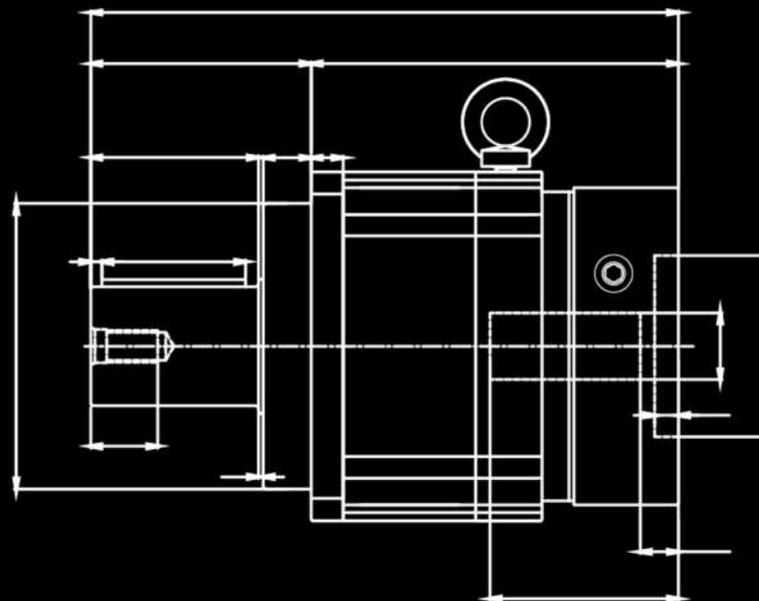




# PRECISION PLANETARY GEARBOX CATALOGUE







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PRECISION PLANETARY GEARBOX

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# CHIARAVALLI LINEAR CENTER



## THE AUTOMATION HUB OF CHIARAVALLI GROUP

Chiaravalli Linear Center was established as a center of excellence dedicated to linear motion and industrial automation within Chiaravalli Group. A project developed with a clear objective: to provide machine builders with a highly specialized reference point, combining a wide product range, strong technical expertise, and real application-oriented support.

As part of an international industrial group with a solid manufacturing structure and a commercial presence in more than 26 countries, Chiaravalli Linear Center represents the natural evolution of Chiaravalli's offering toward advanced automation applications. Not just components, but solutions designed to simplify the work of designers and enhance machine performance.

The strength of Chiaravalli Linear Center lies in its consultative approach: from application analysis to dedicated technical support and the availability of ready-to-use solutions from stock. This model helps reduce development time, increase design reliability, and confidently address increasingly demanding markets.

The introduction of precision planetary gearboxes fits seamlessly into this growth path. It is a strategic expansion that further strengthens Chiaravalli Linear Center's role as a key partner for modern automation, where precision, dynamics, and efficiency are essential requirements.



Discover more,  
scan the QR code.



# CHIARAVALLI LINEAR CENTER



## PRECISION PLANETARY GEARBOXES: WHERE PERFORMANCE MAKES THE DIFFERENCE

Chiaravalli Linear Center precision planetary gearboxes are designed to meet the needs of advanced applications where motion control, repeatability, and energy efficiency are critical.

Thanks to their planetary architecture, these gearboxes deliver an optimal combination of high torque density, compact dimensions, and outstanding efficiency. Extremely low backlash and high torsional stiffness make them ideal for high-dynamic machines, precise positioning systems, and fast, repeatable duty cycles.

Build quality is engineered for long-term reliability. High-strength alloy steel gears, fully hardened profiles, and carefully engineered solutions ensure stable performance over time, even under continuous and demanding operating conditions. The result is a gearbox that maintains precision, quiet operation, and efficiency throughout its service life.

From an application perspective, precision planetary gearboxes open the door to sectors where traditional solutions are no longer sufficient. Robotics, machine tools, packaging, automated logistics, and the food and pharmaceutical industries are just some of the fields where precision and dynamics become true competitive advantages.

Managed directly by Chiaravalli Linear Center, with dedicated technical support, customization possibilities, and a highly competitive price positioning, precision planetary gearboxes represent a strategic choice for manufacturers looking to raise the technological level of their machines - without compromising on performance, reliability, or economic value.



# PRODUCT INTRODUCTION

## FAB SERIES



Available Size		042/060/090/090A/115 115A/142/142A/180/220
Rated Output Torque		14Nm - 2000Nm
Ratio	Single Stages	3/4/5/6/7/8/10
	Dual Stages	12/15/20/25/30/35 40/50/60/70/80/100
Backlash	Single Stages	≤1, ≤3, ≤5 arcmin
	Dual Stages	≤3, ≤5, ≤7 arcmin

## FABR SERIES



Available Size		042/060/090/090A/115 115A/142/142A/180/220
Rated Output Torque		14Nm - 2000Nm
Ratio	Single Stages	3/4/5/6/7/8/10/14/20
	Dual Stages	12/15/20/25/30/35/40/50/60 70/80/100/120/140/160/200
Backlash	Single Stages	≤2, ≤4, ≤6 arcmin
	Dual Stages	≤4, ≤7, ≤9 arcmin

## FAD SERIES



Available Size		047/064/090/090A/110 100A/140/140A/200/255
Rated Output Torque		14Nm - 2000Nm
Ratio	Single Stages	4/5/6/7/8/10
	Dual Stages	20/25/35/40/50/60 70/80/100
Backlash	Single Stages	≤1, ≤3, ≤5 arcmin
	Dual Stages	≤3, ≤5, ≤7 arcmin

## FADR SERIES



Available Size		047/064/090/090A/110 100A/140/140A/200/255
Rated Output Torque		14Nm - 2000Nm
Ratio	Single Stages	4/5/6/7/8/10/14/20
	Dual Stages	20/25/35/40/50/60/70/80 100/120/140/160/200
Backlash	Single Stages	≤2, ≤4, ≤6 arcmin
	Dual Stages	≤4, ≤7, ≤9 arcmin

## FB SERIES



Available Size		042/060/090/090A/115 115A/142/142A/180/220
Rated Output Torque		14Nm - 2000Nm
Ratio	Single Stages	3/4/5/6/7/8/10
	Dual Stages	12/15/20/25/30/35 40/50/60/70/80/100
Backlash	Single Stages	≤5 arcmin
	Dual Stages	≤7 arcmin

## FBR SERIES



Available Size		042/060/090/090A/115 115A/142/142A/180/220
Rated Output Torque		40Nm - 650Nm
Ratio	Single Stages	3/4/5/6/7/8/10/14/20
	Dual Stages	12/15/20/25/30/35/40/50/60 70/80/100/120/140/160/200
Backlash	Single Stages	10 arcmin
	Dual Stages	12 arcmin

## FE SERIES



Available Size		070/090/090A/120/120A 155/155A/205/235
Rated Output Torque		40Nm - 2000Nm
Ratio	Single Stages	3/4/5/6/7/8/10
	Dual Stages	12/15/20/25/30/35/40 50/60/70/80/100
Backlash	Single Stages	≤5 arcmin
	Dual Stages	≤7 arcmin

## FER SERIES



Available Size		070/090/090A/120/120A 155/155A/205/235
Rated Output Torque		40Nm - 650Nm
Ratio	Single Stages	3/4/5/6/7/8/10/14/20
	Dual Stages	12/15/20/25/30/35/40/50/60 70/80/100/120/140/160/200
Backlash	Single Stages	10 arcmin
	Dual Stages	12 arcmin



# PRODUCT INTRODUCTION

## FG SERIES



Available Size		040/060/080/080A 120/120A/160/160A
Rated Output Torque		14Nm - 650Nm
Ratio	Single Stages	3/4/5/6/7/8/10
	Dual Stages	12/15/20/25/30/35/40 50/60/70/80/100
Backlash	Single Stages	≤8 arcmin
	Dual Stages	≤10 arcmin

## FGR SERIES



Available Size		060/080/080A/120 120A/160/160A
Rated Output Torque		40Nm - 650Nm
Ratio	Single Stages	3/4/5/6/7/8/10/14/20
	Dual Stages	12/15/20/25/30/35/40/50/60 70/80/100/120/140/160/200
Backlash	Single Stages	13 arcmin
	Dual Stages	15 arcmin

## FGA SERIES



Available Size		040/060/080/080A/120 120A/160/160A
Rated Output Torque		40Nm - 650Nm
Ratio	Single Stages	3/4/5/6/7/8/10
	Dual Stages	12/15/20/25/30/35/40 50/60/70/80/100
Backlash	Single Stages	≤8 arcmin
	Dual Stages	≤10 arcmin

## FGAR SERIES



Available Size		060/080/080A/120 120A/160/160A
Rated Output Torque		40Nm - 650Nm
Ratio	Single Stages	3/4/5/6/7/8/10/14/20
	Dual Stages	12/15/20/25/30/35/40/50/60 70/80/100/120/140/160/200
Backlash	Single Stages	13 arcmin
	Dual Stages	15 arcmin

## FAF SERIES



Available Size		060/075/075A/100 100A/140/140A/180
Rated Output Torque		14Nm - 2000Nm
Ratio	Single Stages	3/4/5/6/7/8/10
	Dual Stages	12/15/20/25/30/35 40/50/60/70/80/100
Backlash	Single Stages	≤1, ≤3, ≤5 arcmin
	Dual Stages	≤3, ≤5, ≤7 arcmin

## FAFR SERIES



Available Size		060/075/075A/100 100A/140/140A/180
Rated Output Torque		14Nm - 2000Nm
Ratio	Single Stages	3/4/5/6/7/8/10/14/20
	Dual Stages	12/15/20/25/30/35/40/50/60 70/80/100/120/140/160/200
Backlash	Single Stages	≤2, ≤4, ≤6 arcmin
	Dual Stages	≤4, ≤7, ≤9 arcmin

## FAT SERIES



Available Size		065/075/090/110/170/210
Rated Output Torque		12Nm - 1020Nm
Ratio	Single Stages	4/5/6/7/8/10/15/20
	Dual Stages	25/30/35/40/50/75/100 120/150/200
Backlash	Single Stages	≤6 arcmin
	Dual Stages	≤10 arcmin
	Triple Stages	≤12 arcmin



# PRODUCTS FEATURES



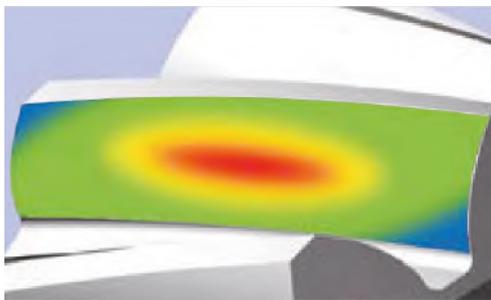
The transmission interface of the planetary gear adopts full needle rolling design without cage, increasing the contact area to improve the structural rigidity and output torque.



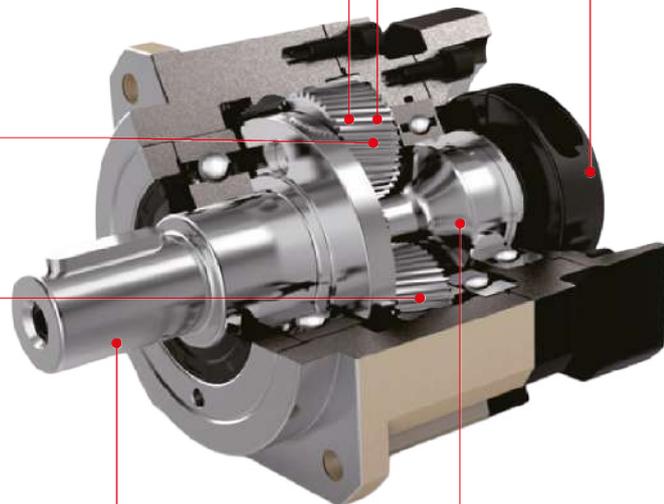
The gearbox mechanism adopts a helical gear design, and its tooth meshing rate is more than twice that of ordinary spur gears. It features with smooth operation, low noise, high output torque and low backlash.



The connection between the input shaft and the motor adopts a collet-type locking mechanism and dynamic balance analysis to ensure the concentricity of the interface and power transmission with zero-backlash at high input speeds.



The finite element analysis of gear strength is carried out by ANSYS technology, and the shape and lead of the tooth surface are modified to reduce the impact and noise of gear meshing and increase the service life of the gear system.



The gear material is made of high-quality alloy steel and treated with carbon and ammonia coinfiltration to obtain the best gear resistance and toughness.



The planetary frame and output shaft are designed with an integrated double support structure to ensure maximum torsional rigidity.



The sun gear and input shaft are integrated to ensure maximum torsional rigidity and zero back lash power transmission at high input speeds.



# PRODUCT OVERVIEW

## PRODUCT FEATURE

Precision planetary gearbox is a new-generation of product with a compromise of advanced technology both at home and abroad, its main features are as follows:

1. Low Noise: Under 65db.
2. Low Backlash: Single-stage $\leq 1$ arcmin; Dual-stage $\leq 3$  arcmin.
3. High Efficiency: Single-stage $\geq 95\%$ ; Dual-stage $\geq 92\%$ .
4. High Input Speed: Up to 8000 RPM.
5. High Torque: High output torque density.
6. High Stability: Employs high tensile strength alloy steel. Gear hardening is made for the entire gear instead of only surface hardening, which extends gear service life and maintain high accuracy as new after a long period of operation.
7. High Speed Reduction Ratio: The gear reducer is a modular design. The planetary gear box can be connected. Speed reduction ratio is over 1:1000.

## PRECISION USAGE

Precision planetary gearbox is widely used in the following industries:

1. Aerospace, military industry.
2. Medical health, electronic information industry.
3. Industrial robots, production automation, CNC manufacturing industry.
4. Motor, textile, printing, food, metallurgy, environmental engineering, warehouse logistics industry.



# SELECTION GUIDE

## PLANETARY GEARBOX SELECTION

The selection of planetary gearbox should follow the principle of combining applicability and economy, that is, the technical indicators of the planetary gearbox can not only meet the requirements of the equipment but also save costs. "Passing" and "failing" will bring waste of costs. Improper selection is the main reason for the failure of the gearbox, so it is very important to choose the planetary gearbox correctly.

The selection of gearbox should consider its internal performance indicators such as structural type, bearing capacity, reduction ratio, output speed, axial force, radial force, torsional rigidity, backlash, etc., and should also fully consider external factors such as installation form, working conditions, and working environment. For your convenience, please refer to the following steps to achieve accurate and fast selection.

### STEP 1: DETERMINATION OF GEARBOX SPECIFICATIONS

STEP	INSTRUCTION	CODE	PARAMETER CALCULATION						
1	Service factor of the equipment	$f_1$	Loading Classification	Running per hour Z	Using $f_s$				
					Running per day (h)				
			Uniform	Z < 10	0,85	0,95	1,00	1,20	1,60
				10 < Z < 30	0,90	1,10	1,15	1,40	1,80
				30 < Z < 100	1,00	1,20	1,30	1,60	2,00
			Medium Shock	Z < 10	1,00	1,20	1,30	1,60	2,00
				10 < Z < 30	1,10	1,35	1,45	1,80	2,20
				30 < Z < 100	1,20	1,45	1,60	2,00	2,40
			Heavy Shock	Z < 10	1,20	1,45	1,60	2,00	2,40
				10 < Z < 30	1,30	1,55	1,75	2,20	2,50
30 < Z < 100	1,40	1,65		1,90	2,40	2,80			
2	Determination of torque	$T_{2n}$	$T_{2N} > T_{c2}$ (Rated torque of selected gearbox $T_{2N} >$ Calculated torque $T_{c2}$ ) $T_{c2} = T_r \times f_s$ ( $T_{c2}$ - Calculated torque, $T_r$ - Actual required torque, $f_s$ - Service factor)						
3	Rated input speed	$n_1$	Please refer to the performance data of the gearbox for the maximum allowable output speed.						
4	Determine the ratio	$i$	$i = n_1 / n_2$						
5	Efficiency of the gearbox	$\eta$	$L1 \geq 95\%$ , $L2 \geq 92\%$						
6	The input power of the gearbox is calculated based on the torque or power required by the driven equipment	$P_1$	$P_1 = (T_2 \times n_1) / (9550 \times i \times \eta)$ $p_1 = p_2 \div \eta$						
7	The specifications of the gearbox are determined according to the calculated transmission torque	$T_{2n}$ , $P_{1n}$	$T_{2N} \geq T_2 \times f_1 \times f_2$ $P_{1N} \geq p_1 \times f_1 \times f_2$						
8	Output shaft radial force and axial force check	$F_r$ , $F_a$	Check the performance data table in the product manual. The comparison should be less than the maximum radial force and axial force of the gearbox. For frequent start-stop operation, the enhanced type should be selected.						
9	Confirm the application environment		Protection level, operating temperature, chemical environment, etc						
10	Check the installation method according to the space		Inline type or with right angle type						
11	Confirm the model of the gearbox		According to the performance data sheet, input and output mode, etc., determine the specific series, model, specification and accessories						

Instruction:  $n_2$ ,  $P_2$  is the ratio and power for equipment which has been driven;  
 $P_1 = P_2$  is the needed power and torque for equipment which has been driven;  
 $P_{1N} = T_{2N}$  is the actual needed power and torque which has been driven.

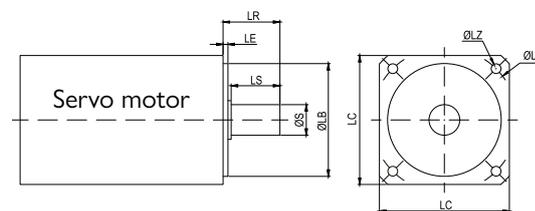


## SELECTION GUIDE

STEP 2: DETERMINE THE MOTOR, MOTOR MANUFACTURER, SPECIFICATION MODEL, PERFORMANCE AND EXTERNAL DIMENSION

### Motor Model: MHMD-082G1U

Output Power	0.75	kW
Rated Torque	2.4	NM
Max. Torque	7.1	NM
Rated Speed	3000	RPM
Max. Speed	4500	RPM
Inertia	6.6	Kg/cm <sup>2</sup>
Shaft Dia	Ø19	mm
Diameter	Ø80	mm
Lug boss	Ø70	mm
Center distance	Ø90	mm



### Notice for ordering

Motor's type & measurement

Planetary gearbox's type

Torque

Ratio

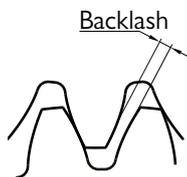
Backlash

Mounting position & others requir

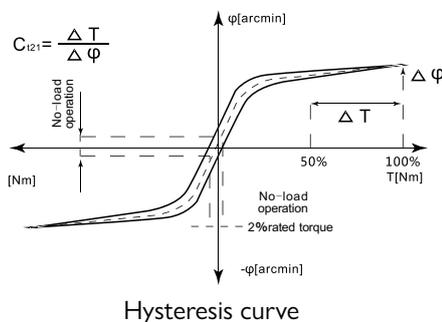
# SELECTION GUIDE

## BASE CONCEPTS OF PRECISION PLANETARY GEARBOX

- Ratio** Input speed/Output speed
  
- n1 [rpm]  
Rated input speed** The driving speed of the gearbox, if the gearbox is directly connected to the motor, the speed value is the same as the motor speed, the rated input speed in this book is measured under the condition that the ambient temperature is 20 °C, please reduce the speed n1 when the ambient temperature is higher.
  
- n2 [rpm]  
Output speed** The output speed is calculated by the following formula from the input speed n1 and the gear ratio i:n2=n1/i.
  
- Stages** Number of sets of planetary gears. Since one set of planetary gears cannot meet the larger transmission ratio, sometimes two or three sets are needed to meet the user's demand for a larger transmission ratio, that is, the larger the reduction ratio, the more stages. Due to the increase in the number of planetary gears, the length of the two- or three-stage gearbox will increase and the efficiency will decrease.
  
- Efficiency** Refers to the transmission efficiency of the gearbox under the condition of rated load. The larger the reduction ratio, the more stages, and the lower the efficiency.
  
- Average lifetime** It refers to the gearbox under the rated load, and the rated input speed is the continuous working time of the gearbox.
  
- Precise positioning** The key to achieving precise positioning in high-speed mechanical reciprocating motion is to minimize the angular deviation caused by the movement. Positioning accuracy depends on two values, one is the loading related deflection angle, which involves the return clearance and torsional stiffness; The other is the deflection angle related to motion control, which involves the problem of synchronization deviation.
  
- Backlash** The maximum deviation angle between the output shaft of the gearbox and the input shaft is fixed when measuring, and then a certain torque (2%T<sub>2n</sub>) is loaded with a torque meter in the output device to overcome the friction force in the gearbox.



- Hysteresis curve** The hysteresis curve is to obtain the torsional stiffness of the gearbox, and the hysteresis curve is obtained by detection. During the detection, the input end of the gearbox is fixed first, and then the maximum output torque T<sub>2B</sub> of is continuously loaded in the two rotation directions of the output end, and then gradually unloaded, and the aberration angle of the torque is recorded by the instrument, and the curve obtained is a closed curve, from which the return clearance and torsional stiffness of the gearbox can be calculated.





# SELECTION GUIDE

## BASE CONCEPTS OF PRECISION PLANETARY GEARBOX

<b>Inertia</b>	The values in this catalogue refer to the input terminals. A value that represents the feature of an object's efforts to keep itself in a state of rotation (or stationary or rotation).								
<b>The proportion of inertia</b>	It refers to the ratio between the load inertia and the inertia of the transmission system (motor plus gearbox). This ratio determines the controllability of the system. The larger the $\lambda$ value, that is, the greater the difference between the moment of inertia, the more difficult it is to accurately control the highly dynamic action process, so it is recommended to control the $\lambda$ value at $<5$ as much as possible. The gearbox can reduce the load inertia by $1/i^2$ .								
<b>Noise</b>	The unit is decibel (dB). The value is measured when the input revis 3000 r/m without load and at the distance of one meter from the gearboxes.								
<b>Operating conditions</b>	<table> <tr> <td>Operating temp</td> <td>-10°C~+90°C</td> </tr> <tr> <td>Degree of protection</td> <td>IP54/IP65</td> </tr> <tr> <td>Lubrication</td> <td>Life time lubrication</td> </tr> <tr> <td>Mounting position</td> <td>Any</td> </tr> </table>	Operating temp	-10°C~+90°C	Degree of protection	IP54/IP65	Lubrication	Life time lubrication	Mounting position	Any
Operating temp	-10°C~+90°C								
Degree of protection	IP54/IP65								
Lubrication	Life time lubrication								
Mounting position	Any								
<b>T<sub>2N</sub> [Nm] Rated output torque</b>	The torque (no wear) that can be loaded on the gearbox for a long time (continuous duty system), the conditions should meet the uniform load, the safety factor $S=1$ , the following specifications of FG160/FAB142, and the theoretical life is 20,000 hours: The theoretical life of FAB180 and above is 10,000 hours: the $T_N$ value complies with the ISODP6336 gear standard and ISO281 bearing standard.								
<b>[Nm] Acceleration torque</b>	Refers to the maximum torque allowed to be loaded to the output in a short time when the duty cycle is less than 1000 times per hour. When the duty cycle is more than 1000 times per hour, the impact factor must be considered. The acceleration torque is a maximum value in the selection of the cyclic working system, and the acceleration torque in actual use must be less than $T_{2B}$ , otherwise the life of the gearbox will be shortened.								
<b>[Nm] Emergency braking torque</b>	It refers to the maximum torque that can be loaded at the output end of the gearbox, which can be loaded 1000 times during the life of the reducer, and must not exceed 1000 times. (Note: The following specifications of FG160/FAB142 are: $T_{2HOT}=2 \cdot T_{2B}$ , FAB180 and above: $T_{2HOT}=1.5 \cdot T_{2B}$ )								
<b>T<sub>012</sub> [Nm] No-load torque</b>	Refers to the moment loaded onto the gearbox to overcome the friction in the gearbox.								
<b>T<sub>2B</sub> Maximum output torque</b>	Rit refers to the output torque that the gearbox can withstand under static conditions or frequent start-up conditions, usually referring to peak load or starting load.								
<b>T<sub>2</sub> [Nm] Actual torque required</b>	The required torque depends on the actual working conditions of the application, and the rated torque $T_{2N}$ of the proposed gearbox must be greater than this torque.								
<b>T<sub>c2</sub> [Nm] Torque for calculation</b>	It will be used in the selection of the gearbox, which can be obtained from the actual required torque $T_2$ and the coefficient $f_s$ , according to the following formula: $T_{c2}=T_2 \cdot f_s \leq T_N$								



# SELECTION GUIDE

## BASE CONCEPTS OF PRECISION PLANETARY GEARBOX

<b>[Nm]</b> <b>Roll torque</b>	Refers to the moment of axial and radial force acting on the radial force point on the bearing at the output end. It is calculated as follows: $M_{2Kmax}=[F_a*y_2+F_r*(X_2+Z_2)]/100$
<b>Fa[N]</b> <b>Axial force</b>	It refers to a force parallel to the axis, and when its application point has a certain axial deviation ( $Y_2$ ) from the output shaft end, an additional bending moment will be formed, and when the axial force exceeds the rated value shown in the catalog, this bending force must be offset by a coupling.
<b>Fr[N]</b> <b>Radial force</b>	Refers to a force acting perpendicular to an axial force, which is parallel to the output shaft, and its point of action is at an axial distance ( $X_2$ ) from the shaft end. This point becomes a lever point, and the transverse force forms a bending moment.
<b>Axial extension radial load, axial load</b>	The additional basis for the selection of the gearbox is the radial load and the axial load on the protruding end of the output shaft. The strength of the shaft and the load-bearing capacity determine the radial load of the allowable shaft extension. The maximum permissible value given in the product catalogue refers to the force acting at the midpoint of the shaft extension (i.e. at $1/2L$ ) in the most unfavorable direction. When the force is not at the midpoint, the closer to the shoulder is, the greater the allowable radial load; Conversely, the farther the application point is from the shoulder, the less radial load is allowed.
<b>s</b> <b>Safety factor</b>	The safety factor is equal to the ratio of the rated input power of the gearbox to the power of the motor.
<b>f<sub>1</sub></b> <b>Use factor</b>	The use factor represents the application characteristics of the gearbox, which takes into account the type of load of the gearbox and the daily operating hours.
<b>[Nm/Arcmin]</b> <b>Torsional stiffness</b>	It is defined by the ratio between the loading moment and the resulting torsion angle. It indicates how much torque is needed to rotate the output shaft by an arc. The torsional stiffness is derived from the hysteresis curve. On the graph, you only need to focus on the range of 50% to 100% of $T_{2B}$ , where the curve can be seen as a straight line.
<b>[Nm]</b> <b>Installation torque</b>	The assembly of the gearbox and the connection and installation of the motor and the gearbox (the input shaft adopts the requirement of elastic coupling), there are torque requirements. It is recommended to use a torque wrench to complete the installation steps.
<b>Pay special attention</b>	The size of all the input ends of the gearbox given in this catalogue is for reference only, and the specific size is determined by the size of the shaft extension end of the adapted motor, so the physical dimensions are different from the catalogue, and the standard drawings of the ordered goods shall prevail, and the output size of the gearbox in the absence of special designation shall prevail in this catalogue. The weights of all gearboxes given in this catalogue are approximate, and the actual weight is subject to the actual product.

**CHIARAVALLI LINEAR CENTER**

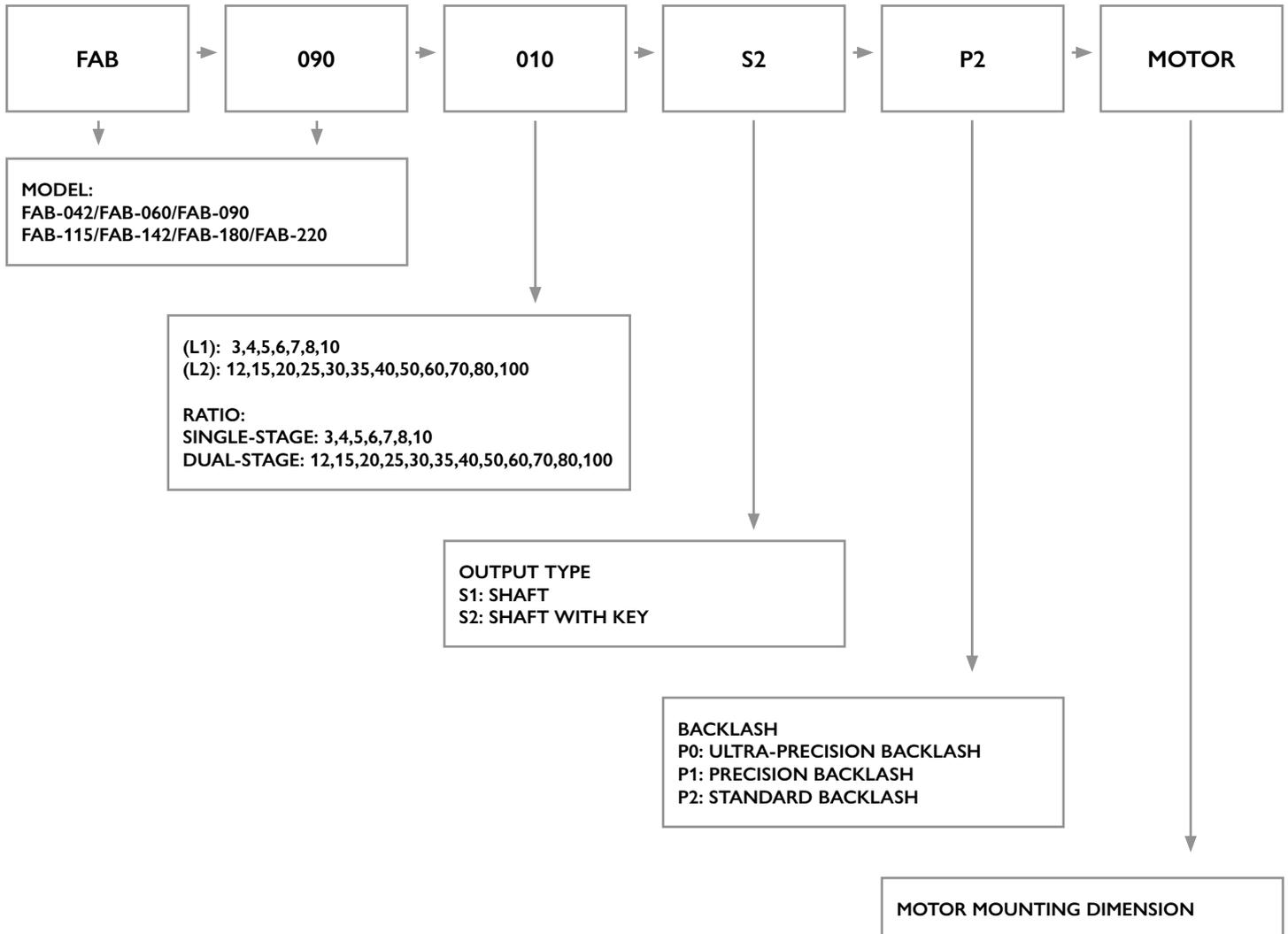
**PRECISION PLANETARY GEARBOX  
FAB SERIES**



# PRECISION PLANETARY GEARBOX FAB SERIES

## MODEL DESCRIPTION

FAB-090-010-S2-P2-19-70-90-M6-42





# PRECISION PLANETARY GEARBOX FAB SERIES

## TECHNICAL SPECIFICATION

MODEL		STAGE	RATIO	FAB042	FAB060	FAB090	FAB090A	FAB115	FAB115A	FAB142	FAB142A	FAB180	FAB220
Rated output torque	Nm	1	3	20	55	130	-	208	-	342	-	588	1,140
			4	19	50	140	-	290	-	542	-	1,050	1,700
			5	22	60	160	-	330	-	650	-	1,200	2,000
			6	20	55	150	-	310	-	600	-	1,100	1,900
			7	19	50	140	-	300	-	550	-	1,100	1,800
			8	17	45	120	-	260	-	500	-	1,000	1,600
		10	14	40	100	-	230	-	450	-	900	1,500	
		2	12	20	55	130	130	208	208	342	342	588	1,140
			15	20	55	130	130	208	208	342	342	588	1,140
			20	19	50	140	140	290	290	542	542	1,050	1,700
			25	22	60	160	160	330	330	650	650	1,200	2,000
			30	22	55	130	130	208	208	342	342	588	1,140
			35	22	60	160	160	330	330	650	650	1,200	2,000
			40	22	50	140	140	290	290	542	542	1,050	1,700
			50	22	60	160	160	330	330	650	650	1,200	2,000
			60	20	55	150	150	310	310	600	600	1,100	1,900
			70	19	50	140	140	300	300	550	550	1,100	1,800
			80	17	45	120	120	260	260	500	500	1,000	1,600
100	14		40	100	100	230	230	450	450	900	1,500		
T <sub>2B</sub> /Max. output torque	Nm	1,2	3~100	3 times the rated output torque									
n <sub>1</sub> /Rated input speed	rpm	1,2	3~100	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
n <sub>1B</sub> /Max.input speed	rpm	1,2	3~100	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
P0/Ultra-precision backlash	arcmin	1	3~10	-	-	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	3~100	-	-	-	-	≤3	≤3	≤3	≤3	≤3	≤3
P1/Precision backlash	arcmin	1	3~10	≤3	≤3	≤3	≤5	≤3	≤5	≤3	≤5	≤3	≤3
		2	12~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
P2/Precision backlash	arcmin	1	3~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional rigidity	Nm/arcmin	1,2	3~100	3	7	14	14	25	25	50	50	145	225
F <sub>2rB</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	780	1,530	3,250	3,250	6,700	6,700	9,400	9,400	14,500	50,000
F <sub>2a1B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	350	630	1,300	1,300	3,000	3,000	4,000	4,000	6,200	35,000
F <sub>2a2B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	390	765	1,625	1,625	3,350	3,350	4,700	4,700	7,250	25,000
Life time	hr	1,2	3~100	20,000*									
η/Efficiency	%	1	3~10	≥97%									
		2	12~100	≥94%									
Weight	kg	1	3~10	0.5	1.3	3.7	-	7.8	-	14.5	-	29	48
		2	12~100	0.8	1.9	4.1	5.3	9	11.2	17.5	17.5	33	60
Operating temperature	°C	1,2	3~100	-10°~ +90°C									
lubrication		1,2	3~100	Synthetic lubricating grease									
Ingress protection		1,2	3~100	IP65									
Mount position		1,2	3~100	Any direction									
(n <sub>1</sub> =3000rpm)/Noise level	dB	1,2	3~100	≤56	≤58	≤60	≤60	≤63	≤63	≤65	≤65	≤67	≤70

## GEARBOX MOMENT OF INERTIA

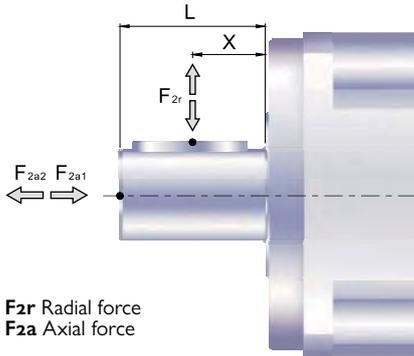
MODEL		STAGE	RATIO	FAB042	FAB060	FAB090	FAB090A	FAB115	FAB115A	FAB142	FAB142A	FAB180	FAB220	
Moment of inertia	kg • cm <sup>2</sup>	1	3	0.03	0.16	0.61	-	3.25	-	9.21	-	28.98	69.61	
			4	0.03	0.14	0.48	-	2.74	-	7.54	-	23.67	54.37	
			5	0.03	0.13	0.47	-	2.71	-	7.42	-	23.29	53.27	
			6	0.03	0.13	0.45	-	2.65	-	7.25	-	22.75	51.72	
			7	0.03	0.13	0.45	-	2.62	-	7.14	-	22.48	50.97	
			8	0.03	0.13	0.44	-	2.58	-	7.07	-	22.59	50.84	
		10	0.03	0.13	0.44	-	2.57	-	7.03	-	22.51	50.56		
		2	12	0.03	0.14	0.13	0.47	0.47	2.71	2.71	7.42	7.42	7.42	23.29
			15	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	7.42	23.29
			20	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	7.42	23.29
			25	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	7.42	23.29
			30	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	7.42	23.29
			35	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	7.42	23.29
			40	0.03	0.13	0.13	0.44	0.47	2.57	2.71	7.03	7.42	7.42	23.29
			50	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	7.03	22.51
			60	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	7.03	22.51
			70	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	7.03	22.51
			80	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	7.03	22.51
100	0.03		0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	7.03	22.51		

- Ratio (i=Nin/Nout) - The lifetime will be shortened by half under continuous operation.
- When the output speed is 100rpm, it applies on the center of the output shaft.



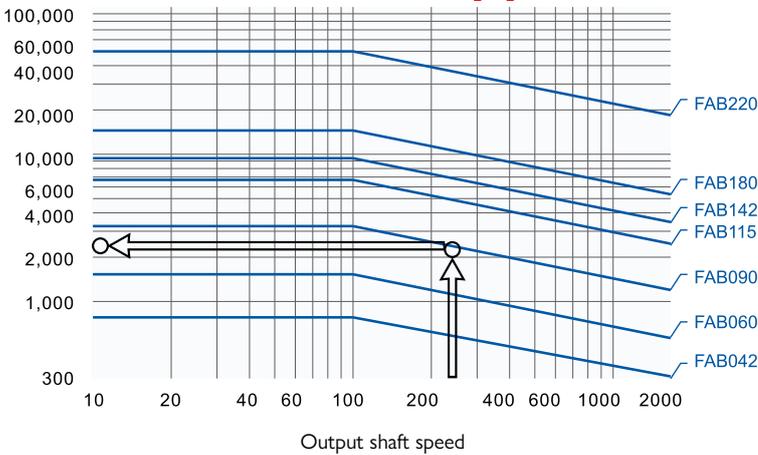
# PRECISION PLANETARY GEARBOX FAB SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEARBOX



The maximum radial and axial forces that the output shaft of the gearbox can withstand. Looking at the design of internal support bearings, the reducer adopts large-sized bearings and a design with a larger span, which can withstand greater radial and axial loads.

### PERMISSIBLE RADIAL FORCE F<sub>2rB</sub> [N] APPLY FORCE TO THE CENTER OF THE SHAFT

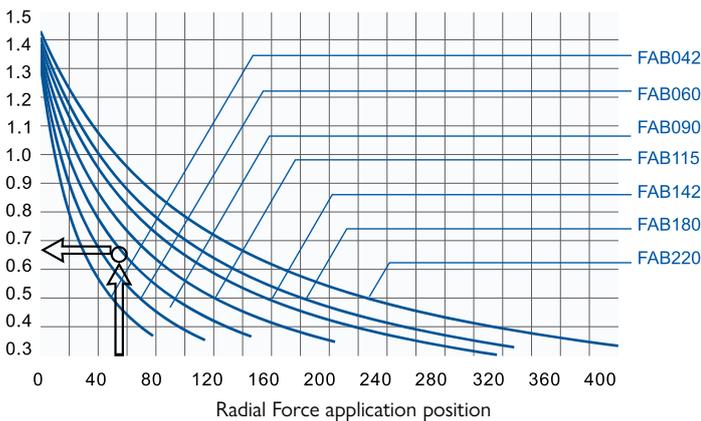


When the radial force F<sub>2r</sub> is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force F<sub>2rB</sub> that can be withstood by different specifications of reducers with a service life of 20,000hr\* under different output speeds is as follows:

$$F_{2a1B} = 0.2 \times F_{2rB}$$

$$F_{2a2B} = 0.1 \times F_{2rB}$$

### POSITIONAL LOAD COEFFICIENT



When the radial force F<sub>2r</sub> is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

Radial force  
 $F'_{2rB} = K_b \times F_{2rB}$

Axial force  
 $F'_{2a1B} = 0.2 \times F'_{2rB}$   
 $F'_{2a2B} = 0.1 \times F'_{2rB}$

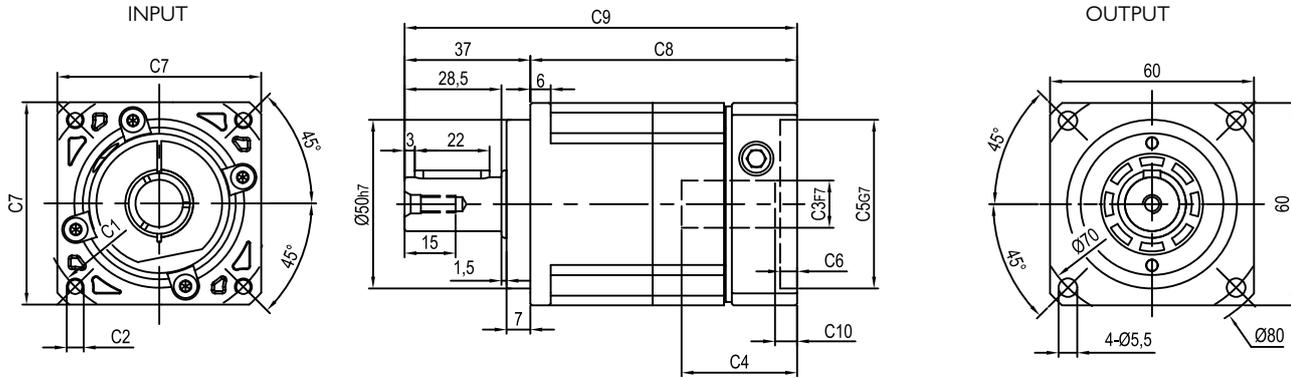
\*The lifetime will be shortened by half under continuous operation.



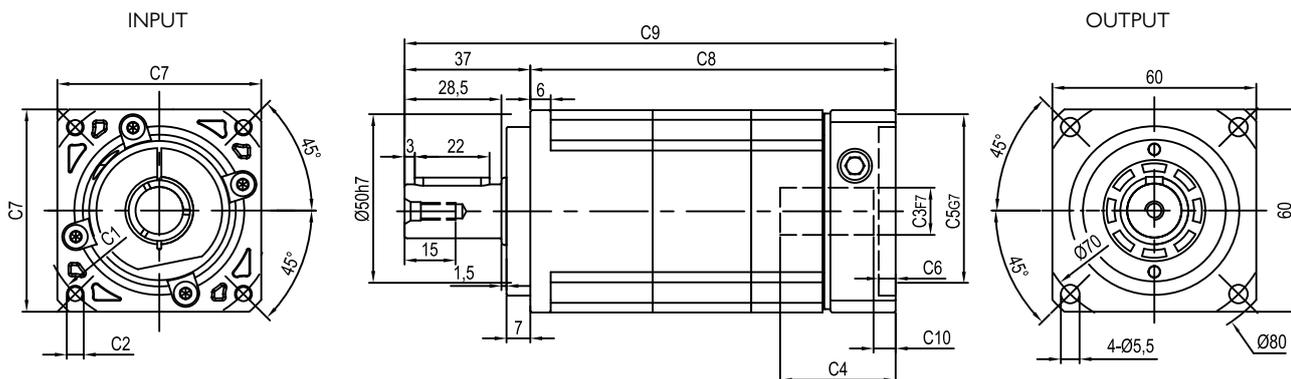
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

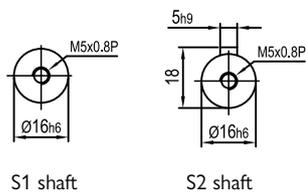
### FAB-060-L1



### FAB-060-L2



## OUTPUT DIAMETER



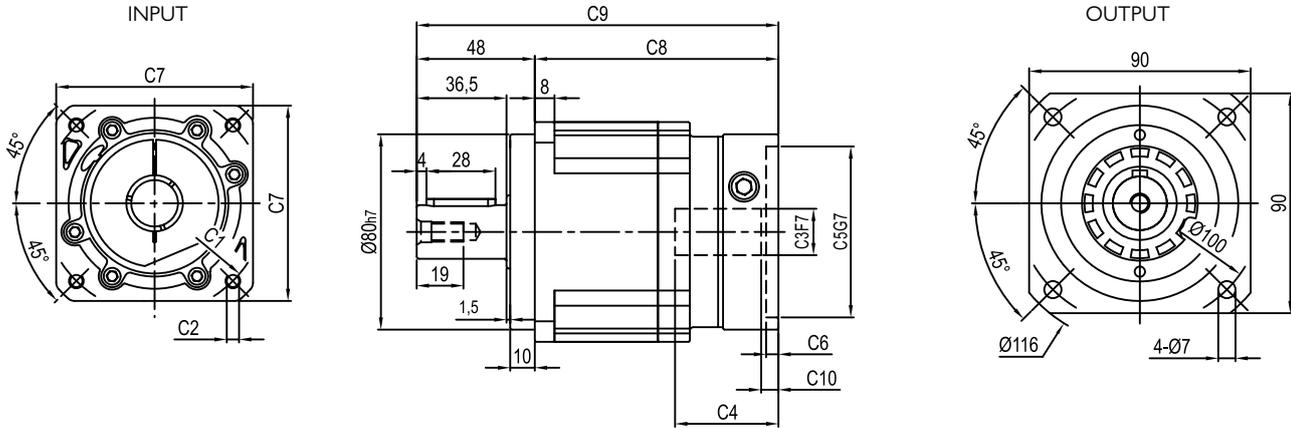
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-060-L1	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	34	$\varnothing 38,1$	5	60	78,5	115,5	5,5
FAB-060-L2								107,5	144,5	5,5
FAB-060-L1	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	34	$\varnothing 50$	5	60	78,5	115,5	5,5
FAB-060-L2								107,5	144,5	5,5
FAB-060M1-L1	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	85	122	12
FAB-060M1-L2								114,0	151,0	12,0

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

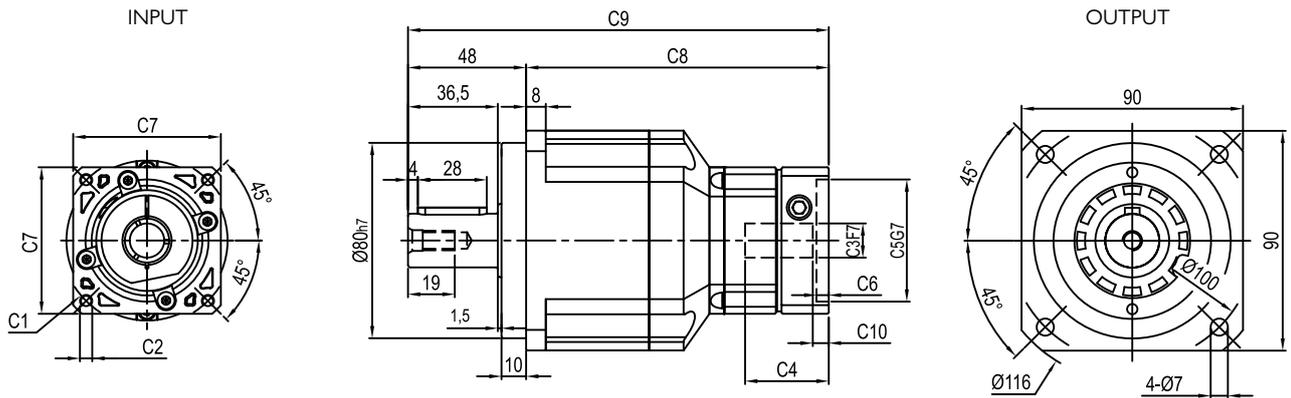
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

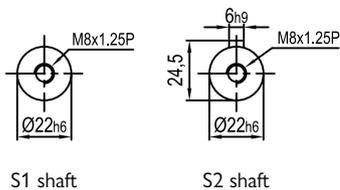
### FAB-090-L1



### FAB-090-L2



## OUTPUT DIAMETER



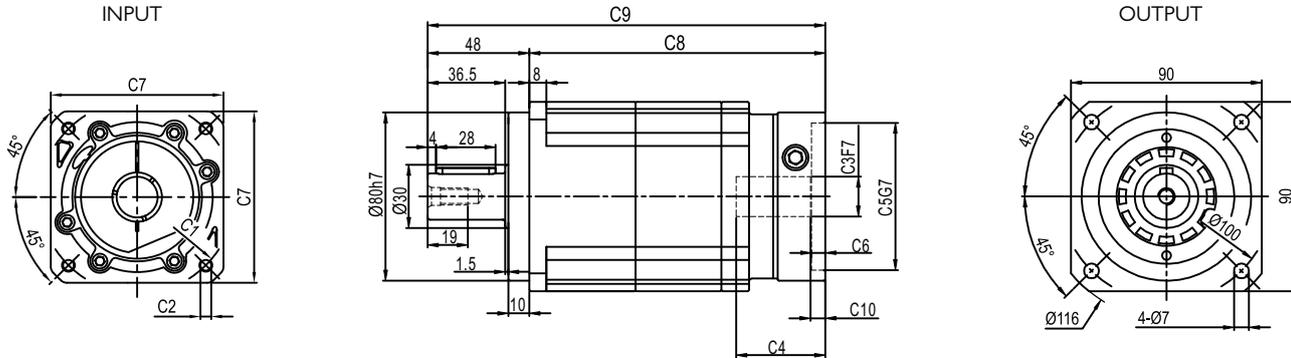
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-090-L1	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	99	147	7
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	99	147	6
FAB-090M1-L1	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	114,5	162,5	16,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	117	165	19
FAB-090-L2	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	34	$\varnothing 38,1$	5	60	123	171	5,5
	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	34	$\varnothing 50$	5	60	123	171	5,5
FAB-090M1-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	129,5	177,5	12
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	129,5	177,5	11

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

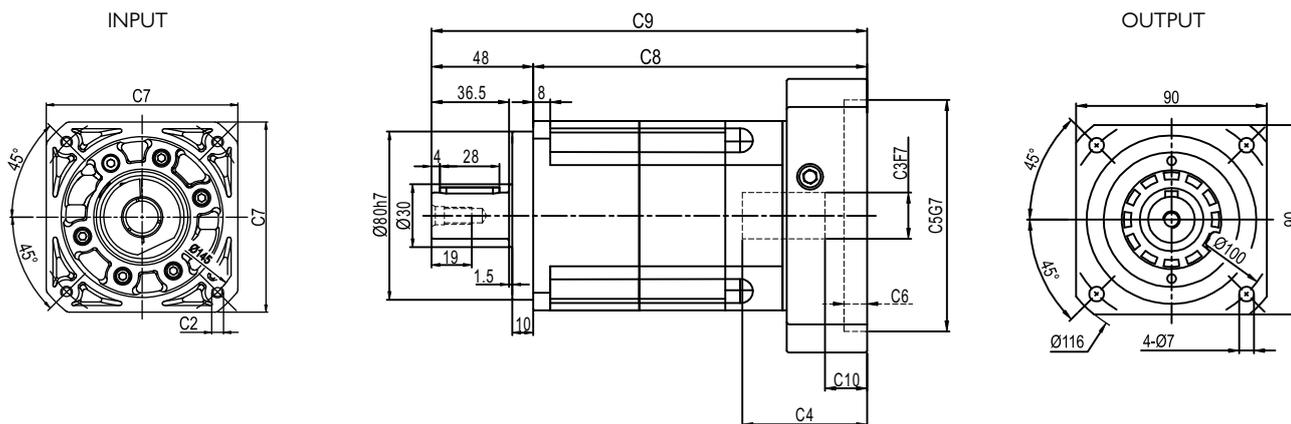
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

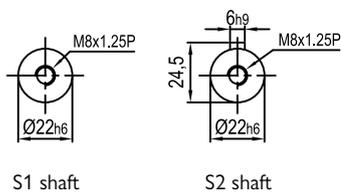
### FAB-090A-L2



### FAB-090A-L2



## OUTPUT DIAMETER



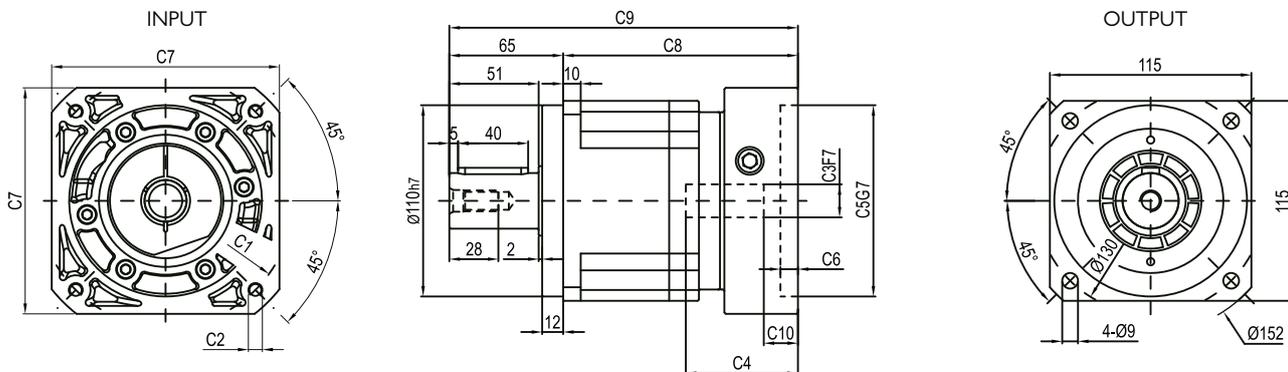
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-090A-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	139,5	187,5	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	139,5	187,5	6
FAB-090AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	155,0	203	16,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	157,5	205,5	19

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

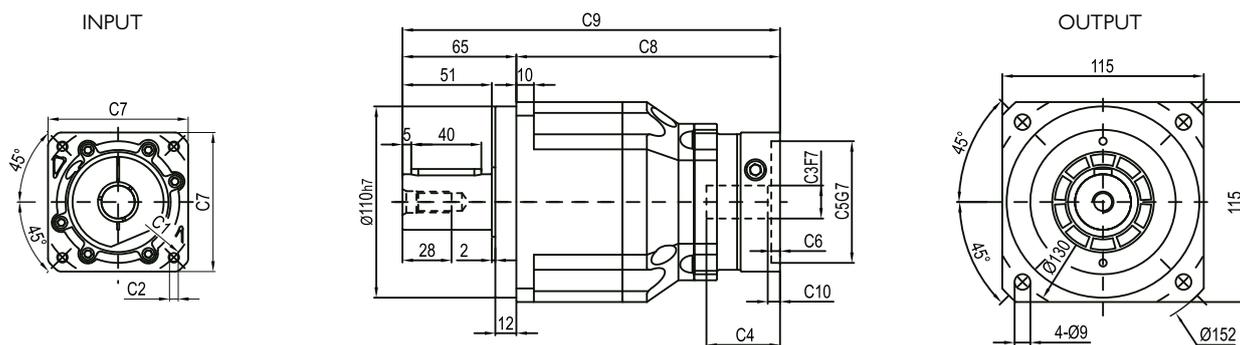
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

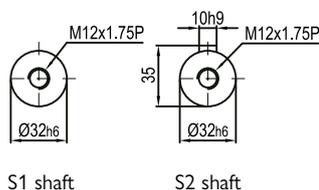
### FAB-115-L1



### FAB-115-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-115-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	134	199	19,5
FAB-115M1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	151,5	216,5	28
FAB-115-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	150,5	215,5	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	150,5	215,5	6
FAB-115M1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	166	231	16,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	168,5	233,5	19

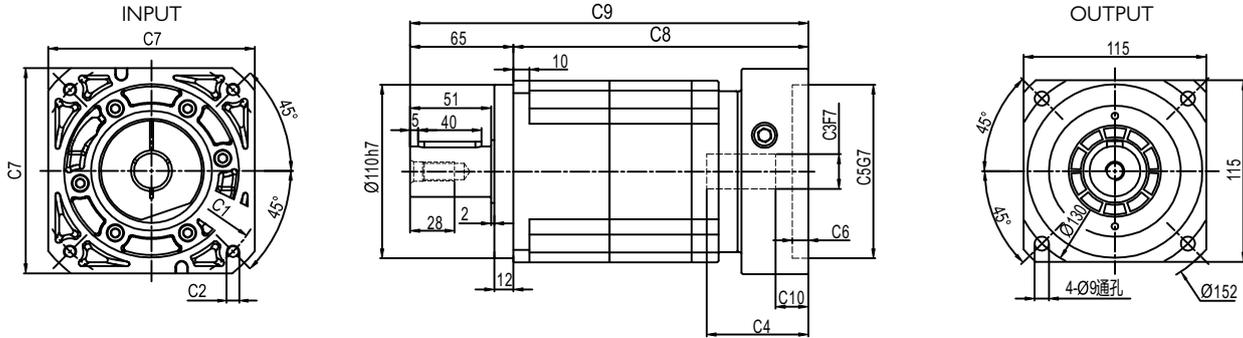
- C1~ C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



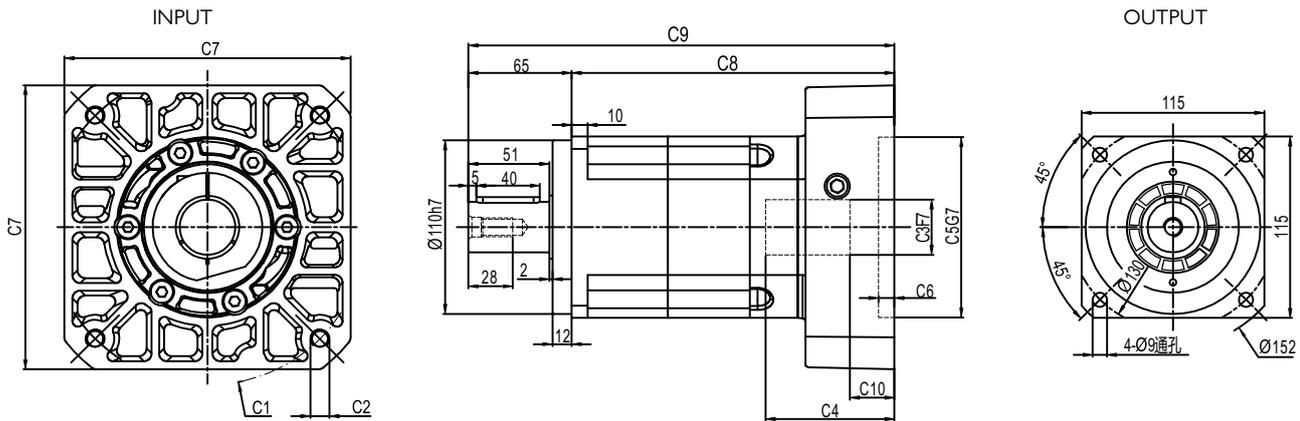
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

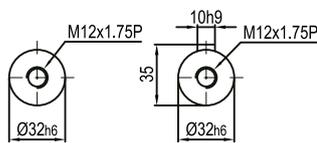
### FAB-115A-L2



### FAB-115A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

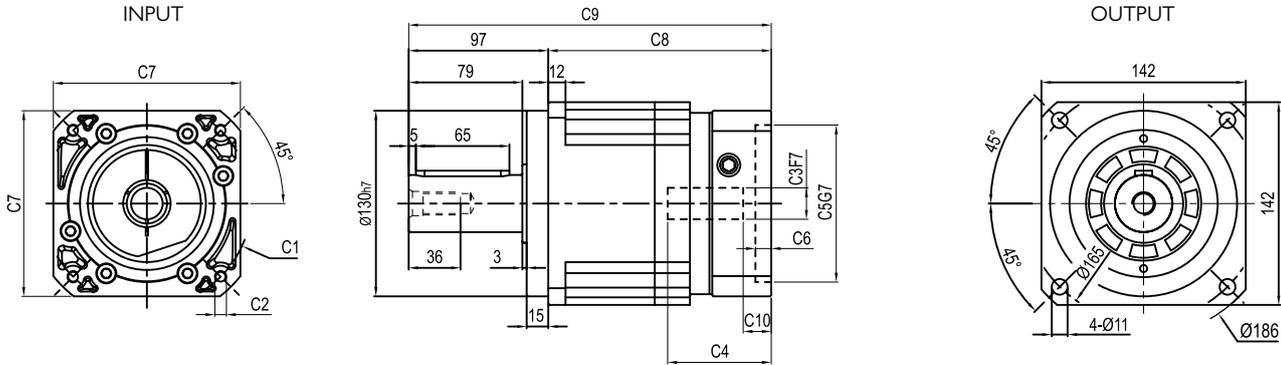
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-115A-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	185,5	205,5	19,5
FAB-115AM1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	203,0	268	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

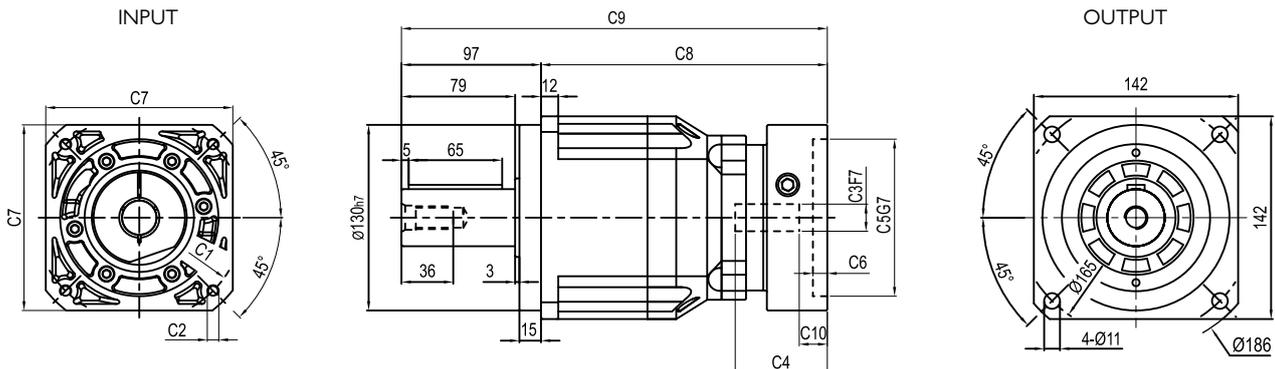
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

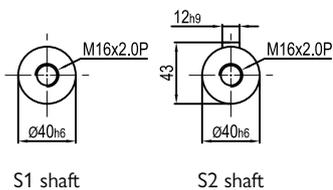
### FAB-142-L1



### FAB-142-L2



## OUTPUT DIAMETER



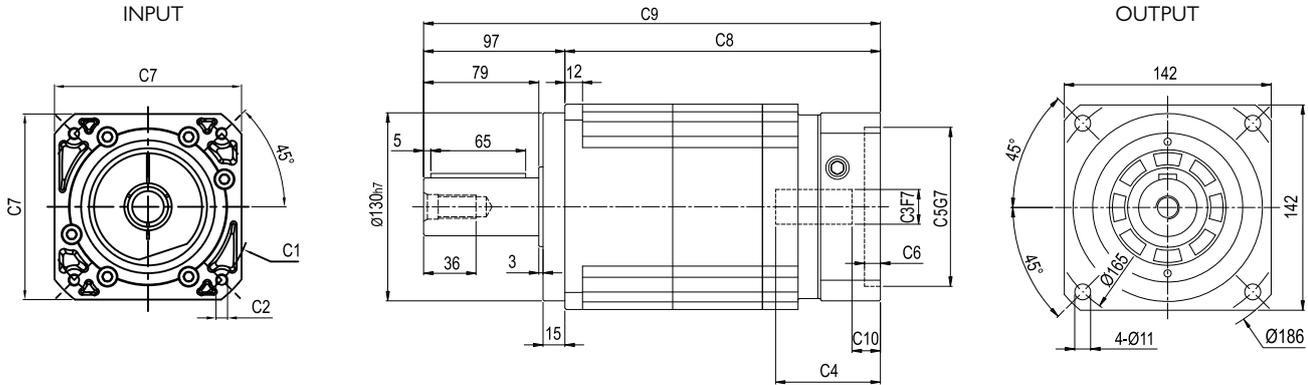
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-142-L1	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	155	252	19,5
	ø200	4-M12x28	ø35	81,5	ø114,3	8	180	165	262	25
FAB-142-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	199	296	19,5
FAB-142M1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	216,5	313,5	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

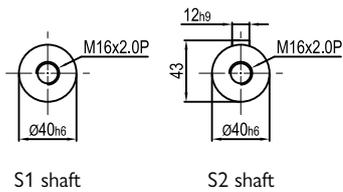
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

### FAB-142A-L2



## OUTPUT DIAMETER



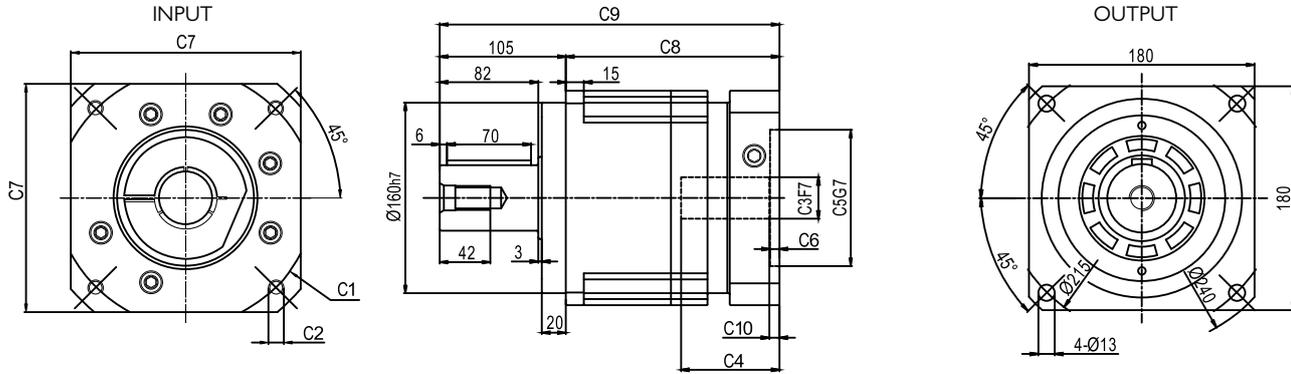
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-142A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	155	252	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	165	262	25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

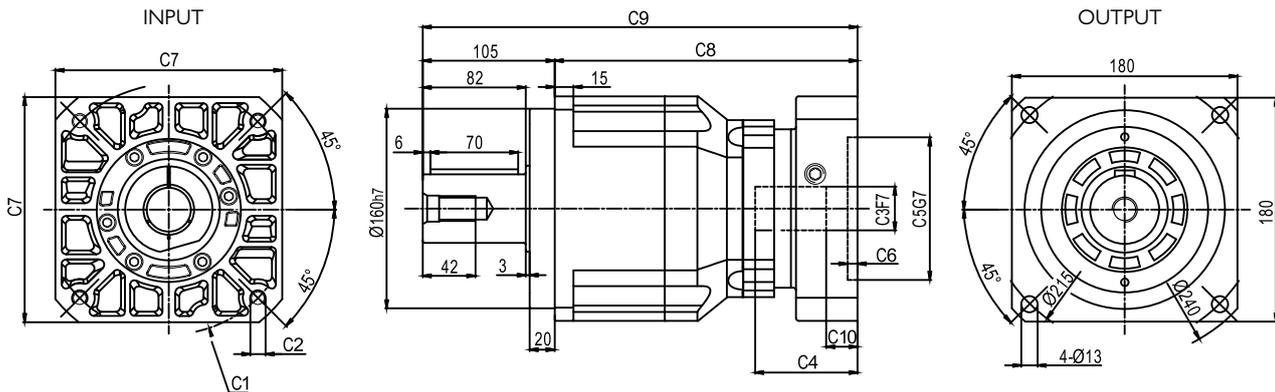
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

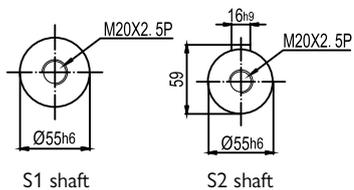
### FAB-180-L1



### FAB-180-L2



## OUTPUT DIAMETER



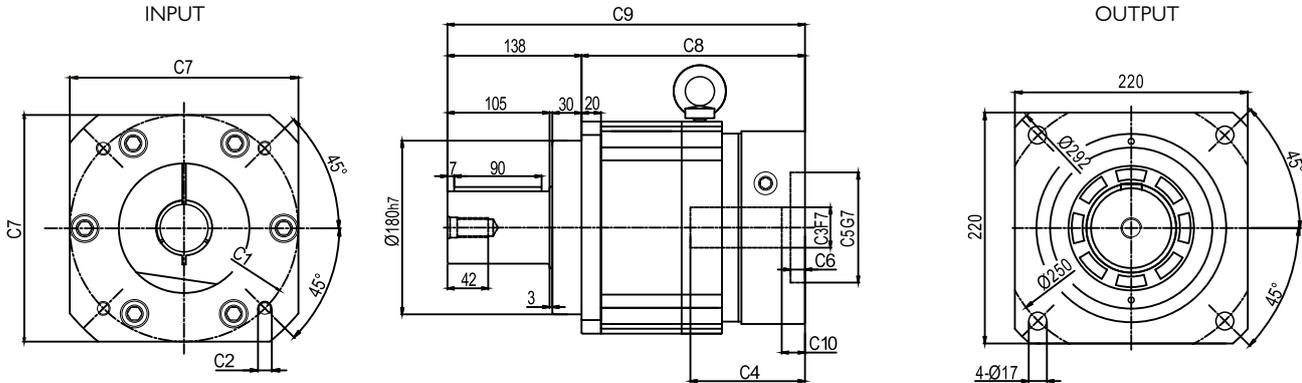
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-180-L1	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	178	283	8,5
	$\varnothing 200$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 114,3$	8	180	213,5	318,5	45,5
	$\varnothing 215$	4-M12x28	$\varnothing 38$	87	$\varnothing 180$	8	192	183	288	13,5
	$\varnothing 235$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 200$	10	220	213,5	318,5	45,5
FAB-180-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	231	336	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	241	346	25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

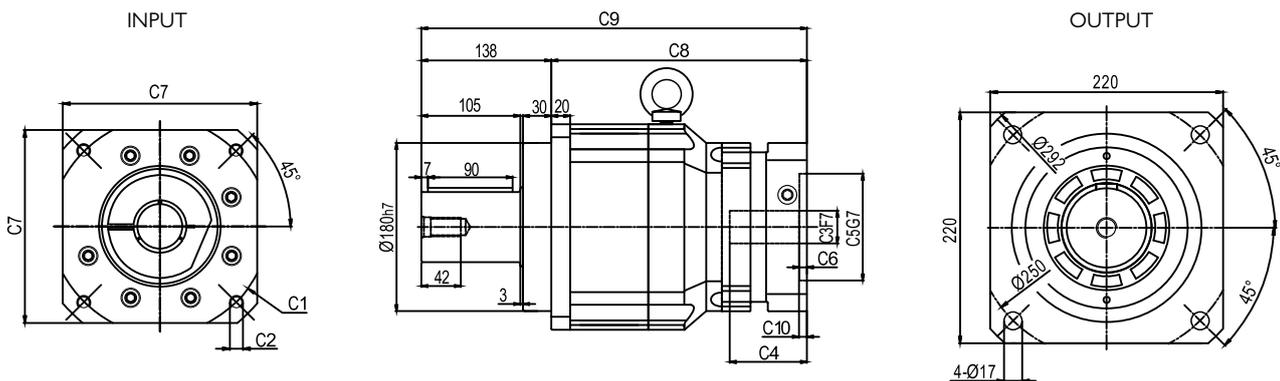
# PRECISION PLANETARY GEARBOX FAB SERIES

## PRODUCT DIMENSION

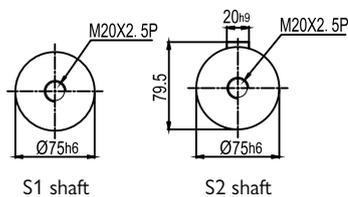
### FAB-220-L1



### FAB-220-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAB-220-L1	$\varnothing 200$	4-M12x28	$\varnothing 35, \varnothing 42$	118	$\varnothing 114,3$	15	200	230	368	24,0
	$\varnothing 215$	4-M12x30	$\varnothing 38$	108	$\varnothing 180$	8	200	220,0	358,0	11,5
	$\varnothing 235$	4-M12x30	$\varnothing 42, \varnothing 55$	118	$\varnothing 200$	10	220	230	368	24,0
FAB-220-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	271,5	409,5	8,5
	$\varnothing 200$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 114,3$	8	180	307	445	45,5
	$\varnothing 215$	4-M12x28	$\varnothing 38$	87	$\varnothing 180$	8	192	276,5	414,5	13,5
	$\varnothing 235$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 200$	10	220	307	445	45,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

**CHIARAVALLI LINEAR CENTER**

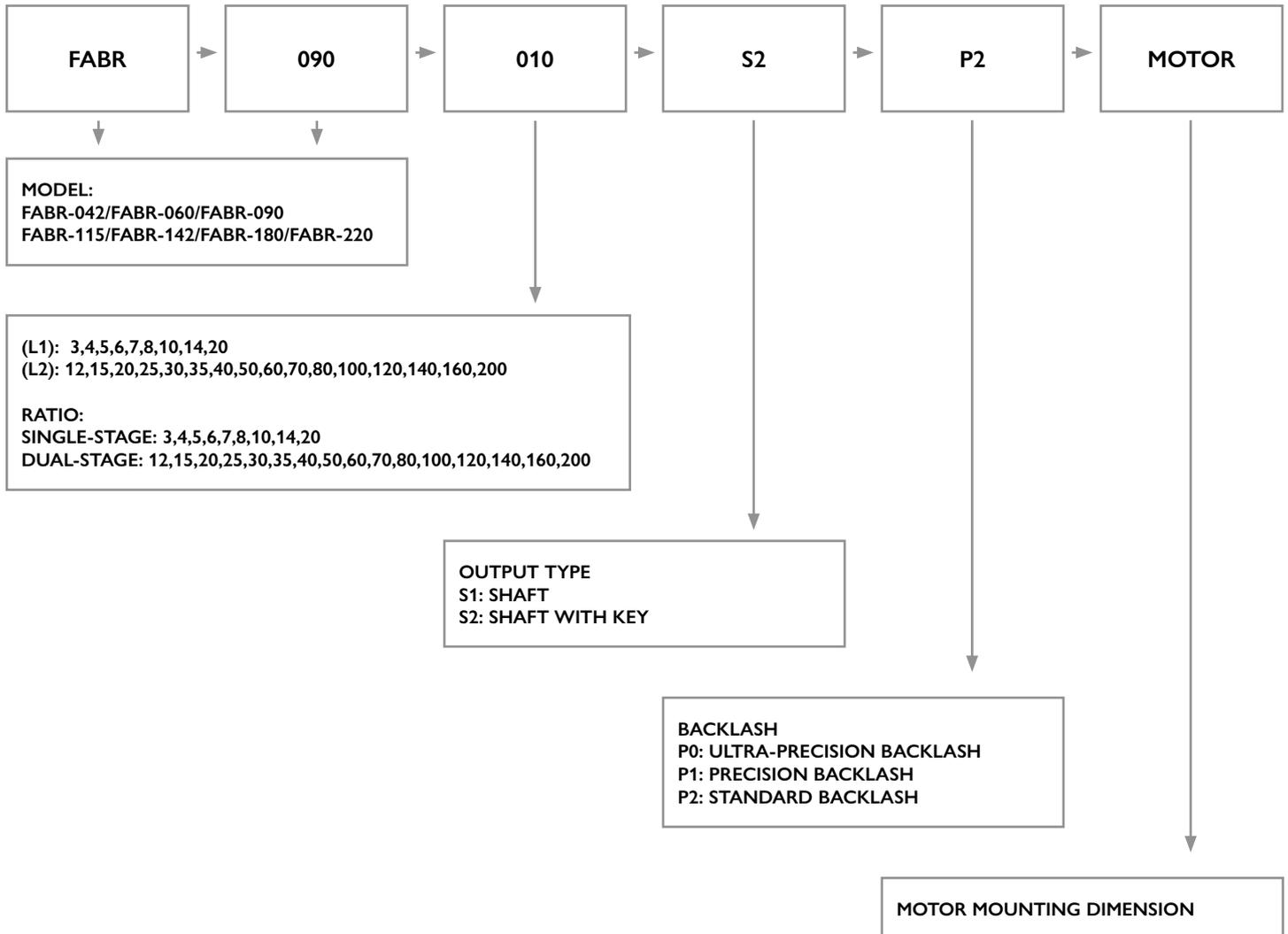
**PRECISION PLANETARY GEARBOX  
FABR SERIES**



# PRECISION PLANETARY GEARBOX FABR SERIES

## MODEL DESCRIPTION

FABR-090-010-S2-P2-19-70-90-M6-45





# PRECISION PLANETARY GEARBOX FABR SERIES

## TECHNICAL SPECIFICATION

MODEL	STAGE	RATIO	FABR042	FABR060	FABR090	FABR090A	FABR115	FABR115A	FABR142	FABR142A	FABR180	FABR220	
Rated output torque	1	3	20	55	130	-	208	-	342	-	588	1,140	
		4	19	50	140	-	290	-	542	-	1,050	1,700	
		5	22	60	160	-	330	-	650	-	1,200	2,000	
		6	20	55	150	-	310	-	600	-	1,100	1,900	
		7	19	50	140	-	300	-	550	-	1,100	1,800	
		8	17	50	140	-	290	-	542	-	1,050	1,700	
		10	14	60	160	-	330	-	650	-	1,200	2,000	
		14	-	50	140	-	300	-	550	-	1,100	1,800	
		20	-	40	100	-	230	-	450	-	900	1,500	
		12	-	55	130	130	208	208	342	342	588	1,140	
	15	20	55	130	130	208	208	342	342	588	1,140		
	20	19	50	140	140	290	290	542	542	1,050	1,700		
	25	22	60	160	160	330	330	650	650	1,200	2,000		
	30	22	55	130	130	208	208	342	342	588	1,140		
	35	22	60	160	160	330	330	650	650	1,200	2,000		
	40	22	50	140	140	290	290	542	542	1,050	1,700		
	50	22	60	160	160	330	330	650	650	1,200	2,000		
	60	22	55	150	150	310	310	600	600	1,100	1,900		
	70	22	60	160	160	330	330	650	650	1,200	2,000		
	80	22	50	140	140	290	290	542	542	1,050	1,700		
100	22	60	160	160	330	330	650	650	1,200	2,000			
120	-	-	150	150	310	310	600	600	1,100	1,900			
140	-	-	140	140	300	300	550	550	1,100	1,800			
160	-	-	120	120	260	260	500	500	1,000	1,600			
200	-	-	100	100	230	230	450	450	900	1,500			
T <sub>2B</sub> /Max. output torque	Nm	1,2	3~200	3 times the rated output torque									
n <sub>1</sub> /Rated input speed	rpm	1,2	3~200	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
n <sub>1B</sub> /Max.input speed	rpm	1,2	3~200	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
P0/Ultra-precision backlash	arcmin	1	3~20	-	-	≤2	≤2	≤2	≤2	≤2	≤2	≤2	≤2
		2	12~200	-	-	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
P1/Precision backlash	arcmin	1	3~20	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	12~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
P2/Precision backlash	arcmin	1	3~20	≤6	≤6	≤6	≤7	≤6	≤7	≤6	≤7	≤6	≤6
		2	12~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional rigidity	Nm/arcmin	1,2	3~200	3	7	14	14	25	25	50	50	145	225
F <sub>2rB</sub> <sup>2</sup> /Allowable radial force	N		3~200	780	1,530	3,250	3,250	6,700	6,700	9,400	9,400	14,500	50,000
F <sub>2r1B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	350	630	1,300	1,300	3,000	3,000	4,000	4,000	6,200	35,000
F <sub>2r2B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	390	765	1,625	1,625	3,350	3,350	4,700	4,700	7,250	25,000
Life time	hr	1,2	3~200	20,000*									
η/Efficiency	%	1	3~20	≤95%									
		2	12~200	≤92%									
Weight	kg	1	3~20	0,9	2,1	6,4	-	13	-	24,5	-	51	83
		2	12~200	1,2	2,5	7,8	9,1	14,2	18,6	27,5	35	54	95
Operating temperature	°C	1,2	3~200	-10°C ~ +90°C									
lubrication		1,2	3~200	Synthetic lubricating grease									
Ingress protection		1,2	3~200	IP65									
Mount position		1,2	3~200	Any direction									
(n <sub>1</sub> =3000rpm) / Noise level	dB	1,2	3~200	≤61	≤63	≤65	≤65	≤68	≤68	≤70	≤70	≤72	≤74

## GEARBOX MOMENT OF INERTIA

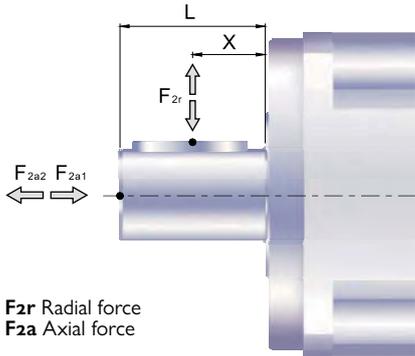
MODEL	STAGE	RATIO	FABR042	FABR060	FABR090	FABR090A	FABR115	FABR115A	FABR142	FABR142A	FABR180	FABR220
Moment of inertia	1	3~7	0.09	0.35	2.25	-	6.84	-	23.4	-	68.9	135.4
		8~10	0.09	0.07	1.87	-	6.25	-	21.8	-	65.6	119.8
		14~20	-	0.07	1.87	-	6.25	-	21.8	-	65.6	119.8
	2	12~40	0.09	0.35	0.35	2.23	2.23	6.84	6.44	6.84	23.4	68.9
		50	0.09	0.07	0.31	1.87	1.87	6.25	6.25	6.25	21.8	65.6
		60	0.09	0.07	0.35	2.25	2.25	6.84	6.84	6.84	23.4	68.9
		70~100	0.09	0.07	0.31	1.87	1.87	6.25	6.25	6.25	21.8	65.6
		120~200	-	-	0.31	1.87	1.87	6.25	6.25	6.25	21.8	65.6

- Ratio (i=N<sub>in</sub>/N<sub>out</sub>) - The lifetime will be shortened by half under continuous operation.
- When the output speed is 100rpm, it applies on the center of the output shaft.



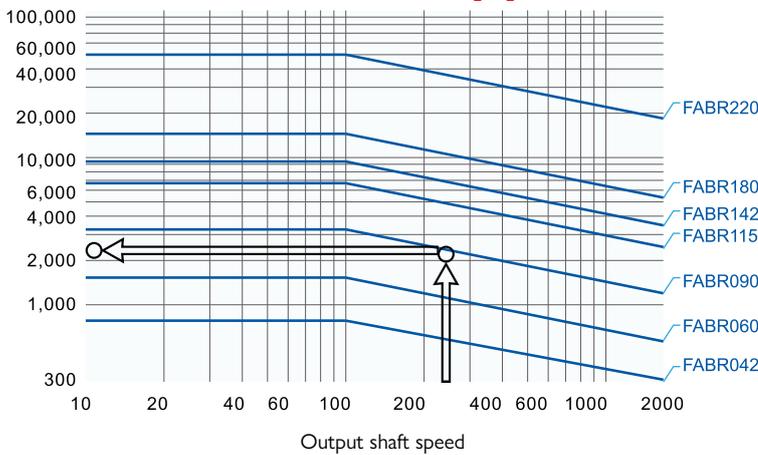
# PRECISION PLANETARY GEARBOX FABR SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEARBOX



The maximum radial and axial forces that the output shaft of the gearbox can withstand. Looking at the design of internal support bearings, the reducer adopts large-sized bearings and a design with a larger span, which can withstand greater radial and axial loads.

### PERMISSIBLE RADIAL FORCE $F_{2rB}$ [N] APPLY FORCE TO THE CENTER OF THE SHAFT

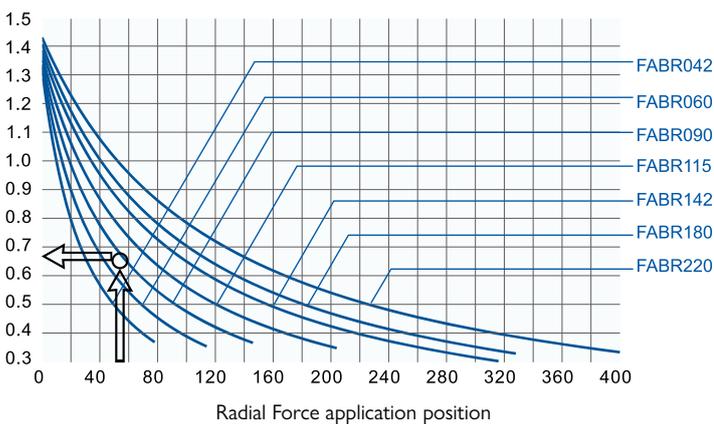


When the radial force  $F_{2r}$  is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force  $F_{2rB}$  that can be withstood by different specifications of reducers with a service life of 20,000hr\* under different output speeds is as follows:

$$F_{2a1B} = 0.2 \times F_{2rB}$$

$$F_{2a2B} = 0.1 \times F_{2rB}$$

### POSITIONAL LOAD COEFFICIENT



When the radial force  $F_{2r}$  is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

Radial force  
 $F'_{2rB} = K_b \times F_{2rB}$

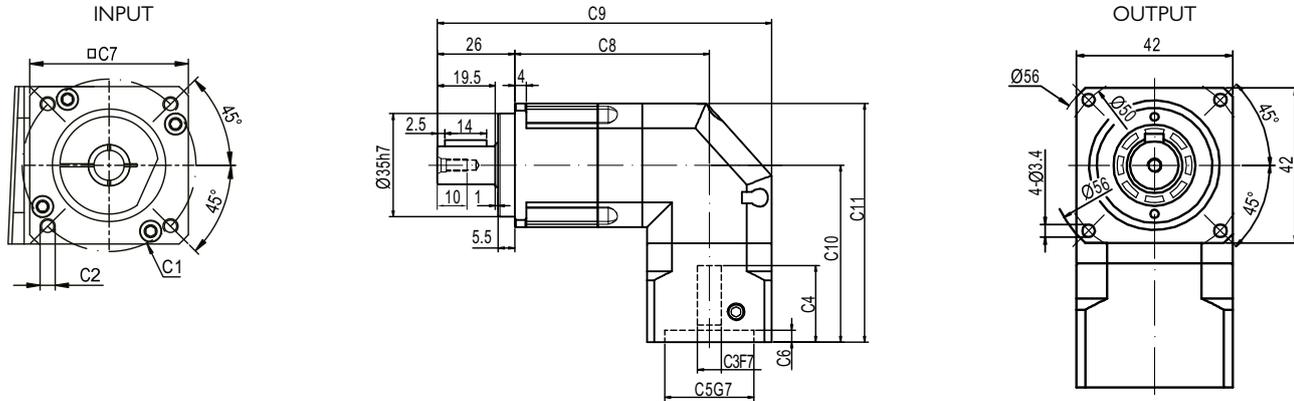
Axial force  
 $F'_{2a1B} = 0.2 \times F'_{2rB}$   
 $F'_{2a2B} = 0.1 \times F'_{2rB}$

\*The lifetime will be shortened by half under continuous operation.

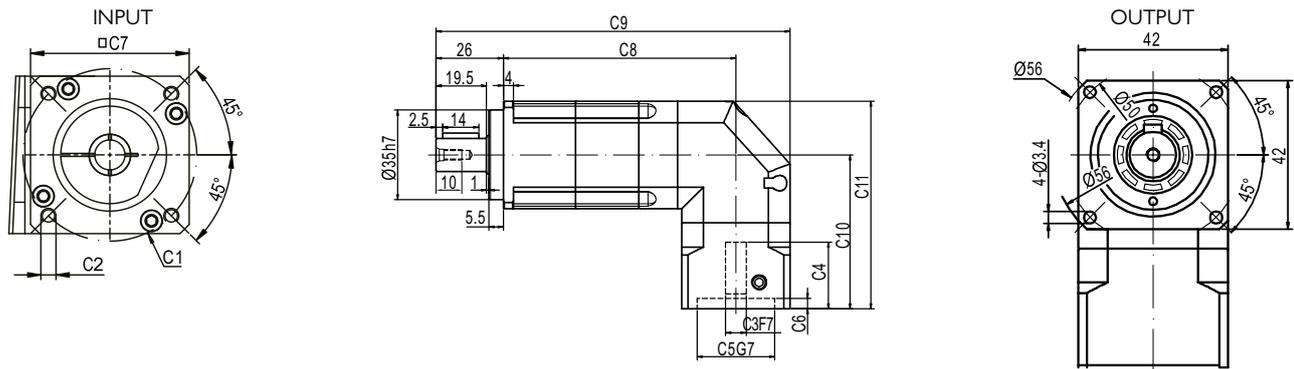
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

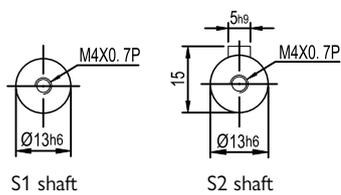
### FABR-042-L1



### FABR-042-L2



## OUTPUT DIAMETER



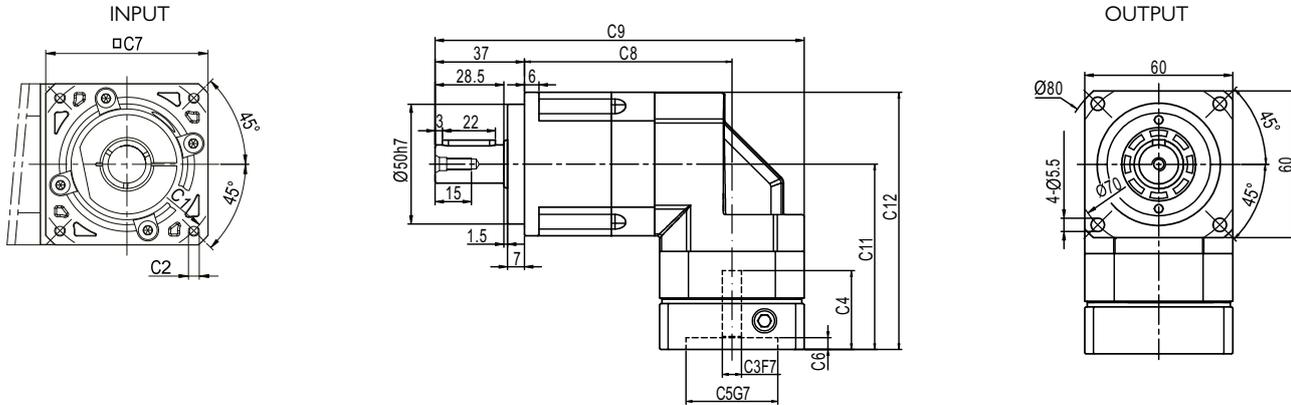
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FABR-042-L1	ø46	4-M4x10	ø8	26	ø30	4	42	65,5	112,5	60	81
	ø45	4-M3x8									
FABR-042-L2	ø46	4-M4x10	ø8	26	ø30	4	42	90	137	60	81
	ø45	4-M3x8									

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

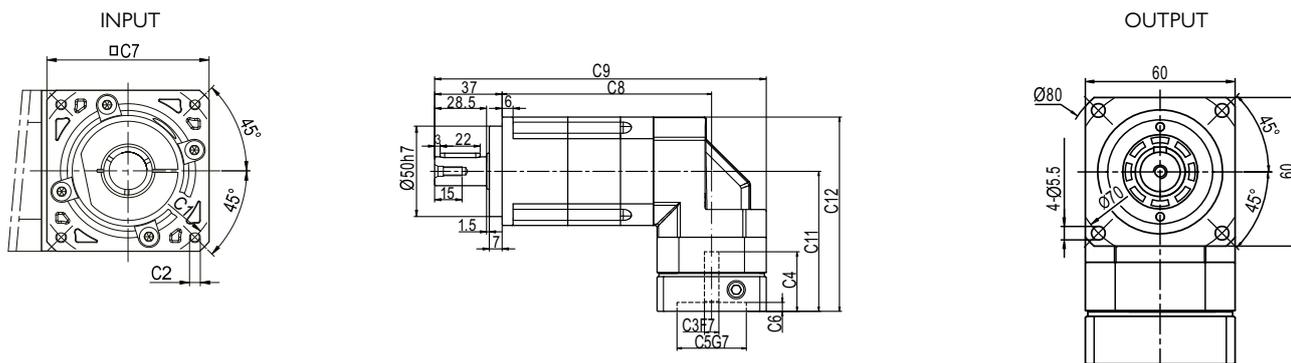
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

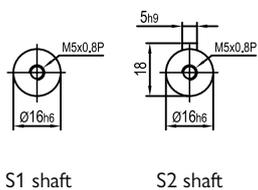
### FABR-060-L1



### FABR-060-L2



## OUTPUT DIAMETER



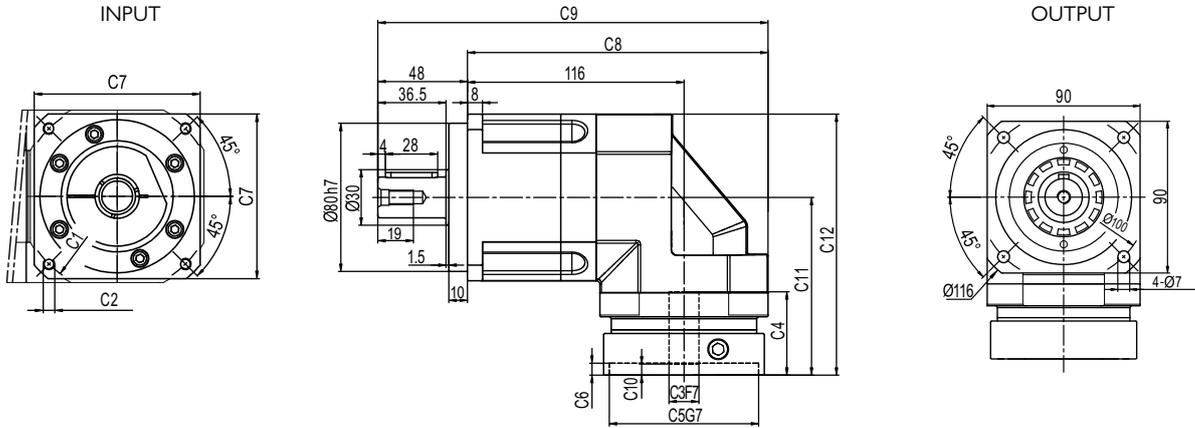
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-060-L1	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	33	$\varnothing 38,1$	5	60	86	153	5,5	77,5	107,5
FABR-060-L2								115	182			
FABR-060-L1	$\varnothing 70$	4-M4x10,	$\varnothing 11, \varnothing 14$	33	$\varnothing 50$	5	60	86	153	5,5	77,5	107,5
FABR-060-L2		4-M5x12							115			
FABR-060M1-L1	$\varnothing 90$	4-M5x12,	$\varnothing 19$	42,5	$\varnothing 70$	6,5	80	86	163	12	87	117
FABR-060M1-L2		4-M6x14							115			

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

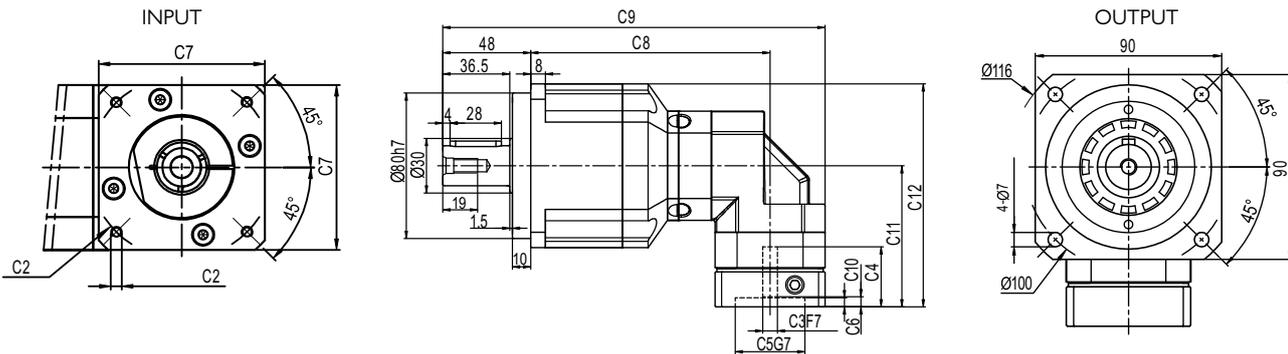
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

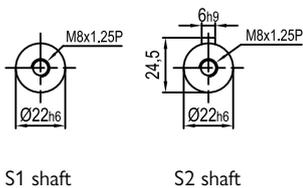
### FABR-090-L1



### FABR-090-L2



## OUTPUT DIAMETER



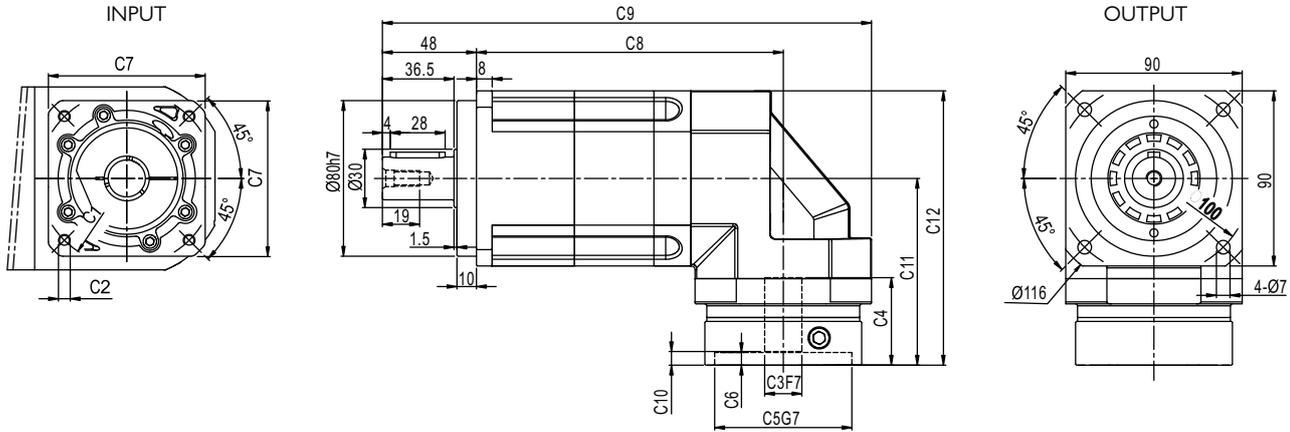
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-090-L1	$\varnothing 90$	4-M5x12, 4-4-M6x14	$\varnothing 19$	45	$\varnothing 70$	6,5	80	116	209	7	96	141
	$\varnothing 100$	4-M6x14	$\varnothing 16$	45	$\varnothing 80$	6,5	86	116	209	6	96	141
FABR-090M1-L1	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	116	214	16,5	117,5	162,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	116	229	19	120	165
FABR-090-L2	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	33	$\varnothing 38,1$	5	60	130,5	208,5	5,5	77,5	122,5
	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	33	$\varnothing 50$	5	60	130,5	208,5	5,5	77,5	122,5
FABR-090M1-L2	$\varnothing 90$	4-M5x12, 4-4-M6x14	$\varnothing 19$	42,5	$\varnothing 70$	6,5	80	130,5	218,5	12	87	132
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42,5	$\varnothing 80$	6,5	86	130,5	221,5	11	87	132

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

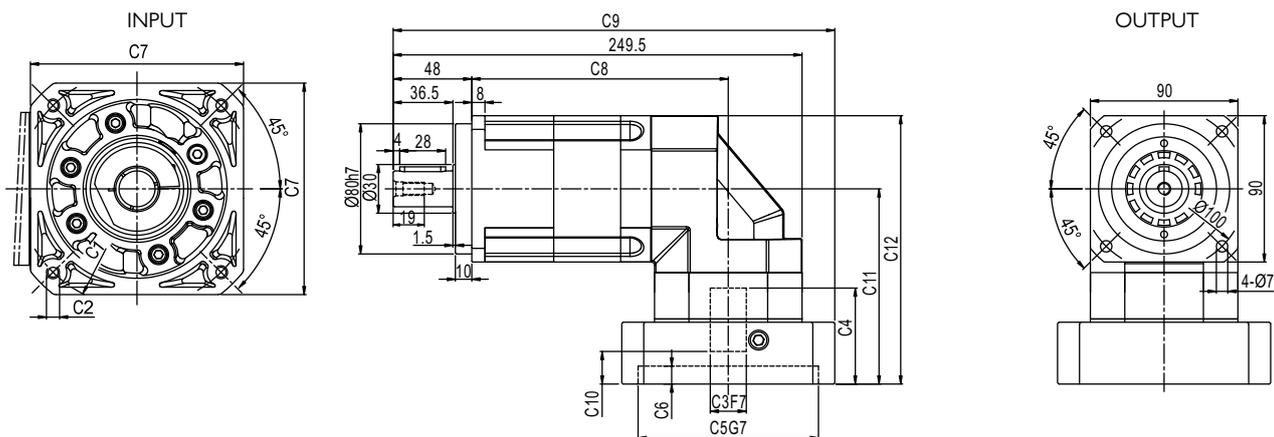
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

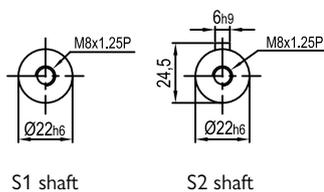
### FABR-090A-L2



### FABR-090A-L2



## OUTPUT DIAMETER



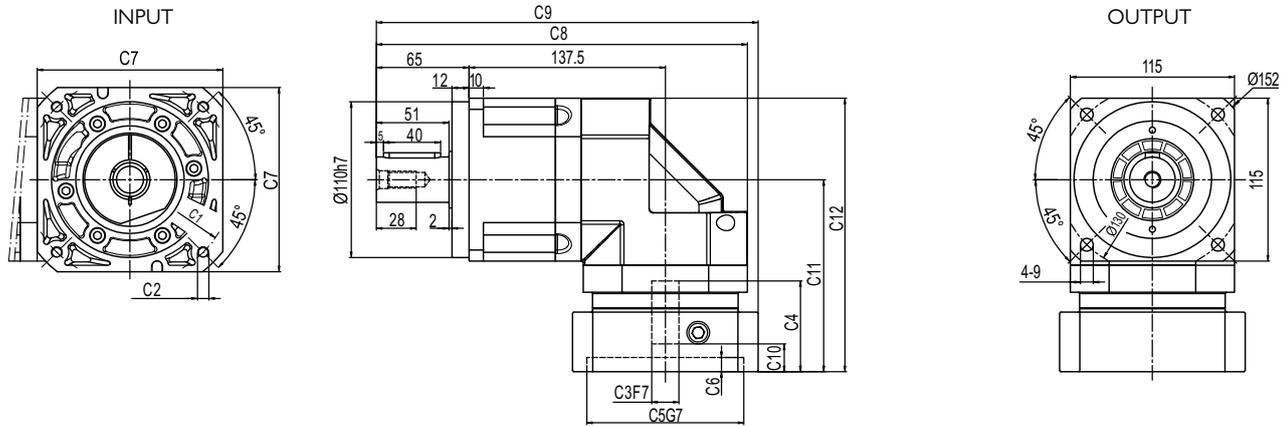
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-090A-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	156,5	249,5	7	96	141
	ø100	4-M6x14	ø16	45	ø80	6,5	86	156,5	249,5	6	96	141
FABR-090AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	156,5	254,5	16,5	117,5	162,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	10	130	156,5	269,5	19	120	165

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

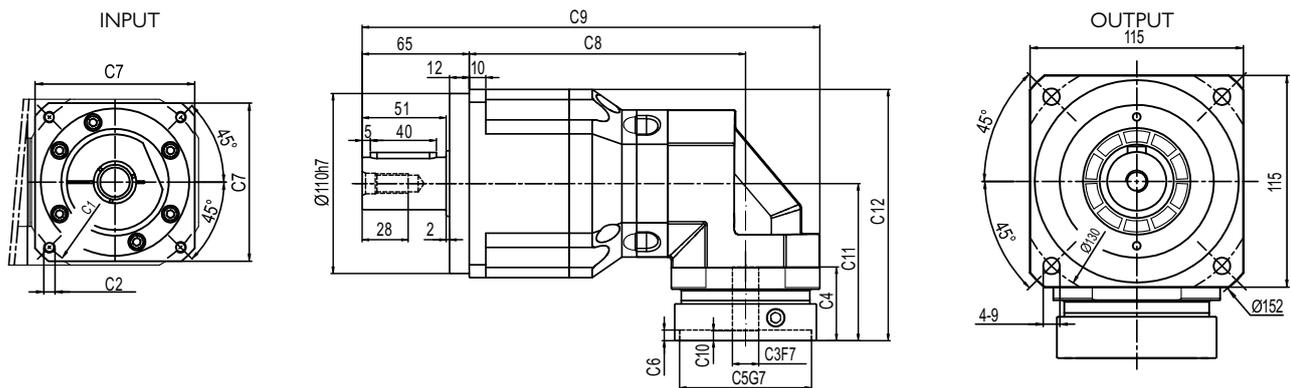
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

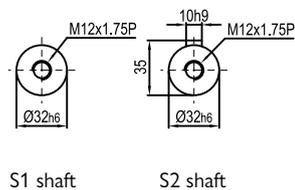
### FABR-115-L1



### FABR-115-L2



## OUTPUT DIAMETER



S1 shaft      S2 shaft

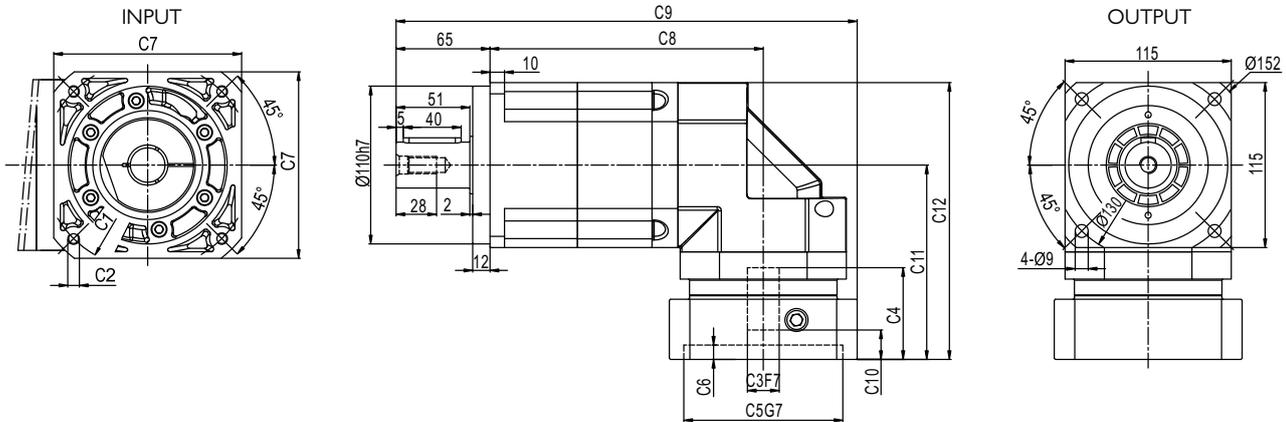
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-115-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	137,5	267,5	19,5	135,5	193
FABR-115M1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	137,5	292,5	28	152,5	210
FABR-115-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	167,5	277,5	7	96	153,5
	ø100	4-M6x14	ø16	45	ø80	6,5	86	167,5	277,5	6	96	153,5
FABR-115M1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	167,5	282,5	16,5	177,5	175
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	167,5	297,5	19	120	177,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

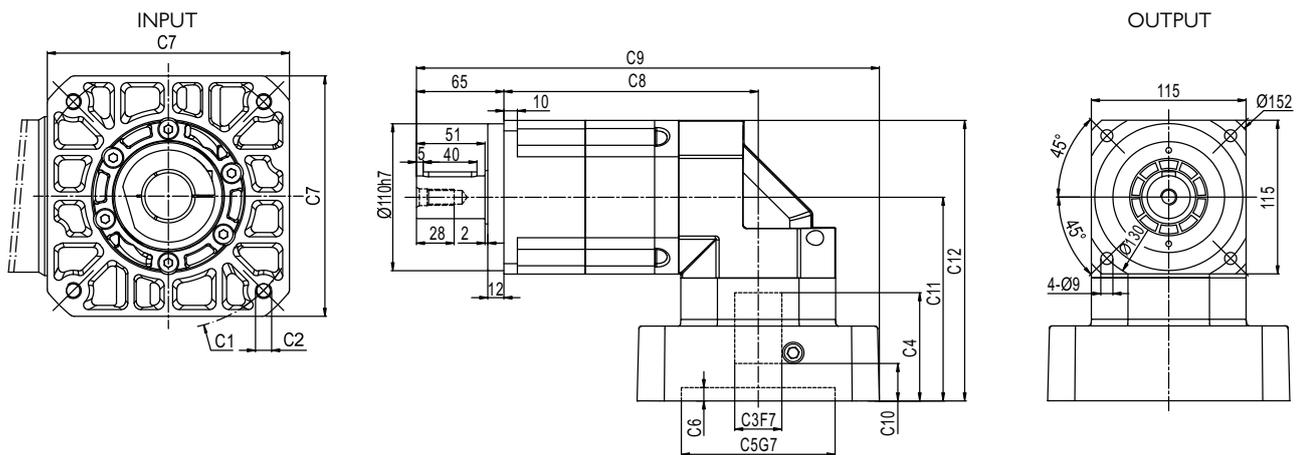
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

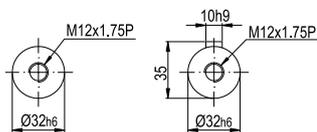
### FABR-115A-L2



### FABR-115A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

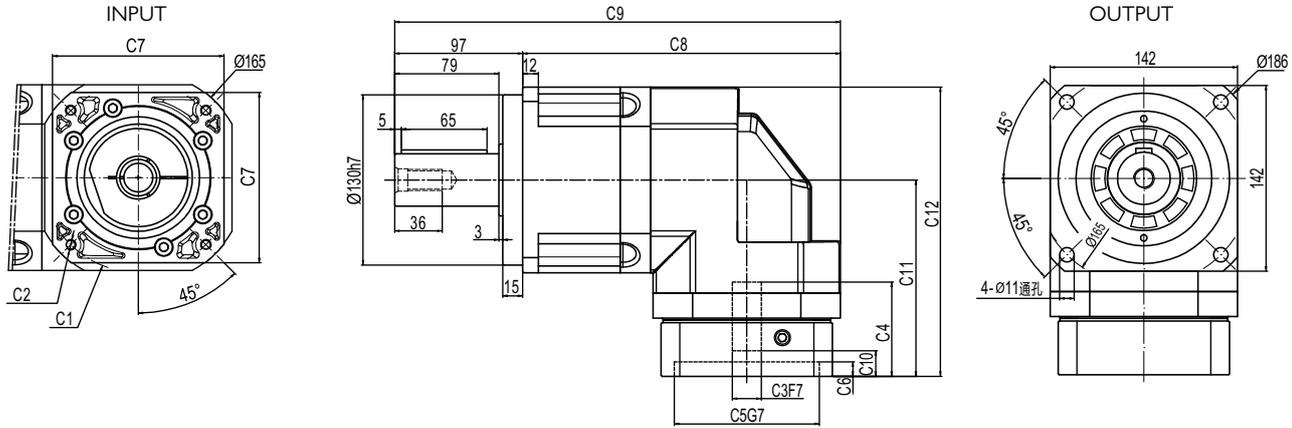
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-115A-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	189	319	19,5	135,5	193
FABR-115AM1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	189	344	28	152,5	210

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

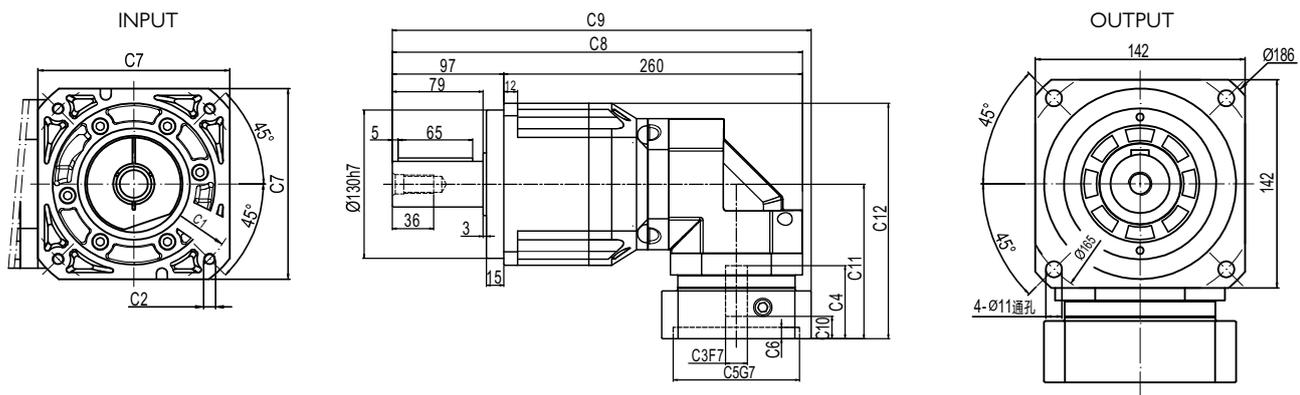
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

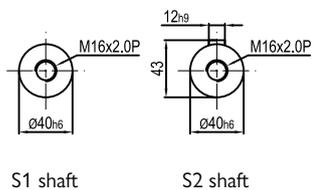
### FABR-142-L1



### FABR-142-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-142-L1	Ø145	4-M8x20	Ø22, Ø24	72	Ø110	11	130	170	338	19,5	150	221
	Ø200	4-M12x28	Ø35	82	Ø114,3	8	180	170	357	25	160	231
FABR-142-L2	Ø145	4-M8x20	Ø19, Ø22, Ø24	64	Ø110	10	130	202,5	364,5	19,5	135,5	206,5
FABR-142M1-L2	Ø200	4-M12x28	Ø35	81	Ø114,3	10	180	202,5	389,5	28	152,5	223,5

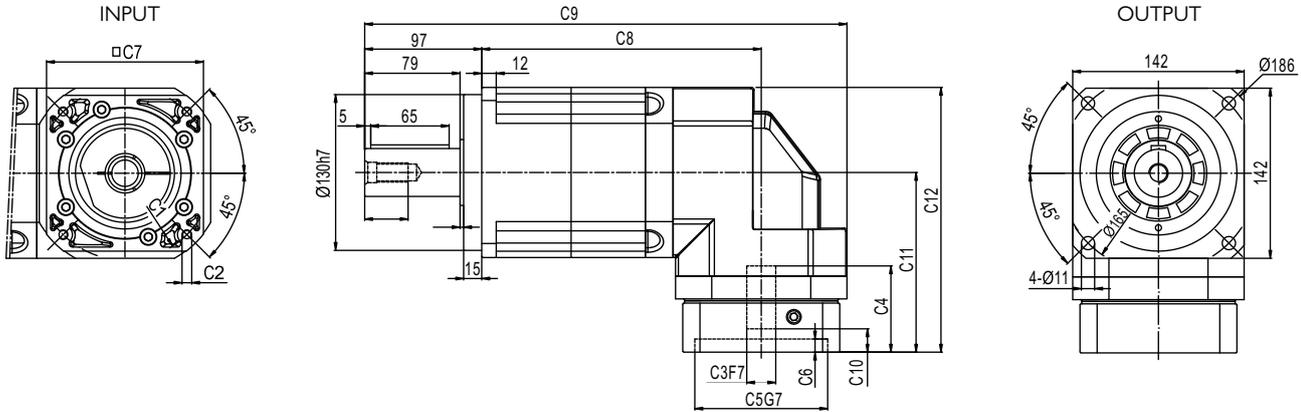
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



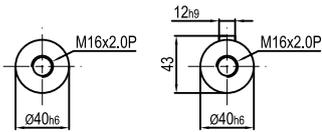
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

### FABR-142A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

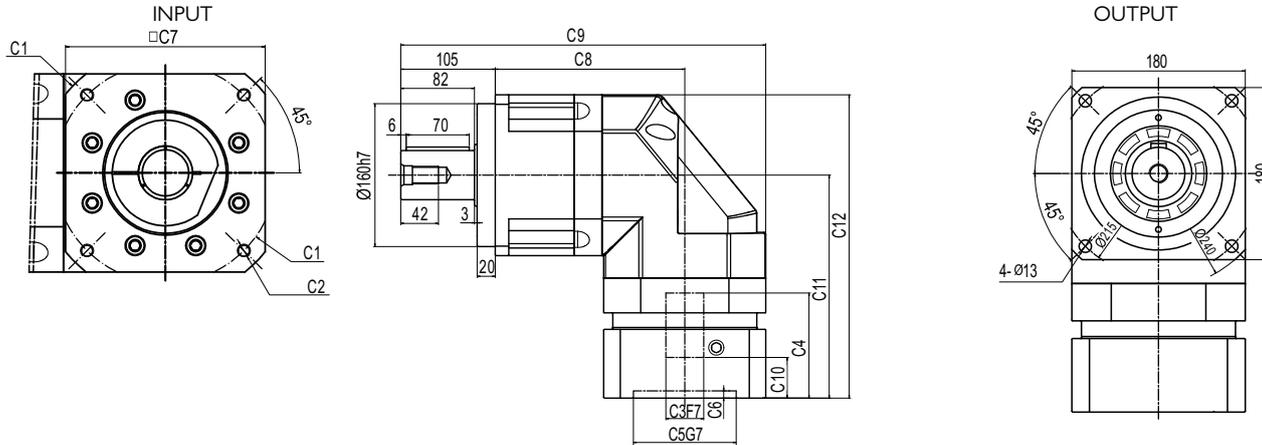
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-142A-L2	Ø145	4-M8x20	Ø22, Ø24	72	Ø110	11	130	231,5	399,5	19,5	150	221
	Ø200	4-M12x28	Ø35	82	Ø114,3	8	180	231,5	418,5	25	160	231

▪ C1-C7 are motor (metric standard) specific dimensions, which could be customized.

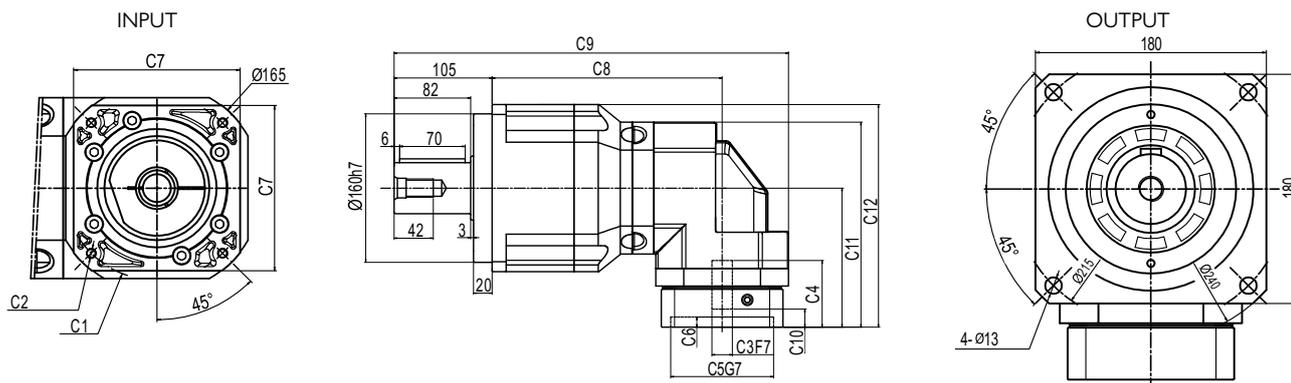
# PRECISION PLANETARY GEARBOX FABR SERIES

## PRODUCT DIMENSION

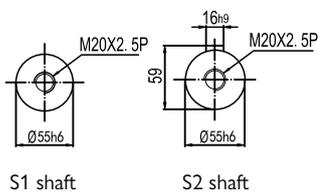
### FABR-180-L1



### FABR-180-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FABR-180-L1	$\phi 200$	4-M12x28	$\phi 35$	82	$\phi 114,3$	8	180	210,5	405,5	8,5	214	304
	$\phi 200$	4-M12x28	$\phi 42$	117,5	$\phi 114,3$	8	180	210,5	405,5	45,5	249,5	339,5
	$\phi 215$	4-M12x28	$\phi 38$	87	$\phi 180$	8	192	210,5	411,5	13,5	219	309
	$\phi 235$	4-M12x28	$\phi 42$	117,5	$\phi 200$	10	220	213,5	318,5	45,5	249,5	339,5
FABR-180-L2	$\phi 145$	4-M8x20	$\phi 22, \phi 24$	72	$\phi 110$	11	130	246	422	19,5	150	240
	$\phi 200$	4-M12x28	$\phi 35$	82	$\phi 114,3$	8	180	246	441	25	160	250

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.



**CHIARAVALLI LINEAR CENTER**

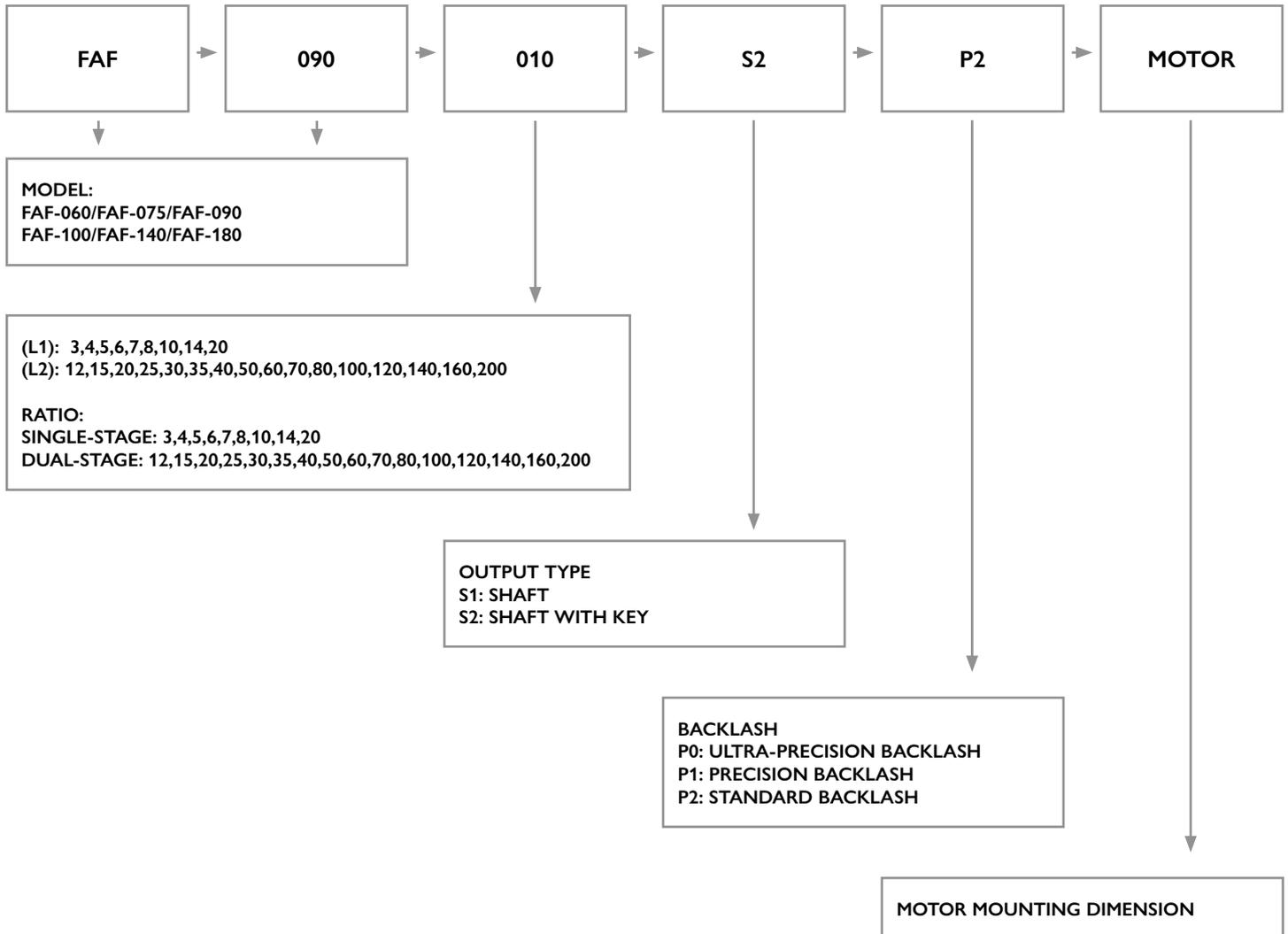
**PRECISION PLANETARY GEARBOX  
FAF SERIES**



# PRECISION PLANETARY GEARBOX FAF SERIES

## MODEL DESCRIPTION

FAF-090-010-S2-P2-19-70-90-M6-45





# PRECISION PLANETARY GEARBOX FAF SERIES

## TECHNICAL SPECIFICATION

MODEL	STAGE	RATIO	FAF060	FAF075	FAF075A	FAF100	FAF100A	FAF140	FAF140A	FAF180	
Rated output torque	1	3	55	130	-	208	-	342	-	588	
		4	50	140	-	290	-	542	-	1,050	
		5	60	160	-	330	-	650	-	1,200	
		6	55	150	-	310	-	600	-	1,100	
		7	50	140	-	300	-	550	-	1,100	
		8	45	120	-	260	-	500	-	1,000	
	2	10	40	100	-	230	-	450	-	900	
		15	55	130	130	208	208	342	342	588	
		20	50	140	140	290	290	542	542	1,050	
		25	60	160	160	330	330	650	650	1,200	
		30	55	160	160	330	330	650	650	1,200	
		35	50	160	160	330	330	650	650	1,200	
		40	45	120	120	260	260	500	500	1,000	
		50	60	160	160	330	330	650	650	1,200	
		60	55	150	150	310	310	600	600	1,100	
		70	50	140	140	300	300	550	550	1,100	
		80	45	120	120	260	260	500	500	1,000	
		100	40	100	100	230	230	450	450	900	
T <sub>2B</sub> /Max. output torque	Nm	1,2	3 times the rated output torque								
n <sub>1</sub> /Rated input speed	rpm	1,2	3~100	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000
n <sub>1B</sub> /Max.input speed	rpm	1,2	3~100	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000
P0/Ultra-precision backlash	arcmin	1	3~10	-	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	3~100	-	-	-	≤3	≤3	≤3	≤3	≤3
P1/Precision backlash	arcmin	1	3~10	≤3	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	12~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
P2/Precision backlash	arcmin	1	3~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional rigidity	Nm/arcmin	1,2	3~100	7	14	14	25	25	50	50	145
F <sub>2rB</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	1,400	4,100	4,100	9,200	9,200	14,000	14,000	18,000
F <sub>2a1B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	1,000	3,300	3,300	5,220	5,220	10,800	10,800	13,000
F <sub>2a2B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	1,100	3,700	3,700	5,800	5,800	11,400	11,400	19,500
Life time	h	1,2	3~100	30,000 <sup>1</sup>							
η/Efficiency	%	1	3~10	≥97%							
		2	12~100	≥94%							
Weight	kg	1	3~10	1.3	3.7	-	7.8	-	14.5	-	29
		2	12~100	1.9	41	41	9	9	17.5	17.5	33
Operating temperature	°C	1,2	3~100	-10C ~ +90C							
lubrication		1,2	3~100	Synthetic lubricating grease							
Ingress protection		1,2	3~100	IP65							
Mount position		1,2	3~100	Any direction							
(n <sub>1</sub> =3000rpm) / Noise level	dB	1,2	3~100	≤58	≤60	≤60	≤63	≤63	≤65	≤65	≤67

## GEARBOX MOMENT OF INERTIA

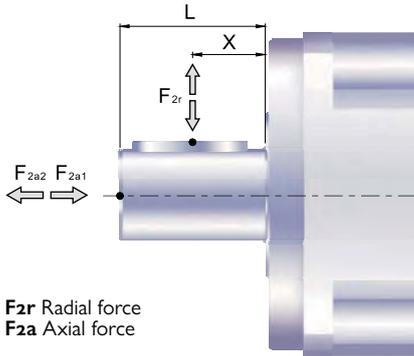
MODEL	STAGE	RATIO	FAF060	FAF075	FAF075A	FAF100	FAF100A	FAF140	FAF140A	FAF180
Moment of inertia	1	3	0.16	0.61	-	3.25	-	9.21	-	28.98
		4	0.14	0.48	-	2.74	-	7.54	-	23.67
		5	0.13	0.47	-	2.71	-	7.42	-	23.29
		6	0.13	0.45	-	2.65	-	7.25	-	22.75
		7	0.13	0.45	-	2.62	-	7.14	-	22.48
		8	0.13	0.44	-	2.58	-	7.07	-	22.59
	2	10	0.13	0.44	-	2.57	-	7.03	-	22.51
		15	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42
		20	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42
		25	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42
		30	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42
		35	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42
		40	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42
		50	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03
		60	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03
		70	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03
		80	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03
		100	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.



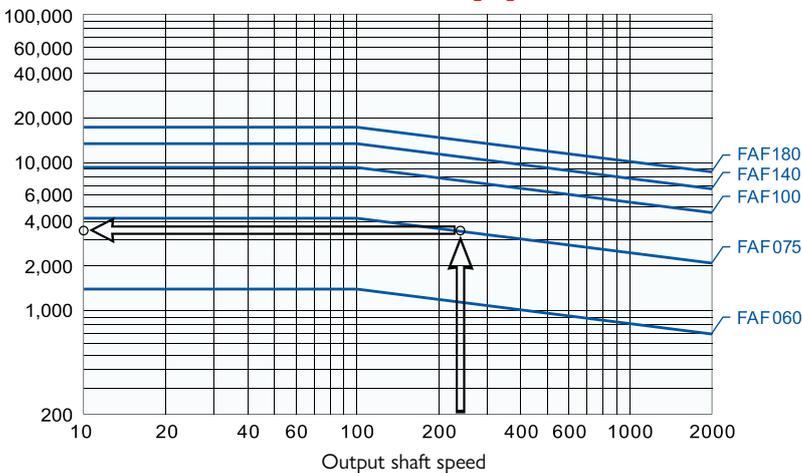
# PRECISION PLANETARY GEARBOX FAF SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEARBOX



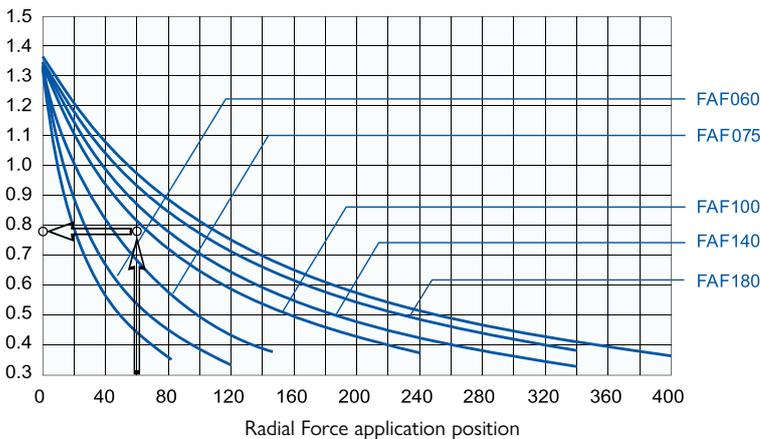
The permitted radial and axial loads on the output shaft depend on the design of the gearbox supporting bearing. A large-span design and high-capacity bearings are adopted to achieve the maximum bearing capacity for radial and axial loads.

### PERMISSIBLE RADIAL FORCE F<sub>2rB</sub> [N] APPLY FORCE TO THE CENTER OF THE SHAFT



When the radial force F<sub>2r</sub> is applied to the center of the shaft, i.e. X=1/2xL, the allowable radial force F<sub>2rB</sub> that can be withstood by different specifications of reducers under different output speeds is refer to the left picture.

### POSITIONAL LOAD COEFFICIENT



When the radial force F<sub>2r</sub> is not in the center of the shaft, the closer to the gearbox, that is, X < 1/2 x L, the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e., X > 1/2xL, the allowable force that can be borne becomes smaller.

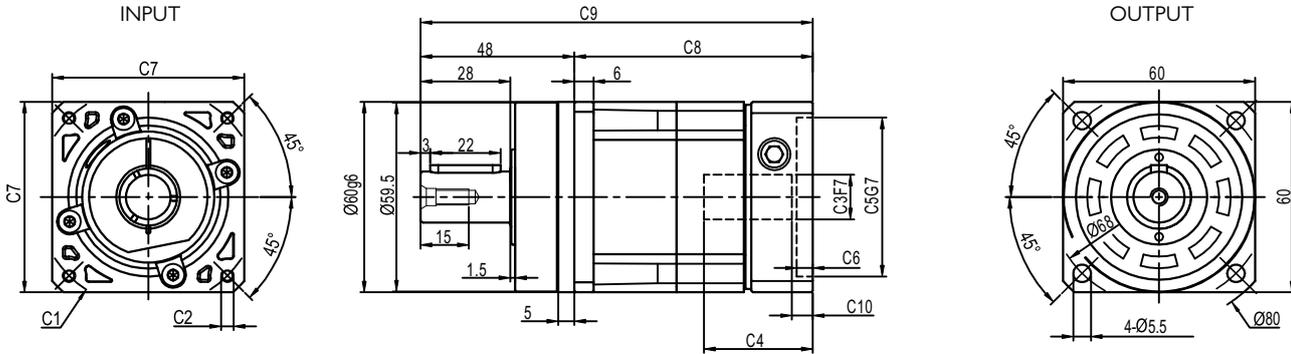
$$F'_{2rB} = K_b X F_{2rB}$$

\*The lifetime will be shortened by half under continuous operation.

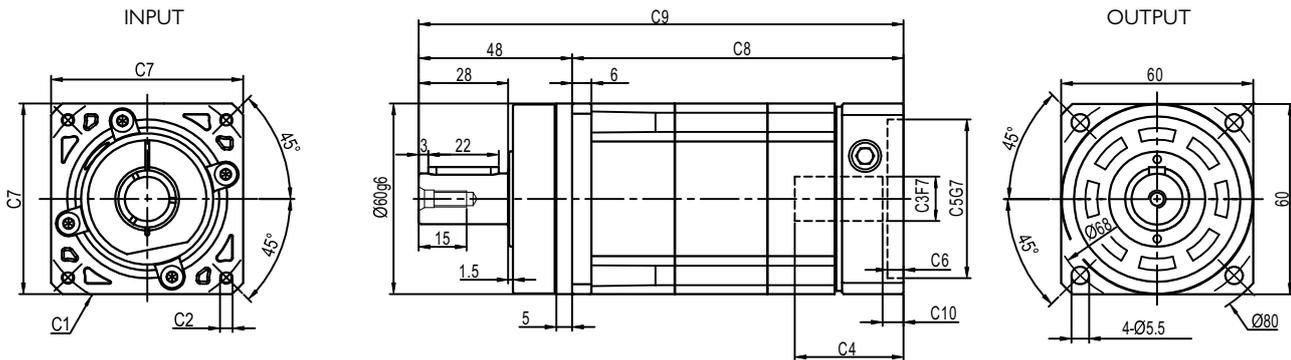
# PRECISION PLANETARY GEARBOX FAF SERIES

## PRODUCT DIMENSION

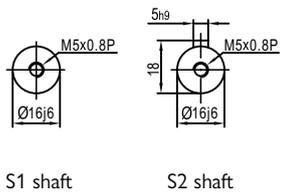
### FAF-060-L1



### FAF-060-L2



## OUTPUT DIAMETER



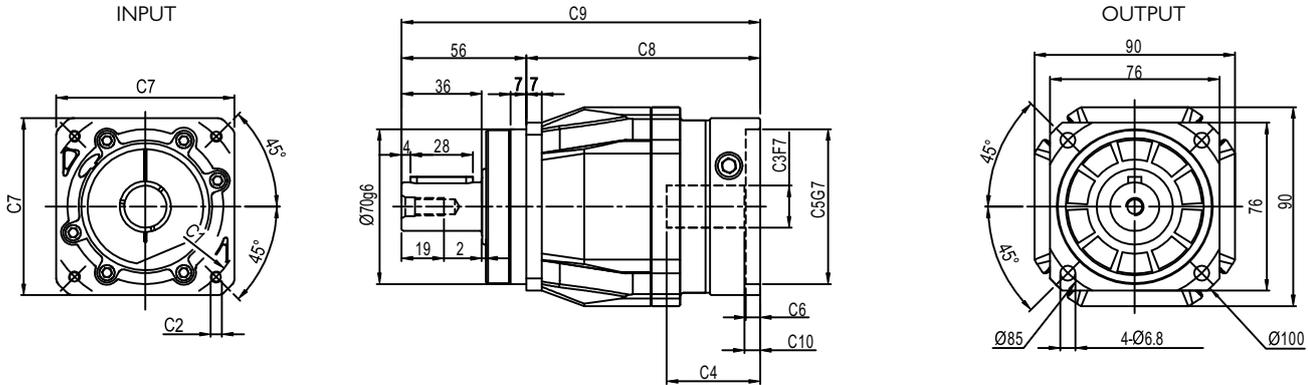
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAF-060-L1	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	34	$\varnothing 38,1$	5	60	74,5	122,5	6,5
FAF-060-L2								103,5	151,5	6,5
FAF-060-L1	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	34	$\varnothing 50$	5	60	74,5	122,5	6,5
FAF-060-L2								103,5	151,5	6,5
FAF-060M1-L1	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	81	129	12
FAF-060M1-L2								110	158	12

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

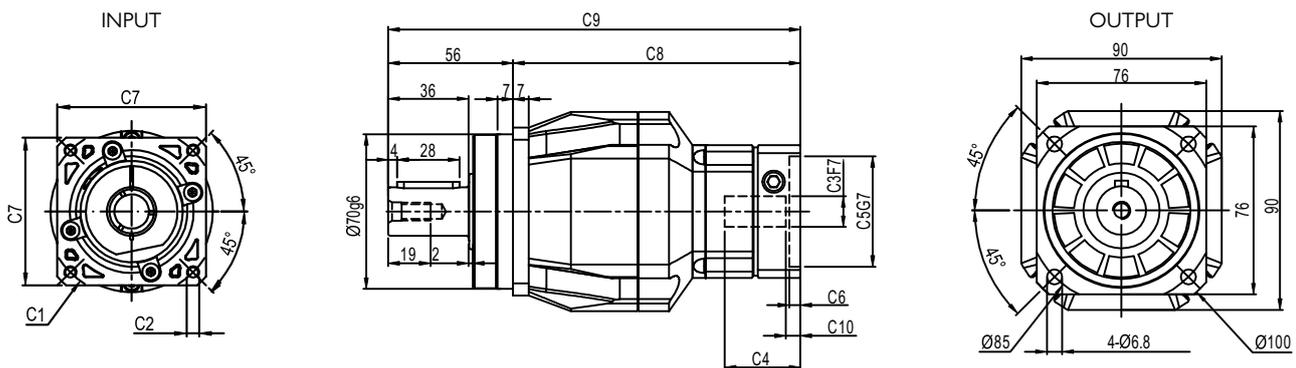
# PRECISION PLANETARY GEARBOX FAF SERIES

## PRODUCT DIMENSION

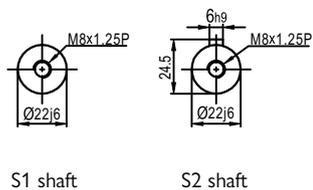
### FAF-075-L1



### FAF-075-L2



## OUTPUT DIAMETER



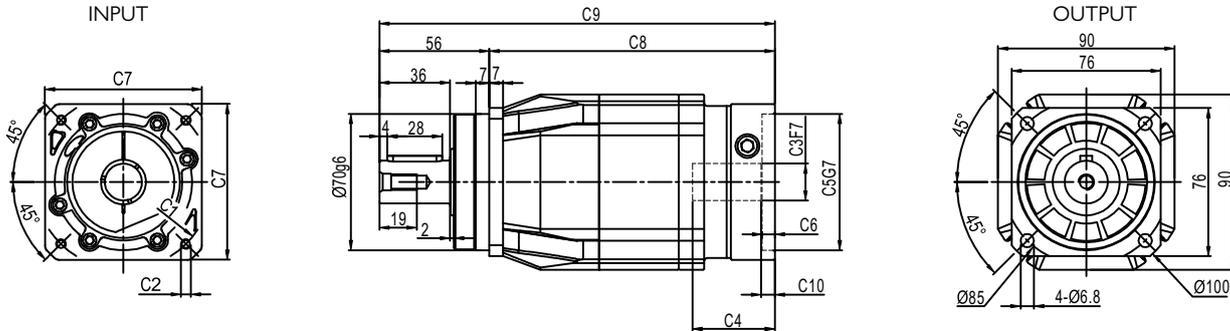
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAF-075-L1	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	105	161	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	105	161	7
FAF-075M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	120,5	176,5	17,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	123	178	20
FAF-075-L2	ø66,7	4-M4x10	ø8	34	ø38,1	5	60	129	185	5,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	34	ø50	5	60	129	185	5,5
FAF-075M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	135,5	191,5	12
	ø100	4-M6x14	ø16	42	ø80	6,5	86	135,5	191,5	11

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

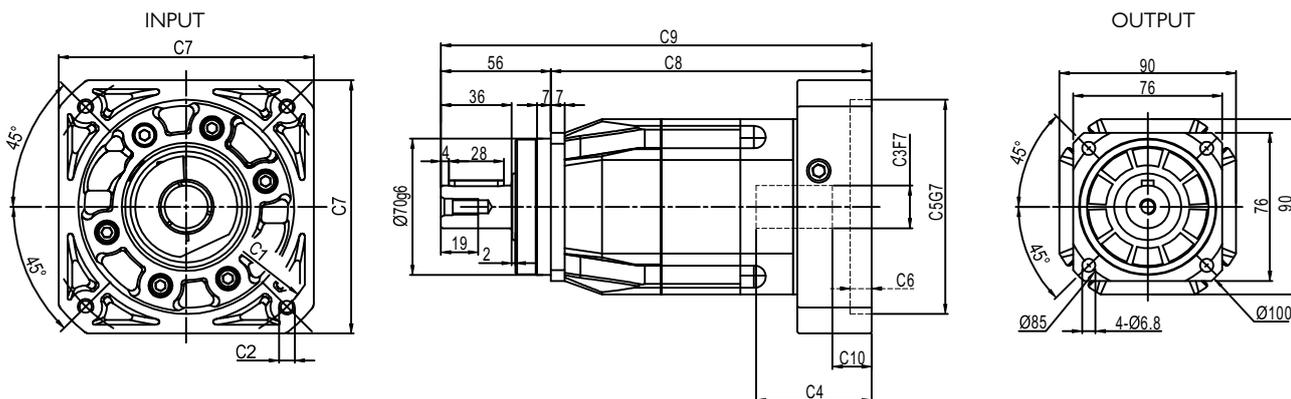
# PRECISION PLANETARY GEARBOX FAF SERIES

## PRODUCT DIMENSION

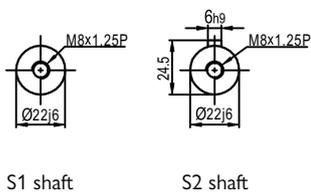
### FAF-075A-L2



### FAF-075A-L2



## OUTPUT DIAMETER



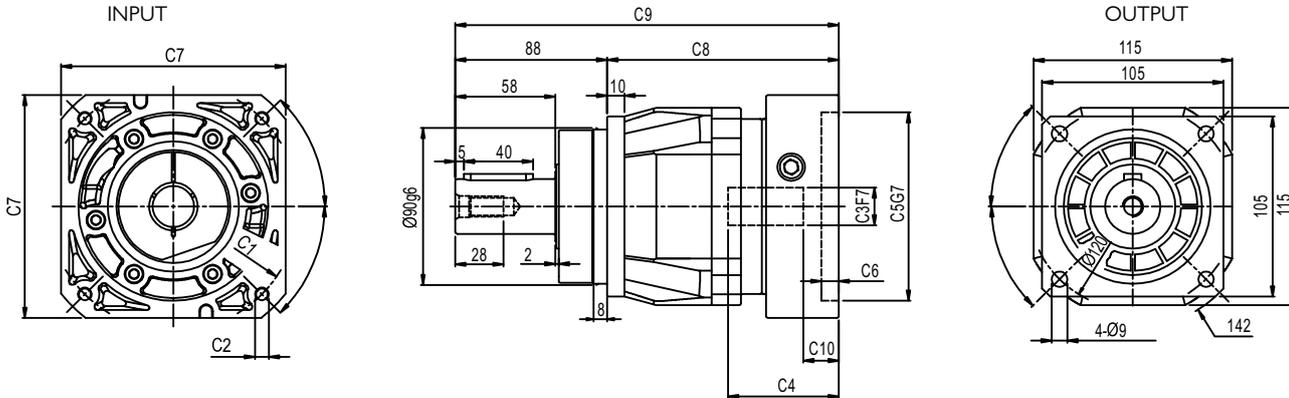
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAF-075A-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	156,5	249,5	7	96	141
	ø100	4-M6x14	ø16	45	ø80	6,5	86	156,5	249,5	6	96	141
FAF-075AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	156,5	254,5	16,5	117,5	162,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	10	130	156,5	269,5	19	120	165

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

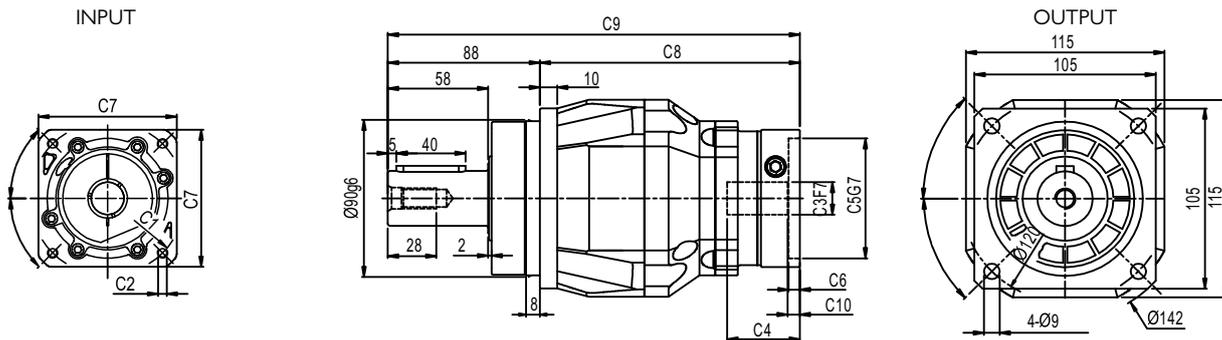
# PRECISION PLANETARY GEARBOX FAF SERIES

## PRODUCT DIMENSION

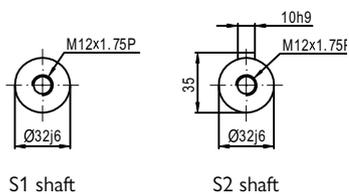
### FAF-100-L1



### FAF-100-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAF-100-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	134	222	19,5
FAF-100M1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	151,5	239,5	28
FAF-100-L2	ø90	4-M5x12, 4xM6x14	ø19	42	ø70	6,5	80	150,5	238,5	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	150,5	238,5	6
FAF-100M1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	166	254	16,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	168,5	256,5	19

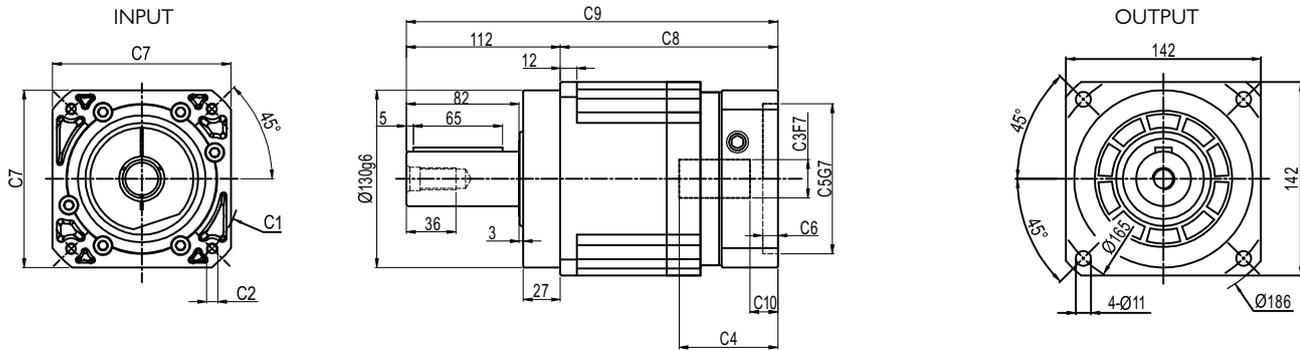
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



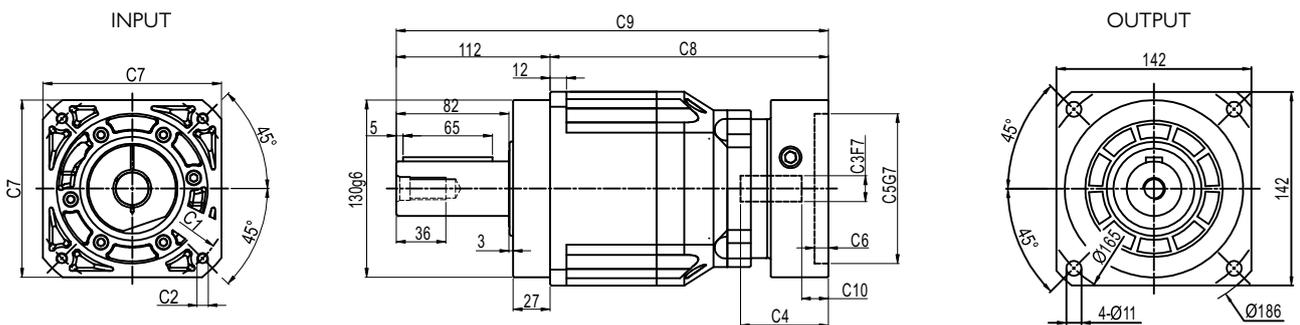
# PRECISION PLANETARY GEARBOX FAF SERIES

## PRODUCT DIMENSION

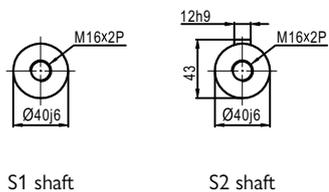
### FAF-140-L1



### FAF-140-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

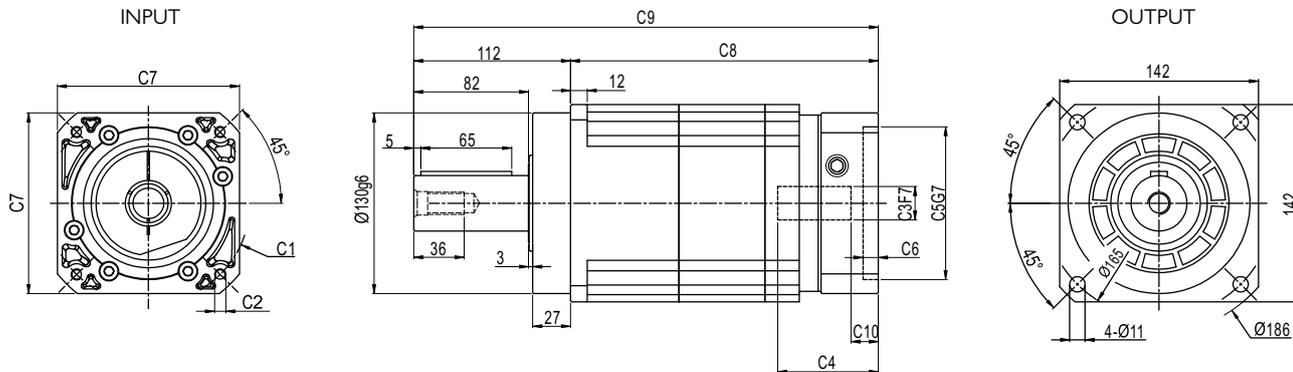
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAF-140-L1	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	158,5	270,5	19,5
	ø200	4-M12x20	ø35	81,5	ø114,3	8	180	168,5	280,5	25
FAF-140-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	202,5	314,5	19,5
FAF-140M1-L2	ø200	4-M12x20	ø35	81	ø114,3	10	180	220	332	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

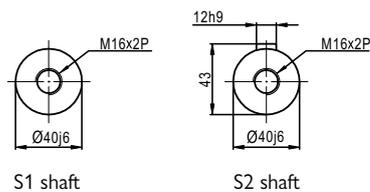
# PRECISION PLANETARY GEARBOX FAF SERIES

## PRODUCT DIMENSION

### FAF-140A-L2



## OUTPUT DIAMETER



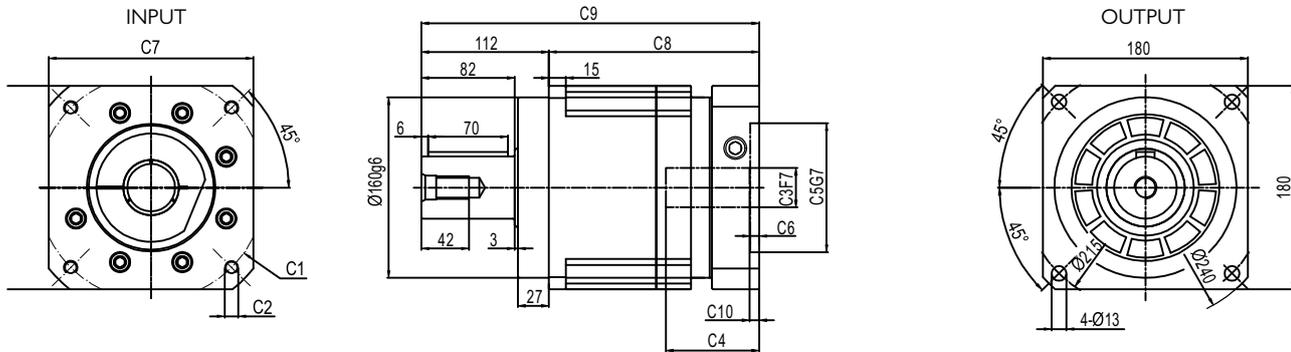
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAF-140A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	220	332	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	230	342	25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

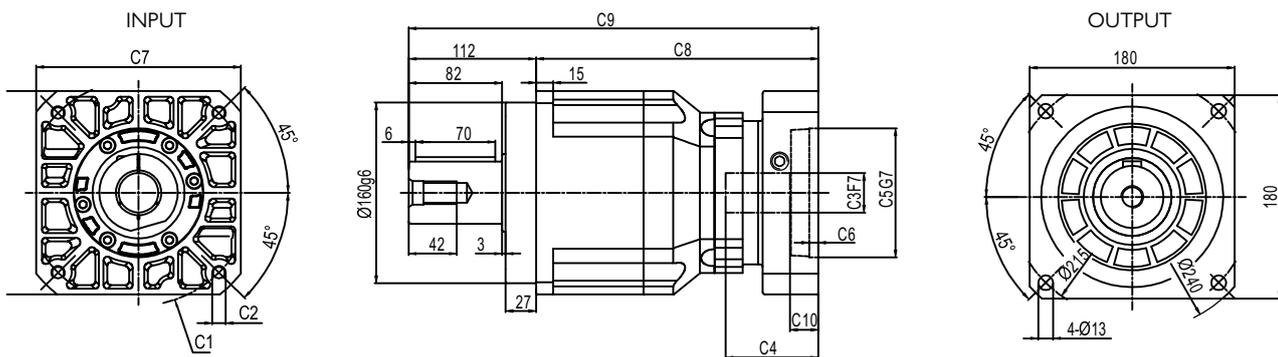
# PRECISION PLANETARY GEARBOX FAF SERIES

## PRODUCT DIMENSION

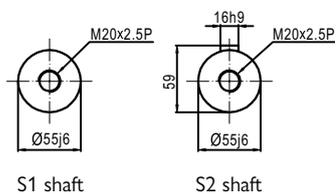
### FAF-180-L1



### FAF-180-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FAF-180-L1	ø200	4-M12x28	ø35	82	ø114,3	8	180	185	297	8,5
	ø200	4-M12x28	ø42	117,5	ø114,3	8	180	220,5	332,5	45,5
	ø215	4-M12x28	ø38	87	ø180	8	192	190	302	13,5
	ø235	4-M12x28	ø42	117,5	ø200	10	200	220,5	332,5	45,5
FAF-180-L2	ø145	4-M8x20	ø24	72	ø110	11	130	238	350	19,5
	ø200	4-M12x28	ø35	81,5	ø114,3	8	180	248	360	25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

**CHIARAVALLI LINEAR CENTER**

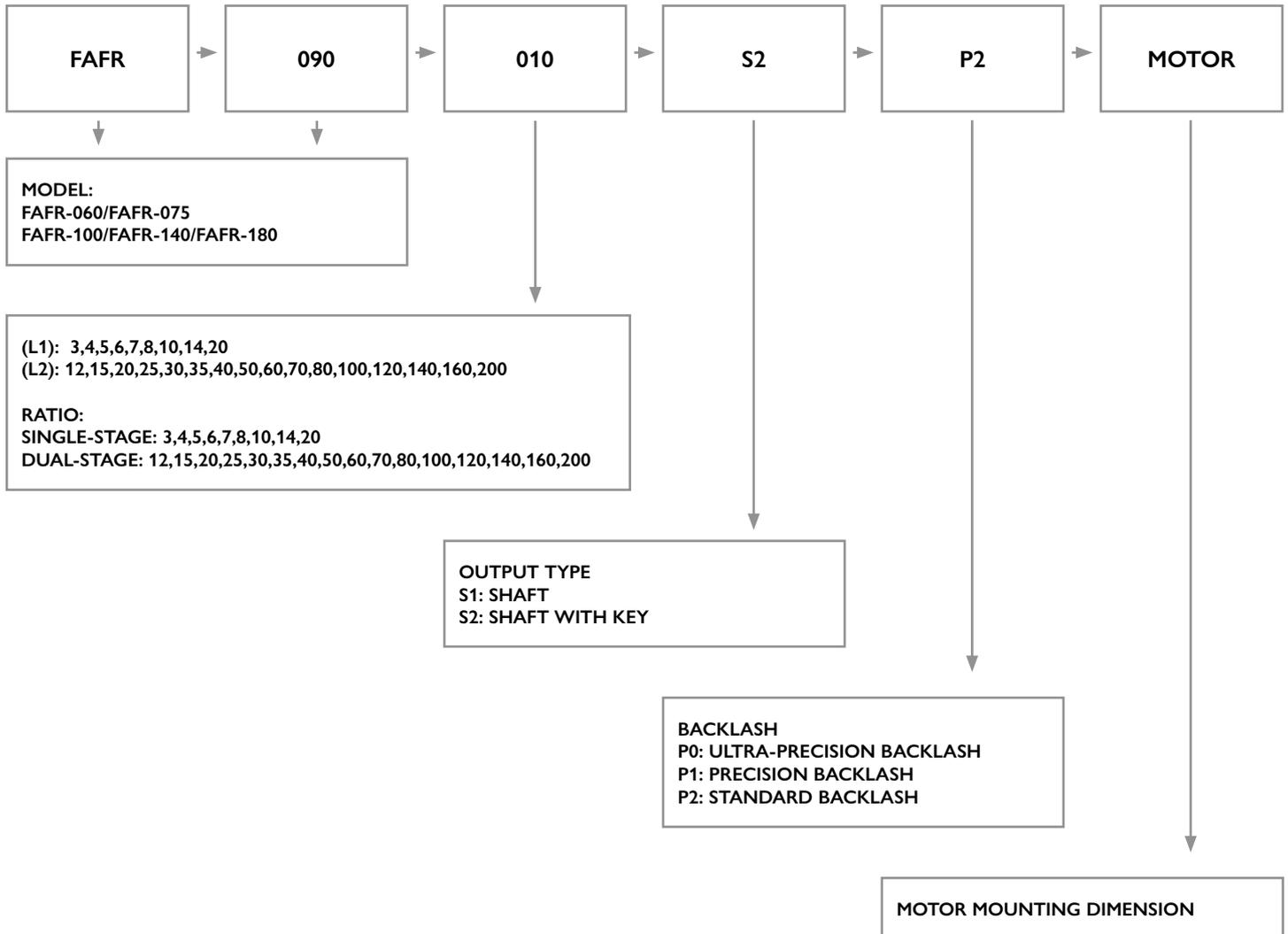
**PRECISION PLANETARY GEARBOX  
FAFR SERIES**



# PRECISION PLANETARY GEARBOX FAFR SERIES

## MODEL DESCRIPTION

FAFR-090-010-S2-P2-19-70-90-M6-45





# PRECISION PLANETARY GEARBOX FAFR SERIES

## TECHNICAL SPECIFICATION

MODEL		STAGE	RATIO	FAFR060	FAFR075	FAFR075A	FAFR100	FAFR100A	FAFR140	FAFR140A	FAFR180
Rated output torque	Nm	1	3	55	130	-	208	-	342	-	588
			4	50	140	-	290	-	542	-	1,050
			5	60	160	-	330	-	650	-	1,200
			6	55	150	-	310	-	600	-	1,100
			7	50	140	-	300	-	550	-	1,100
			8	50	140	-	290	-	542	-	1,000
			10	60	160	-	330	-	650	-	520
			14	50	140	-	300	-	550	-	1,100
		20	40	100	-	230	-	450	-	520	
		2	12	55	130	130	208	208	342	342	588
			15	55	130	130	208	208	342	342	588
			20	50	140	140	290	290	542	542	1,050
			25	60	160	160	330	330	650	650	1,200
			30	55	130	130	208	208	342	342	1,200
			35	60	160	160	330	330	650	650	1,200
			40	50	140	140	290	290	542	542	1,200
			50	60	160	160	330	330	650	650	1,200
			60	55	150	150	310	310	600	600	1,200
			70	60	160	160	330	330	650	650	1,200
			80	50	140	140	290	290	542	542	1,200
100	60		160	160	330	330	650	650	1,200		
120	-	150	150	310	310	600	600	1,100			
140	-	140	140	300	300	550	550	1,100			
160	-	120	120	260	260	500	500	1,000			
200	-	100	100	230	230	450	450	520			
T <sub>2B</sub> /Max. output torque	Nm	1,2	3~200	3 times the rated output torque							
n <sub>1</sub> /Rated input speed	rpm	1,2	3~200	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000
n <sub>1B</sub> /Max.input speed	rpm	1,2	3~200	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000
P0/Ultra-precision backlash	arcmin	1	3~20	-	≤2	≤2	≤2	≤2	≤2	≤2	≤2
		2	12~200	-	≤4	≤4	≤4	≤4	≤4	≤4	≤4
P1/Precision backlash	arcmin	1	3~20	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	12~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
P2/Precision backlash	arcmin	1	3~20	≤6	≤6	≤7	≤6	≤7	≤6	≤7	≤6
		2	12~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional rigidity	Nm/arcmin	1,2	3~200	7	14	14	25	25	50	50	145
F <sub>2rB</sub> /Allowable radial force	N	1,2	3~200	1,400	4,100	4,100	9,200	9,200	14,000	14,000	18,000
F <sub>2rB</sub> /Allowable radial force	N	1,2	3~200	1,000	3,300	3,300	5,220	5,220	10,800	10,800	13,000
F <sub>2rB</sub> /Allowable radial force	N	1,2	3~200	1,100	3,700	3,700	5,800	5,800	11,400	11,400	19,500
Life time	hr	1,2	3~200	30,000 <sup>1</sup>							
η/Efficiency	%	1	3~20	≤95%							
		2	12~200	≤92%							
Weight	kg	1	3~20	2.1	6.4	-	13	-	24.5	-	51
		2	12~200	2.5	7.8	8.9	14.2	18.2	27.5	34.3	54
Operating temperature	°C	1,2	3~200	-10°C ~ +90°C							
lubrication		1,2	3~200	Synthetic lubricating grease							
Ingress protection		1,2	3~200	IP65							
Mount position		1,2	3~200	Any direction							
(n <sub>1</sub> =3000rpm) / Noise level	dB	1,2	3~200	≤63	≤65	≤65	≤68	≤68	≤70	≤70	≤72

## GEARBOX MOMENT OF INERTIA

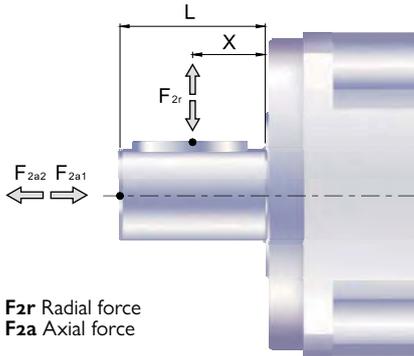
MODEL		STAGE	RATIO	FAFR060	FAFR075	FAFR075A	FAFR100	FAFR100A	FAFR140	FAFR140A	FAFR180	
Moment of inertia	kg • cm <sup>2</sup>	1	3~10	0.35	2.25	-	6.84	-	23.4	-	68.9	
			14	0.07	1.87	-	6.25	-	21.8	-	65.6	
			20	0.07	1.87	-	6.25	-	21.8	-	65.6	
		2	15	-	-	-	-	-	-	-	-	-
			20	-	-	-	-	-	-	-	-	-
			25~100	0.09	0.35	2.25	2.25	6.89	6.84	23.4	23.4	
120~200	-	0.31	1.87	1.87	6.25	6.25	21.8	21.8				

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.



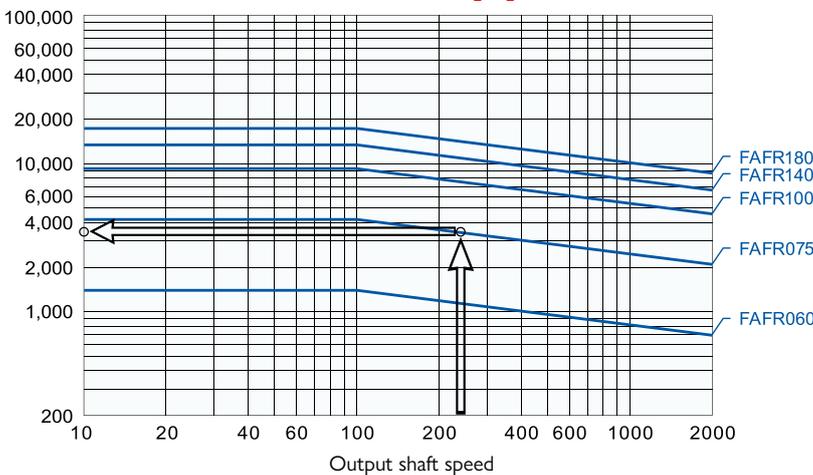
# PRECISION PLANETARY GEARBOX FAFR SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEARBOX



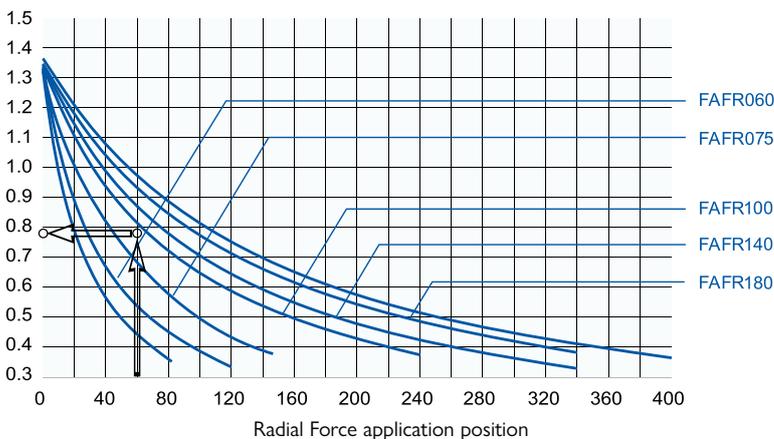
The permitted radial and axial loads on the output shaft depend on the design of the gearbox supporting bearing. A large-span design and high-capacity bearings are adopted to achieve the maximum bearing capacity for radial and axial loads.

### PERMISSIBLE RADIAL FORCE $F_{2rB}$ [N] APPLY FORCE TO THE CENTER OF THE SHAFT



When the radial force  $F_{2r}$  is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force  $F_{2rB}$  that can be withstood by different specifications of reducers under different output speeds is refer to the left picture.

### POSITIONAL LOAD COEFFICIENT



When the radial force  $F_{2r}$  is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

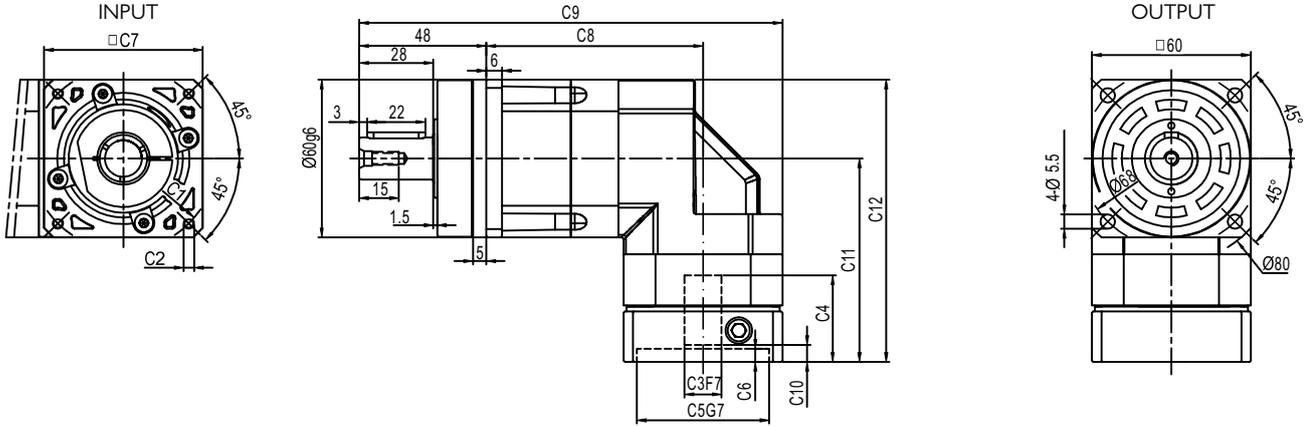
$$F'_{2rB} = K_b X F_{2rB}$$

\*The lifetime will be shortened by half under continuous operation.

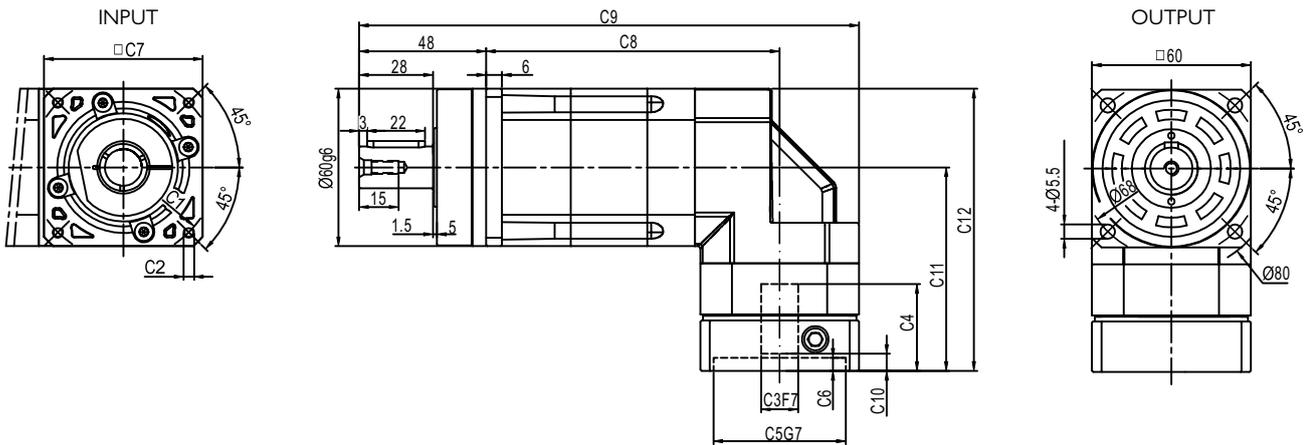
# PRECISION PLANETARY GEARBOX FAFR SERIES

## PRODUCT DIMENSION

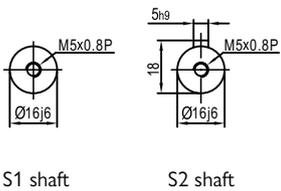
### FAFR-060-L1



### FAFR-060-L2



## OUTPUT DIAMETER



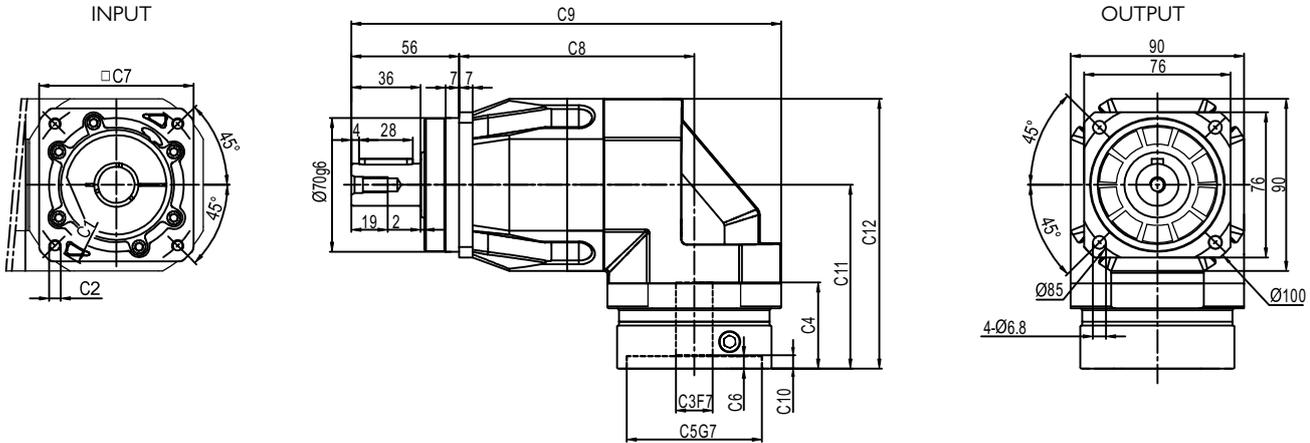
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAFR-060-L1	Ø66,7	4-M4x10	Ø8	33	Ø38	5	60	82	160	5,5	77,5	107,5
FAFR-060-L2								111	189			
FAFR-060-L1	Ø70	4-M4x10, 4-M5x12	Ø11, Ø14	33	Ø50	5	60	82	160	5,5	77,5	107,5
FAFR-060-L2								111	189			
FAFR-060M1-L1	Ø90	4-M5x12, 4-M6x14	Ø19	42,5	Ø70	6,5	80	82	170	12	87	117
FAFR-060M1-L2								111	199			

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

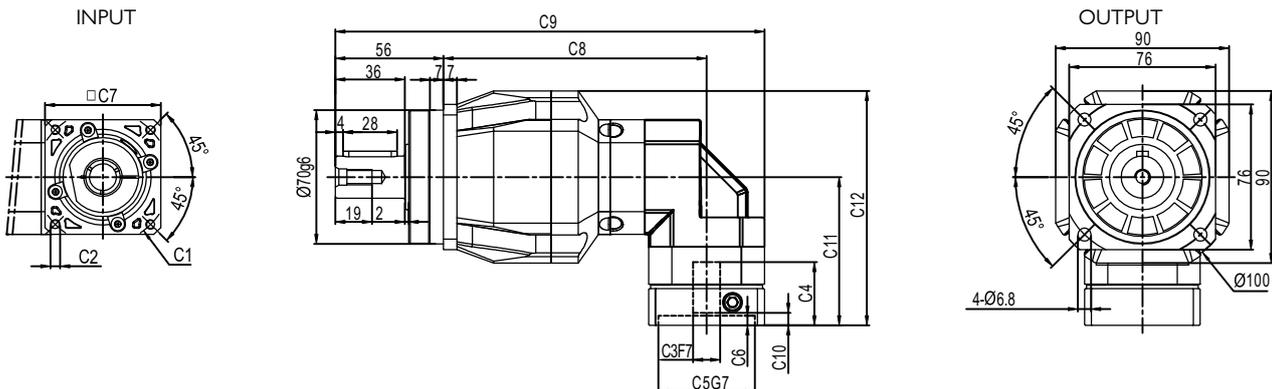
# PRECISION PLANETARY GEARBOX FAFR SERIES

## PRODUCT DIMENSION

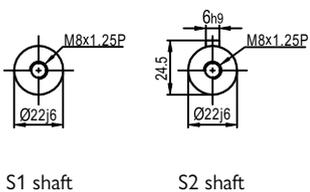
### FAFR-075-L1



### FAFR-075-L2



## OUTPUT DIAMETER



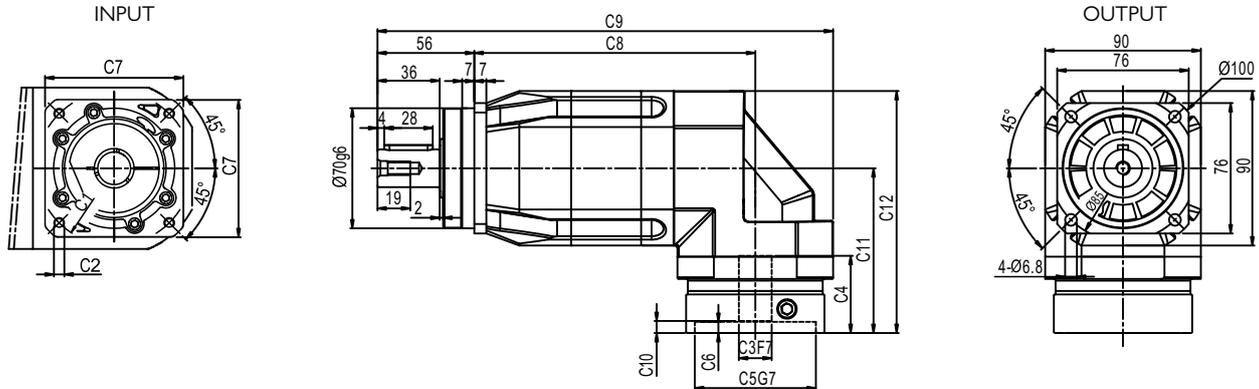
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAFR-075-L1	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	122	223	7	96	141
	ø100	4-M6x14	ø16	45	ø80	6,5	86	122	223	6	96	141
FAFR-075M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	122	228	16,5	117,5	162,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	122	243	19	120	165
FAFR-075-L2	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	136,5	222,5	5,5	77,5	122,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	136,5	222,5	5,5	77,5	122,5
FAFR-075M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	136,5	232,5	12	87	132
	ø100	4-M6x14	ø16	42,5	ø80	6,5	86	136,5	232,5	11	87	132

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

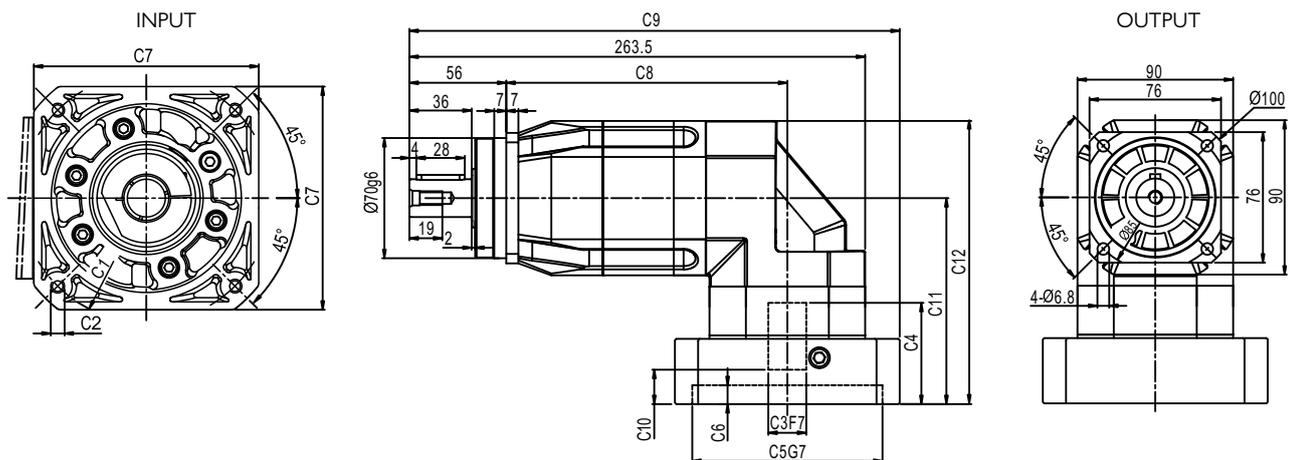
# PRECISION PLANETARY GEARBOX FAFR SERIES

## PRODUCT DIMENSION

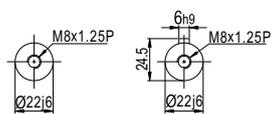
### FAFR-075A-L2



### FAFR-075A-L2



## OUTPUT DIAMETER



S1 shaft      S2 shaft

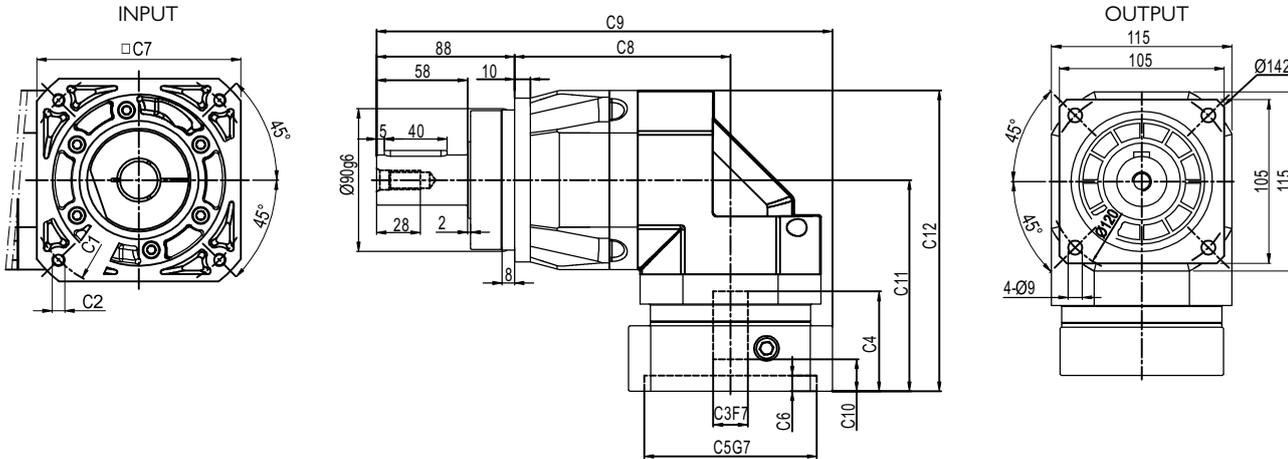
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAFR-075A-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	156,5	249,5	7	96	141
	ø100	4-M6x14	ø16	45	ø80	6,5	86	156,5	249,5	6	96	141
FAFR-075AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	156,5	254,5	16,5	117,5	162,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	10	130	156,5	269,5	19	120	165

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

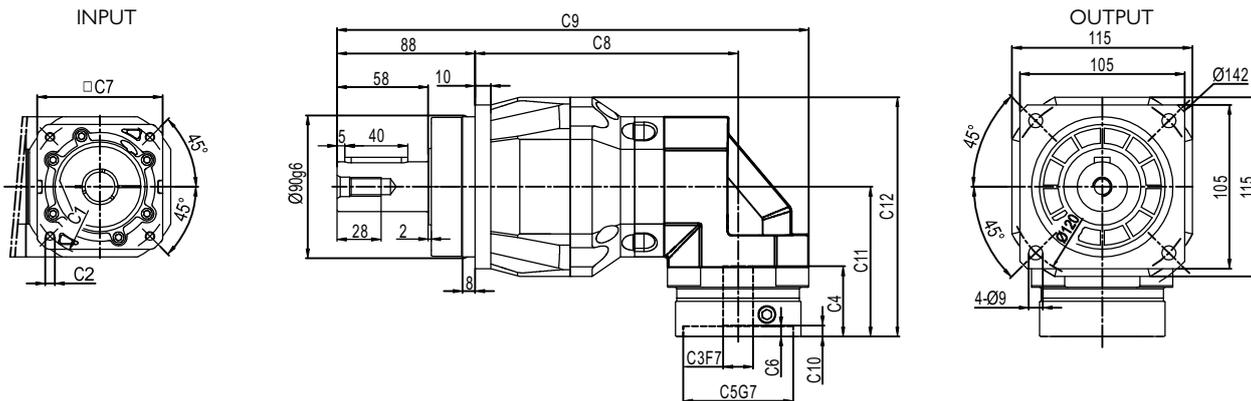
# PRECISION PLANETARY GEARBOX FAFR SERIES

## PRODUCT DIMENSION

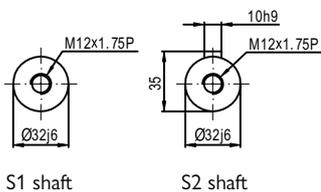
### FAFR-100-L1



### FAFR-100-L2



## OUTPUT DIAMETER



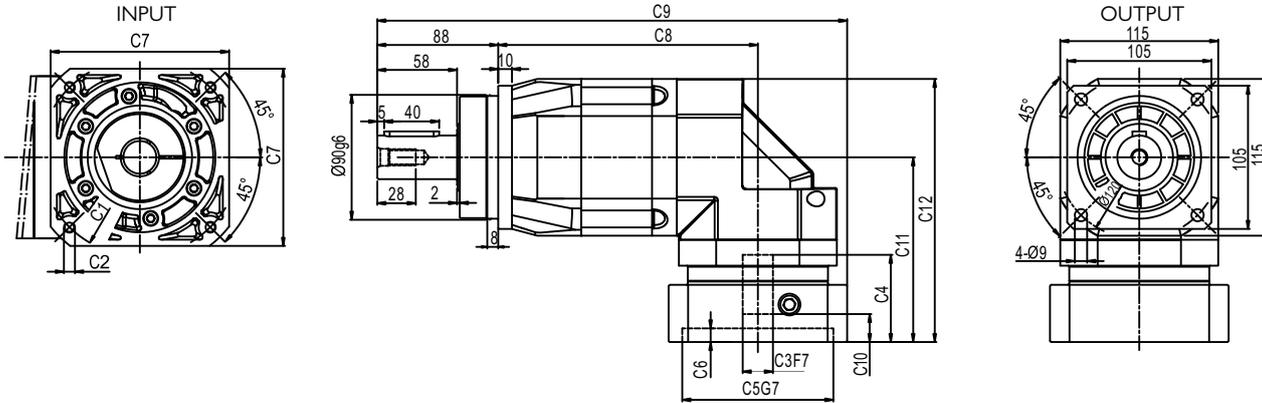
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAFR-100-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	137,5	290,5	195	135,5	193
FAFR-100M1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	137,5	315,5	28	152,5	210
FAFR-100-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	167,5	300,5	7	96	153,5
	ø100	4-M6x14	ø16	45	ø80	65	86	167,5	300,5	6	96	153,5
FAFR-100M1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	167,5	305,5	16,5	117,5	175
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	167,5	320,5	19	120	177,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

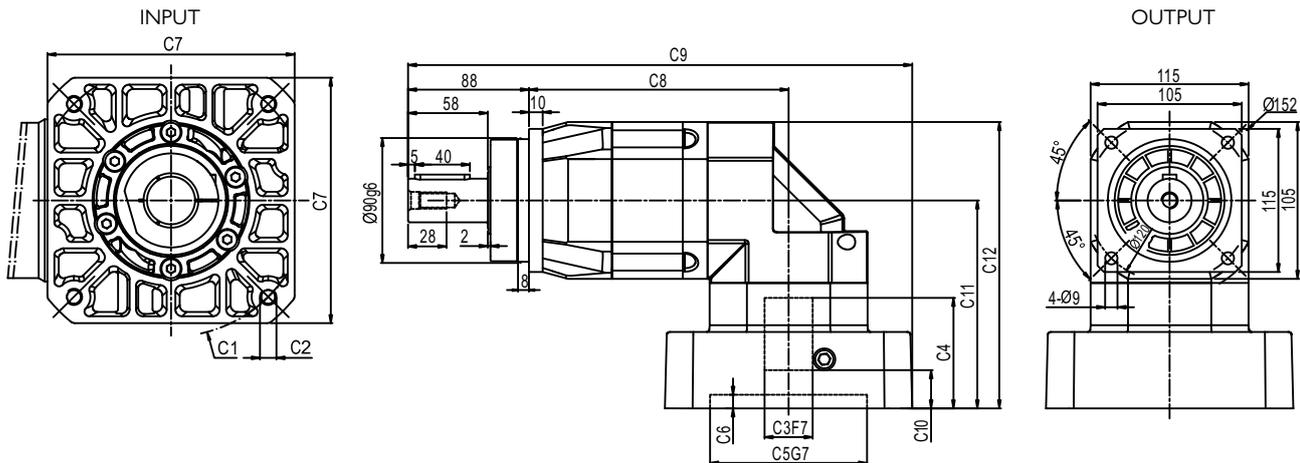
# PRECISION PLANETARY GEARBOX FAFR SERIES

## PRODUCT DIMENSION

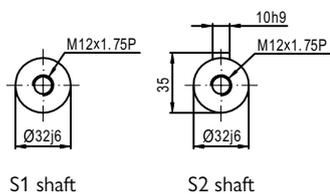
### FAFR-100A-L2



### FAFR-100A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

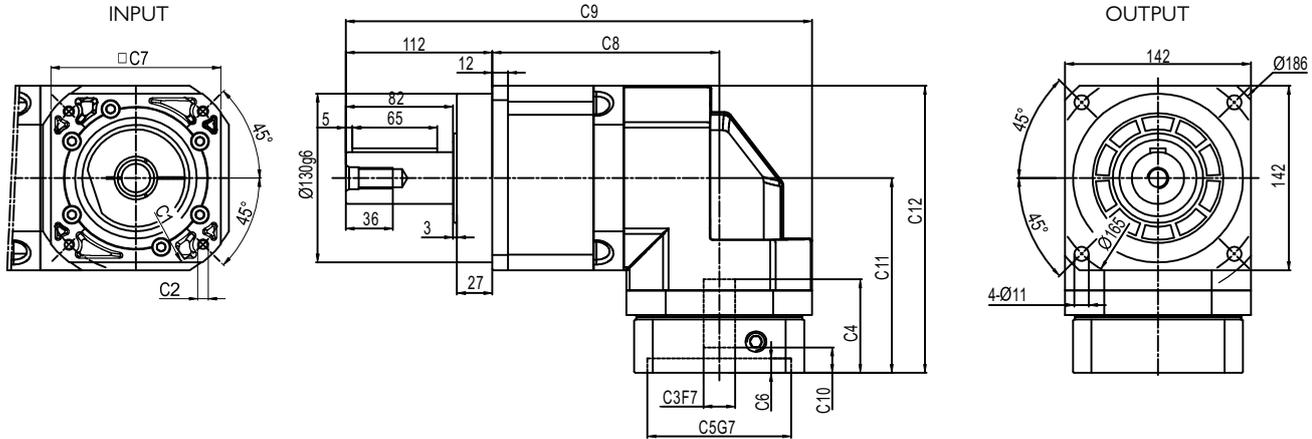
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAFR-100A-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	137,5	290,5	195	135,5	193
FAFR-100AM1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	137,5	315,5	28	152,5	210

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

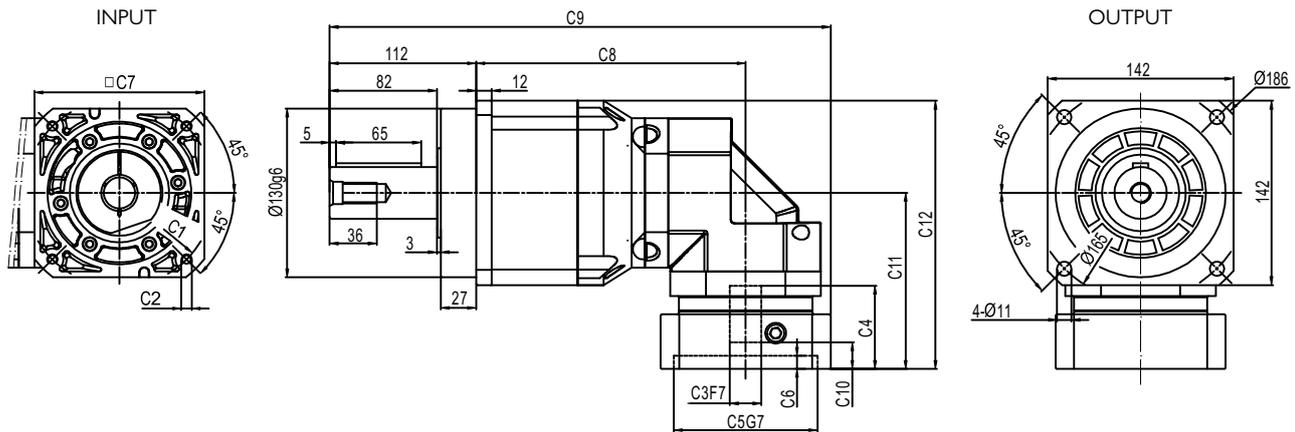
# PRECISION PLANETARY GEARBOX FAFR SERIES

## PRODUCT DIMENSION

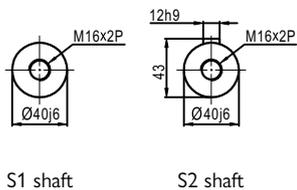
### FAFR-140-L1



### FAFR-140-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAFR-140-L1	ø145	4-M8x20	ø19, ø22	72	ø110	11	130	173,5	356,5	19,5	150	221
	ø200	4-M12x28	ø35	82	ø114,3	8	180	173,5	375,5	25	160	231
FAFR-140-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	206	383	19,5	35,5	6,5
FAFR-140M1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	206	408	28	52,5	23,5

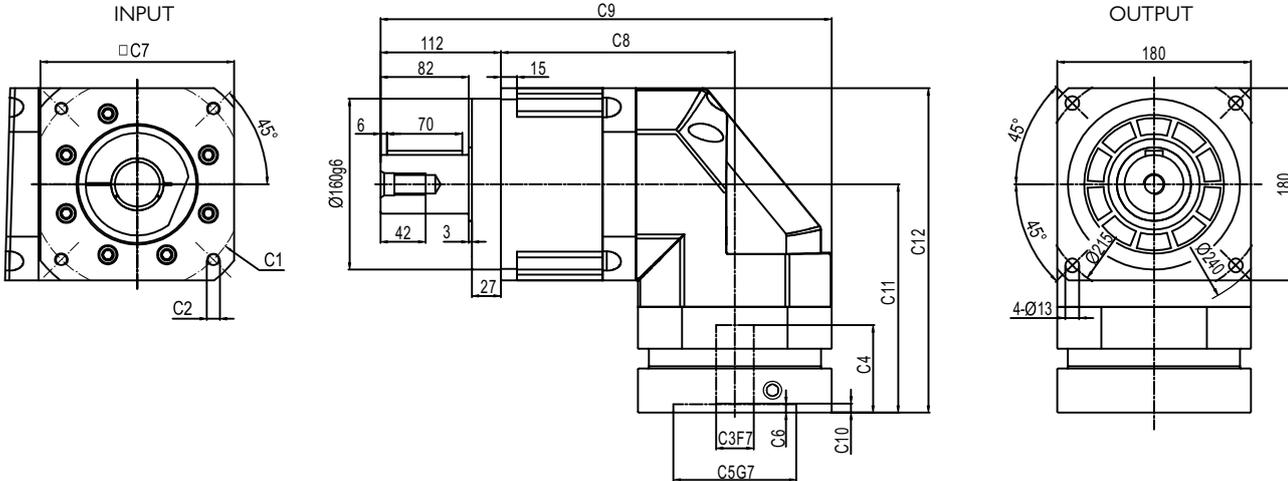
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



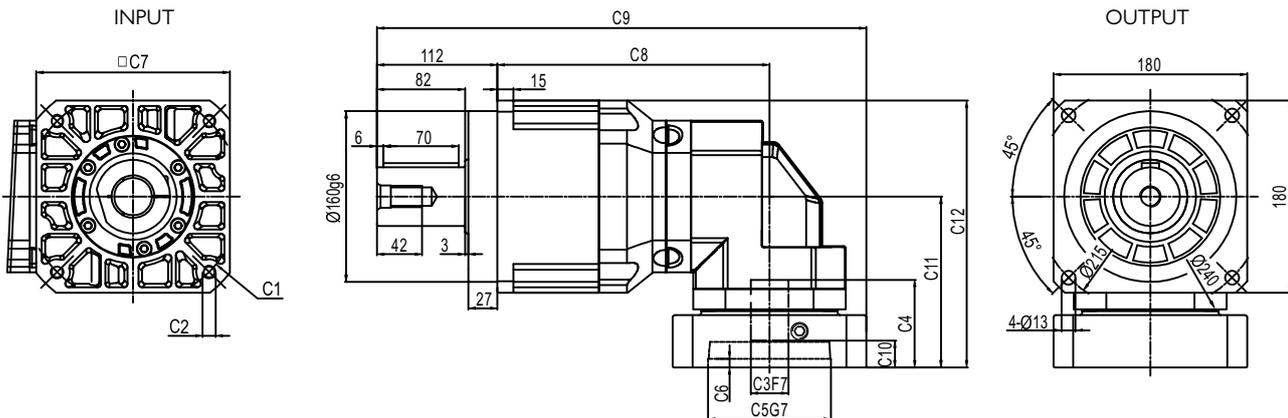
# PRECISION PLANETARY GEARBOX FAFR SERIES

## PRODUCT DIMENSION

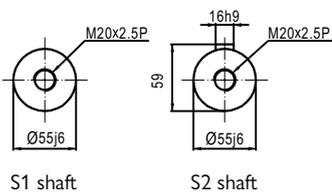
### FAFR-180-L1



### FAFR-180-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FAFR-180-L1	Ø200	4-M12x28	Ø35	82	Ø114,3	8	180	217,5	419,5	8,5	214	304
	Ø200	4-M12x28	Ø42	117,5	Ø114,3	8	180	217,5	419,5	45,5	249,5	339,5
	Ø215	4-M8x20	Ø38	87	Ø180	8	192	217,5	425,5	13,5	219	309
	Ø235	4-M12x28	Ø42	117,5	Ø200	10	220	217,5	439,5	45,5	249,5	339,5
FAFR-180-L2	Ø145	4-M8x20	Ø19, Ø24	72	Ø110	11	130	246	383	19,5	150	240
	Ø200	4-M12x28	Ø35	82	Ø114,3	8	180	253	408	25	160	250

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

**CHIARAVALLI LINEAR CENTER**

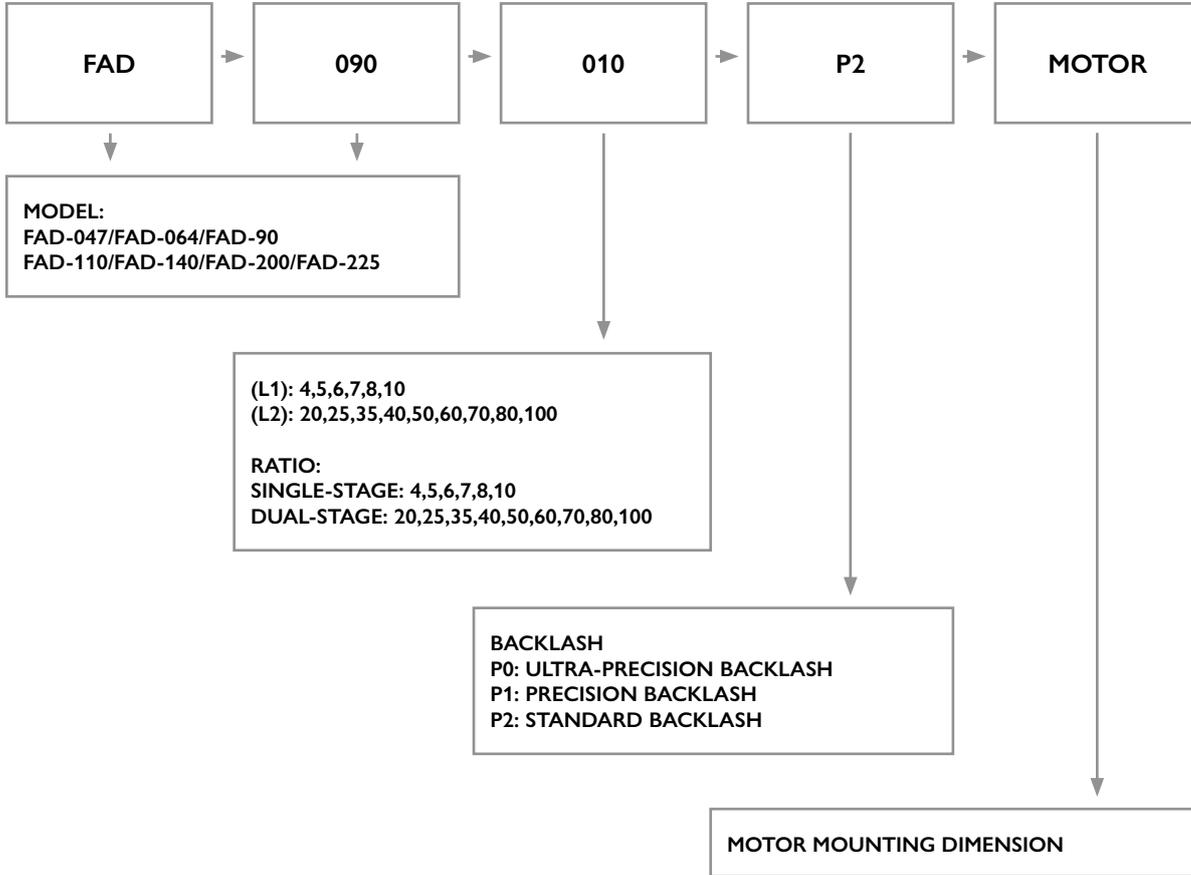
**PRECISION PLANETARY GEARBOX  
FAD SERIES**



# PRECISION PLANETARY GEARBOX FAD SERIES

## MODEL DESCRIPTION

FAD-090-010-P2-19-70-90-M6-42





# PRECISION PLANETARY GEARBOX FAD SERIES

## TECHNICAL SPECIFICATION

MODEL		STAGE	RATIO	FAD047	FAD064	FAD090	FAD090A	FAD110	FAD110A	FAD140	FAD140A	FAD200	FAD255
Rated output torque	Nm	1	4	19	48	130	-	270	-	560	-	1,100	1,700
			5	22	60	160	-	330	-	650	-	1,200	2,000
			6	-	55	150	-	310	-	600	-	1,100	1,900
			7	19	50	140	-	300	-	550	-	1,100	1,800
			8	17	45	120	-	260	-	500	-	1,000	1,600
		10	14	40	100	-	230	-	450	-	900	1,500	
		20	19	48	130	130	270	270	560	560	1,100	1,700	
		25	22	60	160	160	330	330	650	650	1,200	2,000	
		35	22	60	160	160	330	330	650	650	1,200	2,000	
		40	22	48	130	130	270	270	560	560	1,100	1,700	
		50	22	60	160	160	330	330	650	650	1,200	2,000	
		60	-	55	150	150	310	310	600	600	1,100	1,900	
		70	19	50	140	140	300	300	550	550	1,100	1,800	
		80	-	45	120	120	260	260	500	500	1,000	1,600	
100	14	40	100	100	230	230	450	450	900	1,500			
T <sub>2B</sub> /Max. output torque	Nm	1,2	4~100	3 times the rated output torque									
n <sub>1</sub> /Rated input speed	rpm	1,2	4~100	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
n <sub>1B</sub> /Max.input speed	rpm	1,2	4~100	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
P0/Ultra-precision backlash	arcmin	1	4~100	-	-	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	4~10	-	-	-	-	≤3	≤3	≤3	≤3	≤3	≤3
P1/Precision backlash	arcmin	1	20~100	≤3	≤3	≤3	≤5	≤3	≤5	≤3	≤5	≤3	≤3
		2	4~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
P2/Precision backlash	arcmin	1	20~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	4~10	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional rigidity	Nm/arcmin	1,2	20~100	7	13	31	31	82	82	151	151	440	1,006
M <sub>2kB</sub> /Maximum bending moment	Nm	1,2	4~100	42,5	125	235	235	430	430	1,300	1,300	3,064	5,900
F <sub>2B</sub> /Allowable radial force	N	1,2	4~100	1,080	2,110	2,310	2,310	4,800	4,800	6,200	6,200	5,450	10,600
Life time	hr	1,2	4~100	20,000 <sup>1</sup>									
η/Efficiency	%	1	4~10	≥97%									
		2	20~100	≥94%									
Weight	kg	1	4~10	0.7	1.2	3.0	-	5.6	-	11.9	-	31.6	56.1
		2	20~100	1.0	1.6	3.7	4.2	7.3	7.84	15.9	16.6	36.9	70.4
Operating temperature	°C	1,2	4~100	-10°C ~ +90°C									
lubrication		1,2	4~100	Synthetic lubricating grease									
Ingress protection		1,2	4~100	IP65									
Mount position		1,2	4~100	Any direction									
(n <sub>1</sub> =3000rpm) / Noise level	dB	1,2	4~100	≤56	≤58	≤60	≤60	≤63	≤63	≤65	≤65	≤67	≤70

## GEARBOX MOMENT OF INERTIA

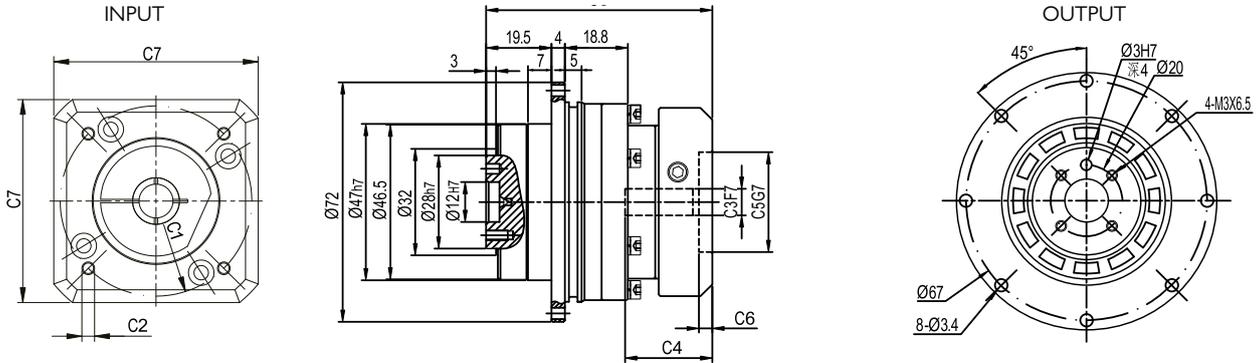
MODEL		STAGE	RATIO	FAD047	FAD064	FAD090	FAD090A	FAD110	FAD110A	FAD140	FAD140A	FAD200	FAD255
Moment of inertia	kg • cm <sup>2</sup>	1	4	0.03	0.14	0.51	-	2.87	-	7.54	-	25.03	58.31
			5	0.03	0.13	0.47	-	2.71	-	7.42	-	23.29	53.27
			6	-	0.13	0.45	-	2.65	-	7.25	-	-	-
			7	0.03	0.13	0.45	-	2.62	-	7.14	-	22.48	50.97
			8	0.03	0.13	0.45	-	2.58	-	7.07	-	22.48	50.97
		10	0.03	0.13	0.44	-	2.57	-	7.03	-	22.51	50.56	
		20	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29	
		25	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29	
		35	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29	
		40	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51	
		50	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51	
		60	-	0.13	0.13	0.44	0.44	2.57	2.57	7.03	-	-	
		70	0.03	0.13	0.13	0.13	0.44	0.44	2.57	7.03	7.03	22.51	
		80	-	0.13	0.13	0.13	0.44	0.44	2.57	2.57	-	-	
100	0.03	0.13	0.13	0.13	0.44	0.44	2.57	7.03	7.03	22.51			

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.

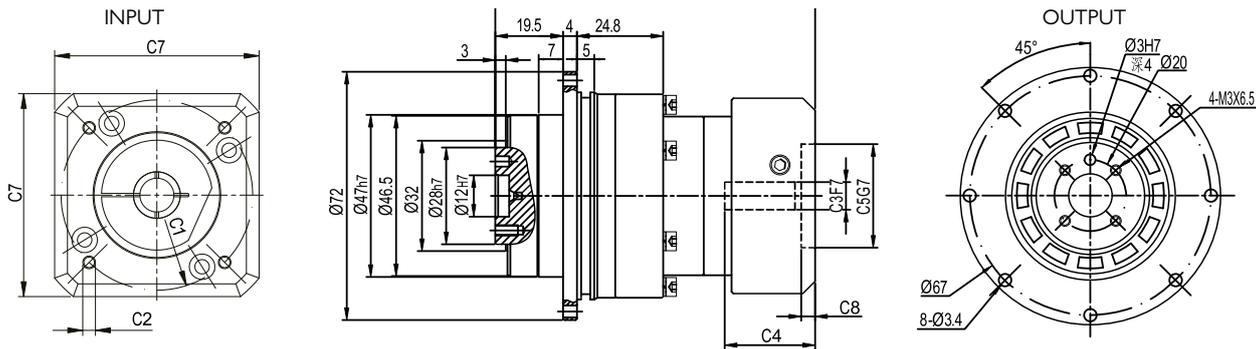
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-047-L1



### FAD-047-L2



## OUTPUT DIAMETER

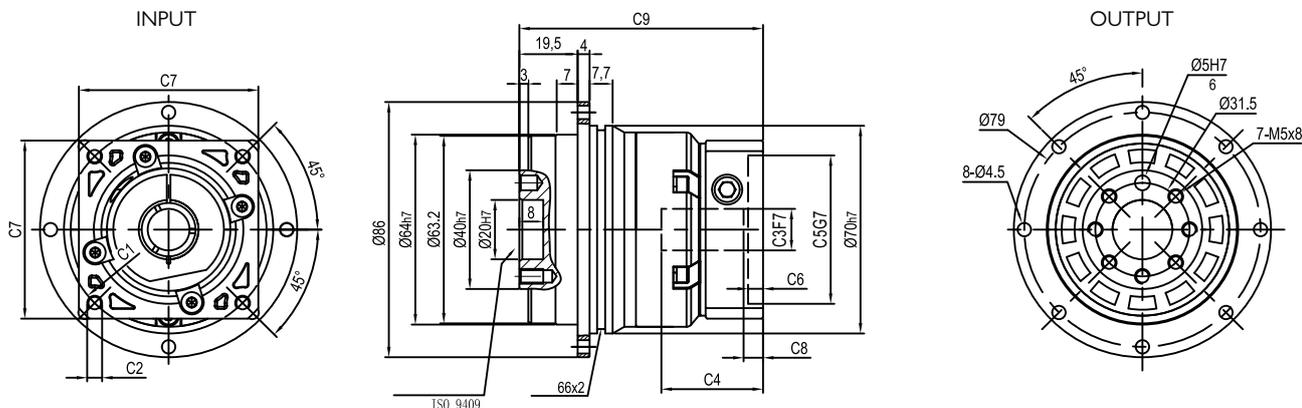
Size	C1	C2	C3	C4	C5	C6	C7	C8
FAD-047-L1	ø46	4-M4x10	ø8	26	ø30	4	42	67,5
	ø45	4-M3x8						
FAD-047-L2	ø46	4-M4x10	ø8	26	ø30	4	42	92
	ø45	4-M3x8						

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

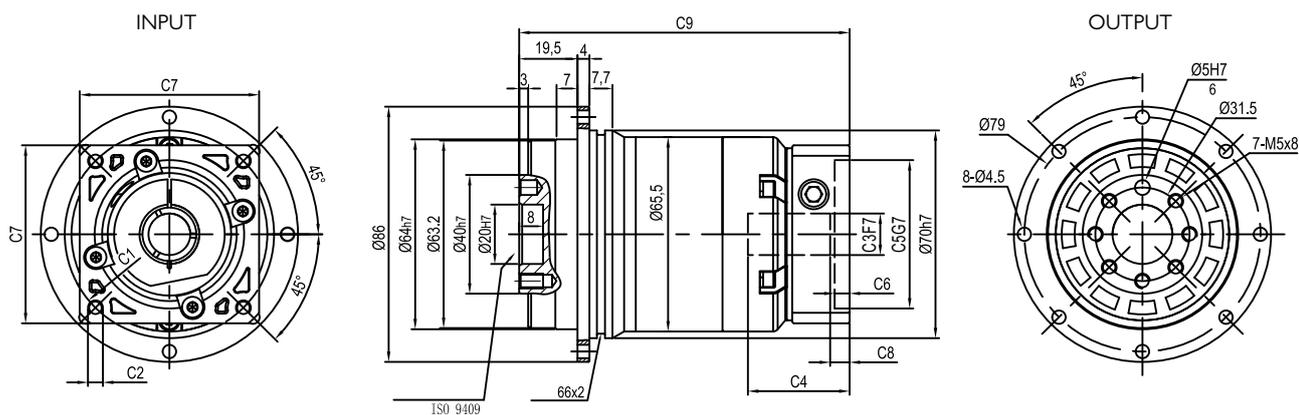
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-064-L1



### FAD-064-L2



## OUTPUT DIAMETER

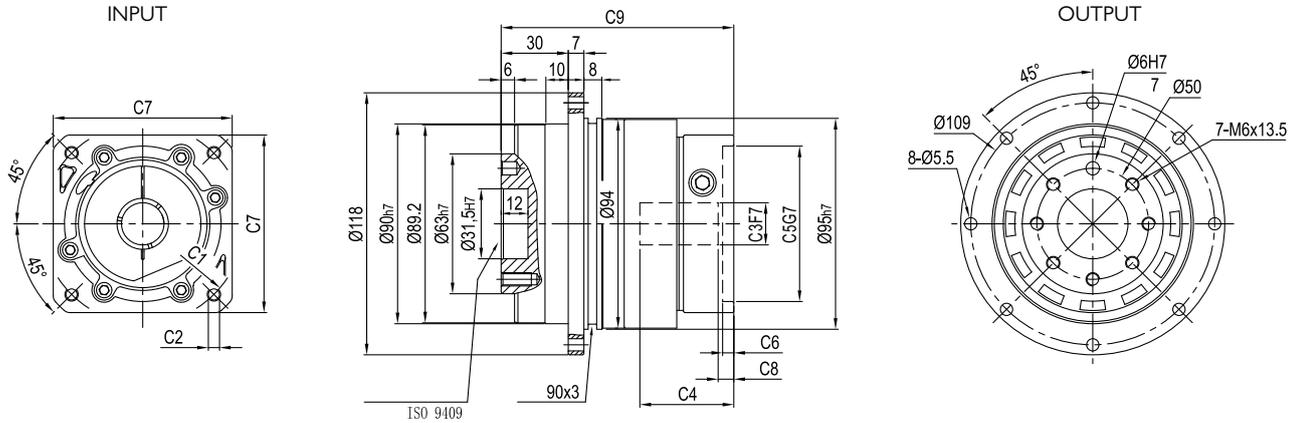
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-064-L1	ø66,7	4-M4x10	ø8	34	ø38,1	5	60	5,5	81,5
110,5									
FAD-064-L1	ø70	4-M4x10, 4-M5x12	ø11, ø14	34	ø50	5	60	5,5	81,5
FAD-064-L2									110,5
FAD-064M1-L1	ø90	4-M4x12, 4-M6x14	ø19	42	ø70	6,5	80	12	88
FAD-064M1-L2									117

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

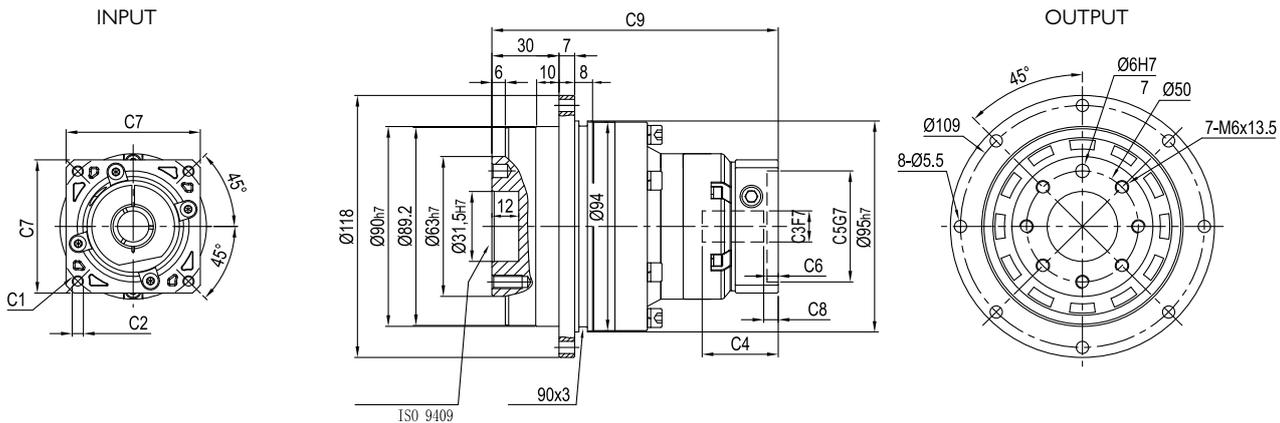
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-090-L1



### FAD-090-L2



## OUTPUT DIAMETER

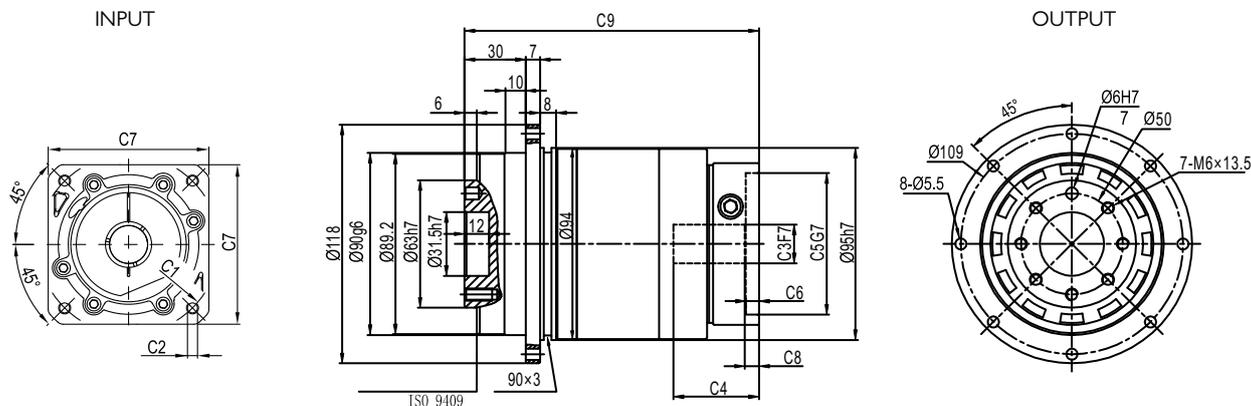
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-090-L1	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	7	104
	ø100	4-M6x14	ø16	42	ø80	6,5	86	6	104
FAD-090M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	16,5	119,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	19	122
FAD-090-L2	ø66,7	4-M4x10	ø8	34	ø38,1	5	60	5,5	128
	ø70	4-M4x10, 4-M5x12	ø11, ø14	34	ø50	5	60	5,5	128
FAD-090M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	12	134,5
	ø100	4-M6x14	ø16	42	ø80	6,5	86	11	134,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

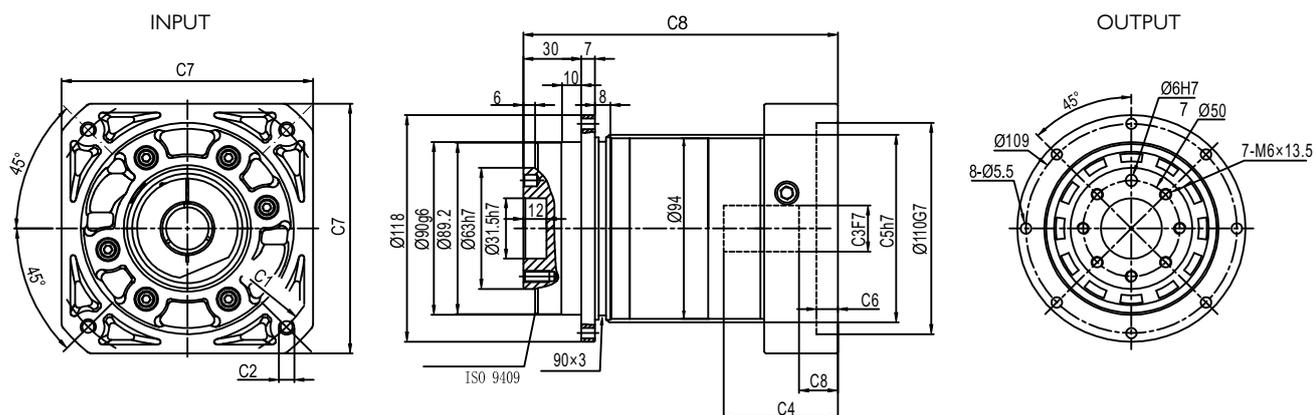
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-090A-L1



### FAD-090A-L2



## OUTPUT DIAMETER

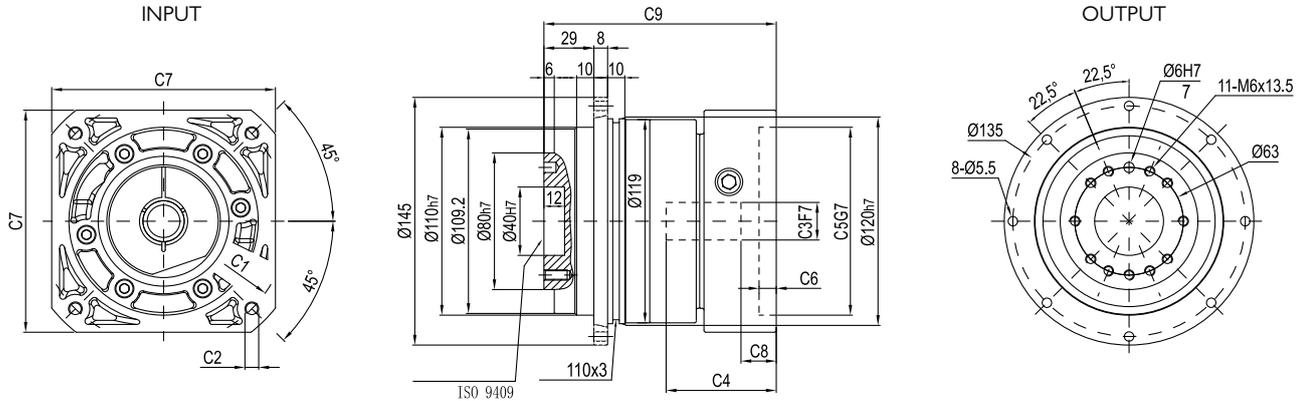
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-090A-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	7	144,5
	ø100	4-M6x14	ø16	42	ø80	6,5	86	6	144,5
FAD-090AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	16,5	160
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	19	162,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

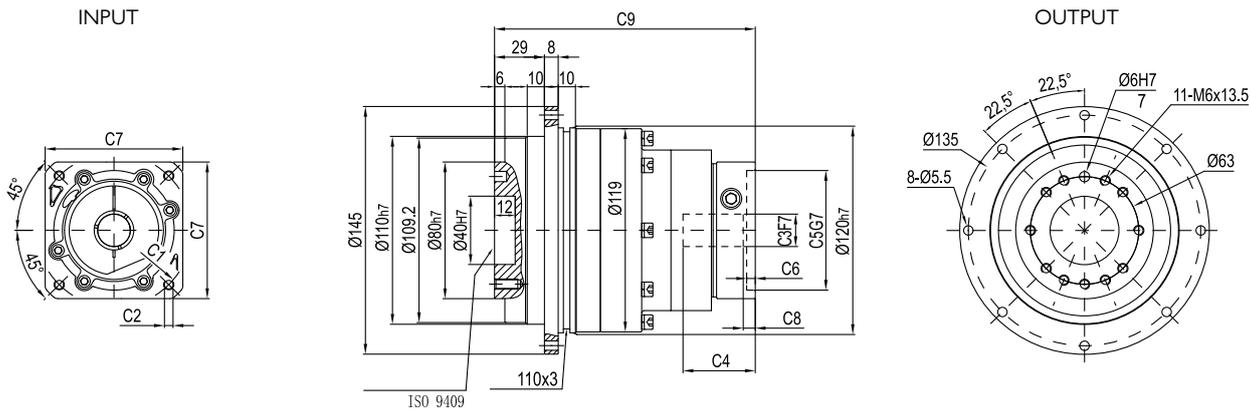
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-110-L1



### FAD-110-L2



## OUTPUT DIAMETER

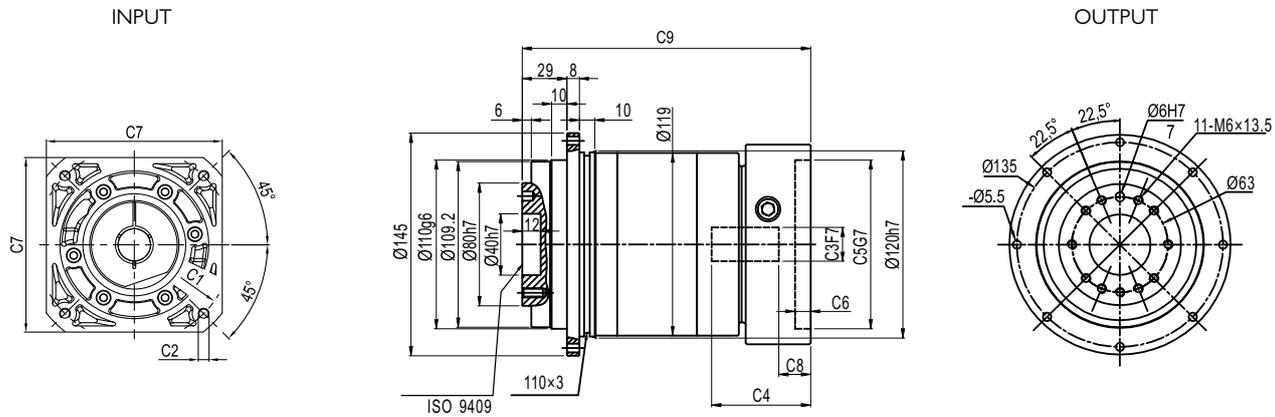
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-110-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	19,5	135
FAD-110M1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	28	152,5
FAD-110-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	7	151,5
	ø100	4-M6x14	ø16	42	ø80	6,5	86	6	151,5
FAD-110M1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	16,5	167
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	19	169,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

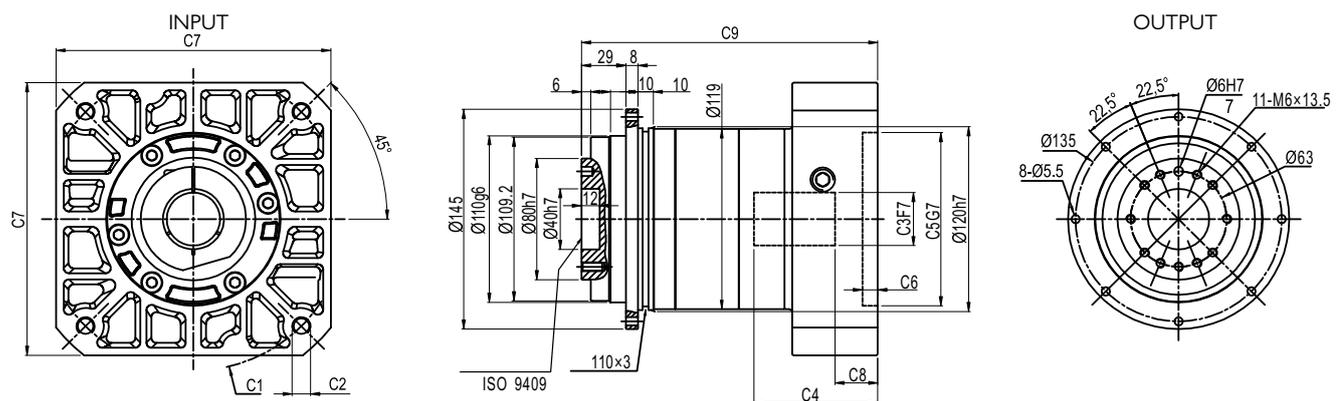
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-110A-L1



### FAD-110A-L2



## OUTPUT DIAMETER

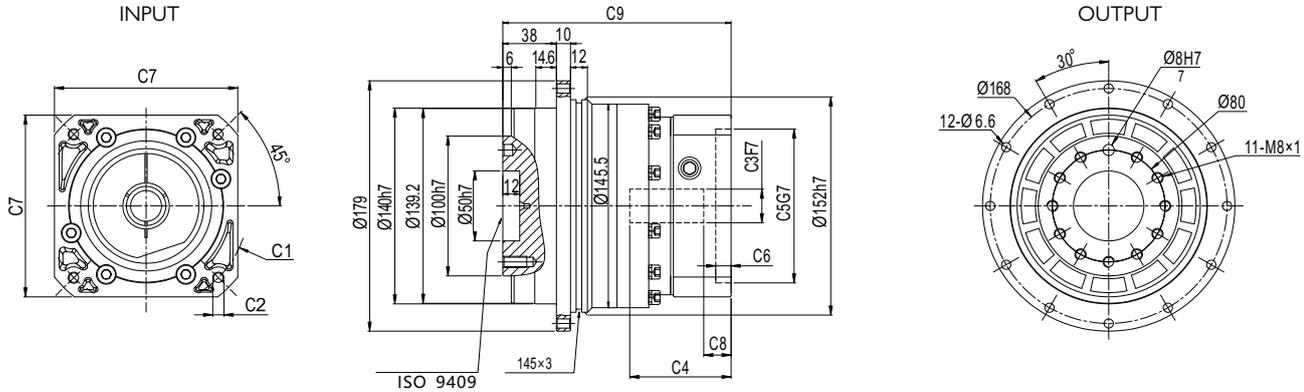
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-110A-L2	Ø145	4-M8x20	Ø19, Ø22, Ø24	64	Ø110	10	130	19,5	186,5
FAD-110AM1-L2	Ø200	4-M12x28	Ø35	81	Ø114,3	10	180	28	194

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

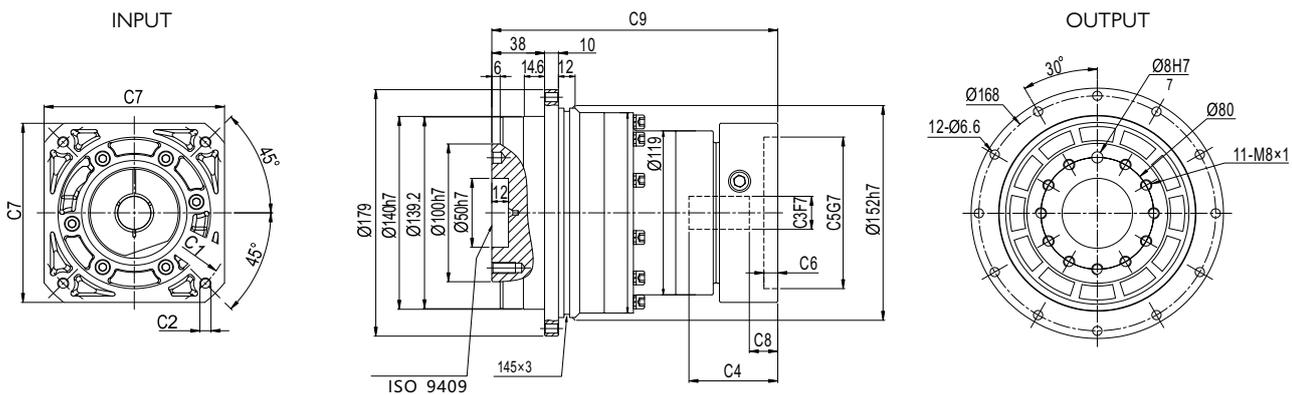
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-140-L1



### FAD-140-L2



## OUTPUT DIAMETER

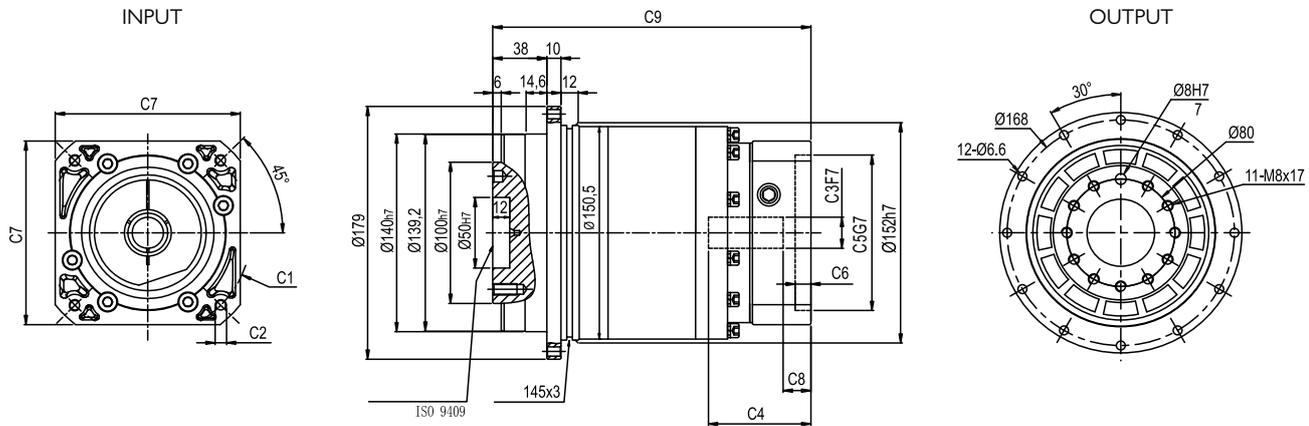
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-140-L1	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	19,5	162
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	25	172
FAD-140-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	19,5	206
FAD-140M1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	28	223,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-140A-L2



## OUTPUT DIAMETER

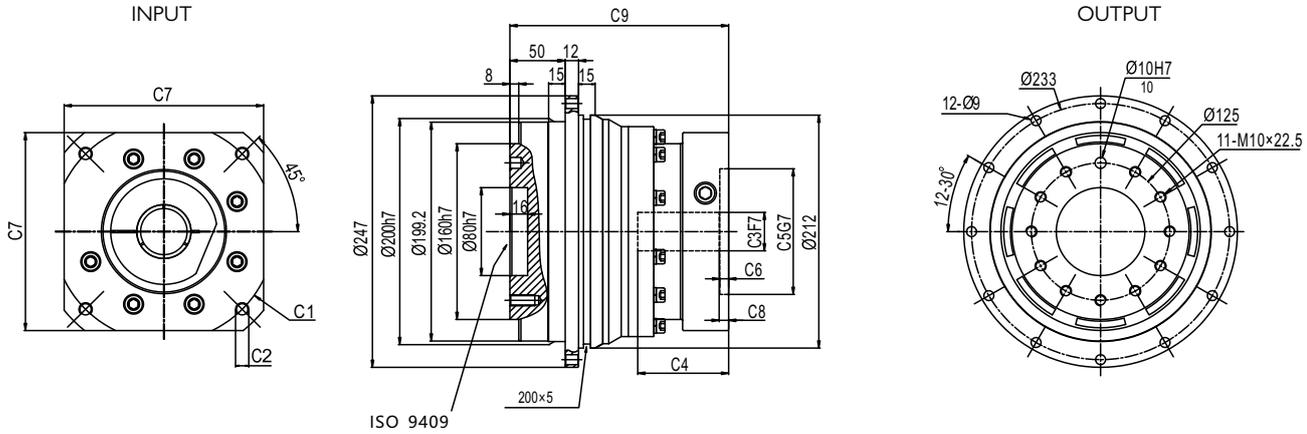
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-140A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22$ , $\varnothing 24$	72	$\varnothing 110$	11	130	19,5	223,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	25	233,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

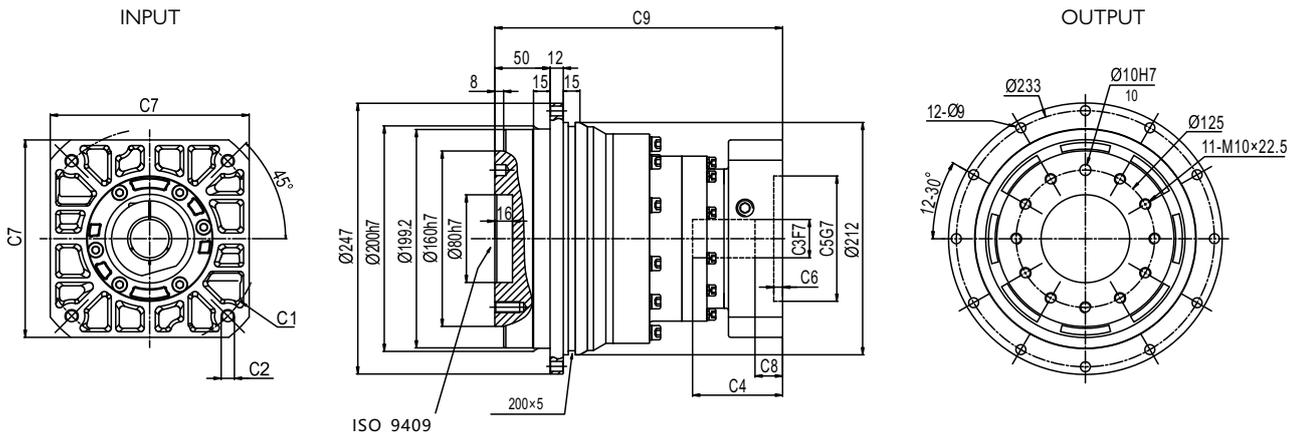
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-200-L1



### FAD-200-L2



## OUTPUT DIAMETER

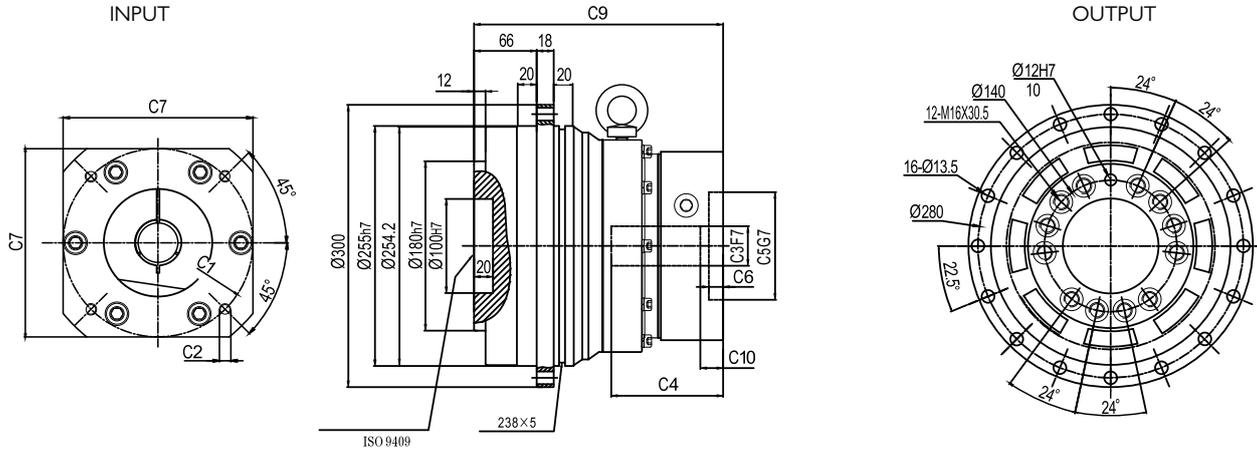
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-200-L1	ø200	4-M12x28	ø35	82	ø114,3	8	180	8,5	197,5
	ø200	4-M12x28	ø42	117,5	ø114,3	8	180	45,5	233
	ø215	4-M12x28	ø38	87	ø180	8	192	13,5	202,5
	ø235	4-M12x28	ø42	117,5	ø200	10	220	45,5	233
FAD-200-L2	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	19,5	250,5
	ø200	4-M12x28	ø35	81,5	ø114,3	8	180	25	260,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

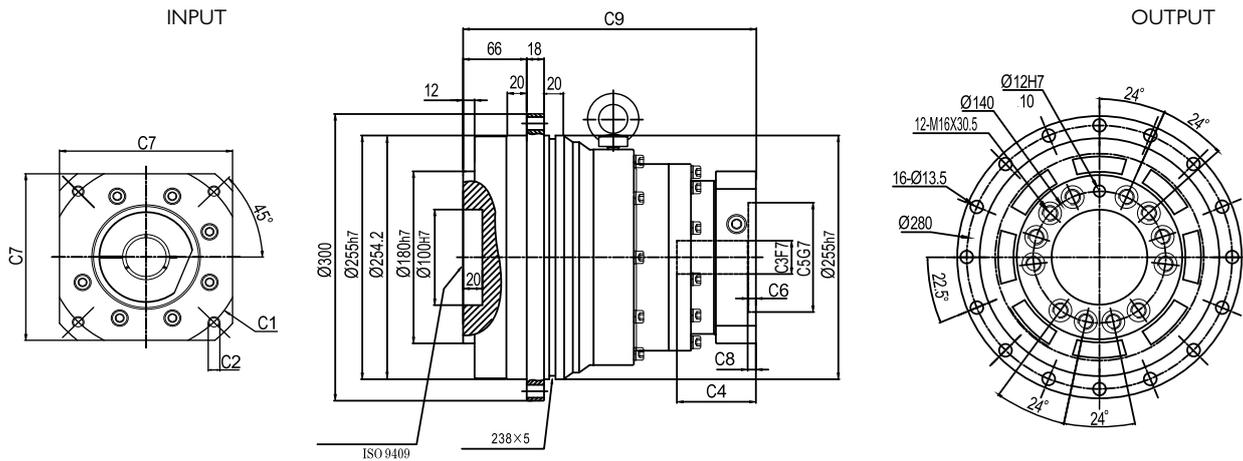
# PRECISION PLANETARY GEARBOX FAD SERIES

## PRODUCT DIMENSION

### FAD-225-L1



### FAD-225-L2



## OUTPUT DIAMETER

Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FAD-255-L1	ø200	4-M12x28	ø35, ø42	118	ø114,3	15	200	24	262,5
	ø215	4-M12x30	ø38	108	ø180	8	200	11,5	252,5
	ø235	4-M12x30	ø42, ø55	118	ø200	10	220	24	262,5
FAD-255-L2	ø200	4-M12x28	ø35	82	ø114,3	8	180	8,5	304
	ø200	4-M12x28	ø42	117,5	ø114,3	8	180	45,5	339,5
	ø215	4-M12x28	ø38	87	ø180	8	192	13,5	309
	ø235	4-M12x28	ø42	117,5	ø200	10	220	45,5	339,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.



**CHIARAVALLI LINEAR CENTER**

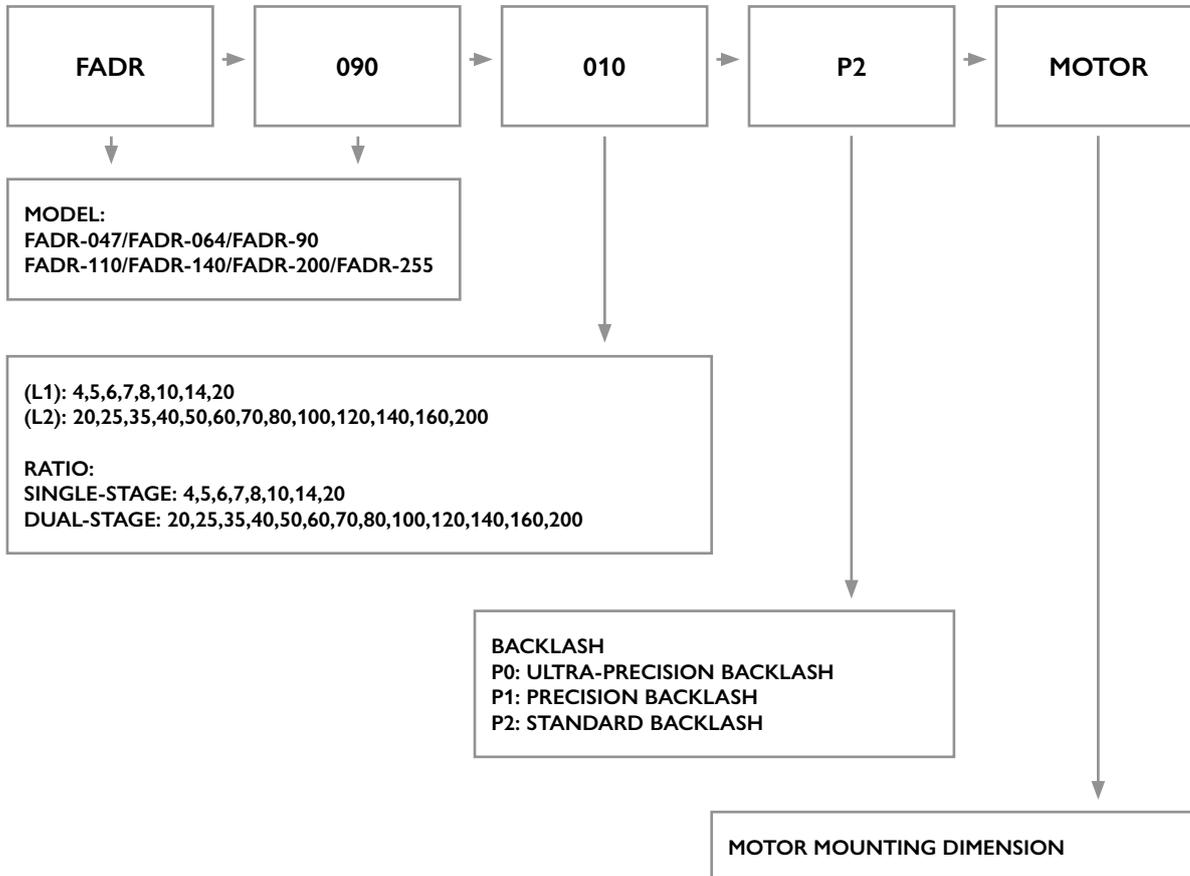
**PRECISION PLANETARY GEARBOX  
FADR SERIES**



# PRECISION PLANETARY GEARBOX FADR SERIES

## MODEL DESCRIPTION

FADR-090-010-S2-P2-19-70-90-M6-45





# PRECISION PLANETARY GEARBOX FADR SERIES

## TECHNICAL SPECIFICATION

MODEL	STAGE	RATIO	FADR041	FADR064	FADR090	FDR090A	FADR110	FADR110A	FADR140	FADR140A	FADR200	FADR255	
Rated output torque	1	4	19	48	130	-	270	-	560	-	1,100	1,700	
		5	22	60	160	-	330	-	650	-	1,200	2,000	
		6	-	55	150	-	310	-	600	-	1,100	1,900	
		7	19	50	140	-	300	-	550	-	1,100	1,800	
		8	17	48	130	-	270	-	560	-	1,100	1,700	
		10	14	60	160	-	330	-	650	-	1,200	2,000	
		14	-	50	140	-	300	-	550	-	1,100	1,800	
		20	-	40	100	-	230	-	450	-	900	1,500	
		20	19	48	130	130	270	270	560	560	1,100	1,700	
		25	22	60	160	160	330	330	650	650	1,200	2,000	
	2	35	22	60	160	160	330	330	650	650	1,200	2,000	
		40	22	48	130	130	270	270	560	560	1,100	1,700	
		50	22	60	160	160	330	330	650	650	1,200	2,000	
		60	-	55	150	150	310	310	600	600	1,100	1,900	
		70	22	60	160	160	330	330	650	650	1,200	2,000	
		80	-	48	130	130	270	270	560	560	1,100	1,700	
		100	22	60	160	160	330	330	650	650	1,200	2,000	
		120	-	-	150	150	310	310	600	600	1,100	1,900	
		140	-	-	140	140	300	300	550	550	1,100	1,800	
		160	-	-	120	120	260	260	500	500	1,000	1,600	
200	-	-	100	100	230	230	450	450	900	1,500			
T <sub>2B</sub> /Max. output torque	Nm	1,2	4~200	-	-	3 times the rated output torque							
n <sub>1</sub> /Rated input speed	rpm	1,2	4~200	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
n <sub>1B</sub> /Max.input speed	rpm	1,2	4~200	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
P0/Ultra-precision backlash	arcmin	2	4~20	-	-	≤2	≤2	≤2	≤2	≤2	≤2	≤2	≤2
			20~200	-	-	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
P1/Precision backlash	arcmin	2	4~20	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
			20~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
P2/Precision backlash	arcmin	2	4~20	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6
			20~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional rigidity		1,2	4~200	7	13	31	31	82	82	151	151	440	1,006
M <sub>2KB</sub> <sup>2</sup> /Maximum bending moment	Nm	1,2	4~200	42.5	125	235	235	430	430	1,300	1,300	3,064	5,900
F <sub>2B</sub> /Allowable radial force	N	1,2	4~200	1,080	2,110	2,310	2,310	4,800	4,800	6,200	6,200	5,450	10,600
Life time	hr	1,2	4~200							20,000 <sup>1</sup>			
η/Efficiency	%	2	4~20										≥95%
			20~200										
Weight	kg	1	4~20	1.1	2.1	5.9	-	10.5	-	21.9	-	50.9	85.4
			2	20~200	1.4	1.9	4.5	8.26	9.8	14.7	20.1	30.6	45.4
Operating temperature	°C	1,2	4~200							-10°C ~ +90°C			
lubrication		1,2	4~200							Synthetic lubricating grease			
Ingress protection		1,2	4~200							IP65			
Mount position		1,2	4~200							Any direction			
(n <sub>1</sub> =3000rpm) / Noise level	dB	1,2	4~200	≤61	≤63	≤65	≤65	≤68	≤68	≤70	≤70	≤72	≤74

## GEARBOX MOMENT OF INERTIA

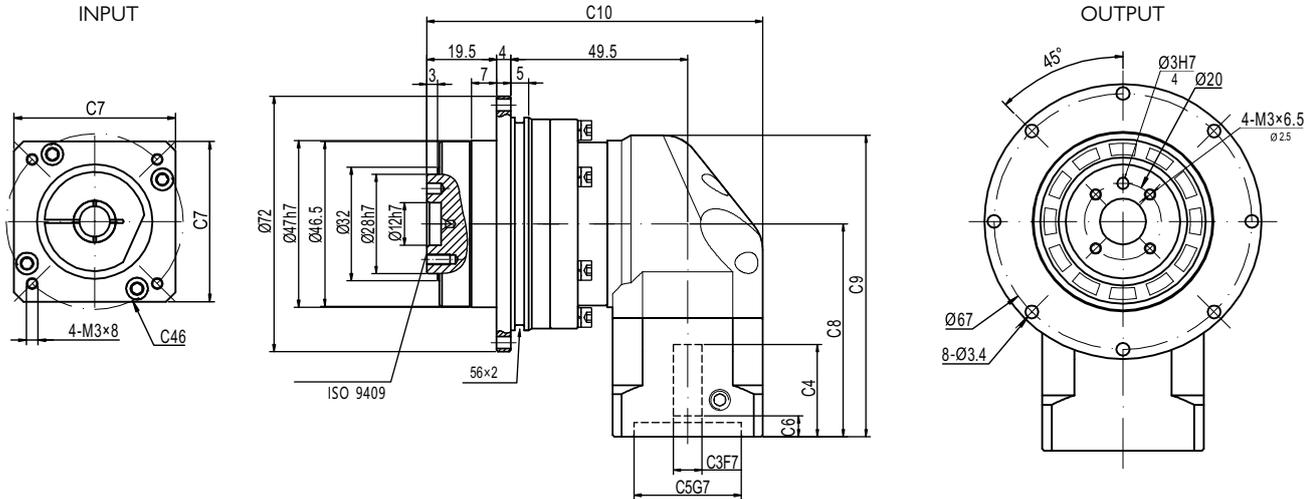
MODEL	STAGE	RATIO	FADR047	FADR064	FADR090	FDR090A	FADR110	FADR110A	FADR140	FADR140A	FADR200	FADR255
Moment of inertia	1	4~7	0.09	0.35	2.25	-	6.84	-	23.4	-	68.9	135.4
		8~10	0.09	0.07	1.87	-	6.25	-	21.8	-	65.6	119.8
		14~20	-	0.07	1.87	-	6.25	-	21.8	-	65.6	119.8
	2	20~40	0.09	0.35	0.35	2.25	2.25	6.84	6.84	23.4	23.4	68.9
		50	-	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6
		60	-	0.07	0.35	2.25	2.25	6.84	6.84	-	-	-
		70~100	-	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6
		120~200	-	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.

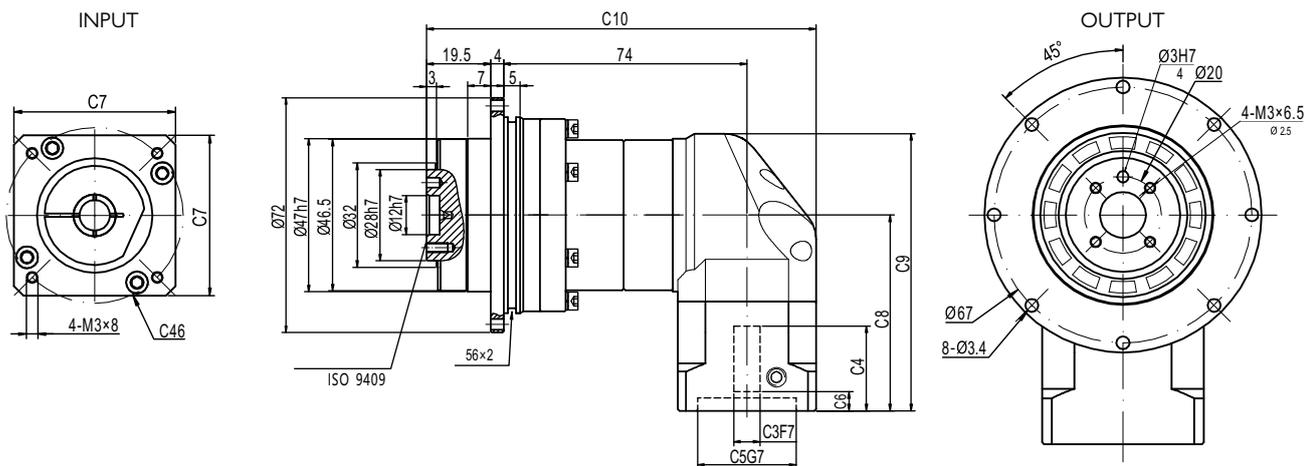
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-047-L1



### FADR-047-L2



## OUTPUT DIAMETER

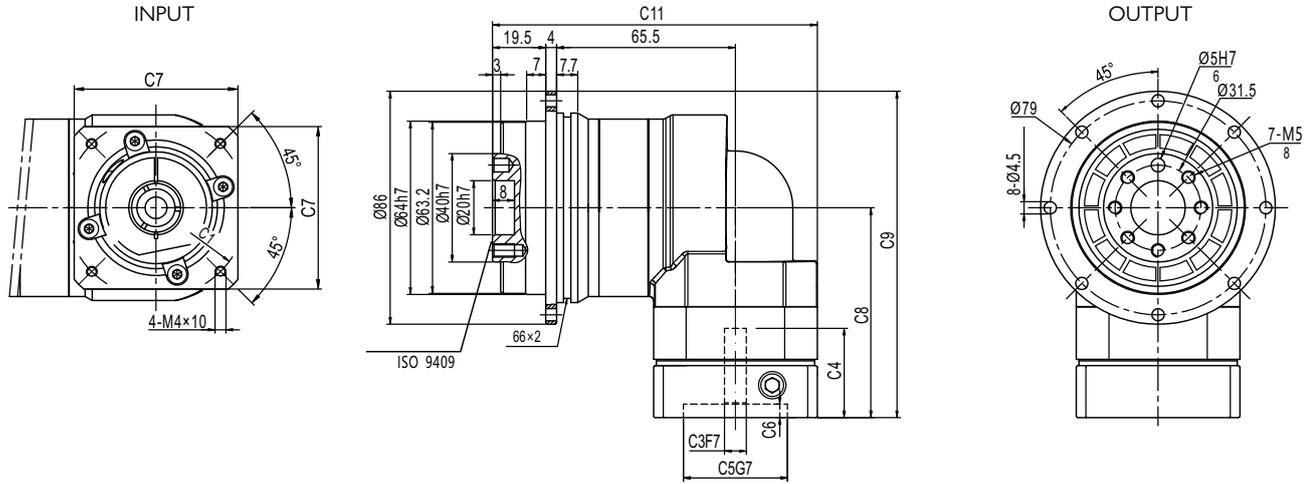
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FADR-047-L1	ø46	4-M4x10	ø8	26	ø30	4	42	60	96	94
	ø45	4-M3x8								
FADR-047-L2	ø46	4-M4x10	ø8	26	ø30	4	42	60	96	118,5
	ø45	4-M3x8								

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

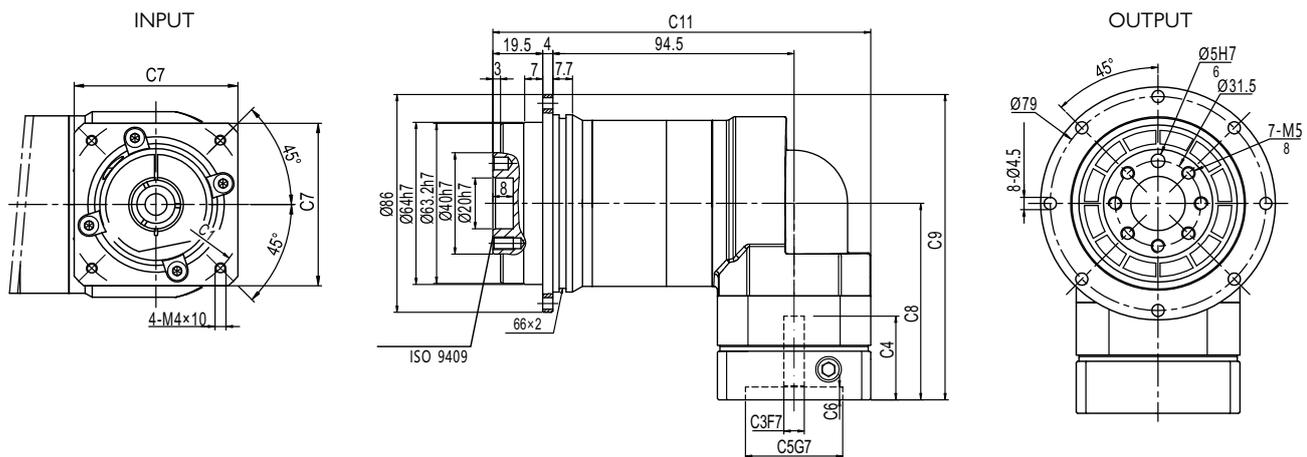
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-064-L1



### FADR-064-L2



## OUTPUT DIAMETER

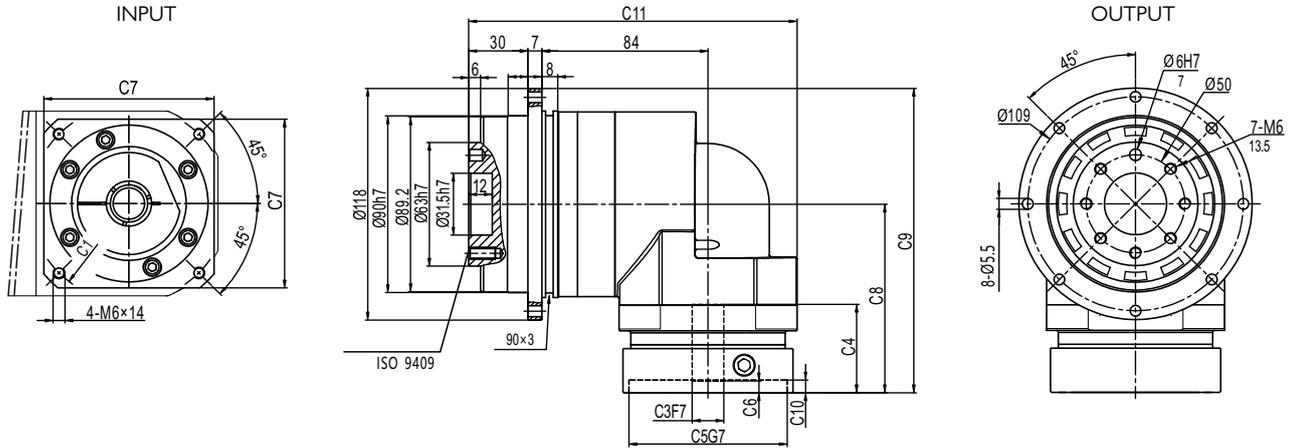
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FADR-064-L1	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	77,5	120,5	5,5	119
FADR-064-L2											148
FADR-064-L1	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	77,5	120,5	5,5	119
FADR-064-L2											148
FADR-064M1-L1	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	87	130	12	129
FADR-064M1-L2											158

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

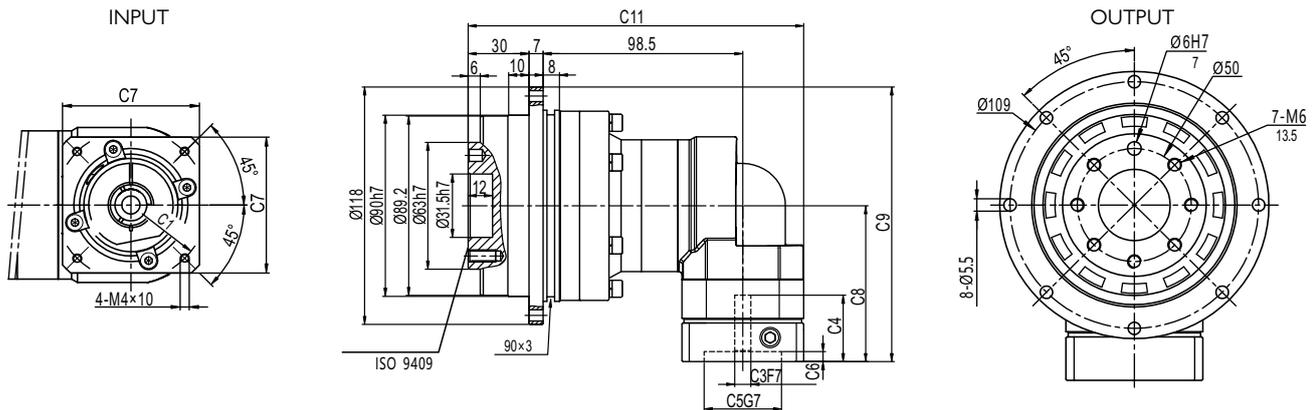
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-090-L1



### FADR-090-L2



## OUTPUT DIAMETER

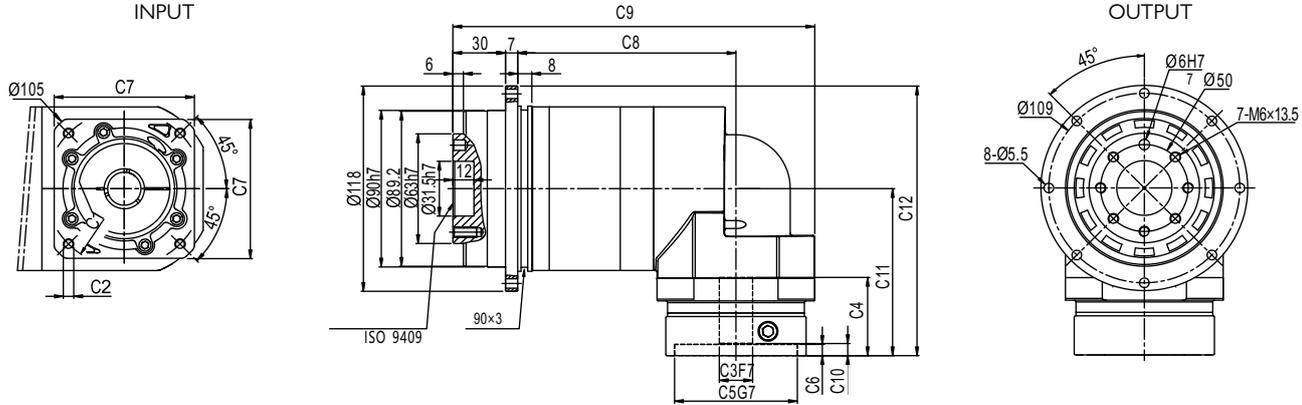
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FADR-090-L1	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	96	155	7	166
	ø100	4-M6x14	ø16	45	ø80	6,5	86	96	155	6	166
FADR-090M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	117,5	176,5	16,5	171
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	120	179	19	186
FADR-090-L2	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	77,5	136,5	5,5	165,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	77,5	136,5	5,5	165,5
FADR-090M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	87	146	12	175,5
	ø100	4-M6x14	ø16	42,5	ø80	6,5	86	87	146	11	175,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

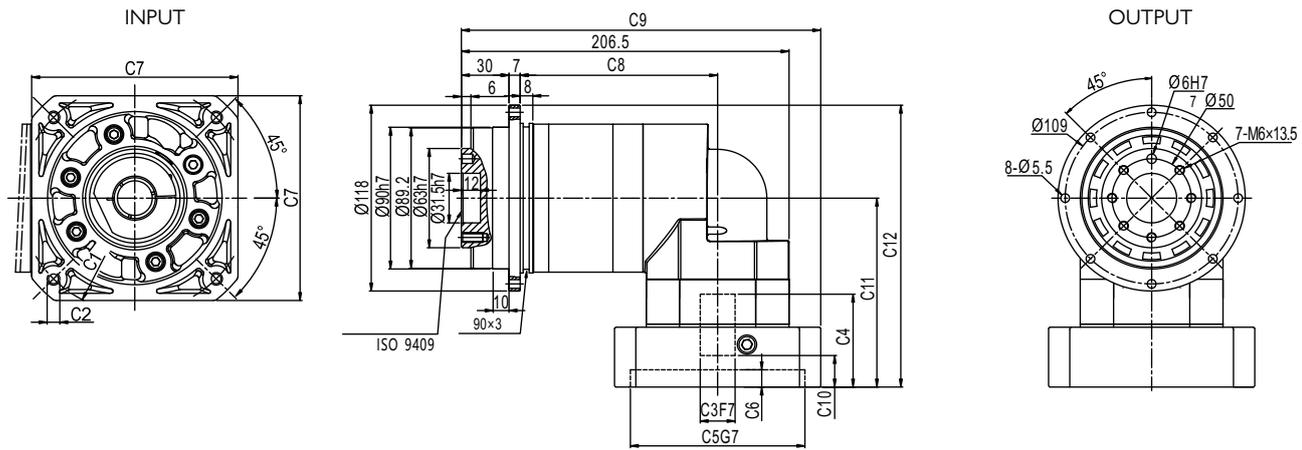
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-90A-L2



### FADR-90A-L2



## OUTPUT DIAMETER

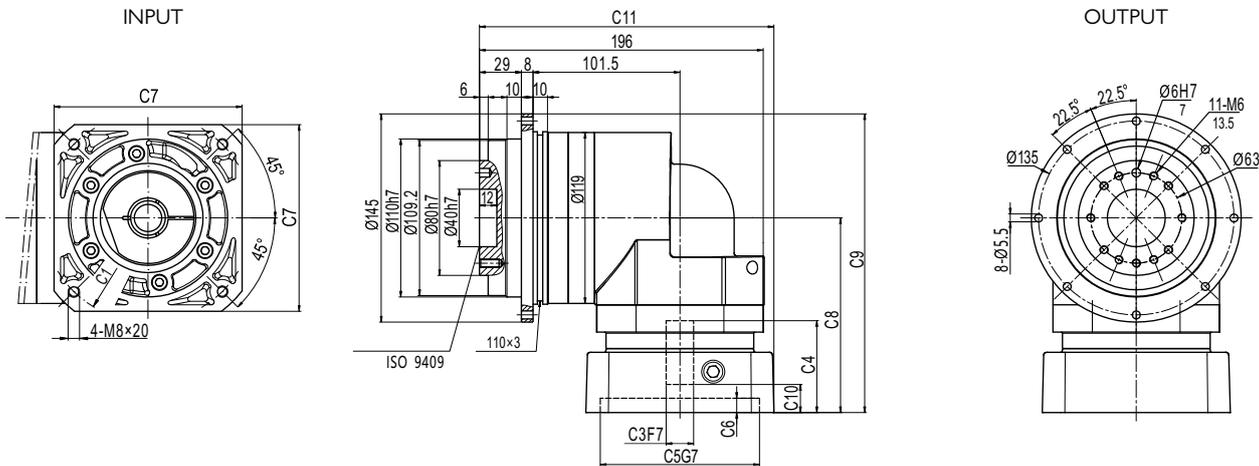
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FADR-090A-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	45	$\varnothing 70$	6,5	80	124,5	206,5	7	96	155
	$\varnothing 100$	4-M6x14	$\varnothing 16$	45	$\varnothing 80$	6,5	86	124,5	206,5	6	96	155
FADR-090AM1-L2	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	124,5	211,5	16,5	117,5	176,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	10	130	124,5	269,5	19	120	179

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

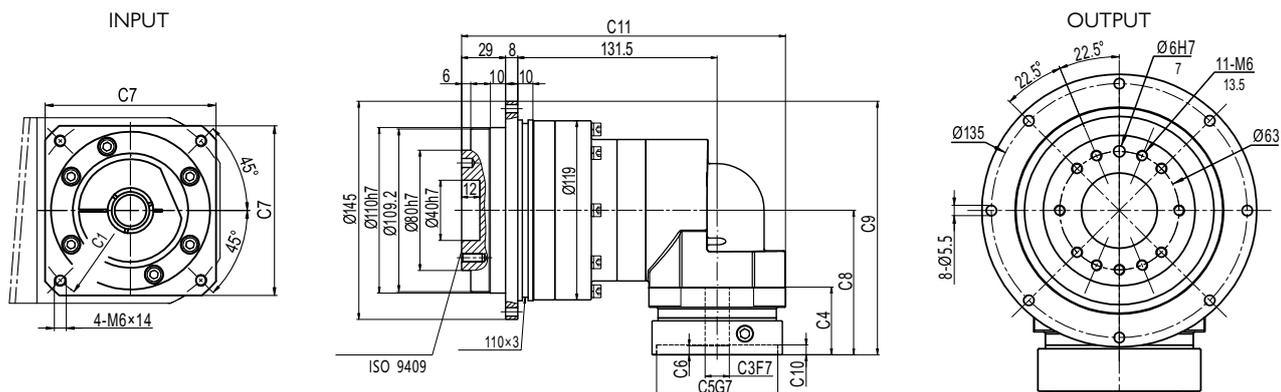
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-110-L1



### FADR-110-L2



## OUTPUT DIAMETER

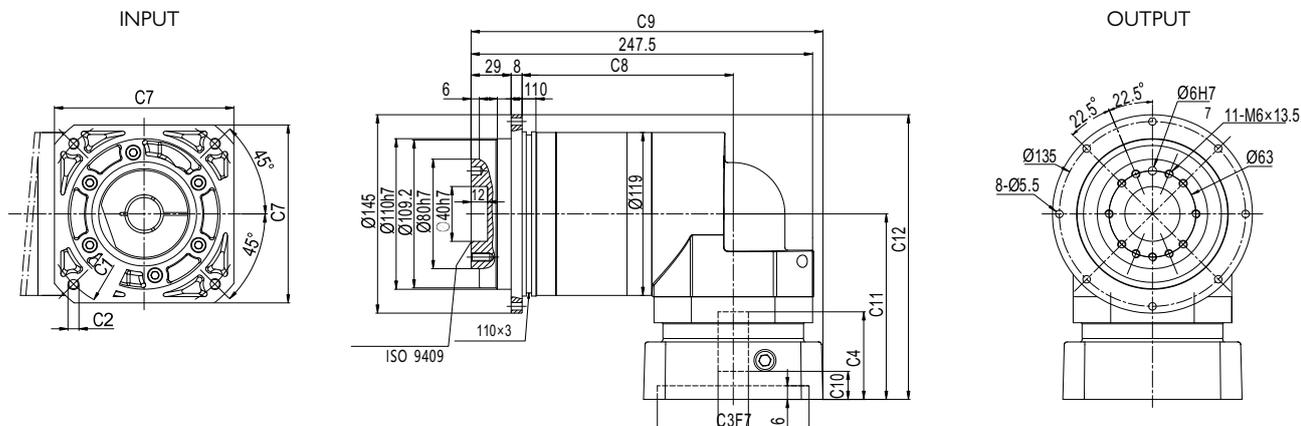
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FADR-110-L1	Ø145	4-M8x20	Ø19, Ø22, Ø24	64	Ø110	10	130	135,5	208	19,5	203,5
FADR-110M1-L1	Ø200	4-M12x28	Ø35	81	Ø114,3	10	180	152,5	225	28	228,5
FADR-110-L2	Ø90	4-M5x12, 4-M6x14	Ø19	45	Ø70	6,5	80	96	168,5	7	213,5
	Ø100	4-M6x14	Ø16	45	Ø80	6,5	86	96	168,5	6	213,5
FADR-110M1-L2	Ø115	4-M8x20	Ø19, Ø22	56,5	Ø95	8	100	117,5	190	16,5	218,5
	Ø145	4-M8x20	Ø19, Ø22, Ø24	59	Ø110	11	130	120	192,5	19	233,5

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

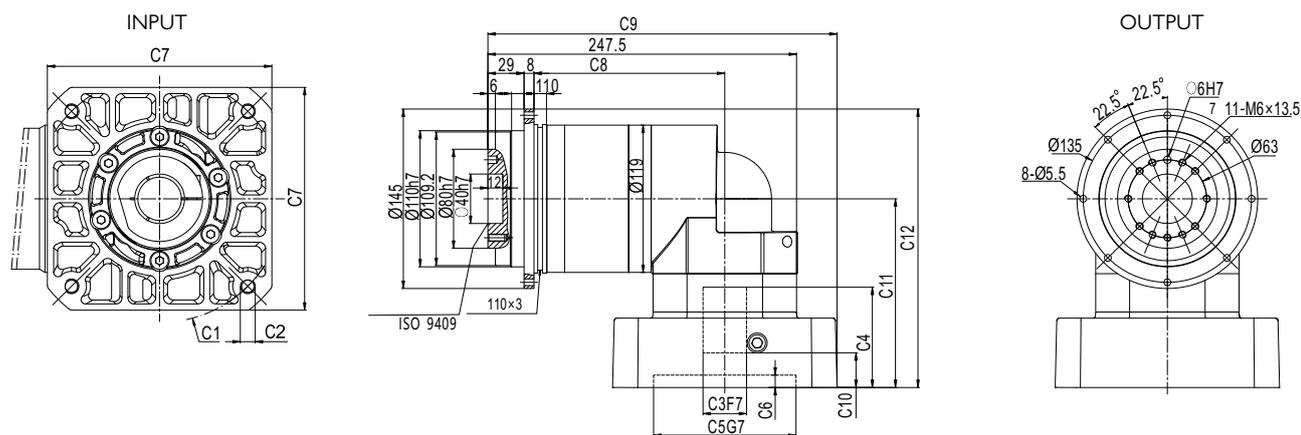
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-110A-L2



### FADR-110A-L2



## OUTPUT DIAMETER

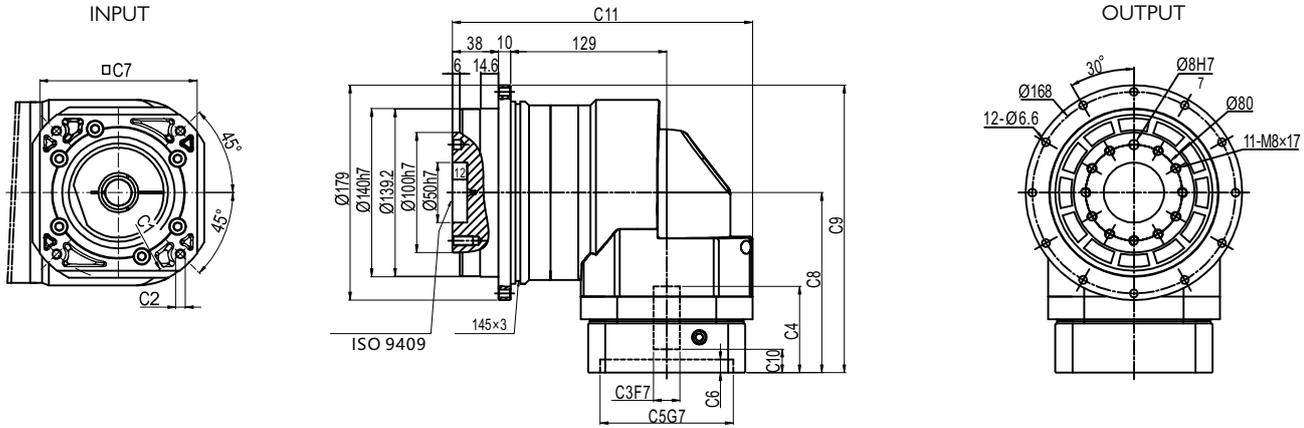
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FADR-110A-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	153	255	19,5	135,5	208
FADR-110AM1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	153	180	28	152,5	225

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

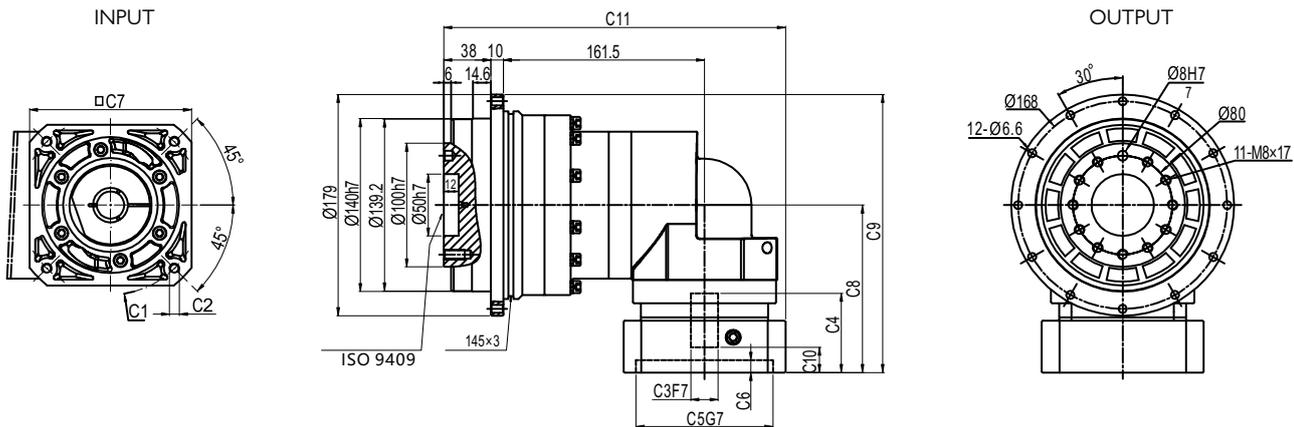
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-140-L1



### FADR-140-L2



## OUTPUT DIAMETER

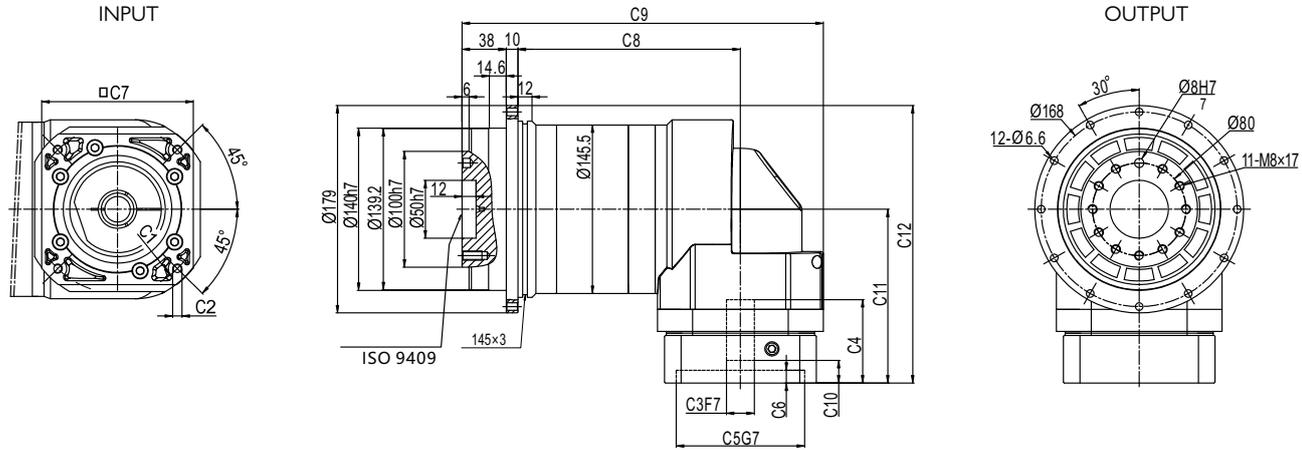
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FADR-140-L1	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	150	239,5	19,5	248
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	160	249,5	25	267
FADR-140-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	135,5	225	19,5	274,5
FADR-140M1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	152,5	242	28	299,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-140A-L2



## OUTPUT DIAMETER

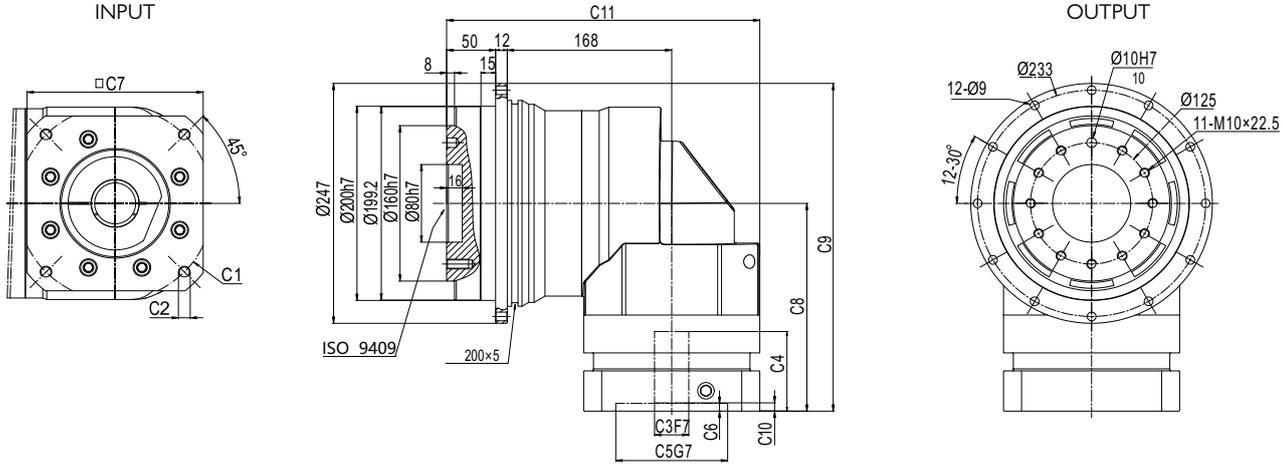
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FADR-140A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22$ , $\varnothing 24$	72	$\varnothing 110$	11	130	190,5	309,5	19,5	150	239,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	190,5	328,5	25	160	248,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

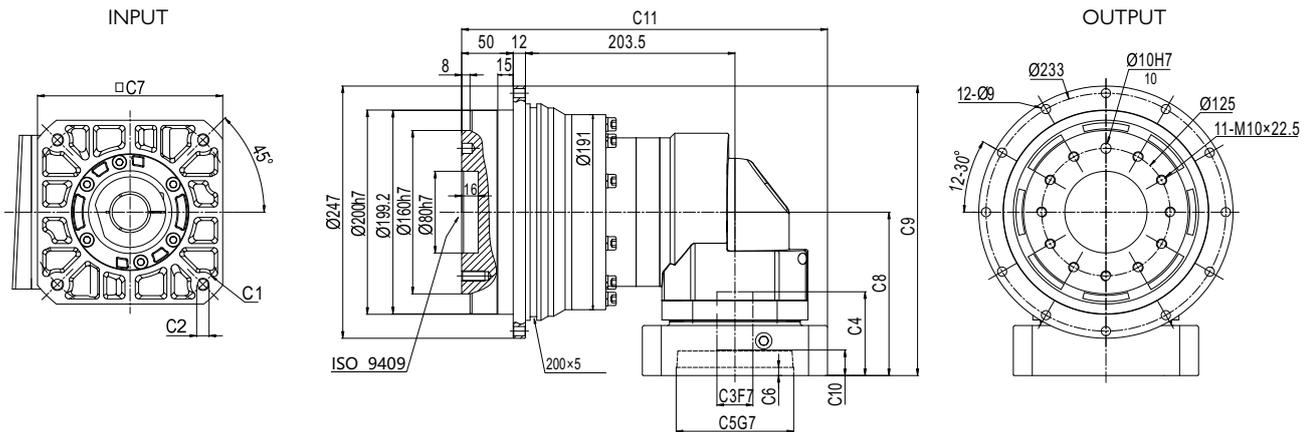
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-200-L1



### FADR-200-L2



## OUTPUT DIAMETER

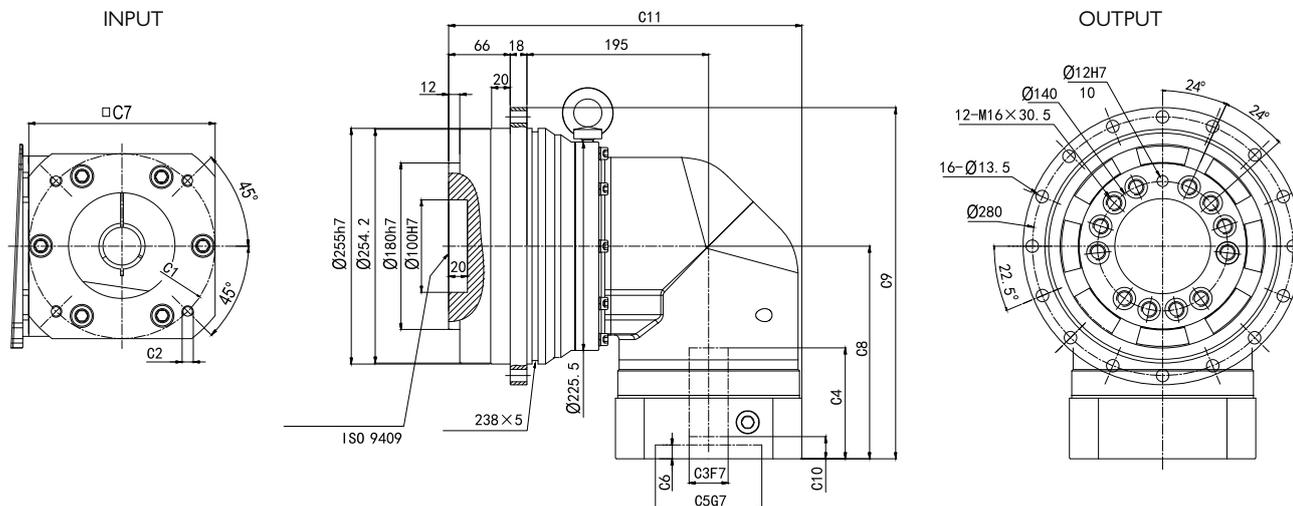
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FADR-200-L1	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	214	337,5	8,5	320
	$\varnothing 200$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 114,3$	8	180	249,5	373	45,5	320
	$\varnothing 215$	4-M12x28	$\varnothing 38$	87	$\varnothing 180$	8	192	219	342,5	13,5	326
	$\varnothing 235$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 200$	10	220	249,5	373	45,5	320
FADR-200-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	150	247,5	19,5	336,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	160	283,5	25	355,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

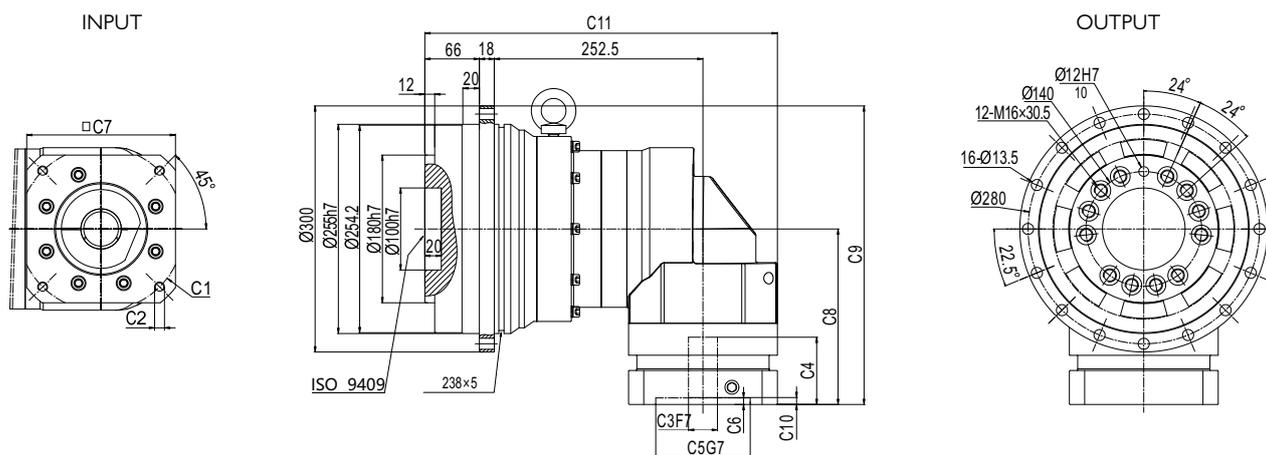
# PRECISION PLANETARY GEARBOX FADR SERIES

## PRODUCT DIMENSION

### FADR-255-L1



### FADR-255-L2



## OUTPUT DIAMETER

Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FADR-255-L1	$\varnothing 200$	4-M12x30	$\varnothing 35, \varnothing 42$	120	$\varnothing 114,3$	15	200	230	380	22,5	379
	$\varnothing 215$	4-M12x30	$\varnothing 38$	110	$\varnothing 180$	8	200	220	370	12,5	379
	$\varnothing 235$	4-M12x30	$\varnothing 42, \varnothing 55$	120	$\varnothing 200$	10	220	230	380	24	389
FADR-255-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	214	364	8,5	426,5
	$\varnothing 200$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 114,3$	8	180	249,5	399,5	45,5	426,5
	$\varnothing 215$	4-M12x28	$\varnothing 38$	87	$\varnothing 180$	8	192	219	369	13,5	432,5
	$\varnothing 235$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 200$	10	220	249,5	399,5	45,5	446,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.



**CHIARAVALLI LINEAR CENTER**

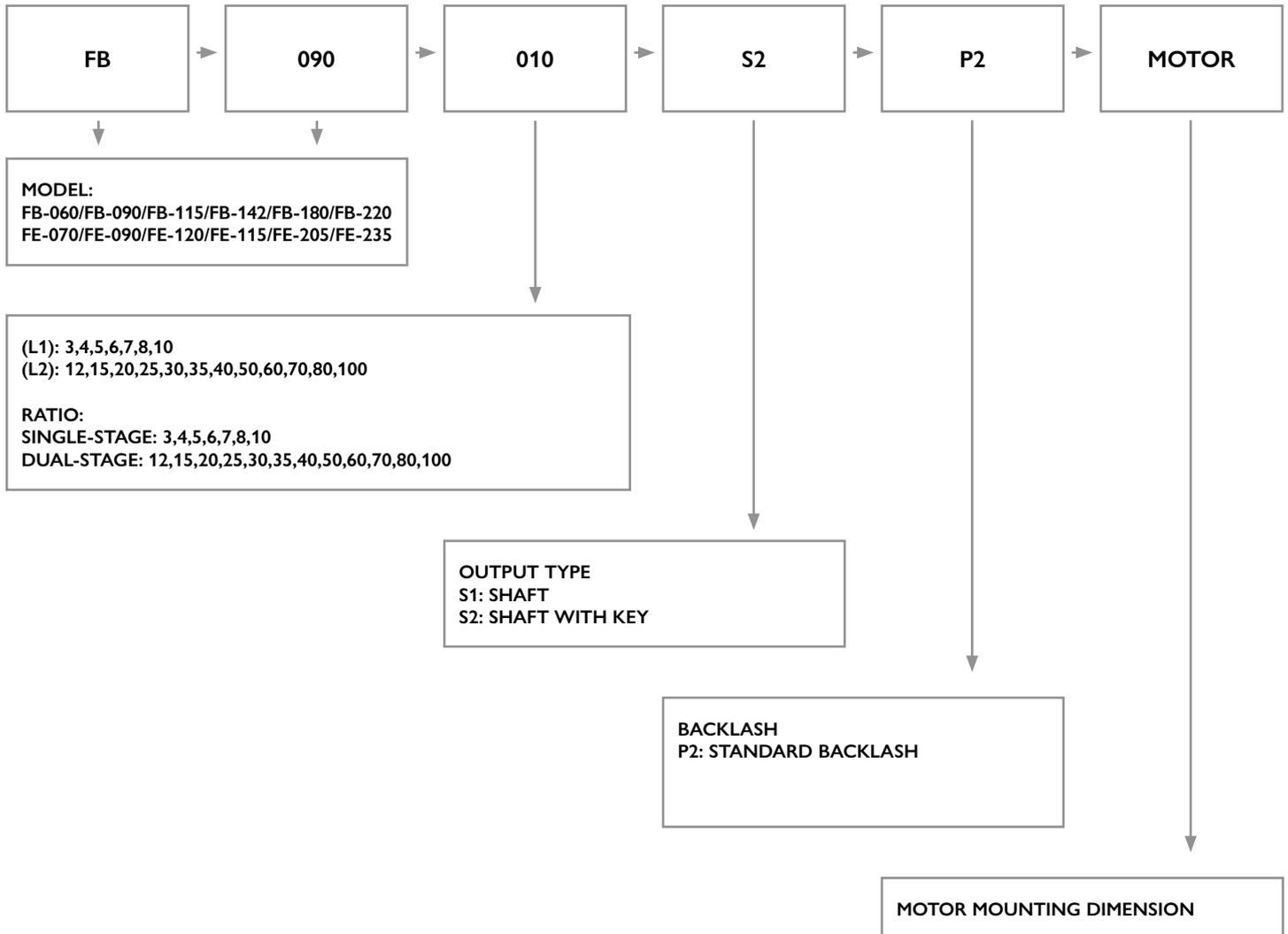
**PRECISION PLANETARY GEARBOX  
FB/FE SERIES**



# PRECISION PLANETARY GEARBOX FB/FE SERIES

## MODEL DESCRIPTION

FB-090-010-S2-P2-19-70-90-M6-42





# PRECISION PLANETARY GEARBOX FB/FE SERIES

## TECHNICAL SPECIFICATION

MODEL		STAGE	RATIO	FB060 FE070	FB090 FE090	FB090A FE090A	FB115 FE120	FB115A FE120A	FB142 FE155	FB142A FE155A	FB180 FE205	FB220 FE235
Rated output torque	Nm	1	3	55	130	-	208	-	342	-	588	1,140
			4	50	140	-	290	-	542	-	1,050	1,700
			5	60	160	-	330	-	650	-	1,200	2,000
			6	55	150	-	310	-	600	-	1,100	1,900
			7	50	140	-	300	-	550	-	1,100	1,800
			8	45	120	-	260	-	500	-	1,000	1,600
		10	40	100	-	230	-	450	-	900	1,500	
		2	12	55	130	130	208	208	342	342	588	1,140
			15	55	130	130	208	208	342	342	588	1,140
			20	50	140	140	290	290	542	542	1,050	1,700
			25	60	160	160	330	330	650	650	1,200	2,000
			30	50	130	130	208	208	342	342	588	1,140
			35	60	160	160	330	330	650	650	1,200	2,000
			40	50	140	140	290	290	542	542	1,050	1,700
			50	60	160	160	330	330	650	650	1,200	2,000
			60	55	150	150	310	310	600	600	1,100	1,900
			70	50	140	140	300	300	550	550	1,100	1,800
			80	45	120	120	260	260	500	500	1,000	1,600
100	40		100	100	230	230	450	450	900	1,500		
T <sub>2B</sub> /Max. output torque	Nm	1,2	3~100	3 times the rated output torque								
n <sub>1</sub> /Rated input speed	rpm	1,2	3~100	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
n <sub>1B</sub> /Max.input speed	rpm	1,2	3~100	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
P2/Precision backlash	arcmin	1	3~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional rigidity	Nm/arcmin	1,2	3~100	7	14	14	25	25	50	50	145	225
F <sub>21B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	1,530	3,250	3,250	6,700	6,700	9,400	9,400	14,500	50,000
F <sub>21B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	630	1,300	1,300	3,000	3,000	4,000	4,000	6,200	35,000
F <sub>22B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	765	1,625	1,625	3,350	3,350	4,700	4,700	7,250	25,000
Life time	hr	1,2	3~100	20,000 <sup>1</sup>								
η/Efficiency	%	1	3~10	≥97%								
		2	12~100	≥94%								
Weight	kg	1	3~10	1.3	3.7	-	7.8	-	14.5	-	29	48
		2	12~100	1.9	4.1	4.1	9	9	17.5	17.5	33	60
Operating temperature	°C	1,2	3~100	-10°C ~ +90°C								
lubrication		1,2	3~100	Synthetic lubricating grease								
Ingress protection		1,2	3~100	IP65								
Mount position		1,2	3~100	Any direction								
(n <sub>1</sub> =3000rpm) / Noise level	dB	1,2	3~100	≤58	≤60	≤60	≤63	≤63	≤65	≤65	≤67	≤70

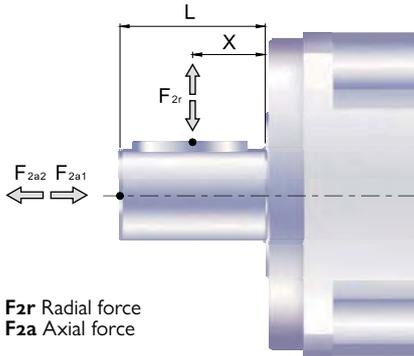
## GEARBOX MOMENT OF INERTIA

MODEL		STAGE	RATIO	FB060 FE070	FB090 FE090	FB090A FE090A	FB115 FE120	FB115A FE120A	FB142 FE155	FB142A FE155A	FB180 FE205	FB220 FE235
Moment of inertia	kg • cm <sup>2</sup>	1	3	0.16	0.61	-	3.25	-	9.21	-	28.98	69.61
			4	0.14	0.48	-	2.74	-	7.54	-	23.67	54.37
			5	0.13	0.47	-	2.71	-	7.42	-	23.29	53.27
			6	0.13	0.45	-	2.65	-	7.25	-	22.75	51.72
			7	0.13	0.45	-	2.62	-	7.14	-	22.48	50.97
			8	0.13	0.44	-	2.58	-	7.07	-	22.59	50.84
		10	0.13	0.44	-	2.57	-	7.03	-	22.51	50.56	
		2	12	0.14	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			15	0.13	0.13	0.13	0.47	2.71	2.71	7.42	7.42	23.29
			20	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			25	0.13	0.13	0.13	0.47	2.71	2.71	7.42	7.42	23.29
			30	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			35	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			40	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			50	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			60	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			70	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			80	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
100	0.13		0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51		

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.

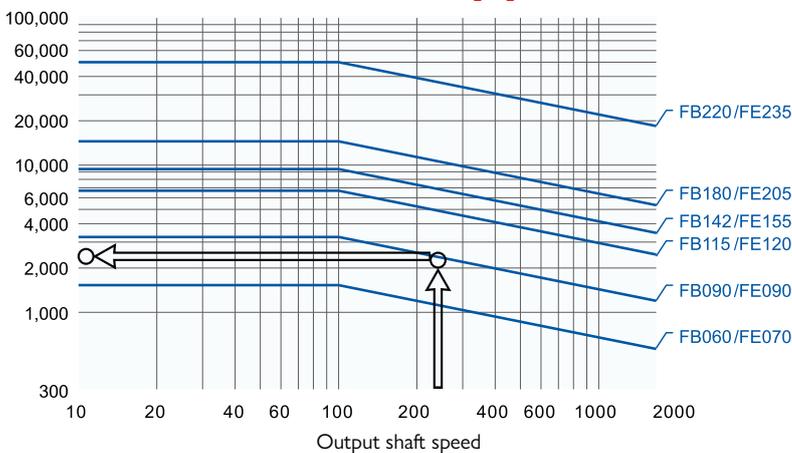
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEAR REDUCER



The maximum radial and axial forces that the output shaft of the gearbox can withstand. Looking at the design of internal support bearings, the reducer adopts large-sized bearings and a design with a larger span, which can withstand greater radial and axial loads.

### PERMISSIBLE RADIAL FORCE $F_{2rB}$ [N] APPLY FORCE TO THE CENTER OF THE SHAFT

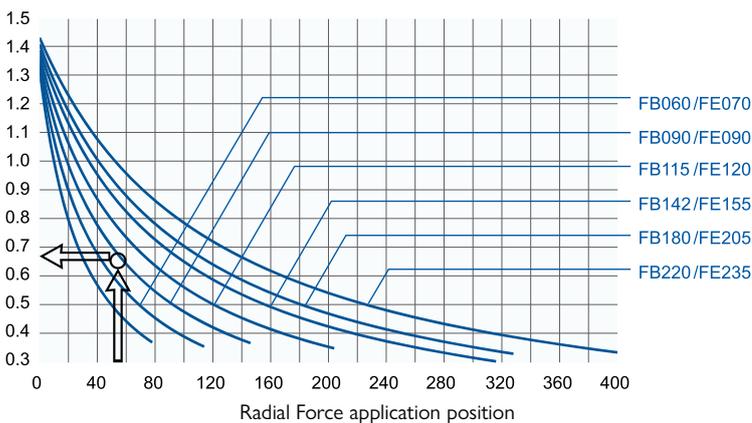


When the radial force  $F_{2r}$  is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force  $F_{2rB}$  that can be withstood by different specifications of reducers with a service life of 20,000hr\* under different output speeds is as follows:

$$F_{2a1B} = 0,2 \times F_{2rB}$$

$$F_{2a2B} = 0,1 \times F_{2rB}$$

### POSITIONAL LOAD COEFFICIENT



When the radial force  $F_{2r}$  is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

Radial force  
 $F'_{2rB} = K_b \times F_{2rB}$

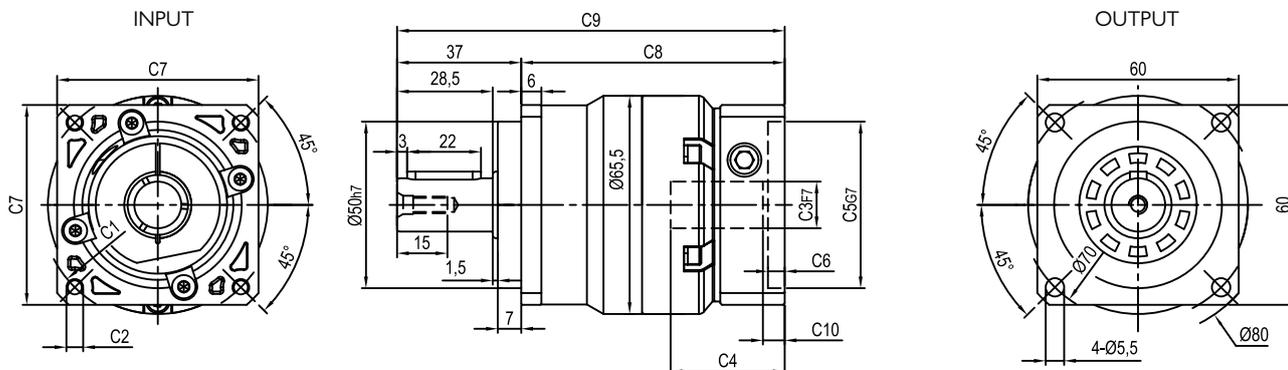
Axial force  
 $F'_{2a1B} = 0,2 \times F'_{2rB}$   
 $F'_{2a2B} = 0,1 \times F'_{2rB}$

\*The lifetime will be shortened by half under continuous operation.

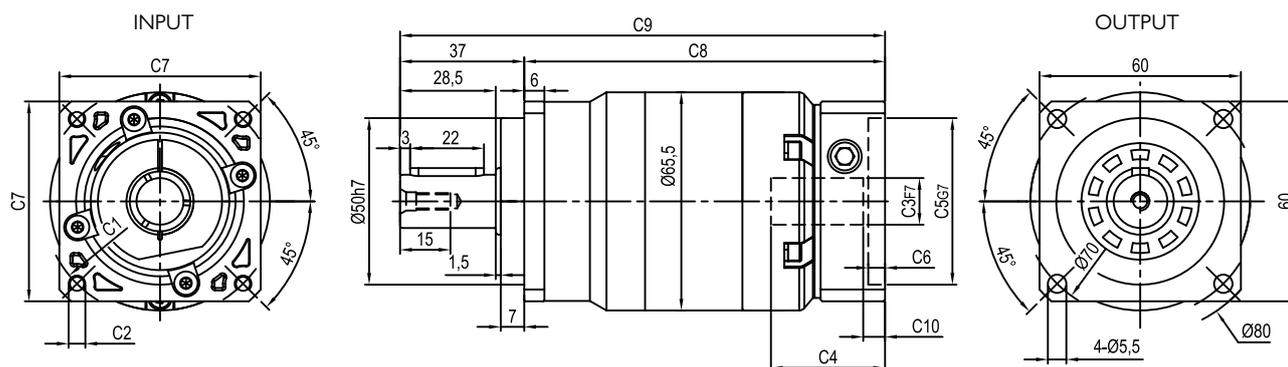
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

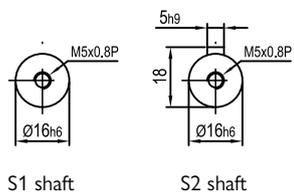
### FB-060-L1



### FB-060-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-060-L1	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	34	$\varnothing 38,1$	5	60	78,5	115,5	5,5
FB-060-L2								107,5	144,5	5,5
FB-060-L1	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	34	$\varnothing 50$	5	60	78,5	115,5	5,5
FB-060-L2								107,5	144,5	5,5
FB-060M1-L1	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	85	122	12
FB-060M1-L2								114	151	12

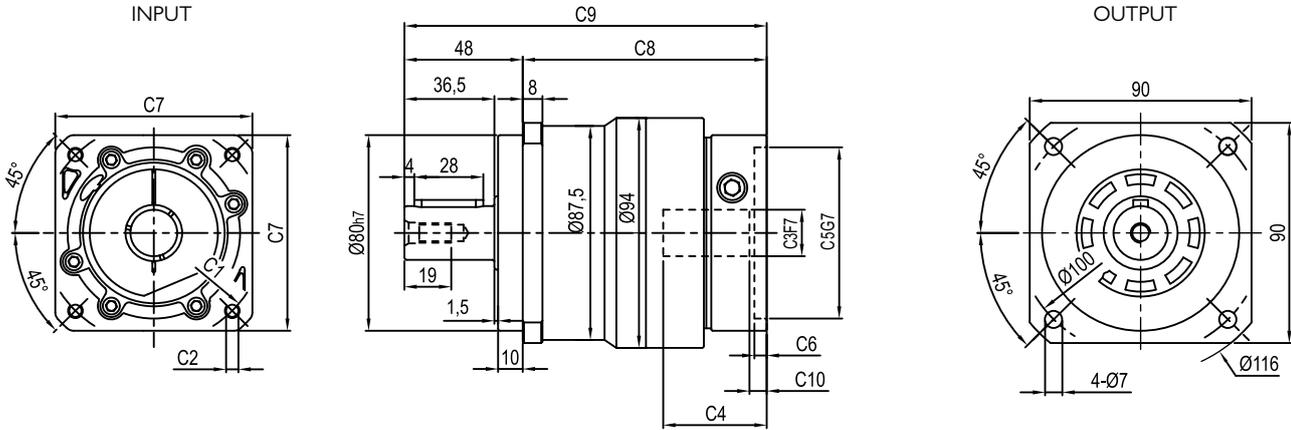
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



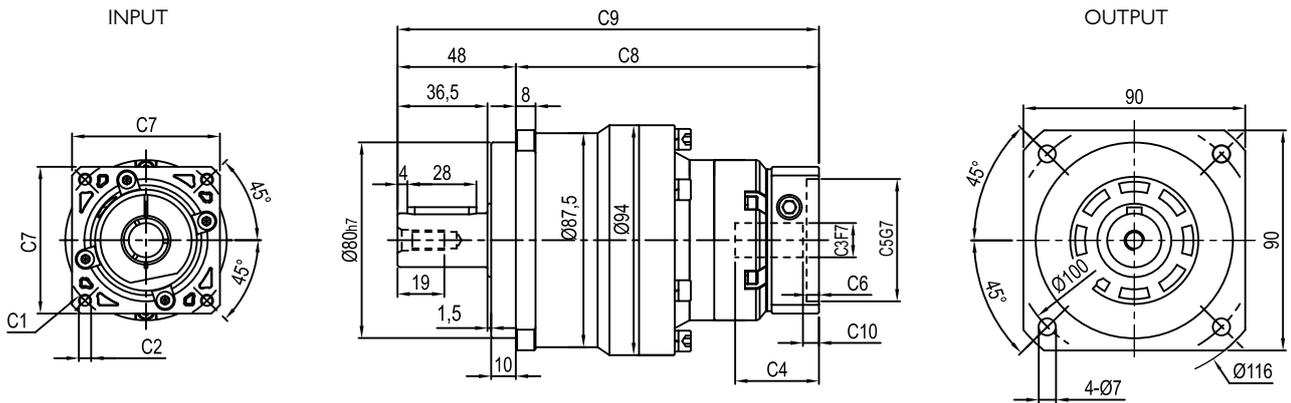
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

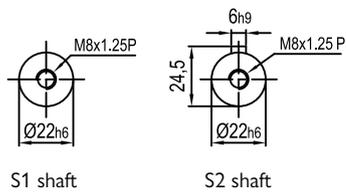
### FB-090-L1



### FB-090-L2



## OUTPUT DIAMETER



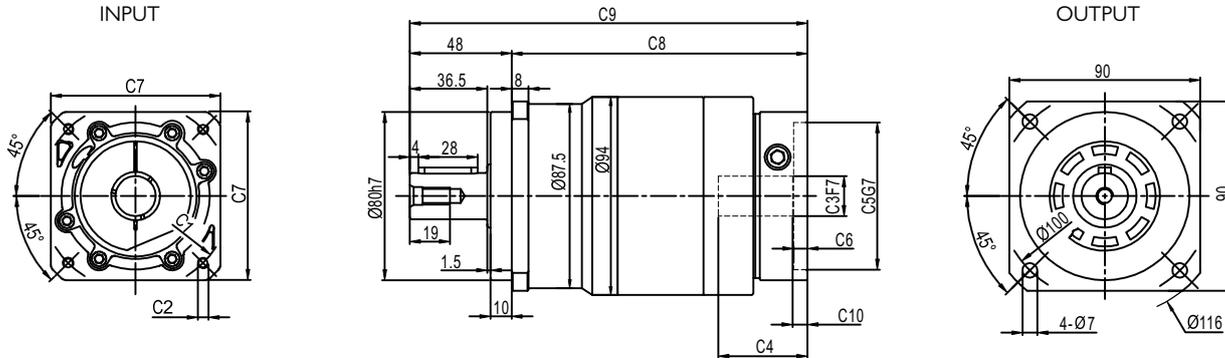
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-090-L1	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	99	147	7
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	99	147	6
FB-090M1-L1	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	114,5	162,5	16,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	117	165	19
FB-090-L2	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	34	$\varnothing 38,1$	5	60	123	171	5,5
	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	34	$\varnothing 50$	5	60	123	171	5,5
FB-090M1-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	129,5	177,5	12
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	129,5	177,5	11

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

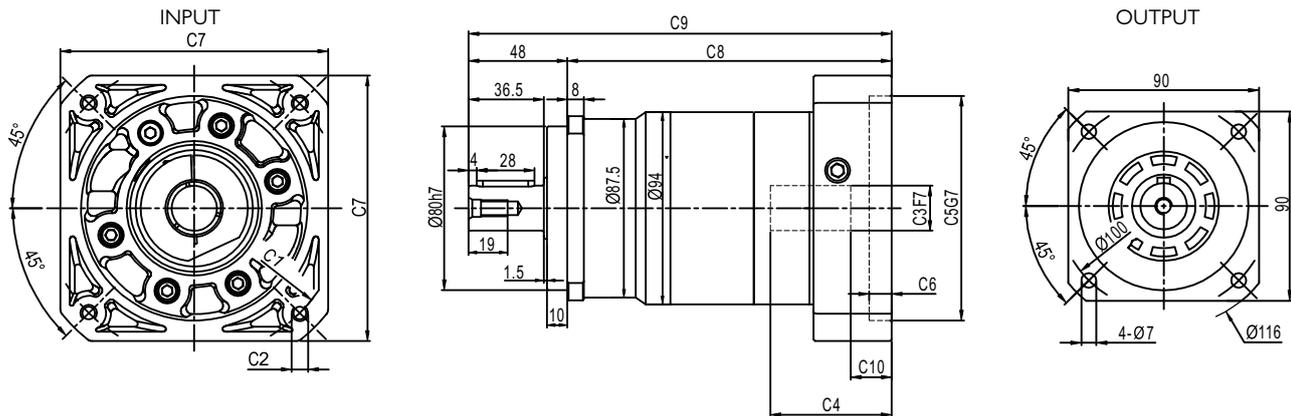
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

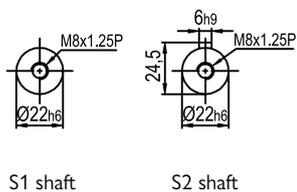
### FB-090A-L2



### FB-090A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

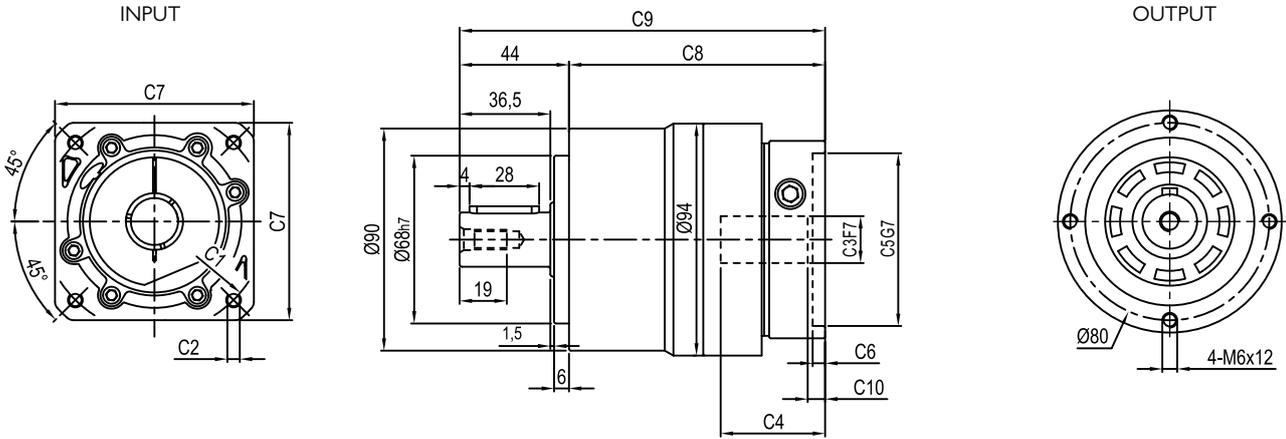
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-090A-L2	ø90	4-M5X12, 4-M6X14	ø19	42	ø70	6,5	80	139,5	187,5	7
	ø100	4-M6X14	ø16	42	ø80	6,5	86	139,5	187,5	6
FB-090AM1-L2	ø115	4-M8X20	ø19, ø22	56,5	ø95	8	100	155	203	16,5
	ø145	4-M8X20	ø19, ø22, ø24	59	ø110	10	130	157,5	205,5	19

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

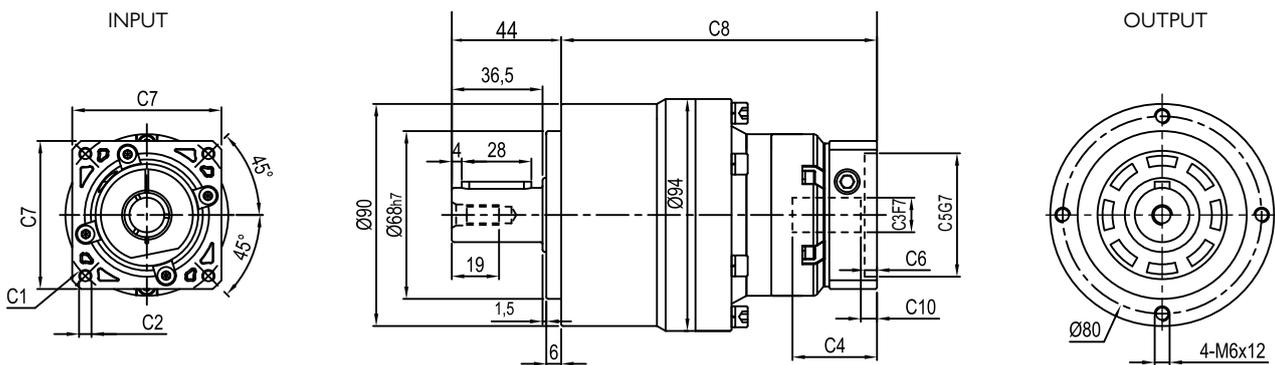
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

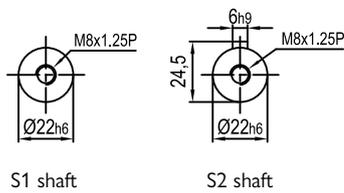
### FE-090-L1



### FE-090-L2



## OUTPUT DIAMETER



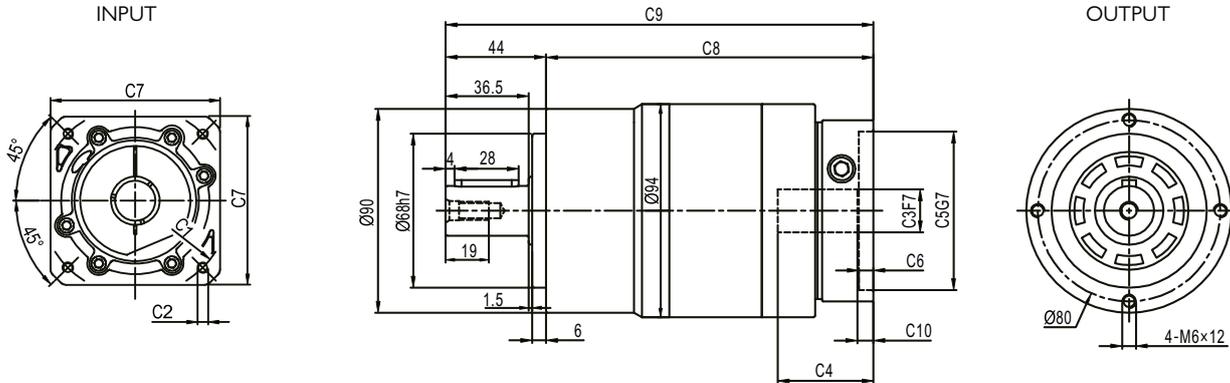
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-090-L1	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	103	147	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	103	147	6
FE-090M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	118,5	162,5	16,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	121	165	19
FE-090-L2	ø66,7	4-M4x10	ø8	34	ø38,1	5	60	127	171	5,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	34	ø50	5	60	127	171	5,5
FE-090M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	133,5	177,5	12
	ø100	4-M6x14	ø16	42	ø80	6,5	86	133,5	177,5	11

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

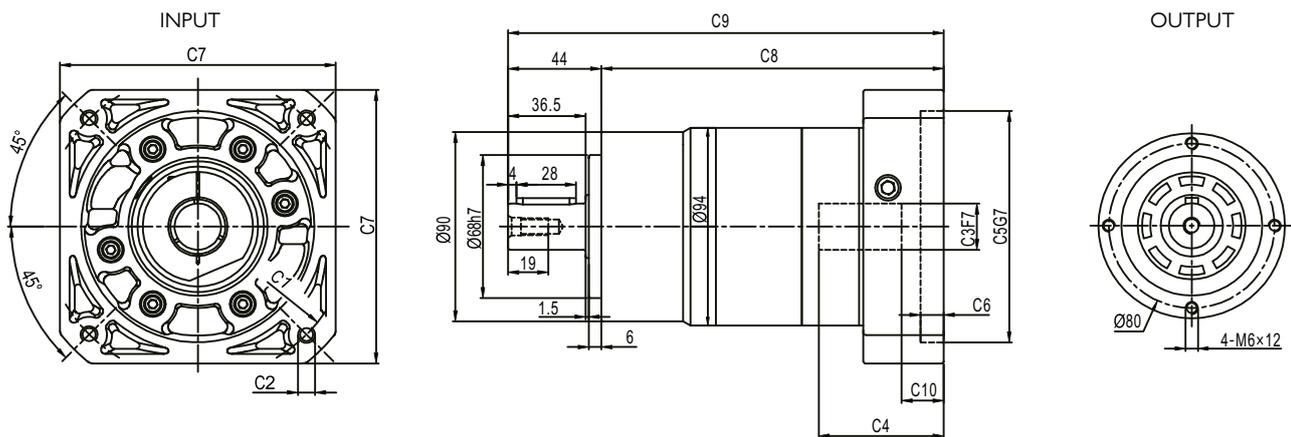
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

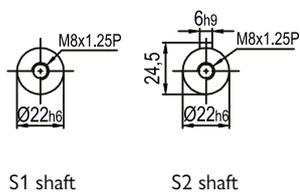
### FE-090A-L2



### FE-090A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-090A-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	143,5	187,5	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	143,5	187,5	6
FE-090AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	159	203	16,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	10	130	161,5	205,5	19

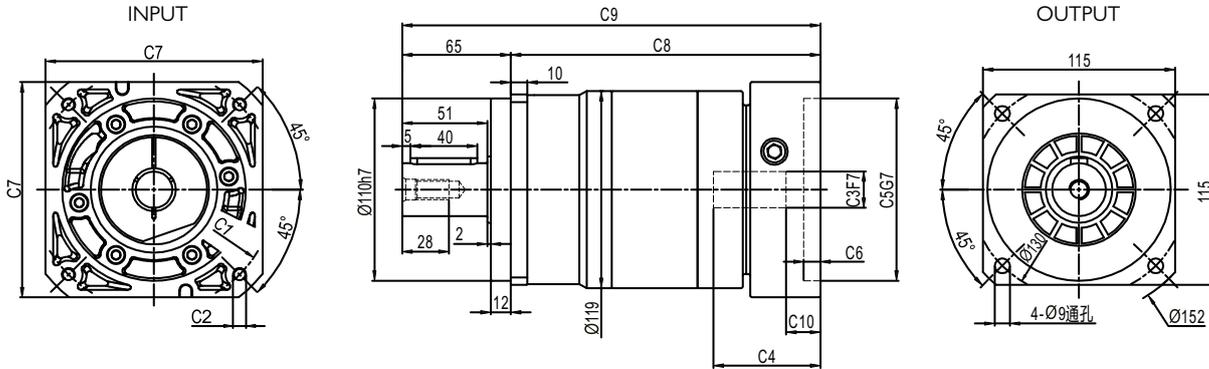
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



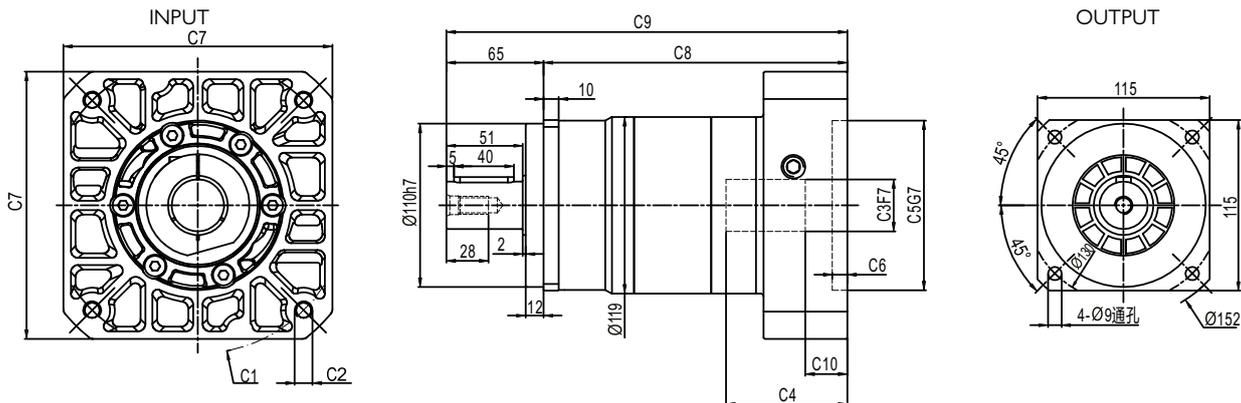
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

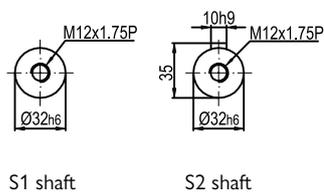
### FB-115A-L2



### FB-115A-L2



## OUTPUT DIAMETER



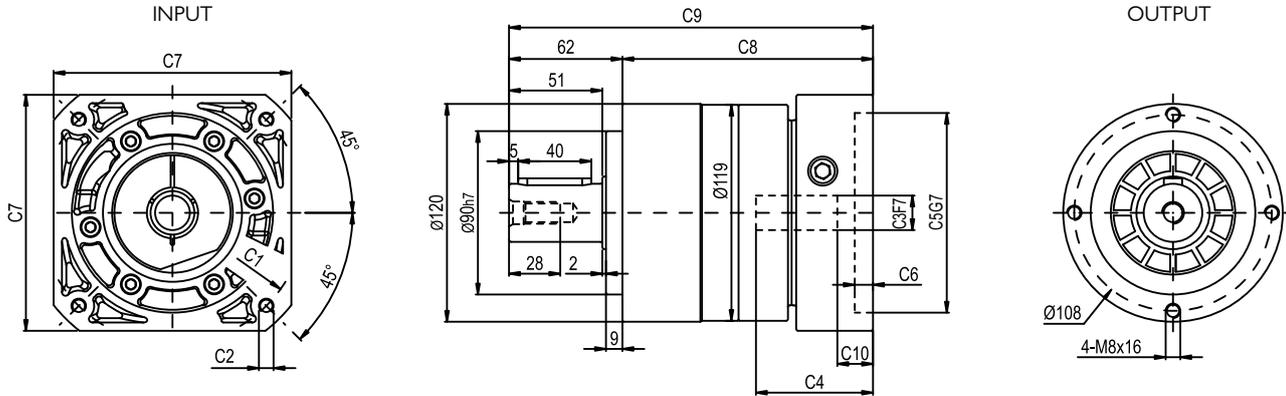
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-115A-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	185,5	205,5	19,5
FB-115AM1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	203	268	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

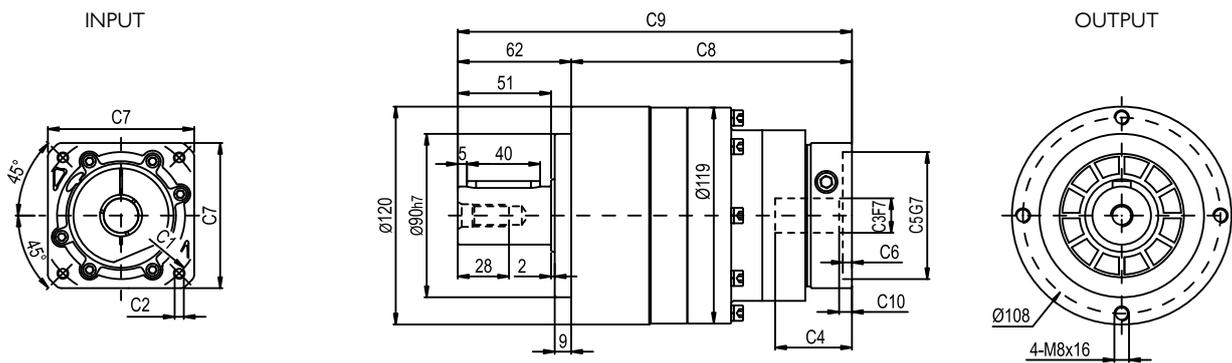
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

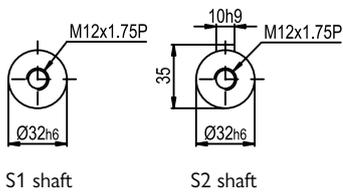
### FE-120-L1



### FE-120-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-120-L1	Ø145	4-M8x20	Ø19, Ø22, Ø24	64	Ø110	10	130	137	199	19,5
FE-120M1-L1	Ø200	4-M12x28	Ø35	81	Ø114,3	10	180	154,5	216,5	28
FE-120-L2	Ø90	4-M5x12, 4-M6x14	Ø19	42	Ø70	6,5	80	153,5	215,5	7
	Ø100	4-M6x14	Ø16	42	Ø80	6,5	86	153,5	215,5	6
FE-120M1-L2	Ø115	4-M8x20	Ø19, Ø22	56,5	Ø95	8	100	169	231	16,5
	Ø145	4-M8x20	Ø19, Ø22, Ø24	59	Ø110	11	130	171,5	233,5	19

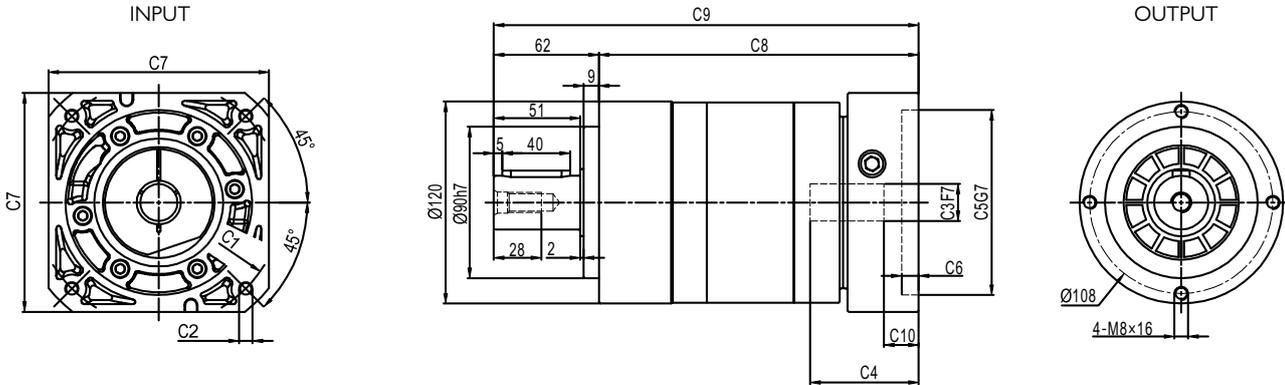
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



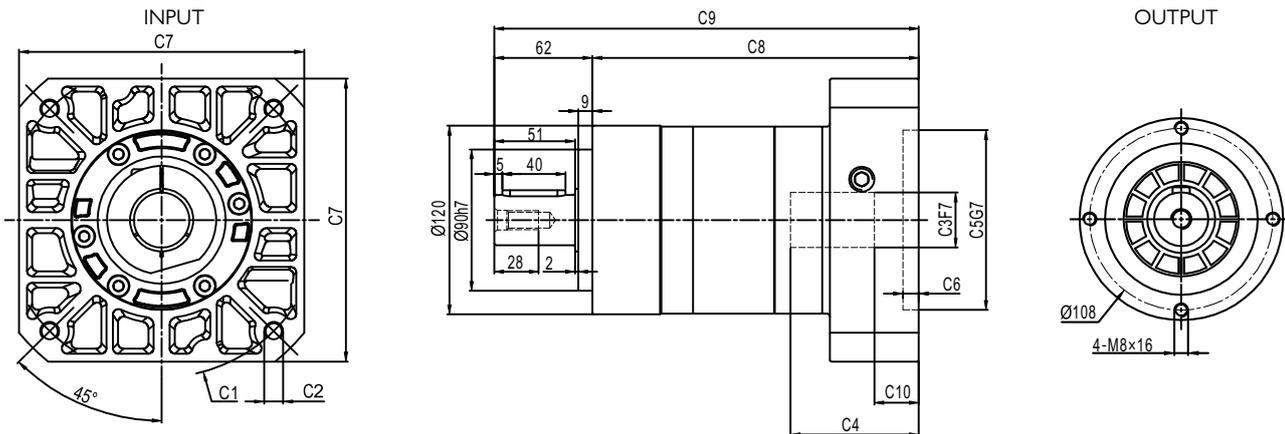
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

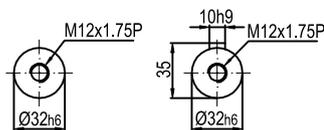
### FE-120A-L2



### FE-120A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

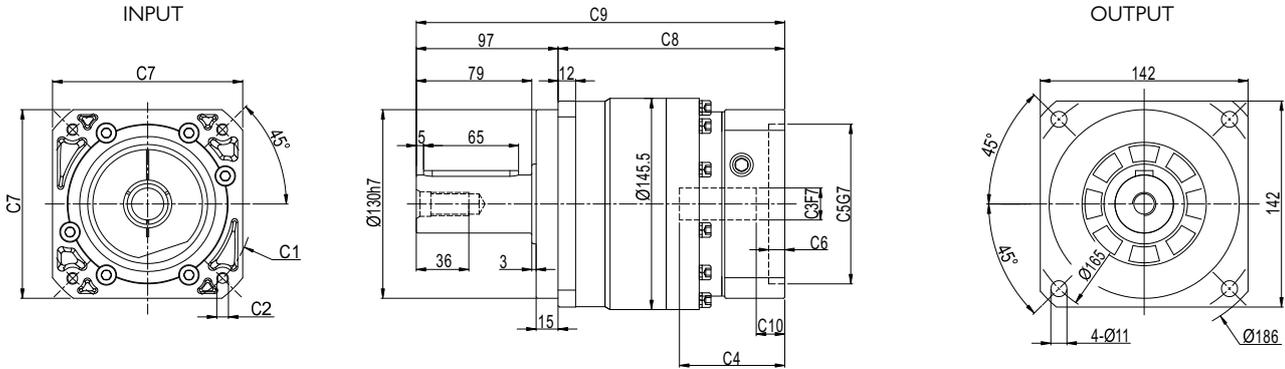
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-120A-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø100	10	130	188,5	205,5	19,5
FE-120AM1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	206	268	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

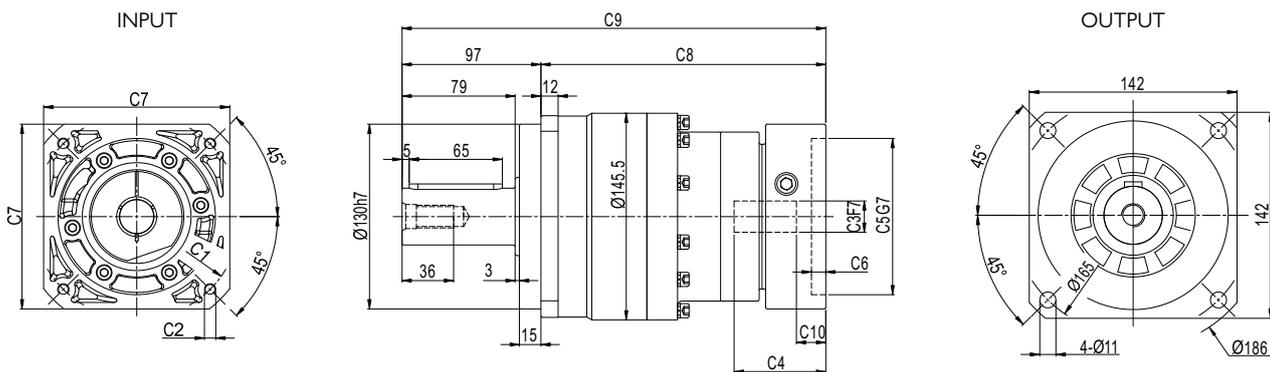
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

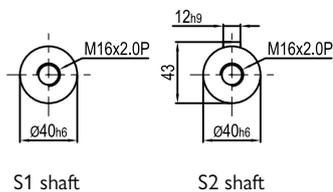
### FB-142-L1



### FB-142-L2



## OUTPUT DIAMETER



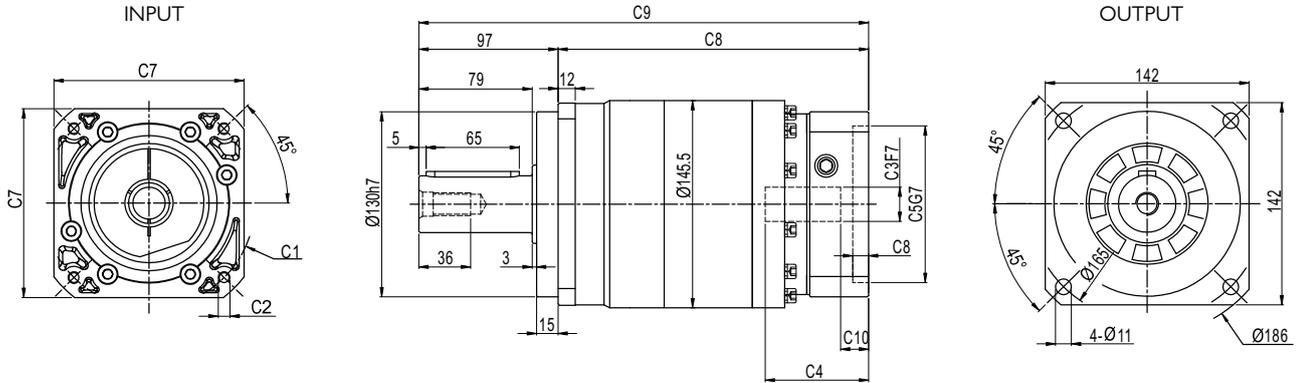
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-142-L1	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	155	252	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	165	262	25
FB-142-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	199	296	19,5
FB-142M1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	216,5	313,5	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

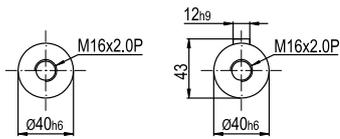
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

### FB-142A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

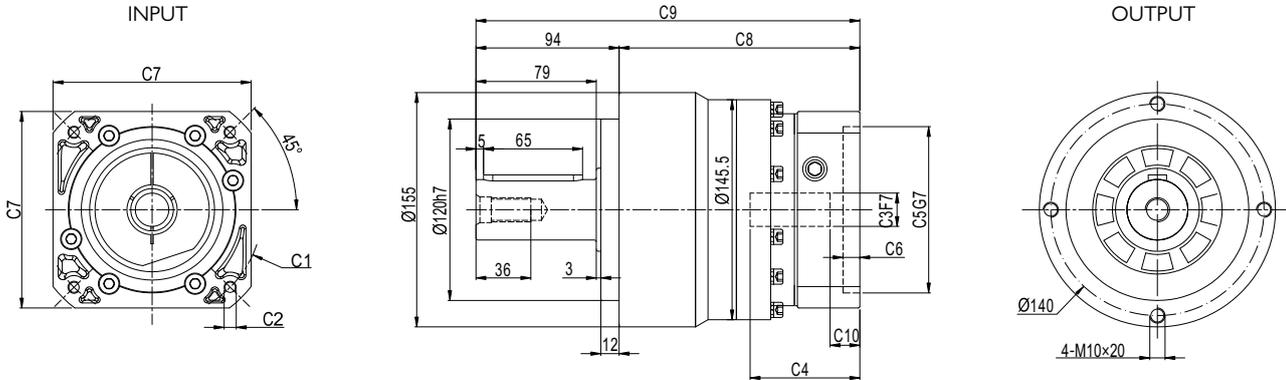
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-142A-L2	$\phi 145$	4-M8x20	$\phi 22, \phi 24$	72	$\phi 110$	11	130	216,5	313,5	19,5
	$\phi 200$	4-M12x28	$\phi 35$	81,5	$\phi 114,3$	8	180	226,5	323,5	25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

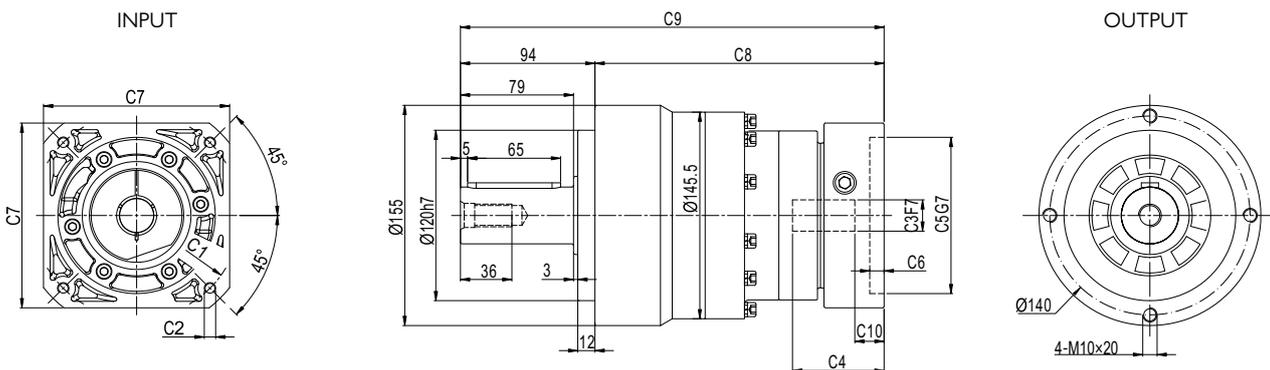
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

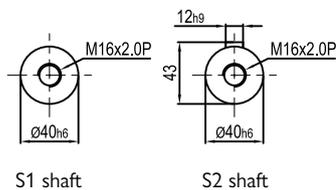
### FE-155-L1



### FE-155-L2



## OUTPUT DIAMETER



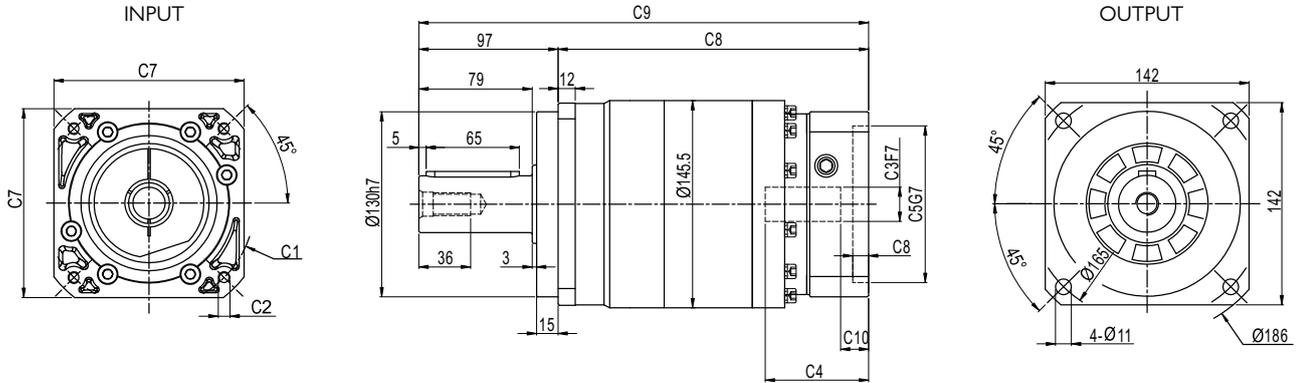
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-155-L1	Ø145	4-M8x20	Ø22, Ø24	72	Ø110	11	130	158	252	19,5
	Ø200	4-M12x28	Ø35	81,5	Ø114,3	8	180	168	262	25
FE-155-L2	Ø145	4-M8x20	Ø19, Ø22, Ø24	64	Ø110	10	130	202	296	19,5
FE-155M1-L2	Ø200	4-M12x28	Ø35	81	Ø114,3	10	180	219,5	313,5	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

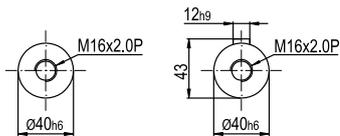
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

### FE-155A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

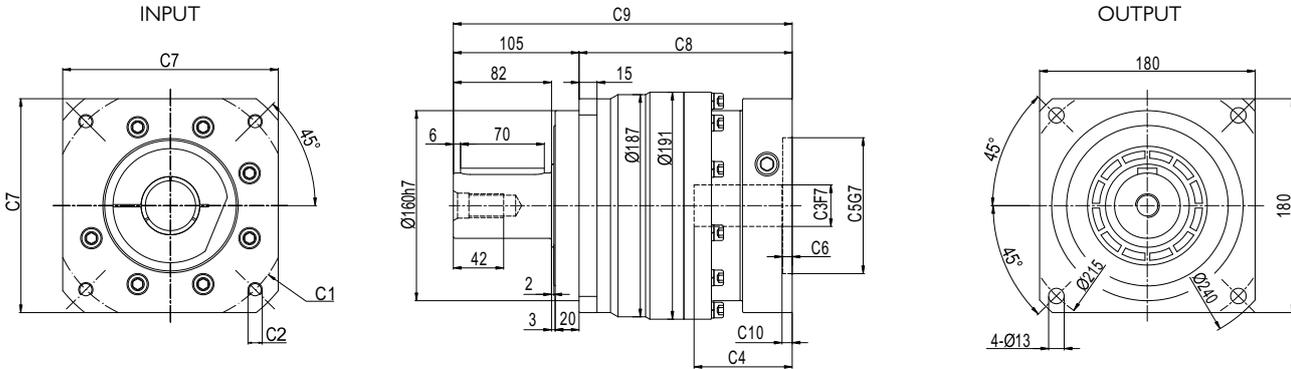
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-155A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	219,5	313,5	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	229,5	323,5	25

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.

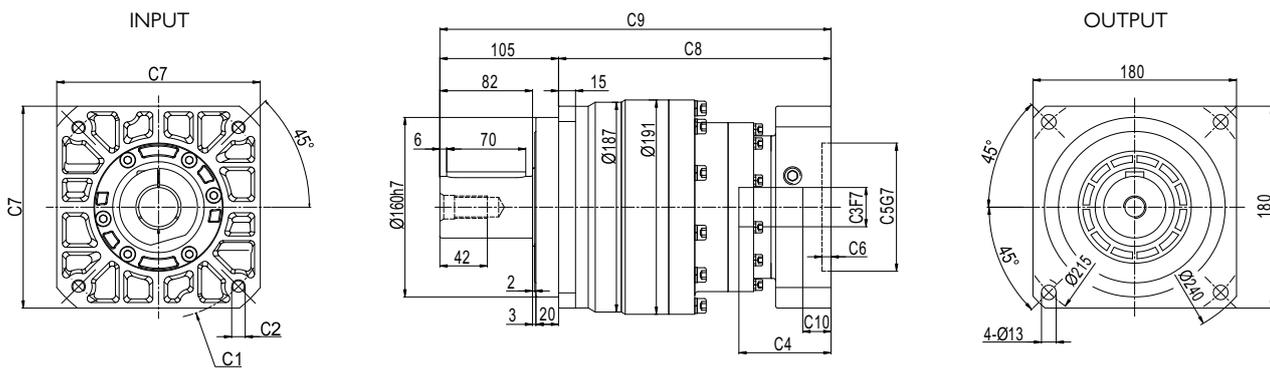
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

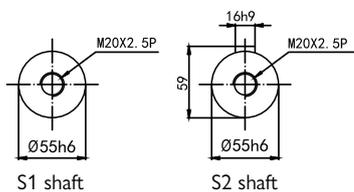
### FB-180-L1



### FB-180-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-180-L1	ø200	4-M12x28	ø35	82	ø114,3	8	180	178	283	8,5
	ø200	4-M12x28	ø42	177,5	ø114,3	8	180	213,5	318,5	45,5
	ø215	4-M12x28	ø38	87	ø180	8	192	183	288	13,5
	ø235	4-M12x28	ø42	117,5	ø200	10	220	213,5	318,5	45,5
FB-180-L2	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	231	336	19,5
	ø200	4-M12x28	ø35	81,5	ø114,3	8	180	241	346	25

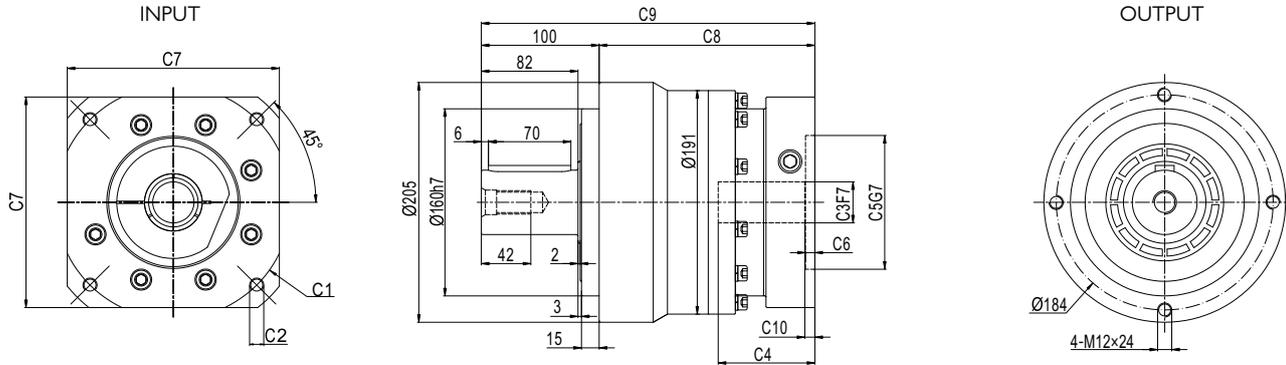
▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.



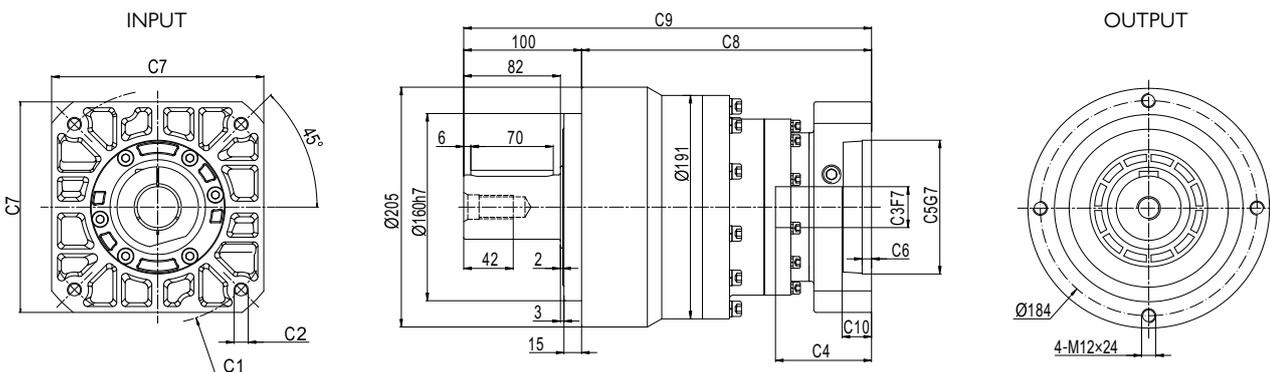
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

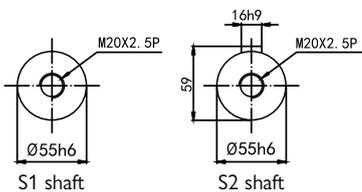
### FE-205-L1



### FE-205-L2



## OUTPUT DIAMETER



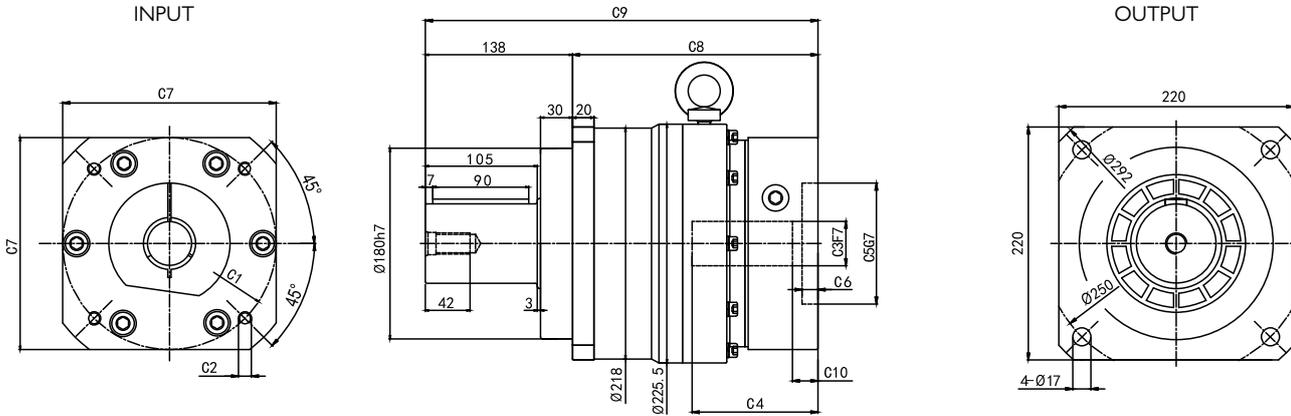
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-205-L1	ø200	4-M12x28	ø35	82	ø114,3	8	180	183	283	8,5
	ø200	4-M12x28	ø42	117,5	ø114,3	8	180	218,5	318,5	45,5
	ø215	4-M12x28	ø38	87	ø180	8	192	188	288	13,5
	ø235	4-M12x28	ø42	117,5	ø200	10	220	218,5	318,5	45,5
FE-205-L2	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	236	336	19,5
	ø200	4-M12x28	ø35	81,5	ø114,3	8	180	246	346	25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

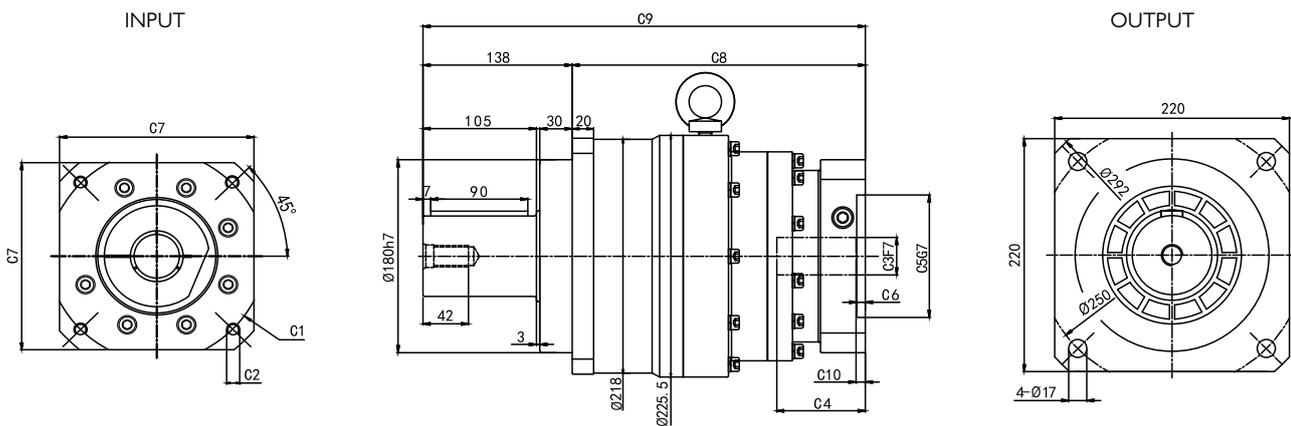
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

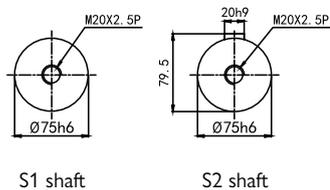
### FB-220-L1



### FB-220-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FB-220-L1	Ø200	4-M12x28	Ø35, Ø42	118	Ø114,3	15	200	230	368	24
	Ø215	4-M12x30	Ø38	108	Ø180	8	200	220	358	11,5
	Ø235	4-M12x30	Ø42, Ø55	118	Ø200	10	220	230	368	24
FB-220-L2	Ø200	4-M12x28	Ø35	82	Ø114,3	8	180	271,5	409,5	8,5
	Ø200	4-M12x28	Ø42	117,5	Ø114,3	8	180	307	445	45,5
	Ø215	4-M12x28	Ø38	87	Ø180	8	192	276,5	414,5	13,5
	Ø235	4-M12x28	Ø42	117,5	Ø200	10	220	307	445	45,5

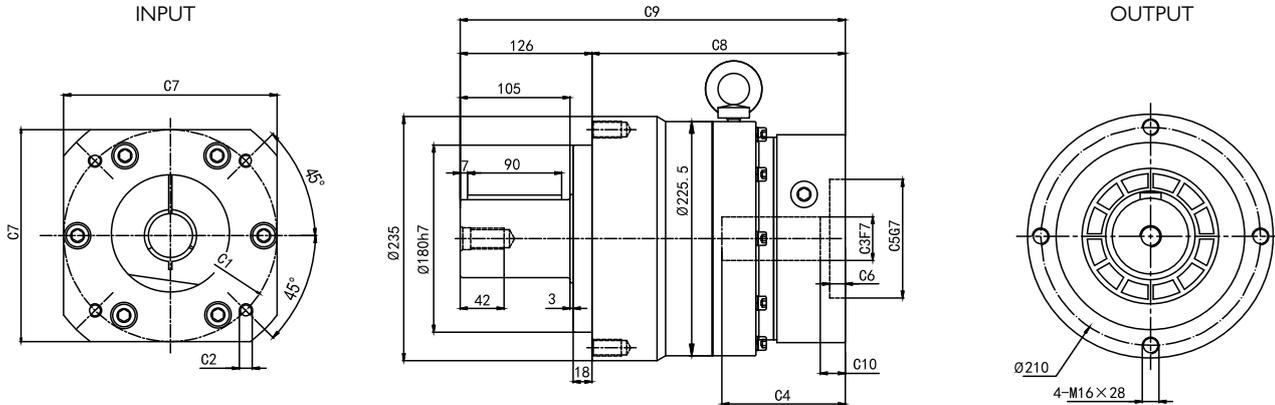
▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.



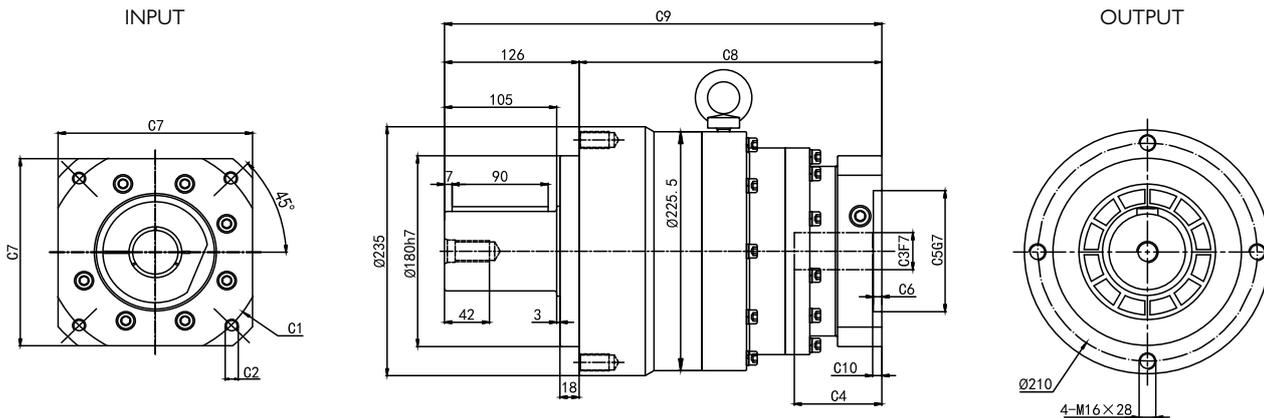
# PRECISION PLANETARY GEARBOX FB/FE SERIES

## PRODUCT DIMENSION

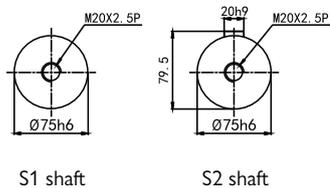
### FE-235-L1



### FE-235-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FE-235-L1	0200	4-M12x28	035, 042	118	0114,3	15	200	242	368	24
	0215	4-M12x30	038	108	0180	8	200	230	358	11,5
	0235	4-M12x30	042, 055	118	0200	10	220	242	368	24
FE-235-L2	0200	4-M12x28	035	82	0114,3	8	180	283,5	409,5	8,5
	0200	4-M12x28	042	117,5	0114,3	8	180	319	445	45,5
	0215	4-M12x28	038	87	0180	8	192	288,5	414,5	13,5
	0235	4-M12x28	042	117,5	0200	10	220	319	445	45,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

**CHIARAVALLI LINEAR CENTER**

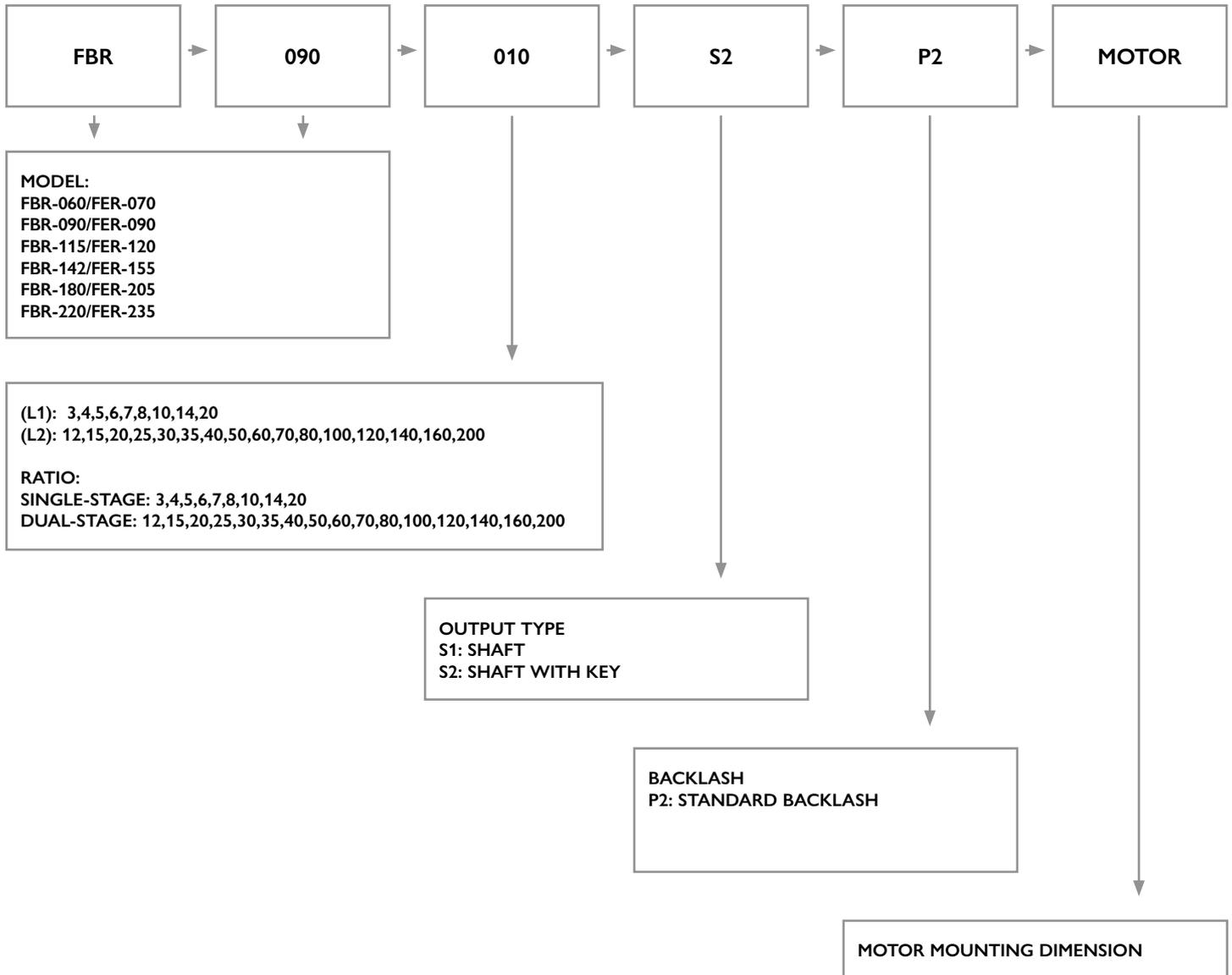
**PRECISION PLANETARY GEARBOX  
FBR/FER SERIES**



# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## MODEL DESCRIPTION

FBR-090-010-S2-P2-19-70-90-M6-45





# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## TECHNICAL SPECIFICATION

MODEL		STAGE	RATIO	FBR060 FER070	FBR090 FER090	FBR090A FER090A	FBR115 FER120	FBR115A FER120A	FBR142 FER155	FBR142A FER155A	FBR180 FER205	FBR220 FER235
Rated output torque	Nm	1	3	55	130	-	208	-	342	-	588	1,140
			4	50	140	-	290	-	542	-	1,050	1,700
			5	60	160	-	330	-	650	-	1,200	2,000
			6	55	150	-	310	-	600	-	1,100	1,900
			7	50	140	-	300	-	550	-	1,100	1,800
			8	50	140	-	290	-	542	-	1,050	1,700
			10	60	160	-	330	-	650	-	1,200	2,000
			14	50	140	-	300	-	550	-	1,100	1,800
		20	40	100	-	230	-	450	-	900	1,500	
		2	12	55	130	130	208	208	342	342	588	1,140
			15	55	130	130	208	208	342	342	588	1,140
			20	50	140	140	290	290	542	542	1,050	1,700
			25	60	160	160	330	330	650	650	1,200	2,000
			30	55	130	130	208	208	342	342	588	1,140
			35	60	160	160	330	330	650	650	1,200	2,000
			40	50	140	140	290	290	542	542	1,050	1,700
			50	60	160	160	330	330	650	650	1,200	2,000
			60	55	150	150	310	310	600	600	1,100	1,900
			70	60	160	160	330	330	650	650	1,200	2,000
			80	50	140	140	290	290	542	542	1,050	1,700
100	60		160	160	330	330	650	650	1,200	2,000		
120	-	150	150	310	310	600	600	1,100	1,900			
140	-	140	140	300	300	550	550	1,100	1,800			
160	-	120	120	260	260	500	500	1,000	1,600			
200	-	100	100	230	230	450	450	900	1,500			
T <sub>2B</sub> /Max. output torque	Nm	1,2	3~200	3 times the rated output torque								
n <sub>1</sub> /Rated input speed	rpm	1,2	3~200	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
n <sub>1B</sub> /Max. input speed	rpm	1,2	3~200	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
P2/Precision backlash	arcmin	1	3~20	≤10	≤10	≤10	≤10	≤10	≤10	≤10	≤10	≤10
		2	12~200	≤12	≤12	≤12	≤12	≤12	≤12	≤12	≤12	≤12
Torsional rigidity	Nm/arcmin	1,2	3~200	7	14	14	25	25	50	50	145	225
F <sub>2rB</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	1,530	3,250	3,250	6,700	6,700	9,400	9,400	14,500	50,000
F <sub>2a1B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	630	1,300	1,300	3,000	3,000	4,000	4,000	6,200	35,000
F <sub>2a2B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	765	1,625	1,625	3,350	3,350	4,700	4,700	7,250	25,000
Life time	hr	1,2	3~200	20,000 <sup>1</sup>								
η/Efficiency	%	1	3~20	≤95%								
		2	12~200	≤92%								
Weight	kg	1	3~20	2.1	6.4	-	13	-	24.5	-	51	83
		2	12~200	2.5	7.8	8.46	14.2	18.2	27.5	34.3	54	95
Operating temperature	°C	1,2	3~200	-10°C ~ +90°C								
lubrication		1,2	3~200	Synthetic lubricating grease								
Ingress protection		1,2	3~200	IP65								
Mount position		1,2	3~200	Any direction								
(n <sub>1</sub> =3000rpm) / Noise level	dB	1,2	3~200	≤63	≤65	≤65	≤68	≤68	≤70	≤70	≤72	≤74

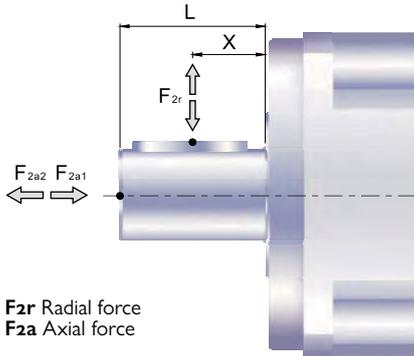
## GEARBOX MOMENT OF INERTIA

MODEL		STAGE	RATIO	FBR060 FER070	FBR090 FER090	FBR090A FER090A	FBR115 FER120	FBR115A FER120A	FBR142 FER155	FBR142A FER155A	FBR180 FER205	FBR220 FER235
Moment of inertia	kg • cm <sup>2</sup>	1	3~7	0.35	2.25	-	6.84	-	23.4	-	68.9	135.4
			8~10	0.07	1.87	-	6.25	-	21.8	-	65.6	119.8
			14~20	0.07	1.87	-	6.25	-	21.8	-	65.6	119.8
		2	12v40	0.35	0.35	2.25	2.25	6.84	6.84	23.4	23.4	68.9
			50	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6
			60	0.07	0.35	2.25	2.25	6.84	6.84	23.4	23.4	68.9
			70~100	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6
			120~200	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.

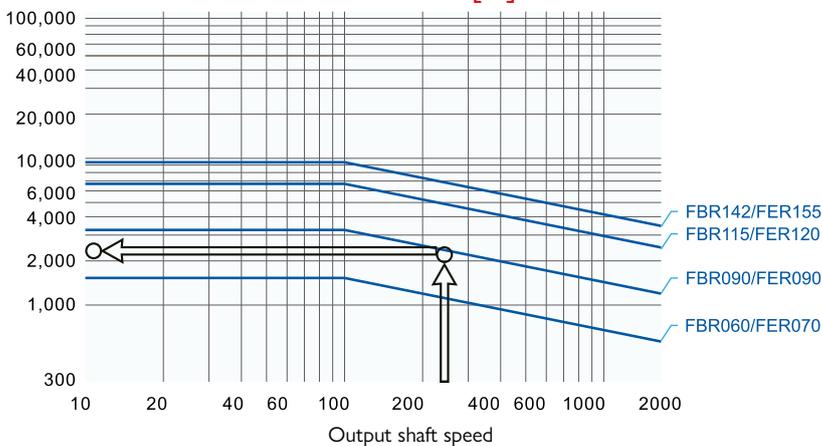
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEAR REDUCER



The maximum radial and axial forces that the output shaft of the gearbox can withstand. Looking at the design of internal support bearings, the reducer adopts large-sized bearings and a design with a larger span, which can withstand greater radial and axial loads.

### PERMISSIBLE RADIAL FORCE $F_{2rB}$ [N] APPLY FORCE TO THE CENTER OF THE SHAFT

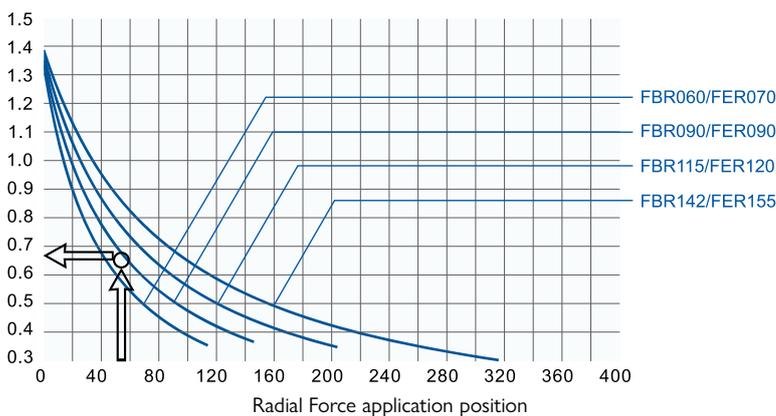


When the radial force  $F_{2r}$  is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force  $F_{2rB}$  that can be withstood by different specifications of reducers with a service life of 20,000hr\* under different output speeds is as follows:

$$F_{2a1B} = 0,2 \times F_{2rB}$$

$$F_{2a2B} = 0,1 \times F_{2rB}$$

### POSITIONAL LOAD COEFFICIENT



When the radial force  $F_{2r}$  is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

Radial force  
 $F'_{2rB} = K_b \times F_{2rB}$

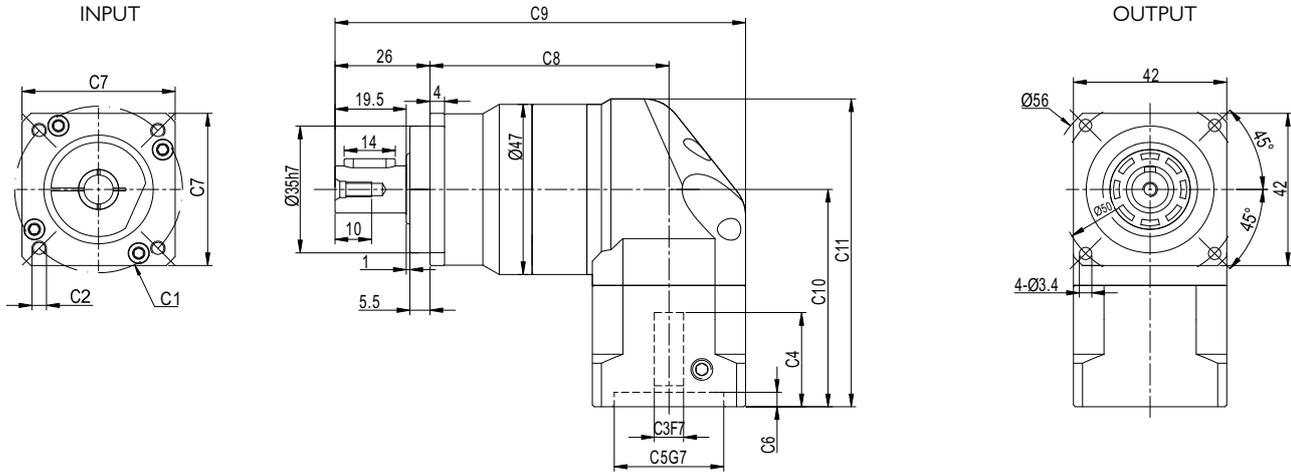
Axial force  
 $F'_{2a1B} = 0,2 \times F'_{2rB}$   
 $F'_{2a2B} = 0,1 \times F'_{2rB}$

\*The lifetime will be shortened by half under continuous operation.

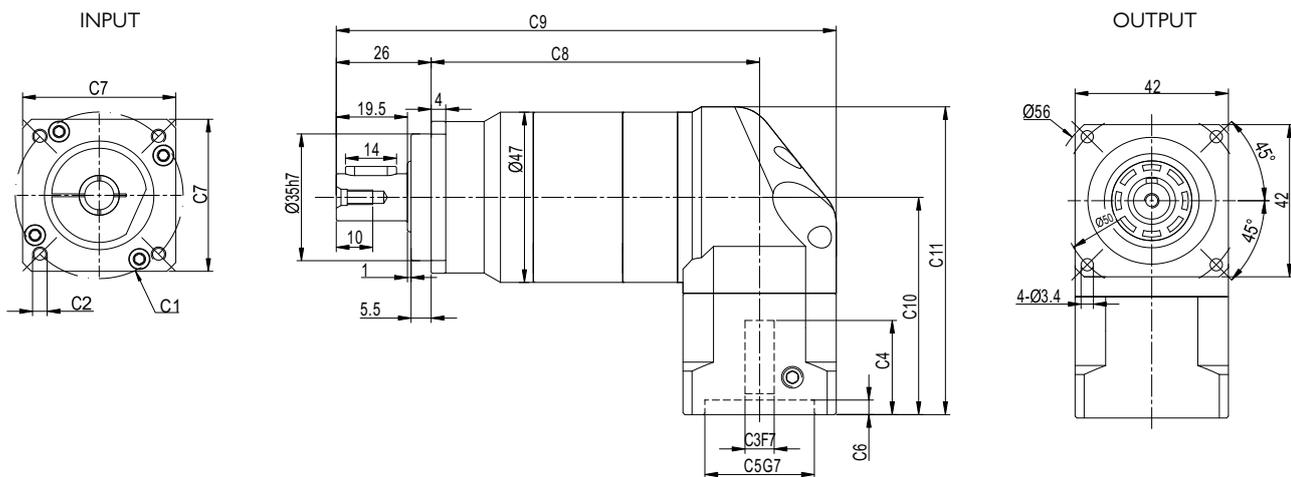
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

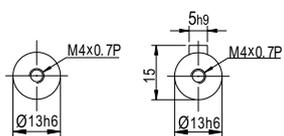
### FBR-042-L1



### FBR-042-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

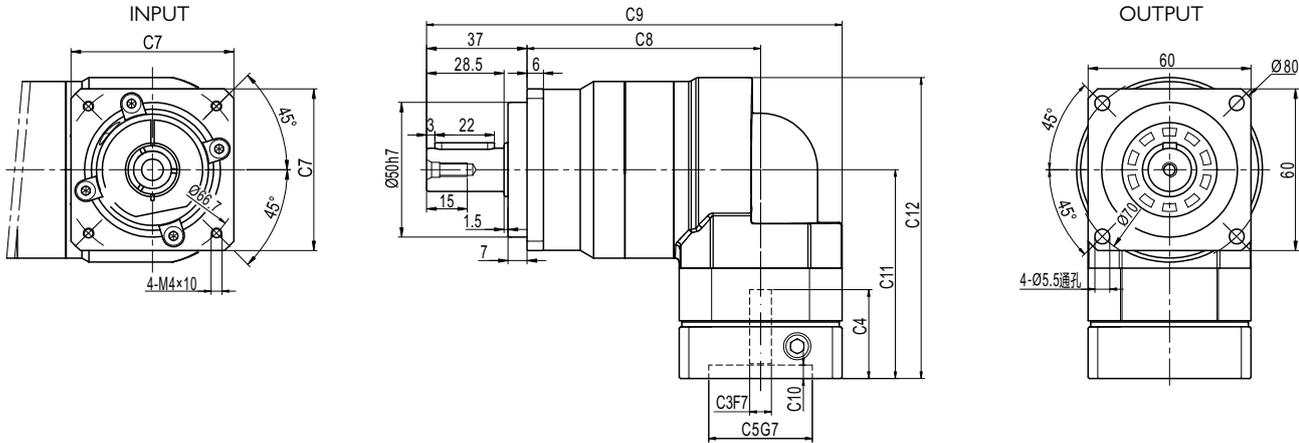
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
FBR-042-L1	ø46	4-M4x10	ø8	26	ø30	4	42	65,5	112,5	60	85
	ø45	4-M3x8									
FBR-042-L2	ø46	4-M4x10	ø8	26	ø30	4	42	90	60	60	85
	ø45	4-M3x8									

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

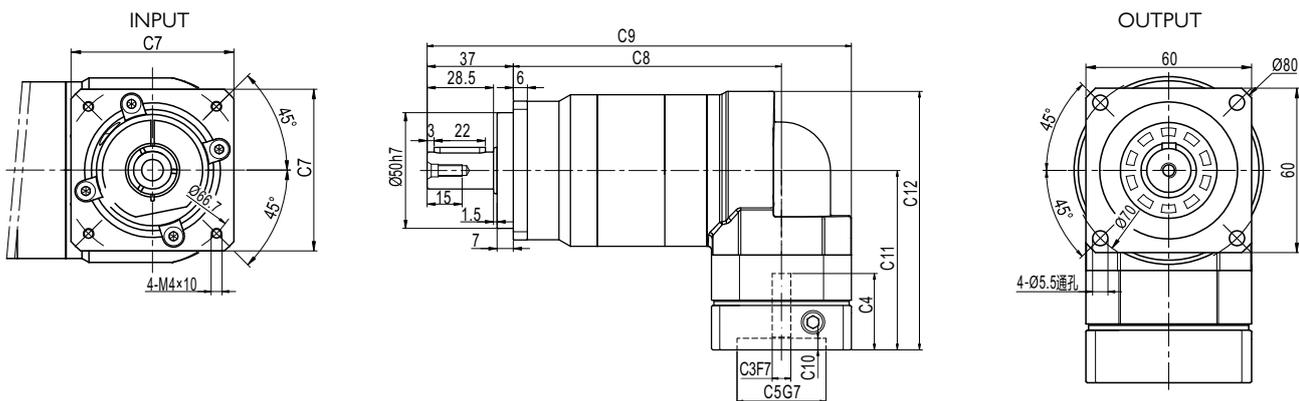
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

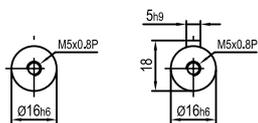
### FBR-060-L1



### FBR-060-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

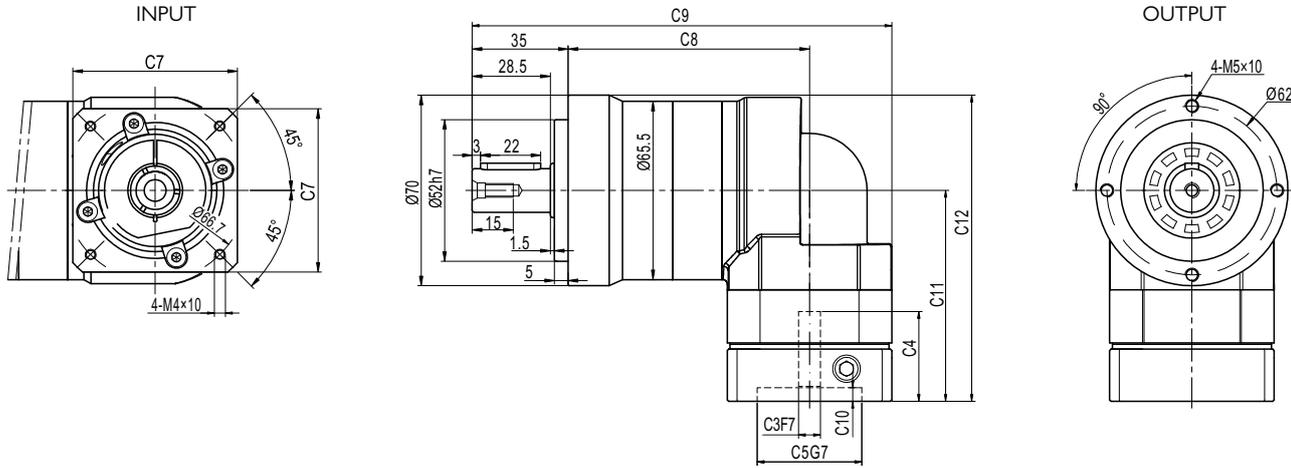
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-060-L1	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	86	153	5,5	77,5	111,75
FBR-060-L2								115	182			
FBR-060-L1	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	86	153	5,5	77,5	111,75
FBR-060-L2								115	182			
FBR-060M1-L1	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	86	163	12	87	121,25
FBR-060M1-L2								115	192			

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

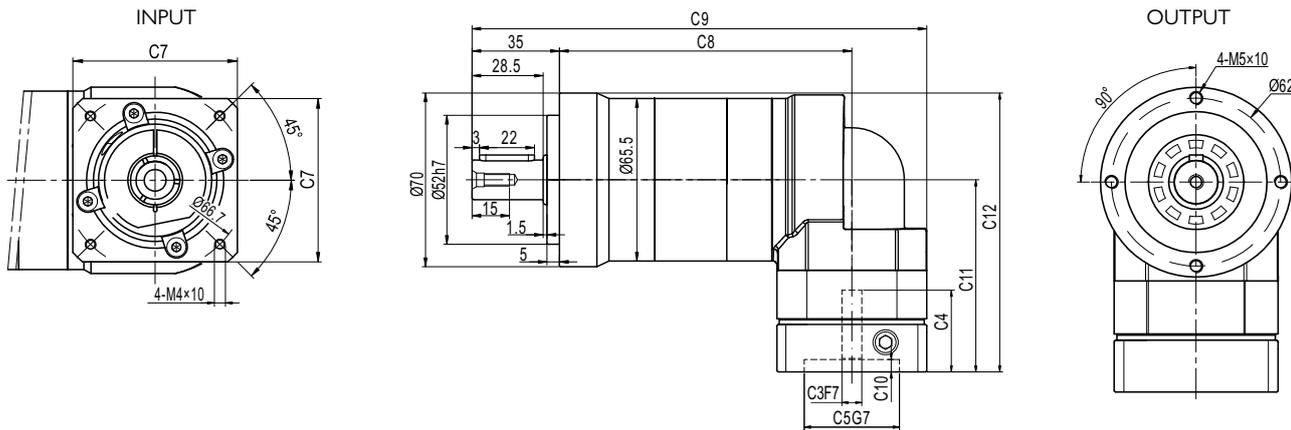
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

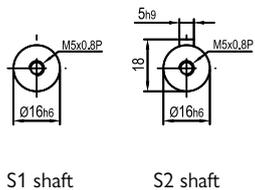
### FER-070-L1



### FER-070-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

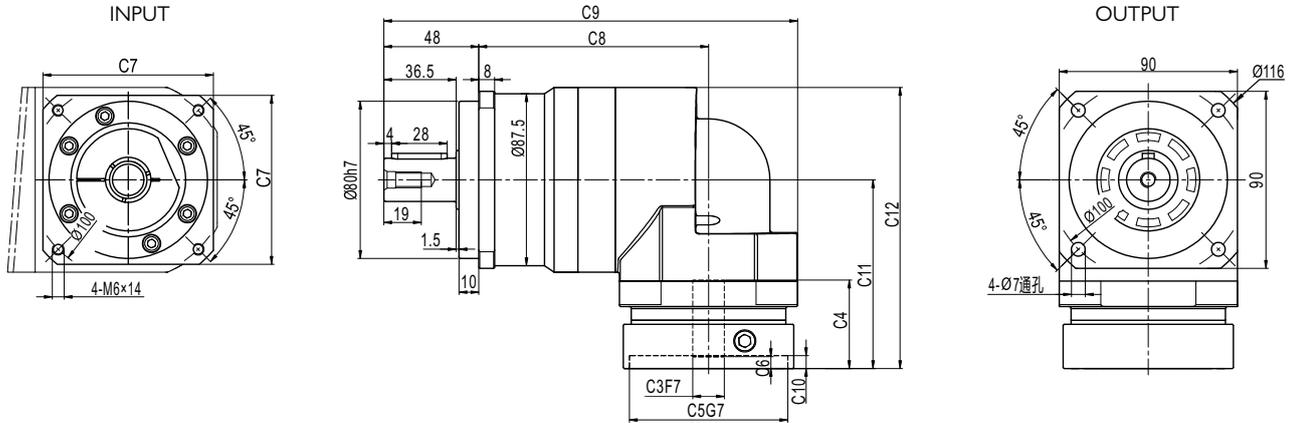
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-070-L1	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	88	153	5,5	77,5	112,5
FER-070-L2								117	182			
FER-070-L1	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	88	153	5,5	77,5	112,5
FER-070-L2								117	182			
FER-070M1-L1	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	88	163	12	87	122
FER-070M1-L2								117	192			

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

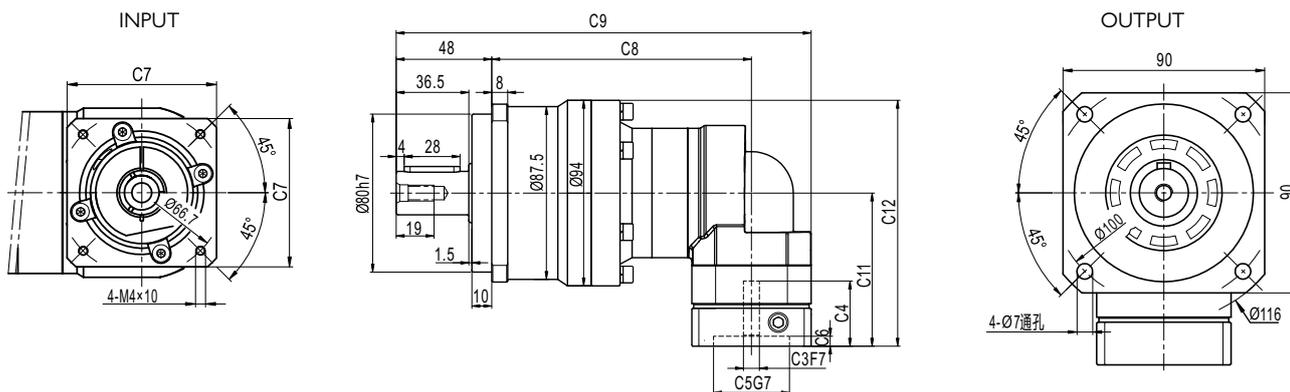
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

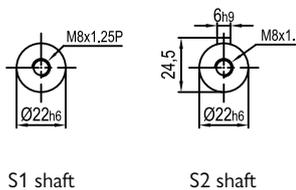
### FBR-090-L1



### FBR-090-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-090-L1	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	116	209	7	96	143
	ø100	4-M6x14	ø16	45	ø80	6,5	86	116	209	6	96	143
FBR-090M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	116	214	16,5	117,5	164,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	116	229	19	120	167
FBR-090-L2	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	130,5	208,5	5,5	77,5	124,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	130,5	208,5	5,5	77,5	124,5
FBR-090M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	130,5	218,5	12	87	134
	ø100	4-M6x14	ø16	42,5	ø80	6,5	86	130,5	221,5	11	87	134

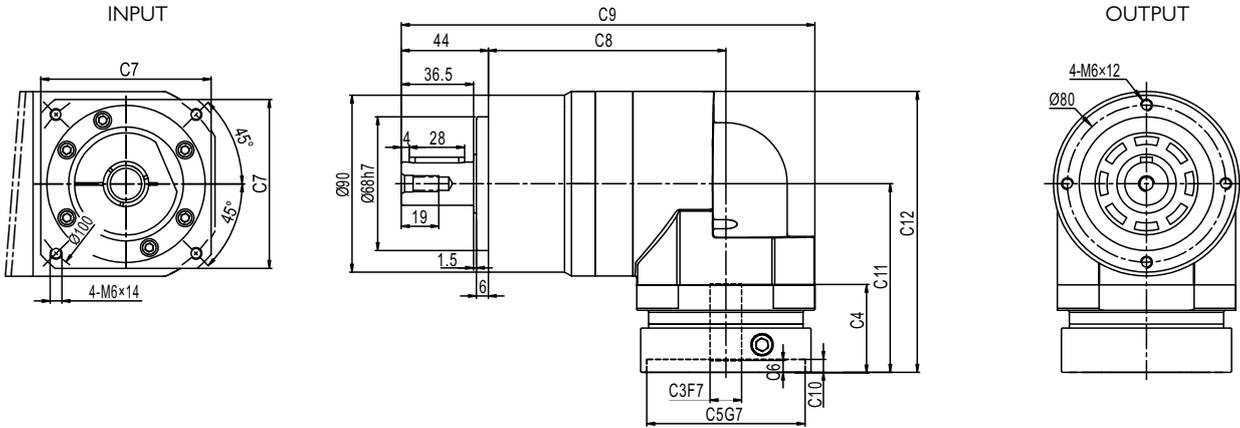
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



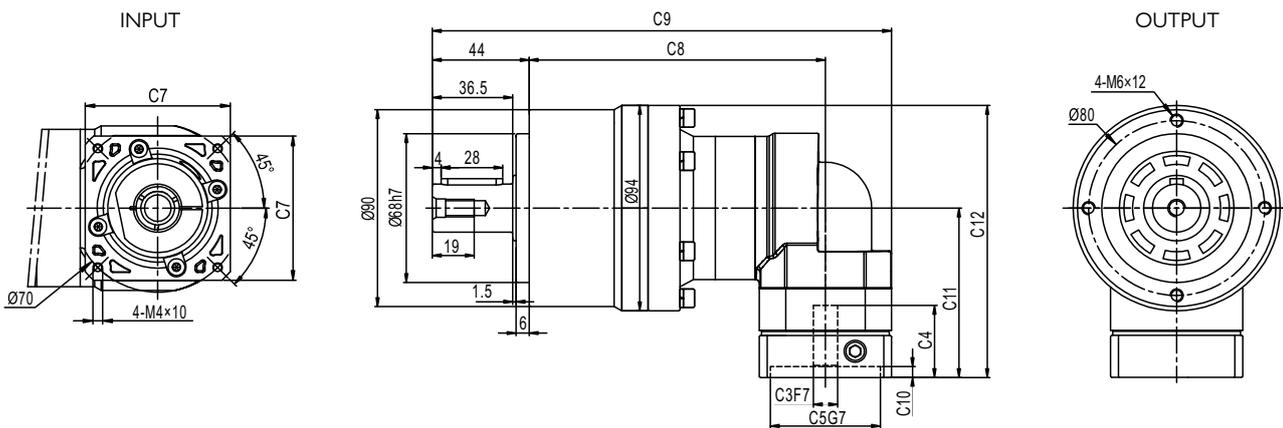
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

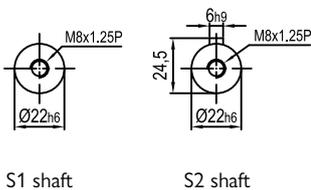
### FER-090-L1



### FER-090-L2



## OUTPUT DIAMETER



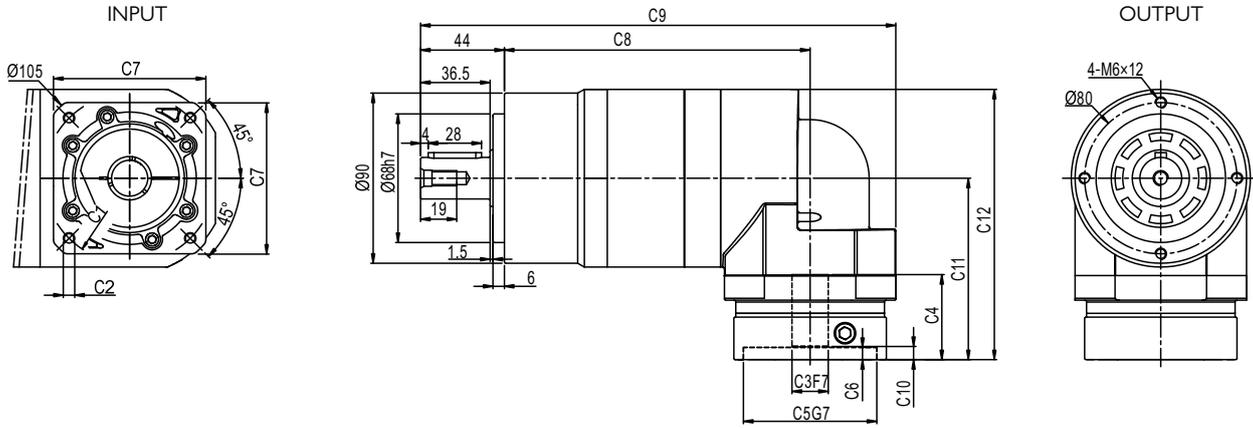
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-090-L1	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	120	209	7	96	143
	ø100	4-M6x14	ø16	45	ø80	6,5	86	120	209	6	96	143
FER-090M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	120	214	16,5	117,5	164,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	120	229	19	120	167
FER-090-L2	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	134,5	208,5	5,5	77,5	124,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	134,5	208,5	5,5	77,5	124,5
FER-090M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	134,5	218,5	12	87	134
	ø100	4-M6x14	ø16	42,5	ø80	6,5	86	134,5	221,5	11	87	134

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

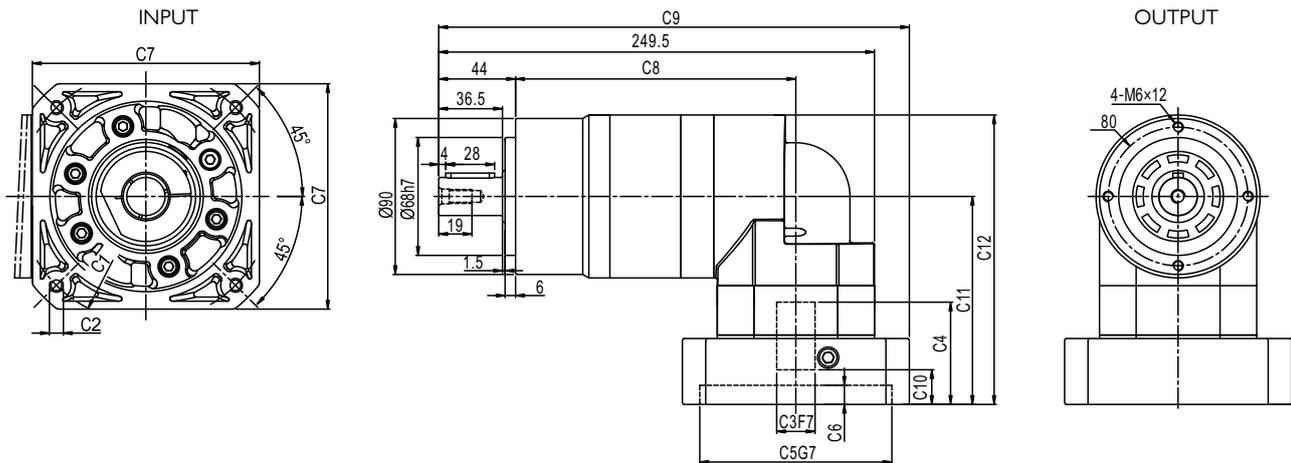
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

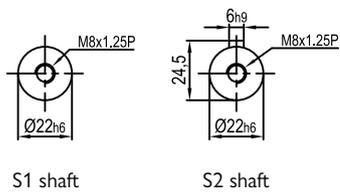
### FER-090A-L2



### FER-090A-L2



## OUTPUT DIAMETER



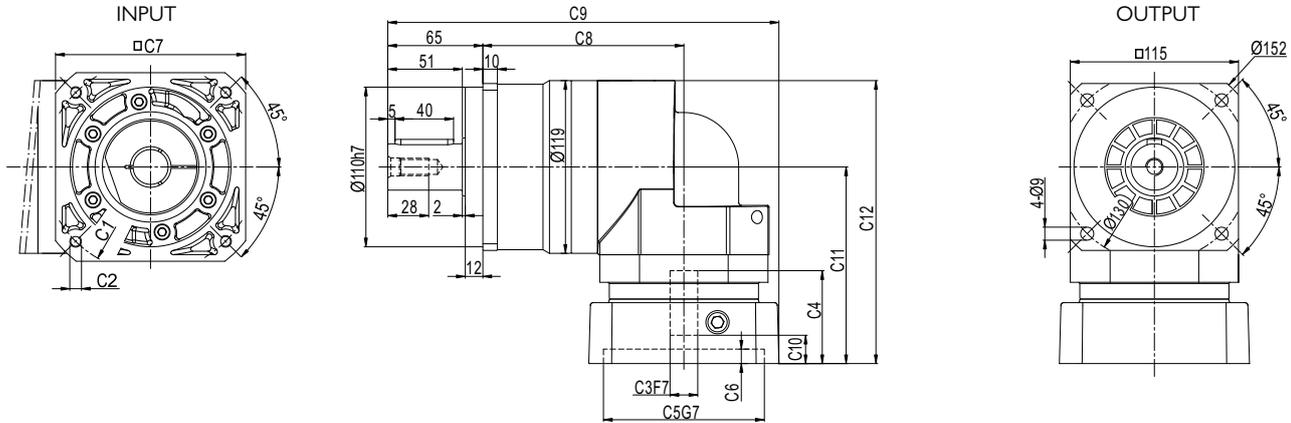
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-090A-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	45	$\varnothing 70$	6,5	80	160,5	249,5	7	96	143
	$\varnothing 100$	4-M6x14	$\varnothing 16$	45	$\varnothing 80$	6,5	86	160,5	249,5	6	96	143
FER-090AM1-L2	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	160,5	254,5	16,5	117,5	164,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	10	130	160,5	269,5	19	120	167

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

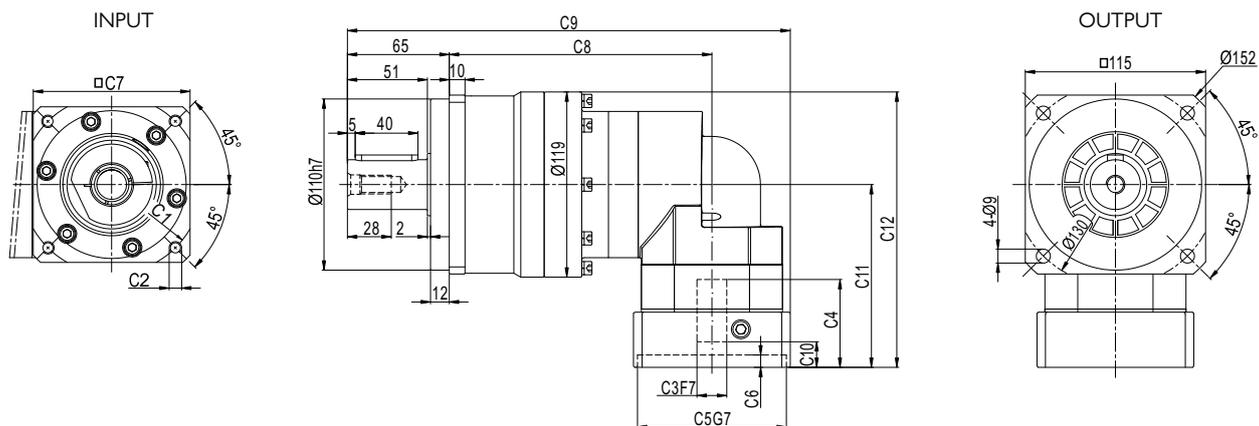
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

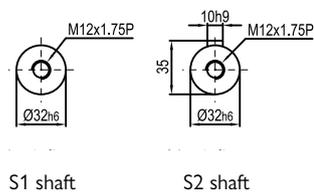
### FBR-115-L1



### FBR-115-L2



## OUTPUT DIAMETER



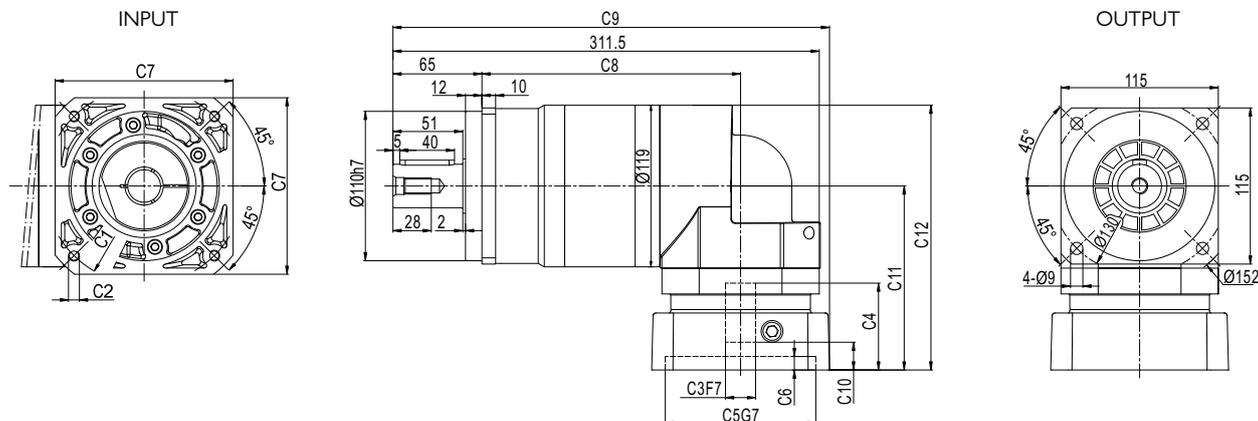
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-115-L1	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	137,5	267,5	19,5	135,5	195
FBR-115M1-L1	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	137,5	292,5	28	152,5	212
FBR-115-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	45	$\varnothing 70$	6,5	80	167,5	277,5	7	96	155,5
	$\varnothing 100$	4-M6x14	$\varnothing 16$	45	$\varnothing 80$	6,5	86	167,5	277,5	6	96	155,5
FBR-115M1-L2	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	167,5	282,5	16,5	117,5	177
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	167,5	297,5	19	120	179,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

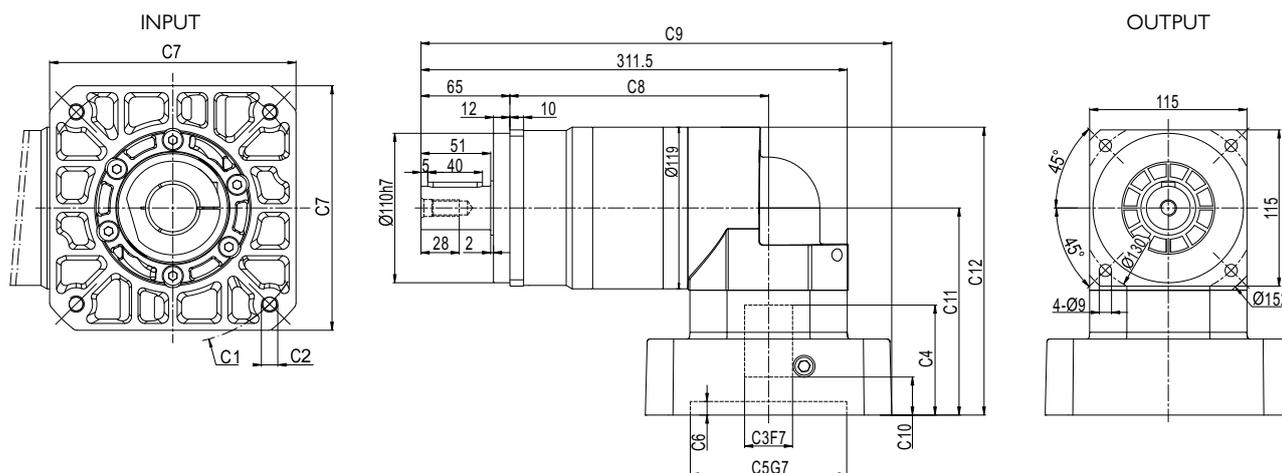
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

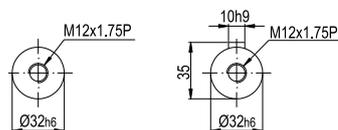
### FBR-115A-L2



### FBR-115A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

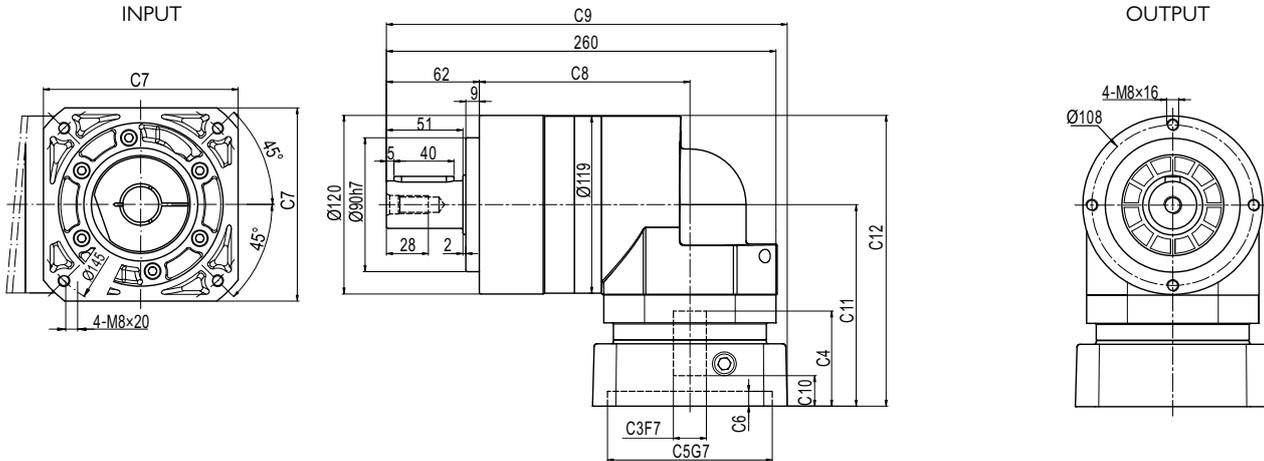
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-115A-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	189	319	19,5	135,5	195,5
FBR-115AM1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	189	344	28	152,5	212,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

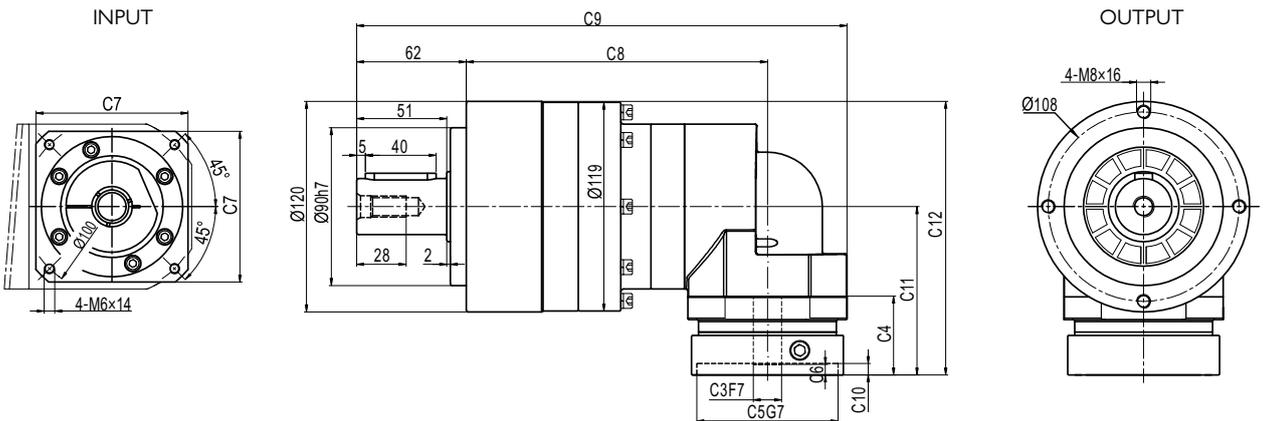
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

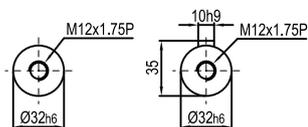
### FER-120-L1



### FER-120-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

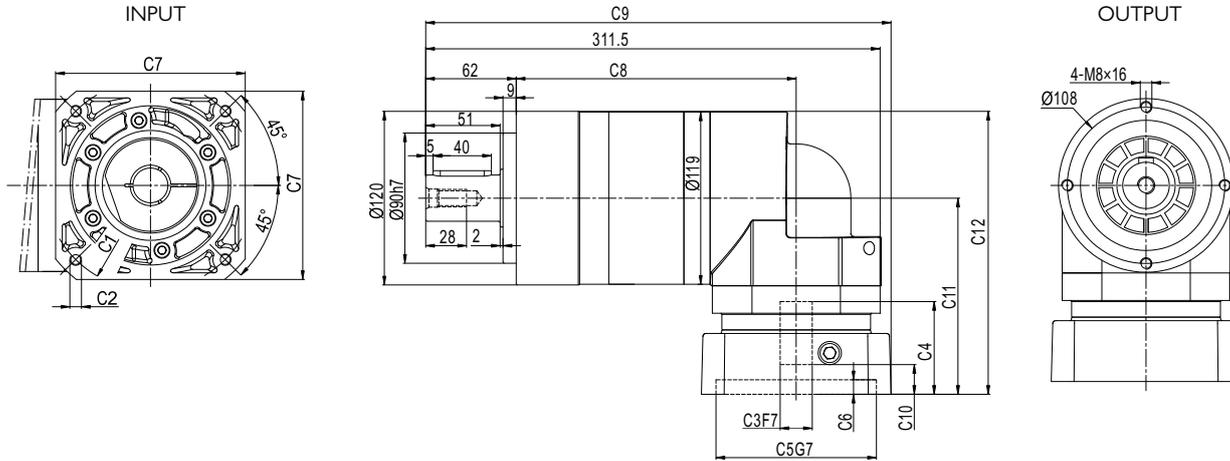
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-120-L1	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	140,5	267,5	19,5	135,5	195,5
FER-120M1-L1	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	140,5	292,5	28	152,5	212,5
FER-120-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	45	$\varnothing 70$	6,5	80	170,5	277,5	7	96	156
	$\varnothing 100$	4-M6x14	$\varnothing 16$	45	$\varnothing 80$	6,5	86	170,5	277,5	6	96	156
FER-120M1-L2	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	170,5	282,5	16,5	117,5	177,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	170,5	297,5	19	120	180

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

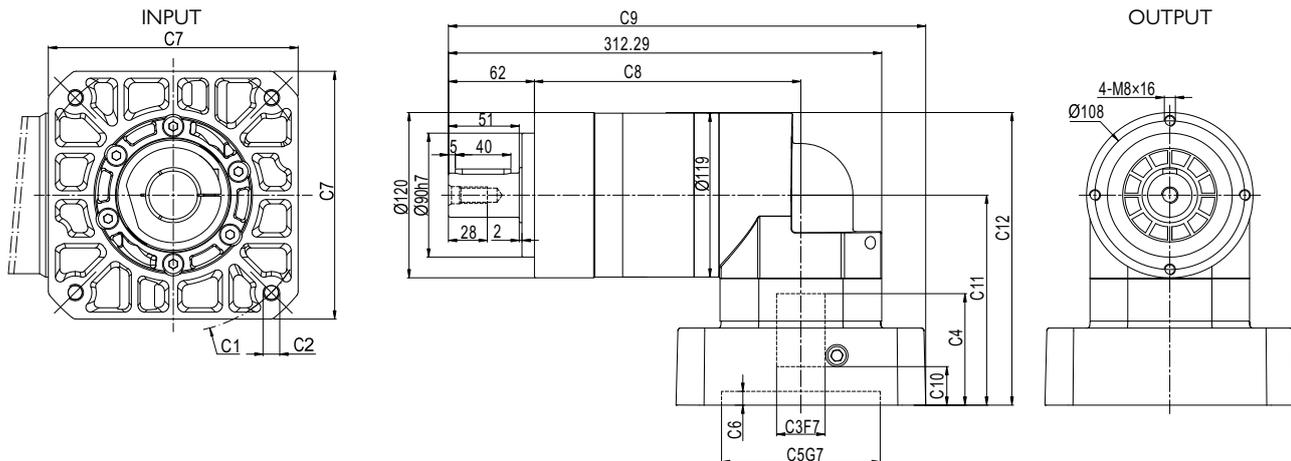
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

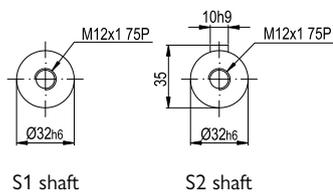
### FER-120A-L2



### FER-120A-L2



## OUTPUT DIAMETER



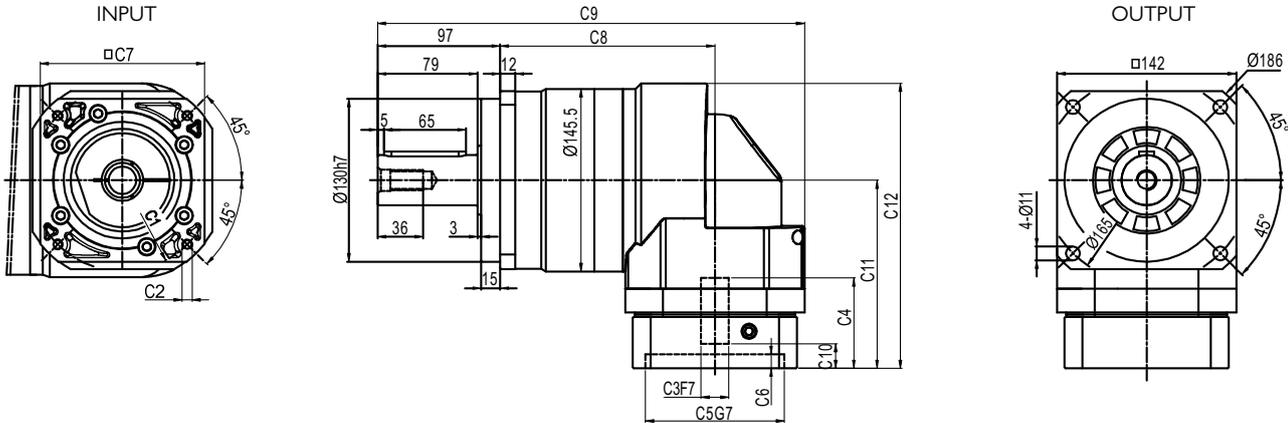
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-120A-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	192	319	19,5	135,5	195,5
FER-120AM1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	192	344	28	152,5	212,5

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

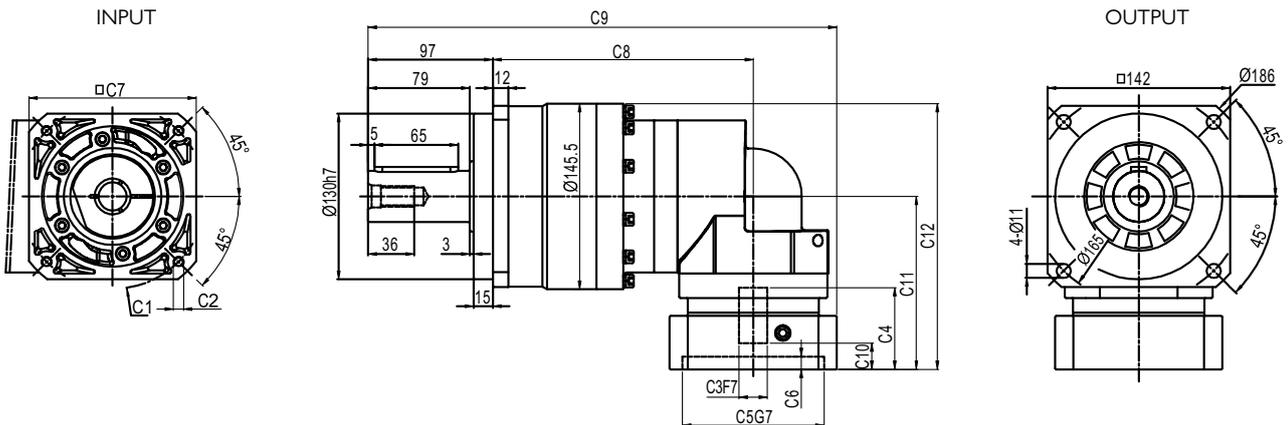
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

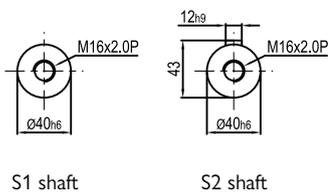
### FBR-142-L1



### FBR-142-L2



## OUTPUT DIAMETER



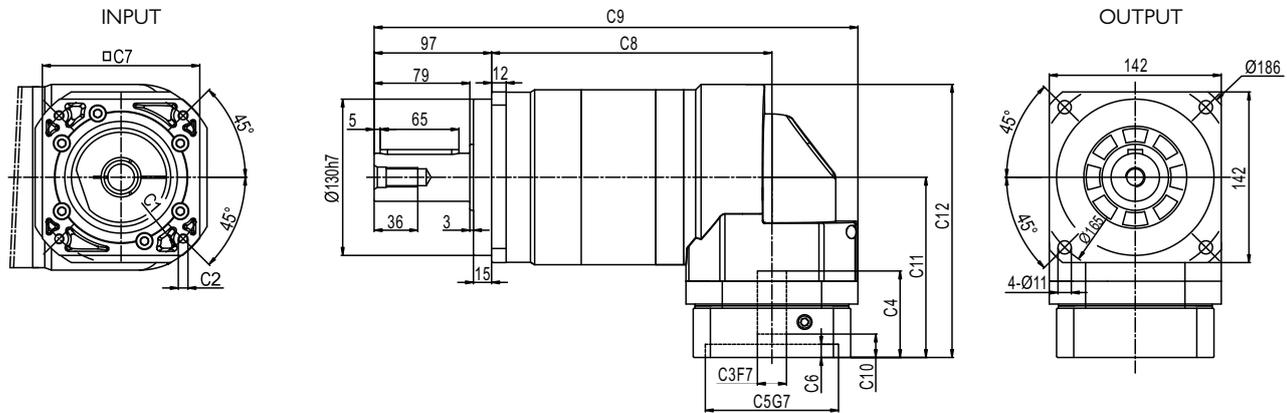
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-142-L1	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	170	338	19,5	150	227,25
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	170	357	25	160	237,25
FBR-142-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	202,5	364,5	19,5	135,5	210,75
FBR-142M1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	202,5	389,5	28	152,5	227,75

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

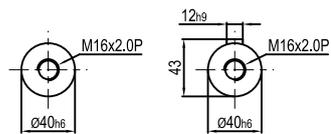
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

### FBR-142A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

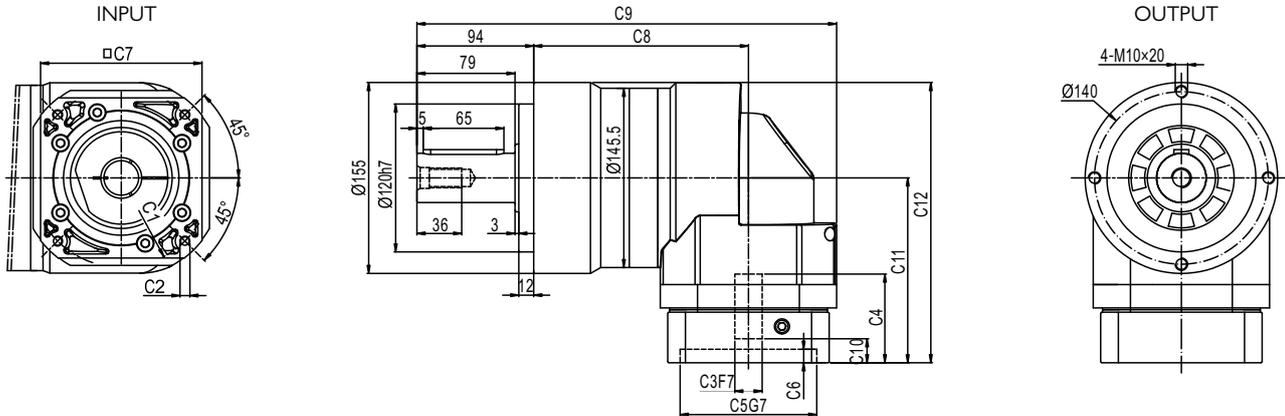
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-142A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	231,5	399,5	19,5	150	227,25
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	231,5	418,5	25	160	237,25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

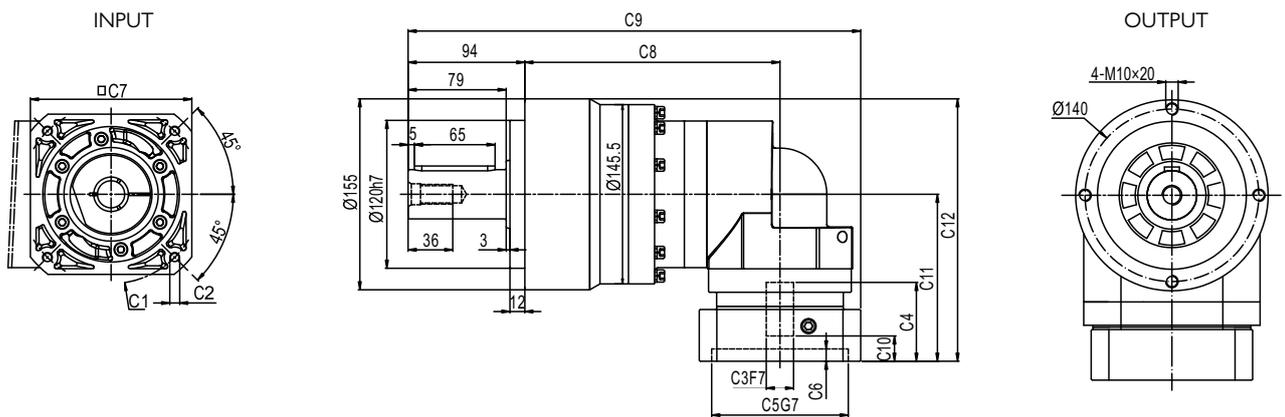
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

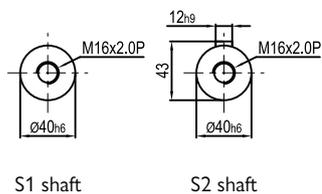
### FER-155-L1



### FER-155-L2



## OUTPUT DIAMETER



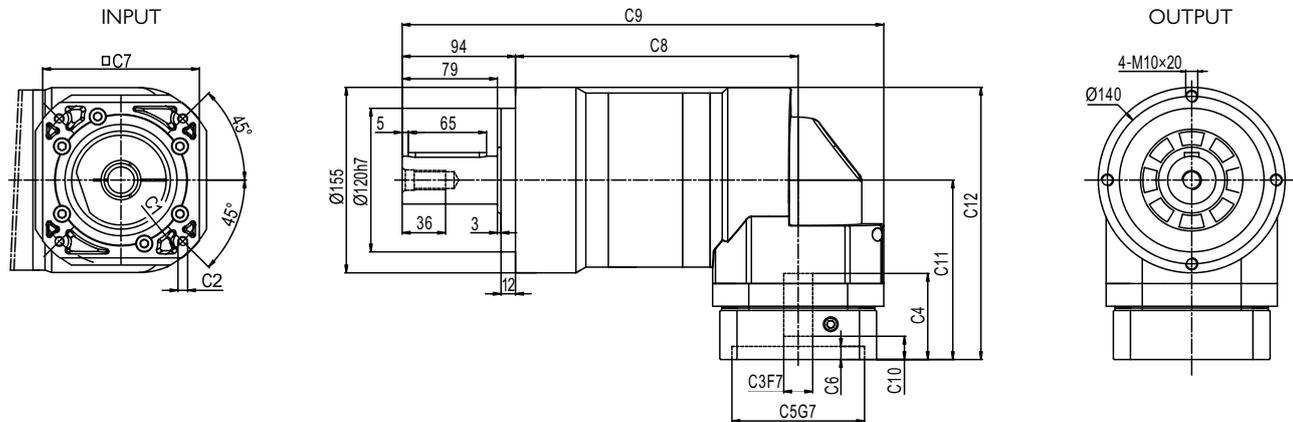
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-155-L1	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	173	338	19,5	150	227,5
	ø200	4-M12x28	ø35	82	ø114,3	8	180	173	357	25	160	237,5
FER-155-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	205,5	364,5	19,5	135,5	213
FER-155M1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	205,5	389,5	28	152,5	230

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

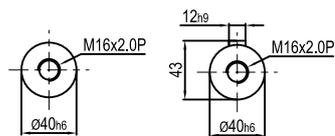
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

### FER-155A-L2



## OUTPUT DIAMETER



S1 shaft

S2 shaft

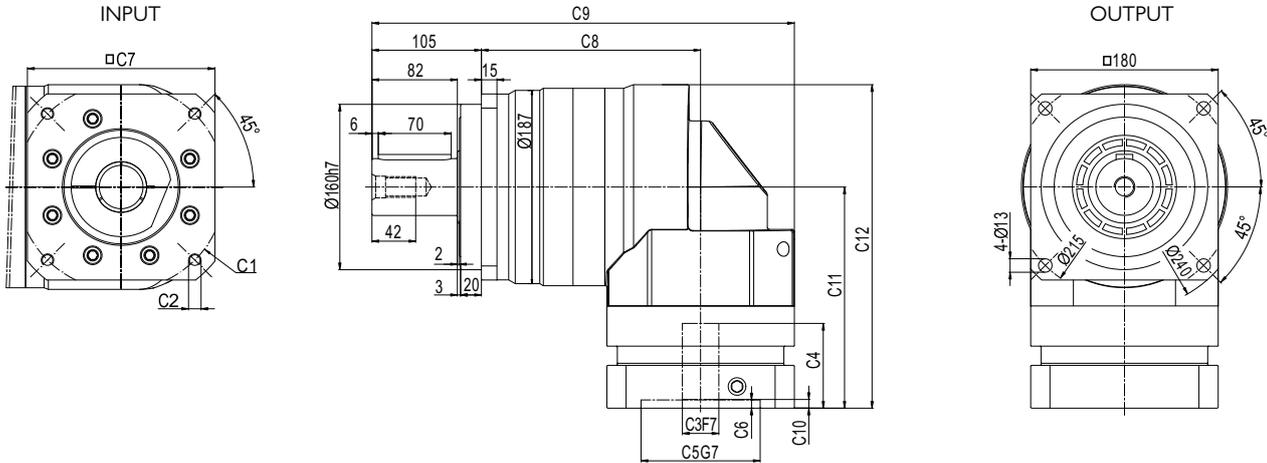
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-155A-L1	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	234,5	399,5	19,5	150	227,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	234,5	418,5	25	160	237,5

▪ C1-C7 are motor (metric standard) specific dimensions, which could be customized.

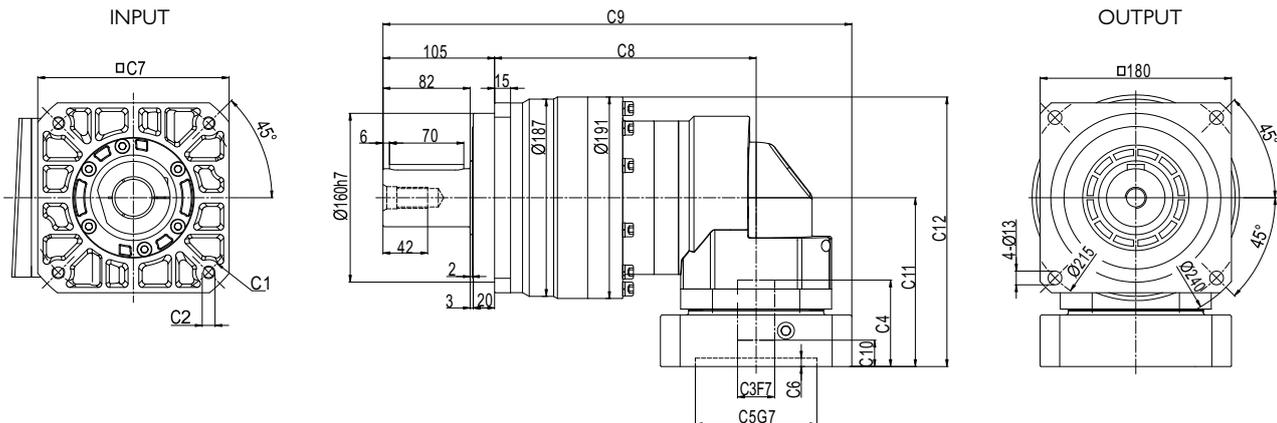
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

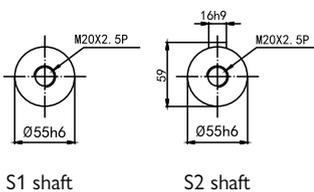
### FBR-180-L1



### FBR-180-L2



## OUTPUT DIAMETER



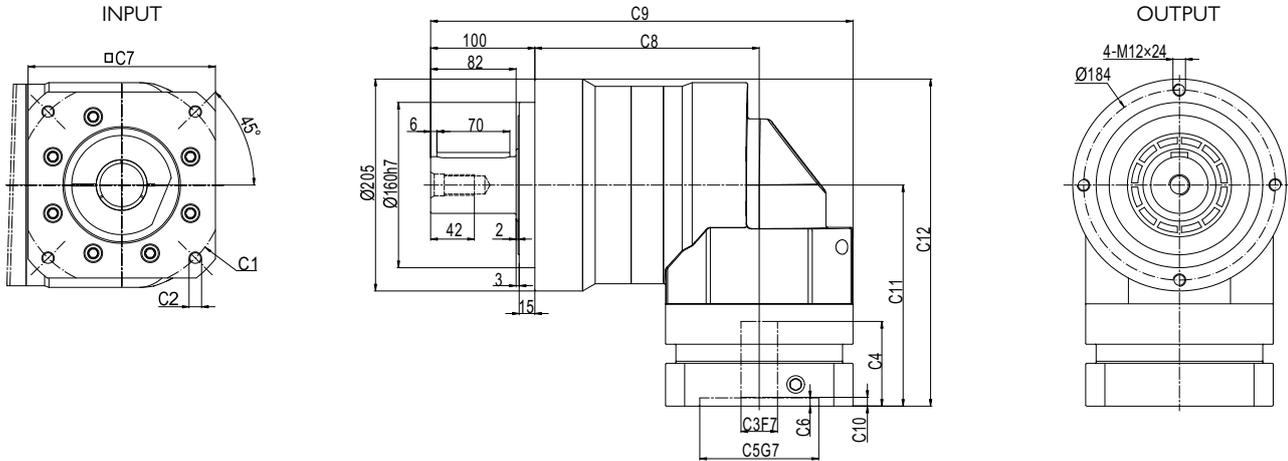
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-180-L1	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	210,5	405,5	8,5	214	313
	$\varnothing 200$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 114,3$	8	180	210,5	405,5	45,5	249,5	348,5
	$\varnothing 215$	4-M12x28	$\varnothing 38$	87	$\varnothing 180$	8	192	210,5	411,5	13,5	219	318
	$\varnothing 235$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 200$	10	220	213,5	318,5	45,5	249,5	348,5
FBR-180-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	246	422	19,5	150	247,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	246	441	25	160	257,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

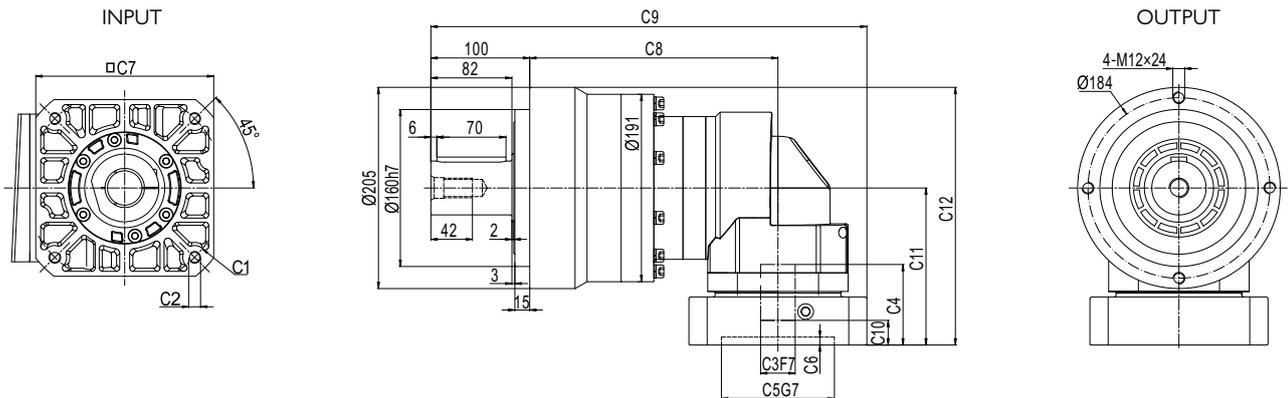
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

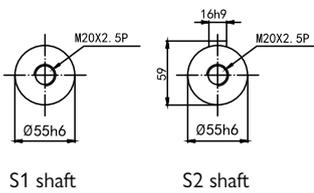
### FER-205-L1



### FER-205-L2



## OUTPUT DIAMETER



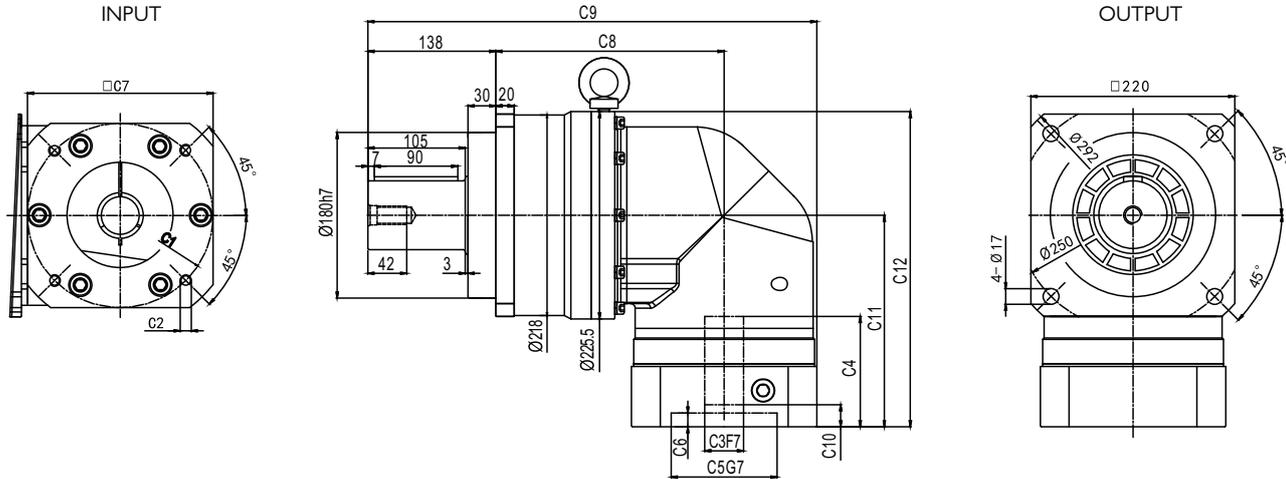
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-205-L1	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	215,5	405,5	8,5	214	318
	$\varnothing 200$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 114,3$	8	180	215,5	405,5	45,5	249,5	353,5
	$\varnothing 215$	4-M12x28	$\varnothing 38$	87	$\varnothing 180$	8	192	215,5	411,5	13,5	219	323
	$\varnothing 235$	4-M12x28	$\varnothing 42$	117,5	$\varnothing 200$	10	220	218,5	318,5	45,5	249,5	353,5
FER-205-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	251	422	19,5	150	252,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	251	441	25	160	262,5

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

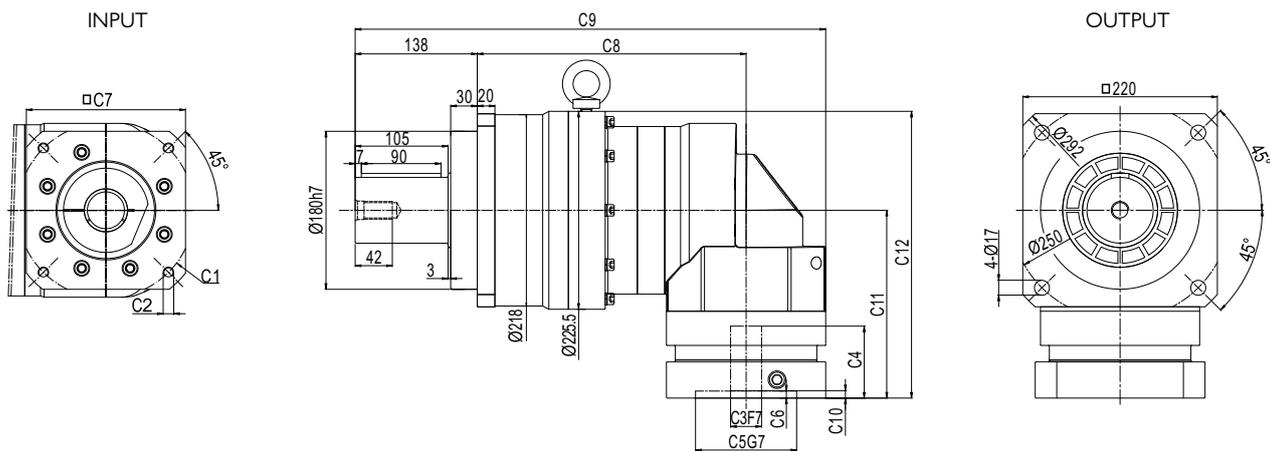
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

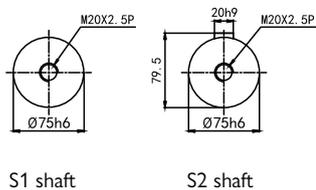
### FBR-220-L1



### FBR-220-L2



## OUTPUT DIAMETER



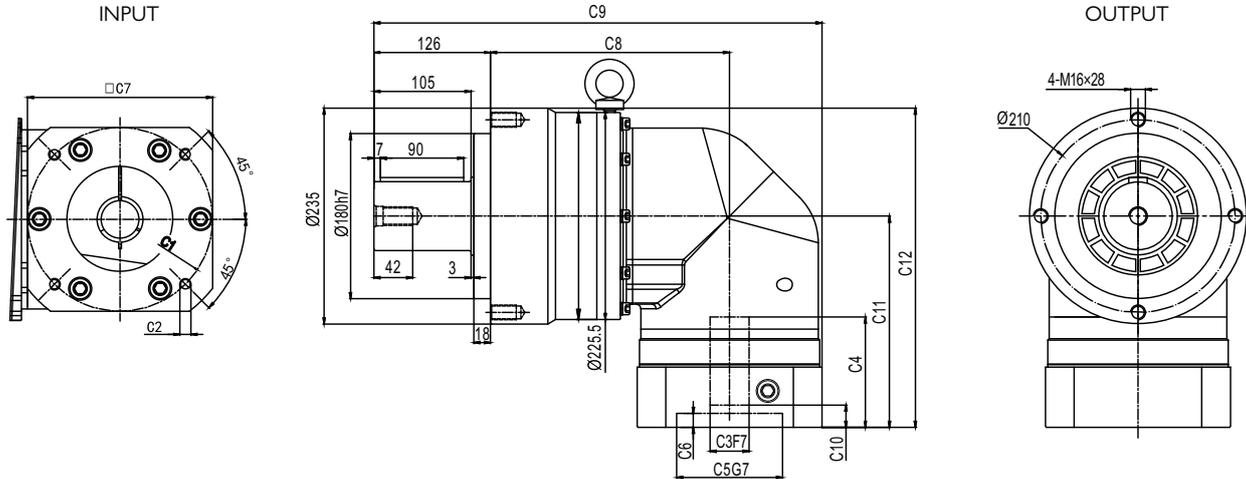
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FBR-220-L1	ø200	4-M12x28	ø35, ø42	120	ø114,3	15	200	246,5	484,5	22,5	230	342,75
	ø215	4-M12x30	ø38	110	ø180	8	200	246,5	484,5	12,5	220	332,75
	ø235	4-M12x30	ø42, ø55	120	ø200	10	220	246,5	494,5	24	230	342,75
FBR-220-L2	ø200	4-M12x28	ø35	82	ø114,3	8	180	304	532	8,5	214	326,75
	ø200	4-M12x28	ø42	117,5	ø114,3	8	180	304	532	45,5	249,5	362,25
	ø215	4-M12x28	ø38	87	ø180	8	192	304	538	13,5	219	331,75
	ø235	4-M12x28	ø42	117,5	ø200	10	220	304	532	45,5	249,5	362,25

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

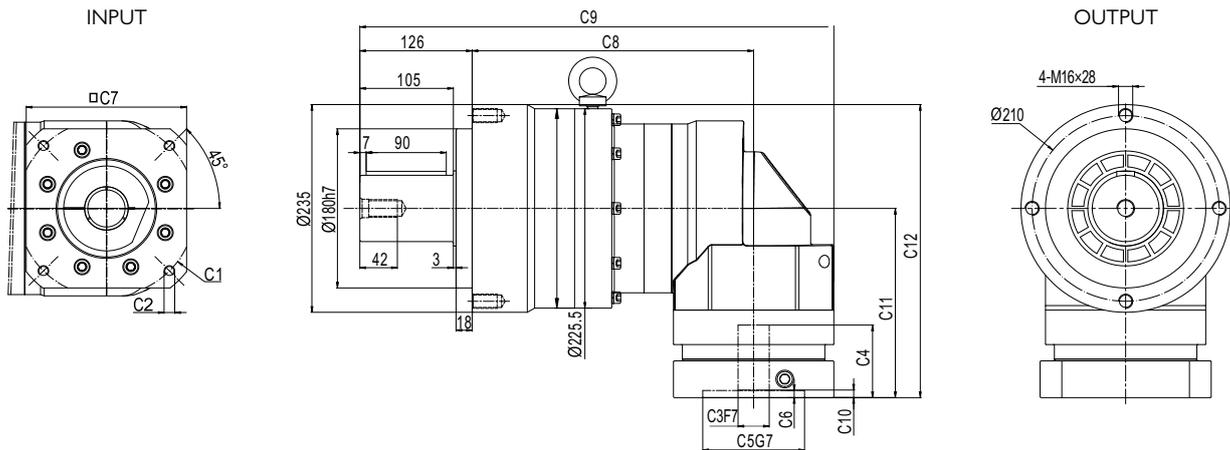
# PRECISION PLANETARY GEARBOX FBR/FER SERIES

## PRODUCT DIMENSION

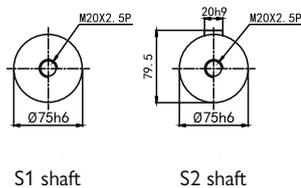
### FER-235-L1



### FER-235-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FER-235-L1	Ø200	4-M12x28	Ø35, Ø42	120	Ø114,3	15	200	258,5	484,5	22,5	230	347,5
	Ø215	4-M12x30	Ø38	110	Ø180	8	200	258,5	484,5	12,5	220	337,5
	Ø235	4-M12x30	Ø42, Ø55	120	Ø200	10	220	258,5	494,5	24	230	347,5
FER-235-L2	Ø200	4-M12x28	Ø35	82	Ø114,3	8	180	316	532	8,5	214	331,5
	Ø200	4-M12x28	Ø42	117,5	Ø114,3	8	180	316	532	45,5	249,5	367
	Ø215	4-M12x28	Ø38	87	Ø180	8	192	316	538	13,5	219	336,5
	Ø235	4-M12x28	Ø42	117,5	Ø200	10	220	316	552	45,5	249,5	367

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.



**CHIARAVALLI LINEAR CENTER**

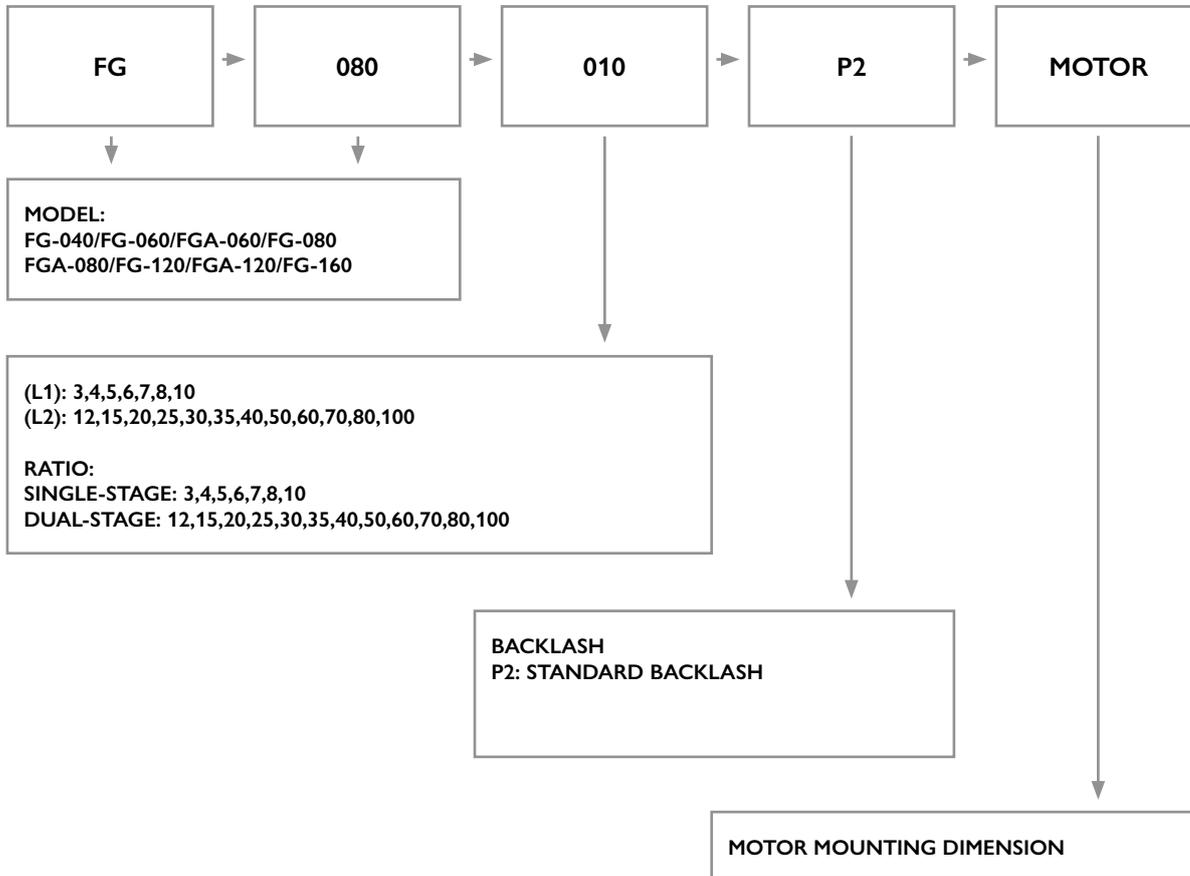
**PRECISION PLANETARY GEARBOX  
FG/FGA SERIES**



# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## MODEL DESCRIPTION

FG-080-010-P2-19-70-90-M6-42





# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## TECHNICAL SPECIFICATION

MODEL		STA-GE	RATIO	FG040 FGA040	FG060 FGA060	FG080 FGA080	FG080A FGA080A	FG120 FGA120	FG120A FGA120A	FG160 FGA160	FG160A FGA160A
Rated output torque	Nm	1	3	20	55	130	-	208	-	342	-
			4	19	50	140	-	290	-	542	-
			5	22	60	160	-	330	-	650	-
			6	20	55	150	-	310	-	600	-
			7	19	50	140	-	300	-	550	-
			8	17	45	120	-	260	-	500	-
		10	14	40	100	-	230	-	450	-	
		2	12	20	55	130	130	208	208	342	342
			15	20	55	130	130	208	208	342	342
			20	19	50	140	140	290	290	542	542
			25	22	60	160	160	330	330	650	650
			30	22	55	130	130	208	208	342	342
			35	22	60	160	160	330	330	650	650
			40	22	50	140	140	290	290	542	542
			50	22	60	160	160	330	330	650	650
			60	20	55	150	150	310	310	600	600
			70	19	50	140	140	300	300	550	550
			80	17	45	120	120	260	260	500	500
100	14		40	100	100	230	230	450	450		
T <sub>2B</sub> /Max. output torque	Nm	1,2	3~100	3 times the rated output torque							
n <sub>1</sub> /Rated input speed	rpm	1,2	3~100	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000
n <sub>1B</sub> /Max. input speed	rpm	1,2	3~100	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000
P2/Precision backlash	arcmin	1	3~10	≤8	≤8	≤8	≤8	≤8	≤8	≤8	≤8
		2	12~100	≤10	≤10	≤10	≤10	≤10	≤10	≤10	≤10
Torsional rigidity	Nm/arcmin	2	3~100	3	7	14	14	25	25	50	50
F <sub>21B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	780	1,530	3,250	3,250	6,700	6,700	9,400	9,400
F <sub>21B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	350	630	1,300	1,300	3,000	3,000	4,000	4,000
F <sub>22B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~100	390	765	1,625	1,625	3,350	3,350	4,700	4,700
Life time	hr	1,2	3~100	20,000 <sup>1</sup>							
η/Efficiency	%	1	03~10	≥97%							
		2	12~100	≥94%							
Weight	kg	1	3~10	0.5	1.3	3.7	-	7.8	-	14.5	-
		2	12~100	0.8	1.9	4.1	4.76	9	10.92	17.5	20.3
Operating temperature	°C	1,2	3~100	-10°C ~ +90°C							
lubrication		1,2	3~100	Synthetic lubricating grease							
Ingress protection		1,2	3~100	IP65							
Mount position		1,2	3~100	Any Direction							
(n <sub>1</sub> =3000rpm)/Noise level	dB	1,2	3~100	≤56	≤58	≤60	≤60	≤63	≤63	≤65	≤65

## GEARBOX MOMENT OF INERTIA

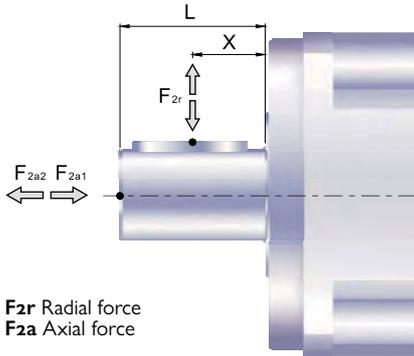
MODEL		STAGE	RATIO	FG040 FGR040	FG060 FGR060	FG080 FGR080	FG080A FGR080A	FG120 FGR120	FG120A FGR120A	FG160 FGR160	FG160A FGR160A
Moment of inertia	kg · cm <sup>2</sup>	1	3	0.03	0.16	0.61	-	3.25	-	9.21	-
			4	0.03	0.14	0.48	-	2.74	-	7.54	-
			5	0.03	0.13	0.47	-	2.71	-	7.42	-
			6	0.03	0.13	0.45	-	2.65	-	7.25	-
			7	0.03	0.13	0.45	-	2.62	-	7.14	-
			8	0.03	0.13	0.44	-	2.58	-	7.07	-
		10	0.03	0.13	0.44	-	2.57	-	7.03	-	
		2	12	0.03	0.03	0.03	0.47	0.47	2.71	2.71	7.42
			15	0.03	0.03	0.03	0.47	0.47	2.71	2.71	7.42
			20	0.03	0.03	0.03	0.47	0.47	2.71	2.71	7.42
			25	0.03	0.03	0.03	0.47	0.47	2.71	2.71	7.42
			30	0.03	0.03	0.03	0.47	0.47	2.71	2.71	7.42
			35	0.03	0.03	0.03	0.47	0.47	2.71	2.71	7.42
			40	0.03	0.03	0.03	0.47	0.47	2.71	2.71	7.42
			50	0.03	0.03	0.03	0.44	0.44	2.57	2.57	7.03
			60	0.03	0.03	0.03	0.44	0.44	2.57	2.57	7.03
			70	0.03	0.03	0.03	0.44	0.44	2.57	2.57	7.03
			80	0.03	0.03	0.03	0.44	0.44	2.57	2.57	7.03
100	0.03		0.03	0.03	0.44	0.44	2.57	2.57	7.03		

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.



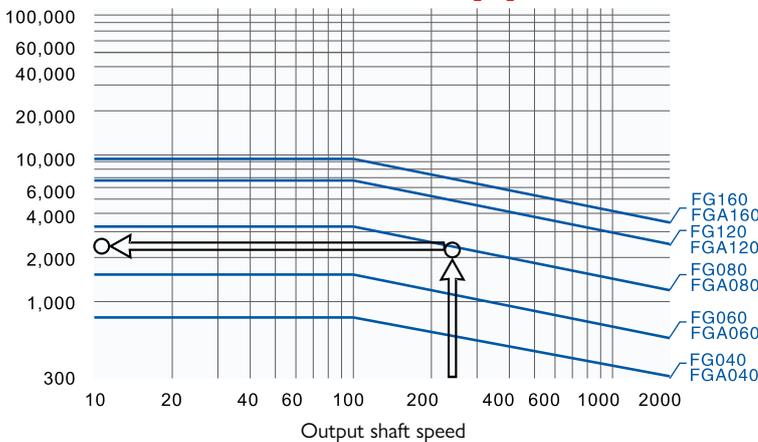
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEAR REDUCER



The maximum radial and axial forces that the output shaft of the gearbox can withstand. Looking at the design of internal support bearings, the reducer adopts large-sized bearings and a design with a larger span, which can withstand greater radial and axial loads.

### PERMISSIBLE RADIAL FORCE $F_{2rB}$ [N] APPLY FORCE TO THE CENTER OF THE SHAFT

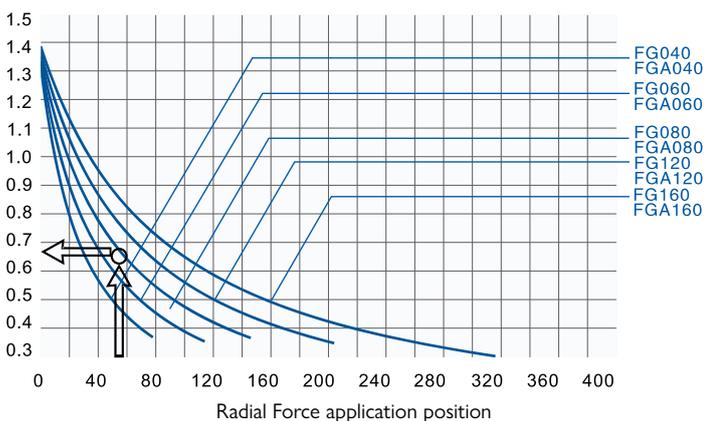


When the radial force  $F_{2r}$  is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force  $F_{2rB}$  that can be withstood by different specifications of reducers with a service life of 20,000hr\* under different output speeds is as follows:

$$F_{2a1B} = 0,2 \times F_{2rB}$$

$$F_{2a2B} = 0,1 \times F_{2rB}$$

### POSITIONAL LOAD COEFFICIENT



When the radial force  $F_{2r}$  is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

Radial force  
 $F'_{2rB} = K_b \times F_{2rB}$

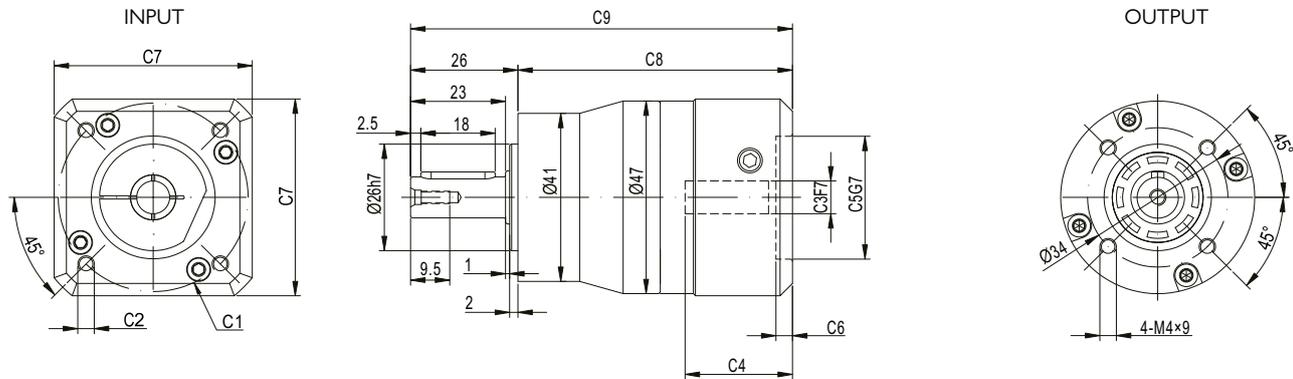
Axial force  
 $F'_{2a1B} = 0,2 \times F'_{2rB}$   
 $F'_{2a2B} = 0,1 \times F'_{2rB}$

\*The lifetime will be shortened by half under continuous operation.

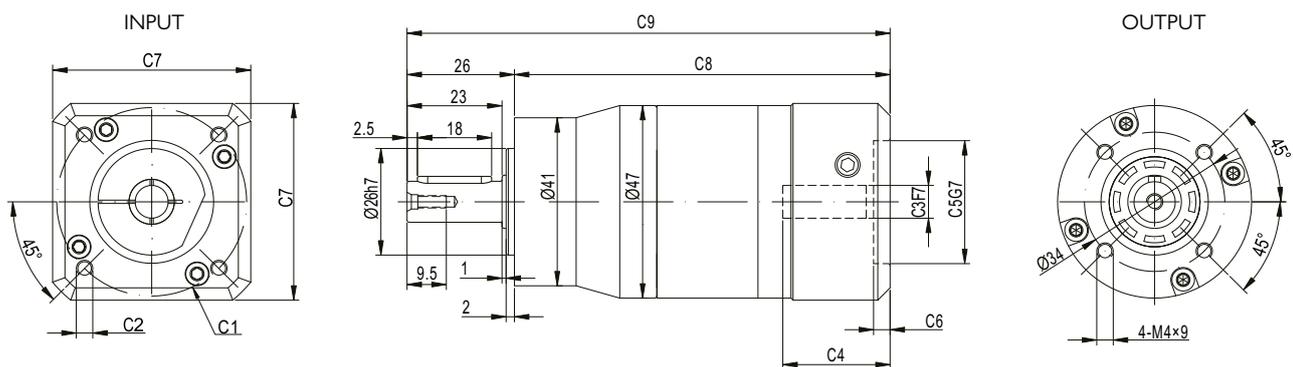
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

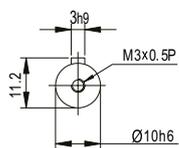
### FG-040-L1



### FG-040-L2



## OUTPUT DIAMETER



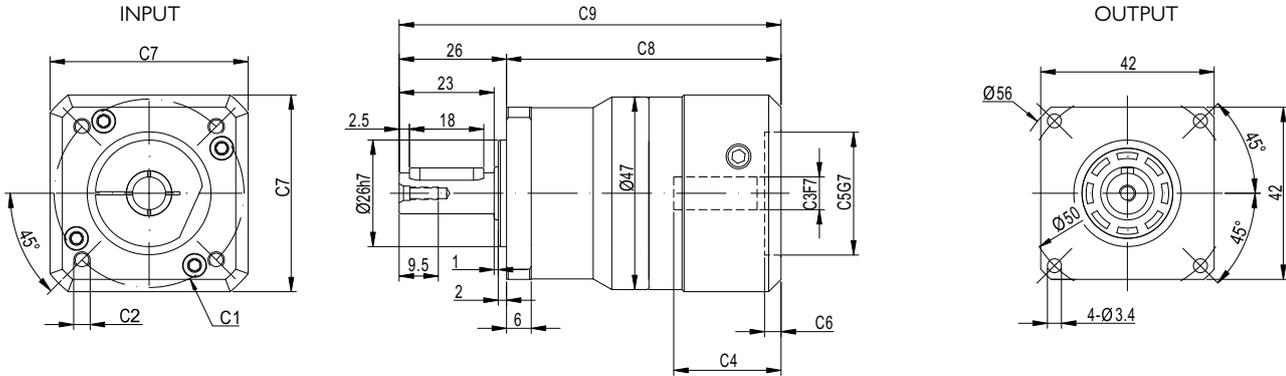
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FG-040-L1	ø46	4-M4x10	ø8	26	ø30	4	42	66,5	92,5
	ø45	4-M3x8							
FG-040-L2	ø46	4-M4x10	ø8	26	ø30	4	42	91	117
	ø45	4-M3x8							

▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.

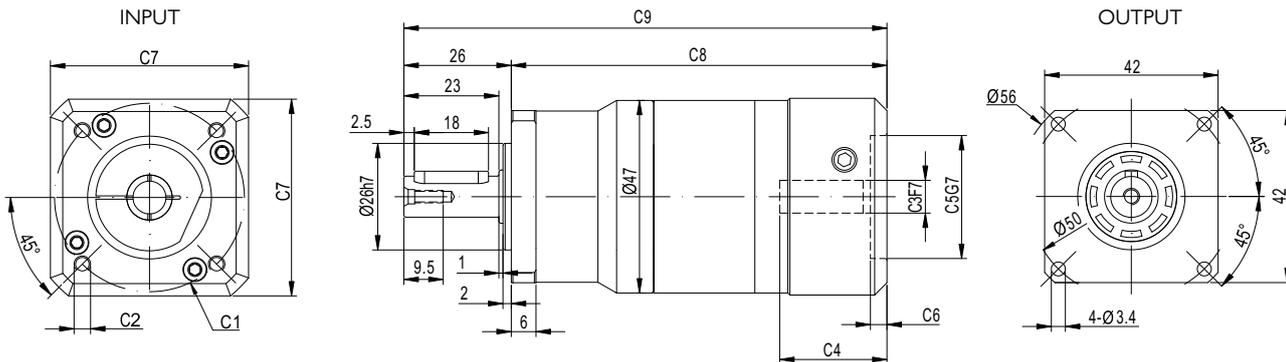
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

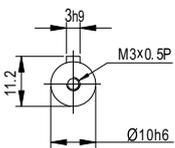
### FGA-040-L1



### FGA-040-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9
FG-040-L1	$\varnothing 46$	4-M4x10	$\varnothing 8$	26	$\varnothing 30$	4	42	66,5	92,5
	$\varnothing 45$	4-M3x8							
FG-040-L2	$\varnothing 46$	4-M4x10	$\varnothing 8$	26	$\varnothing 30$	4	42	91	117
	$\varnothing 45$	4-M3x8							

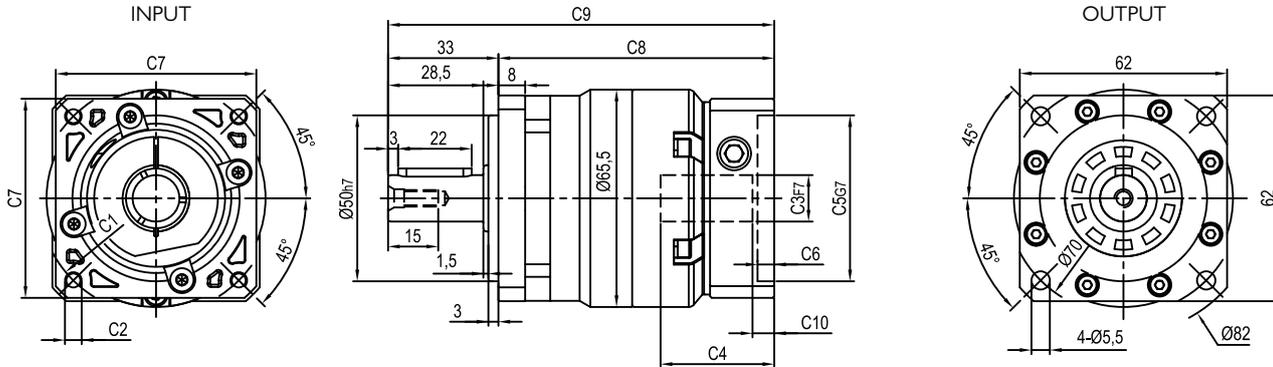
▪ C1~C7 are motor (metric standard) specific dimensions, which could be customized.



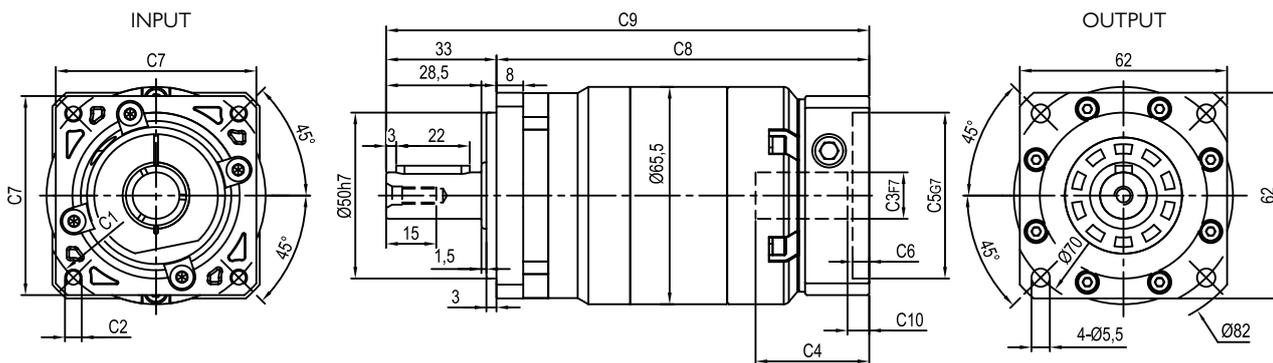
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

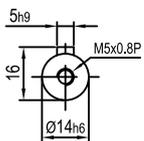
### FGA-060-L1



### FGA-060-L2



## OUTPUT DIAMETER



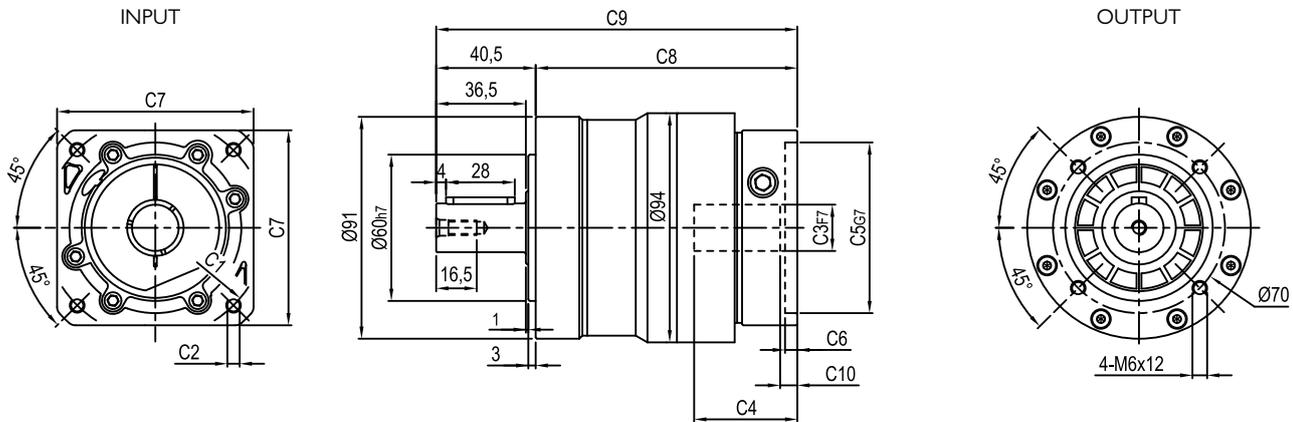
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FGA-060-L1	ø66.7	4-M4x10	ø8	34	ø38,1	5	60	82,5	115,5	5,5
FGA-060-L2								111,5	144,5	5,5
FGA-060-L1	ø70	4-M4x10, 4-M5x12	ø11, ø14	34	ø50	5	60	82,5	115,5	5,5
FGA-060-L2								111,5	144,5	5,5
FGA-060M1-L1	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	89	122	12
FGA-060M2-L2								118	151	12

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- M1: Limit hole (Version number)

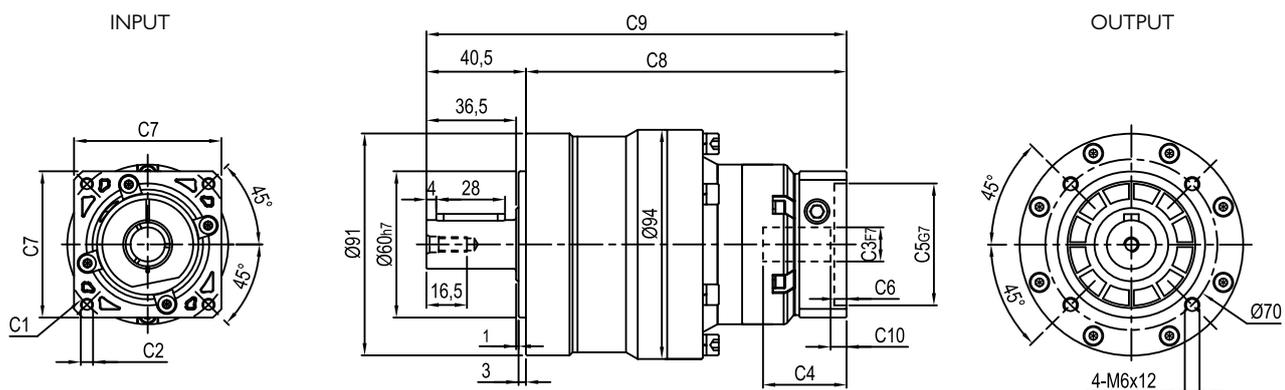
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

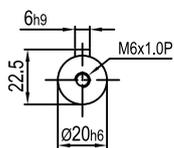
### FG-080-L1



### FG-080-L2



## OUTPUT DIAMETER



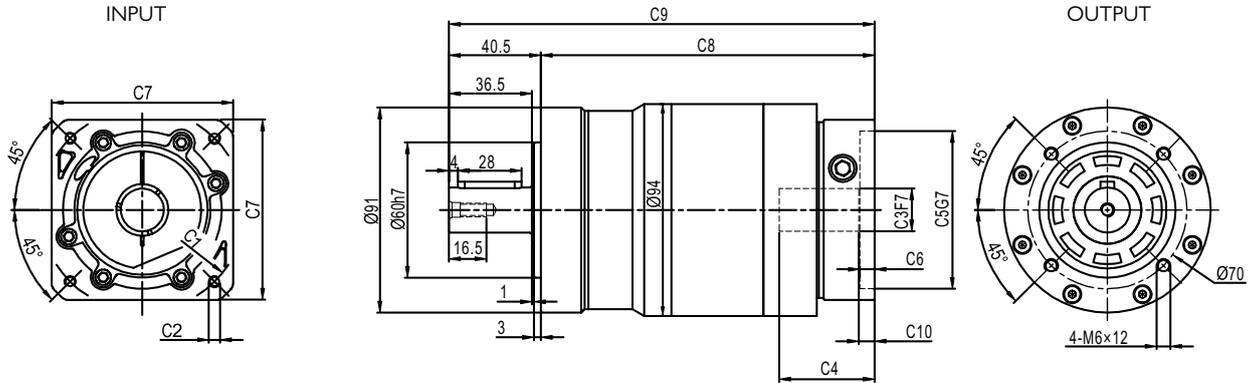
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FG-080-L1	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	106,5	147	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	106,5	147	6
FG-080M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	122	162,5	16,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	124,5	165	19
FG-080-L2	ø66.7	4-M4x10	ø8	34	ø38,1	5	60	130,5	171	5,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	34	ø50	5	60	130,5	171	5,5
FG-080M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	137	177,5	12
	ø100	4-M6x14	ø16	42	ø80	6,5	86	137	177,5	11

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

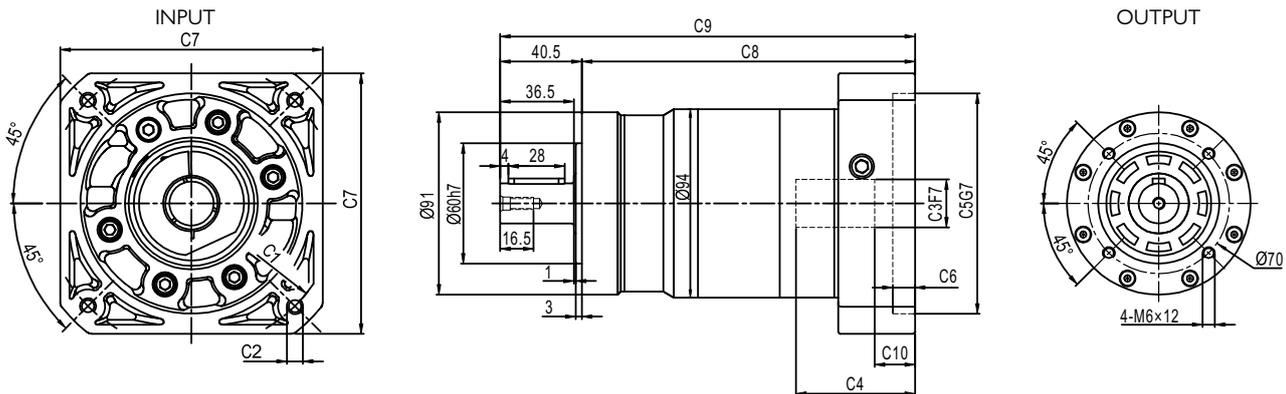
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

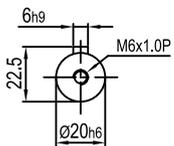
### FG-080A-L2



### FG-080A-L2



## OUTPUT DIAMETER



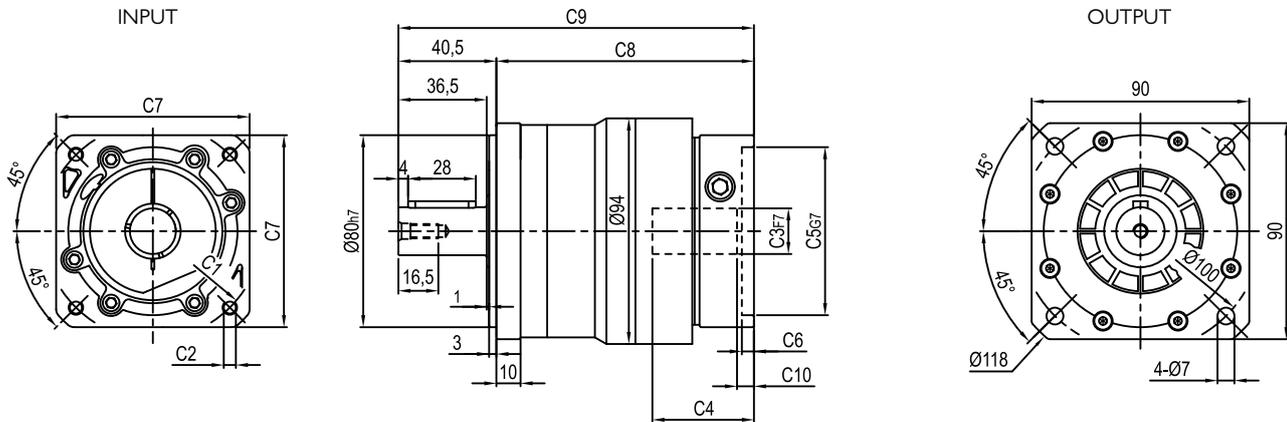
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FG-080A-L2	ø90	4-M5x12, 4-M6x14	ø19	42	ø70	6,5	80	147	187,5	7
	ø100	4-M6x14	ø16	42	ø80	6,5	86	147	187,5	6
FG-080AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	162,5	203	16,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	10	130	165	205,5	19

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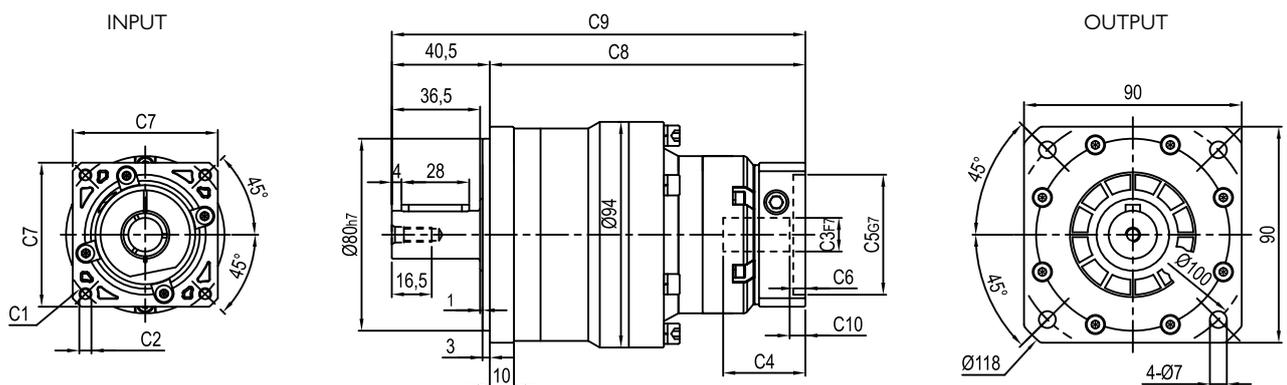
# PRECISION PLANETARY GEARBOX FGA/FGA SERIES

## PRODUCT DIMENSION

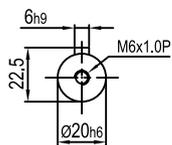
### FGA-080-L1



### FGA-080-L2



## OUTPUT DIAMETER



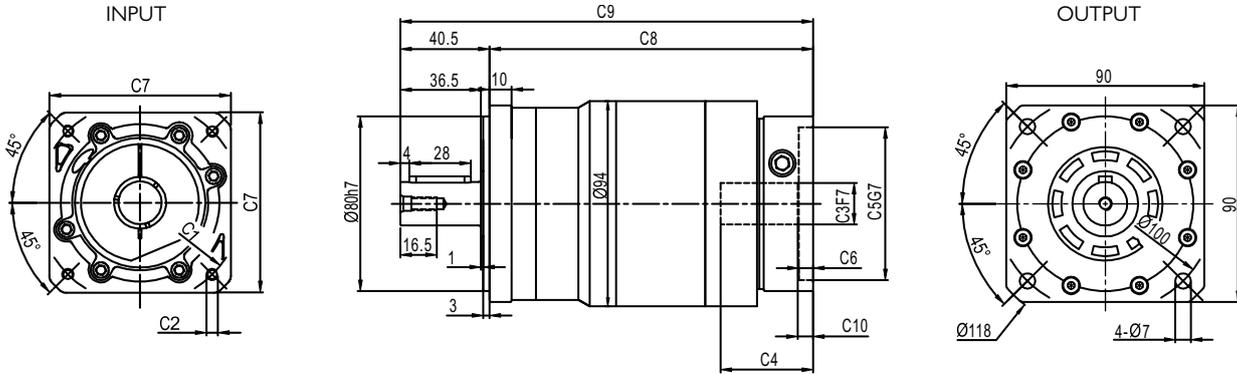
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FGA-080-L1	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	106,5	147	7
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	106,5	147	6
FGA-080M1-L1	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	122	162,5	16,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	124,5	165	19
FGA-080-L2	$\varnothing 66.7$	4-M4x10	$\varnothing 8$	34	$\varnothing 38,1$	5	60	130,5	171	5,5
	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	34	$\varnothing 50$	5	60	130,5	171	5,5
FGA-080M1-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	137	177,5	12
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	137	177,5	11

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

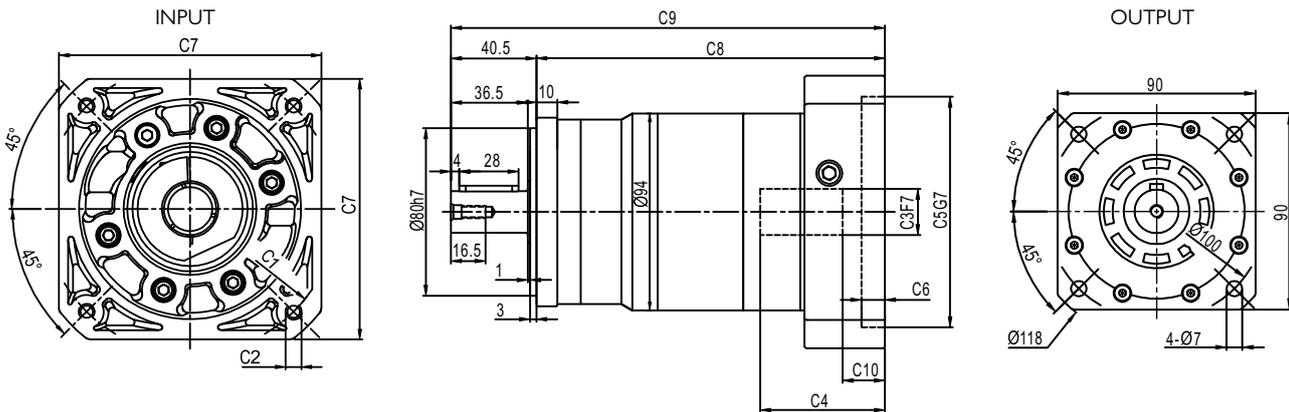
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

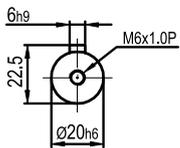
### FGA-080A-L2



### FGA-080A-L2



## OUTPUT DIAMETER



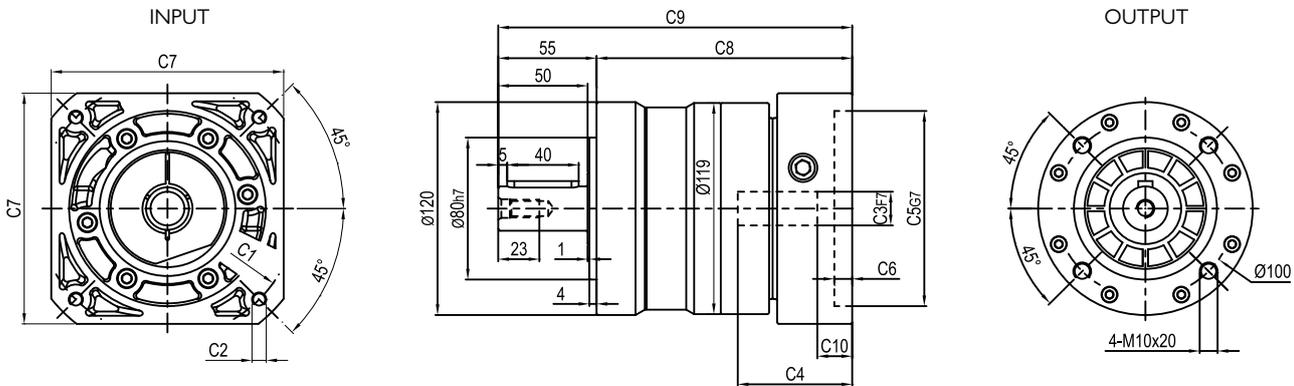
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FGA-080A-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	147	187,5	7
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	147	187,5	6
FGA-080AM1-L2	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	162,5	203	16,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	10	130	165	205,5	19

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

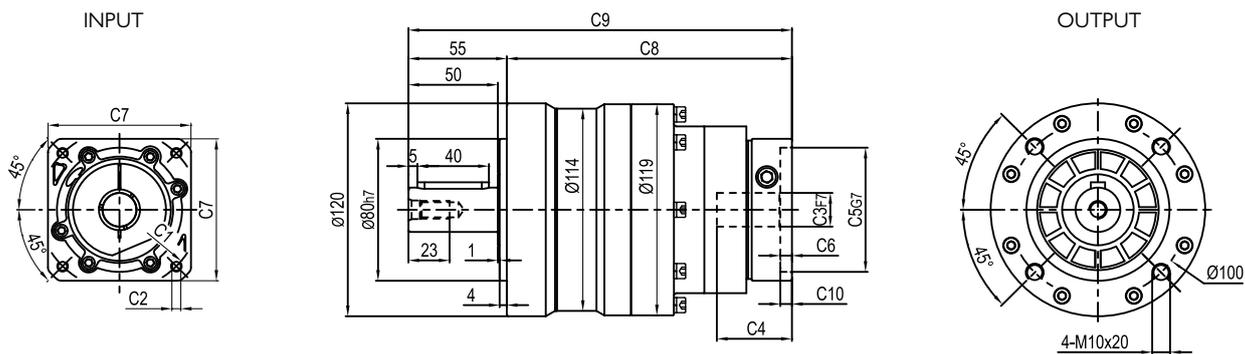
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

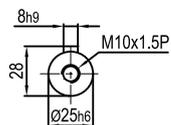
### FG-120-L1



### FG-120-L2



## OUTPUT DIAMETER



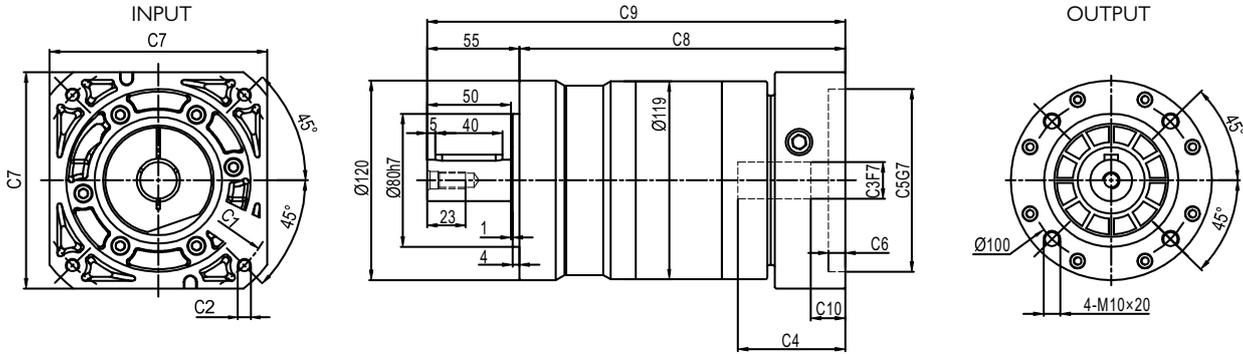
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FG-120-L1	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	143	198	19,5
FG-120M1-L1	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	160,5	215,5	28
FG-120-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42	$\varnothing 70$	6,5	80	159,5	214,5	7
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42	$\varnothing 80$	6,5	86	159,5	214,5	6
FG-120M1-L2	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	175	230	16,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	177,5	232,5	19

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

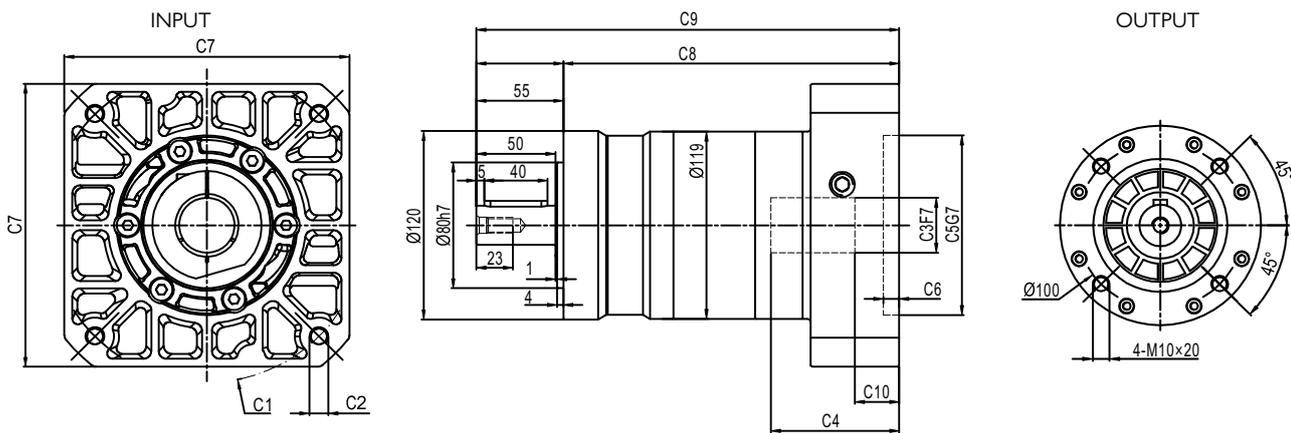
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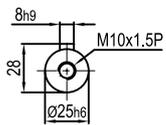
### FG-120A-L2



### FG-120A-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FG-120A-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	194,5	249,5	19,5
FG-120AM1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	212	267	28

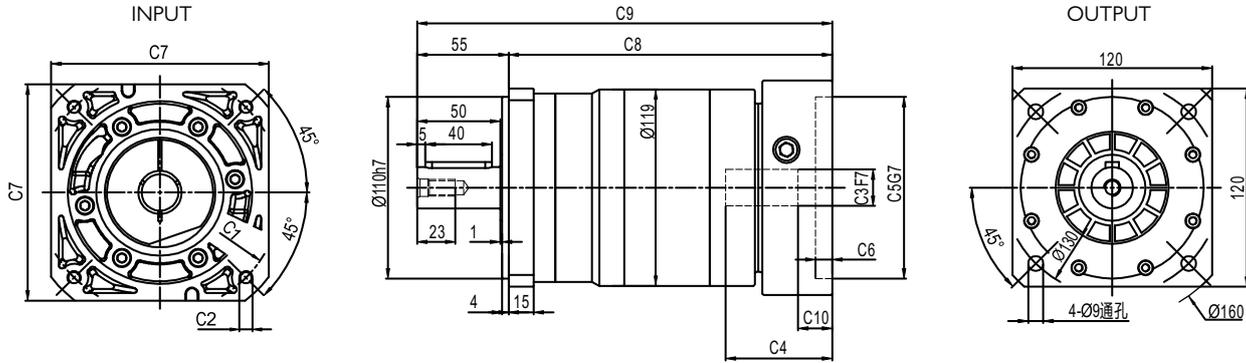
- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



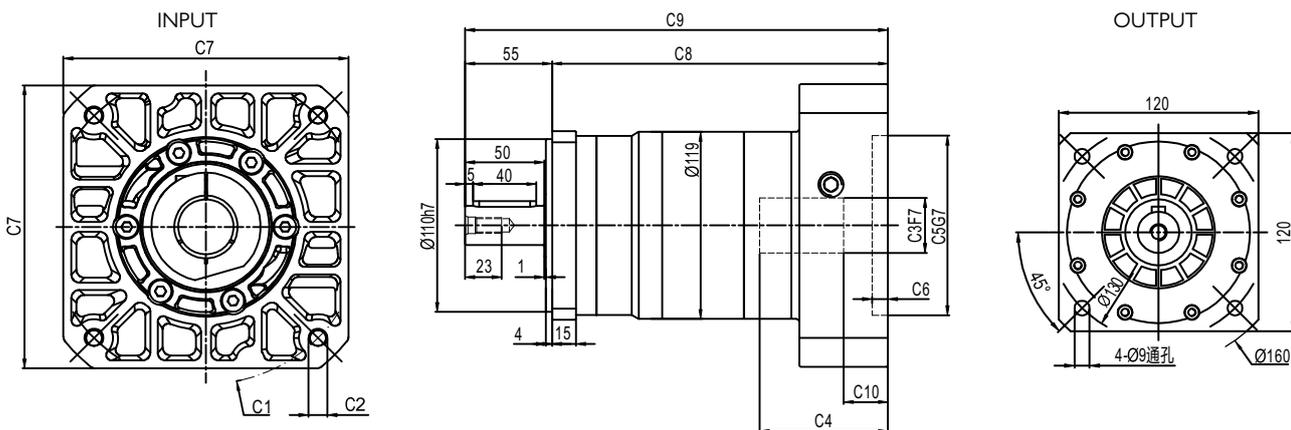
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

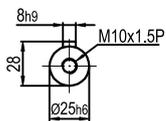
### FGA-120A-L2



### FGA-120A-L2



## OUTPUT DIAMETER



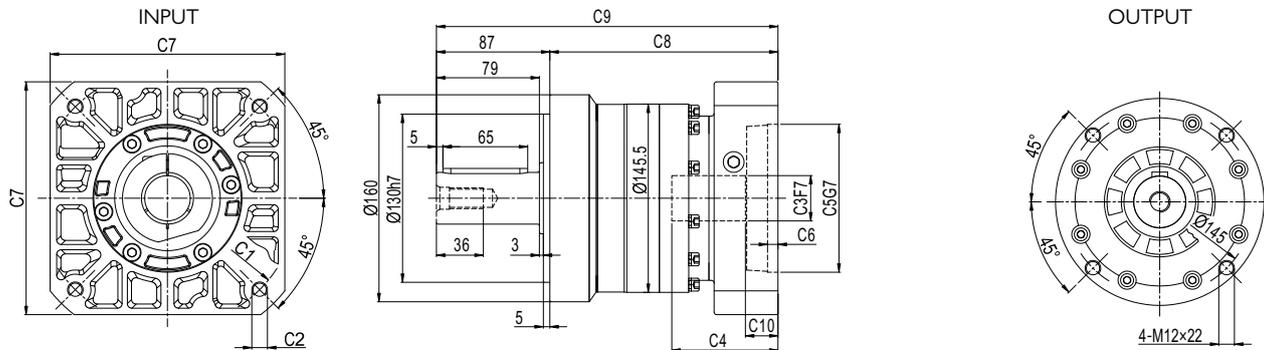
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FGA-120A-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	194,5	249,5	19,5
FGA-120AM1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	212	267	28

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

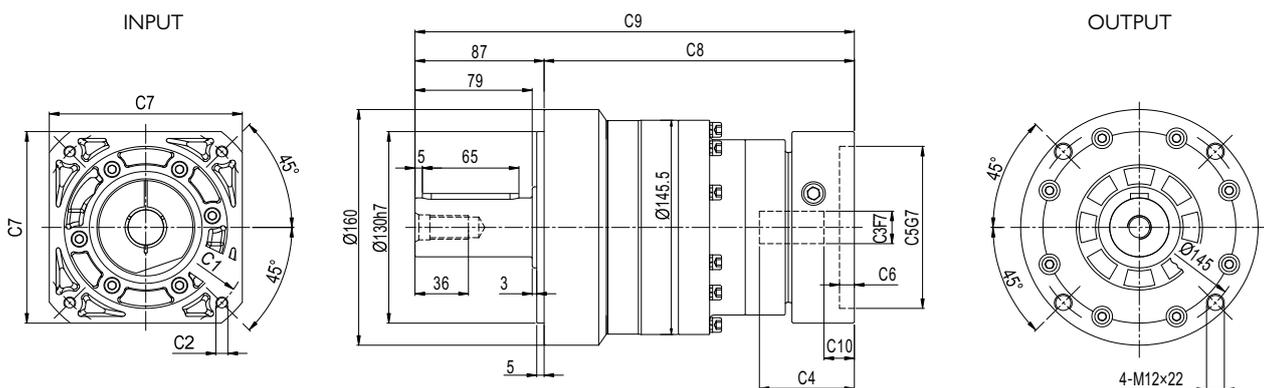
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

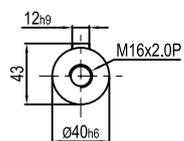
### FG-160-L1



### FG-160-L2



## OUTPUT DIAMETER



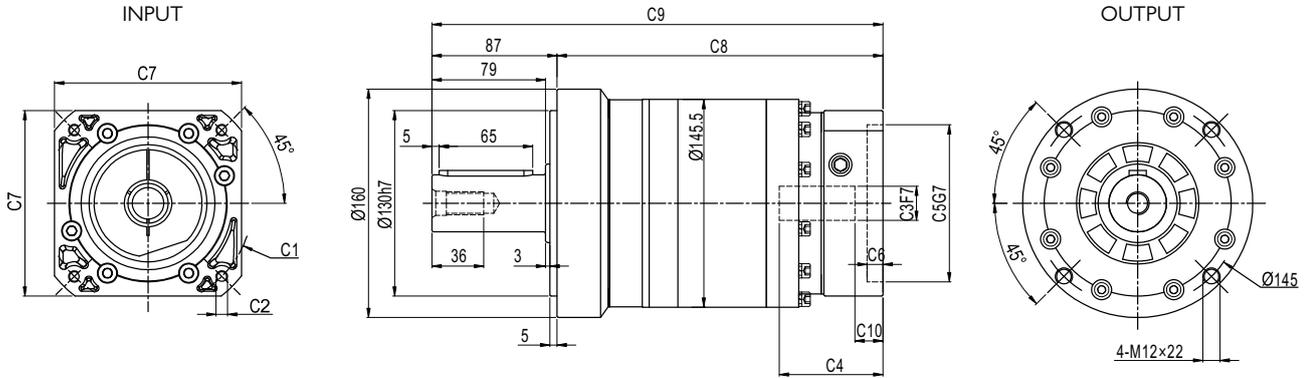
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FG-160-L1	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	165	252	19,5
	ø200	4-M12x28	ø35	81,5	ø114,3	8	180	175	262	25
FG-160-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	209	296	19,5
FG-160M1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	226,5	313,5	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

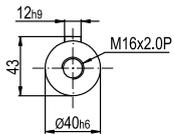
# PRECISION PLANETARY GEARBOX FG/FGA SERIES

## PRODUCT DIMENSION

### FG-160A-L2



## OUTPUT DIAMETER



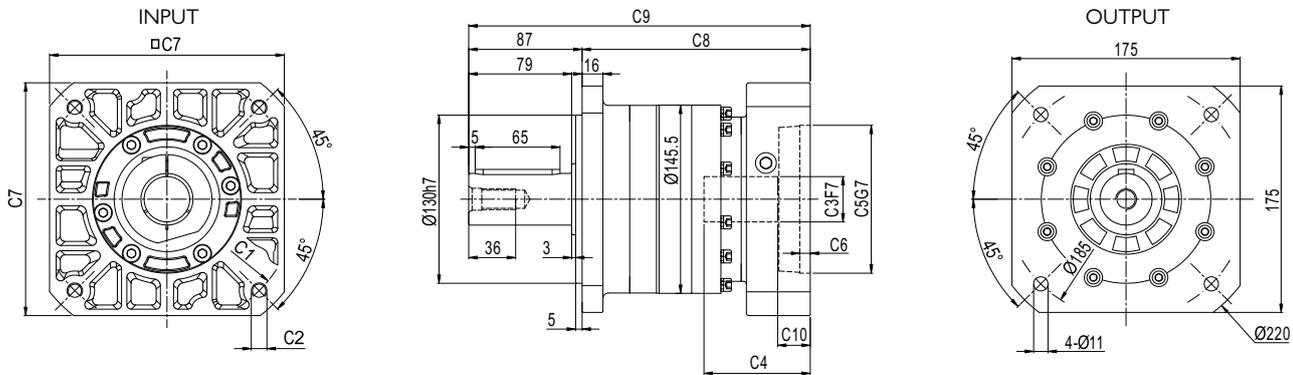
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FG-160A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	226,5	313,5	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	236,5	323,5	25

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.

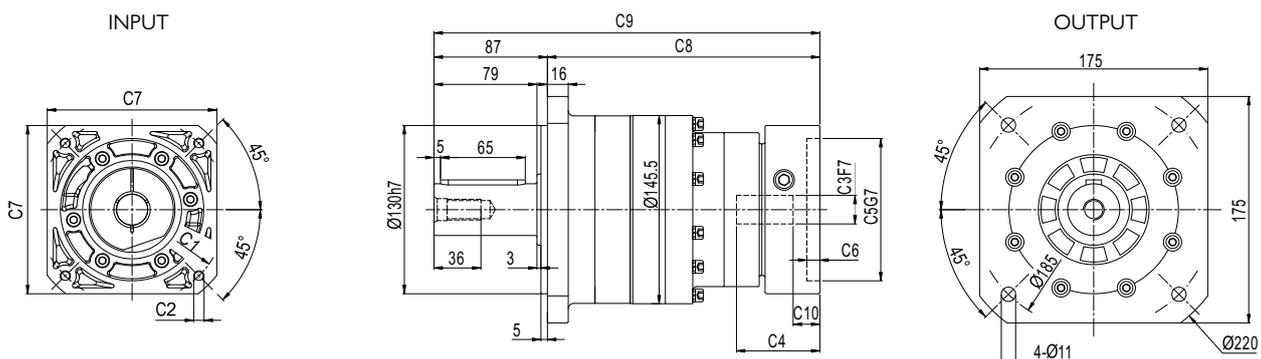
# PRECISION PLANETARY GEARBOX FGA/FGA SERIES

## PRODUCT DIMENSION

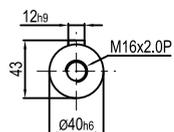
### FGA-160-L1



### FGA-160-L2



## OUTPUT DIAMETER



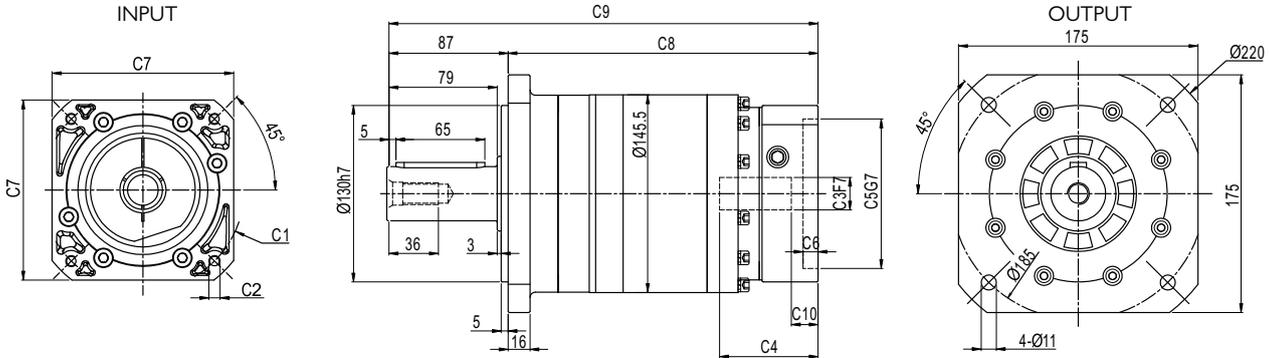
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FGA-160-L1	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	165	252	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	175	262	25
FGA-160-L2	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	64	$\varnothing 110$	10	130	209	296	19,5
FGA-160M1-L2	$\varnothing 200$	4-M12x28	$\varnothing 35$	81	$\varnothing 114,3$	10	180	226,5	313,5	28

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

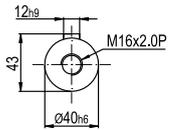
# PRECISION PLANETARY GEARBOX FGA/FGA SERIES

## PRODUCT DIMENSION

### FGA-160A-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
FGA-160A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	226,5	313,5	19,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	81,5	$\varnothing 114,3$	8	180	236,5	323,5	25

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.

**CHIARAVALLI LINEAR CENTER**

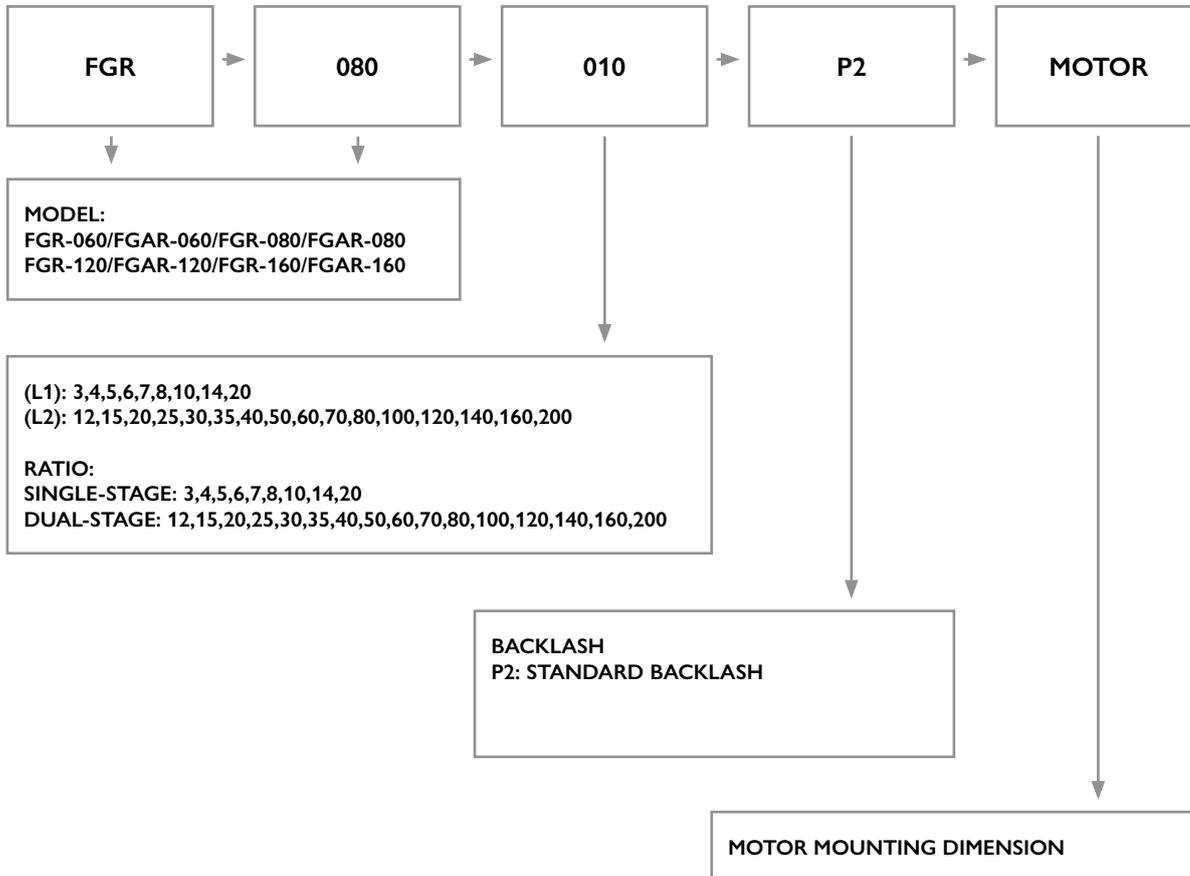
**PRECISION PLANETARY GEARBOX  
FGR/FGAR SERIES**



# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## MODEL DESCRIPTION

FGR-080-010-P2-19-70-90-M6-45





# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## TECHNICAL SPECIFICATION

MODEL		STAGE	RATIO	FGR060 FGAR060	FGR080 FGAR080	FGR080A FGAR080A	FGR120 FGAR120	FGR120A FGAR120A	FGR160 FGAR160	FGR160A FGAR160A
Rated output torque	Nm	1	3	55	130	-	208	-	342	-
			4	50	140	-	290	-	542	-
			5	60	160	-	330	-	650	-
			6	55	150	-	310	-	600	-
			7	50	140	-	300	-	550	-
			8	50	140	-	290	-	542	-
			10	60	160	-	330	-	650	-
			14	50	140	-	300	-	550	-
		20	40	100	-	230	-	450	-	
		12	55	130	130	208	208	342	342	
		15	55	130	130	208	208	342	342	
		20	50	140	140	290	290	542	542	
		25	60	160	160	330	330	650	650	
		30	55	130	130	208	208	342	342	
		35	60	160	160	330	330	650	650	
		40	50	140	140	290	290	542	542	
		50	60	160	160	330	330	650	650	
		60	55	150	150	310	310	600	600	
		70	60	160	160	330	330	650	650	
		80	50	140	140	290	290	542	542	
100	60	160	160	330	330	650	650			
120	-	150	150	310	310	600	600			
140	-	140	140	300	300	550	550			
160	-	120	120	260	260	500	500			
200	-	100	100	230	230	450	450			
T <sub>2B</sub> /Max. output torque	Nm	1,2	3~200	3 times the rated output torque						
n <sub>1</sub> /Rated input speed	rpm	1,2	3~200	5,000	4,000	4,000	4,000	4,000	3,000	3,000
n <sub>1B</sub> /Max. input speed	rpm	1,2	3~200	10,000	8,000	8,000	8,000	8,000	6,000	6,000
P2/Precision backlash	arcmin	1	3~20	≤13	≤13	≤13	≤13	≤13	≤13	≤13
		2	12~200	≤15	≤15	≤15	≤15	≤15	≤15	≤15
Torsional rigidity	Nm/arcmin	1,2	3~200	7	14	14	25	25	50	50
F <sub>2rB</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	1,530	3,250	3,250	6,700	6,700	9,400	9,400
F <sub>2a1B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	630	1,300	1,300	3,000	3,000	4,000	4,000
F <sub>2a2B</sub> <sup>2</sup> /Allowable radial force	N	1,2	3~200	765	1,625	1,625	3,350	3,350	4,700	4,700
Life time	hr	1,2	3~200	20,000 <sup>1</sup>						
η/Efficiency	%	1	3~20	≤95%						
		2	12~200	≤92%						
Weight	kg	1	3~20	2.1	6.4	-	13	-	24.5	-
		2	12~200	2.5	7.8	7.8	14.2	14.2	27.5	27.5
Operating temperature	°C	1,2	3~200	-10°C ~ +90°C						
Lubrication		1,2	3~200	Synthetic lubricating grease						
Ingress protectbn		1,2	3~200	IP65						
Mount position		1,2	3~200	Any direction						
(n <sub>1</sub> =3000rpm)/Noise level	dB	1,2	3~200	≤63	≤65	≤65	≤68	≤68	≤70	≤70

## GEARBOX MOMENT OF INERTIA

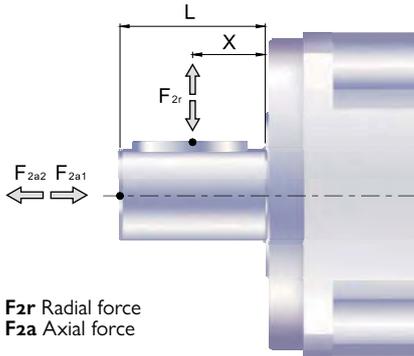
MODEL		STAGE	RATIO	FGR060 FGAR060	FGR080 FGAR080	FGR080A FGAR080A	FGR120 FGAR120	FGR120A FGAR120A	FGR160 FGAR160	FGR160A FGAR160A
Moment of inertia	kg • cm <sup>2</sup>	1	3~7	0.35	2.25	-	6.84	-	23.4	-
			8~10	0.07	1.87	-	6.25	-	21.8	-
			14~20	0.07	1.87	-	6.25	-	21.8	-
		2	12~40	0.09	0.35	0.35	2.25	2.25	6.84	6.84
			50	0.09	0.31	0.31	1.87	1.87	6.25	6.25
			60	0.09	0.35	0.35	2.25	2.25	6.84	6.84
			70~100	0.09	0.31	0.31	1.87	1.87	6.25	6.25
			120~200	-	0.31	0.31	1.87	1.87	6.25	6.25

1. The lifetime will be shortened by half under continuous operation.  
When the output speed is 100rpm, it applies on the center of the output shaft.



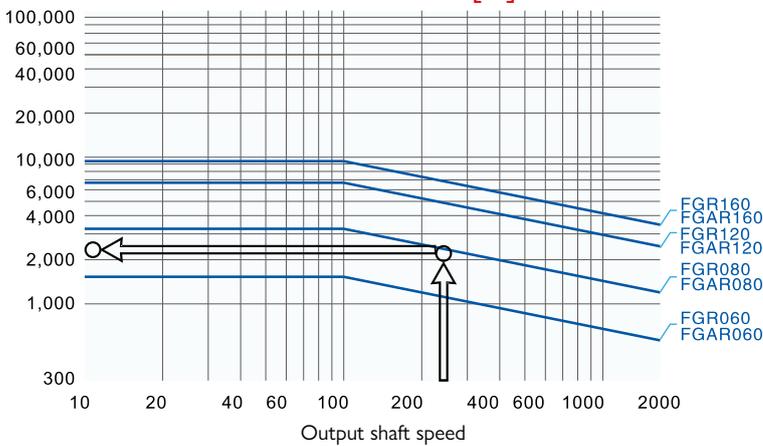
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEAR REDUCER



The maximum radial and axial forces that the output shaft of the gearbox can withstand. Looking at the design of internal support bearings, the reducer adopts large-sized bearings and a design with a larger span, which can withstand greater radial and axial loads.

### PERMISSIBLE RADIAL FORCE $F_{2rB}$ [N] APPLY FORCE TO THE CENTER OF THE SHAFT

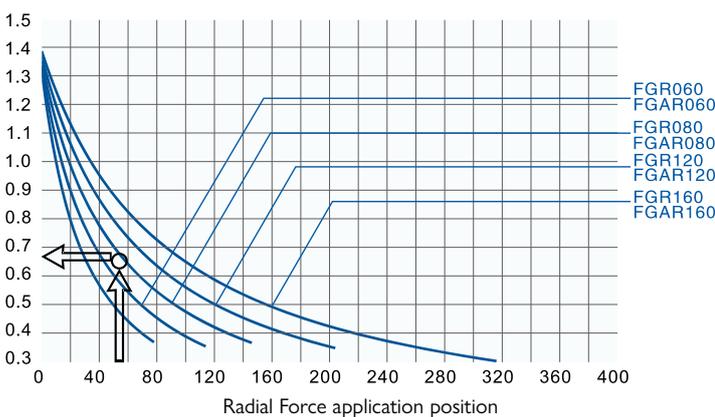


When the radial force  $F_{2r}$  is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force  $F_{2rB}$  that can be withstood by different specifications of reducers with a service life of 20,000hr\* under different output speeds is as follows:

$$F_{2a1B} = 0,2 \times F_{2rB}$$

$$F_{2a2B} = 0,1 \times F_{2rB}$$

### POSITIONAL LOAD COEFFICIENT



When the radial force  $F_{2r}$  is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

Radial force  
 $F'_{2rB} = K_b \times F_{2rB}$

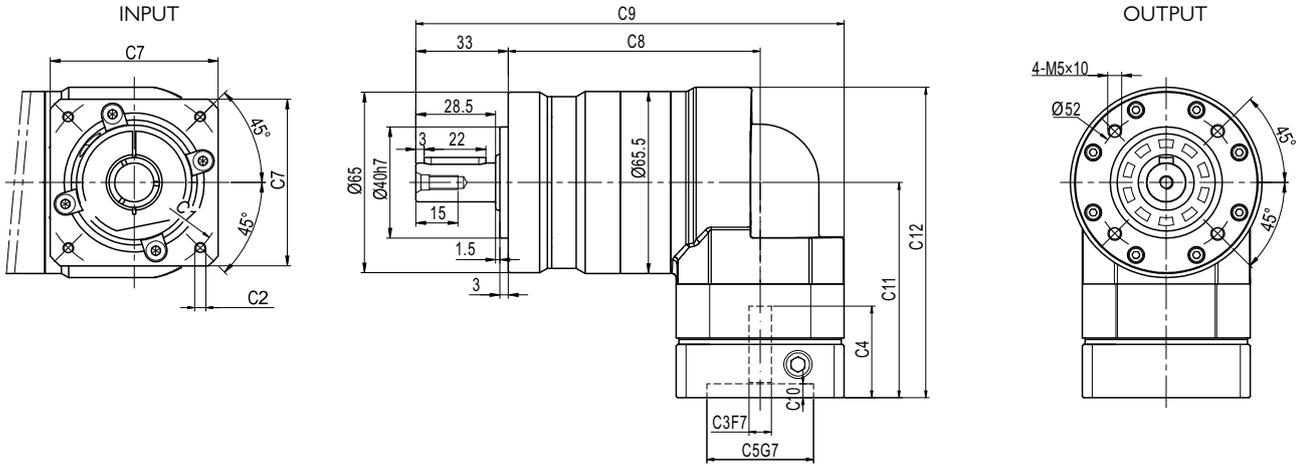
Axial force  
 $F'_{2a1B} = 0,2 \times F'_{2rB}$   
 $F'_{2a2B} = 0,1 \times F'_{2rB}$

\*The lifetime will be shortened by half under continuous operation.

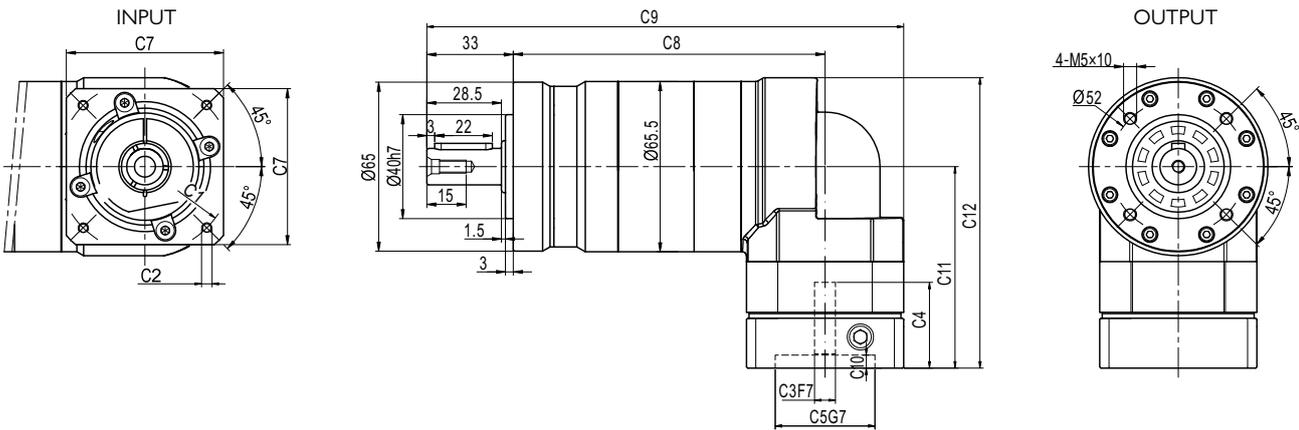
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

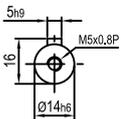
### FGR-060-L1



### FGR-060-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-060-L1	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	90	153	5,5	77,5	111,75
FGR-060-L2								119	182			
FGR-060-L1	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	90	153	5,5	77,5	111,75
FGR-060-L2								119	182			
FGR-060M1-L1	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	90	163	12	87	121,25
FGR-060M1-L2								119	192			

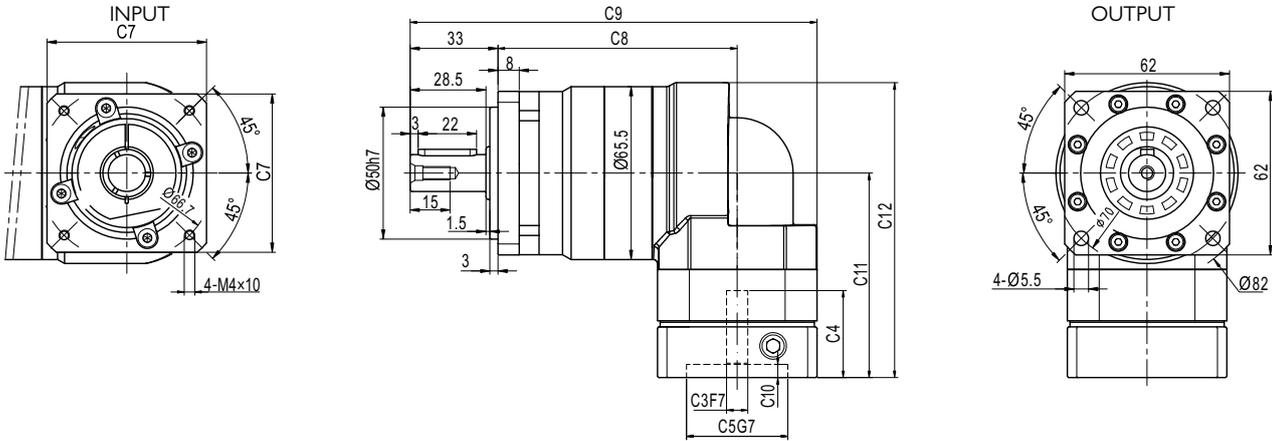
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



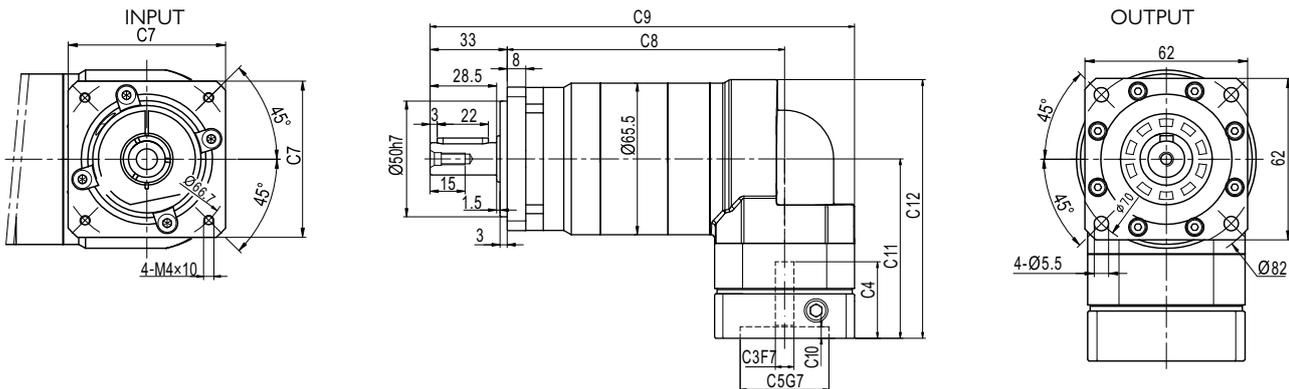
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

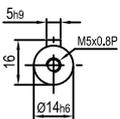
### FGAR-060-L1



### FGAR-060-L2



## OUTPUT DIAMETER



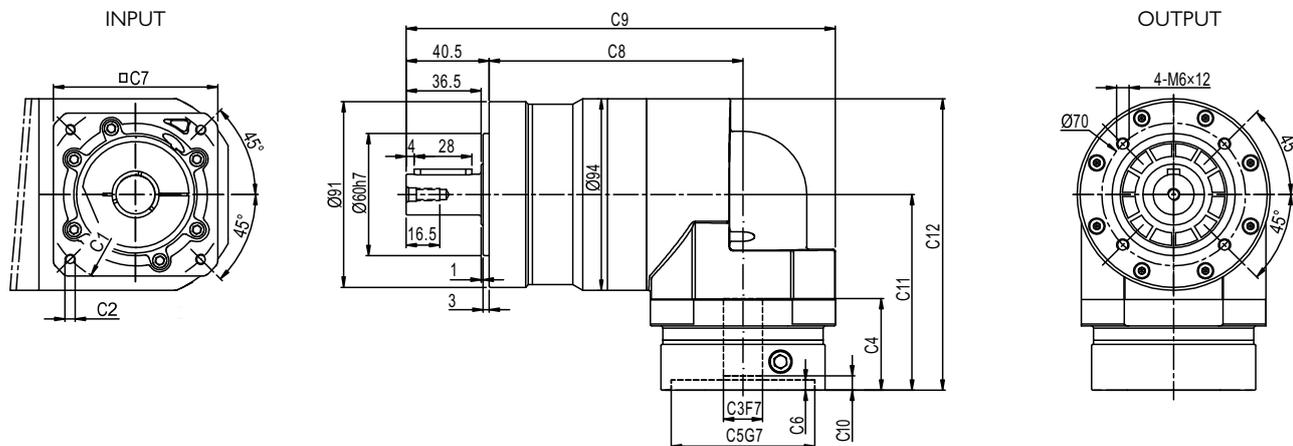
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGAR-060-L1	$\phi 66,7$	4-M4x10	$\phi 8$	33	$\phi 38,1$	5	60	90	153	5,5	77,5	111,75
FGAR-060-L2								119	182			
FGAR-060-L1	$\phi 70$	4-M4x10, 4-M5x12	$\phi 11, \phi 14$	33	$\phi 50$	5	60	90	153	5,5	77,5	111,75
FGAR-060-L2								119	182			
FGAR-060M1-L1	$\phi 90$	4-M5x12, 4-M6x14	$\phi 19$	42,5	$\phi 70$	6,5	80	90	163	12	87	121,25
FGAR-060M1-L2								119	192			

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

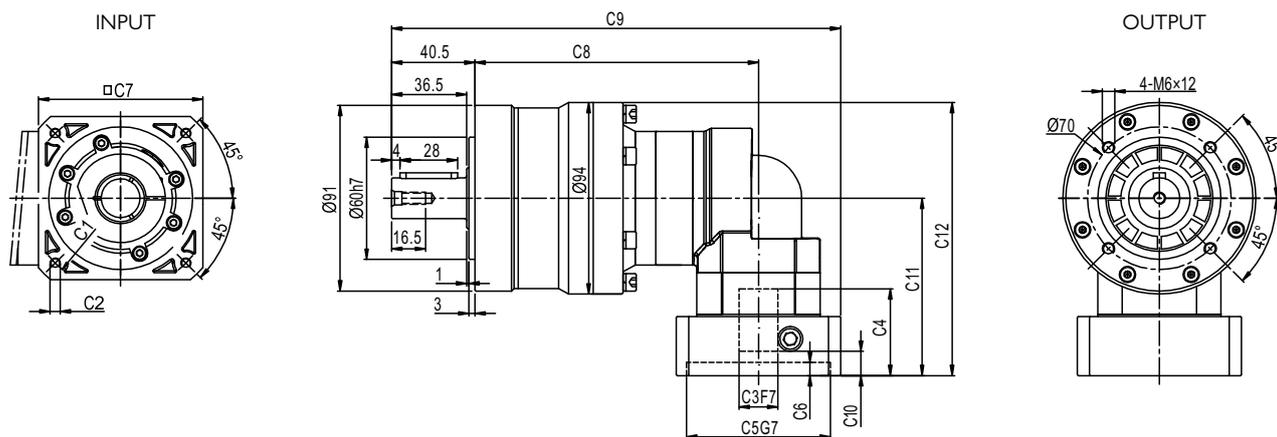
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

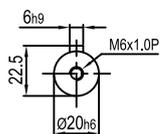
### FGR-080-L1



### FGR-080-L2



## OUTPUT DIAMETER



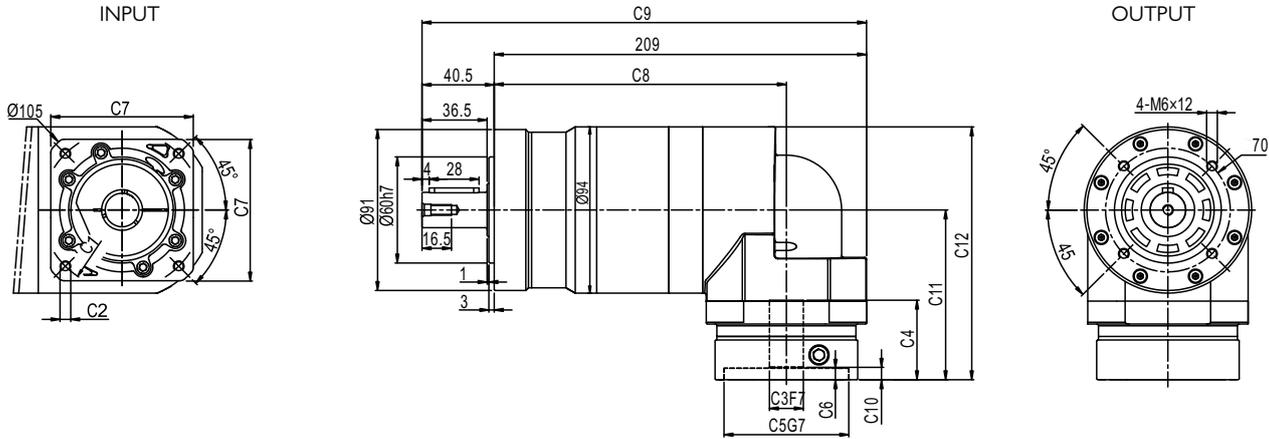
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-080-L1	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	123,5	209	7	96	143
	ø100	4-M6x14	ø16	45	ø80	6,5	86	123,5	209	6	96	143
FGR-080M1-L1	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	123,5	214	16,5	117,5	164,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	123,5	229	19	120	167
FGR-080-L2	ø66,7	4-M4x10	ø8	33	ø38,1	5	60	138	208,5	5,5	77,5	124,5
	ø70	4-M4x10, 4-M5x12	ø11, ø14	33	ø50	5	60	138	208,5	5,5	77,5	124,5
FGR-080M1-L2	ø90	4-M5x12, 4-M6x14	ø19	42,5	ø70	6,5	80	138	218,5	12	87	134
	ø100	4-M6x14	ø16	42,5	ø80	6,55	86	138	221,5	11	87	134

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

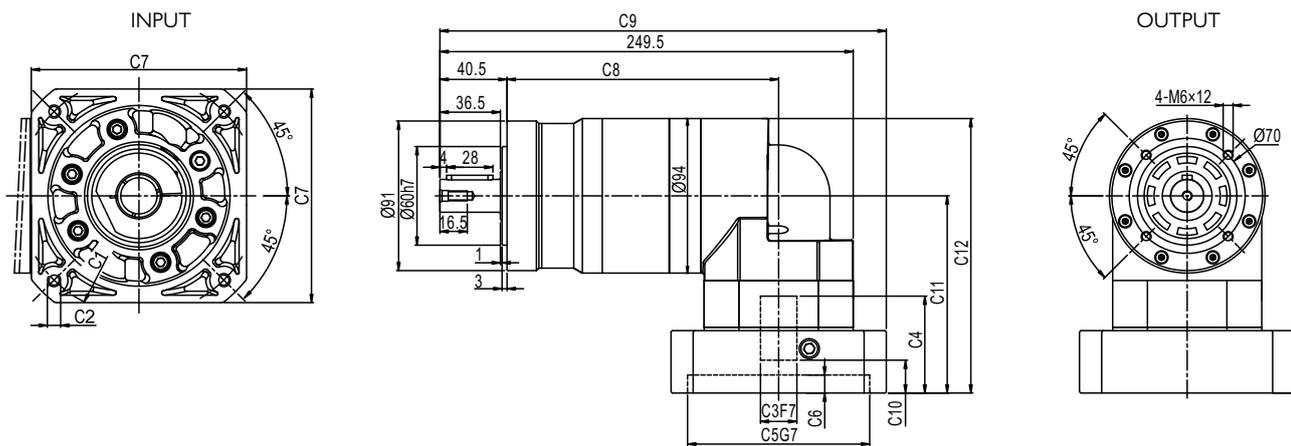
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

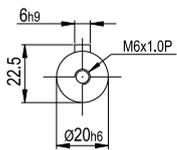
### FGR-080A-L2



### FGR-080A-L2



## OUTPUT DIAMETER



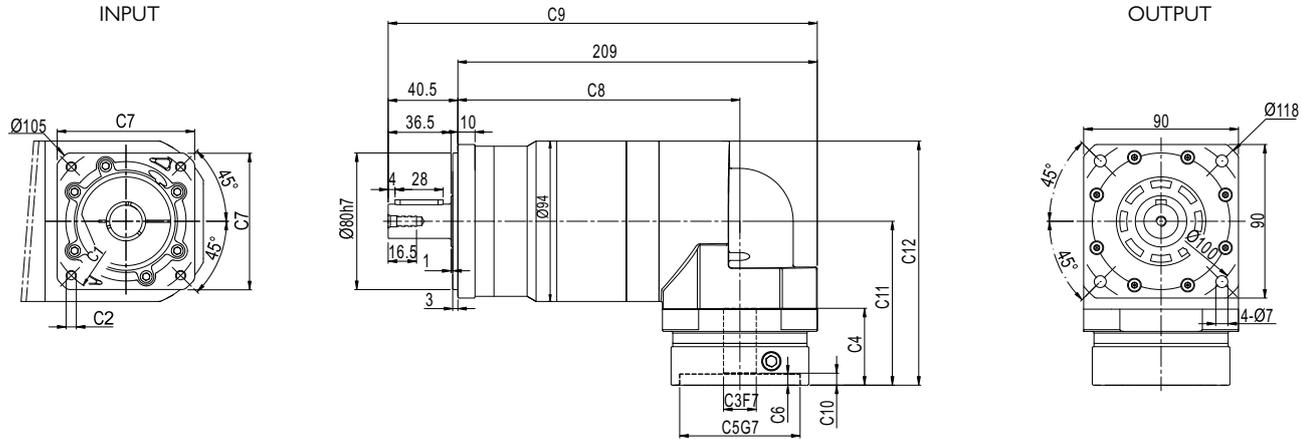
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-080A-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	164	249,5	7	96	143
	ø100	4-M6x14	ø16	45	ø80	6,5	86	164	249,5	6	96	143
FGR-080AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	164	254,5	16,5	117,5	164,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	10	130	164	269,5	19	120	167

- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

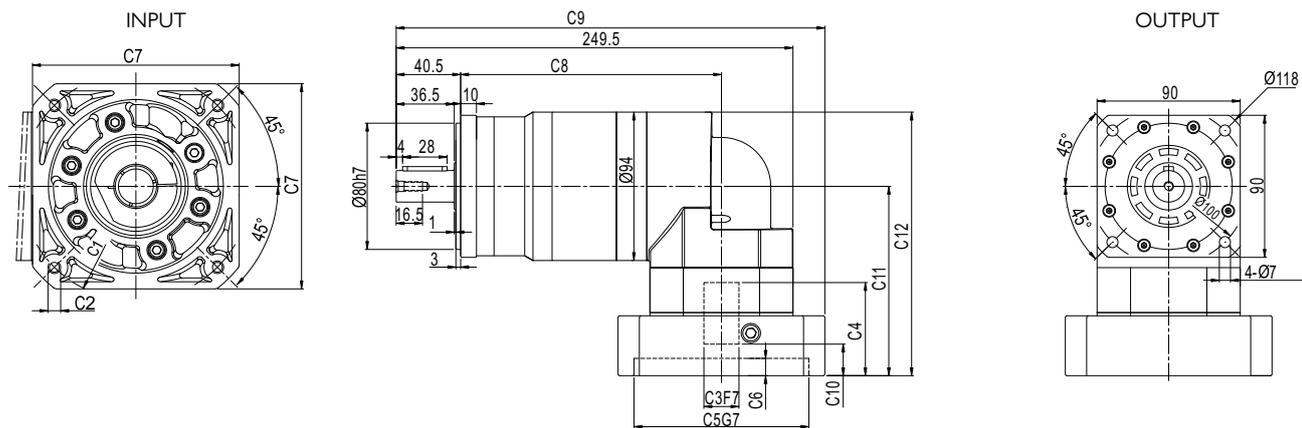
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

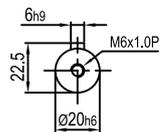
### FGAR-080-L1



### FGAR-080-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGAR-080-L1	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	45	$\varnothing 70$	6,5	80	123,5	209	7	96	143
	$\varnothing 100$	4-M6x14	$\varnothing 16$	45	$\varnothing 80$	6,5	86	123,5	209	6	96	143
FGAR-080M1-L2	$\varnothing 115$	4-M8x20	$\varnothing 19, \varnothing 22$	56,5	$\varnothing 95$	8	100	123,5	214	16,5	117,5	164,5
	$\varnothing 145$	4-M8x20	$\varnothing 19, \varnothing 22, \varnothing 24$	59	$\varnothing 110$	11	130	123,5	229	19	120	167
FGAR-080-L2	$\varnothing 66,7$	4-M4x10	$\varnothing 8$	33	$\varnothing 38,1$	5	60	138	208,5	5,5	77,5	124,5
	$\varnothing 70$	4-M4x10, 4-M5x12	$\varnothing 11, \varnothing 14$	33	$\varnothing 50$	5	60	138	208,5	5,5	77,5	124,5
FGAR-080M1-L2	$\varnothing 90$	4-M5x12, 4-M6x14	$\varnothing 19$	42,5	$\varnothing 70$	6,5	80	138	218,5	12	87	134
	$\varnothing 100$	4-M6x14	$\varnothing 16$	42,5	$\varnothing 80$	6,5	86	138	221,5	11	87	134

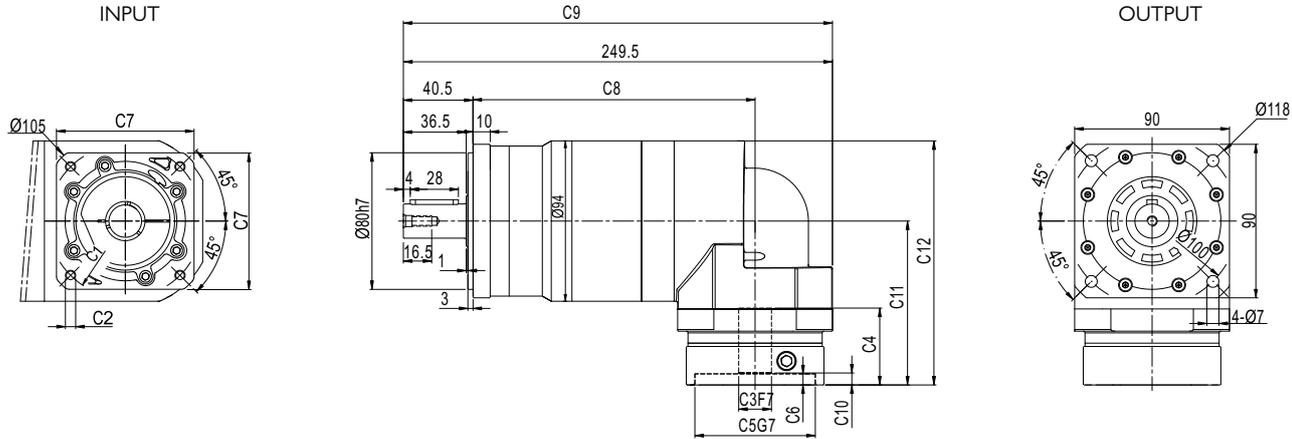
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



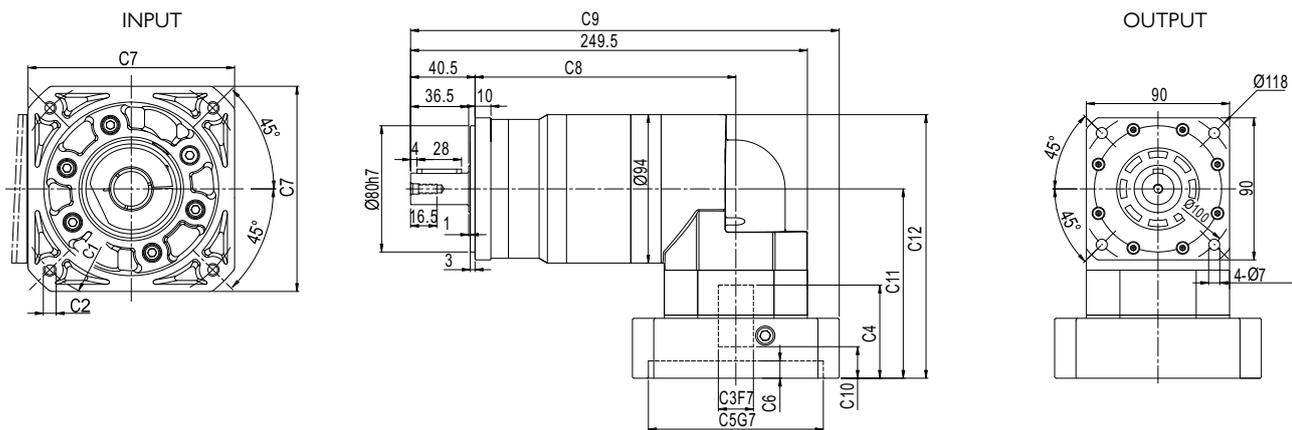
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

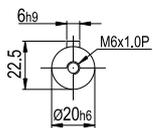
### FGAR-080A-L2



### FGAR-080A-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGAR-080A-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	164	249,5	7	96	143
	ø100	4-M6x14	ø16	45	ø80	6,5	86	164	249,5	6	96	143
FGAR-080AM1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	164	254,5	16,5	117,5	164,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	164	269,5	19	120	167

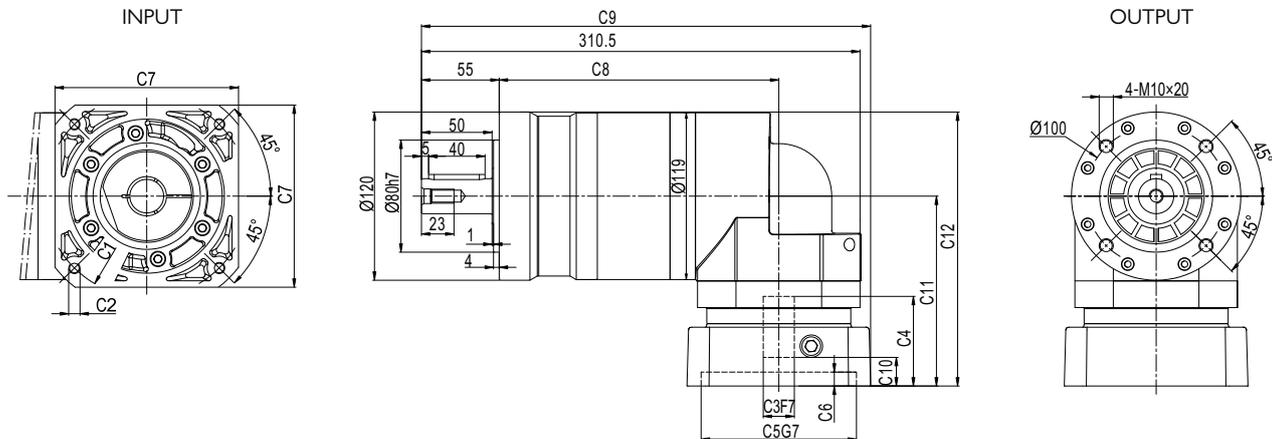
- C1~C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



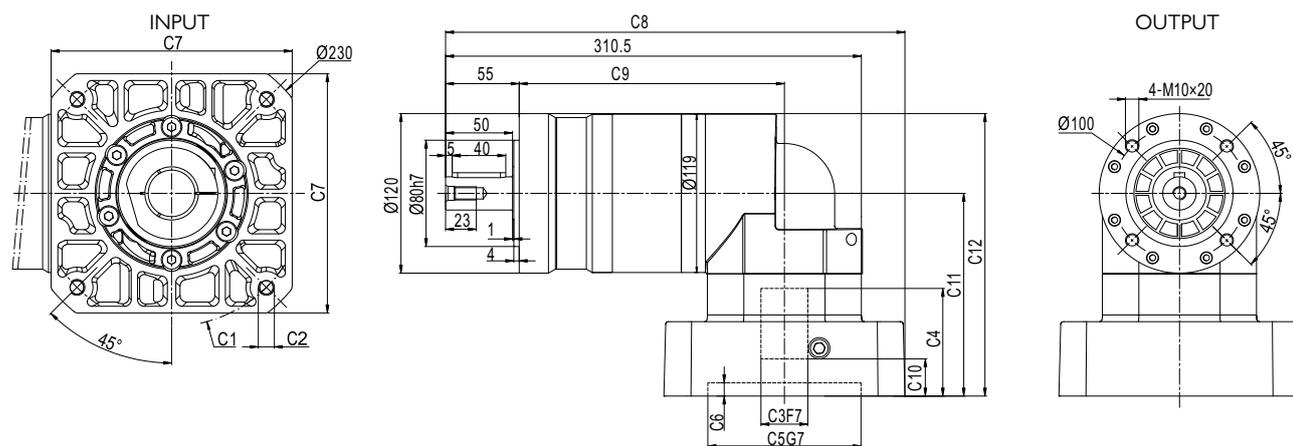
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

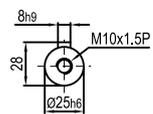
### FGR-120-L1



### FGR-120-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-120-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	146,5	266,5	19,5	135,5	195,5
FGR-120M1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	146,5	291,5	28	152,5	212,5
FGR-120-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	176,5	276,5	7	96	156
	ø100	4-M6x14	ø16	45	ø80	6,5	86	176,5	276,5	6	96	156
FGR-120M1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	176,5	281,5	6,5	117,5	177,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	176,5	296,5	19	120	180

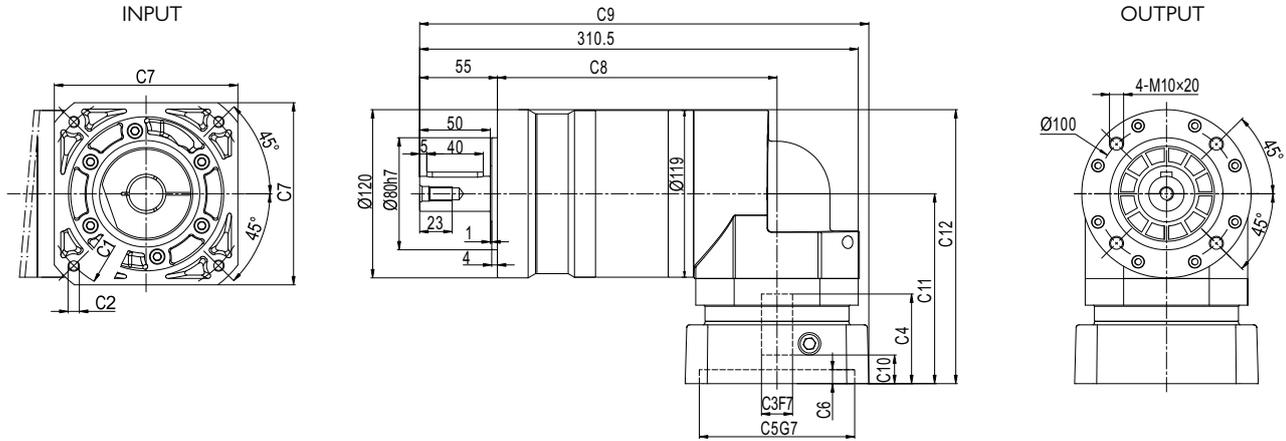
- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



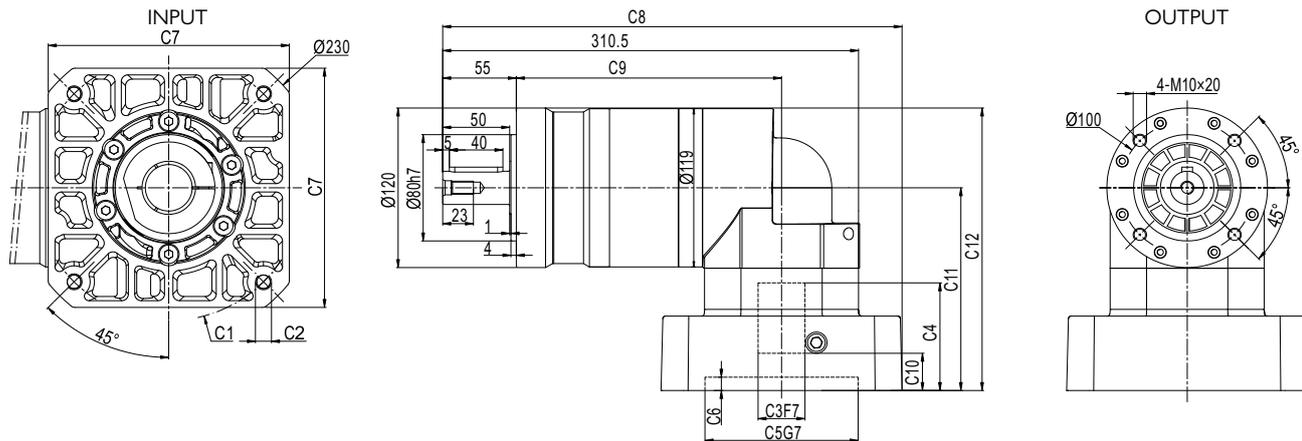
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

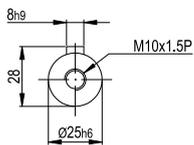
### FGR-120A-L2



### FGR-120A-L2



## OUTPUT DIAMETER



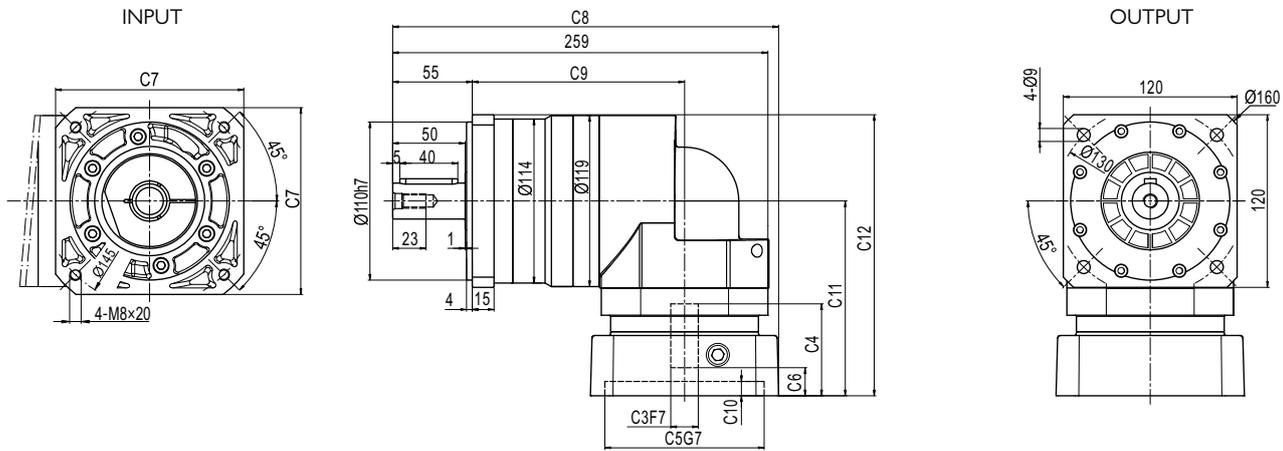
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-120A-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	198	318	19,5	135,5	195,5
FGR-120AM2-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	198	343	28	152,5	212,5

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

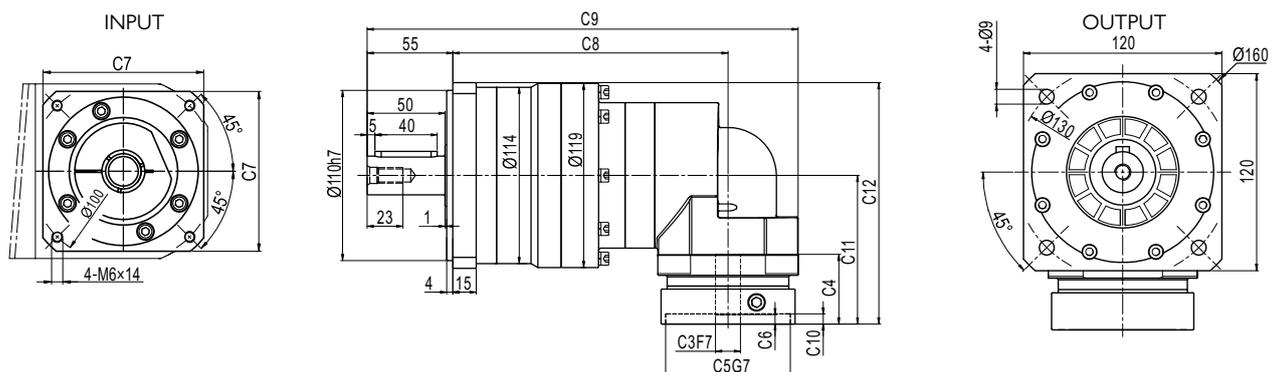
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

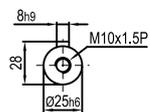
### FGAR-120-L1



### FGAR-120-L2



## OUTPUT DIAMETER



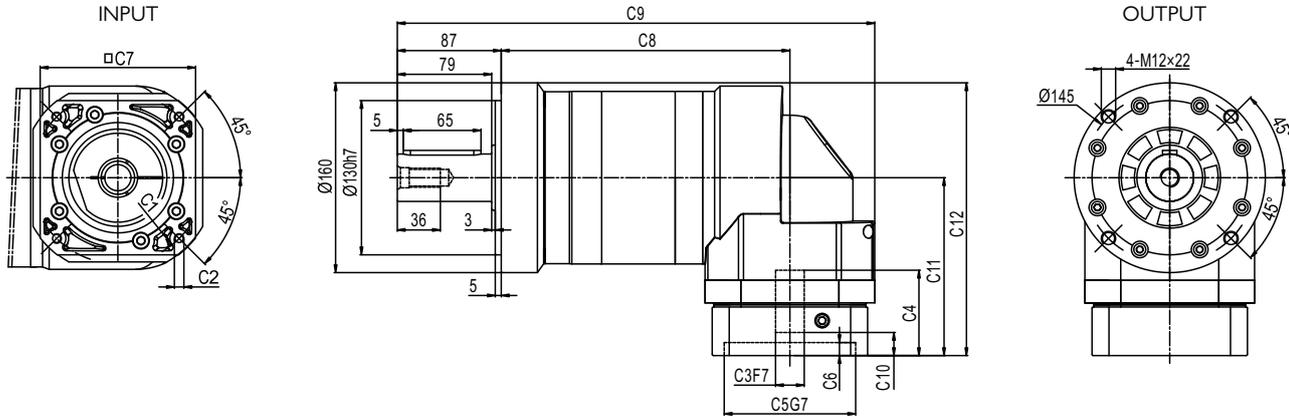
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGAR-120-L1	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	146,5	266,5	19,5	135,5	195,5
FGAR-120M1-L1	ø200	4-M12x28	ø35	81	ø114,3	10	180	146,5	291,5	28	152,5	212,5
FGAR-120-L2	ø90	4-M5x12, 4-M6x14	ø19	45	ø70	6,5	80	176,5	276,5	7	96	156
	ø100	4-M6x14	ø16	45	ø80	6,5	86	176,5	276,5	6	96	156
FGAR-120M1-L2	ø115	4-M8x20	ø19, ø22	56,5	ø95	8	100	176,5	281,5	6,5	117,5	177,5
	ø145	4-M8x20	ø19, ø22, ø24	59	ø110	11	130	176,5	296,5	19	120	180

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)

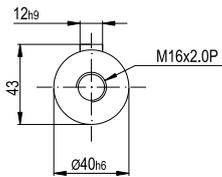
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

### FGR-160A-L2



## OUTPUT DIAMETER



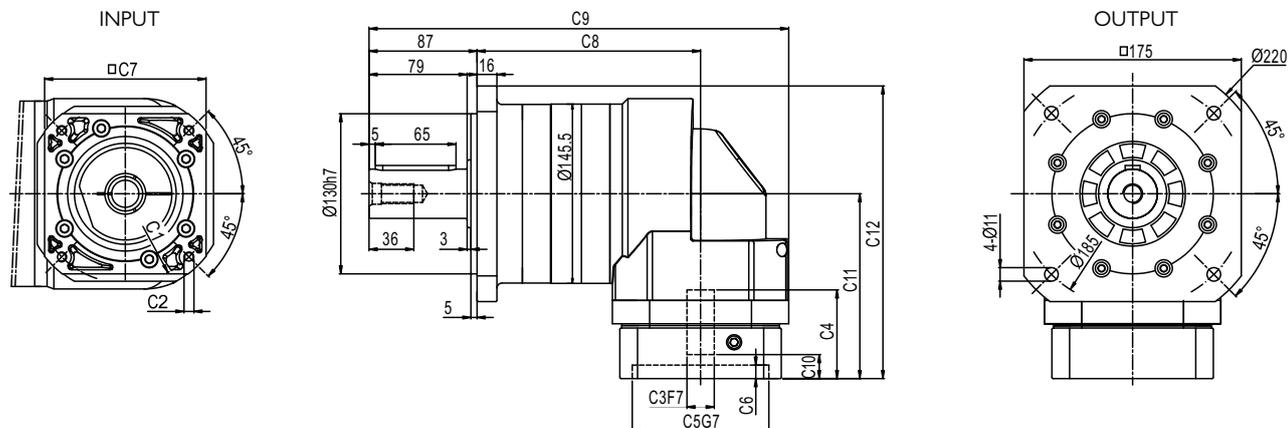
Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-160A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	241,5	399,5	19,5	150	230
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	241,5	418,5	25	160	240

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.

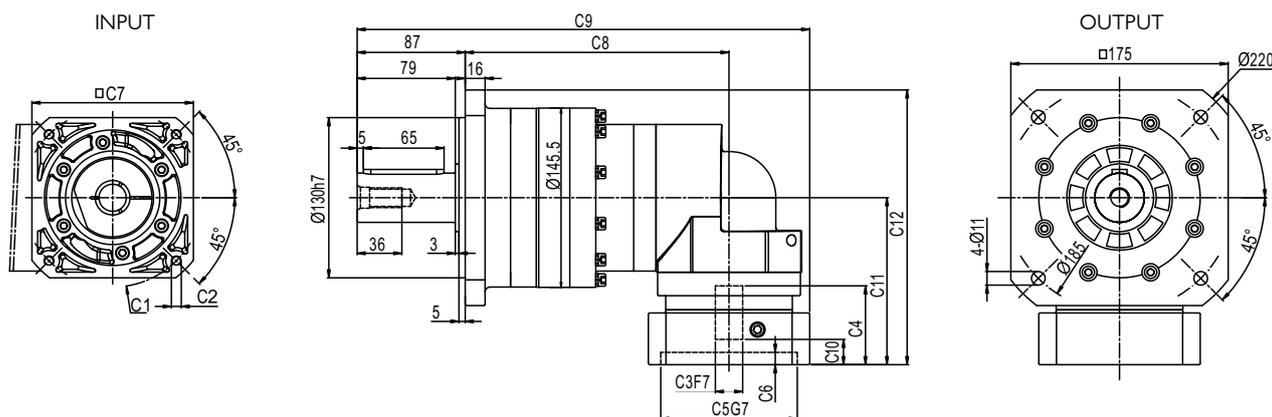
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

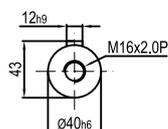
### FGAR-160-L1



### FGR-160-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-160A-L2	ø145	4-M8x20	ø22, ø24	72	ø110	11	130	180	338	19,5	150	237,5
	ø200	4-M12x28	ø35	82	ø114,3	8	180	180	357	25	160	247,5
FGAR-160-L2	ø145	4-M8x20	ø19, ø22, ø24	64	ø110	10	130	212,5	364,5	19,5	135,5	223
FGAR-160M1-L2	ø200	4-M12x28	ø35	81	ø114,3	10	180	212,5	389,5	28	152,5	240

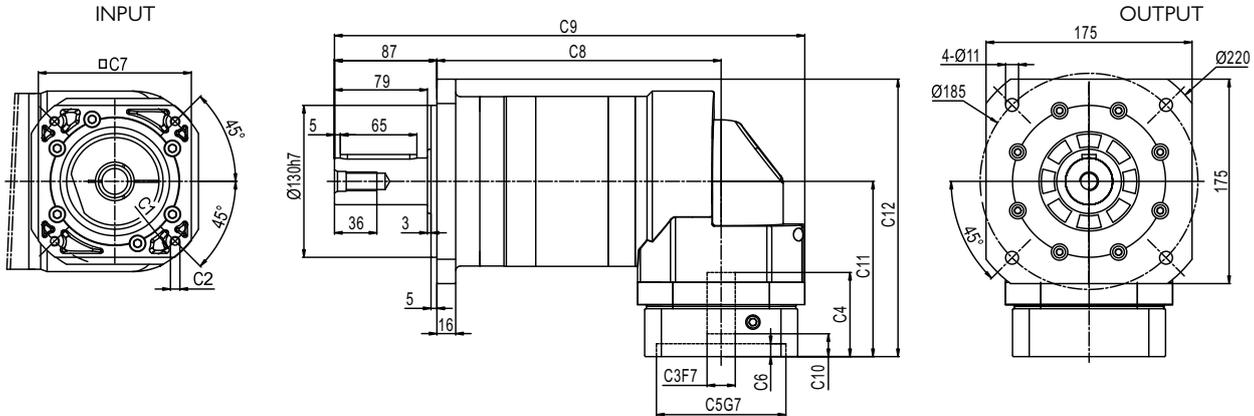
- C1-C7 are motor (metric standard) specific dimensions, which could be customized.
- M1: Limit hole (Version number)



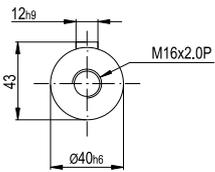
# PRECISION PLANETARY GEARBOX FGR/FGAR SERIES

## PRODUCT DIMENSION

### FGAR-160A-L2



## OUTPUT DIAMETER



Size	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
FGR-160A-L2	$\varnothing 145$	4-M8x20	$\varnothing 22, \varnothing 24$	72	$\varnothing 110$	11	130	241,5	399,5	19,5	150	237,5
	$\varnothing 200$	4-M12x28	$\varnothing 35$	82	$\varnothing 114,3$	8	180	241,5	418,5	25	160	247,5

- C1-C7 are motor (metric standard) specific dimensions, which could be customized.

**CHIARAVALLI LINEAR CENTER**

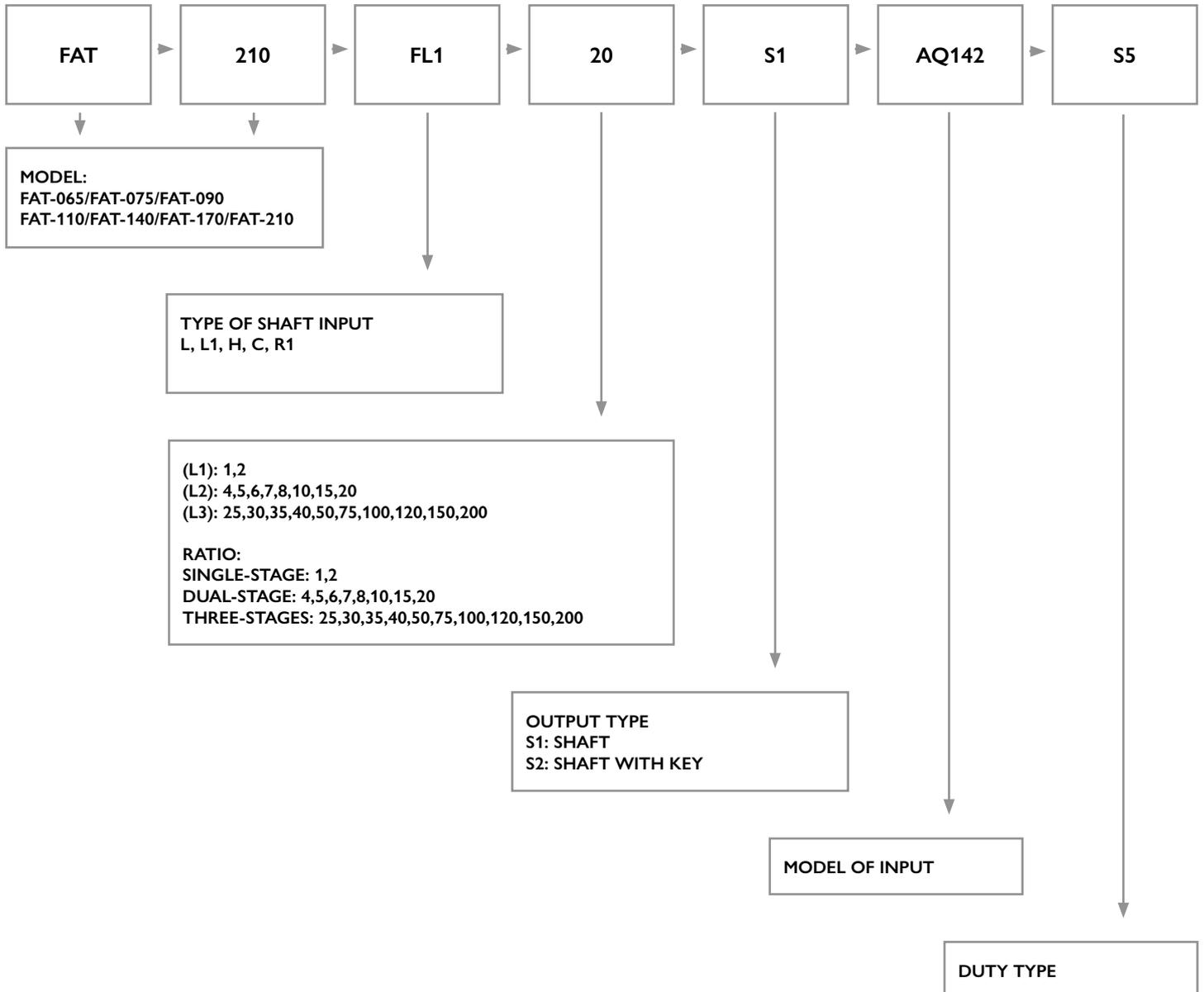
**PRECISION PLANETARY GEARBOX  
FAT SERIES**



# PRECISION PLANETARY GEARBOX FAT SERIES

## MODEL DESCRIPTION

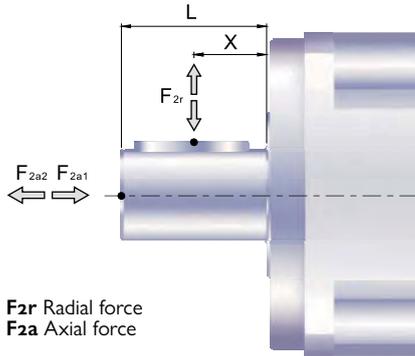
FAT-065-L-1.5-S1-S5



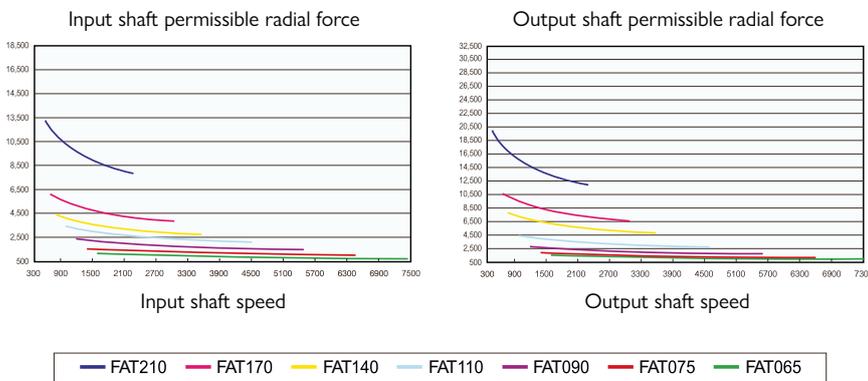


# PRECISION PLANETARY GEARBOX FAT SERIES

## ALLOWABLE RADIAL AND AXIAL FORCES ON THE OUTPUT SHAFT OF THE GEAR REDUCER



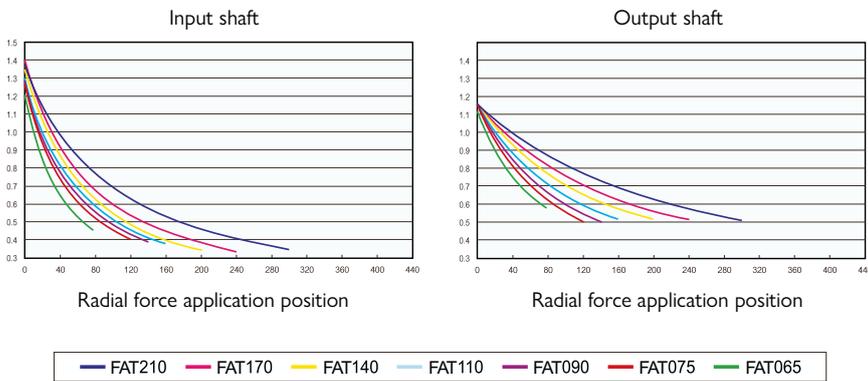
The permitted radial and axial loads on the output shaft depend on the design of the gearbox supporting bearings. Large-span design and high bearing capacity are adopted to achieve the maximum permissible radial and axial loads.



When the radial force  $F_{2r}$  is applied to the center of the shaft, i.e.  $X=1/2 \times L$ , the allowable radial force  $F_{2rB}$  that can be withstood by different specifications of reducers with a service life of 20,000hr\* under different output speeds is as follows:

$$F_{2a1B} = 0,2 \times F_{2rB}$$

$$F_{2a2B} = 0,1 \times F_{2rB}$$



When the radial force  $F_{2r}$  is not in the center of the shaft, the closer to the gearbox, that is,  $X < 1/2 \times L$ , the allowable radial force that can be borne becomes larger, and the farther away from the reducer, i.e.,  $X > 1/2 \times L$ , the allowable force that can be borne becomes smaller.

Radial force

$$F'_{2rB} = K_b \times F_{2rB}$$

Axial force

$$F'_{2a1B} = 0,2 \times F'_{2rB}$$

$$F'_{2a2B} = 0,1 \times F'_{2rB}$$



# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

FAT-L



FAT-FL



FAT-H



FAT-FH



FAT-C



FAT-FC





# PRECISION PLANETARY GEARBOX FAT SERIES

## TECHNICAL SPECIFICATION SHAFT INPUT TYPE

MODEL	STAGE	RATIO	FAT065L	FAT075L	FAT090L	FAT110L	FAT140L	FAT170L	FAT210L	
			FAT065L1 FAT065H FAT065C FAT065R1	FAT075L1 FAT075H FAT075C FAT075R1	FAT090L1 FAT090H FAT090C FAT090R1	FAT110L1 FAT110H FAT110C FAT110R1	FAT140L1 FAT140H FAT140C FAT140R1	FAT170L1 FAT170H FAT170C FAT170R1	FAT210L1 FAT210H FAT210C FAT210R1	
T <sub>2N</sub> /Rated output torque	Nm	1	1	25	45	78	150	360	585	1,300
			1.5	25	45	78	150	360	585	1,300
			2	24	42	68	150	330	544	1,220
			3	18	33	54	120	270	450	1,020
T <sub>2B</sub> /Maximum acceleration moment	Nm	1	1~3	1.5 times of Nominal Output Torque						
n <sub>1B</sub> /Maximum acceleration input speed	rpm	1	1~3	7,500	6,500	5,500	4,500	3,500	3,000	2,200
Backlash	arcmin	1	1~3	≤6	≤6	≤6	≤6	≤6	≤6	≤6
F <sub>1rB</sub> /Maximum input shaft radial force	N	1	1~3	700	950	1,450	2,100	2,700	3,800	7,800
F <sub>2rB</sub> /Maximum output shaft radial force	N	1	1~3	900	1,100	1,700	2,700	4,800	6,600	11,500
F <sub>1aB</sub> /Maximum input shaft axial force	N	1	1~3	350	425	725	1,050	1,350	1,900	3,900
F <sub>2aB</sub> /Maximum output shaft axial force	N	1	1~3	450	550	850	1,350	2,400	3,300	5,750
Life time	h	1	1~3	20,000 (S5 working mode)						
Efficiency	%	1	1~3	≥95%						
Operating temperature	°C	1	1~3	-10°C ~ -90°C						
lubrication				Synthetic lubrication oils						
Noise level (n <sub>l</sub> =1500rpm, no load)	dB (A)	1	1~3	≤68	≤70	≤74	≤76	≤77	≤78	≤80

## MOMENT OF INERTIA

MODEL	STAGE	RATIO	FAT065L	FAT075L	FAT090L	FAT110L	FAT140L	FAT170L	FAT210L
			FAT065L1 FAT065H FAT065C FAT065R1	FAT075L1 FAT075H FAT075C FAT075R1	FAT090L1 FAT090H FAT090C FAT090R1	FAT110L1 FAT110H FAT110C FAT110R1	FAT140L1 FAT140H FAT140C FAT140R1	FAT170L1 FAT170H FAT170C FAT170R1	FAT210L1 FAT210H FAT210C FAT210R1
Mass Moments of Inertia J <sub>1</sub> (kg · cm <sup>2</sup> )	1	1	0.51	1.30	3.16	7.70	23.57	58.99	195.40
		1.5	0.64	1.16	2.82	6.74	19.37	49.28	155.45
		2	0.44	1.11	2.70	6.31	17.75	45.35	140.24
		3	0.43	1.09	2.66	6.17	17.18	44.01	134.95

## WEIGHT

MODEL	STAGE	RATIO	FAT065	FAT075	FAT090	FAT110	FAT 140	FAT170	FAT210
L (Series)	kg	1	2.6	4.2	6.8	11.6	19.8	34.8	66.2
L1 (Series)		1	2.6	4.1	6.7	11.5	19.5	34.2	65.1
H(Series)		1	2.5	3.9	6.4	11.0	18.1	31.6	60.0
C (Series)		1	2.8	4.2	6.9	11.4	19.6	33.7	63.3
R1 (Series)		1	2.6	4.1	6.7	11.5	19.5	34.2	65.1

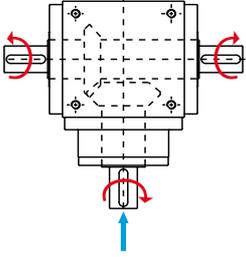
- The above performance parameters are based on the gearbox operating at duty type S5. If it operates at duty type S1, please contact CLC.
- The above backlash is measured under at 2% rated torque T<sub>2N</sub>.



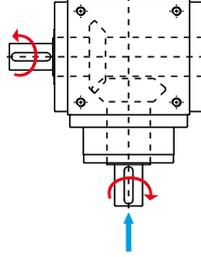
# PRECISION PLANETARY GEARBOX FAT SERIES

## ROTATE DIRECTIONS - SHAFT INPUT TYPE

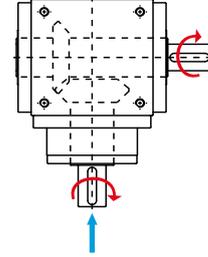
FAT-L, FAT-H, FAT-C,  
FAT-FL, FAT-FH, FAT-FC



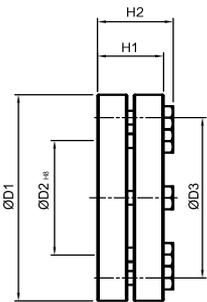
FAT-L1, FAT-FL1



FAT-R1, FAT-FR1



## SHRINK DISCS

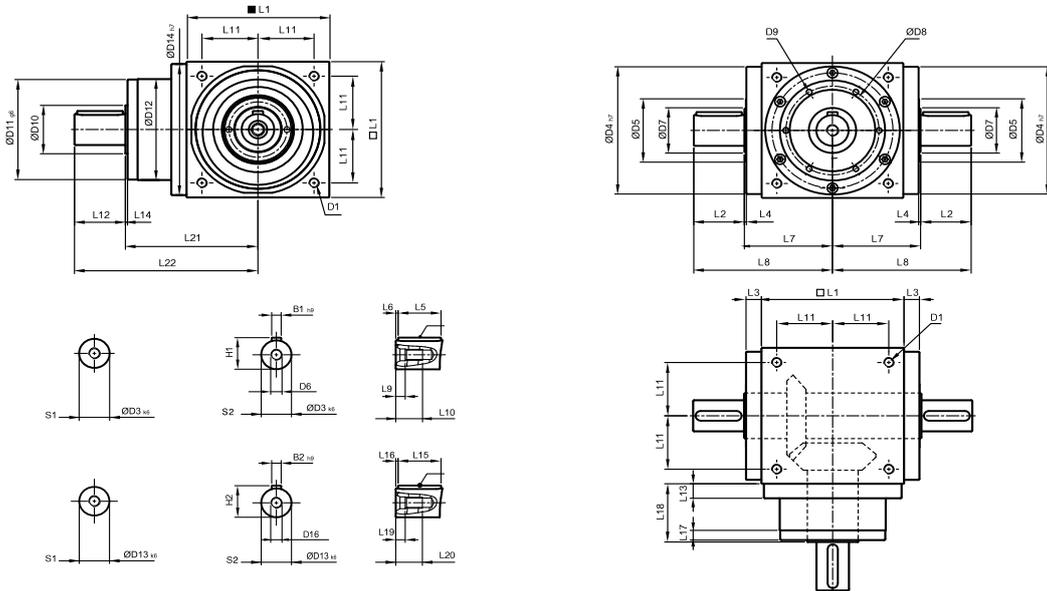


FAT.. C FAT.. TC	D1	D2	D3	H1	H2
SSD-d16xdw14	41	16	26	15	18,5
SSD-d22xdw18	50	22	36	19,5	23
SSD-d25xdw22	50	25	38	19,5	23
SSD-d44xdw32	80	44	61	25,5	29,5
SSD-d50xdw40	90	50	70	27,5	31,5
SSD-d62xdw50	110	62	86	30,5	34,5
SSD-d68xdw55	115	68	86	30,5	34,5
SSD-d75xdw60	138	75	100	32,5	38

# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-L, 1 STAGE



(Unit: mm)

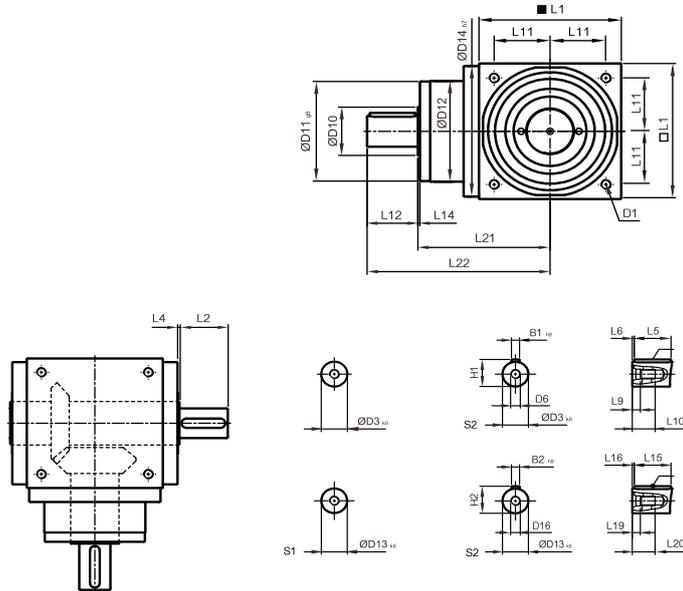
MODEL	FAT065L	FAT075L	FAT090L	FAT110L	FAT140L	FAT170L	FAT210L
D1	M4	M6	M6	M8	M10	M12	M16
D3 k6	13	16	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D6	M4	M5	M5	M8	M12	M16	M16
D7	21	22	28	33	47	55	75
D8	53	62	76	95	92	114	142
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12,5	6xM8xL12,5
D10	15,4	20,4	25,8	35,8	49,8	59,3	79,3
D11 g6	62,9	72,9	87	107	103	127	158
D12	62	72	86	106	104	128	160
D13 k6	13	16	18	22	32	40	50
D14 h7	63	73	88	108	135	165	205
D16	M4	M5	M5	M8	M12	M16	M16
L1	65	75	90	110	140	170	210
L2	19,5	30	35	40	50	60	75
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70
L6	2	2,5	3,5	4	2,5	5	2,5
L7	47,5	54	62	72	87	102	127
L8	67	84	97	112	137	162	202
L9	4,5	4,8	4,8	7,2	10	12	12
L10	10	12,5	12,5	19	28	36	36
L11	27	30	36	44	55	67	85
L12	19,5	30	35	40	50	60	75
L13	13	15	15	15	15	15	20
L14	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70
L16	2	2,5	3,5	4	2,5	5	2,5
L17	6	8	8	8	10	10	10
L18	43	52,5	55	60	60	70	90
L19	4,5	4,8	4,8	7,2	10	12	12
L20	10	12,5	12,5	19	28	36	36
L21	75,5	90	100	115	130	155	195
L22	95	120	135	155	180	215	270
B1 h9	5	5	6	6	10	12	14
B2 h9	5	5	6	6	10	12	14
H1	15	18	20,5	24,5	35	43	53,5
H2	15	18	20,5	24,5	35	43	53,5



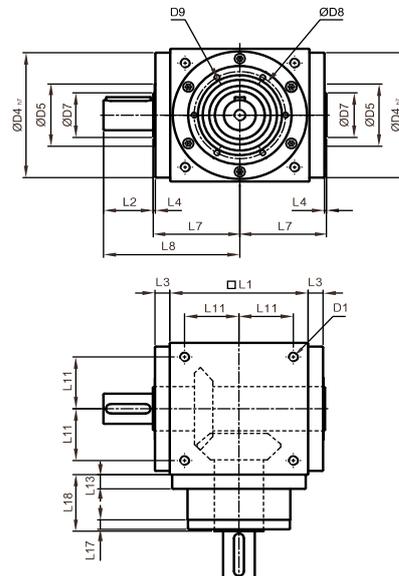
# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-R1, 1 STAGE



### FAT-L1, 1 STAGE



(Unit: mm)

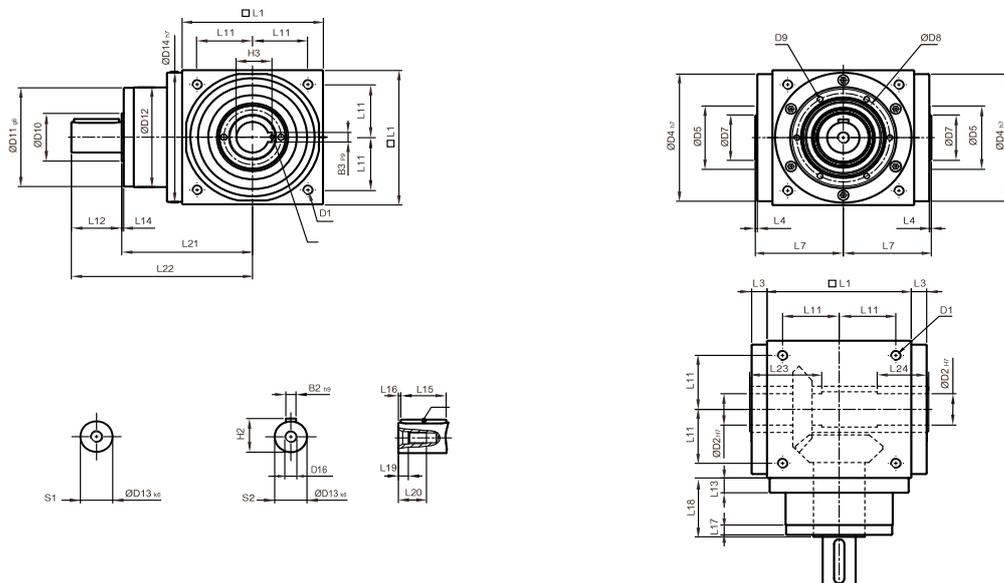
MODEL	FAT065 L1/R1	FAT075 L1/R1	FAT090 L1/R1	FAT110 L1/R1	FAT140 L1/R1	FAT170 L1/R1	FAT210 L1/R1
D1	M4	M6	M6	M8	M10	M12	M16
D3 k6	13	16	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D6	M4	M5	M5	M8	M12	M16	M16
D7	21	22	28	33	47	55	75
D8	53	62	76	95	92	114	142
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12,5	6xM8xL12,5
D10	15,4	20,4	25,8	35,8	49,8	59,3	79,3
D11 g6	62,9	72,9	87	107	103	127	158
D12	62	72	86	106	104	128	160
D13 k6	13	16	18	22	32	40	50
D14 h7	63	73	88	108	135	165	205
D16	M4	M5	M5	M8	M12	M16	M16
L1	65	75	90	110	140	170	210
L2	19,5	30	35	40	50	60	75
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70
L6	2	2,5	3,5	4	2,5	5	2,5
L7	47,5	54	62	72	87	102	127
L8	67	84	97	112	137	162	202
L9	4,5	4,8	4,8	7,2	10	12	12
L10	10	12,5	12,5	19	28	36	36
L11	27	30	36	44	55	67	85
L12	19,5	30	35	40	50	60	75
L13	13	15	15	15	15	15	20
L14	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70
L16	2	2,5	3,5	4	2,5	5	2,5
L17	6	8	8	8	10	10	10
L18	43	52,5	55	60	60	70	90
L19	4,5	4,8	4,8	7,2	10	12	12
L20	10	12,5	12,5	19	28	36	36
L21	75,5	90	100	115	130	155	195
L22	95	120	135	155	180	215	270
B1 h9	5	5	6	6	10	12	14
B2 h9	5	5	6	6	10	12	14
H1	15	18	20,5	24,5	35	43	53,5
H2	15	18	20,5	24,5	35	43	53,5



# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-H, 1 STAGE



(Unit: mm)

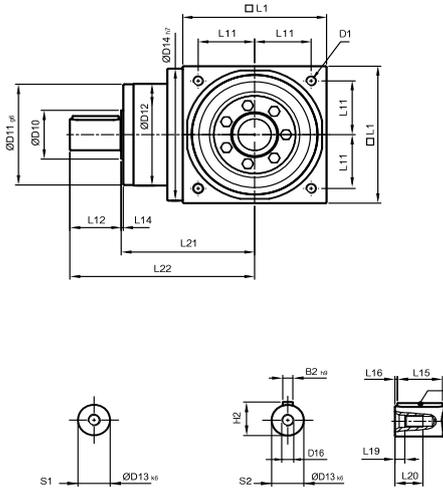
MODEL	FAT065 H	FAT075 H	FAT090 H	FAT110 H	FAT140 H	FAT170 H	FAT210 H
D1	M4	M6	M6	M8	M10	M12	M16
D2 H7	13	14	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D7	21	22	28	33	47	55	75
D8	53	62	76	95	62	114	142
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12,5	6xM8xL12,5
D10	15,4	20,4	25,8	35,8	49,8	59,3	79,3
D11 g6	62,9	72,9	87	107	103	127	158
D12	62	72	86	106	104	128	160
D13 k6	13	16	18	22	32	40	50
D14 h7	63	73	88	108	135	165	205
D16	M4	M5	M5	M8	M12	M16	M16
L1	65	75	90	110	140	170	210
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L7	47,5	54	62	72	87	102	127
L11	27	30	36	44	55	67	85
L12	19,5	30	35	40	50	60	75
L13	13	15	15	15	15	15	20
L14	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70
L16	2	2,5	3,5	4	2,5	5	2,5
L17	6	8	8	8	10	10	10
L18	43	52,5	55	60	60	70	90
L19	4,5	4,8	4,8	7,2	10	12	12
L20	10	12,5	12,5	19	28	36	36
L21	75,5	90	100	115	130	155	195
L22	95	120	135	155	180	215	270
L23	23	47	52	53	70	80	95
L24	30	32	35	35	50	55	65
B2 h9	5	5	6	6	10	12	14
B3 P9	5	5	6	6	10	12	14
H2	15	18	20,5	24,5	35	43	53,5
H3	15,3	16,3	20,8	24,8	35,3	43,3	53,8



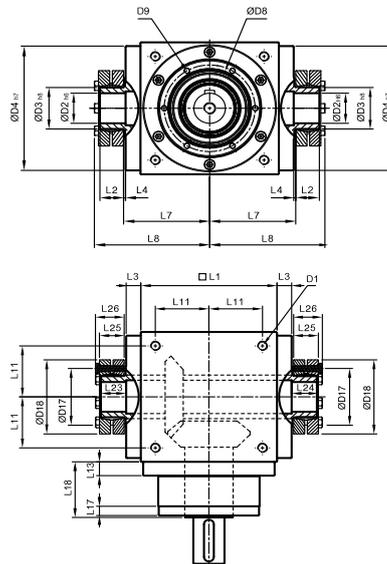
# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-C, 1 STAGE



### FAT-L1, 1 STAGE



(Unit: mm)

MODEL	FAT065 C	FAT075 C	FAT090 C	FAT110 C	FAT140 C	FAT170 C	FAT210 C
D1	M4	M6	M6	M8	M10	M12	M16
D2 H6	13	14	18	22	32	40	50
D3 h8	16	16	22	25	44	50	62
D4 h7	63	73	88	108	135	165	205
D8	53	62	76	95	92	114	142
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12,5	6xM8xL12,5
D10	15,4	20,4	25,8	35,8	49,8	59,3	79,3
D11 g6	62,9	72,9	87	107	103	127	158
D12	62	72	86	106	104	128	160
D13 K6	13	16	18	22	32	40	50
D14 h7	63	63	88	108	135	165	205
D16	M4	M5	M5	M8	M12	M16	M16
D17	26	26	36	38	61	70	86
D18	41	41	50	50	80	90	110
L1	65	75	90	110	140	170	210
L2	14	14	18	18	24	26	29
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L7	47,5	54	54	72	87	102	127
L8	66	72,5	72,5	95	116,5	133,5	161,5
L11	27	30	30	44	55	67	85
L12	19,5	30	30	40	50	60	75
L13	13	15	15	15	15	15	20
L14	2	2	2	2	2	2	2
L15	16	25	25	32	45	50	70
L16	2	2,5	2,5	4	2,5	5	2,5
L17	6	8	8	8	10	10	10
L18	43	52,5	52,5	60	60	70	90
L19	4,5	4,8	4,8	7,2	10	12	12
L20	10	12,5	12,5	19	28	36	36
L21	75,5	90	100	115	130	155	195
L22	95	120	135	155	180	215	270
L23	15	15	20	20	26	28	31
L24	15	15	20	20	26	28	31
L25	15	15	19,5	19,5	25,5	27,5	30,5
L26	18,5	18,5	23	23	29,5	31,5	34,5
B2 h9	5	5	6	6	10	12	14
H2	15	18	20,5	24,5	35	43	53,5



# PRECISION PLANETARY GEARBOX FAT SERIES

## TECHNICAL SPECIFICATION - FLANGE INPUT TYPE

(Unit: mm)

MODEL		STAGE	RATIO	FAT065 FL	FAT075 FL	FAT090 FL	FAT110 FL	FAT140 FL	FAT170 FL	FAT210 FL
				FAT065 FL1 FAT065 FH FAT065 FC FAT065 FR1	FAT075 FL1 FAT075 FH FAT075 FC FAT075 FR1	FAT090 FL1 FAT090 FH FAT090 FC FAT090 FR1	FAT110 FL1 FAT110 FH FAT110 FC FAT110 FR1	FAT140 FL1 FAT140 FH FAT140 FC FAT140 FR1	FAT170 FL1 FAT170 FH FAT170 FC FAT170 FR1	FAT210 FL1 FAT210 FH FAT210 FC FAT210 FR1
T <sub>2N</sub> Rated output torque	Nm	1	1	25	45	78	150	360	585	1,300
			1.5	25	45	78	150	360	585	1,300
			2	24	42	68	150	330	544	1,220
			3	18	33	54	120	270	450	1,020
		2	4	25	45	78	150	360	585	1,300
			5	25	45	78	150	360	585	1,300
			6	25	45	78	150	360	585	1,300
			7	25	45	78	150	360	585	1,300
			8	24	42	68	150	330	544	1,220
			10	24	42	68	150	330	544	1,220
			15	18	33	54	120	270	450	1,020
			20	24	42	68	150	330	544	1,220
		3	25	25	45	78	150	360	585	1,300
			30	25	45	78	150	360	585	1,300
			35	25	45	78	150	360	585	1,300
			40	25	45	78	150	360	585	1,300
			50	24	42	68	150	330	544	1,220
			75	-	-	-	120	270	450	1,020
			100	-	-	-	150	330	544	1,220
			120	-	-	-	120	270	450	1,020
150	-		-	-	120	270	450	1,020		
200	-		-	-	150	330	544	1,220		
300	-	-	-	120	270	450	1,020			
T <sub>2B</sub> /Maximum acceleration moment	Nm	1,2,3	1~300	(1.5 times of Nominal Output Torque)						
η <sub>1B</sub> /Maximum acceleration input speed	rpm	1	1~3	7,500	6,500	5,500	4,500	3,500	3,000	2,200
		2	4~20	8,000	8,000	6,000	6,000	6,000	6,000	4,800
		3	25~300	-	-	-	8,000	8,000	6,000	6,000
Backlash	arcmin	1	1~3	≤6	≤6	≤6	≤6	≤6	≤6	≤6
		2	4~20	≤10	≤10	≤10	≤10	≤10	≤10	≤10
		3	25~300	-	-	-	≤12	≤12	≤12	≤12
F <sub>2rB</sub> /Maximum input shaft radial force	N	1,2,3	1~300	900	1,100	1,700	2,700	4,800	6,600	11,500
F <sub>2aB</sub> /Maximum input shaft axial force	N	1,2,3	1~300	450	550	850	1,350	2,400	3,300	5,750
Life time	h	1,2,3	1~300	20,000 (S5 working mode)						
η/Efficiency	%	1	01~300	≥95%						
		2,3	4~300	≥92%						
Operating temperature	°C	1,2,3	1~300	-10°C ~ 90°C						
Lubrication				Synthetic lubrication oils						
Noise level (nl=1500rpm, no load) <sup>6</sup>	dB (A)	1,2,3	1~300	≤71	≤72	≤76	≤77	≤78	≤79	≤81

1. The above performance parameters are based on the gearbox operating at duty type S5. If it operates at duty type S1, please contact CLC.

2. The above backlash is measured under at 2% rated torque T<sub>2N</sub>



# PRECISION PLANETARY GEARBOX FAT SERIES

## MOMENT OF INERTIA - FLANGE INPUT TYPE

(Unit: mm)

MODEL	STAGE	RATIO	FAT065 FL	FAT075 FL	FAT090 FL	FAT110 FL	FAT140 FL	FAT170 FL	FAT210 FL
			FAT065 FL1 FAT065 FH FAT065 FC FAT065 FR1	FAT075 FL1 FAT075 FH FAT075 FC FAT075 FR1	FAT090 FL1 FAT090 FH FAT090 FC FAT090 FR1	FAT110 FL1 FAT110 FH FAT110 FC FAT110 FR1	FAT140 FL1 FAT140 FH FAT140 FC FAT140 FR1	FAT170 FL1 FAT170 FH FAT170 FC FAT170 FR1	FAT210 FL1 FAT210 FH FAT210 FC FAT210 FR1
$J_1$ (kg · cm <sup>2</sup> ) Mass Moments of Inertia $J_1$	1	1	0,51	1,30	3,14	7,62	23,54	59,09	195,96
		1,5	0,46	1,15	2,80	6,65	19,34	49,38	156,02
		2	0,44	1,10	2,68	6,23	17,72	45,44	140,8
		3	0,43	1,09	2,64	6,08	17,16	44,11	135,51
	2	4	0,43	1,08	2,63	6,05	17,03	43,79	134,14
		5	0,43	1,08	2,63	6,04	16,99	43,69	133,71
		6	0,15	0,15	0,50	2,79	2,79	2,79	9,91
		7	0,15	0,15	0,50	2,79	2,79	2,79	9,91
		8	0,15	0,15	0,50	2,80	2,80	2,80	9,96
		10	0,15	0,15	0,50	2,80	2,80	2,80	9,96
		15	0,15	0,15	0,50	2,80	2,80	2,80	9,96
		20	0,15	0,15	0,50	2,80	2,80	2,80	9,96
	3	25	0,15	0,15	0,50	2,80	2,80	2,80	9,96
		30	0,15	0,15	0,50	2,80	2,80	2,80	9,96
		35	0,15	0,15	0,50	2,79	2,79	2,79	9,91
		40	0,15	0,15	0,50	2,79	2,79	2,79	9,91
		50	0,15	0,15	0,50	2,79	2,79	2,79	9,89
		75	-	-	-	0,15	0,15	0,50	0,50
		100	-	-	-	0,15	0,15	0,50	0,50
		120	-	-	-	0,15	0,15	0,50	0,50
150		-	-	-	0,15	0,15	0,50	0,50	
200		-	-	-	0,15	0,15	0,50	0,50	
300	-	-	-	0,15	0,15	0,50	0,50		

## WEIGHT

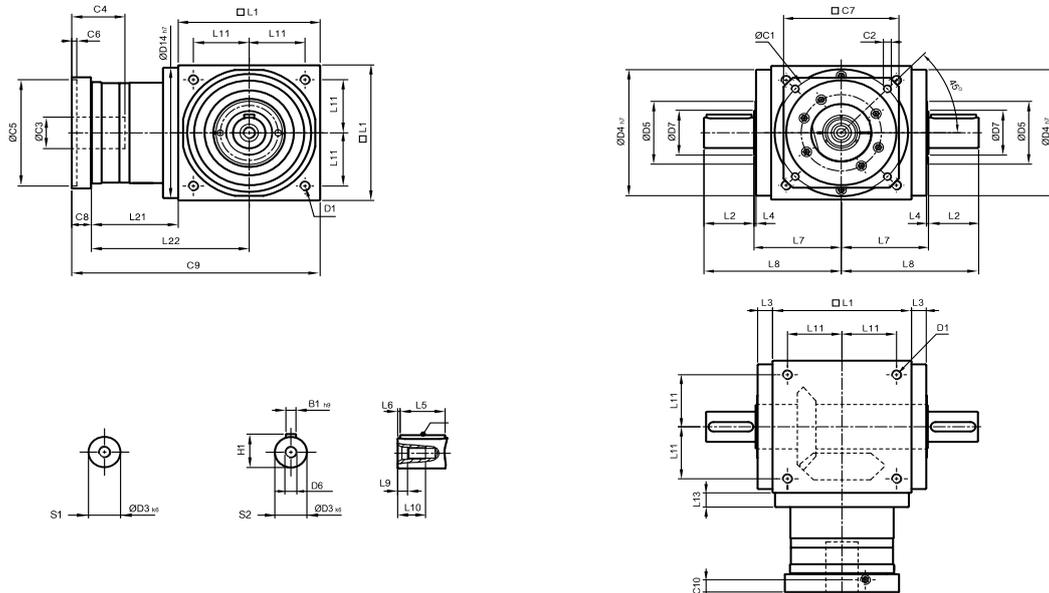
(Unit: mm)

MODEL	STAGE	RATIO	PT065	PT075	PT090	PT110	PT140	PT170	PT210	
FL (Series)	kg	1	1~3	2,8	4,4	7,1	12,1	20,9	36,1	69,4
		2	4~20	3,2	4,8	8,1	14,3	24,2	38,5	38,5
		3	25~300	-	-	-	13,9	23,7	38,8	73,4
FL1 (Series)	kg	1	1~3	2,7	4,3	7,1	11,9	20,3	35,5	68,3
		2	4~20	3,2	4,8	8,0	14,2	23,9	37,9	73,0
		3	25~300	-	-	-	13,8	23,4	38,2	72,3
FH (Series)	kg	1	1~3	2,6	4,1	6,7	11,4	18,9	32,9	63,2
		2	4~20	3,1	4,6	7,7	13,6	22,4	35,3	67,9
		3	25~300	-	-	-	13,3	21,9	35,6	67,2
FC (Series)	kg	1	1~3	2,9	4,4	7,2	11,8	20,4	35,0	66,5
		2	4~20	3,3	4,9	8,2	14,1	24,1	37,4	71,2
		3	25~300	-	-	-	13,7	23,5	37,5	70,5
FR1 (Series)	kg	1	1~3	2,7	4,3	7,1	11,9	20,3	35,5	68,3
		2	4~20	3,2	4,8	8,0	14,2	23,9	37,9	73
		3	25~300	-	-	-	13,8	23,4	38,2	72,3

# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FL, 1 STAGE



(Unit: mm)

MODEL	FAT065 FL	FAT075 FL	FAT090 FL	FAT110 FL	FAT140 FL	FAT170 FL	FAT210 FL
D1	M4	M6	M6	M8	M10	M12	M16
D3 k6	13	16	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D6	M4	M5	M5	M8	M12	M16	M16
D7	21	22	28	33	47	55	75
D14 h7	63	73	88	108	135	165	205
L1	65	75	90	110	140	170	210
L2	19,5	30	35	40	50	60	75
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70
L6	2	2,5	3,5	4	2,5	5	2,5
L7	47,5	54	62	72	87	102	127
L8	67	84	97	112	137	162	202
L9	4,5	4,8	4,8	7,2	10	12	12
L10	10	12,5	12,5	19	28	36	36
L11	27	30	36	44	55	67	85
L13	13	15	15	15	15	15	20
L21	49	60,5	63	69,5	85,5	95	130
L22	81,5	98	1,8	124,5	155,5	180	235
C1 <sup>1</sup>	46	70	100	100	130	165	215
C2 <sup>1</sup>	M4	M5	M6	M6	M8	M10	M12
C3 <sup>1</sup>	≤11/≤12 <sup>2</sup>	≤14/≤15,875/≤16 <sup>2</sup>	≤19	≤24	≤32	≤38	≤42
C4 <sup>1</sup>	30	34	40	40	50	60	85
C5 <sup>1</sup>	30	50	80	80	110	130	180
C6 <sup>1</sup>	3,5	8	4	4	5	6	6
C7 <sup>1</sup>	42	60	90	90	115	142	190
C8 <sup>1</sup>	19,5	19	17	17	19,5	22,5	29
C9 <sup>1</sup>	133,5	154,5	170	196,5	245	287,5	369
C10 <sup>1</sup>	13,25	13,5	10,75	10,75	13	15	20,75
B1 h9	5	5	6	6	10	12	14
H1	15	18	20,5	24,5	35	43	53,5

Some dimensions of gearbox refer to IS09409 standard.

For more detailed information, or special sizes, please: contact CLC.

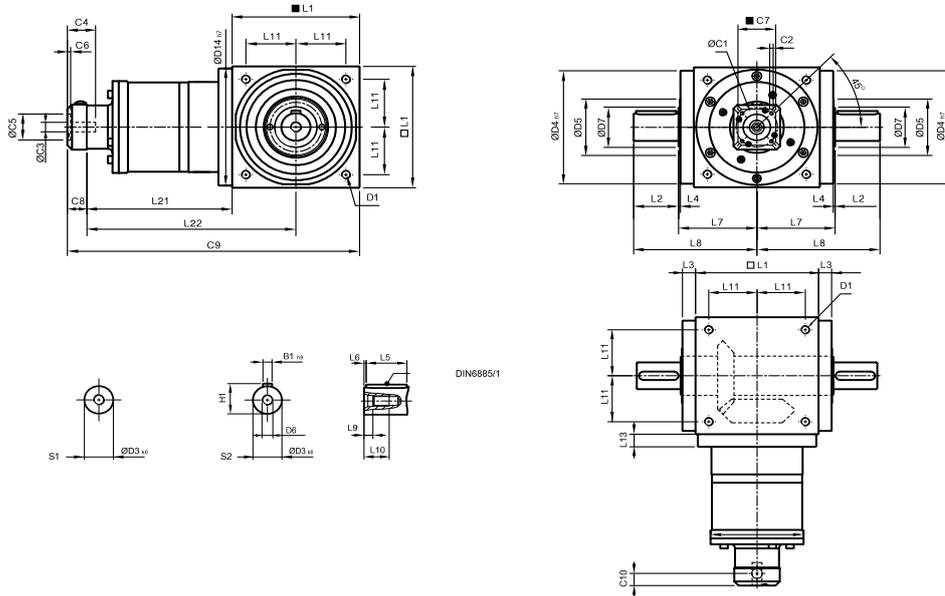




# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FL, 3 STAGES



(Unit: mm)

MODEL	FAT110 FL	FAT140 FL	FAT170 FL	FAT210 FL
D1	M8	M10	M12	M16
D3 k6	22	32	40	50
D4 h7	108	135	165	205
D5	53	68	83	104
D6	M8	M12	M16	M16
D7	33	47	55	75
D14 h7	108	135	165	205
L1	110	140	170	210
L2	40	50	60	75
L3	15	15	15	20
L4	2	2	2	2
L5	32	45	50	70
L6	4	2,5	5	2,5
L7	72	87	102	127
L8	112	137	162	202
L9	7,2	10	12	12
L10	19	28	36	36
L11	44	55	67	85
L13	15	15	15	20
L21	136,5	159,5	183,5	226
L22	191,5	229,5	268,5	331
C1	46	46	70	70
C2	M4	M4	M5	M5
C3	≤12	≤12	≤16	≤16
C4	30	30	34	34
C5	30	30	50	50
C6	3,5	3,5	8	8
C7	42	42	60	60
C8	21,5	21,5	21,5	21,5
C9	268	321	375	457,5
C10	14,5	14,5	15,5	15,5
B1 h9	6	10	12	14
H1	24,5	35	43	53,5

Some dimensions of gearbox refer to ISO9409 standard.

For more detailed information, or special sizes, please: contact CLC.

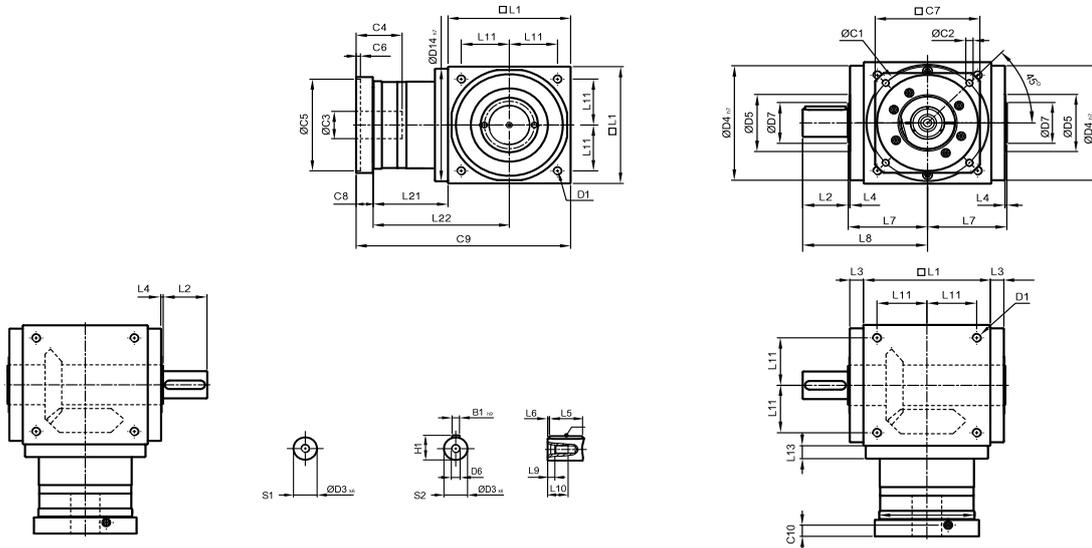


# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FR1, 1 STAGE

### FAT-FL1, 1 STAGE



(Unit: mm)

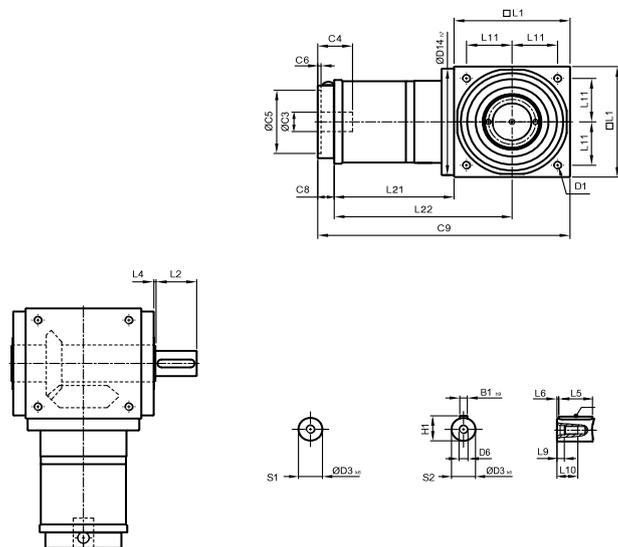
MODEL	FAT065 FL1/FR1	FAT075 FL1/FR1	FAT090 FL1/FR1	FAT110 FL1/FR1	FAT140 FL1/FR1	FAT170 FL1/FR1	FAT210 FL1/FR1
D1	M4	M6	M6	M8	M10	M12	M16
D3 k6	13	16	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D6	M4	M5	M5	M8	M12	M16	M16
D7	21	22	28	33	47	55	75
D14 h7	63	73	88	108	135	165	205
L1	65	75	90	110	140	170	210
L2	19,5	30	35	40	50	60	75
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L5	16	25	28	45	45	50	70
L6	2	2,5	3,5	4	2,5	5	2,5
L7	47,5	54	62	72	87	102	127
L8	67	84	97	112	137	162	202
L9	4,5	4,8	4,8	7,2	10	12	12
L10	10	12,5	12,5	19	28	36	36
L11	27	30	36	44	55	67	85
L13	13	15	15	15	15	15	20
L21	49	60,5	63	69,5	85,5	95	130
L22	81,5	98	108	124,5	155,5	180	235
C1	46	70	100	100	130	165	215
C2	M4	M5	M6	M6	M8	M10	M12
C3	≤11/≤12	≤14/≤15,875/≤16	≤19	≤24	≤32	≤38	≤42
C4	30	34	40	40	50	60	85
C5	30	50	80	80	110	130	180
C6	3,5	8	4	4	5	6	6
C7	42	60	90	90	115	142	190
C8	19,5	19	17	17	19,5	22,5	29
C9	133,5	154,5	170	196,5	245	287,5	369
C10	13,25	13,5	10,75	10,75	13	15	20,75
B1 h9	5	5	6	6	10	12	14
H1	15	18	20,5	24,5	30	43	53,5

Some dimensions of gearbox refer to ISO9409 standard.  
For more detailed information, or special sizes, please: contact CLC.

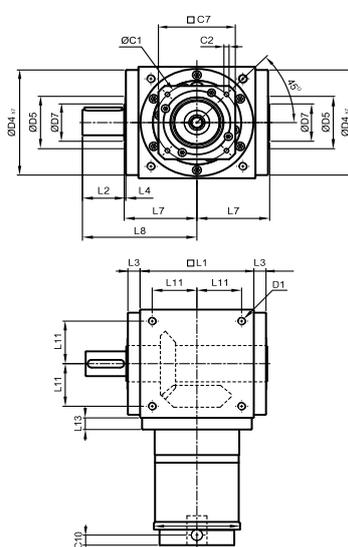
# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FR1, 2 STAGES



### FAT-FL1, 2 STAGES



(Unit: mm)

MODEL	FAT065 FL1/FR1	FAT075 FL1/FR1	FAT090 FL1/FR1	FAT110 FL1/FR1	FAT140 FL1/FR1	FAT170 FL1/FR1	FAT210 FL1/FR1
D1	M4	M6	M6	M8	M10	M12	M16
D3 k6	13	16	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D6	M4	M5	M5	M8	M12	M16	M16
D7	21	22	28	33	47	55	75
D14 h7	63	73	88	108	135	165	205
L1	65	75	90	110	140	170	210
L2	19,5	30	35	40	50	60	75
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70
L6	2	2,5	3,5	4	2,5	5	2,5
L7	47,5	54	62	72	87	102	127
L8	67	84	97	112	137	162	202
L9	4,5	4,8	4,8	7,2	10	12	12
L10	10	12,5	12,5	19	28	36	36
L11	27	30	36	44	55	67	85
L13	13	15	15	15	15	15	20
L21	75	84,5	99	122	144,5	157,5	206,5
L22	107,5	122	144	177	214,5	242,5	311,5
C1	46	46	70	100	100	100	130
C2	M4	M4	M5	M6	M6	M6	M8
C3	≤12	≤12	≤16	≤24	≤24	≤24	≤32
C4	30	30	34	40	40	40	50
C5	30	30	50	80	80	80	110
C6	3,5	3,5	8	4	4	4	5
C7	42	42	60	92	92	92	115
C8	21,5	21,5	21,5	20	20	20	24
C9	161,5	181	210,5	252	304,5	347,5	440,5
C10	14,55	14,5	15,5	13	13	1	16
B1 h9	5	5	6	6	10	12	14
H1	15	18	20,5	24,5	35	43	53,5

Some dimensions of gearbox refer to ISO9409 standard.  
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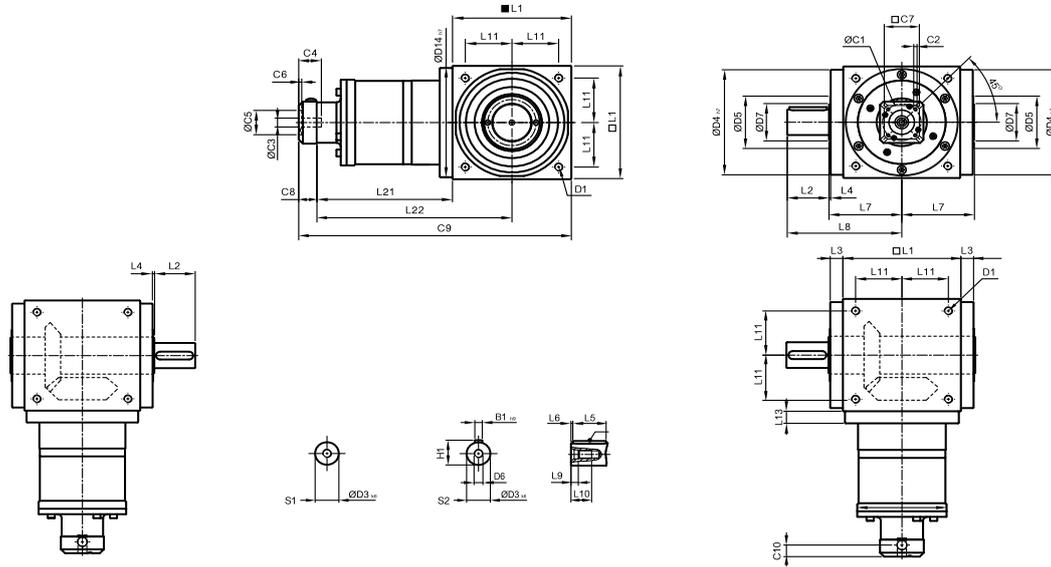


# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FR1, 3 STAGES

### FAT-FL1, 3 STAGES



(Unit: mm)

MODEL	FAT110 FL1/FR1	FAT140 FL1/FR1	FAT170 FL1/FR1	FAT210 FL1/FR1
D1	M8	M10	M12	M16
D3 k6	22	32	40	50
D4 h7	108	135	165	205
D5	53	68	83	104
D6	M8	M12	M16	M16
D7	33	47	55	75
D14 h7	108	135	165	205
L1	110	140	170	210
L2	40	50	60	75
L3	15	15	15	20
L4	2	2	2	2
L5	32	45	50	70
L6	4	2,5	5	2,5
L7	72	87	102	127
L8	112	137	162	202
L9	7,2	10	12	12
L10	19	28	36	36
L11	44	55	67	85
L13	15	15	15	20
L21	136,5	159,5	183,5	226
L22	191,5	229,5	268,5	331
C1	46	46	70	70
C2	M4	M4	M5	M5
C3	≤12	≤12	≤16	≤16
C4	30	30	34	34
C5	30	30	50	50
C6	3,5	3,5	8	8
C7	42	42	60	60
C8	21,5	21,5	21,5	21,5
C9	268	321	375	457,5
C10	14,5	14,5	15,5	15,5
B1 h9	6	10	12	14
H1	24,5	35	43	53,5

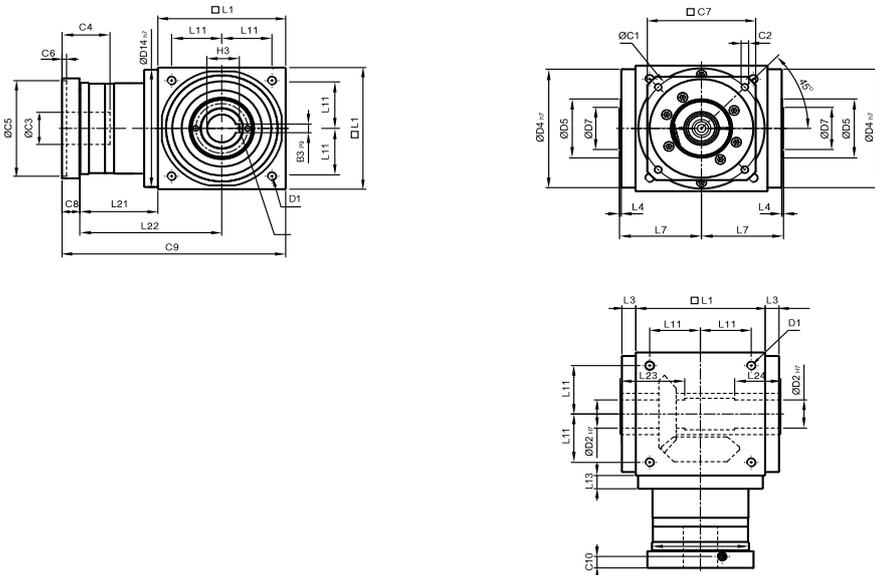
Some dimensions of gearbox refer to ISO9409 standard.  
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# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FH, 1 STAGE



(Unit: mm)

MODEL	FAT065 FH	FAT075 FH	FAT090 FH	FAT110 FH	FAT140 FH	FAT170 FH	FAT210 FH
D1	M4	M6	M6	M8	M10	M12	M16
D2 H7	13	14	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D7	21	22	28	33	47	55	75
D14 h7	63	73	88	108	135	165	205
L1	65	75	90	110	140	170	210
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L7	47,5	54	62	72	87	102	127
L11	27	30	36	44	55	67	85
L13	13	15	15	15	15	15	20
L21	49	60,5	63	69,5	85,5	95	130
L22	81,5	98	108	124,5	155,5	180	235
L23	40	47	52	53	70	80	95
L24	30	32	35	35	50	55	65
C1	46	70	100	100	130	165	215
C2	M4	M5	M6	M6	M8	M10	M12
C3	≤11/≤12	≤14/≤15,875/≤16	≤19	≤24	≤32	≤38	≤42
C4	30	34	40	40	50	60	85
C5	30	50	80	80	110	130	180
C6	3,5	8	4	4	5	6	6
C7	42	60	90	90	115	142	190
C8	19,5	19	17	17	19,5	22,5	29
C9	133,5	154,5	170	196,5	245	287,5	369
C10	13,25	13,5	10,75	10,75	13	15	20,75
B3 P9	5	5	6	6	10	12	14
H3	15,3	16,3	20,8	24,8	35,3	43,3	53,8

Some dimensions of gearbox refer to ISO9409 standard.

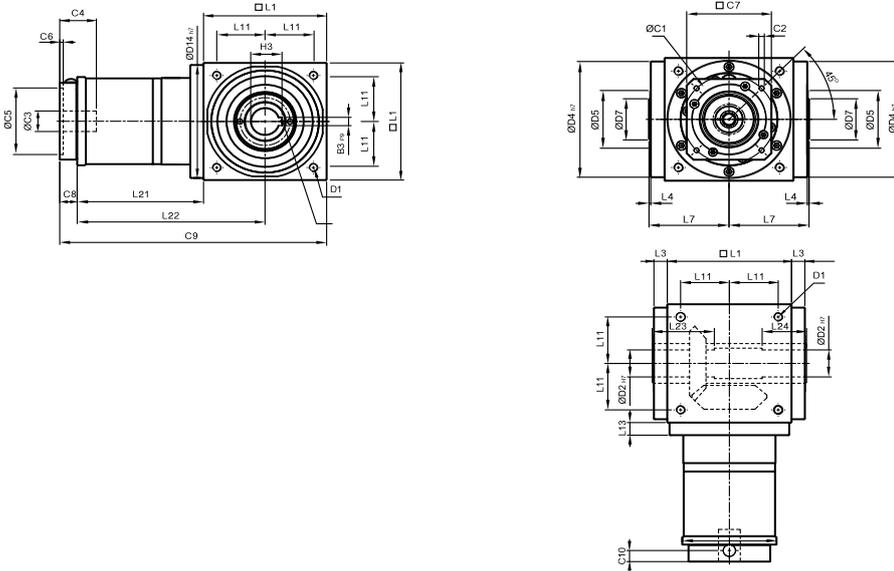
For more detailed information, or special sizes, please: contact CLC.



# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FH, 2 STAGES



(Unit: mm)

MODEL	FAT065 FH	FAT075 FH	FAT090 FH	FAT110 FH	FAT140 FH	FAT170 FH	FAT210 FH
D1	M4	M6	M6	M8	M10	M12	M16
D2 H7	13	14	18	22	32	40	50
D4 h7	63	73	88	108	135	165	205
D5	31	35	43	53	68	83	104
D7	21	22	28	33	47	55	75
D14 h7	63	73	88	108	135	165	205
L1	65	75	90	110	140	170	210
L3	13	14,5	15	15	15	15	2
L4	2	2	2	2	2	2	2
L7	47,5	54	62	72	87	102	127
L11	27	30	36	44	55	67	85
L13	13	15	15	15	15	15	20
L21	75	84,5	99	122	144,5	157,5	206,5
L22	107,5	122	144	177	214,5	242,5	311,5
L23	40	47	52	53	70	80	95
L24	30	32	35	35	50	55	65
C1	46	46	70	100	100	100	130
C2	M4	M4	M5	M6	M6	M6	M8
C3	≤12	≤12	≤16	≤24	≤24	≤24	≤32
C4	30	30	34	40	40	40	50
C5	30	30	50	80	80	80	110
C6	3,5	3,5	8	4	4	4	5
C7	42	42	60	92	92	92	115
C8	21,5	21,5	21,5	20	20	20	24
C9	161,5	181	210,5	252	304,5	347,5	440,5
C10	14,5	14,5	15,5	13	13	13	16
B3 P9	5	5	6	6	10	12	14
H3	15,3	16,3	20,8	24,8	35,3	43,3	53,8

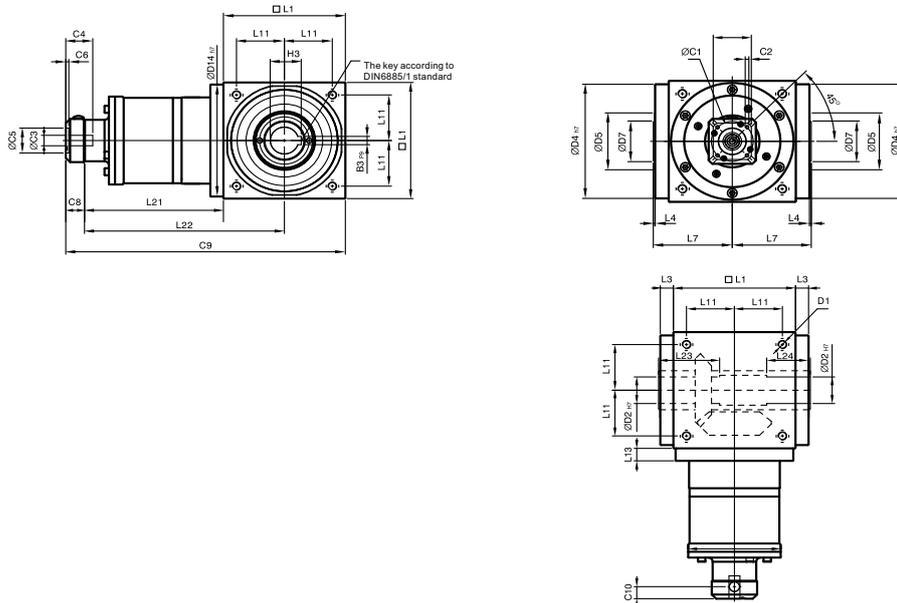
Some dimensions of gearbox refer to ISO9409 standard.  
For more detailed information, or special sizes, please: contact CLC.



# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FH, 3 STAGE



(Unit: mm)

MODEL	FAT110 FH	FAT140 FH	FAT170 FH	FAT210 FH
D1	M8	M10	M12	M16
D2 H7	22	32	40	50
D4 h7	108	135	165	205
D5	53	68	83	104
D7	33	47	55	75
D14 h7	108	135	165	205
L1	110	140	170	210
L3	15	15	15	20
L4	2	2	2	2
L7	72	87	102	127
L11	44	55	67	85
L13	15	15	15	20
L21	136,5	159,5	183,5	226
L22	191,5	229,5	268,5	331
L23	53	70	80	95
L24	35	50	55	65
C1	46	46	70	70
C2	M4	M4	M5	M5
C3	≤12	≤12	≤16	≤16
C4	30	30	34	34
C5	30	30	50	50
C6	3,5	3,5	8	8
C7	42	42	60	60
C8	21,5	21,5	21,5	21,5
C9	268	321	375	457,5
C10	14,5	14,5	15,5	15,5
B3 P9	6	10	12	14
H3	24,8	35,3	43,3	53,8

Some dimensions of gearbox refer to ISO9409 standard.

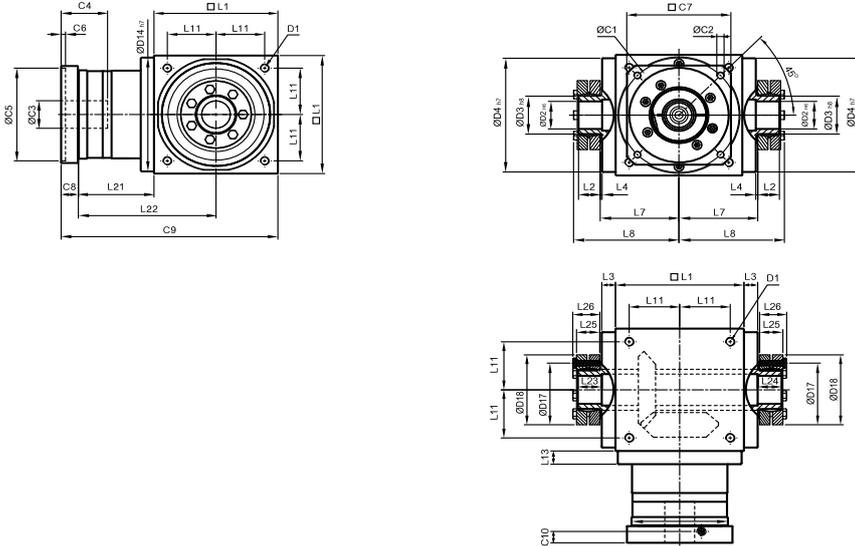
For more detailed information, or special sizes, please: contact CLC.



# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FC, 1 STAGE



(Unit: mm)

MODEL	FAT065 FC	FAT075 FC	FAT090 FC	FAT110 FC	FAT140 FC	FAT170 FC	FAT210 FC
D1	M4	M6	M6	M8	M10	M12	M16
D2 H6	13	14	18	22	32	40	50
D3 h8	16	16	22	25	44	50	62
D4 h7	63	73	88	108	135	165	205
D14 h7	63	73	88	108	135	165	205
D17	26	26	36	38	61	70	86
D18	41	41	50	50	80	90	110
L1	65	75	90	90	140	170	210
L2	14	14	18	18	24	26	29
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L7	47,5	54	62	62	87	102	127
L8	66	72,5	85	85	116,5	133,5	161,5
L11	27	30	36	36	55	67	85
L13	13	15	15	15	12	15	20
L21	49	60,5	63	63	85,5	95	130
L22	81,5	98	108	108	155,5	180	235
L23	15	15	20	20	26	28	31
L24	15	15	20	20	26	28	31
L25	15	15	19,5	19,5	25,5	27,5	30,5
L26	18,5	18,5	23	23	29,5	31,5	34,5
C1	46	70	100	100	130	165	215
C2	M4	M5	M6	M6	M8	M10	M12
C3	≤11/≤12	≤14/≤15,875/≤16	≤19	≤24	≤32	≤38	≤42
C4	30	34	40	40	50	60	85
C5	30	50	80	80	110	130	180
C6	3,5	8	4	4	5	6	6
C7	42	60	90	90	115	142	190
C8	19,5	19	17	17	19,5	22,5	29
C9	133,5	154,5	170	196,5	245	287,5	369
C10	13,25	13,5	10,75	10,75	13	15	20,75

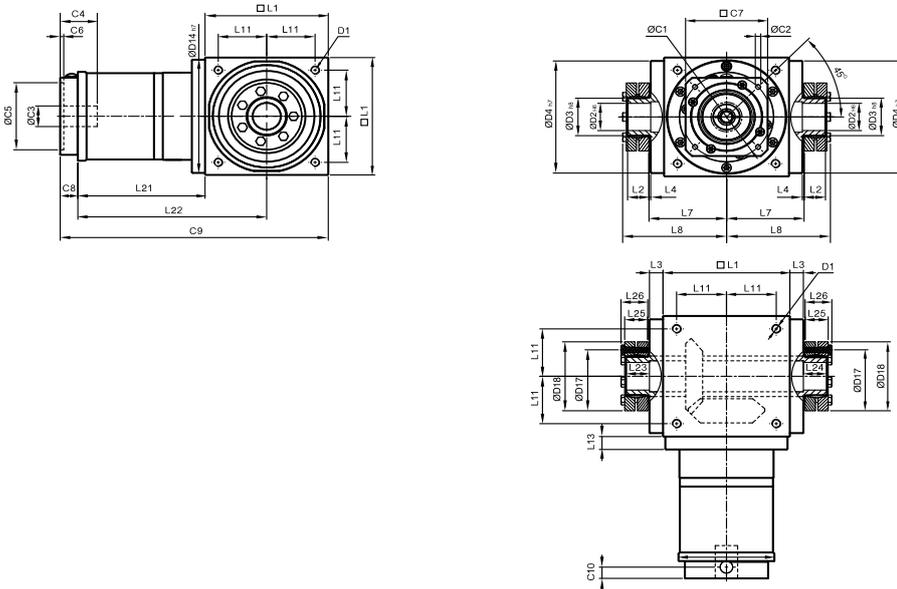
Some dimensions of gearbox refer to ISO9409 standard.  
For more detailed information, or special sizes, please: contact CLC.



# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FC, 2 STAGES



(Unit: mm)

MODEL	FAT065 FC	FAT075 FC	FAT090 FC	FAT110 FC	FAT140 FC	FAT170 FC	FAT210 FC
D1	M4	M6	M6	M8	M10	M12	M16
D2 H6	13	14	18	22	32	40	50
D3 h8	16	16	22	25	44	50	62
D4 h7	63	73	88	108	135	165	205
D14 h7	63	73	88	108	135	165	205
D17	26	26	36	38	61	70	86
D18	41	41	50	50	80	90	110
L1	65	75	90	110	140	170	210
L2	14	14	18	18	24	26	29
L3	13	14,5	15	15	15	15	20
L4	2	2	2	2	2	2	2
L7	47,5	54	62	72	87	102	12
L8	66	72,5	85	95	116,5	133,5	161,5
L11	27	30	36	44	55	67	85
L13	13	15	15	15	15	15	20
L21	75	84,5	99	122	144,5	157,5	206,5
L22	107,5	122	144	177	214,5	242,5	311,5
L23	15	15	20	20	26	28	31
L24	15	15	20	20	26	28	31
L25	15	15	19	19,5	25,5	27,5	30,5
L26	18,5	18,5	23	23	29,5	31,5	34,5
C1	46	46	70	100	100	100	130
C2	M4	M4	M5	M6	M6	M6	M8
C3	≤12	≤12	≤16	≤24	≤24	≤24	≤32
C4	30	30	34	40	40	40	50
C5	30	30	50	80	80	80	110
C6	3,5	3,5	8	4	4	4	5
C7	42	42	60	92	92	92	115
C8	21,5	21,5	21,5	20	20	20	24
C9	161,5	181	210,5	252	304,5	347,5	440,5
C10	14,5	14,5	15,5	13	13	13	16

Some dimensions of gearbox refer to ISO9409 standard.

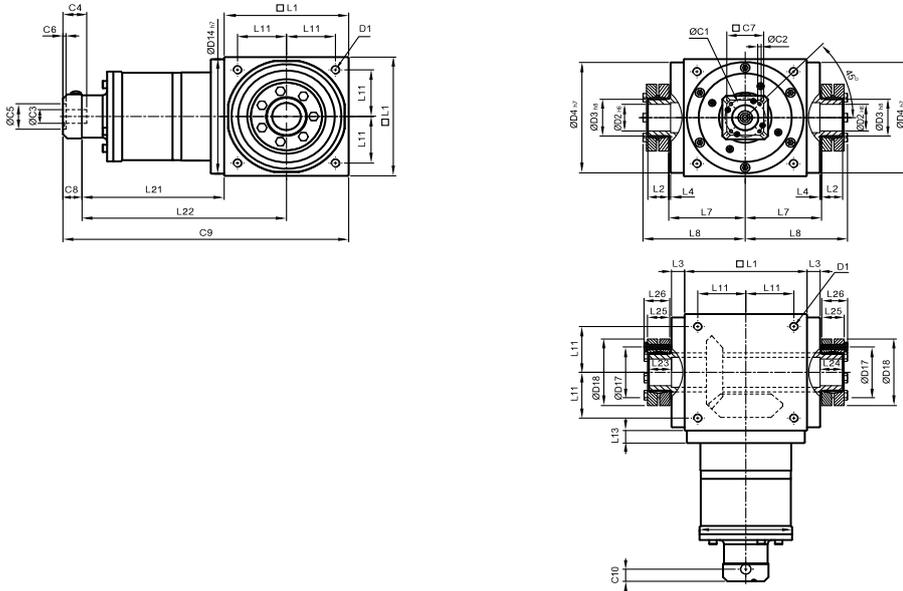
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# PRECISION PLANETARY GEARBOX FAT SERIES

## PRODUCT DIMENSION

### FAT-FC, 3 STAGES



(Unit: mm)

MODEL	FAT110 FC	FAT140 FC	FAT170 FC	FAT210 FC
D1	M8	M10	M12	M16
D2 H6	22	32	40	50
D3 h8	25	44	50	62
D4 h7	108	135	165	205
D14 h7	108	135	165	205
D17	38	61	70	86
D18	50	80	90	110
L1	110	140	170	210
L2	18	24	26	29
L3	15	15	15	20
L4	2	2	2	2
L7	72	87	102	127
L8	95	116,5	133,5	161,5
L11	44	55	67	85
L13	15	15	15	20
L21	136,5	159,5	183,5	226
L22	191,5	229,5	268,5	331
L23	20	26	28	31
L24	20	26	28	31
L25	19,5	25,5	27,5	30,5
L26	23	29,5	31,5	34,5
C1	46	46	70	70
C2	M4	M4	M5	M5
C3	≤12	≤12	≤16	≤16
C4	30	30	34	34
C5	30	30	50	50
C6	3,5	3,5	8	8
C7	42	42	60	60
C8	21,5	21,5	21,5	21,5
C9	268	321	375	457,5
C10	14,5	14,5	15,5	15,5

Some dimensions of gearbox refer to ISO9409 standard.  
For more detailed information, or special sizes, please: contact CLC.



# PRECISION PLANETARY GEARBOX

## INSTALLATION INSTRUCTION

### SUGGESTED TORQUE TABLE FOR MOTOR LOCKING SCREWS

SCREW SIZE	HEXAGON HEAD SIZE	STRENGTH 8.8		STRENGTH 10.9		STRENGTH 12.9	
	[mm]	[Nm]	[In-lbs]	[NMI]	[In-lbs]	[Nm]	[In-lbs]
M3x0.5P	2.5	1.3	12	1.8	16	2.1	19
M4x0.7P	3	3	27	4.1	37	4.9	44
M5x0.8P	4	6.1	55	8.2	73	9.8	87
M6x1P	5	11	98	14	124	17	151
M8x1.25P	6	25	222	34	302	41	364
M10x1.5P	8	49	434	67	594	80	709
M12x1.75P	10	85	753	116	1028	139	1232
M14x2P	12	137	1214	186	1648	223	1976
M16x2P	14	210	1860	286	2534	343	3038

### SUGGESTED TORQUE TABLE FOR THE LOCKING SCREW OF THE GEARBOX

REDUCER MODEL		MOTOR SHAFT DIAMETER	SCREW SIZE	HEXAGON HEAD SIZE	LOCKING TORQUE	
		[mm]	[mm]	[mm]	[Nm]	[In-lbs]
FAB042 FABR042 FAD047 FADR047 FG040 FGA040 FB042 FBR042	Single Stage	≤12	M3x0.5Px10L	2.5	2.1	19
	Dual Stage	≤12	M3x0.5Px10L	2.5	2.1	19
FAB060 FABR060 FAD064 FADR064 FB060 FBR060 FE070 FER070 FG060 FGA060 FGR060 FGAR060 FAF060 FAFR060	Single Stage	≤19	M5x0.8Px14L	4	9.8	87
	Dual Stage	≤19	M5x0.8Px14L	4	9.8	87
FAB090 FABR090 FAD090 FADR090 FB090 FBR090 FE090 FER090 FG080 FGA080 FGR080 FGAR080 FAF070 FAFR070	Single Stage	≤24	M6x1Px20L	5	17	151
	Dual Stage	≤19	M5x0.8Px14L	4	9.8	87
FAB115 FABR115 FAD110 FADR110 FB115 FBR115 FE120 FER120 FG120 FGR120 FGA120 FGAR120 FAF100 FAFR100	Single Stage	≤35	M8x1.25P25L	6	41	364
	Dual Stage	≤24	M6x1Px20L	5	17	151
FAB142 FABR142 FAD140 FADR140 FB142 FBR142 FE155 FER155 FG160 FGR160 FGA160 FGAR160 FAF140 FAFR140	Single Stage	≤38	M10x1,5Px30L	8	80	709
	Dual Stage	≤35	M8x1.25P25L	6	41	364
FAB180 FABR180 FAD200 FADR200 FB180 FE205 FBR180 FER205 FAF180 FAFR180	Single Stage	≤50	M12x1.75Px35L	10	139	1232
	Dual Stage	≤38	M10x1,5Px30L	8	80	709
FAB220 FABR220 FAD255 FADR255 FE235 FB220 FBR220 FER235	Single Stage	≤55	M16x2Px40L	14	343	3038
	Dual Stage	≤50	M12x1.75Px35L	10	139	1232

**Note:** The screw tightening torque must be greater than the above value.

If necessary, the tightening torque can be increased by 20% of the above recommended value to avoid slipping.



# PRECISION PLANETARY GEARBOX

## INSTALLATION INSTRUCTION

1. Confirm the appearance of the reducer.

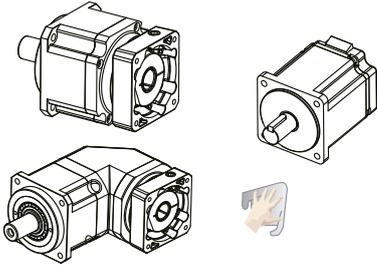
Please confirm if the reducer model is correct.

2. Installation of the servo motor.

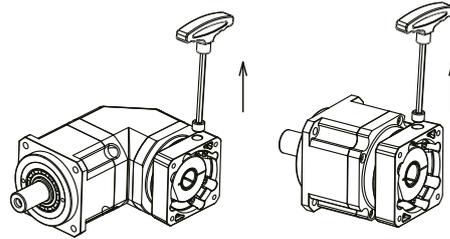
The installation of servo motor according to the following steps.

Please proceed with the installation of the servo motor according to the order.

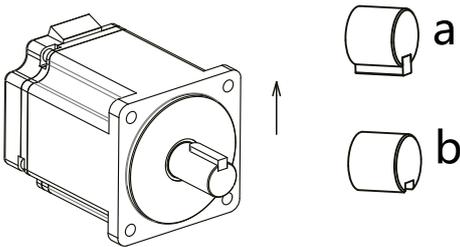
**1.** Confirm the specifications of motor and reducer, and wipe the mounting surface of motor and reducer clean.



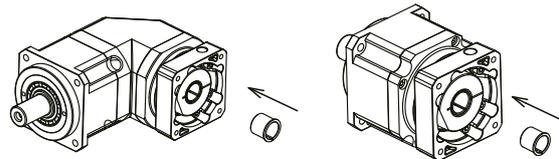
**2.** Take the plug screw out of the flange side hole, and rotate the motor locking hub until the locking hub screw is aligned with the flange side hole.



**3.** Remove the original flat key from the motor; if necessary, install the balance key.



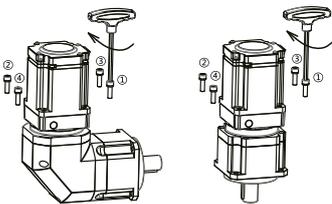
**4.** Confirm the axis size of the motor and install the sleeve if necessary.



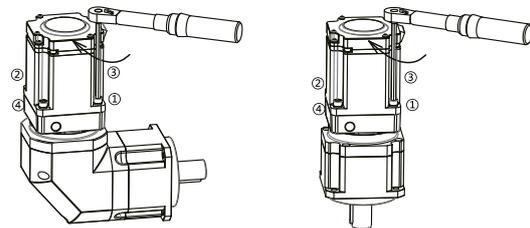
### Correct locking method

When the motor is in the shape of a flat shaft, the opposite shaft is clamped on the center line of the flat shaft, so that the locking hub screw is perpendicular to the flat shaft.

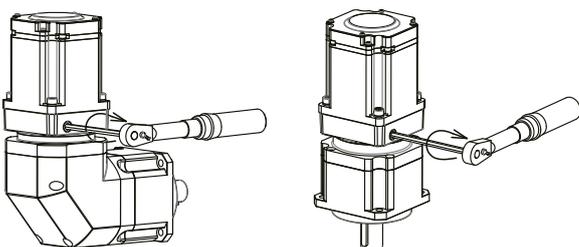
**5.** Install the motor in a vertical position, and use a wrench to lock the screws with gaskets according to the order from 1 ~ 4, using 5% of the recommended torque value in the screw torque table (Table 1).



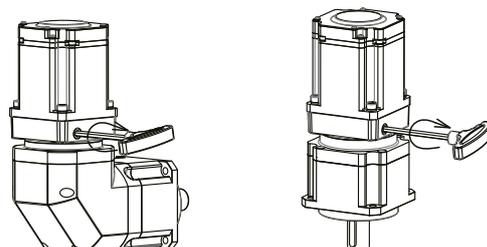
**6.** Place the motor and reducer vertically. Lock the screws with a torque wrench in the order of 1 ~ 4, according to the recommended torque values in the screw torque table (Table 1).



**7.** According to the recommended torque value in Table 2, lock the locking hub screw with a torque wrench.



**8.** Lock the flange side hole plug screw.





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