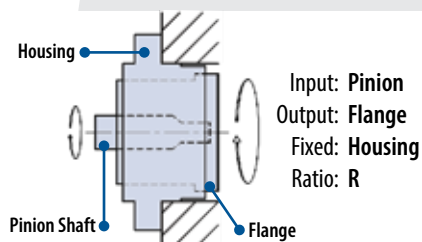
020		040		080		110		160		320		450	
Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code
57:1	057	57:1	057	57:1	057	81:1	081	81:1	081	81:1	081	81:1	081
81:1	081	81:1	081	81:1	081	111:1	111	101:1	101	101:1	101	101:1	101
105:1	105	105:1	105	101:1	101	161:1	161	129:1	129	118.5:1	119	129:1	129
121:1	121	121:1	121	121:1	121	175.28:1	175	145:1	145	129:1	129	153:1	153
141:1	141	153:1	153	153:1	153			171:1	171	141:1	141	171:1	171
161:1	161									153:1	153	192.4:1	192
										171:1	171	201:1	201
										185:1	185	210.23:1	210
										201:1	201	257.84:1	258

GCL-H Ratios (R:1)

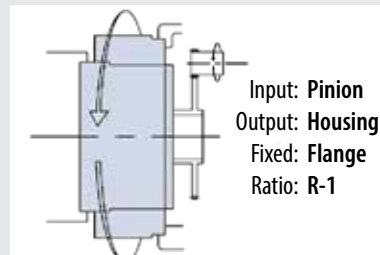
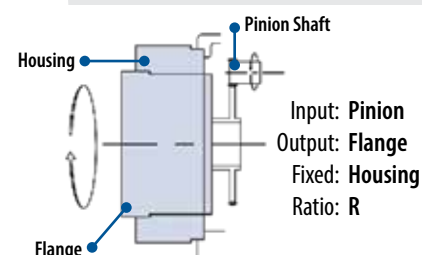
050		120		200		320		320A		400		500	
Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code	Ratio	Type Code
32.54	033	36.75	037	34.86	035	35.61	036			35.61	036	37.34	037

Mounting Options

GCLC-F



GCLC-H





Robotic Strain Wave Gearboxes

GAM's GSL Series Robotic Strain Wave Gearboxes provide zero-backlash and high torque in a small, lightweight gearbox.

- Backlash of ≤ 0.5 arcmin (≤ 30 arcsec)
- High repeatability and positional accuracy for fine positioning
- High reduction ratios in a single stage: 50:1 to 160:1
- Simple design for integration into housing or machine
- High torque density with low inertia
- Drops in for popular competitor gearboxes

Strain Wave Operating Principle

Strain wave gear reducers have three basic components:

Wave Generator

Made up of an elliptical cam and a ball bearing. It is usually attached to the driving component. The inner ring of the bearing is fixed around the cam causing the bearing to deform to an elliptical shape.

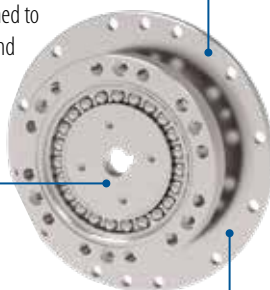


Flexspline

An elastic, thin-walled component with gear teeth on the outer surface. The flexspline is either cup or hat shaped, with a rigid base for transmitting torque. Most commonly the output component

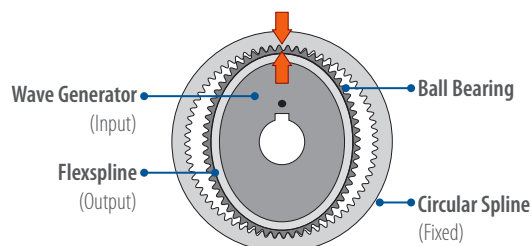
Circular Spline

Rigid steel ring with internal teeth. It has 2 more teeth than the flexspline. Most commonly the fixed component.

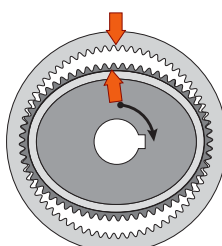


Operation

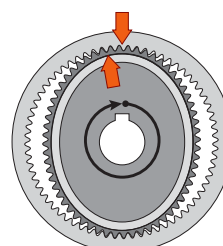
1. The Wave Generator mounts inside the Flexspline forcing the Flexspline into an elliptical shape.
2. The Flexspline teeth engage the Circular Spline teeth along the major axis of the ellipse of the Wave Generator. The Flexspline has two fewer teeth than the Circular Spline.
3. The rotation of the Wave Generator continuously deforms the Flexspline resulting in the teeth engaging and disengaging the teeth of the Circular Spline, rotating the Flexspline in the opposite direction
4. As the Wave Generator moves through 360° , since the Flexspline has two fewer teeth it "runs out" of teeth to engage with the Circular Spline before it gets to the first tooth and so moves two teeth in the opposite direction of the Wave Generator.
5. The distance (degrees) the Flexspline rotates depends on the reduction ratio: at 50:1 it moves $360/50$ or 7.2°



At Input 0° :
Output at 0°



At Input 90° rotation clockwise:
Output has rotated $\frac{1}{2}$ tooth counter-clockwise

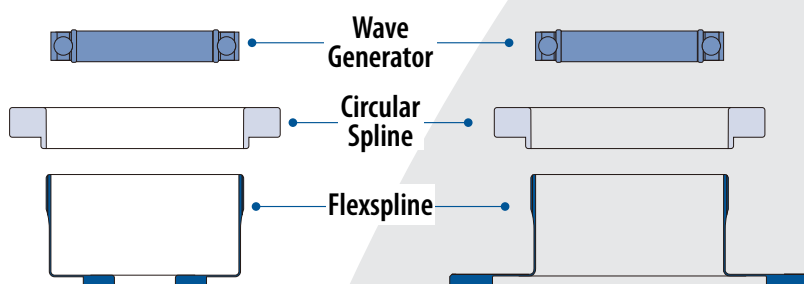


At Input 360° rotation clockwise:
Output has rotated 2 teeth counter-clockwise

► GSL STRAIN WAVE GEARBOX

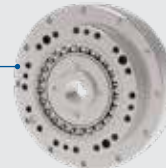
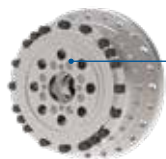
GSL-C: Cup-Style

GSL-H: Hat-Style



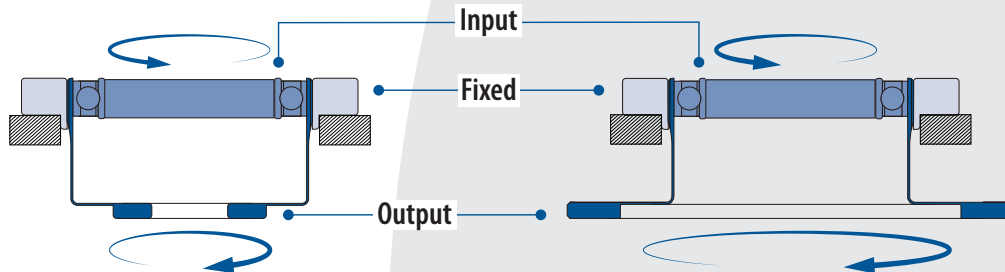
- Cup-shaped flexspline
- Smaller diameter
- Flange output eases mounting of pinions or shafts

- Hat-shaped flexspline
- Lower profile
- Rotating outer housing useful for AGV wheels or robot joints



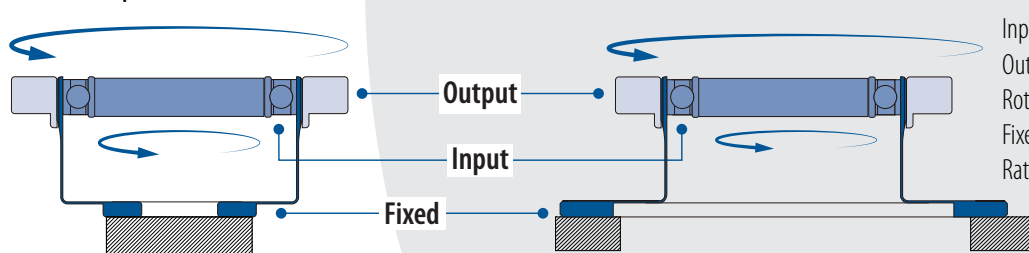
GSL Relative Rotation

Common Operation



Input Wave Generator
Output Flexspline
Rotation Opposite Direction
Fixed Circular Spline
Ratio Ratio, e.g. 50:1

Alternate Operation



Input Wave Generator
Output Circular Spline
Rotation Same Direction
Fixed Flexspline
Ratio Ratio+1, e.g. 51:1

GSL-CS: Standard Profile (Cup)

- Cup-Style Flexspline
- Small diameter



GSL-CS-A/B

- Keyed or set screw input
- Optional Oldham's coupling (B)
- Frame sizes 014-032

GSL-HS: Standard Profile (Hat)

- Hat-Style Flexspline
- Low Profile



GSL-HS-A/B

- Keyed or set screw input
- Optional Oldham's coupling (B)
- Frame sizes 014-032



GSL-HS-C

- Hollow shaft input
- Frame sizes 014-040



GSL-HS-D

- Shaft input
- Frame sizes 014-032



GSL-HS-E

- Includes output bearing but no housing for more complete integration
- Frame sizes 014-032

GSL-_T: Compact/Ultra-Low Profile



GSL-CT-A

- Compact, low profile
- Keyed input
- Cup-style flexspline
- Frame sizes 014-017



GSL-HT-A

- Ultra-low profile
- Keyed input
- Hat-style flexspline
- Frame sizes 014-017

GSLC Components

Includes wave generator, flexspline, and circular spline only for full integration into customer application



GSLC-CS

- Keyed input
- Cup-style flexspline



GSLC-HS

- Keyed input
- Hat-style flexspline

► GSL GEARBOX TYPE CODES



TYPE CODES FOR GSL-C SERIES

Example: GSL - CS - 025 - 050 - A - M0000 - H0000 - C0000

Gearbox Series GSL = With Housing

GSLC = Gearing Only

Gearbox Style C = Cup

Gearbox Profile S = Standard

T = Compact Low Profile (014/017 only)

Gearbox Size 014, 017, 020, 025, 032

Ratio 050, 080, 100, 120, 160 [:1]

Configuration Code (Assigned by GAM)

Output Code (Assigned by GAM)

Motor Code (Assigned by GAM)

Input Design

A = Keyed/Set Screw

B = Keyed/Set Screw with Oldhams Coupling

Series	Style/ Profile	Frame Size	Ratio					Input
			50:1	80:1	100:1	120:1	160:1	
GSL, GSLC	CS	014	x	x	x			A, B
		017	x	x	x			A, B
		020	x	x	x	x		A, B
		025	x	x	x	x		A, B
		032	x	x	x	x	x	A, B
GSL	CT	014	x	x	x			A
		017	x	x	x			A



TYPE CODES FOR GSL-H SERIES

Example: GSL - HS - 025 - 050 - A - M0000 - H0000 - C0000

Gearbox Series GSL = With Housing

GSLC = Gearing Only

Gearbox Style H = Hat

Gearbox Profile S = Standard

T = Compact Low Profile

Gearbox Size 014, 017, 020, 025, 032, 040

Ratio 050, 080, 100, 120, 160 [:1]

Configuration Code (Assigned by GAM)

Output Code (Assigned by GAM)

Motor Code (Assigned by GAM)

Input Design

A = Keyed/Set Screw

B = Keyed/Set Screw with Oldhams Coupling

C = Hollow Shaft

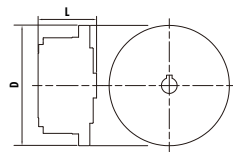
D = Shaft Input

E = Basic with Hollow

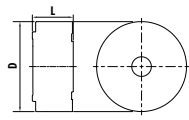
Series	Style/ Profile	Frame Size	Ratio					Input
			50:1	80:1	100:1	120:1	160:1	
GSL, GSLC	HS	014	x	x	x			A, B, C, D, E
		017	x	x	x			A, B, C, D, E
		020	x	x	x	x	x	A, B, C, D, E
		025	x	x	x	x		A, B, C, D, E
		032	x	x	x			A, B, C, D, E
		040			x			C
GSL	HT	014	x	x	x			A
		017	x					A



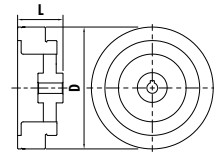
► GSL GEARBOX TECHNICAL SPECIFICATIONS



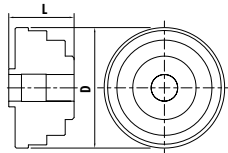
GSL-CS



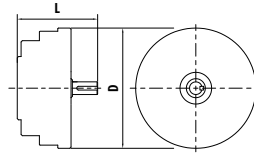
GSL-CT



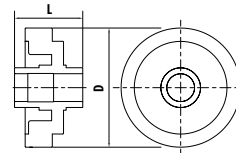
GSL-HS-A/B



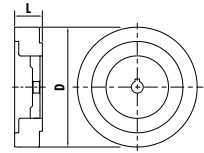
GSL-HS-C



GSL-HS-D



GSL-HS-E



GSL-HT

Gearbox Style			GSL-CS					GSL-CT		GSL-HS						GSL-HT	
Frame Size		Input	014	017	020	025	032	014	017	014	017	020	025	032	040*	014	017
Overall Diameter	mm	A-B-E	72	79	9	107	138	55	62	70	80	90	110	142	-	70	80
		C-D	-	-	-	-	-	-	-	74	84	95	115	147	175	-	-
Overall Length	mm	A-B	41	45	45.5	52	62	25	26.5	28.5	32.5	33.5	37	37	44	17.5	18.5
		C-E	-	-	-	-	-	-	-	52.5	56.5	51.5	55.5	65.5	79	-	-
		D	-	-	-	-	-	-	-	50.5	56	63.5	72.5	84.5	-	-	-
Weight	kg	A-B	0.51	0.67	0.94	1.5	3.15	0.35	0.45	0.39	0.56	0.73	1.23	2.54	-	0.35	0.45
		C	-	-	-	-	-	-	-	0.71	0.98	1.34	2.04	4.2	7.2	-	-
		D	-	-	-	-	-	-	-	0.66	0.9	1.28	1.99	4.1	-	-	-
		E	-	-	-	-	-	-	-	0.55	0.7	0.98	1.5	3.15	-	-	-
Nominal Torque	Nm	50:1	7.9	29.9	39	63	124	4.8	18	7.9	29.9	39	63	124		4.8	18
		80:1	12.7	31	54	100	192	5.9	21	12.7	31	54	100	192		5.9	
		100:1	12.7	45	56	124	248	7.7	27	12.7	45	56	124	248	432	7.7	
		120:1			56	124	248					56	124				
		160:1					248					56					
Acceleration Torque	Nm	50:1	20.7	39	64.4	113	248	12	23	20.7	39	64.4	113	248		12	23
		80:1	27	49.5	85	158	350	16	30	27	49.5	85	158	350		16	
		100:1	32	62	94.3	181	383	19	37	32	62	94.3	181	383	660	19	
		120:1			100	192	406					100	192				
		160:1					428					100					
Emergency Stopping Torque	Nm	50:1	40.3	80.5	112.7	213.9	439	24	48	40.3	80.5	112.7	213.9	439		24	48
		80:1	54.1	100.1	146.1	293.3	653	31	58	54.1	100.1	146.1	293.3	653		31	
		100:1	62.1	124.2	169.1	326.6	744	35	71	62.1	124.2	169.1	326.6	744	1232	35	
		120:1			169.1	349.6	789					169.1	349.6				
		160:1					789					169.1					
Rated Torque at 2000 rpm Input Speed	Nm	50:1	6.2	18.4	28.8	44.9	87.4	3.7	11	6.2	18.4	28.8	44.9	87.4		3.7	11
		80:1	9	25.3	39.1	72.5	135.7	4.2	14	9	25.3	39.1	72.5	135.7		4.2	
		100:1	9	27.6	46	77.1	157.6	5.4	16	9	27.6	46	77.1	157.6	308	5.4	
		120:1			46	77.1	157.6					46	77.1				
		160:1					157.6					46					
Average Allowable Input Speed		RPM	3,000 RPM					3,500 RPM		3,000						3500	
Maximum Input Speed		RPM	7,000	6,500	5,600	4,800	4,000	8,500	7,300	7000	6500	5600	4800	4000	400	8500	7300
Backlash		arcsec	≤30														
Life		hours	15,000					7,000	10,000	15,000						7,000	10,000

Drawings and information contained herein are for reference only. Please contact GAM for application specific drawings.

► GSL MAIN BEARING SPECIFICATIONS

GAM GSL Series Gearboxes use cross roller bearings for external load support

GSL-C (Cup Style) Bearing Specifications

Size	Basic Rated Load				Allowable Static Moment Mc		Mass
	Dynamic Load (Cr)		Static Load Cr				
	kN	kgf	kN	kgf	Nm	kgfm	kg
014	4.7	480	6.07	620	41	4.2	0.22
017	5.2	540	7.55	770	64	6.5	0.3
020	5.8	590	9	920	91	9.3	0.38
025	9.6	980	15.1	1540	156	16	0.6
032	15	1530	25.1	2550	313	32	1.1

GSL-HS (Hat Style) Bearing Specifications

Size	Basic Rated Load				Allowable Static Moment Mc		Mass
	Dynamic Load (Cr)		Static Load Cr				
	kN	kgf	kN	kgf	Nm	kgfm	kg
014	4.7	480	6.07	620	41	4.2	0.22
017	5.2	540	7.55	770	64	6.5	0.3
020	5.8	590	9	920	91	9.3	0.38
025	9.6	980	15.1	1540	156	16	0.6
032	15	1530	25.1	2550	313	32	1.1
040	25.3	49.5	31	100.1	6,500	3,000	30

Basic rated dynamic load = static radial load for 1 million cycles of gearbox

Basic static load = static load exerting contact stress (4kN/mm) at the center point between rotor of bearing maximum load and contact part of pathway.

Allowable Static Moment = the maximum allowable torque exerted on output bearing

GSL-C (Cup Style) Starting Torque (cNm)

Size Ratio	014	017	020	025	032
50	5.85	8.7	11.2	22	44
80	4	5.7	7	13	27
100	3.6	4.8	6	17.6	26
120	-	4.4	5.5	10.5	22
160	-	-	-	-	19.5

GSL-HS-C (Hat Style with Hollow Input) Starting Torque (cNm)

Size Ratio	014	017	020	025	032	040
50	11.5	35	46.8	73	110	-
80	9.8	32.5	43	65	96	-
100	9	31	41.5	76	93	118
120	-	31	40	62.5	88	-
160	-	-	-	-	87	-

GSL-HS-D (Hat Style with Input Shaft) Starting Torque (cNm)

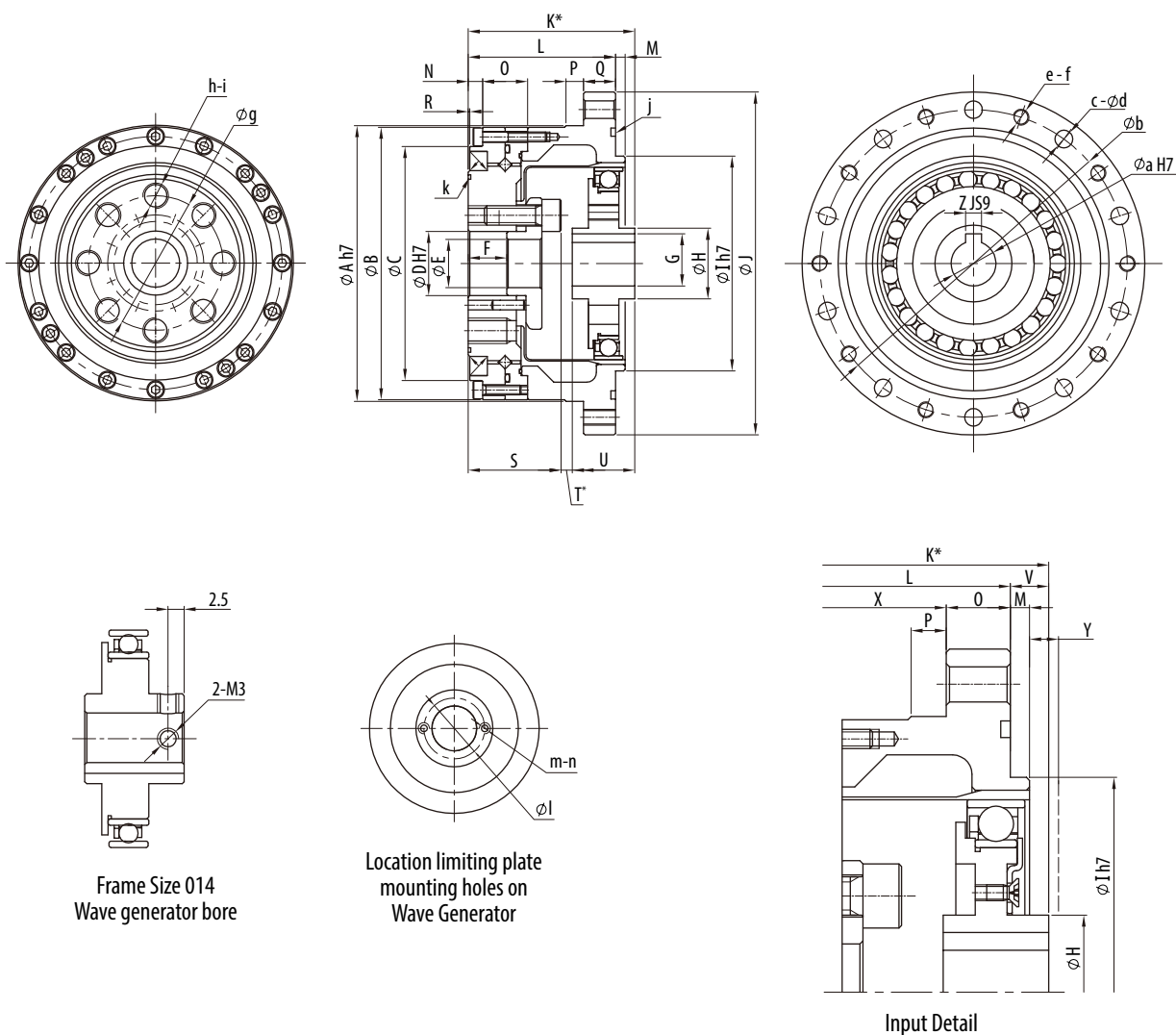
Size Ratio	014	017	020	025	032
50	7.5	12.6	18	28	54
80	5.7	16.5	25	19.5	37
100	4.8	8.5	12.8	18	35
120	-	8	12	17	31
160	-	-	-	-	30

► GSL-CS-A GEARBOX



GSL-CS-A

- Keyed or set screw input
- Cup-style flexspline
- Frame sizes 014-032



NOTE: (Note) Please notice that length of bolt mesh should be kept within the depth of internal thread. In particular, the flexspline will be damaged if the size of code is exceeded. E position is through-hole shape which leads to inside of the product. The size of • in figure is reference dimension of installation, please comply with requirements of such installation size.

NOTE: The output flange varies by size. Contact GAM for details or download the CAD model at www.gamweb.com

► GSL-CS-A GEARBOX DIMENSIONS

Dimension (mm)	014	017	020	025	032
Ø A h7	56	63	72	86	113
Ø B	55	62	70	85	112
Ø C	42.5	49.5	58	73	96
Ø D H7	11	10	14	20	26
Ø E	8	7	10	15	20
F	9.4	9.5	9	12	14.2
G	9.4	9.4	9.4	16.3	21.8
Ø H	14	16	22	22	35
Ø I h7	38	48	56	67	90
Ø J	73	79	93	107	138
K	41	45	45.5	52	62
L	36	37	38	46	57
M	2	2	3	3	3
N	4.5	2.5	4	3.5	5.3
O	12	12	12.5	14	17
P	4	4	5.5	5.5	5.5
Q	7	8	10	10	12
R	0.5	0.5	0.5	0.5	1
S	21.4	23.5	23	29	36.2
T	4.1	2.5	4	3.5	5.3
U	15.5	19	18.5	19.5	20.5
V	5	6	4.5	6	5
X	27	29	28	36	45
Y	1	1	1.5	1.5	1.5
Z JS9	3	3	3	5	6
Ø a H7	8	8	8	14	19
Ø b	65	71	82	96	125
c	8	8	8	10	12
Ø d	4.5	4.5	5.5	5.5	6.5
e	8	8	8	10	12
f	M4	M4	M5	5	M6
Ø g	23	27	32	42	55
h	6	6	8	8	8
i	M4	M5	M6	M8	M10
j	50x2	56x2	67x2	80x2	105x2
k	29x0.5	34.5x0.8	40.5x1.2	53x1	69x2
Ø l	-	12	18	18	26
m	-	2	2	2	2
n	-	M2.5	M2.5	M2.5	M3

* Position and tolerance of GSL as assembled (wave generator, flexspline, and circular spline). These are critical dimensions which determine the axial position of the wave generator and must be within the specified tolerance for proper operation of the gearbox.

NOTE: The GSL is shipped with the wave generator unassembled from the gearbox for ease of mounting to the input driver

Drawings and information contained herein are for reference only. Please contact GAM for application specific drawings.

► GSL-CS-B GEARBOX DIMENSIONS

Dimension (mm)	014	017	020	025	032
ØA h7	56	63	72	86	113
ØB	55	62	70	85	112
ØC	42.5	49.5	58	73	96
ØD H7	11	10	14	20	26
ØE	8	7	10	15	20
ØF	9.4	9.5	9	12	14.2
G	-	-	12.8	16.3	16.3
ØH	14	18	21	26	26
ØI h7	38	48	56	67	90
ØJ	73	79	93	107	138
K	41	45	45.5	52	62
L	34	37	38	46	57
M	2	2	3	3	3
N	4.5	4.5	4	4.5	5.5
O	7	12	12.5	14	17
P	4	4	5.5	5.5	5.5
Q	7	8	10	10	12
R	0.5	0.5	0.5	0.5	1
S	21.4	23.5	23	29	36.2
T	2.6	2.5	2.5	3.5	2.2
U	17	19	20	19.5	23.6
V	2	8	7.5	6	5
X	27	29	28	36	45
Y	1	1	1.5	1.5	1.5
Z JS9	-	-	4	5	5
Øa H7	6	8	11	14	14
Øb	65	71	82	96	125
c	8	8	8	10	12
ØD H7	4.5	4.5	5.5	5.5	6.5
e	8	8	8	10	12
f	M4	M4	M5	M5	M6
Øg	23	27	32	42	55
h	6	6	8	8	8
i	M4	M5	M6	M8	M10
j	50x2	56x2	67x2	80x2	105x2
k	29x0.5	34.5x0.8	40.5x1.2	53x1	69x2

* Position and tolerance of GSL as assembled (wave generator, flexspline, and circular spline). These are critical dimensions which determine the axial position of the wave generator and must be within the specified tolerance for proper operation of the gearbox.

NOTE: The GSL is shipped with the wave generator unassembled from the gearbox for ease of mounting to the input driver

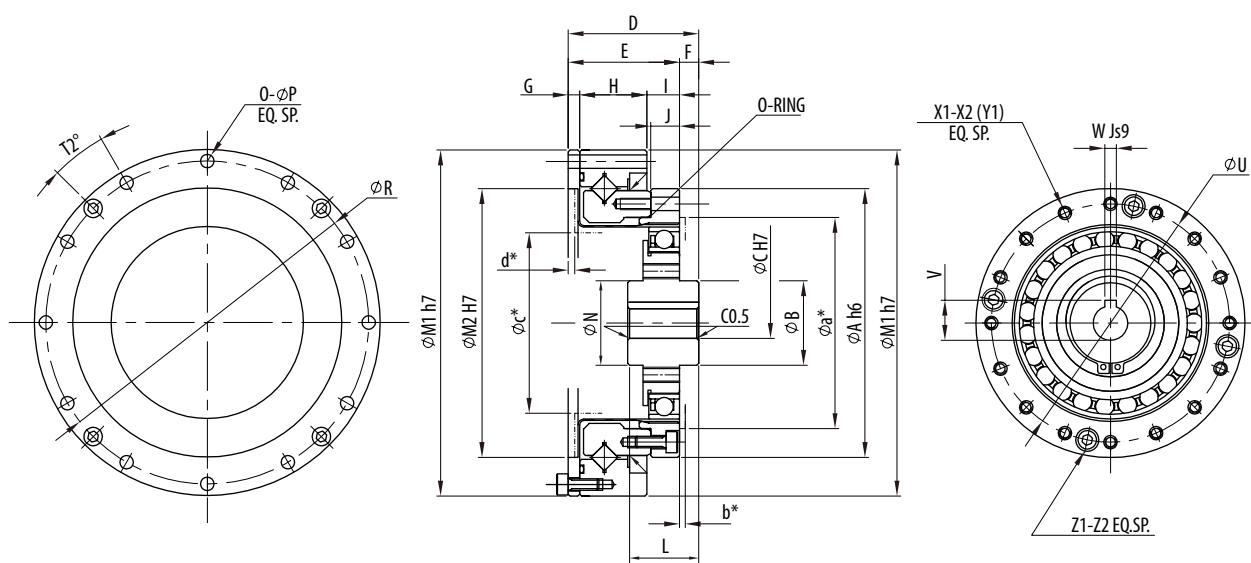
Drawings and information contained herein are for reference only. Please contact GAM for application specific drawings.

▶ GSL-HS-A GEARBOX DIMENSIONS



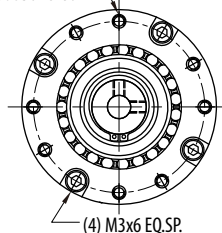
GSL-HS-A

- Keyed or set screw input
- Hat-style flexspline
- Frame sizes 014-032



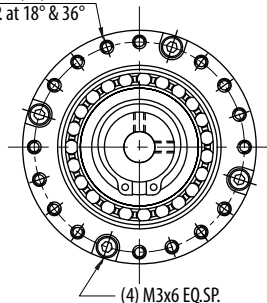
Frame Size 014

(X1) X2: (8) M3x6
EQ. SP. at 30° & 60°

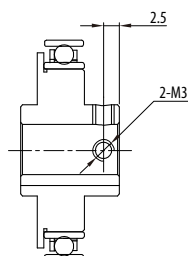


Frame Size 017

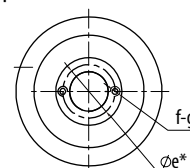
(X1) X2: (16) M3x6
EQ. SP. at 18° & 36°



Size 014 Wave Generator Set screw only input bore



Mounting holes in wave generator for input stop



► GSL-HS-A GEARBOX DIMENSIONS

Dimension (mm)	014	017	020	025	032
ØA h6	50	60	70	85	110
ØB	14	16	22	24	30
ØC H7	8	8	8	14	19
D	28.5 $^{0}_{-0.1}$	32.5 $^{0}_{-0.1}$	33.5 $^{0}_{-0.1}$	37 $^{0}_{-0.1}$	44 $^{0}_{-0.1}$
E	23.5	26.5	29	34	42
F	5	6	4.5	3	2
G	2.4	3	3	3.3	3.6
H	14.1	16	17.5	18.7	23.4
I	7	7.5	8.5	12	15
J	6	6.5	7.5	10	14
L	15.5 $^{0}_{-0.1}$	19 $^{0}_{-0.1}$	18.5 $^{0}_{-0.1}$	19.5 $^{0}_{-0.1}$	20.5 $^{0}_{-0.1}$
M1 h7	70	80	90	110	142
M2 H7	48*	60	70	88	114
ØN	14	16	22	22	35
O	8	12	12	12	12
ØP	3.5	3.5	3.5	4.5	5.5
ØR	64	74	84	102	132
T2	22.5°	15°	15°	15°	15°
ØU	44	54	62	77	100
V	9.4 $^{+0.1}_{0}$	9.4 $^{+0.1}_{0}$	9.4 $^{+0.1}_{0}$	16.3 $^{+0.1}_{0}$	21.8 $^{+0.1}_{0}$
W Js9	3	3	3	5	6
X1	See drawing on page 46		16	16	16
X2	M3x6	M3x6	M3x6	M4x8	M5x10
Y1	3.5x6	3.5x6.5	3.5x7.5	4.5x10	5.5x14
Z1	4	4	4	4	4
Z2	M3x6	M3x6	M3x8	M3x10	M4x16
Øa*	36.5	45	54.5	64.5	86
Øb*	1	1	1.5	1.5	2
c*	31	38	48	58	77
d*	1.2	1.7	1.7	1.9	2.1
Øe	-	12	18	18	26
f	-	2	2	2	2
g	-	M2.5	M2.5	M2.5	M3

* Position and tolerance of GSL as assembled (wave generator, flexspline, and circular spline). These are critical dimensions which determine the axial position of the wave generator and must be within the specified tolerance for proper operation of the gearbox.

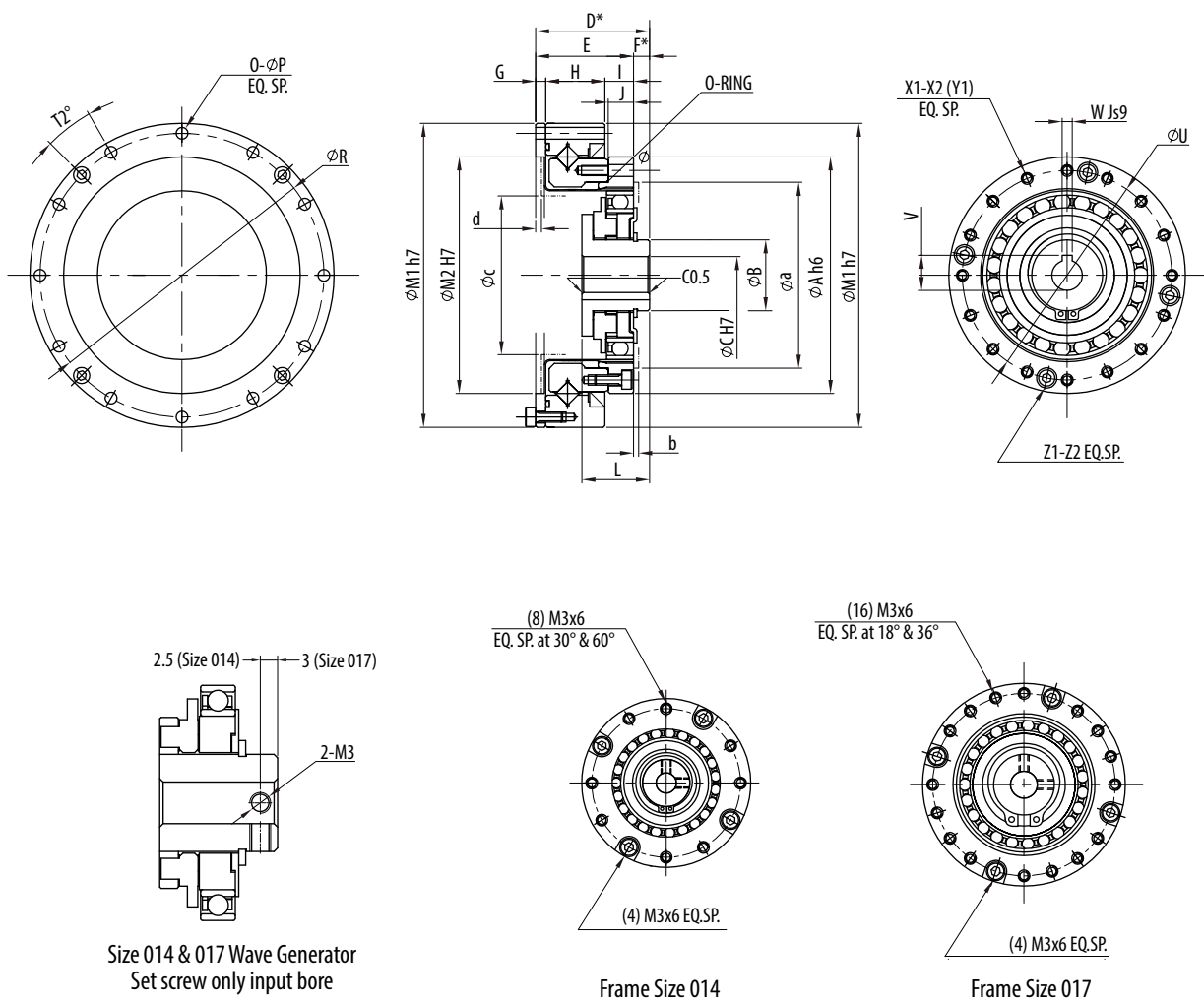
Drawings and information contained herein are for reference only. Please contact GAM for application specific drawings.

► GSL-HS-B GEARBOX DIMENSIONS



GSL-HS-B

- Keyed or set screw input
- Oldham's coupling accomodates slight parallel misalignment
- Hat-style flexspline
- Frame sizes 014-032



► GSL-HS-B GEARBOX DIMENSIONS

Dimension (mm)	014	017	020	025	032
ØA h6	50	60	70	85	110
ØB	14	18	21	26	26
ØC H7	6	8	11	14	14
D	28.5 $^{0}_{-0.1}$	32.5 $^{0}_{-0.1}$	33.5 $^{0}_{-0.1}$	37 $^{0}_{-0.1}$	44 $^{0}_{-0.1}$
E	23.5	26.5	29	34	42
F	5	6.5	4.5	3.5	2
G	2.4	3	3	3.3	3.6
H	14.1	16	17.5	18.7	23.4
I	7	7.5	8.5	12	15
J	6	6.5	7.5	10	14
L	17 $^{0}_{-0.1}$	19 $^{0}_{-0.1}$	20 $^{0}_{-0.1}$	19.5 $^{0}_{-0.1}$	23.6 $^{0}_{-0.1}$
M1 h7	70	80	90	110	142
M2 H7	48*	60	70	88	114
O	8	12	12	12	12
ØP	3.5	3.5	3.5	4.5	5.5
ØR	64	74	84	102	132
T2	22.5°	15°	15°	15°	15°
ØU	44	54	62	77	100
V	-	-	12.8 $^{+0.1}_{0}$	16.3 $^{+0.1}_{0}$	21.8 $^{+0.1}_{0}$
W Js9	3	3	3	5	6
X1	See drawing on page 48		16	16	16
X2	M3x6	M3x6	M3x6	M4x8	M5x10
Y1	3.5x6	3.5x6.5	3.5x7.5	4.5x10	5.5x14
Z1	4	4	4	4	4
Z2	M3x6	M3x6	M3x8	M3x10	M4x16
Øa*	36.5	45	54.5	64.5	86
Øb*	1	1	1.5	1.5	2
c*	31	38	48	58	77
d*	1.2	1.7	1.7	1.9	2.1

* Position and tolerance of GSL as assembled (wave generator, flexspline, and circular spline). These are critical dimensions which determine the axial position of the wave generator and must be within the specified tolerance for proper operation of the gearbox.

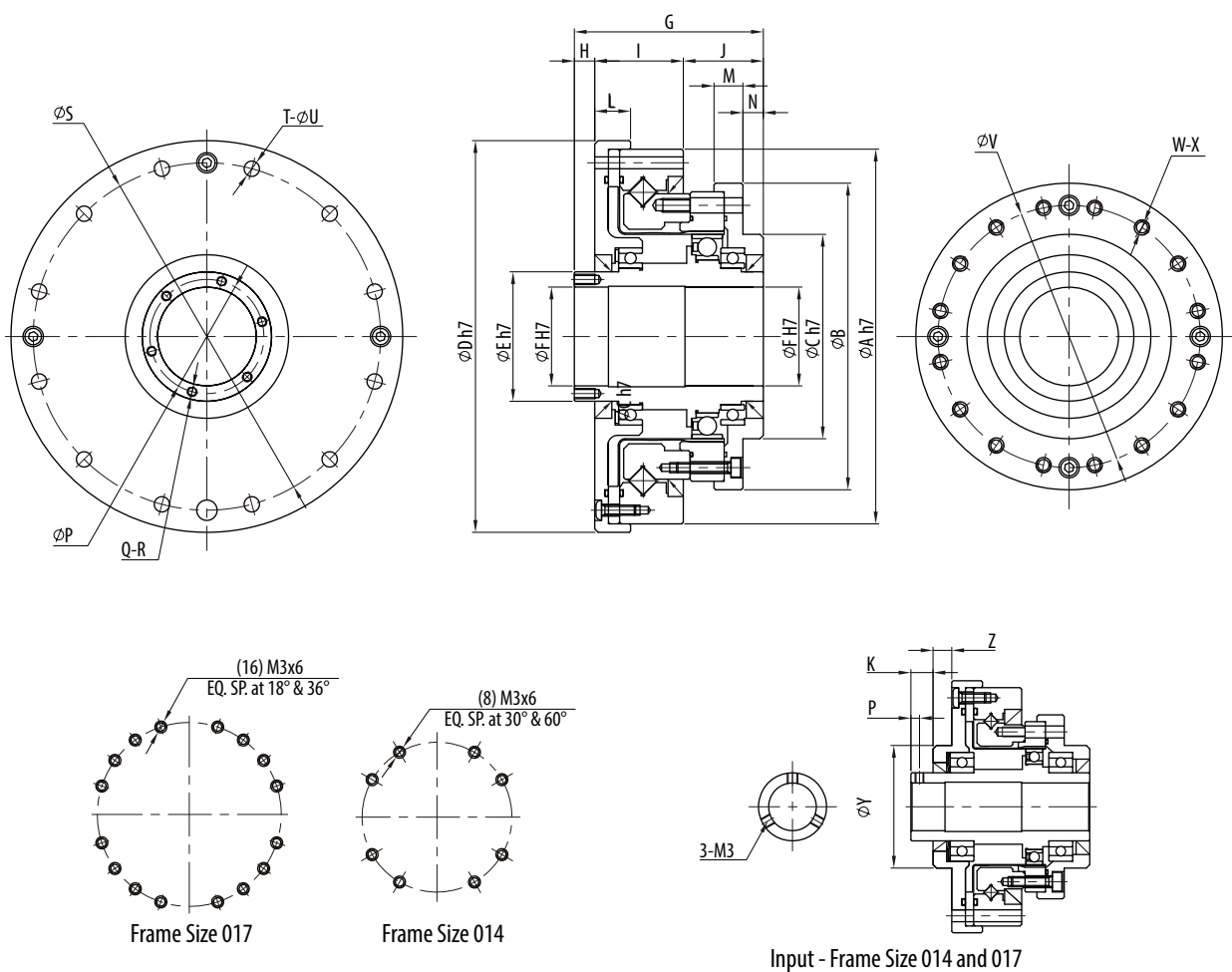
Drawings and information contained herein are for reference only. Please contact GAM for application specific drawings.

▶ GSL-HS-C GEARBOX DIMENSIONS



GSL-HS-C

- Hollow shaft input
- Hat-style flexspline
- Frame sizes 014-040



► GSL-HS-C GEARBOX DIMENSIONS



Dimension (mm)	014	017	020	025	032	040
ØA h7	70	80	90	110	142	170
ØB	54	64	75	90	115	140
ØC h7	36	45	50	60	85	100
ØD h7	74	84	95	115	147	175
ØE h7	20	25	30	38	45	59
ØF H7	14	19	21	29	36	46
G	52.5	56.5	51.5	55.5	65.5	79
H	12	12	5	6	7	8
I	20.5	23	25	26	32	38
J	20	21.5	21.5	23.5	26.5	33
K	6.5	6.5	-	-	-	-
L	9	10	10.5	10.5	12	14
M	8	8.5	9	8.5	9.5	13
N	7.5	8.5	7	6	5	7
ØP (P)	(2.5)	(2.5)	25.5	33.5	4.5	52
Q	3	3	6	6	6	6
R	M3	M3	M3x6	M3x6	M3x6	M4x8
ØS	64	74	84	102	132	158
T	8	12	12	12	12	12
ØU	3.5	3.5	3.5	4.5	5.5	6.6
ØV	44	54	62	77	100	122
W	See drawing on page 50		16	16	16	16
X	M3x6	M3x6	M3x6	M4x8	M5x8	M6x10
	Ø3.5x11.5	Ø3.5x12	Ø3.5x13.5	Ø4.5x15.5	Ø5.5x20.5	Ø6.6x25
ØY	36	45	-	-	-	-
Z	5.5	5.5	-	-	-	-

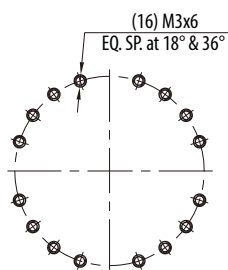
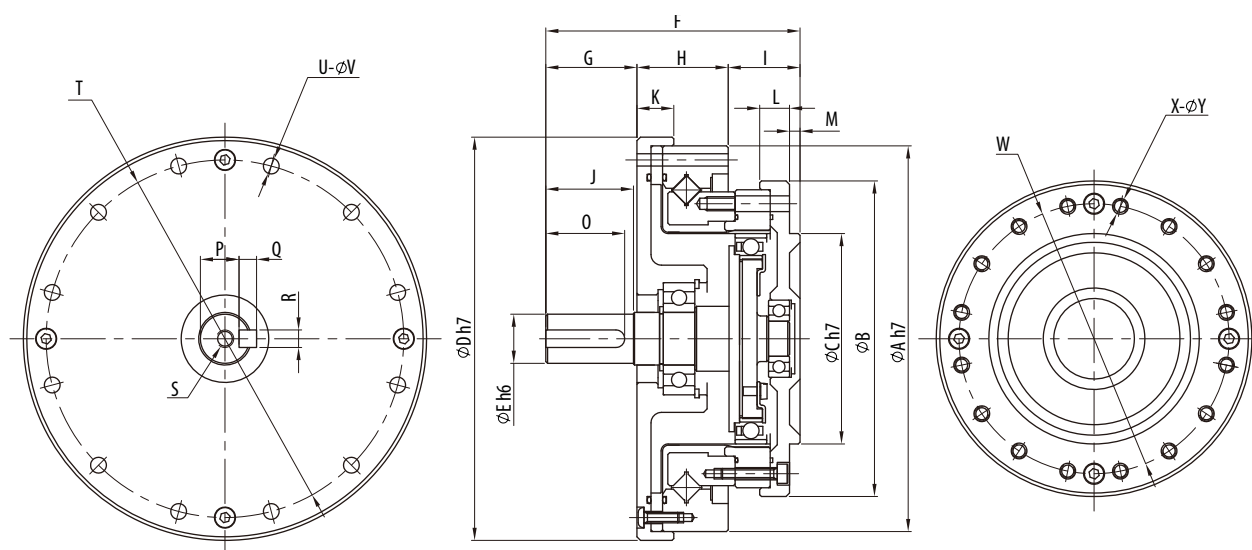
Drawings and information contained herein are for reference only. Please contact GAM for application specific drawings.

► GSL-HS-D GEARBOX DIMENSIONS

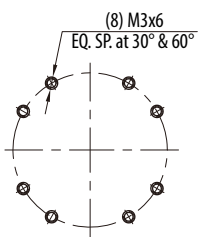


GSL-HS-D

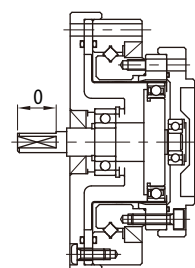
- Shaft input
- Hat-style flexspline
- Frame sizes 014-032



Frame Size 017



Frame Size 014



Input
Frame Size 014 and 017



Shaft Detail
Frame Size 014 and 017

► GSL-HS-D GEARBOX DIMENSIONS



Dimension (mm)	014	017	020	025	032
ØA h6	50	60	90	110	142
ØB	54	64	75	90	115
ØC h7	36	45	50	60	85
ØD h7	74	84	95	115	147
ØE h6	6	8	10	14	14
F	50.5	56	63.5	72.5	84.5
G	15	17	21	26	26
H	20.5	23	25	26	32
I	15	16	17.5	20.5	26.5
J	14	16	20	25	25
K	9	10	10.5	10.5	12
L	8	8.5	9	8.5	9.5
M	2.5	3	3	3	5
O	11	12	16.5	22.5	22.5
P	-	-	8.2 ^{-0.1}	11 ^{-0.1}	11 ^{-0.1}
Q	0.5	0.5	3 ^{-0.025}	5 ^{-0.03}	5 ^{-0.03}
R	-	-	3 ^{-0.025}	5 ^{-0.03}	5 ^{-0.03}
S	-	-	M3x6	M5x8	M5x8
ØT	64	74	84	102	132
U	8	12	12	12	12
ØV	3.5	3.5	3.5	4.5	5.5
ØW	44	54	62	77	100
X	See drawing on page 52		16	16	16
ØY	M3x6	M3x6	M3x6	M4x8	M5x8
	Ø3.5x11.5	Ø3.5x12	Ø3.5x13.5	Ø4.5x15.5	Ø5.5x20.5

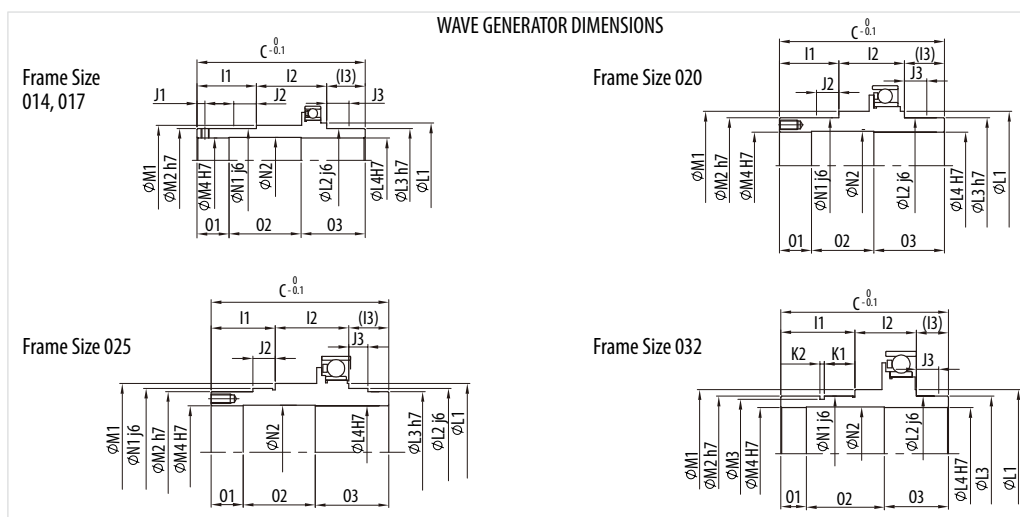
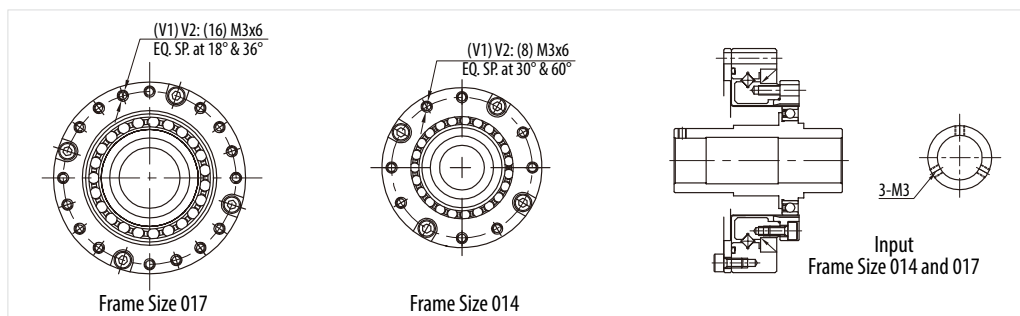
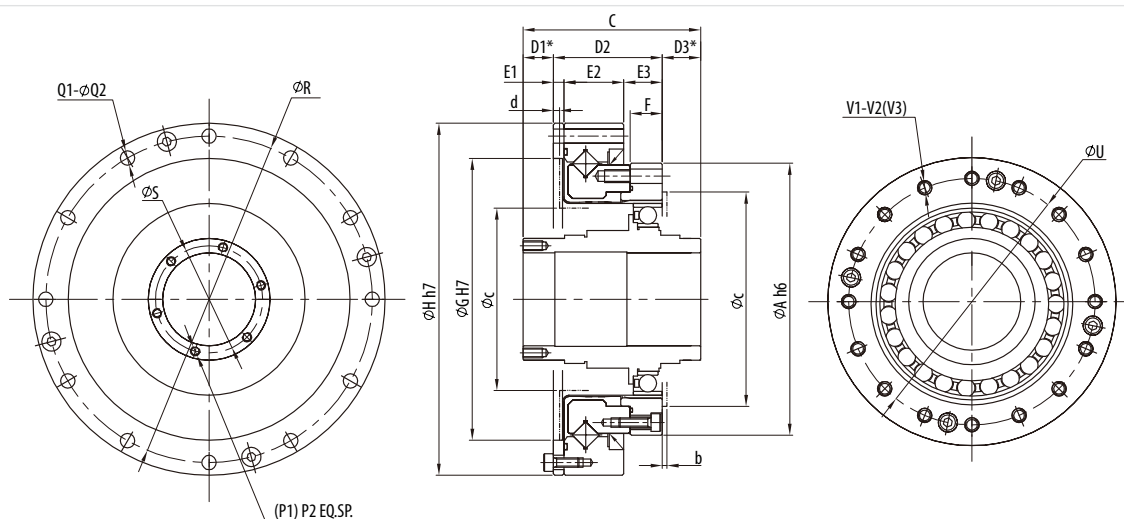
Drawings and information contained herein are for reference only. Please contact GAM for application specific drawings.

► GSL-HS-E GEARBOX DIMENSIONS



GSL-HS-E

- Includes output bearing but no housing for more complete integration where other GSL gearboxes don't fit
- Hollow shaft input
- Hat-style flexspline
- Frame sizes 014-032



► GSL-HS-E GEARBOX DIMENSIONS

Dimension (mm)	014	017	020	025	032
ØA h6	50	60	70	80	110
C	52.5	56.5	51.5	55.5	65.5
D1	15.5	15	8	9.5	12
D2	23.5	26.5	29	34	42
D3	13.5	15	14.5	12	12
E1	2.4	3	3	3.6	3.6
E2	14.1	16	17.5	18.7	23.4
E3	7	7.5	8.5	12	15
F	6	6.5	7.5	10	14
ØG	48	60	70	88	114
ØH	70	80	90	110	142
I1	18.5	19.5	18.5	20	29
I2	22	23.5	2.5	23	24
I3	12	13.5	12.5	12.5	12.5
J1	2.5	2.5	-	-	-
J2	7	7	7	6.5	-
J3	7	7	7	6.5	7
K1	-	-	-	-	1.7
K2	-	-	-	-	12
ØL1	23	29	34	43	50
ØL2	20	25	30	40	45
ØL3	20	25	30	38	45
ØL4	14	19	21	29	36
ØM1	22	28	34	43	50
ØM2	20	25	30	38	45
ØM3	-	-	-	-	42.5
ØM4	14	19	21	29	36
ØN1 j6	20	25	30	38	45
ØN2	14.5	19.5	21.5	29.5	36.5
O1	10	10	10	10	10
O2	22.5	24.5	19.5	22.5	30.5
O3	20	22	22	23	25
P1	3	3	6	6	6
P2	M3	M3	M3x6	M3x6	M3
Q1	8	12	12	12	12
Q2	3.5	3.5	3.5	4.5	5.5
ØR	64	74	84	102	132
ØS	-	-	25.5	33.5	40.5
ØU	44	54	62	77	100
V1	See dimensions on page 54		16	16	16
V2	M3x6	M3x6	M3x6	M4x8	M5x8
V3	Ø3.5x6	Ø3.5x6.5	Ø3.5x7.5	Ø4.5x10	Ø5.5x14
Øa	36.5	45	54.5	64.5	86
b	1	1	1.7	1.5	2
Øc	31	38	48	58	77
d	1.2	1.7	1.7	1.9	2.1

* D1 and D3 with is the position and tolerance of GSL as assembled (wave generator, flexspline, and circular spline). These are critical dimensions which determine the axial position of the wave generator and must be within the specified tolerance for proper operation of the gearbox.

* Because the flexspline can be distorted, use mating parts with dimensions greater than a, b, c, and d to prevent contact with the flexspline

NOTE: The GSL is shipped with the wave generator unassembled from the gearbox for ease of mounting to the input driver

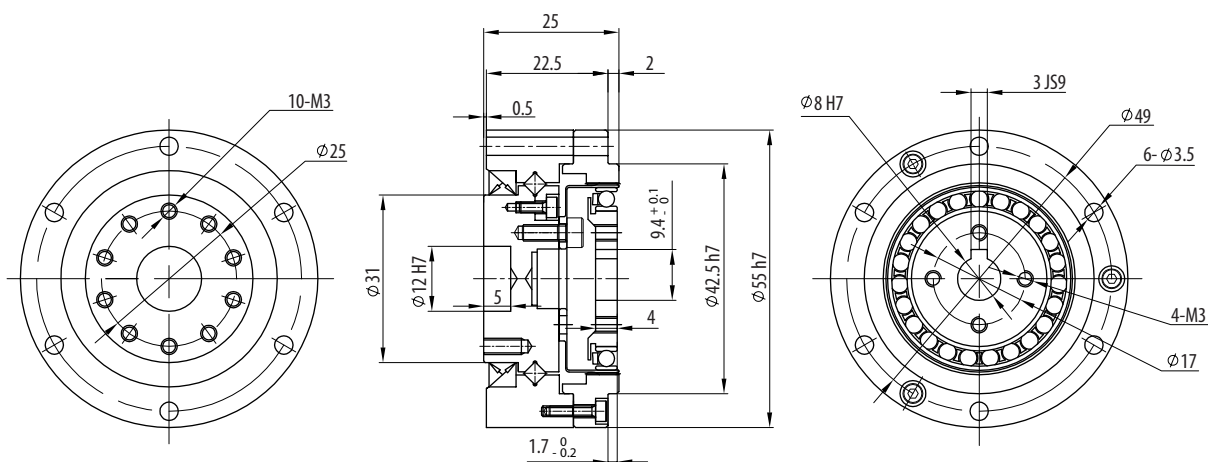
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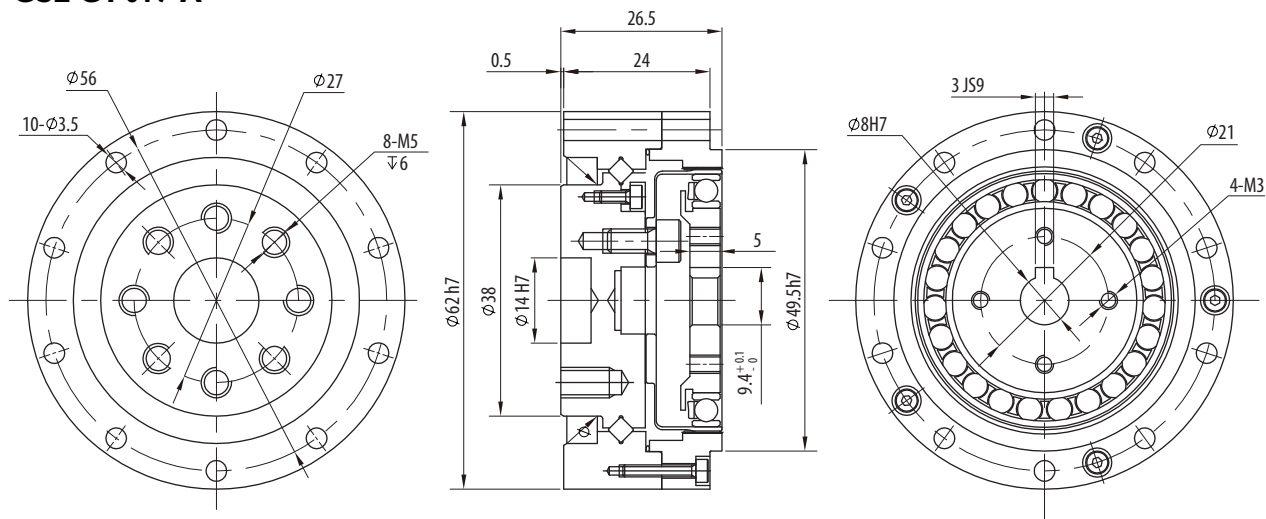
GSL-CT-A

- Compact, low profile
- Cup-style flexspline
- Frame sizes 014-017

GSL-CT-014-A



GSL-CT-017-A



► GSL-HT-A GEARBOX

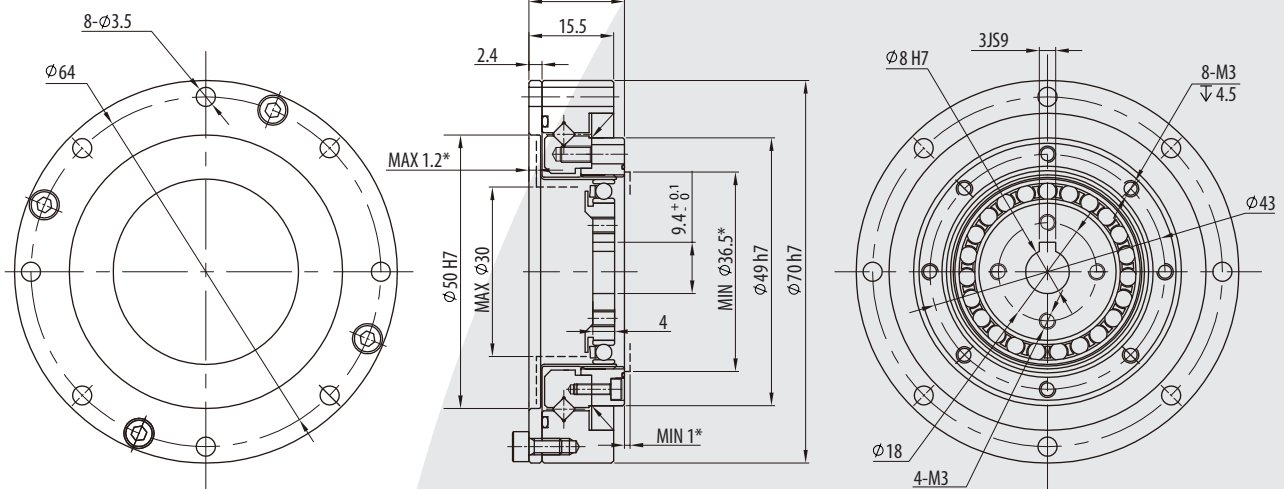


GSL-HT-A

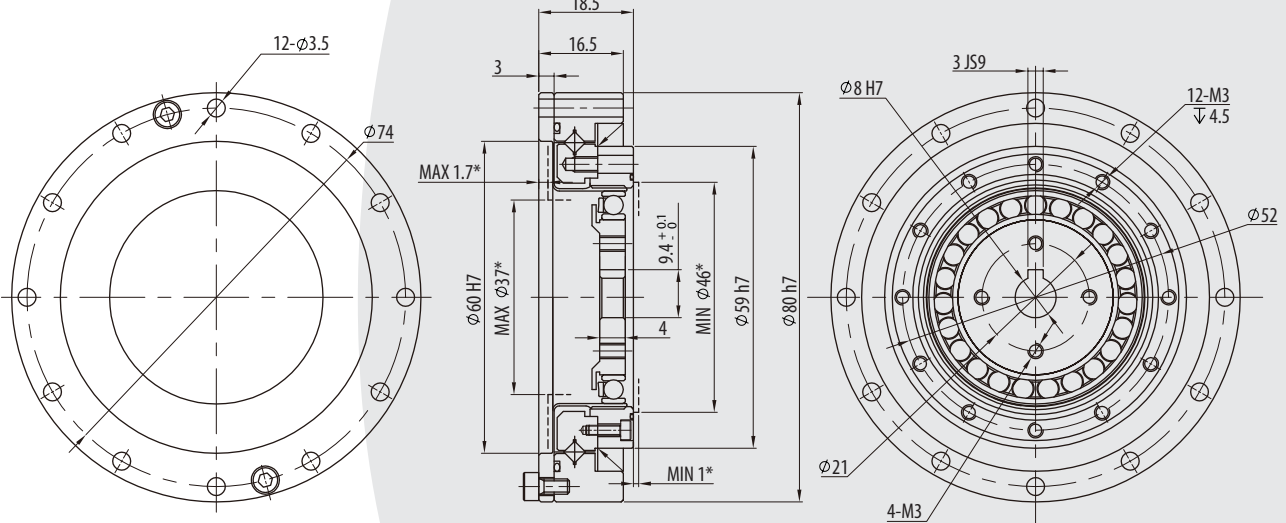
- Ultra low profile
- Hat-style flexspline
- Frame sizes 014-017

GSL

GSL-HT-014-A



GSL-HT-017-A



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For more information, call us toll-free at 888-GAM-7117 | Visit www.gamweb.com for 2-D and 3-D Drawings