Worldwide Sumitomo Network

CW11

Sumitomo Drive Technologies

Always on the Move

Motion Control Drives
IB Series P1 Type
Speed Reducer for Servo Motors

Sumitomo Heavy Industries, Ltd.

Motion Control Drives Product Lineup
IB Series

Backlash Specification: 15 min Motor Rated Speed 3000 [r/min]

Servo motor Capacity [W]	Reduction Ratio						
	5	9	15	21	33	45	81
50	■	■	■	■	■	■	■
100	■	■	■	■	■	■	■
200	■	■	■	■	■	■	■
400	■	■	■	■	■	■	■
750	■	■	■	■	■	■	
1000	■	■	■	■	■		
1200	■	■	■	■	■		
1500	■	■	■	■	■		
2000	■	■	■	■			
2500	■	■	■				
3000	■	■	■				
3500	■	■	■				
4000	■	■					
4500	■	■					
5000	■						

New Release P1 Type

On page 1 - 70 in this catalog.

Backlash Specification: 3 min Motor Rated Speed 3000 [r/min]

Servo motor Capacity [W]	Reduction Ratio					
	5	9	15	21	33	45
50	■	■	■	■	■	■
100	■	■	■	■	■	■
200	■	■	■	■	■	■
400	■	■	■	■	■	■
750	■	■	■	■	■	■
1000	■	■	■	■	■	
1500	■	■	■	■		

P Type

Refer to separate catalog Z2003. for P Type.

Backlash Specification: 3 min Motor Rated Speed 3000 [r/min]

Servo motor Capacity [W]	Reduction Ratio				
	5	9	20	29	45
1000					■
1500					■
2000	■	■	■	■	■
2500	■	■	■	■	■
3000	■	■	■	■	■
3500	■	■	■	■	
4000	■	■	■	■	
4500	■	■	■	■	
5000	■	■	■	■	

L Type

Refer to separate catalog Z2002 for L Type.

Table of Contents

IB Series P1 Type

- **No.1** Compactness in the Industry
- Reduced Size of **38%** of the size of our Models
  (Compared to Existing Lineup) (29 Models out of 77 Types)
- Motor Capacity Expanded 50W−1500W, **New** **2000-5000W**
- Reduction Ratio Expanded 1/5, 1/9, 1/15, 1/21, 1/33, 1/45, **New** **1/81**
- **Responsiveness to Newest Servo Motors for Simpler Applications!**

Features

- ● Leading industry with high torque transmission capacity
- ● Low backlash: 15 min
- ● Low noise
- ● High efficiency: 90% and greater (At full load)
- ● All reduction ratio: Integer
- ● Input speed: Capable of 6000r/min
- ● Compatible with major servo motor manufacturers
- ● Lineup for flange output type available

Capacity [W]	Reduction Ratio						
	5	9	15	21	33	45	81
50							
100							
200			Existing Model Range				
400							
750							
1000							
1500							
2000							
2500							
3000							
3500							
4000							
4500							
5000							

New
Expanded Capacity and Reduction Range
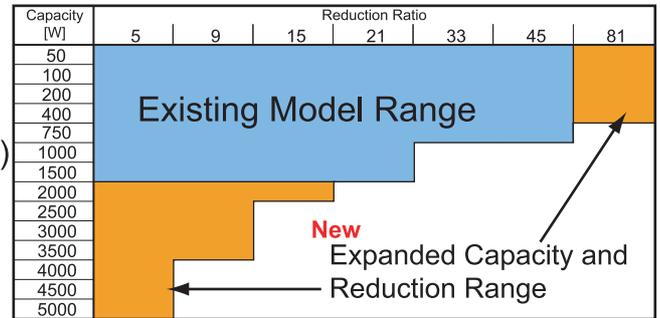
Purpose

- ● Transfer robots
- ● Peripheral equipment for robots
- ● FA equipment related
- ● Semi-conductor production machine
- ● Machine tools
- ● Loader drive and shaft motion
- ● Wrapping machines (bag making and pillow wrapping)
- ● Wood-working machine
- ● Medical equipment
- ● Monitoring camera
- ● Vending machine
- ● Analyzing machine
- ● Measuring equipment

Flange shaft type

Compactness enabled by housing with internal gear

IB Series P1 Type

Output shaft Variation

Three variations available to match customers' needs. Optimal selection possible for your application.

Keyless solid shaft type

Flange shaft type

Solid shaft type with keyway

Sumitomo Drive Technologies

No. 1 Compactness in Our Industry

Significant size and mass reduction in low reduction ratio and medium capacity range.

New Release

Mass reduced to about 1/3

ANFX-P130N-1ZLD-5
Mass 8.4kg

Existing Product

ANFJ-L30-SV-5
Mass 25kg

Comparison of Reduction Ratio 5 for 3500W

New Release

Mass reduced to about 1/2

ANFX-P120N-7XLD-5
Mass 2.7kg

Existing Product

ANFX-P35N-7XLC-5
Mass 6.3kg

Comparison of Reduction Ratio 5 for 1500W

High Moment Capacity: Large Diameter Angular Bearing Adopted

Large diameter precision angular bearing, supporting output shaft, allows large radial load with compact casing.

[Angular Contact Ball Bearings]

Angular contact ball bearing is a high precision bearing used for machine tools and such other applications.
This bearing bears both radial and axial load. It bears higher axial load compared to general ball bearings.

Assembly

Simple assembly. Directly connect servo motor and reducer with bolt (provided by customer) after delivery. Tighten motor shaft with hexagon wrench. Ready for immediate use.

Keyless Type Servo Motor

Input Side Clamp
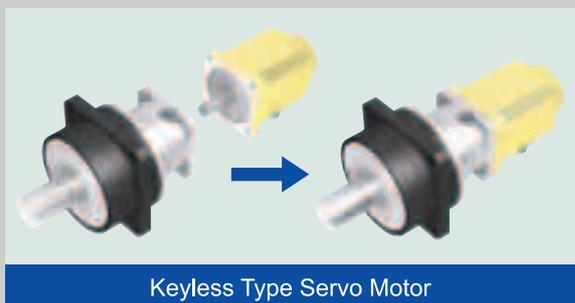
Standard Specification, Construction, and Mechanism

Standard Specification

Backlash	15 min specification *3-minute specification requires P Type. Refer to catalog No. Z2003 for details.
Efficiency	90% or more at rated output torque (with reduction ratio 5 or 9)
Noise Level	70dB(A) 0.5m *Varies depending on models and mounting condition.
Lubrication system	Grease lubrication The unit is filled with grease at the time of shipping. It is ready for immediate use.
Reduction system	Planetary gear mechanism Single Stage Type (Reduction Ratio 5, 9) Double Stage Type (Reduction Ratio 15, 21, 33, 45, 81)
Output shaft rotation direction	Same direction as the rotation direction of input gear.
Material	Case with internal gear and gear: Chrome-Molybdenum Steel Joint cover: Aluminum alloy Output and input shaft: S45C
Mounting location	Indoor (without dust and water)
Ambient temperature	0~40℃ Consult us when the operation condition exceeds the above and when special grease is necessary such as food manufacturing machine.
Ambient humidity	85% or less. There should be no condensation.
Altitude	1000m or below
Ambient atmosphere	There should be no corrosive gases, explosive gases, vapor, or dust.
Mounting angle	All angles possible (no limitation)
Paint	Black oxide coating for housing with internal gear Output shaft comes with rustproof treatment at the time of shipping.
Actual reduction ratio	Integer reduction ratio as indicated in the catalog.
Surface temperature of the reducer	80℃ or below. Consult us when operating continuously.

Construction Drawing
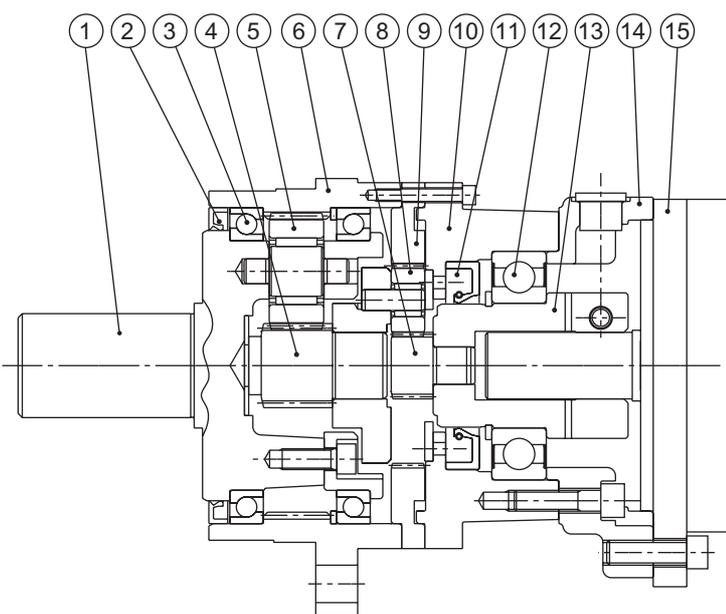
Number	Part Name
1	Output Shaft
2	Oil Seal
3	Bearing of Output
4	Sun Gear of Output
5	Planetary Gear of Output
6	Casing with Internal Gear
7	Sun Gear of Input
8	Planetary Gear of Input
9	Internal Gear of Input
10	Joint Cover
11	Input Shaft Bearing
12	Oil Seal
13	Coupling
14	Adaptor Plate
15	Motor (Provided by Customers)

Fig. 1

Nomenclature

| A | N | F | X | | — | P120 | F | — | 7A | LD | — | 15 |

Special

Input Method

Mounting (Flange Attachment Type)

Output Shaft Direction (Unlimited Mounting Direction)

MC Drive IB Series

Reduction Ratio

Backlash Symbol

15 min specification: LD

Motor Flange Code

※ We offer P Type for 3-minute specification. Refer to catalog No. 2003 for details.

Type and Frame Size	
	110
P	120
	130

Output Shaft Type	Symbol
Solid Shaft (Keyless)	N
Solid Shaft (with Key)	W
Flange Shaft	F

Selection Table 1 (Frame Size Combination Table for Each Motor Rated Speed)

Rated Motor Speed 1000 [r/min]

Servo Motor Capacity [W]	Reduction Ratio						
	5	9	15	21	33	45	81
50				●		●	P120
100		P110			P120		P130
200							
300			P120				
400						●	
500							
600			P130				
750				●			
1000							
1200							
1500							
2000	P130						
2500							
3000							
3500							
4000							
4500							
5000							

Rated Motor Speed 1500 [r/min]

Servo Motor Capacity [W]	Reduction Ratio						
	5	9	15	21	33	45	81
50							P120
100		P110		●	●		●
200			●				P130
300							●
400			P120		P130		
500						●	
600							
750							
1000			P130				
1200							
1500							
2000							
2500	P130						
3000							
3500							
4000							
4500							
5000							

Rated Motor Speed 2000 [r/min]

Servo Motor Capacity [W]	Reduction Ratio						
	5	9	15	21	33	45	81
50							●
100		P110				●	P120
200				●			
300		●			P120		P130
400							●
500			P120		P130		
600							
750							
1000							
1200			P130				
1500							
2000							
2500							
3000	P130						
3500							
4000							
4500							
5000							

Rated Motor Speed 3000 [r/min]

Servo Motor Capacity [W]	Reduction Ratio						
	5	9	15	21	33	45	81
50							●
100		P110					P120
200					●		●
300				●			
400							P130
500							●
600			P120		P130		
750							
1000							
1200							
1500			P130				
2000							
2500							
3000							
3500							
4000							
4500							
5000							

Rated Motor Speed 4000 [r/min]

Servo Motor Capacity [W]	Reduction Ratio						
	5	9	15	21	33	45	81
50							
100							●
200		P110				●	●
300					●	●	●
400				●			
500							
600							
750			P120			P130	
1000							
1200							
1500							
2000							
2500			P130				
3000							
3500							
4000							
4500							
5000							

No load running torque

Frame Size	Unit	Reduction Ratio						
		5	9	15	21	33	45	81
P110	N · m	0.20	0.16	0.20			0.14	
	kgf · m	0.020	0.016	0.020			0.014	
P120	N · m	0.40	0.30	0.35			0.26	
	kgf · m	0.041	0.031	0.036			0.027	
P130	N · m	0.70	0.55	0.60			0.45	
	kgf · m	0.071	0.056	0.061			0.046	

*Torque necessary at the input side to rotate the reducer at no load condition.

*This is the representative value when the ambient temperature is 20⁰C.

*Refer to Selection Table 2 (on pages 7-15) for frame size combination for each servo motor manufacturer.

*Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.

*Refer to Selection Table 3 (on pages 16-17) for %ED of each speed.

*Refer to Selection Table 3 (on page 17) for allowable peak torque at startup for combinations marked ● .

*Note the no load running torque on this page when using combinations with [___].

*Consult us when no load running torque is too large for your application. Special models for lowering no load running torque are available on request.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

1. Yaskawa Electric Corporation

Σ Ⅲ Series SGMAS Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	SGMAS-A5A**2*	P110△	P110△	P110△	P110△	P110△	P110△	P110△	7J
100	SGMAS-01A**2*	P110△	P110△	P110△	P110△	P110	P110	P120△	2D
200	SGMAS-02A**2*	P110	P110	P110	P110	P110	P120	P120	2R
400	SGMAS-04A**2*	P110	P110	P120	P120	P120	P120	P130	2R
600	SGMAS-06A**2*	P110	P120	P120	P120	P130	P130	-	2R
750	SGMAS-08A**2*	P120	P120	P120	P120	P130	P130	-	7P

Σ Ⅲ Series SGMPS Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
100	SGMPS-01A**2*	P110△	P110△	P110△	P110△	P110	P110	P120△	2G
200	SGMPS-02A**2*	P110	P110	P110	P110	P110	P120	P120	2T
400	SGMPS-04A**2*	P110	P110	P120	P120	P120	P120	P130	2T
750	SGMPS-08A**2*	P120	P120	P120	P120	P130	P130	-	7R
1500	SGMPS-15A**2*	P120	P120	P130	P130	-	-	-	7X

Σ Ⅲ Series SGMSS Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
1000	SGMSS-10A**2*	P120	P120	P120	P130	-	-	-	1L
1500	SGMSS-15A**2*	P120	P120	P130	P130	-	-	-	1L
2000	SGMSS-20A**2*	P120	P130	P130	-	-	-	-	1L
2500	SGMSS-25A**2*	P120	P130	-	-	-	-	-	1L
3000	SGMSS-30A**2*	P130	P130	-	-	-	-	-	1T
4000	SGMSS-40A**2*	P130	-	-	-	-	-	-	1T
5000	SGMSS-50A**2*	P130	-	-	-	-	-	-	1T

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
*Consult us for combination with △ . They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

Yaskawa Electric Corporation

Σ Ⅱ Series SGMAH Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	SGMAH-A5***2*	P110△	P110△	P110△	P110△	P110△	P110△	P110△	7J
100	SGMAH-01***2*	P110△	P110△	P110△	P110△	P110	P110	P120△	2D
200	SGMAH-02***2*	P110	P110	P110	P110	P110	P120	P120	2R
400	SGMAH-04***2*	P110	P110	P120	P120	P120	P120	P130	2R
750	SGMAH-08***2*	P120	P120	P120	P120	P130	P130	-	7P

Σ Ⅱ Series SGMPH Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
100	SGMPH-01***2*	P110△	P110△	P110△	P110△	P110	P110	P120△	2G
200	SGMPH-02***2*	P110	P110	P110	P110	P110	P120	P120	2T
400	SGMPH-04***2*	P110	P110	P120	P120	P120	P120	P130	2T
750	SGMPH-08***2*	P120	P120	P120	P120	P130	P130	-	7R
1500	SGMPH-15***2*	P120	P120	P130	P130	-	-	-	7X

Σ Ⅱ Series SGMSH Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
1000	SGMSH-10***2*	P120	P120	P120	P130	-	-	-	1L
1500	SGMSH-15***2*	P120	P120	P130	P130	-	-	-	1L
2000	SGMSH-20***2*	P120	P130	P130	-	-	-	-	1L
3000	SGMSH-30***2*	P130	P130	-	-	-	-	-	1T
4000	SGMSH-40***2*	P130	-	-	-	-	-	-	1T
5000	SGMSH-50***2*	P130	-	-	-	-	-	-	1T

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
P110	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
P120	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
P130	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
*Consult us for combination with △ . They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

Yaskawa Electric Corporation

Σ Series SGM Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	SGM-A5***2*	P110△	P110△	P110△	P110△	P110△	P110△	P110△	7J
100	SGM-01***2*	P110△	P110△	P110△	P110△	P110	P110	P120△	2D
200	SGM-02***2*	P110	P110	P110	P110	P110	P120	P120	2R
400	SGM-04***2*	P110	P110	P120	P120	P120	P120	P130	2R
750	SGM-08***2*	P120	P120	P120	P120	P130	P130	-	7P

Σ Series SGMP Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
100	SGMP-01***2*	P110△	P110△	P110△	P110△	P110	P110	P120△	2G
200	SGMP-02***2*	P110	P110	P110	P110	P110	P120	P120	2T
400	SGMP-04***2*	P110	P110	P120	P120	P120	P120	P130	2T
750	SGMP-08***2*	P120	P120	P120	P120	P130	P130	-	7R
1500	SGMP-15***2*	P120	P120	P130	P130	-	-	-	7X

Σ Series SGMS Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
1000	SGMS-10A*2*	P120	P120	P120	P130	-	-	-	1L
1500	SGMS-15A**2*	P120	P120	P130	P130	-	-	-	1L
2000	SGMS-20A**2*	P120	P130	P130	-	-	-	-	1L
3000	SGMS-30A**2*	P130	P130	-	-	-	-	-	1T
4000	SGMS-40A**2*	P130	-	-	-	-	-	-	1T
5000	SGMS-50A**2*	P130	-	-	-	-	-	-	1T

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
P110	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
P120	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
P130	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
　　　*Consult us for combination with △ . They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

2. Mitsubishi Electric Corporation

HF-KP Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	HF-KP053	P110△	P110△	P110△	P110△	P110△	P110△	P110△	2D
100	HF-KP13	P110△	P110△	P110△	P110△	P110	P110	P120△	2D
200	HF-KP23	P110	P110	P110	P110	P110	P120	P120	2R
400	HF-KP43	P110	P110	P120	P120	P120	P120	P130	2R
750	HF-KP73	P120	P120	P120	P120	P130	P130	-	1G

HF-SP Series (Rated speed: 2000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
500	HF-SP52	P120	P120	P120	P120	P130	P130	-	7Z
1000	HF-SP102	P120	P120	P130	P130	-	-	-	7Z
1500	HF-SP152	P120	P130	P130	-	-	-	-	7Z
2000	HF-SP202	P130	P130	-	-	-	-	-	0X
3500	HF-SP352	P130	-	-	-	-	-	-	0X
5000	HF-SP502	-	-	-	-	-	-	-	

HC-KFS Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	HC-KFS053	P110	P110	P110	P110	P110	P110	P110	2D
100	HC-KFS13	P110	P110	P110	P110	P110	P110	P120△	2D
200	HC-KFS23	P110	P110	P110	P110	P110	P120	P120	2R
400	HC-KFS43	P110	P110	P120	P120	P120	P120	P130	2R
750	HC-KFS73	P120	P120	P120	P120	P130	P130	-	1G

HC-MFS Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	HC-MFS053	P110	P110	P110	P110	P110	P110	P110	2D
100	HC-MFS13	P110	P110	P110	P110	P110	P110	P120	2D
200	HC-MFS23	P110	P110	P110	P110	P110	P120	P120	2R
400	HC-MFS43	P110	P110	P120	P120	P120	P120	P130	2R
750	HC-MFS73	P120	P120	P120	P120	P130	P130	-	1G

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
P110	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
P120	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
P130	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
        *Consult us for combination with △ . They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

Mitsubishi Electric corporation

HC-SFS Series (Rated speed: 2000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
500	HC-SFS52	P120	P120	P120	P120	P130	P130	-	7Z
1000	HC-SFS102	P120	P120	P130	P130	-	-	-	7Z
1500	HC-SFS152	P120	P130	P130	-	-	-	-	7Z
2000	HC-SFS202	P130	P130	-	-	-	-	-	0X
3500	HC-SFS352	P130	-	-	-	-	-	-	0X
5000	HC-SFS502	-	-	-	-	-	-	-	

HC-UFS Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
100	HC-UFS13	P110△	P110△	P110△	P110△	P110	P110	P120△	2G
200	HC-UFS23	P110	P110	P110	P110	P110	P120	P120	2T
400	HC-UFS43	P110	P110	P120	P120	P120	P120	P130	2T
750	HC-UFS73	P120	P120	P120	P120	P130	P130	-	7X

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
P110	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
P120	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
P130	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
       *Consult us for combination with △ . They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

3. Matsushita Electric Industrial Co., Ltd.

MSMA Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	MSMA5A**1A	P110△	P110△	P110△	P110△	P110△	P110△	P110△	2C
100	MSMA01**1A	P110△	P110△	P110△	P110△	P110	P110	P120△	2C
200	MSMA02**1A	P110	P110	P110	P110	P110	P120	P120	2L
400	MSMA04**1A	P110	P110	P120	P120	P120	P120	P130	2P
750	MSMA08**1A	P120	P120	P120	P120	P130	P130	—	7S
1000	MSMA10**1A	P120	P120	P120	P130	—	—	—	7V
1500	MSMA15**1A	P120	P120	P130	P130	—	—	—	7B
2000	MSMA20**1A	P120	P130	P130	—	—	—	—	7B
2500	MSMA25**1A	P120	P130	—	—	—	—	—	7B
3000	MSMA30**1A	P130	P130	—	—	—	—	—	1S
3500	MSMA35**1A	P130	P130	—	—	—	—	—	1S
4000	MSMA40**1A	P130	—	—	—	—	—	—	7Z
4500	MSMA45**1A	P130	—	—	—	—	—	—	7Z
5000	MSMA50**1A	P130	—	—	—	—	—	—	7Z

MQMA Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
100	MQMA022A1A	P110△	P110△	P110△	P110△	P110	P110	P120△	2F
200	MQMA032A1A	P110	P110	P110	P110	P110	P120	P120	8A
400	MQMA042A1A	P110	P110	P120	P120	P120	P120	P130	8B

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
P110	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
P120	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
P130	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
*Consult us for combination with △ . They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

4. Sanyo Denki Co., Ltd.

P3 Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	P30B04005H***	P110△	P110△	P110△	P110△	P110△	P110△	P110△	2D
100	P30B04010H***	P110△	P110△	P110△	P110△	P110	P110	P120△	2D
200	P30B06020H***	P110	P110	P110	P110	P110	P120	P120	2R
400	P30B06040H***	P110	P110	P120	P120	P120	P120	P130	2R
750	P30B08075H***	P120	P120	P120	P120	P130	P130	-	7P

P5 Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	P50B05005H***	P110△	P110△	P110△	P110△	P110△	P110△	P110△	2E
100	P50B05010H***	P110△	P110△	P110△	P110△	P110	P110	P120△	2E
200	P50B05020H***	P110	P110	P110	P110	P110	P120	P120	2K
200	P50B07020H***	P110	P110	P110	P110	P110	P120	P130	8B
300	P50B07030H***	P110	P110	P110	P120	P120	P120	P130	8B
400	P50B07040H***	P110	P110	P120	P120	P120	P120	P130	8B
500	P50B08050H***	P110	P120	P120	P120	P130	P130	-	8E
750	P50B08075H***	P120	P120	P120	P120	P130	P130	-	8E
1000	P50B08100H***	P120	P120	P120	P130	-	-	-	8E

Q1 Series (Rated speed: 3000 r/min)

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	Q1AA04005***	P110△	P110△	P110△	P110△	P110△	P110△	P110△	2D
100	Q1AA04010***	P110△	P110△	P110△	P110△	P110	P110	P120△	2D
200	Q1AA06020***	P110	P110	P110	P110	P110	P120	P120	2R
400	Q1AA06040***	P110	P110	P120	P120	P120	P120	P130	2R
750	Q1AA07075***	P120	P120	P120	P120	P130	P130	-	0U
1000	Q1AA10100***	P120	P120	P120	P130	-	-	-	0W
1500	Q1AA10150***	P120	P120	P130	P130	-	-	-	0W
2000	Q1AA10200***	P120	P130	P130	-	-	-	-	0W
2500	Q1AA10250***	P120	P130	-	-	-	-	-	0W
3000	Q1AA12300***	P130	P130	-	-	-	-	-	1T
3000	Q1AA13300***	P130	P130	-	-	-	-	-	1T
4000	Q1AA13400***	P130	-	-	-	-	-	-	1T
5000	Q1AA13500***	P130	-	-	-	-	-	-	1T

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
P110	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
P120	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
P130	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
*Consult us for combination with △ . They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

5. Fuji Electric FA Components & Systems

GYS Motor（Rated speed: 3000 r/min)

FALDIC-α, β Series Cubic Type
FALDIC-W　Low Inertia Series

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	GYS500DC*-**B-*	P110△	P110△	P110△	P110△	P110△	P110△	P110△	7J
100	GYS101DC*-**B-*	P110△	P110△	P110△	P110△	P110	P110	P120△	2D
200	GYS201DC*-**B-*	P110	P110	P110	P110	P110	P120	P120	2R
400	GYS401DC*-**B-*	P110	P110	P120	P120	P120	P120	P130	2R
750	GYS751DC*-**B-*	P120	P120	P120	P120	P130	P130	-	7P
1000	GYS102DC*-**B-*	P120	P120	P120	P130	-	-	-	7Y
1500	GYS152DC*-**B-*	P120	P120	P130	P130	-	-	-	7Y
2000	GYS202DC*-**B-*	P120	P130	P130	-	-	-	-	7Y
3000	GYS302DC*-**B-*	P130	P130	-	-	-	-	-	1T
4000	GYS402DC*-**B-*	P130	-	-	-	-	-	-	1T
5000	GYS502DC*-**B-*	P130	-	-	-	-	-	-	1T

GYS Motor（Rated speed: 3000 r/min)

FALDIC-α, β Series Slim Type

Servo Motor Capacity [W]	Nomenclature of Servo Motor	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
100	GYC101DC*-**B-*	P110△	P110△	P110△	P110△	P110	P110	P120△	2G
200	GYC201DC*-**B-*	P110	P110	P110	P110	P110	P120	P120	2T
400	GYC401DC*-**B-*	P110	P110	P120	P120	P120	P120	P130	2T
750	GYC751DC*-**B-*	P120	P120	P120	P120	P130	P130	-	7A
1000	GYC102DC*-**B-*	P120	P120	P120	P130	-	-	-	7Z
1500	GYC152DC*-**B-*	P120	P120	P130	P130	-	-	-	7Z
2000	GYC202DC*-**B-*	P120	P130	P130	-	-	-	-	7Z

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
　　　*Consult us for combination with △. They are for special models.

Selection Table 2 (Frame Size Combination Table for Each Servo Motor Manufacturers)

6. FANUC Ltd.

β is Series (Rated speed: 4000-2000 r/min）Applies to rated speed torque.

Servo motor Capacity [W]	Nomenclature of Servo Motor ( ) indicates reted spped	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
50	β 0.2/5000is (4000)	P110△	P110△	P110△	P110△	P110△	P110△	P110△	2D
100	β 0.3/5000is (4000)	P110△	P110△	P110△	P110△	P110△	P110△	P110△●	2D
130	β 0.4/5000is (4000)	P110	P110	P110	P110	P110	P110	P110●	2H
200	β 0.5/5000is (4000)	P110	P110	P110	P110●	P110●	P110●	P110●	2H
400	β 1/5000is (4000)	P110	P110	P120	P120	P120●	P120●	-	2R
500	β 2/4000is (4000)	P110	P120	P120	P120	P120●	P120●	-	2J
750	β 4/4000is (3000)	P120	P120	P120	P120●	P130	-	-	0V
1200	β 8/3000is (2000)	P120	P130	P130	P130	-	-	-	7X
1800	β 12/3000is (2000)	P120	P130	P130●	-	-	-	-	7Z
2500	β 22/2000is (2000)	P130	-	-	-	-	-	-	0X

α is Series (Rated speed: 4000-2000 r/min）

Servo motor Capacity [W]	Nomenclature of Servo Motor ( ) indicates reted spped	Reduction Ratio							Motor Flange Code
		5	9	15	21	33	45	81	
750	α 2/5000is (4000)	P110	P120	P120	P120	P130	P130	P130●	2J
1000	α 4/5000is (4000)	P120	P120	P120	P120	P130	P130	-	0V
2500	α 8/4000is (4000)	P120	P130	-	-	-	-	-	7X
2700	α 12/4000is (3000)	P130	-	-	-	-	-	-	7Z
4500	α 22/4000is (3000)	P130	-	-	-	-	-	-	0X
5500	α 30/4000is (3000)	-	-	-	-	-	-	-	0X
5500	α 40/4000is (3000)	-	-	-	-	-	-	-	0X
5000	α 50/3000is (2000)	-	-	-	-	-	-	-	0X

Page of Dimension Table   [Page]

Frame Size	Output Shaft Type	Reduction Ratio						
		5	9	15	21	33	45	81
P110	Solid Shaft	22	23	24	25	26	26	27
	Flange Shaft	40	41	42	43	44	44	45
P120	Solid Shaft	28	29	30	31	32	32	33
	Flange Shaft	46	47	48	49	50	50	51
P130	Solid Shaft	34	35	36	37	38	38	39
	Flange Shaft	52	53	54	55	56	56	57

Note: *Refer to Selection Table 3 (on pages 16-17) for rated torque, allowable input capacity, allowable maximum input speed, allowable peak torque, and allowable radial load for each frame size.
     *Consult us for combination with △ . They are for special models.
     *Note the allowable peak torque at start and stop on Selection Table 3 (on page 17) for combinations with ● .

Selection Table 3 (Rating Table)

Table 1

Frame Size	Reduction Ratio	6000 Rated Torque *1 (Nm / kgfm)	6000 Output Speed (r/min)	6000 Allowable %ED (%)	5000 Rated Torque *1 (Nm / kgfm)	5000 Output Speed (r/min)	5000 Allowable %ED (%)	4000 Rated Torque *1 (Nm / kgfm)	4000 Output Speed (r/min)	4000 Allowable %ED (%)	3000 Rated Torque *1 (Nm / kgfm)	3000 Output Speed (r/min)	3000 Allowable %ED (%)	2000 Rated Torque *1 (Nm / kgfm)	2000 Output Speed (r/min)	2000 Allowable %ED (%)
P110	5	8.5 / 0.87	1200	40	9.0 / 0.92	1000	60	9.5 / 0.97	800	70	10.5 / 1.07	600	80	11.5 / 1.17	400	90
	9	9.5 / 0.97	666.7	50	10.0 / 1.02	555.6	70	10.5 / 1.07	444.4	80	11.5 / 1.17	333.3	90	11.5 / 1.17	222.2	
	15	12.5 / 1.27	400	40	13.5 / 1.38	333.3	60	14.0 / 1.43	266.7	70	15.5 / 1.58	200	80	17.5 / 1.78	133.3	
	21	14.0 / 1.43	285.7		15.0 / 1.53	238.1		16.0 / 1.63	190.5		17.5 / 1.78	142.9		19.5 / 1.99	95.2	
	33	18.0 / 1.83	181.8		19.0 / 1.94	151.5		19.0 / 1.94	121.2		19.0 / 1.94	90.9		19.0 / 1.94	60.6	
	45	18.0 / 1.83	133.3	50	19.0 / 1.94	111.1	70	20.0 / 2.04	88.9	80	22.0 / 2.24	66.7	90	23.0 / 2.34	44.4	
	81	11.5 / 1.17	74.1		11.5 / 1.17	61.7		11.5 / 1.17	49.4		11.5 / 1.17	37.0		11.5 / 1.17	24.7	
P120	5	36.0 / 3.67	1200	30	38.0 / 3.87	1000	50	41.0 / 4.18	800	60	44.5 / 4.54	600	70	50.5 / 5.15	400	80
	9	40.5 / 4.13	666.7	40	42.5 / 4.33	555.6	60	42.5 / 4.33	444.4	70	42.5 / 4.33	333.3	80	42.5 / 4.33	222.2	90
	15	37.5 / 3.82	400	30	40.0 / 4.08	333.3	50	42.5 / 4.33	266.7	60	46.5 / 4.74	200	70	52.5 / 5.35	133.3	
	21	40.0 / 4.08	285.7		42.5 / 4.33	238.1		45.5 / 4.64	190.5		49.5 / 5.05	142.9		56.0 / 5.71	95.2	
	33	34.5 / 3.52	181.8		36.5 / 3.72	151.5		39.0 / 3.98	121.2		40.0 / 4.08	90.9		40.0 / 4.08	60.6	
	45	47.0 / 4.79	133.3	40	49.5 / 5.05	111.1	60	53.0 / 5.40	88.9	70	54.5 / 5.56	66.7	80	54.5 / 5.56	44.4	
	81	43.5 / 4.43	74.1		43.5 / 4.43	61.7		43.5 / 4.43	49.4		43.5 / 4.43	37.0		43.5 / 4.43	24.7	
P130	5	—	—	—	74.0 / 7.54	1000	30	79.5 / 8.10	800	50	86.5 / 8.82	600	60	97.5 / 9.94	400	70
	9	—	—	—	83.5 / 8.51	555.6	40	89.5 / 9.12	444.4	60	97.5 / 9.94	333.3	70	97.5 / 9.94	222.2	90
	15	—	—	—	77.0 / 7.85	333.3	30	82.5 / 8.41	266.7	50	90.0 / 9.17	200	60	101.5 / 10.35	133.3	70
	21	—	—	—	82.0 / 8.36	238.1		88.0 / 8.97	190.5		96.0 / 9.79	142.9		108.5 / 11.06	95.2	
	33	—	—	—	70.5 / 7.19	151.5		75.5 / 7.70	121.2		82.0 / 8.36	90.9		93.0 / 9.48	60.6	
	45	—	—	—	96.0 / 9.79	111.1	40	103.0 / 10.50	88.9	60	112.0 / 11.42	66.7	70	126.5 / 12.90	44.4	90
	81	—	—	—	101.0 / 10.3	61.7		101.0 / 10.3	49.4		101.0 / 10.3	37.0		101.0 / 10.3	24.7	
Allowable constant operation time*7 [min]		5			10						20					

*1: Rated torque of each rated motor speed.
*2: Allowable value of the average load torque calculated from the load torque pattern (on page 20).
*3: Maximum allowable torque when startup and stop during operation cycle.
*4: Maximum allowable value of the shock torque at emergency stop or external shock torque. Should be less than 1,000 times in one lifetime.
*5: Maximum allowable value of average input speed during operation.
*6: Maximum allowable input speed when not under constant operation condition.
*7: Allowable constant operation hours for intermittent operation condition (Consult us when exceeding or when continuously operating).

Selection Table 3 (Rating Table)

1500			1000			Allowable Average Load Torque *2	Allowable Peak Torque at Startup and Stop *3	Maximum Torque at Emergency *4	Allowable Average Input Speed *5	Allowable Maximum Input Speed *6
Rated Torque *1	Output Speed	Allowable %ED	Rated Torque *1	Output Speed	Allowable %ED					
Nm / kgfm	r/min	%	Nm / kgfm	r/min	%	Nm / kgfm	Nm / kgfm	Nm (kgfm)	r/min	r/min
13.0 / 1.33	300		14.5 / 1.48	200		16.5 / 1.68	45.0 / 4.59			
11.5 / 1.17	166.7		11.5 / 1.17	111.1		11.5 / 1.17	35.0 / 3.57			
19.0 / 1.94	100		21.5 / 2.19	66.7		23.0 / 2.34	45.0 / 4.59			
21.5 / 2.19	71.4	90	23.0 / 2.34	47.6	90	23.0 / 2.34	45.0 / 4.59	60 (6.12)	3000	6000
19.0 / 1.94	45.5		19.0 / 1.94	30.3		19.0 / 1.94	45.0 / 4.59			
23.0 / 2.34	33.3		23.0 / 2.34	22.2		23.0 / 2.34	45.0 / 4.59			
11.5 / 1.17	18.5		11.5 / 1.17	12.3		11.5 / 1.17	35.0 / 3.57			
54.5 / 5.56	300		54.5 / 5.56	200		54.5 / 5.56	190.0 / 19.4			
42.5 / 4.33	166.7		42.5 / 4.33	111.1		42.5 / 4.33	140.0 / 14.3			
55.0 / 5.61	100		55.0 / 5.61	66.7		55.0 / 5.61	190.0 / 19.4			
61.0 / 6.22	71.4	90	69.0 / 7.03	47.6	90	76.0 / 7.75	190.0 / 19.4	250 (25.5)	3000	6000
40.0 / 4.08	45.5		40.0 / 4.08	30.3		40.0 / 4.08	135.0 / 13.7			
54.5 / 5.56	33.3		54.5 / 5.56	22.2		54.5 / 5.56	190.0 / 19.4			
43.5 / 4.43	18.5		43.5 / 4.43	12.3		43.5 / 4.43	140.0 / 14.3			
106.0 / 10.81	300	80	111.0 / 11.31	200		111.0 / 11.31	380.0 / 38.7			
97.5 / 9.94	166.7		97.5 / 9.94	111.1		97.5 / 9.94	330.0 / 33.6			
111.0 / 11.31	100		125.0 / 12.74	66.7		197.0 / 20.1	380.0 / 38.7			
118.0 / 12.03	71.4	90	133.5 / 13.61	47.6	90	197.0 / 20.1	380.0 / 38.7	500 (51.0)	3000	5000
101.0 / 10.30	45.5		114.0 / 11.62	30.3		162.0 / 16.5	370.0 / 37.7			
138.0 / 14.07	33.3		156.0 / 15.90	22.2		197.0 / 20.1	380.0 / 38.7			
101.0 / 10.3	18.5		101.0 / 10.3	12.3		101.0 / 10.3	330.0 / 33.6			
	30									

Selection Table 3 (Allowable External Rating)

Table 2

Motor Speed [r/min]		6000				5000				4000				3000	
Frame Size	Reduction Ratio	Radial Load *1		Axial Load *2		Radial Load *1		Axial Load *2		Radial Load *1		Axial Load *2		Radial Load *1	
		N	kgf	N	kgf	N	kgf	N	kgf	N	kgf	N	kgf	N	kgf
P110	5	240	24.5	470	47.9	255	26.0	500	51.0	275	28.0	540	55.0	305	31.1
	9	295	30.1	575	58.6	315	32.1	610	62.2	335	34.1	655	66.8	370	37.7
	15	350	35.7	680	69.3	370	37.7	725	73.9	400	40.8	780	79.5	440	44.9
	21	390	39.8	7760	791.0	415	42.3	810	82.6	450	45.9	870	88.7	495	50.5
	33	455	46.4	885	90.2	485	49.4	940	95.8	520	53.0	1015	103.5	575	58.6
	45	505	51.5	985	100.4	535	54.5	1045	106.5	580	59.1	1125	114.7	635	64.7
	81	615	62.7	1190	121.3	655	66.8	1265	129.0	705	71.9	1360	138.6	775	79.0
P120	5	745	75.9	1385	141.2	790	80.5	1475	150.4	855	87.2	1590	162.1	940	95.8
	9	905	92.3	1690	172.3	965	98.4	1795	183.0	1040	106.0	1935	197.2	1145	116.7
	15	1075	109.6	2000	203.9	1145	116.7	2130	217.1	1230	125.4	2295	233.9	1355	138.1
	21	1205	122.8	2240	228.3	1280	130.5	2380	242.6	1380	140.7	2565	261.5	1515	154.4
	33	1400	142.7	2605	265.5	1485	151.4	2770	282.4	1600	163.1	2985	304.3	1765	179.9
	45	1550	158.0	2890	294.6	1650	168.2	3070	312.9	1775	180.9	3305	336.9	1955	199.3
	81	1890	192.7	3515	358.3	2005	204.4	3735	380.7	2165	220.7	4025	410.3	2380	242.6
P130	5	—	—	—	—	1060	108.1	1780	181.4	1140	116.2	1915	195.2	1260	128.4
	9	—	—	—	—	1290	131.5	2165	220.7	1390	141.7	2335	238.0	1530	156.0
	15	—	—	—	—	1530	156.0	2565	261.5	1650	168.2	2765	281.9	1815	185.0
	21	—	—	—	—	1710	174.3	2870	292.6	1845	188.1	3095	315.5	2030	206.9
	33	—	—	—	—	1990	202.9	3340	340.5	2145	218.7	3600	367.0	2360	240.6
	45	—	—	—	—	2210	225.3	3705	377.7	2380	242.6	3990	406.7	2620	267.1
	81	—	—	—	—	2685	273.7	4505	459.2	2895	295.1	4855	494.9	3185	324.7

*1: Radial load is the value applied to the middle of the output shaft (at axial load).
*2: Axial load is the value applied to the center of the output shaft (at radial load).

Selection Table 3 (Allowable External Rating)

3000		2000				1500				1000				Allowable Moment
Axial Load *2		Radial Load *1		Axial Load *2		Radial Load *1		Axial Load *2		Radial Load *1		Axial Load *2		
N	kgf	N	kgf	N	kgf	N	kgf	N	kgf	N	kgf	N	kgf	Nm [kgfm]
595	60.7	350	35.7	680	69.3	385	39.2	750	76.5	440	44.9	860	87.7	
725	73.9	425	43.3	830	84.6	470	47.9	910	92.8	535	54.5	1045	106.5	
860	87.7	505	51.5	985	100.4	555	56.6	1080	110.1	635	64.7	1240	126.4	
960	97.9	565	57.6	1100	112.1	620	63.2	1210	123.3	715	72.9	1385	141.2	70 (7.13)
1115	113.7	655	66.8	1280	130.5	725	73.9	1405	143.2	830	84.6	1610	164.1	
1240	126.4	730	74.4	1420	144.8	805	82.1	1560	159.0	920	93.8	1785	182.0	
1500	152.9	890	90.7	1715	174.8	980	99.9	1885	192.2	1050	107.0	2160	220.2	
1750	178.4	1075	109.6	2000	203.9	1185	120.8	2205	224.8	1355	138.1	2525	257.4	
2130	217.1	1310	133.5	2435	248.2	1440	146.8	2680	273.2	1650	168.2	3070	312.9	
2525	257.4	1550	158.0	2890	294.6	1710	174.3	3180	324.2	1955	199.3	3640	371.0	300 (30.6)
2825	288.0	1735	176.9	3235	329.8	1910	194.7	3560	362.9	2190	223.2	4075	415.4	
3285	334.9	2020	205.9	3760	383.3	2225	226.8	4140	422.0	2545	259.4	4735	482.7	
3640	371.0	2240	228.3	4170	425.1	2465	251.3	4585	467.4	2825	288.0	4800	489.3	
4430	451.6	2725	277.8	4800	489.3	2900	295.6	4800	489.3	2900	295.6	4800	489.3	
2110	215.1	1440	146.8	2415	246.2	1585	161.6	2660	271.2	1815	185.0	3045	310.4	
2570	262.0	1750	178.4	2940	299.7	1930	196.7	3235	329.8	2210	225.3	3705	377.7	
3045	310.4	2075	211.5	3785	385.8	2285	232.9	3835	390.9	2620	267.1	4390	447.5	620 (63.2)
3405	347.1	2325	237.0	3900	397.6	2560	261.0	4290	437.3	2930	298.7	4915	501.0	
3960	403.7	2705	275.7	4535	462.3	2975	303.3	4990	508.7	3405	347.1	5715	582.6	
4390	447.5	3000	305.8	5025	512.2	3300	336.4	5535	564.2	3780	385.3	6335	645.8	
5345	544.9	3645	371.6	6115	623.3	4015	409.3	6730	686.0	4500	458.7	7705	785.4	

Multiply radial load locating factor to the value in the above table when the radial load is applied to locations other than the middle of the output shaft.
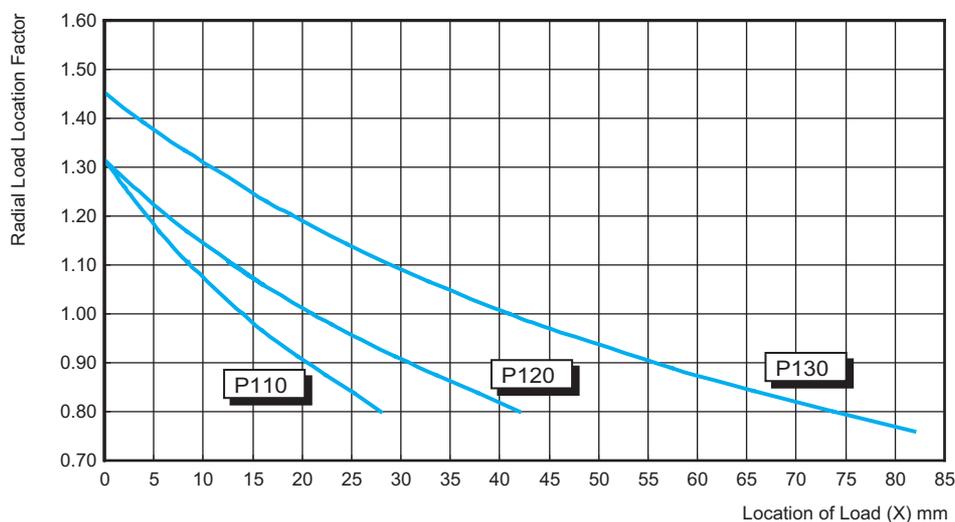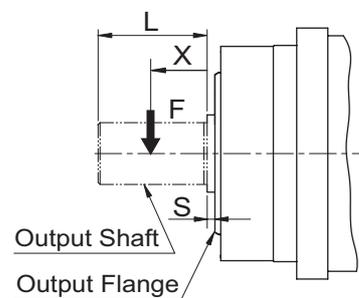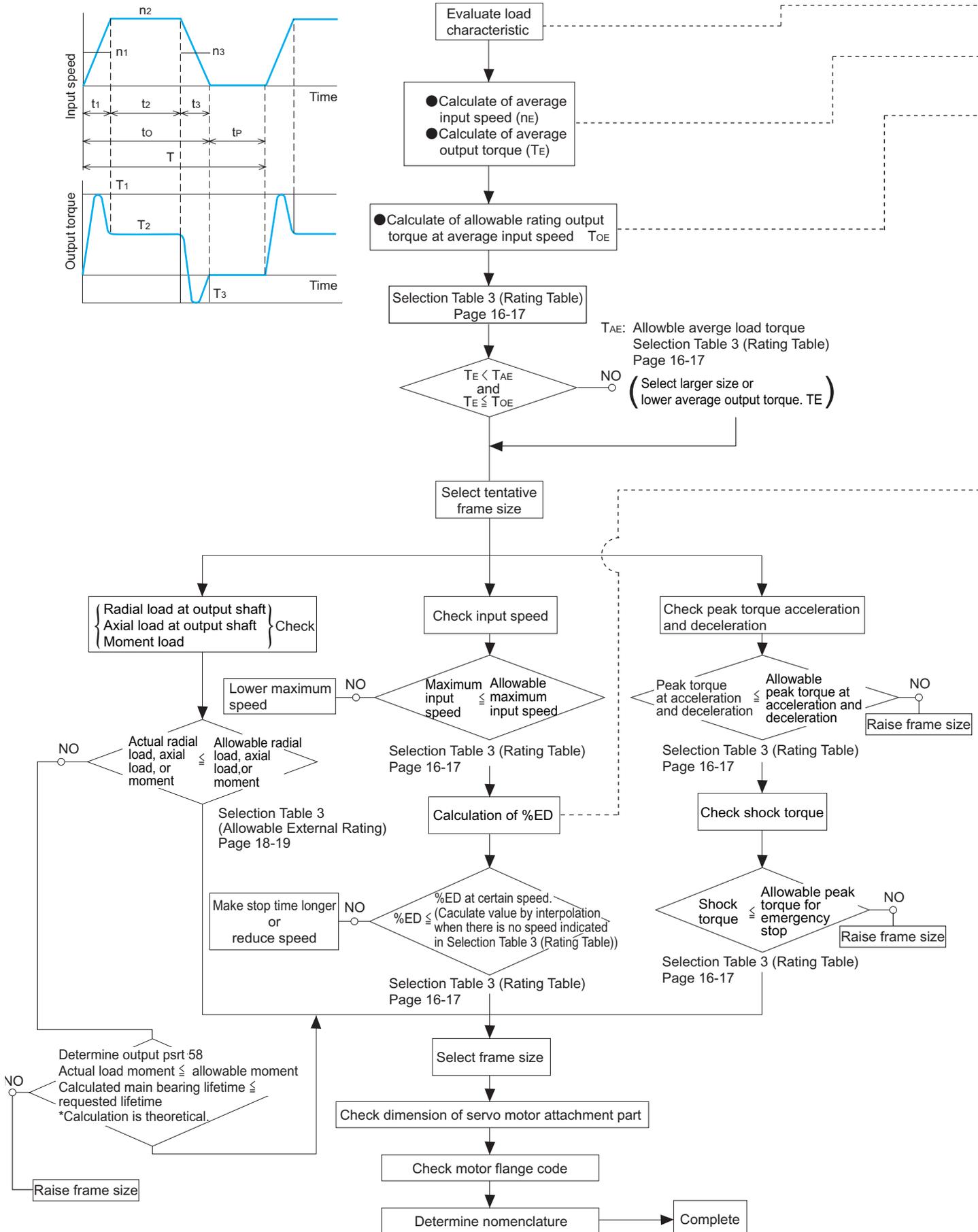

Fig. 2 Radial Load Location Factor

Fig. 3

Selection Procedure

Flow Chart and Formula of Selection

Fig. 4 Load Pattern

Evaluate load characteristic

- ● Calculate of average input speed (n_E)
- ● Calculate of average output torque (T_E)

● Calculate of allowable rating output torque at average input speed T_{OE}

Selection Table 3 (Rating Table) Page 16-17

T_{AE}: Allowble averge load torque
Selection Table 3 (Rating Table)
Page 16-17

$T_E < T_{AE}$ and $T_E \leqq T_{OE}$

NO → $\left(\begin{array}{l}\text{Select larger size or}\\ \text{lower average output torque. TE}\end{array}\right)$

Select tentative frame size

$\left\{\begin{array}{l}\text{Radial load at output shaft}\\ \text{Axial load at output shaft}\\ \text{Moment load}\end{array}\right\}$ Check

Check input speed

Check peak torque acceleration and deceleration

Lower maximum speed ← NO — Maximum input speed $\leqq$ Allowable maximum input speed

Peak torque at acceleration and deceleration $\leqq$ Allowable peak torque at acceleration and deceleration — NO → Raise frame size

NO — Actual radial load, axial load, or moment $\leqq$ Allowable radial load, axial load, or moment

Selection Table 3 (Rating Table) Page 16-17

Selection Table 3 (Rating Table) Page 16-17

Selection Table 3 (Allowable External Rating) Page 18-19

Calculation of %ED

Check shock torque

Make stop time longer or reduce speed ← NO — %ED $\leqq$ %ED at certain speed. (Caculate value by interpolation when there is no speed indicated in Selection Table 3 (Rating Table))

Shock torque $\leqq$ Allowable peak torque for emergency stop — NO → Raise frame size

Selection Table 3 (Rating Table) Page 16-17

Selection Table 3 (Rating Table) Page 16-17

Determine output psrt·58
Actual load moment $\leqq$ allowable moment
Calculated main bearing lifetime $\leqq$ requested lifetime
*Calculation is theoretical.

NO

Raise frame size

Select frame size

Check dimension of servo motor attachment part

Check motor flange code

Determine nomenclature → Complete

Selection Procedure

Calculation in Load Condition of Fig. 4

○ Average input speed $n_E = \dfrac{t_1 \cdot n_1 + t_2 \cdot n_2 + t_3 \cdot n_3 \cdots t_n \cdot n_n}{t_o}$ · Formual 1   n =4, 5, 6 · · · ·

○ Average output torque $T_E = \left(\dfrac{t_1 \cdot n_1 \cdot T_1^{10/3} + t_2 \cdot n_2 \cdot T_2^{10/3} + t_3 \cdot n_3 \cdot T_3^{10/3} + t_n \cdot n_n \cdot T_n^{10/3}}{t_o \cdot n_E} \right)^{0.3}$ x F_{s2} · · · Formual 2   n=4,5,6 · · · ·
(Table 3)

○ Allowable rating output torque at average input speed $T_{OE} = \left(\dfrac{3000}{n_E} \right)^{0.3}$ x T_o · Formula 3
T_o: Rated output torque at input speed 3000 r/min
Selection Table 3 (Rating Table)
Page 16-17

○ %ED $\% ED = \dfrac{t_o}{T}$ x 100 · Formual 4

%ED Calculation at Average Input Speed

Interpolation method

$\%ED(x) = \dfrac{y_i(x - x_{i+1}) - y_{i+1}(x - x_i)}{x_i - x_{i+1}}$

%ED(x): Calculated %ED

x: Average input speed

x_i: Speed lower than the average input speed on the rating table

y_i: Allowable %ED at the above speed

x_{i+1}: Speed higher than the average input speed on the rating table

y_{i+1}: Allowable %ED at the above speed

Table 3 Fs2 Load factor

Loading condition	F_{s2}
Uniform load	1
Moderate shock	1-1.2
Heavy shock	1.4-1.6

Example of Selection

Evaluate ANFX-P120F-7ZLD-9 for following specification.

Specification: T_A: Acceleration peak torque   130 Nm t_A: Acceleration time   0.2sec
T_R: Normal running torque   50 Nm t_R: Normal running time   5.0sec
T_B: Peak torque at breaking   100 Nm t_B: Deceleration time   0.2sec
Shock torque: 2000 Nm t_P: Total running time   3.0sec
(700 times during overall lifetime) t_o: Standstill time   5.4sec
n_A: Average input speed during acceleration   1500 r/min   T: Single cycle time   8.4sec
n_R: Input speed with normal running   3000r/min
n_B: Average input speed during deceleration   1500 r/min

Application is assumed to have almost no load.

Calculation: Average input speed $n_E = \dfrac{0.2 \times 1500 + 5.0 \times 3000 + 0.2 \times 1500}{5.4} = 2889$ [r/min]

Average output torque $T_E = \left(\dfrac{0.2 \times 1500 \times 130^{10/3} + 5.0 \times 3000 \times 50^{10/3} + 0.2 \times 1500 \times 100^{10/3}}{5.4 \times 2889} \right)^{0.3}$ x1= 57.8 [Nm]

○ Allowable rating output torque at average input speed $T_{OE} = \left(\dfrac{3000}{2889} \right)^{0.3}$ x59= 59.6 ≧ 57.8 → Select ANFX-P120F-7ZLD-9 temporarily.

○ Cheak Average output torque   57.8 ⟨ 59.6 · · · · ·OK

○ Calculate %ED $\% ED = \dfrac{5.4}{8.4}$ x100= 64.3%

○ Cheak Average output torque   20 [min]= 1200 [sec] ⟩ 5.4 [sec] · · · · ·OK

$\dfrac{90(2889 - 3000) - 80(2889 - 2000)}{2000 - 3000} ≒ 81$

81% ⟩ 64.3% · · · · ·OK

○ Evaluate maximum input speed   3000 [r/min] ⟨ 6000 [r/min]
○ Evaluate average input speed   2889 [r/min] ⟨ 3000 [r/min]
○ Evaluate peak torque at acceleration and deceleration   130 [Nm] ⟨ 140 [Nm]
○ Evaluate shock torque   200 [Nm] ⟨ 250 [Nm] (1000 times during entire lifetime)
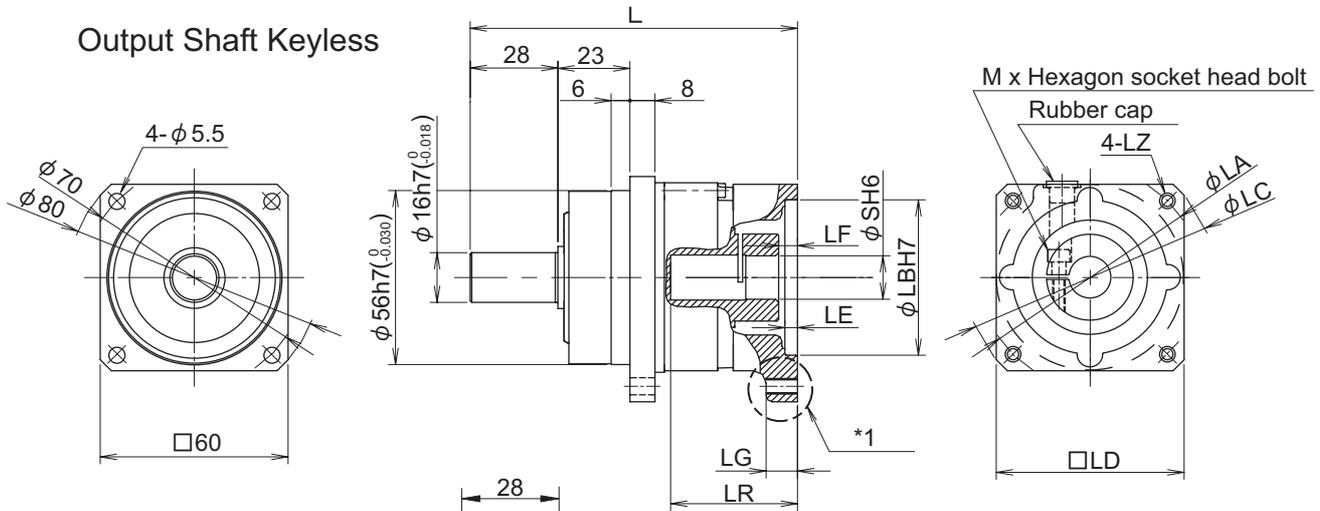
Selection Table 3
(Rating Table)
Page 16-17

ANFX-P120-7ZLD-9 is selected by the process above.

Dimension Drawings

Frame Size: P110
Reduction Ratio: 5
Solid Shaft

Output Shaft Keyless

4-φ5.5
φ70
φ80
□60

L
28 23
6   8
φ16h7(0/-0.018)
φ56h7(0/-0.030)
φSH6
LF
LBH7
LE
LG
LR
*1

M x Hexagon socket head bolt
Rubber cap
4-LZ
φLA
φLC
□LD

Output Shaft with Key

28
22
5
3
5
M4
φ16h7
11
R0.4

Dimension of shaft end key: Dimension tolerance conforms to
JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P110

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (5)

15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C	107.5	45	30	60	-	5	11	7	Useful thread length	M3	46.5	8	M3	0.9	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	46.5	6	M3	0.9	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	46.5	8	M3	0.9	2D
2E	105	60	50	80	60	4	8.5	8	Useful thread length	M4	44	8	M3	0.9	2E
2K		60	50	80	60	4	6	8	Useful thread length	M4	44	11	M4	0.9	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	44	8	M3	0.9	2F
2L		70	50	80	60	4	6	10	Through hole	M4	44	11	M4	0.9	2L
2P		70	50	80	60	4	6	10	Through hole	M4	44	14	M4	0.9	2P
2G		70	50	80	60	4	8.5	10	Through hole	M5	44	8	M3	0.9	2G
2H		70	50	80	60	4	6	10	Through hole	M5	44	9	M4	0.9	2H
2R		70	50	80	60	4	6	10	Through hole	M5	44	14	M4	0.9	2R
8A	106.5	90	70	105	80	6	7.5	12	Through hole	M5	45.5	11	M4	1.0	8A
8B		90	70	105	80	6	7.5	12	Through hole	M5	45.5	14	M4	1.0	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	45.5	14	M4	1.0	2T
2J	112	100	80	120	90	5	13	12	Through hole	M6	51	10	M4	1.1	2J
8E	128.5	100	80	120	90	6	9.5	12	Through hole	M6	41	16	M5	1.3	8E

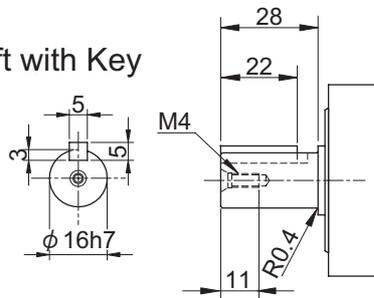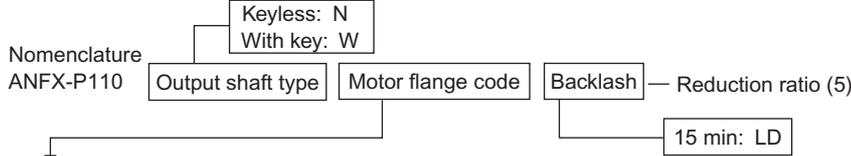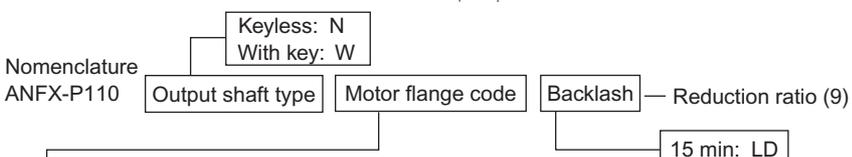# Dimension Drawings

Frame Size: P110
Reduction Ratio: 9
Solid Shaft

Output Shaft Keyless

4- φ 5.5

φ 70
φ 80

□60

28   23
6   8

φ 16h7($^{0}_{-0.018}$)
φ 56h7($^{0}_{-0.030}$)

L

φ SH6
φ LBH7

LF
LE

LG
LR

*1

M x Hexagon socket head bolt
Rubber cap
4-LZ

φLA
φLC

□LD

Output Shaft with Key

5
3
5

φ 16h7

M4

28
22

11   R0.4

Dimension of shaft end key: Dimension tolerance conforms to
JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P110

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (9)

15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C		45	30	60	-	5	11	7	Useful thread length	M3	46.5	8	M3	0.9	2C
7J	107.5	46	30	60	-	5	11	9	Useful thread length	M4	46.5	6	M3	0.9	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	46.5	8	M3	0.9	2D
2E		60	50	80	60	4	8.5	8	Useful thread length	M4	44	8	M3	0.9	2E
2K		60	50	80	60	4	6	8	Useful thread length	M4	44	11	M4	0.9	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	44	8	M3	0.9	2F
2L	105	70	50	80	60	4	6	10	Through hole	M4	44	11	M4	0.9	2L
2P		70	50	80	60	4	6	10	Through hole	M4	44	14	M4	0.9	2P
2G		70	50	80	60	4	8.5	10	Through hole	M5	44	8	M3	0.9	2G
2H		70	50	80	60	4	6	10	Through hole	M5	44	9	M4	0.9	2H
2R		70	50	80	60	4	6	10	Through hole	M5	44	14	M4	0.9	2R
8A		90	70	105	80	6	7.5	12	Through hole	M5	45.5	11	M4	1.0	8A
8B	106.5	90	70	105	80	6	7.5	12	Through hole	M5	45.5	14	M4	1.0	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	45.5	14	M4	1.0	2T
2J	112	100	80	120	90	5	13	12	Through hole	M6	51	10	M4	1.2	2J
8E	128.5	100	80	120	90	6	9.5	12	Through hole	M6	41	16	M5	1.3	8E

Dimension Drawings

Frame Size: P110
Reduction Ratio: 15
Solid Shaft

Output Shaft Keyless

M x Hexagon socket head bolt
Rubber cap

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to
JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P110

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (15)

15 min: LD

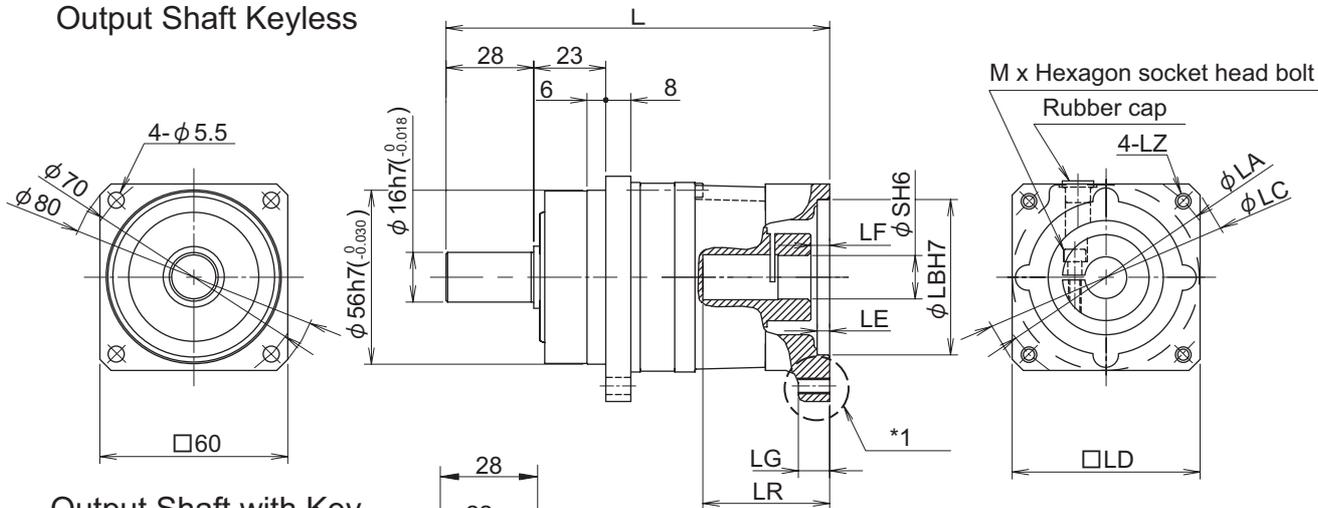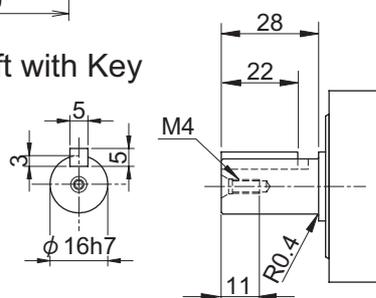| Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C	125.5	45	30	60	-	5	11	7	Useful thread length	M3	43	8	M3	1.1	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	43	6	M3	1.1	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	43	8	M3	1.1	2D
2E	123	60	50	80	60	4	8.5	9	Useful thread length	M4	40.5	8	M3	1.1	2E
2K		60	50	80	60	4	6	9	Useful thread length	M4	40.5	11	M4	1.2	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	40.5	8	M3	1.1	2F
2L		70	50	80	60	4	6	10	Through hole	M4	40.5	11	M4	1.2	2L
2G		70	50	80	60	4	8.5	10	Through hole	M5	40.5	8	M3	1.1	2G
2H		70	50	80	60	4	6	10	Through hole	M5	40.5	9	M4	1.2	2H
2R		70	50	80	60	4	6	10	Through hole	M5	40.5	14	M4	1.2	2R
8A	124.5	90	70	105	80	6	7.5	12	Through hole	M5	42	11	M4	1.3	8A
8B		90	70	105	80	6	7.5	12	Through hole	M5	42	14	M4	1.3	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	42	14	M4	1.3	2T

Dimension Drawings
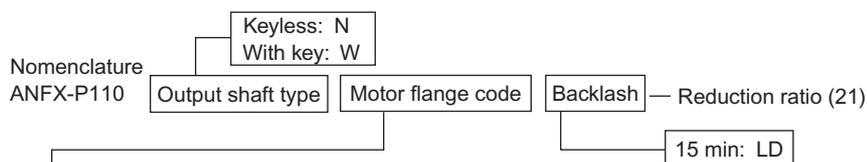
Frame Size: P110
Reduction Ratio: 21
Solid Shaft

Output Shaft Keyless

Output Shaft with Key

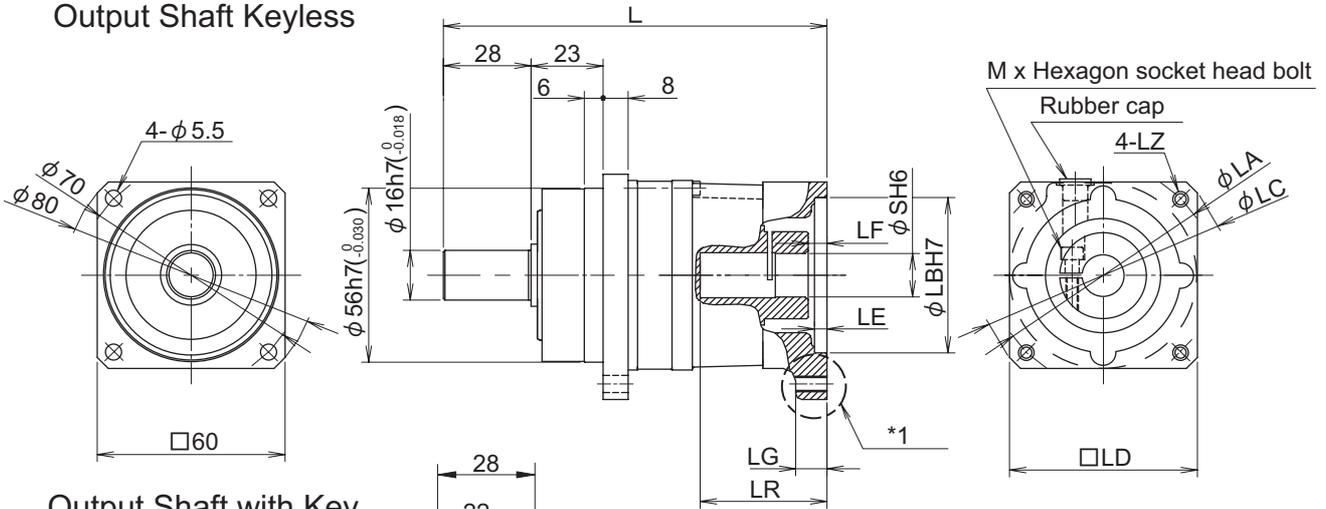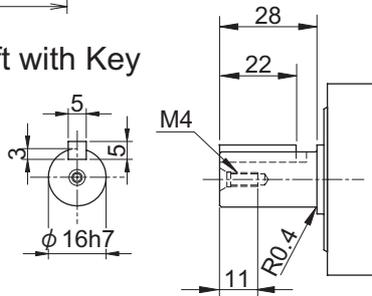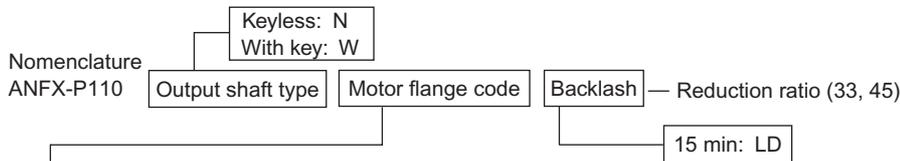Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P110

- Keyless: N / With key: W
- Output shaft type
- Motor flange code
- Backlash — Reduction ratio (21)
- 15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C	125.5	45	30	60	-	5	11	7	Useful thread length	M3	43	8	M3	1.1	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	43	6	M3	1.1	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	43	8	M3	1.1	2D
2E	123	60	50	80	60	4	8.5	9	Useful thread length	M4	40.5	8	M3	1.1	2E
2K		60	50	80	60	4	6	9	Useful thread length	M4	40.5	11	M4	1.2	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	40.5	8	M3	1.1	2F
2L		70	50	80	60	4	6	10	Through hole	M4	40.5	11	M4	1.1	2L
2G		70	50	80	60	4	8.5	10	Through hole	M5	40.5	8	M3	1.1	2G
2H		70	50	80	60	4	6	10	Through hole	M5	40.5	9	M4	1.2	2H
2R		70	50	80	60	4	6	10	Through hole	M5	40.5	14	M4	1.1	2R
8A	124.5	90	70	105	80	6	7.5	12	Through hole	M5	42	11	M4	1.3	8A
8B		90	70	105	80	6	7.5	12	Through hole	M5	42	14	M4	1.2	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	42	14	M4	1.2	2T

Dimension Drawings

Frame Size: P110
Reduction Ratio: 33, 45
Solid Shaft

Output Shaft Keyless

4-ϕ5.5
ϕ70
ϕ80
$\square$60

L
28 23
6 8
ϕ16h7($^{0}_{-0.018}$)
ϕ56h7($^{0}_{-0.030}$)

M x Hexagon socket head bolt
Rubber cap
4-LZ
ϕLA
ϕLC
ϕSH6
LF
ϕLBH7
LE
$\square$LD
LG
LR
*1

Output Shaft with Key

28
22
5
3 5
M4
ϕ16h7
11 R0.4

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P110

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (33, 45)

15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG Shape *1		LZ	LR	S	M		
2C	125.5	45	30	60	-	5	11	7	Useful thread length	M3	43	8	M3	1.2	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	43	6	M3	1.2	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	43	8	M3	1.2	2D
2E	123	60	50	80	60	4	8.5	9	Useful thread length	M4	40.5	8	M3	1.1	2E
2K[Note]		60	50	80	60	4	6	9	Useful thread length	M4	40.5	11	M4	1.3	2K[Note]
2F		70	50	80	60	4	8.5	10	Through hole	M4	40.5	8	M3	1.1	2F
2L[Note]		70	50	80	60	4	6	10	Through hole	M4	40.5	11	M4	1.2	2L[Note]
2G		70	50	80	60	4	8.5	10	Through hole	M5	40.5	8	M3	1.1	2G
2H		70	50	80	60	4	6	10	Through hole	M5	40.5	9	M4	1.2	2H
8A[Note]	124.5	90	70	105	80	6	7.5	12	Through hole	M5	42	11	M4	1.4	8A[Note]

Note: Only for reduction retio 33.

Frame Size: P110
Reduction Ratio: 81
Solid Shaft

Output Shaft Keyless

4-ϕ5.5
ϕ70
ϕ80
$\square$60

L
28   23
6   8
ϕ16h7($^{0}_{-0.018}$)
ϕ56h7($^{0}_{-0.030}$)

ϕSH6
LF
ϕLBH7
LE
LG
LR
*1

M x Hexagon socket head bolt
Rubber cap
4-LZ
ϕLA
ϕLC
$\square$LD

Output Shaft with Key

5
3   5
ϕ16h7

28
22
M4
R0.4
11

Dimension of shaft end key: Dimension tolerance conforms to
JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P110

Output shaft type | Motor flange code | Backlash — Reduction ratio (81)

Keyless: N
With key: W

15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C	125.5	45	30	60	-	5	11	7	Useful thread length	M3	43	8	M3	1.1	2C
7J	125.5	46	30	60	-	5	11	9	Useful thread length	M4	43	6	M3	1.1	7J
2D	125.5	46	30	60	-	5	11	9	Useful thread length	M4	43	8	M3	1.1	2D
2E	123	60	50	80	60	4	8.5	9	Useful thread length	M4	40.5	8	M3	1.2	2E

Dimension Drawings
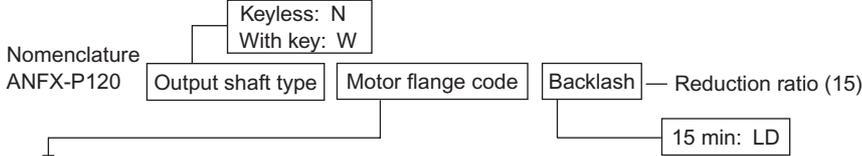
Frame Size: P120
Reduction Ratio: 5
Solid Shaft

Output Shaft Keyless

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to
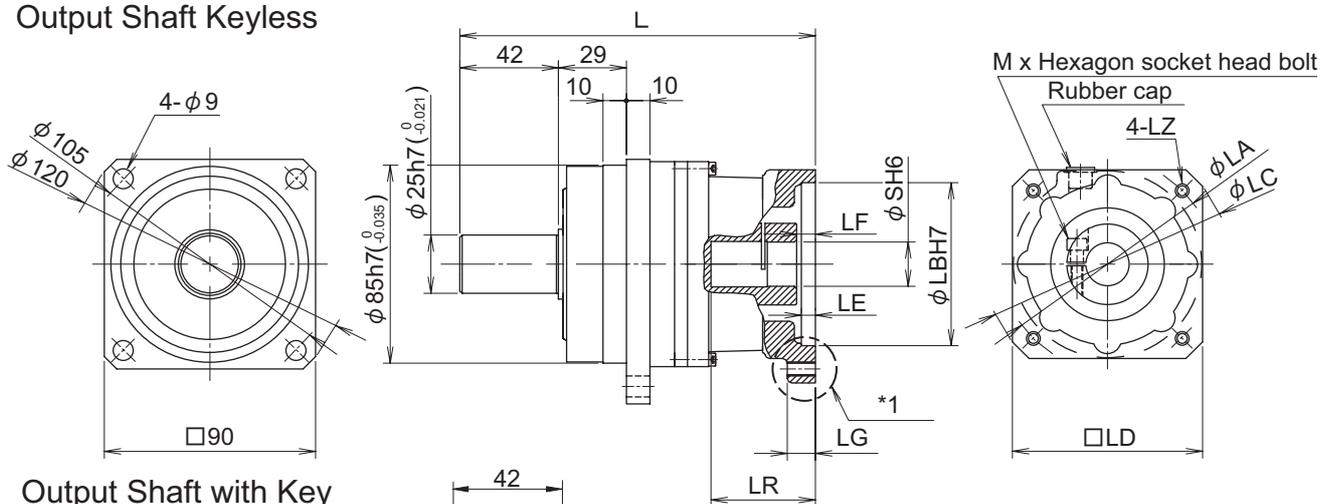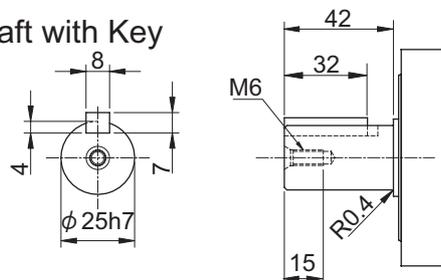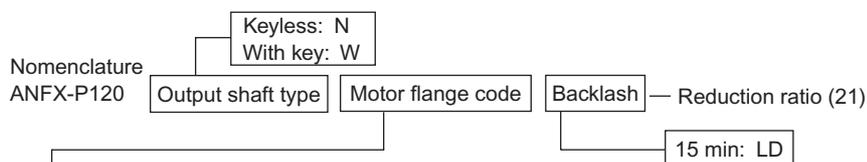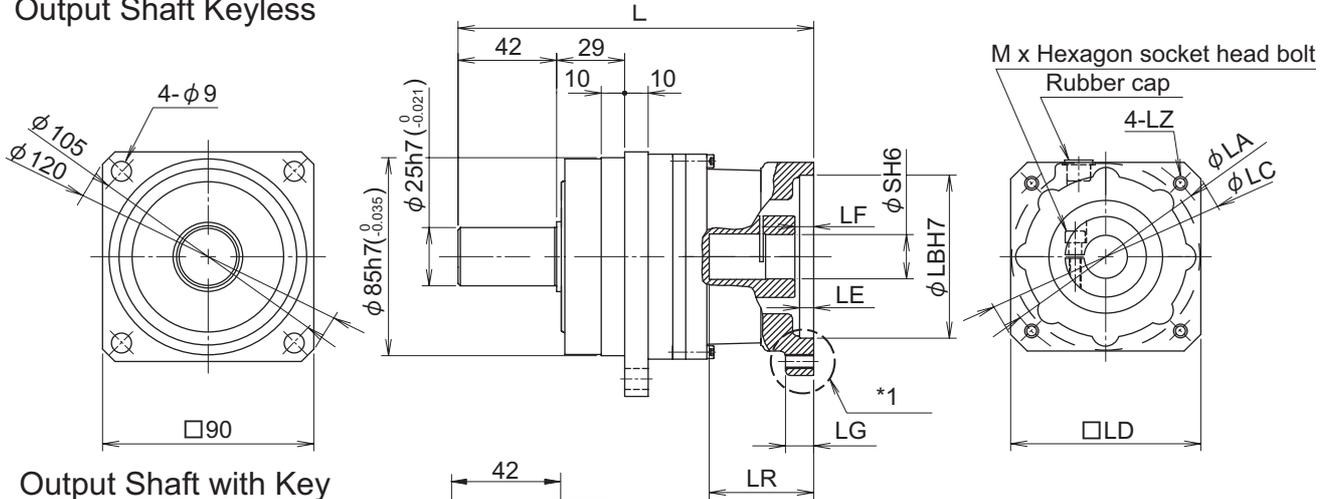JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P120

| Keyless: N / With key: W |
| Output shaft type | Motor flange code | Backlash — Reduction ratio (5) |
| 15 min: LD |

Motor flange code	L	Dimension													Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
0U	138	90	70	105	81	6	6	12	Through hole	M5	50	16	M5	2.5	0U
7S		90	70	105	81	6	6	12	Through hole	M5	50	19	M5	2.4	7S
7P		90	70	105	81	6	6	12	Through hole	M6	50	16	M5	2.5	7P
1G		90	70	105	81	6	6	12	Through hole	M6	50	19	M5	2.4	1G
0V	151.5	100	80	120	90	5	21.5	12	Through hole	M6	63.5	14	M4	2.6	0V
8E		100	80	120	90	5	19.5	12	Through hole	M6	63.5	16	M5	2.6	8E
7V		100	80	120	90	5	19.5	12	Through hole	M6	63.5	19	M5	2.5	7V
1L	164.5	115	95	135	100	6	17	16	Through hole	M6	46	24	M6	2.9	1L
7A	151.5	115	95	135	100	6	19.5	16	Through hole	M8	63.5	16	M5	2.7	7A
7B		115	95	135	100	6	19.5	16	Through hole	M8	63.5	19	M5	2.6	7B
0W	164.5	115	95	135	100	6	17	16	Through hole	M8	46	22	M6	3.0	0W
7Y		115	95	135	100	6	17	16	Through hole	M8	46	24	M6	2.9	7Y
7R	154.5	145	110	165	120	7	22.5	16	Through hole	M8	66.5	16	M5	2.8	7R
7X		145	110	165	120	7	22.5	16	Through hole	M8	66.5	19	M5	2.7	7X
1S	189.5	145	110	165	120	7	42	16	Through hole	M8	71	22	M6	3.2	1S
7Z		145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.2	7Z

P1 Type

Frame Size: P120
Reduction Ratio: 9
Solid Shaft

Output Shaft Keyless

4-ϕ9
ϕ105
ϕ120
$\square$90

L
42
29
10
10
ϕ25h7($^{0}_{-0.021}$)
ϕ85h7($^{0}_{-0.035}$)
ϕSH6
LF
LE
ϕLBH7
LG
LR
*1

M x Hexagon socket head bolt
Rubber cap
4-LZ
ϕLA
ϕLC
$\square$LD

Output Shaft with Key

8
4
7
ϕ25h7

42
32
M6
15
R0.4

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P120

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (9)

15 min: LD

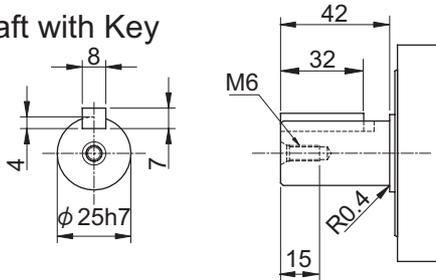| Motor flange code	L	Dimension								LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
2R	136	70	50	80	60	6	6	11	Useful thread length	M5	48	14	M4	2.5	2R
0U	138	90	70	105	81	6	6	12	Through hole	M5	50	16	M5	2.5	0U
7S		90	70	105	81	6	6	12	Through hole	M5	50	19	M5	2.4	7S
7P		90	70	105	81	6	6	12	Through hole	M6	50	16	M5	2.5	7P
1G		90	70	105	81	6	6	12	Through hole	M6	50	19	M5	2.4	1G
2J	151.5	100	80	120	90	5	21.5	12	Through hole	M6	63.5	10	M4	2.6	2J
0V		100	80	120	90	5	21.5	12	Through hole	M6	63.5	14	M4	2.4	0V
8E		100	80	120	90	5	19.5	12	Through hole	M6	63.5	16	M5	2.6	8E
7V		100	80	120	90	5	19.5	12	Through hole	M6	63.5	19	M5	2.5	7V
1L	164.5	115	95	135	100	6	17	16	Through hole	M6	46	24	M6	2.9	1L
7A	151.5	115	95	135	100	6	19.5	16	Through hole	M8	63.5	16	M5	2.7	7A
7B		115	95	135	100	6	19.5	16	Through hole	M8	63.5	19	M5	2.6	7B
0W	164.5	115	95	135	100	6	17	16	Through hole	M8	46	22	M6	3.0	0W
7Y		115	95	135	100	6	17	16	Through hole	M8	46	24	M6	2.9	7Y
7R	154.5	145	110	165	120	7	22.5	16	Through hole	M8	66.5	16	M5	2.8	7R
7X		145	110	165	120	7	22.5	16	Through hole	M8	66.5	19	M5	2.8	7X
1S	189.5	145	110	165	120	7	42	16	Through hole	M8	71	22	M6	3.3	1S
7Z		145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.2	7Z
1U	145	165	130	190	140	6	13	20	Through hole	M10	57	19	M5	2.8	1U

Dimension Drawings
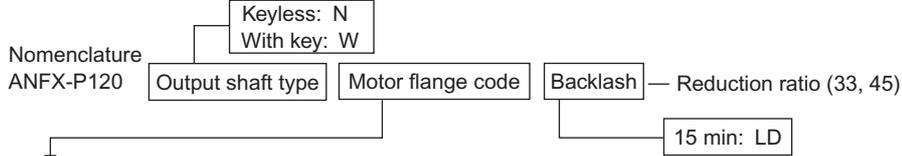
Frame Size: P120
Reduction Ratio: 15
Solid Shaft

Output Shaft Keyless

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."
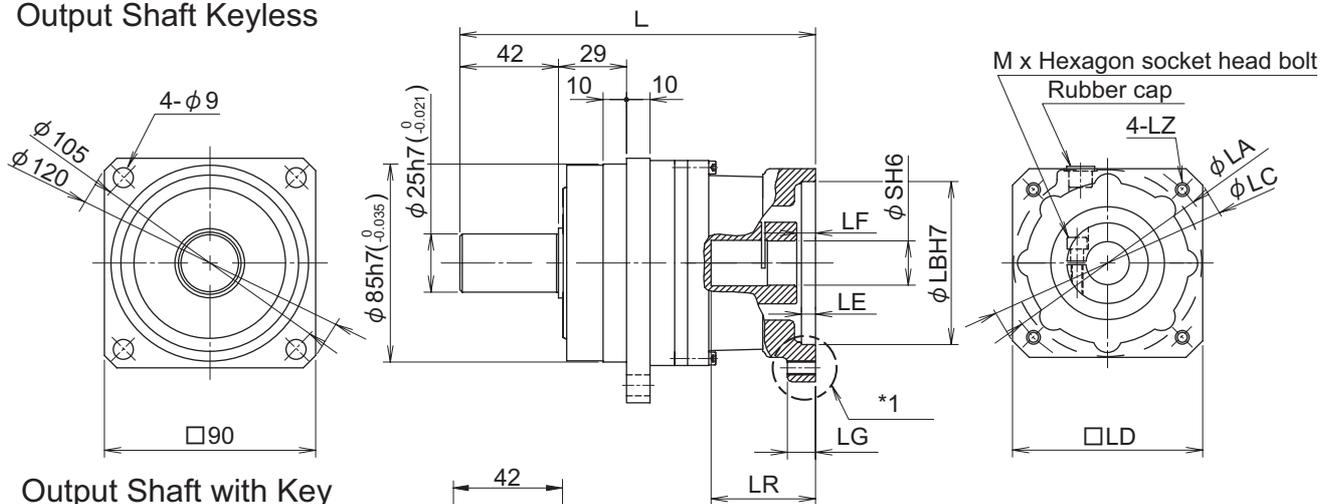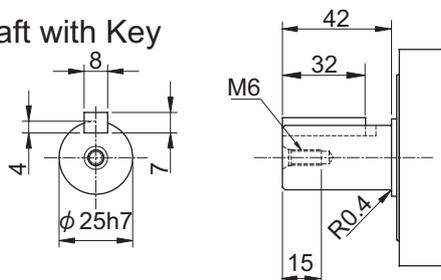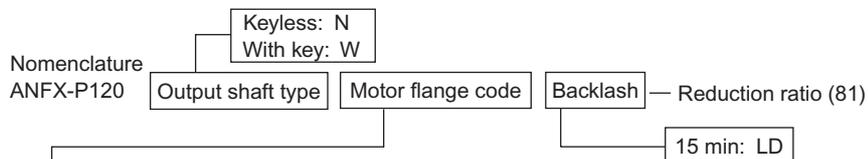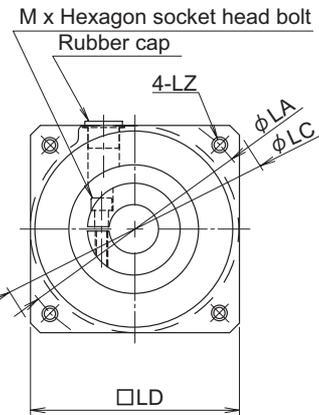
Nomenclature
ANFX-P120

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (15)

15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2P	149.5	70	50	80	60	6	6	9	Useful thread length	M4	40.5	14	M4	2.8	2P
2R		70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.8	2R
8B		90	70	105	81	6	8	12	Through hole	M5	42.5	14	M4	2.8	8B
0U		90	70	105	81	6	6	12	Through hole	M5	42.5	16	M5	2.9	0U
7S	151.5	90	70	105	81	6	6	12	Through hole	M5	42.5	19	M5	2.9	7S
2T		90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.8	2T
7P		90	70	105	81	6	6	12	Through hole	M6	42.5	16	M5	2.9	7P
1G		90	70	105	81	6	6	12	Through hole	M6	42.5	19	M5	2.9	1G
2J		100	80	120	90	5	21.5	12	Through hole	M6	56	10	M4	3.0	2J
0V	165	100	80	120	90	5	21.5	12	Through hole	M6	56	14	M4	2.9	0V
8E		100	80	120	90	5	19.5	12	Through hole	M6	56	16	M5	3.0	8E
7V		100	80	120	90	5	19.5	12	Through hole	M6	56	19	M5	3.0	7V
1L	178	115	95	135	100	6	17	16	Through hole	M6	46	24	M6	3.4	1L
7A	165	115	95	135	100	6	19.5	16	Through hole	M8	56	16	M5	3.1	7A
0W	178	115	95	135	100	6	17	16	Through hole	M8	46	22	M6	3.7	0W
7Y		115	95	135	100	6	17	16	Through hole	M8	46	24	M6	3.4	7Y
7R	168	145	110	165	120	7	22.5	16	Through hole	M8	59	16	M5	3.2	7R
7X		145	110	165	120	7	22.5	16	Through hole	M8	59	19	M5	3.2	7X
7Z	203	145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.7	7Z

Frame Size: P120
Reduction Ratio: 21
Solid Shaft

Output Shaft Keyless

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to
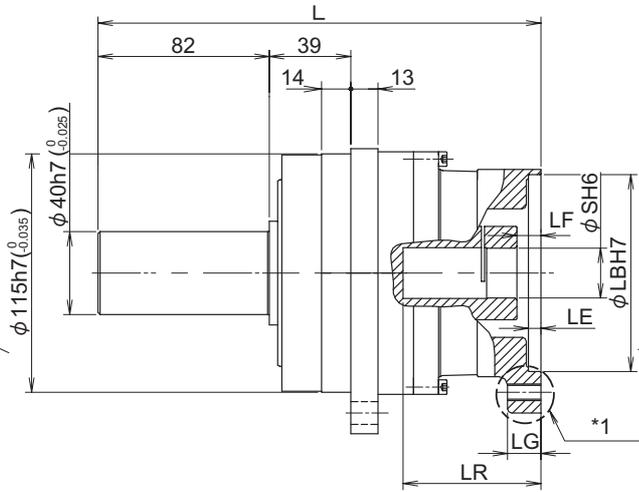JIS B 1301-1996 "Parallel Key."

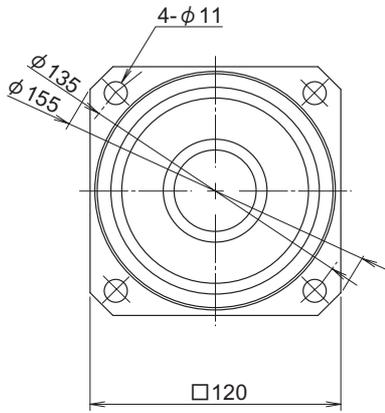Nomenclature
ANFX-P120

| Keyless: N / With key: W |
| Output shaft type | Motor flange code | Backlash | Reduction ratio (21) |

15 min: LD

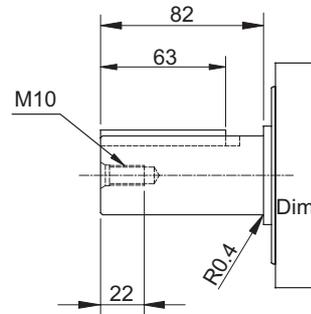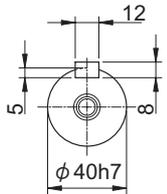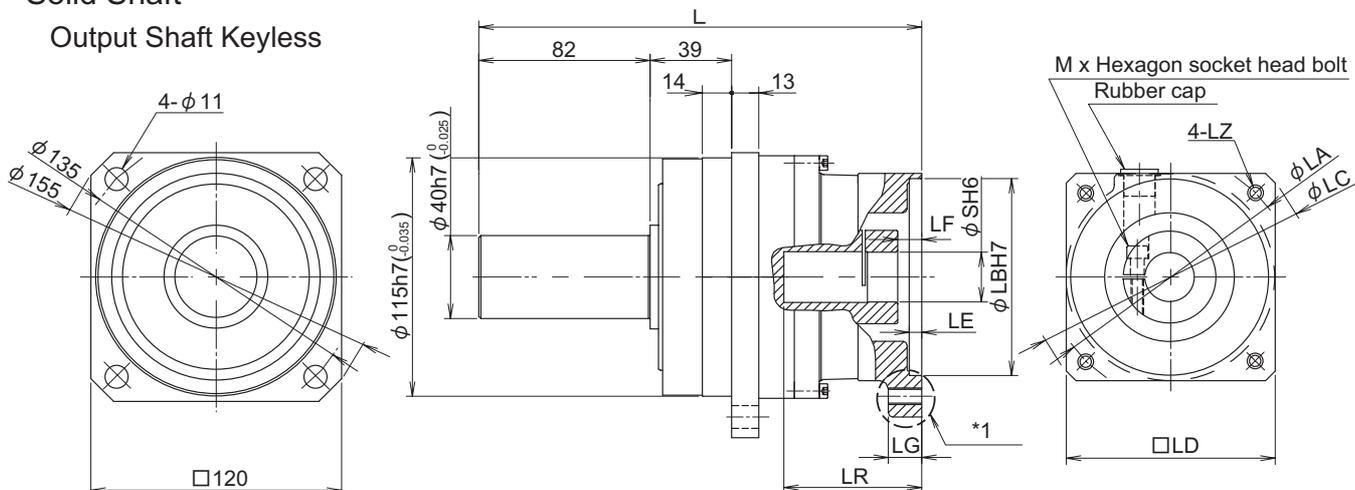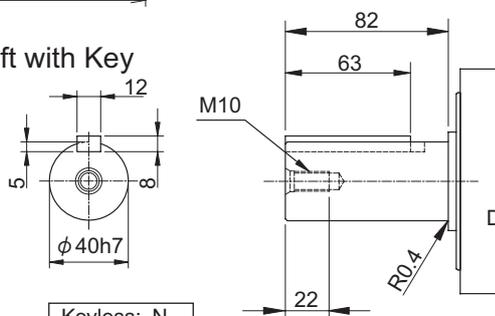| Motor flange code	L	LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M	Mass [kg]	Motor flange code
2P	149.5	70	50	80	60	6	6	9	Useful thread length	M4	40.5	14	M4	2.8	2P
2H	149.5	70	50	80	60	6	6	11	Useful thread length	M5	40.5	9	M4	2.8	2H
2R	149.5	70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.8	2R
8B	151.5	90	70	105	81	6	8	12	Through hole	M5	42.5	14	M4	2.8	8B
0U	151.5	90	70	105	81	6	6	12	Through hole	M5	42.5	16	M5	2.9	0U
7S	151.5	90	70	105	81	6	6	12	Through hole	M5	42.5	19	M5	2.9	7S
2T	151.5	90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.8	2T
7P	151.5	90	70	105	81	6	6	12	Through hole	M6	42.5	16	M5	2.9	7P
1G	151.5	90	70	105	81	6	6	12	Through hole	M6	42.5	19	M5	2.9	1G
2J	165	100	80	120	90	6	21.5	12	Through hole	M6	56	10	M4	3.0	2J
0V	165	100	80	120	90	5	21.5	12	Through hole	M6	56	14	M4	3.0	0V
8E	165	100	80	120	90	5	19.5	12	Through hole	M6	56	16	M5	3.0	8E
7A	165	115	95	135	100	5	19.5	16	Through hole	M8	56	16	M5	3.1	7A
7R	168	145	110	165	120	7	22.5	16	Through hole	M8	59	16	M5	3.2	7R
7X	168	145	110	165	120	7	22.5	16	Through hole	M8	59	19	M5	3.2	7X
7Z	203	145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.7	7Z

Dimension Drawings

Frame Size: P120
Reduction Ratio: 33, 45
Solid Shaft

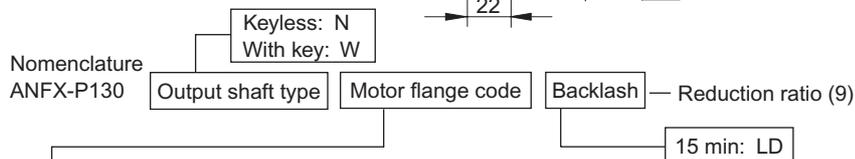## Output Shaft Keyless

Output Shaft with Key

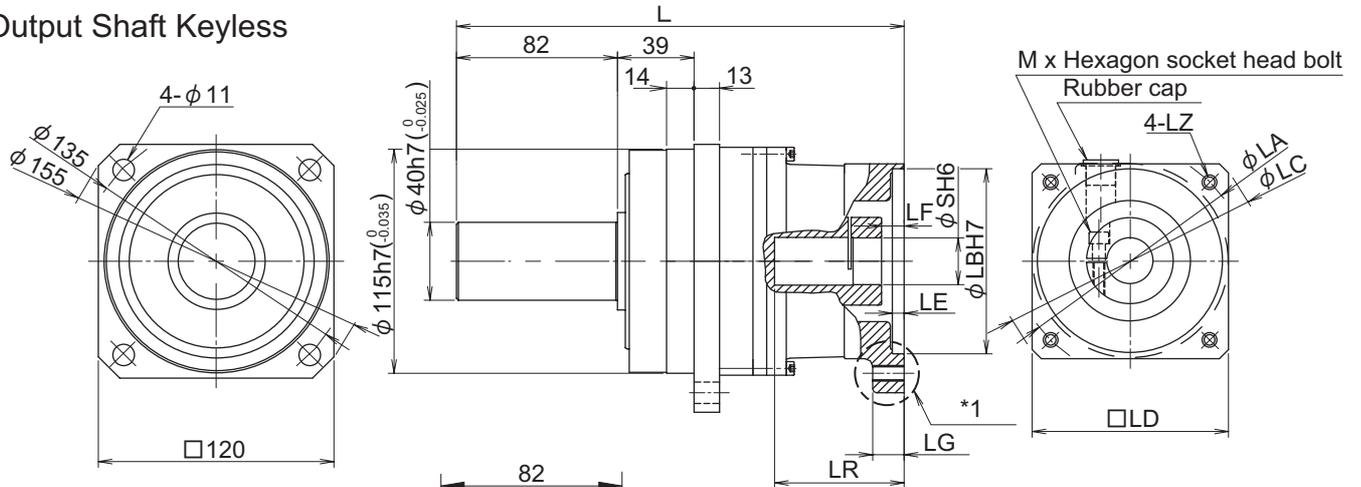Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P120 — Output shaft type — Motor flange code — Backlash — Reduction ratio (33, 45)

Keyless: N
With key: W

15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2K Note	149.5	60	50	80	60	6	6	9	Useful thread length	M4	40.5	11	M4	2.9	2K Note
2L Note		70	50	80	60	6	6	9	Useful thread length	M4	40.5	11	M4	2.9	2L Note
2P		70	50	80	60	6	6	9	Useful thread length	M4	40.5	14	M4	2.9	2P
2H Note		70	50	80	60	6	6	11	Useful thread length	M5	40.5	9	M4	2.9	2H Note
2R		70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.9	2R
8A Note	151.5	90	70	105	81	6	8	12	Through hole	M5	42.5	11	M4	2.9	8A Note
8B		90	70	105	81	6	8	12	Through hole	M5	42.5	14	M4	2.9	8B
2T		90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.9	2T

Note: Only for reduction retio 45.

Frame Size: P120
Reduction Ratio: 81
Solid Shaft

Output Shaft Keyless

4-ϕ9
ϕ105
ϕ120
ϕ85h7($_{-0.035}^{0}$)
$\square$90

ϕ25h7($_{-0.021}^{0}$)
L
42 29
10 10
ϕSH6
LF
ϕLBH7
LE
LG
LR
*1

M x Hexagon socket head bolt
Rubber cap
4-LZ
ϕLA
ϕLC
$\square$LD

Output Shaft with Key

8
4
7
ϕ25h7

42
32
M6
R0.4
15

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P120

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (81)

15 min: LD

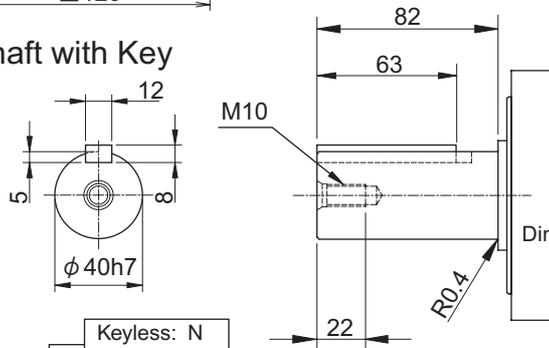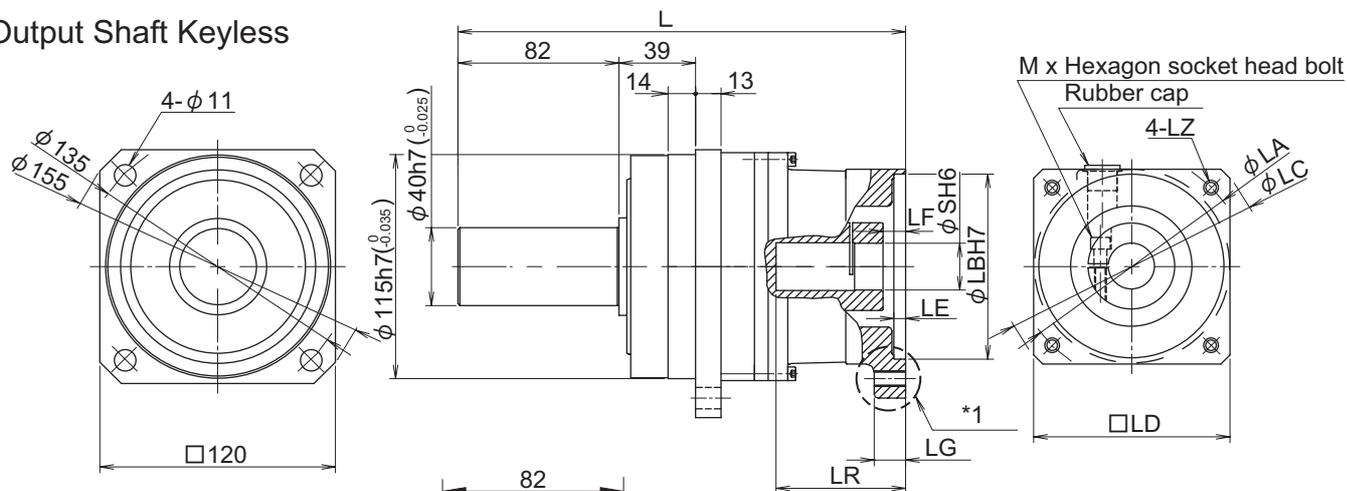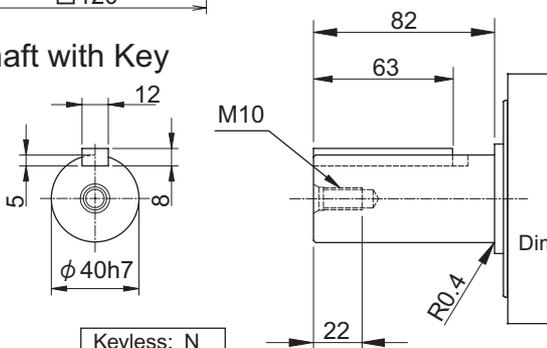| Motor flange code | L | Dimension | | | | | | | | | | | | | Mass [kg] | Motor flange code |
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C	152	45	30	54	-	4	11	7	Useful thread length	M3	43	8	M3	2.8	2C
2D		46	30	54	-	4	11	9	Useful thread length	M4	43	8	M3	2.8	2D
2E	149.5	60	50	80	60	6	8.5	9	Useful thread length	M4	40.5	8	M3	2.9	2E
2K		60	50	80	60	6	6	9	Useful thread length	M4	40.5	11	M4	2.9	2K
2F		70	50	80	60	6	8.5	9	Useful thread length	M4	40.5	8	M3	2.9	2F
2G		70	50	80	60	6	8.5	11	Useful thread length	M5	40.5	8	M3	2.9	2G
2H		70	50	80	60	6	6	11	Useful thread length	M5	40.5	9	M4	2.9	2H
2R		70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.9	2R
2T	151.5	90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.9	2T

Dimension Drawings

Frame Size: P130
Reduction Ratio: 5
Solid Shaft

Output Shaft Keyless

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P130

- Keyless: N
  With key: W
- Output shaft type
- Motor flange code
- Backlash — Reduction ratio (5)
  - 15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
1S	220	145	110	165	120	7	19.5	16	Through hole	M8	74	22	M6	6.9	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	74	24	M6	6.8	7Z
1T		145	110	165	120	7	19.5	16	Through hole	M8	74	28	M6	6.7	1T
0X	265.5	200	114.3	230	180	6	41.5	24	Through hole	M12	81	35	M8	8.4	0X

Dimension Drawings

Frame Size: P130
Reduction Ratio: 9
Solid Shaft

Output Shaft Keyless

4-ϕ11
ϕ135
ϕ155
ϕ115h7$(^{0}_{-0.035})$
ϕ40h7$(^{0}_{-0.025})$
□120

L
82
39
14
13

M x Hexagon socket head bolt
Rubber cap
4-LZ
ϕLA
ϕLC
LF
ϕSH6
ϕLBH7
LE
LG
*1
LR
□LD

Output Shaft with Key

12
5
8
ϕ40h7

82
63
M10
22
R0.4

Dimension of shaft end key: Dimension tolerance conforms to
JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P130

Keyless: N
With key: W

Output shaft type — Motor flange code — Backlash — Reduction ratio (9)

15 min: LD

Motor flange code	L	Dimension								LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
1L	212	115	95	135	100	6	11.5	16	Through hole	M6	66	24	M6	6.5	1L
7B		115	95	135	100	6	13.5	16	Through hole	M8	66	19	M5	6.5	7B
0W		115	95	135	100	6	11.5	16	Through hole	M8	66	22	M6	6.5	0W
7Y		115	95	135	100	6	11.5	16	Through hole	M8	66	24	M6	6.5	7Y
7X	220	145	110	165	120	7	21.5	16	Through hole	M8	74	19	M5	7	7X
1S		145	110	165	120	7	19.5	16	Through hole	M8	74	22	M6	7	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	74	24	M6	6.9	7Z
1T		145	110	165	120	7	19.5	16	Through hole	M8	74	28	M6	6.8	1T
0X	265.5	200	114.3	230	180	6	41.5	24	Through hole	M12	81	35	M8	8.5	0X

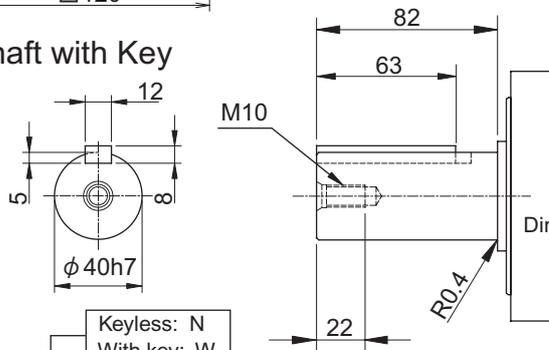# Dimension Drawings

Frame Size: P130
Reduction Ratio: 15
Solid Shaft

Output Shaft Keyless

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P130

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (15)

15 min: LD

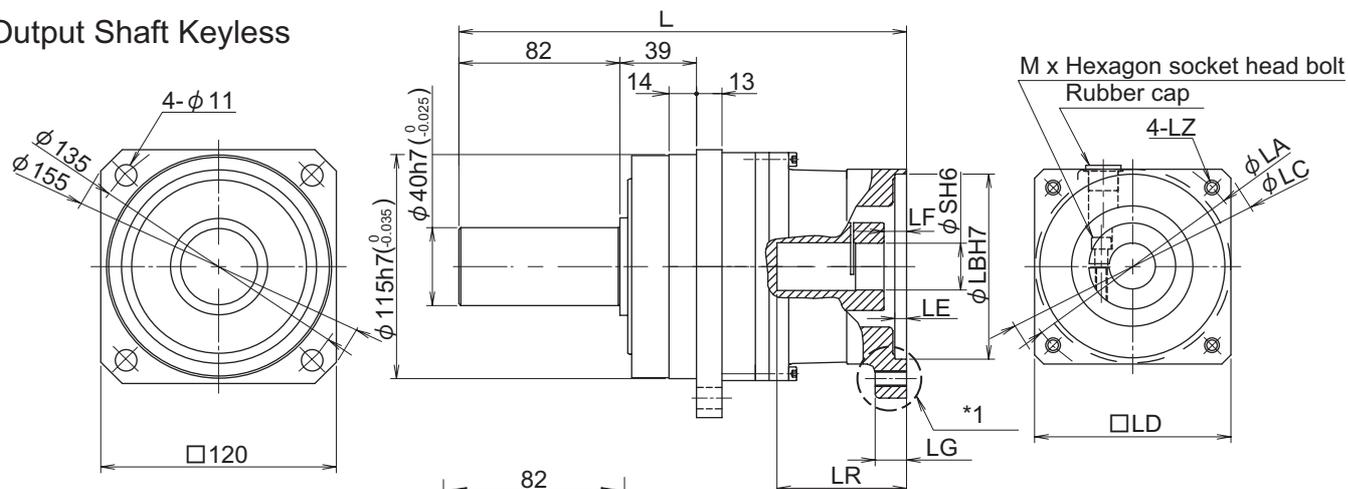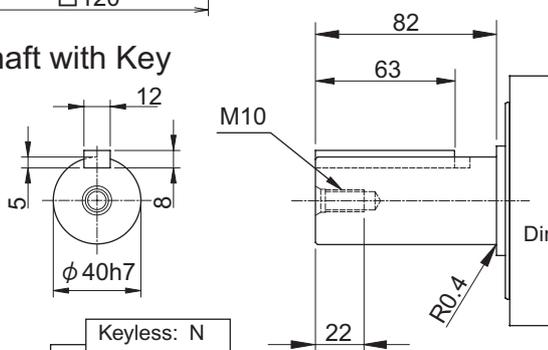| Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
1L	228	115	95	135	100	6	11.5	16	Through hole	M6	56	24	M6	7.4	1L
7B		115	95	135	100	6	13.5	16	Through hole	M8	56	19	M5	7.3	7B
0W		115	95	135	100	6	11.5	16	Through hole	M8	56	22	M6	7.4	0W
7Y		115	95	135	100	6	11.5	16	Through hole	M8	56	24	M6	7.4	7Y
7X	236	145	110	165	120	7	21.5	16	Through hole	M8	64	19	M5	7.7	7X
1S		145	110	165	120	7	19.5	16	Through hole	M8	64	22	M6	7	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	64	24	M6	7.7	7Z

Frame Size: P130
Reduction Ratio: 21
Solid Shaft
Output Shaft Keyless

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P130

| Output shaft type | Motor flange code | Backlash | Reduction ratio (21) |

Keyless: N
With key: W

15 min: LD

Motor flange code	L	LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M	Mass [kg]	Motor flange code
8E[Note]	228	100	80	120	90	5	13.5	12	Through hole	M6	56	16	M5	7.4	8E[Note]
7V[Note]		100	80	120	90	5	13.5	12	Through hole	M6	56	19	M5	7.3	7V[Note]
1L	228	115	95	135	100	6	11.5	16	Through hole	M6	56	24	M6	7.3	1L
7B		115	95	135	100	6	13.5	16	Through hole	M8	56	19	M5	7.3	7B
0W		115	95	135	100	6	11.5	16	Through hole	M8	56	22	M6	7.3	0W
7Y		115	95	135	100	6	11.5	16	Through hole	M8	56	24	M6	7.3	7Y
7X	236	145	110	165	120	7	21.5	16	Through hole	M8	64	19	M5	7.6	7X
1S		145	110	165	120	7	19.5	16	Through hole	M8	64	22	M6	7.6	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	64	24	M6	7.7	7Z

Note: With motor flange plate.

Dimension Drawings

Frame Size: P130
Reduction Ratio: 33, 45
Solid Shaft

Output Shaft Keyless

Output Shaft with Key

Dimension of shaft end key: Dimension tolerance conforms to JIS B 1301-1996 "Parallel Key."
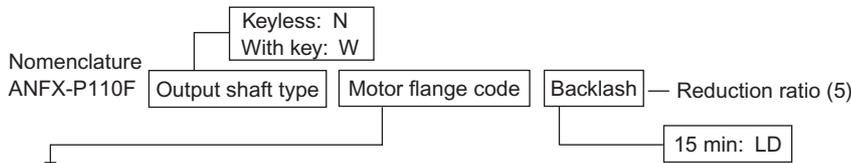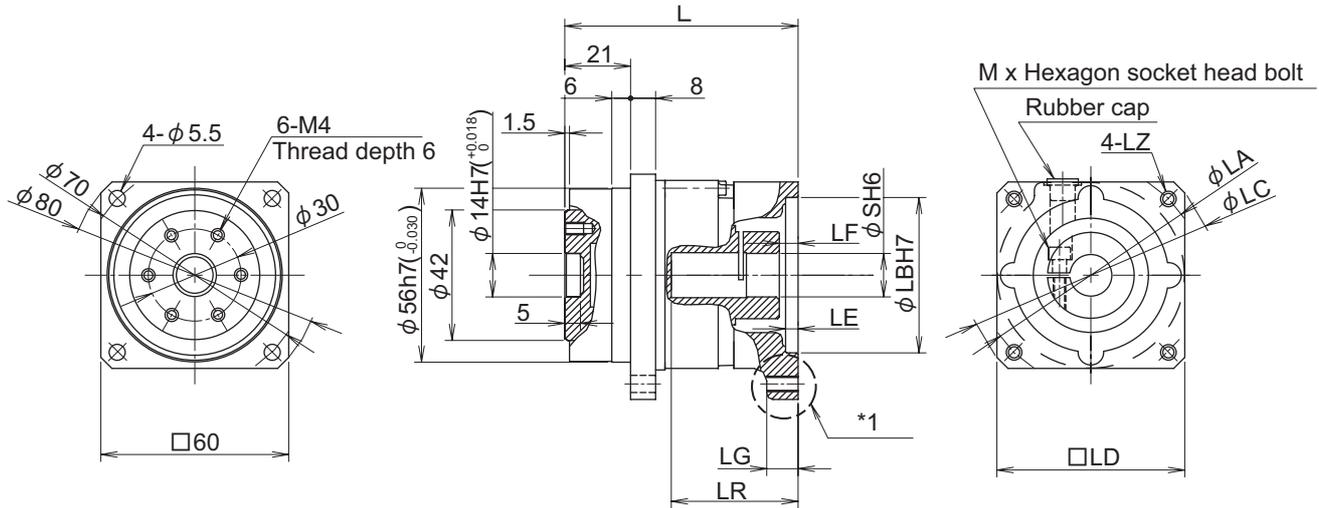
Nomenclature
ANFX-P130

Keyless: N
With key: W

Output shaft type — Motor flange code — Backlash — Reduction ratio (33, 45)

15 min: LD

Motor flange code	L	Dimension								LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
2R	217.5	70	50	80	60	5	4	11	Useful thread length	M5	45.5	14	M4	7.3	2R
0U	220.5	90	70	120	90	6	6	11	Useful thread length	M5	48.5	16	M5	7.3	0U
7S		90	70	120	90	6	6	11	Useful thread length	M5	48.5	19	M5	7.3	7S
7P		90	70	120	90	6	6	13	Useful thread length	M6	48.5	16	M5	7.3	7P
1G		90	70	120	90	6	6	13	Useful thread length	M6	48.5	19	M5	7.3	1G
2J[Note]	228	100	80	120	90	5	15.5	12	Through hole	M6	56	10	M4	7.4	2J[Note]
0V[Note]		100	80	120	90	5	15.5	12	Through hole	M6	56	14	M4	7.4	0V[Note]
8E[Note]		100	80	120	90	5	13.5	12	Through hole	M6	56	16	M5	7.4	8E[Note]
7A		115	95	135	100	6	13.5	16	Through hole	M8	56	16	M5	7.4	7A
7R	236	145	110	165	120	7	21.5	16	Through hole	M8	64	16	M5	7.7	7R
7X		145	110	165	120	7	21.5	16	Through hole	M8	64	19	M5	7.7	7X
7Z		145	110	165	120	7	21.5	16	Through hole	M8	64	24	M6	7.7	7Z

Note: With motor flange plate.

Frame Size: P130
Reduction Ratio: 81
Solid Shaft

Output Shaft Keyless

4-φ11
φ135
φ155
□120

L
82 39
14 13
φ40h7($_{-0.025}^{0}$)
φ115h7($_{-0.035}^{0}$)

M x Hexagon socket head bolt
Rubber cap
4-LZ
φLA
φLC
LF φSH6
φLBH7
LE
*1
LG
LR
□LD

Output Shaft with Key

12
5
8
φ40h7

M10
82
63
22
R0.4

Dimension of shaft end key: Dimension tolerance conforms to
JIS B 1301-1996 "Parallel Key."

Nomenclature
ANFX-P130

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (81)

15 min: LD

Motor flange code	L	Dimension								LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
2L	217.5	70	50	80	60	4	5	9	Useful thread length	M4	45.5	11	M4	7.3	2L
2P		70	50	80	60	4	5	9	Useful thread length	M4	45.5	14	M4	7.3	2P
2H		70	50	80	60	4	5	11	Useful thread length	M5	45.5	9	M4	7.3	2H
2R		70	50	80	60	4	5	11	Useful thread length	M5	45.5	14	M4	7.3	2R
8A		90	70	120	90	6	8	11	Useful thread length	M5	48.5	11	M4	7.4	8A
8B	220.5	90	70	120	90	6	8	11	Useful thread length	M5	48.5	14	M4	7.4	8B
2T		90	70	120	90	6	8	13	Useful thread length	M6	48.5	14	M4	7.4	2T

Dimension Drawings

Frame Size: P110
Reduction Ratio: 5
Flange Shaft

Nomenclature
ANFX-P110F

Keyless: N
With key: W

| Output shaft type | Motor flange code | Backlash | — Reduction ratio (5) |

15 min: LD

Motor flange code	L	Dimension						LG Shape *1		LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF								
2C	77.5	45	30	60	-	5	11	7	Useful thread length	M3	46.5	8	M3	0.86	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	46.5	6	M3	0.86	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	46.5	8	M3	0.86	2D
2E	75	60	50	80	60	4	8.5	8	Useful thread length	M4	44	8	M3	0.86	2E
2K		60	50	80	60	4	6	8	Useful thread length	M4	44	11	M4	0.86	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	44	8	M3	0.86	2F
2L		70	50	80	60	4	6	10	Through hole	M4	44	11	M4	0.86	2L
2P		70	50	80	60	4	6	10	Through hole	M4	44	14	M4	0.86	2P
2G		70	50	80	60	4	8.5	10	Through hole	M5	44	8	M3	0.86	2G
2H		70	50	80	60	4	6	10	Through hole	M5	44	9	M4	0.86	2H
2R		70	50	80	60	4	6	10	Through hole	M5	44	14	M4	0.86	2R
8A	76.5	90	70	105	80	6	7.5	12	Through hole	M5	45.5	11	M4	0.96	8A
8B		90	70	105	80	6	7.5	12	Through hole	M5	45.5	14	M4	0.96	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	45.5	14	M4	0.96	2T
2J	82	100	80	120	90	5	13	12	Through hole	M6	51	10	M4	1.06	2J
8E	98.5	100	80	120	90	6	9.5	12	Through hole	M6	41	16	M5	1.26	8E

Dimension Drawings

Frame Size: P110
Reduction Ratio: 9
Flange Shaft

Nomenclature
ANFX-P110F

- Output shaft type
- Keyless: N / With key: W
- Motor flange code
- Backlash — 15 min: LD
- Reduction ratio (9)

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C	97.5	45	30	60	-	5	11	7	Useful thread length	M3	46.5	8	M3	0.86	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	46.5	6	M3	0.86	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	46.5	8	M3	0.86	2D
2E	75	60	50	80	60	4	8.5	8	Useful thread length	M4	44	8	M3	0.86	2E
2K		60	50	80	60	4	6	8	Useful thread length	M4	44	11	M4	0.86	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	44	8	M3	0.86	2F
2L		70	50	80	60	4	6	10	Through hole	M4	44	11	M4	0.86	2L
2P		70	50	80	60	4	6	10	Through hole	M4	44	14	M4	0.86	2P
2G		70	50	80	60	4	8.5	10	Through hole	M5	44	8	M3	0.86	2G
2H		70	50	80	60	4	6	10	Through hole	M5	44	9	M4	0.86	2H
2R		70	50	80	60	4	6	10	Through hole	M5	44	14	M4	0.86	2R
8A	76.5	90	70	105	80	6	7.5	12	Through hole	M5	45.5	11	M4	0.96	8A
8B		90	70	105	80	6	7.5	12	Through hole	M5	45.5	14	M4	0.96	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	45.5	14	M4	0.96	2T
2J	82	100	80	120	90	5	13	12	Through hole	M6	51	10	M4	1.16	2J
8E	98.5	100	80	120	90	6	9.5	12	Through hole	M6	41	16	M5	1.26	8E

P1 Type

Dimension Drawings

Frame Size: P110
Reduction Ratio: 15
Flange Shaft

Nomenclature
ANFX-P110F

- Output shaft type
- Keyless: N
- With key: W
- Motor flange code
- Backlash — Reduction ratio (15)
- 15 min: LD

Motor flange code	L	Dimension													Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG		LZ	LR	S	M		
									Shape *1						
2C	95.5	45	30	60	-	5	11	7	Useful thread length	M3	43	8	M3	1.06	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	43	6	M3	1.06	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	43	8	M3	1.06	2D
2E	93	60	50	80	60	4	8.5	9	Useful thread length	M4	40.5	8	M3	1.06	2E
2K		60	50	80	60	4	6	9	Useful thread length	M4	40.5	11	M4	1.16	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	40.5	8	M3	1.06	2F
2L		70	50	80	60	4	6	10	Through hole	M4	40.5	11	M4	1.16	2L
2G		70	50	80	60	4	8.5	10	Through hole	M5	40.5	8	M3	1.06	2G
2H		70	50	80	60	4	6	10	Through hole	M5	40.5	9	M4	1.16	2H
2R		70	50	80	60	4	6	10	Through hole	M5	40.5	14	M4	1.16	2R
8A	94.5	90	70	105	80	6	7.5	12	Through hole	M5	42	11	M4	1.26	8A
8B		90	70	105	80	6	7.5	12	Through hole	M5	42	14	M4	1.26	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	42	14	M4	1.26	2T

Dimension Drawings

Frame Size: P110
Reduction Ratio: 21
Flange Shaft

Nomenclature
ANFX-P110F

Keyless: N
With key: W

Output shaft type — Motor flange code — Backlash — Reduction ratio (21)

15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2C		45	30	60	-	5	11	7	Useful thread length	M3	43	8	M3	1.06	2C
7J	95.5	46	30	60	-	5	11	9	Useful thread length	M4	43	6	M3	1.06	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	43	8	M3	1.06	2D
2E		60	50	80	60	4	8.5	9	Useful thread length	M4	40.5	8	M3	1.06	2E
2K		60	50	80	60	4	6	9	Useful thread length	M4	40.5	11	M4	1.16	2K
2F		70	50	80	60	4	8.5	10	Through hole	M4	40.5	8	M3	1.06	2F
2L	93	70	50	80	60	4	6	10	Through hole	M4	40.5	11	M4	1.06	2L
2G		70	50	80	60	4	8.5	10	Through hole	M5	40.5	8	M3	1.06	2G
2H		70	50	80	60	4	6	10	Through hole	M5	40.5	9	M4	1.16	2H
2R		70	50	80	60	4	6	10	Through hole	M5	40.5	14	M4	1.06	2R
8A		90	70	105	80	6	7.5	12	Through hole	M5	42	11	M4	1.26	8A
8B	94.5	90	70	105	80	6	7.5	12	Through hole	M5	42	14	M4	1.16	8B
2T		90	70	105	80	6	7.5	12	Through hole	M6	42	14	M4	1.16	2T

Dimension Drawings

Frame Size: P110
Reduction Ratio: 33, 45
Flange Shaft

Nomenclature
ANFX-P110F — [Output shaft type] [Motor flange code] [Backlash] — Reduction ratio (33, 45)

Keyless: N
With key: W

15 min: LD

Motor flange code	L	Dimension						LG		LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF		Shape *1						
2C	95.5	45	30	60	-	5	11	7	Useful thread length	M3	43	8	M3	1.16	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	43	6	M3	1.16	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	43	8	M3	1.16	2D
2E	93	60	50	80	60	4	8.5	10	Useful thread length	M4	40.5	8	M3	1.06	2E
2K[Note]		60	50	80	60	4	6	9	Useful thread length	M4	40.5	11	M4	1.26	2K[Note]
2F[Note]		70	50	80	60	4	8.5	10	Through hole	M4	40.5	8	M3	1.06	2F[Note]
2L		70	50	80	60	4	6	10	Through hole	M4	40.5	11	M4	1.16	2L
2G		70	50	80	60	4	8.5	10	Through hole	M5	40.5	8	M3	1.06	2G
2H		70	50	80	60	4	6	10	Through hole	M5	40.5	9	M4	1.16	2H
8A[Note]	124.5	90	70	105	80	6	7.5	12	Through hole	M5	42	11	M4	1.36	8A[Note]

Note: Only for reduction retio 33.

Dimension Drawings

Frame Size: P110
Reduction Ratio: 81
Flange Shaft

Nomenclature
ANFX-P110F

Keyless: N
With key: W

Output shaft type — Motor flange code — Backlash — Reduction ratio (81)

15 min: LD

Motor flange code	L	Dimension									LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
2C	95.5	45	30	60	-	5	11	7	Useful thread length	M3	43	M3	8	1.16	2C
7J		46	30	60	-	5	11	9	Useful thread length	M4	43	M3	6	1.16	7J
2D		46	30	60	-	5	11	9	Useful thread length	M4	43	M3	8	1.16	2D
2E	93	60	50	80	60	4	8.5	9	Useful thread length	M4	40.5	M3	8	1.16	2E

Dimension Drawings

Frame Size: P120
Reduction Ratio: 5
Flange Shaft

Nomenclature
ANFX-P120F

	Keyless: N With key: W
Output shaft type	Motor flange code	Backlash — Reduction ratio (5)
	15 min: LD

Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	*1 Shape	LZ	LR	S	M		
0U	94	90	70	105	81	6	6	12	Through hole	M5	50	16	M5	2.3	0U
7S		90	70	105	81	6	6	12	Through hole	M5	50	19	M5	2.2	7S
7P		90	70	105	81	6	6	12	Through hole	M6	50	16	M5	2.3	7P
1G		90	70	105	81	6	6	12	Through hole	M6	50	19	M5	2.4	1G
0V	107.5	100	80	120	90	5	21.5	12	Through hole	M6	63.5	14	M4	2.4	0V
8E		100	80	120	90	5	19.5	12	Through hole	M6	63.5	16	M5	2.4	8E
7V		100	80	120	90	5	19.5	12	Through hole	M6	63.5	19	M5	2.3	7V
1L	120.5	115	95	135	100	6	17	16	Through hole	M6	46	24	M6	2.7	1L
7A	107.5	115	95	135	100	6	19.5	16	Through hole	M8	63.5	16	M5	2.5	7A
7B		115	95	135	100	6	19.5	16	Through hole	M8	63.5	19	M5	2.4	7B
0W	120.5	115	95	135	100	6	17	16	Through hole	M8	46	22	M6	2.8	0W
7Y		115	95	135	100	6	17	16	Through hole	M8	46	24	M6	2.7	7Y
7R	110.5	145	110	165	120	7	22.5	16	Through hole	M8	66.5	16	M5	2.6	7R
7X		145	110	165	120	7	22.5	16	Through hole	M8	66.5	19	M5	2.5	7X
1S	145.5	145	110	165	120	7	42	16	Through hole	M8	71	22	M6	3.0	1S
7Z		145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.0	7Z

Dimension Drawings
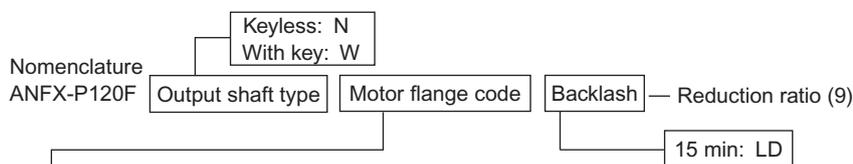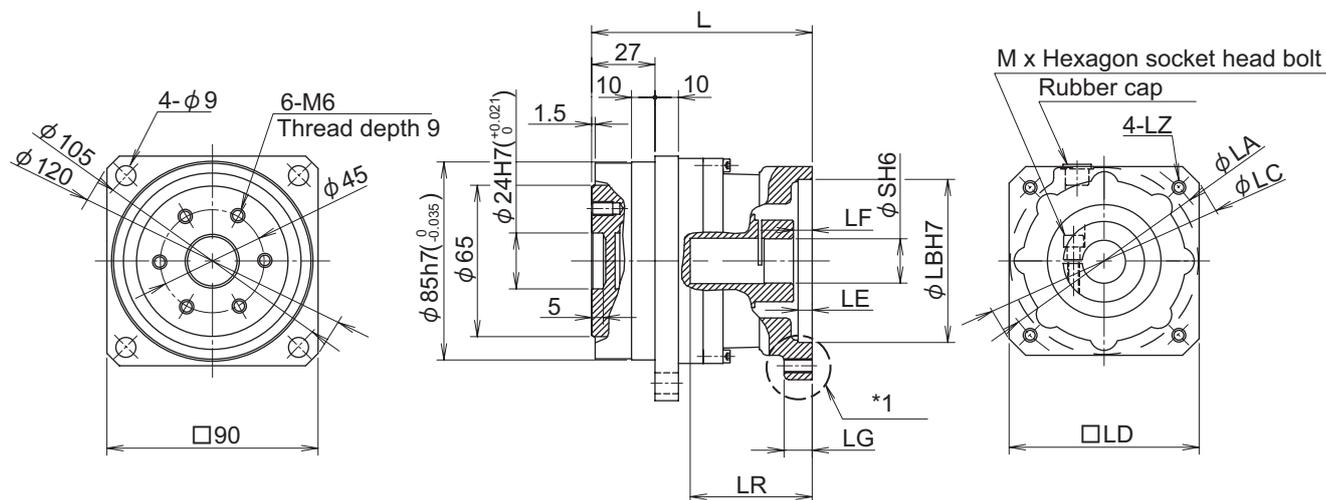
Frame Size: P120
Reduction Ratio: 9
Flange Shaft

Nomenclature
ANFX-P120F

| Output shaft type | Motor flange code | Backlash | — Reduction ratio (9) |

Keyless: N
With key: W

15 min: LD

Motor flange code	L	Dimension									LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
2R	92	70	50	80	60	6	6	11	Useful thread length	M5	48	14	M4	2.3	2R
0U	94	90	70	105	81	6	6	12	Through hole	M5	50	16	M5	2.3	0U
7S		90	70	105	81	6	6	12	Through hole	M5	50	19	M5	2.2	7S
7P		90	70	105	81	6	6	12	Through hole	M6	50	16	M5	2.3	7P
1G		90	70	105	81	6	6	12	Through hole	M6	50	19	M5	2.2	1G
2J	107.5	100	80	120	90	5	21.5	12	Through hole	M6	63.5	10	M4	2.4	2J
0V		100	80	120	90	5	21.5	12	Through hole	M6	63.5	14	M4	2.2	0V
8E		100	80	120	90	5	19.5	12	Through hole	M6	63.5	16	M5	2.4	8E
7V		100	80	120	90	5	19.5	12	Through hole	M6	63.5	19	M5	2.3	7V
1L	120.5	115	95	135	100	6	17	16	Through hole	M6	46	24	M6	2.7	1L
7A	107.5	115	95	135	100	6	19.5	16	Through hole	M8	63.5	16	M5	2.5	7A
7B		115	95	135	100	6	19.5	16	Through hole	M8	63.5	19	M5	2.4	7B
0W	120.5	115	95	135	100	6	17	16	Through hole	M8	46	22	M6	2.8	0W
7Y		115	95	135	100	6	17	16	Through hole	M8	46	24	M6	2.7	7Y
7R	110.5	145	110	165	120	7	22.5	16	Through hole	M8	66.5	16	M5	2.6	7R
7X		145	110	165	120	7	22.5	16	Through hole	M8	66.5	19	M5	2.6	7X
1S	145.5	145	110	165	120	7	42	16	Through hole	M8	71	22	M6	3.1	1S
7Z		145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.0	7Z
1U	101	165	130	190	140	6	13	20	Through hole	M10	57	19	M5	2.6	1U

Dimension Drawings
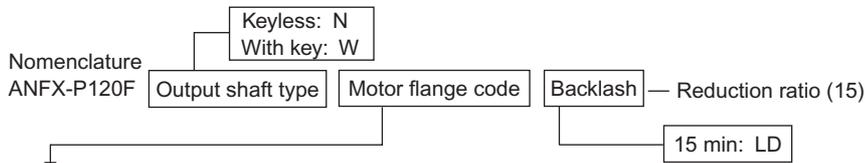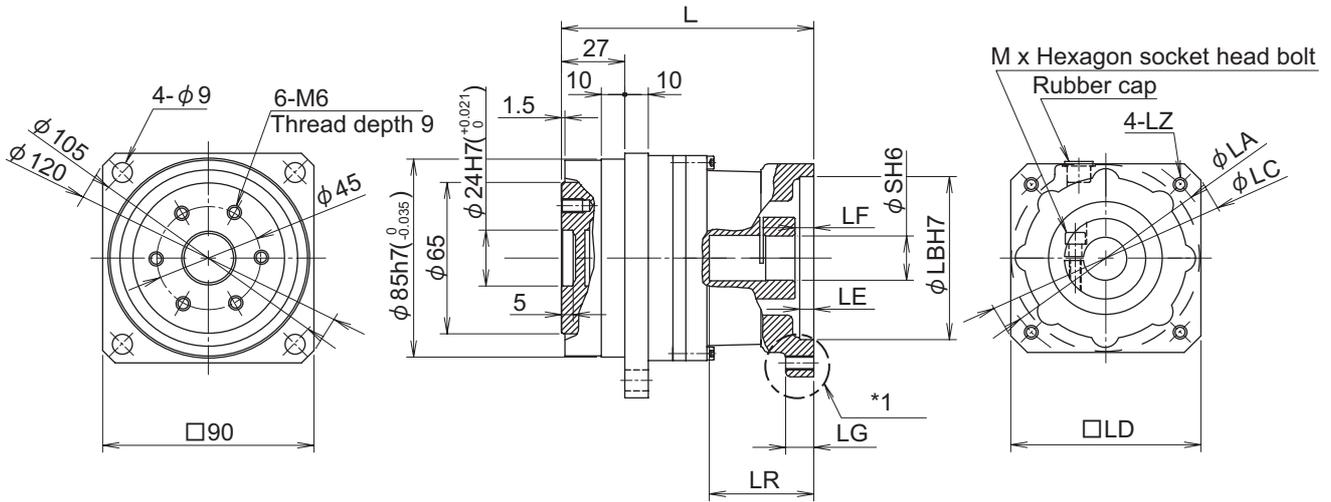
Frame Size: P120
Reduction Ratio: 15
Flange Shaft

Nomenclature
ANFX-P120F

- Keyless: N / With key: W
- Output shaft type
- Motor flange code
- Backlash — Reduction ratio (15)
- 15 min: LD

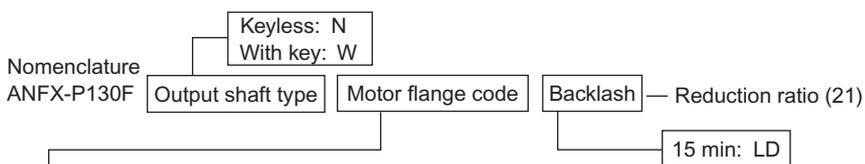| Motor flange code	L	Dimension						LG		LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF		Shape *1						
2P	105.5	70	50	80	60	6	6	9	Useful thread length	M4	40.5	14	M4	2.6	2P
2R		70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.6	2R
8B	107.5	90	70	105	81	6	8	12	Through hole	M5	42.5	14	M4	2.6	8B
0U		90	70	105	81	6	6	12	Through hole	M5	42.5	16	M5	2.7	0U
7S		90	70	105	81	6	6	12	Through hole	M5	42.5	19	M5	2.7	7S
2T		90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.6	2T
7P		90	70	105	81	6	6	12	Through hole	M6	42.5	16	M5	2.7	7P
1G		90	70	105	81	6	6	12	Through hole	M6	42.5	19	M5	2.7	1G
2J	121	100	80	120	90	5	21.5	12	Through hole	M6	56	10	M4	2.8	2J
0V		100	80	120	90	5	21.5	12	Through hole	M6	56	14	M4	2.7	0V
8E		100	80	120	90	5	19.5	12	Through hole	M6	56	16	M5	2.8	8E
7V		100	80	120	90	5	19.5	12	Through hole	M6	56	19	M5	2.8	7V
1L	134	115	95	135	100	6	17	16	Through hole	M6	46	24	M6	3.2	1L
7A	121	115	95	135	100	6	19.5	16	Through hole	M8	56	16	M5	2.9	7A
0W	134	115	95	135	100	6	17	16	Through hole	M8	46	22	M6	3.5	0W
7Y		115	95	135	100	6	17	16	Through hole	M8	46	24	M6	3.2	7Y
7R	124	145	110	165	120	7	22.5	16	Through hole	M8	59	16	M5	3.0	7R
7X		145	110	165	120	7	22.5	16	Through hole	M8	59	19	M5	3.0	7X
7Z	159	145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.5	7Z

Frame Size: P120
Reduction Ratio: 21
Flange Shaft

Nomenclature
ANFX-P120F — Output shaft type — Motor flange code — Backlash — Reduction ratio (21)

Keyless: N
With key: W

15 min: LD

Motor flange code	L	Dimension									LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1							
2P		70	50	80	60	6	6	9	Useful thread length	M4	40.5	14	M4	2.6	2P
2H	105.5	70	50	80	60	6	6	11	Useful thread length	M5	40.5	9	M4	2.6	2H
2R		70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.6	2R
8B		90	70	105	81	6	8	12	Through hole	M5	42.5	14	M4	2.6	8B
0U		90	70	105	81	6	6	12	Through hole	M5	42.5	16	M5	2.7	0U
7S	107.5	90	70	105	81	6	6	12	Through hole	M5	42.5	19	M5	2.7	7S
2T		90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.6	2T
7P		90	70	105	81	6	6	12	Through hole	M6	42.5	16	M5	2.7	7P
1G		90	70	105	81	6	6	12	Through hole	M6	42.5	19	M5	2.7	1G
2J		100	80	120	90	5	21.5	12	Through hole	M6	56	10	M4	2.8	2J
0V	121	100	80	120	90	5	21.5	12	Through hole	M6	56	14	M4	2.8	0V
8E		100	80	120	90	5	19.5	12	Through hole	M6	56	16	M5	2.8	8E
7A		115	95	135	100	6	19.5	16	Through hole	M8	56	16	M5	2.9	7A
7R	124	145	110	165	120	7	22.5	16	Through hole	M8	59	16	M5	3.0	7R
7X		145	110	165	120	7	22.5	16	Through hole	M8	59	19	M5	3.0	7X
7Z	159	145	110	165	120	7	42	16	Through hole	M8	71	24	M6	3.5	7Z

Dimension Drawings

Frame Size: P120
Reduction Ratio: 33, 45
Flange Shaft
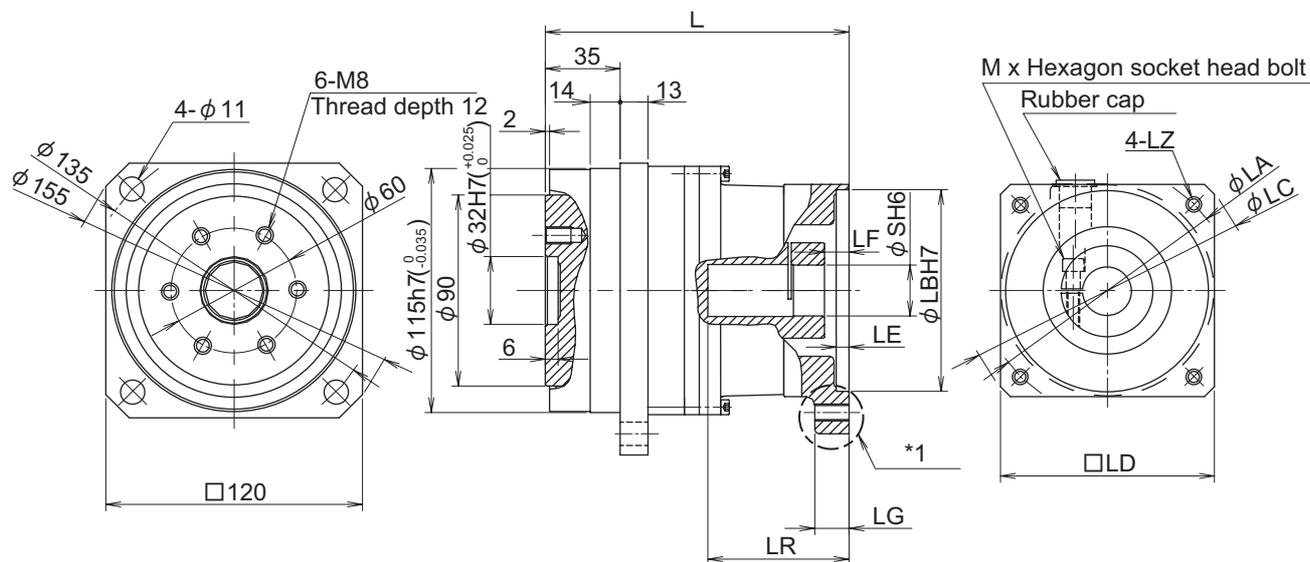

Nomenclature
ANFX-P120F

- Keyless: N / With key: W
- Output shaft type
- Motor flange code
- Backlash — Reduction ratio (33, 45)
- 15 min: LD
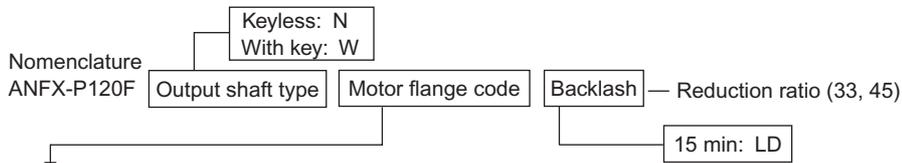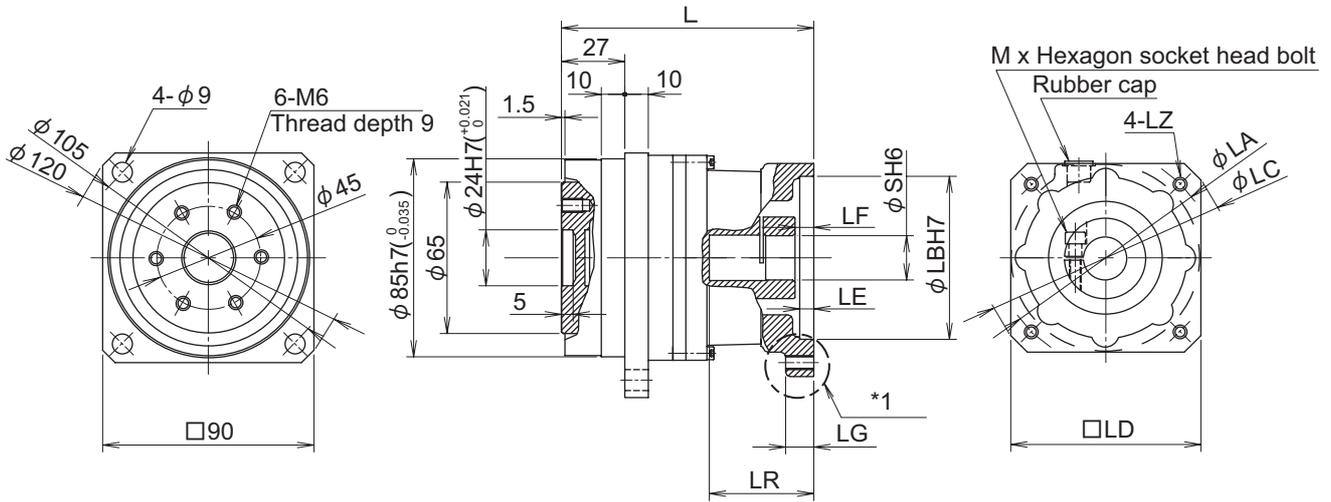
Motor flange code	L	Dimension								LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
2K Note	105.5	60	50	80	60	6	6	9	Useful thread length	M4	40.5	11	M4	2.7	2K Note
2L Note		70	50	80	60	6	6	9	Useful thread length	M4	40.5	11	M4	2.7	2L Note
2P		70	50	80	60	6	6	9	Useful thread length	M4	40.5	14	M4	2.7	2P
2H Note		70	50	80	60	6	6	11	Useful thread length	M5	40.5	9	M4	2.7	2H Note
2R		70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.7	2R
8A Note	107.5	90	70	105	81	6	8	12	Through hole	M5	42.5	11	M4	2.7	8A Note
8B		90	70	105	81	6	8	12	Through hole	M5	42.5	14	M4	2.7	8B
2T		90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.7	2T

Note: Only for reduction retio 45.

Frame Size: P120
Reduction Ratio: 81
Flange Shaft

Nomenclature
ANFX-P120F

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (81)

15 min: LD
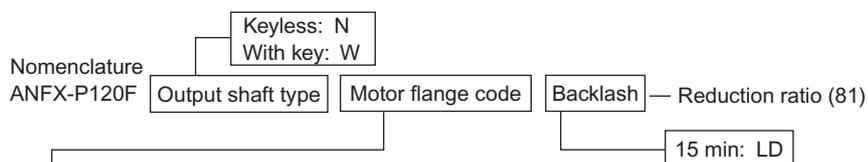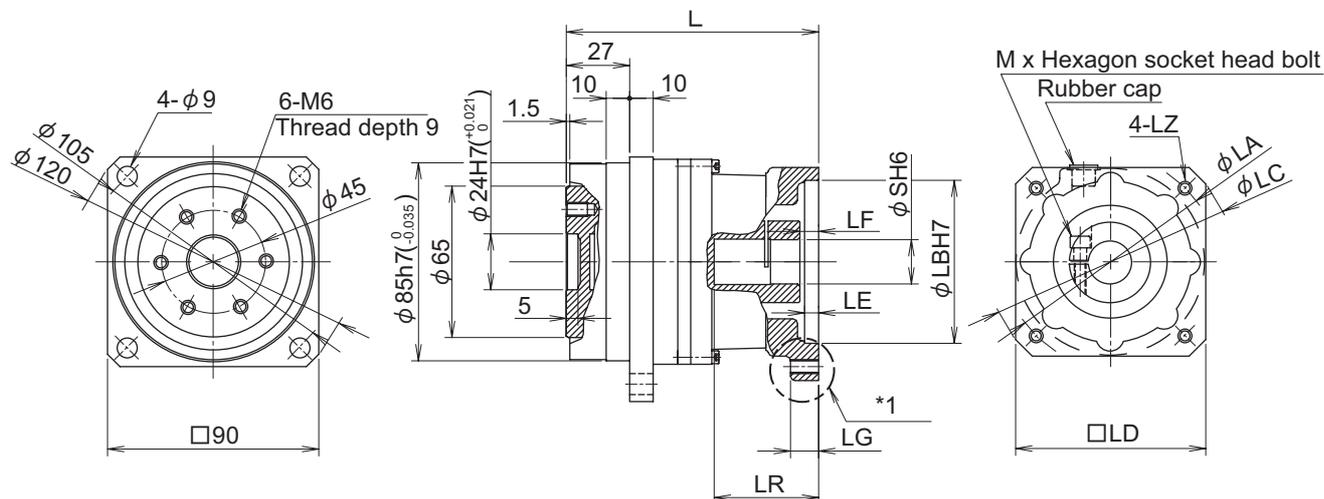
Motor flange code	L	Dimension									LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
2C	108	45	30	54	-	4	11	7	Useful thread length	M3	43	8	M3	2.6	2C
2D		46	30	54	-	4	11	9	Useful thread length	M4	43	8	M3	2.6	2D
2E	105.5	60	50	80	60	6	8.5	9	Useful thread length	M4	40.5	8	M3	2.7	2E
2K		60	50	80	60	6	6	9	Useful thread length	M4	40.5	11	M4	2.7	2K
2F		70	50	80	60	6	8.5	9	Useful thread length	M4	40.5	8	M3	2.7	2F
2G		70	50	80	60	6	8.5	11	Useful thread length	M5	40.5	8	M3	2.7	2G
2H		70	50	80	60	6	6	11	Useful thread length	M5	40.5	9	M4	2.7	2H
2R		70	50	80	60	6	6	11	Useful thread length	M5	40.5	14	M4	2.7	2R
2T	107.5	90	70	105	81	6	8	12	Through hole	M6	42.5	14	M4	2.7	2T

Dimension Drawings

Frame Size: P130
Reduction Ratio: 5
Flange Shaft

Motor flange code	L	Dimension								LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1						
1S	134	145	110	165	120	7	19.5	16	Through hole	M8	74	22	M6	6.7	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	74	24	M6	6.6	7Z
1T		145	110	165	120	7	19.5	16	Through hole	M8	74	28	M6	5.9	1T
0X	179.5	200	114.3	230	180	6	41.5	24	Through hole	M12	81	35	M8	7.6	0X

Dimension Drawings

Frame Size: P130
Reduction Ratio: 9
Flange Shaft

Nomenclature
ANFX-P130F

- Output shaft type
  - Keyless: N
  - With key: W
- Motor flange code
- Backlash — Reduction ratio (9)
  - 15 min: LD

Motor flange code	L	Dimension											Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG Shape *1		LZ	LR	S	M		
1L	126	115	95	135	100	6	11.5	16	Through hole	M6	66	24	M6	5.7	1L
7B		115	95	135	100	6	13.5	16	Through hole	M8	66	19	M5	6.3	7B
0W		115	95	135	100	6	11.5	16	Through hole	M8	66	22	M6	6.3	0W
7Y		115	95	135	100	6	11.5	16	Through hole	M8	66	24	M6	5.7	7Y
7X	134	145	110	165	120	7	21.5	16	Through hole	M8	74	19	M5	6.8	7X
1S		145	110	165	120	7	19.5	16	Through hole	M8	74	22	M6	6.2	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	74	24	M6	6.1	7Z
1T		145	110	165	120	7	19.5	16	Through hole	M8	74	28	M6	6.0	1T
0X	179.5	200	114.3	230	180	6	41.5	24	Through hole	M12	81	35	M8	7.7	0X

Dimension Drawings
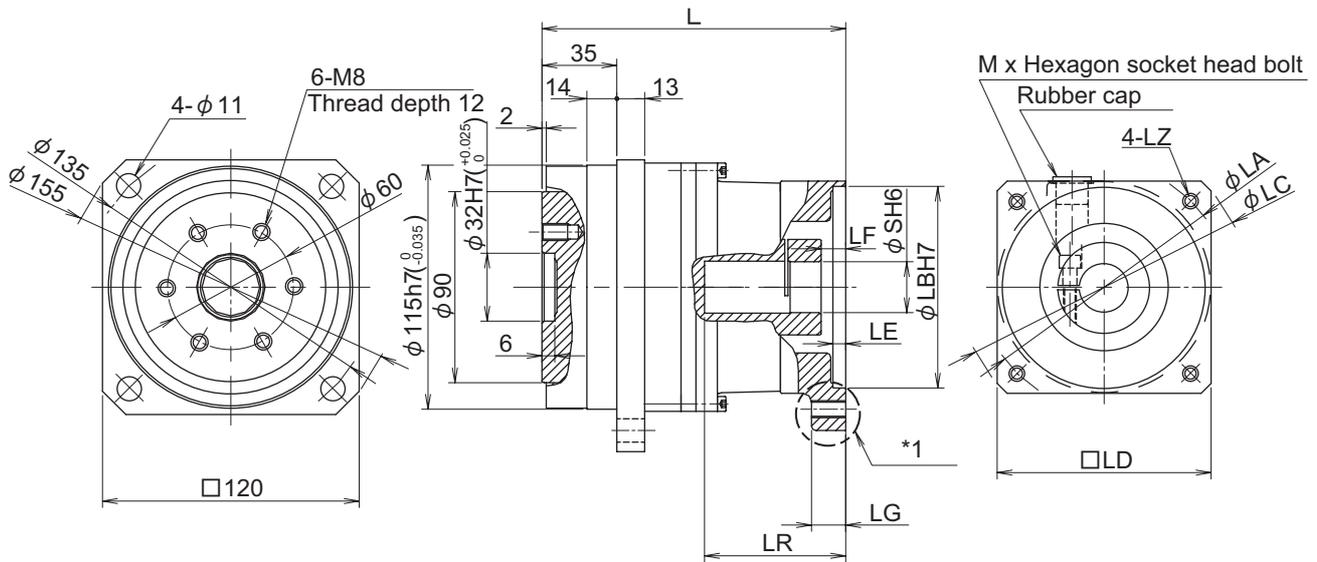
Frame Size: P130
Reduction Ratio: 15
Flange Shaft

Nomenclature
ANFX-P130F

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (15)

15 min: LD

Motor flange code	L	Dimension											Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG Shape *1		LZ	LR	S	M		
1L	142	115	95	135	100	6	11.5	16	Through hole	M6	56	24	M6	6.6	1L
7B		115	95	135	100	6	13.5	16	Through hole	M8	56	19	M5	6.4	7B
0W		115	95	135	100	6	13.5	16	Through hole	M8	56	22	M6	6.5	0W
7Y		115	95	135	100	6	11.5	16	Through hole	M8	56	24	M6	6.6	7Y
7X	150	145	110	165	120	7	21.5	16	Through hole	M8	64	19	M5	6.7	7X
1S		145	110	165	120	7	17.5	16	Through hole	M8	64	22	M6	6.2	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	64	24	M6	6.9	7Z

Dimension Drawings

Frame Size: P130
Reduction Ratio: 21
Flange Shaft

Nomenclature
ANFX-P130F

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (21)

15 min: LD

| Motor flange code | L | Dimension | | | | | | LG | | | | | | | Mass [kg] | Motor flange code |
		LA	LB	LC	LD	LE	LF		Shape *1	LZ	LR	S	M		
8E Note	142	100	80	120	90	5	13.5	12	Through hole	M6	56	16	M5	6.6	8E Note
7V Note		100	80	120	90	5	13.5	12	Through hole	M6	56	19	M5	6.5	7V Note
1L	142	115	95	135	100	6	11.5	16	Through hole	M6	56	24	M6	6.5	1L
7B		115	95	135	100	6	13.5	16	Through hole	M8	56	19	M5	6.5	7B
0W		115	95	135	100	6	11.5	16	Through hole	M8	56	22	M6	7.2	0W
7Y		115	95	135	100	6	11.5	16	Through hole	M8	56	24	M6	6.5	7Y
7X	150	145	110	165	120	7	21.5	16	Through hole	M8	64	19	M5	6.8	7X
1S		145	110	165	120	7	19.5	16	Through hole	M8	64	22	M6	7.5	1S
7Z		145	110	165	120	7	19.5	16	Through hole	M8	64	24	M6	6.9	7Z

Note: With motor flange plate.

Dimension Drawings

Frame Size: P130
Reduction Ratio: 33, 45
Flange Shaft

Nomenclature
ANFX-P130F

- Keyless: N
- With key: W
- Output shaft type
- Motor flange code
- Backlash — Reduction ratio (33, 45)
- 15 min: LD
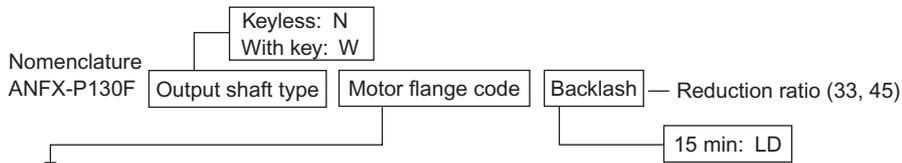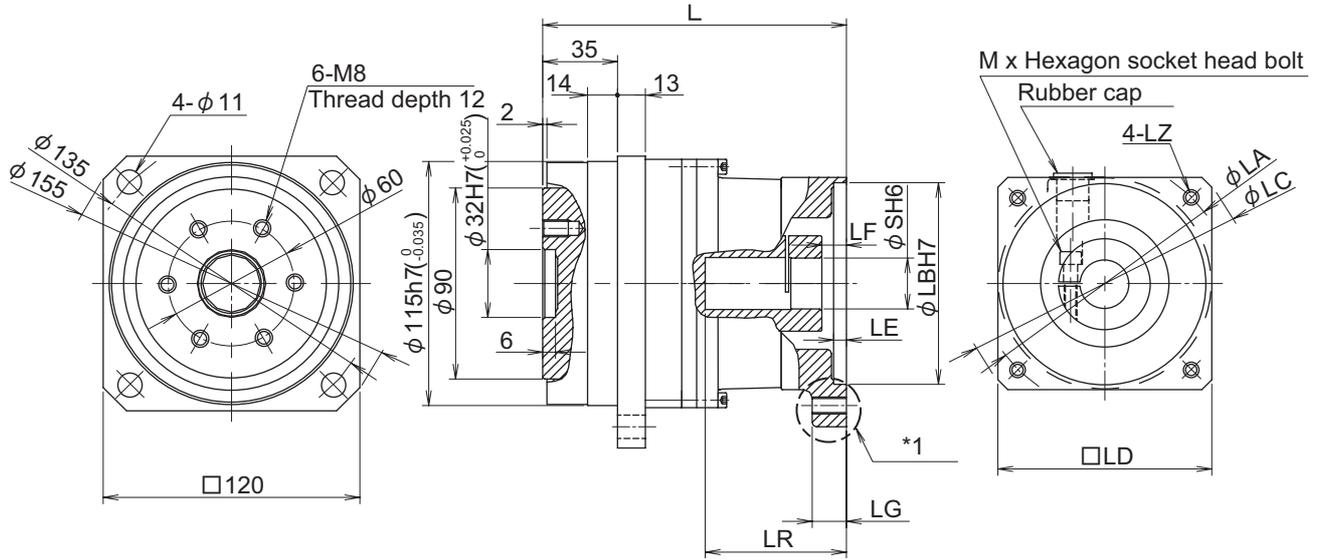
Motor flange code	L	Dimension												Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1	LZ	LR	S	M		
2R	131.5	70	50	80	60	5	5	11	Useful thread length	M5	45.5	14	M4	6.5	2R
0U	134.5	90	70	120	90	6	6	11	Useful thread length	M5	48.5	16	M5	6.5	0U
7S		90	70	120	90	6	6	11	Useful thread length	M5	48.5	19	M5	6.5	7S
7P		90	70	120	90	6	6	13	Useful thread length	M6	48.5	16	M5	6.5	7P
1G		90	70	120	90	6	6	13	Useful thread length	M6	48.5	19	M5	6.5	1G
2J [Note]	142	100	80	120	90	5	15.5	12	Through hole	M6	56	10	M4	6.6	2J [Note]
0V [Note]		100	80	120	90	5	15.5	12	Through hole	M6	56	14	M4	6.6	0V [Note]
8E [Note]		100	80	120	90	5	13.5	12	Through hole	M6	56	16	M5	6.6	8E [Note]
7A		115	95	135	100	6	13.5	16	Through hole	M8	56	16	M5	6.6	7A
7R	150	145	110	165	120	7	21.5	16	Through hole	M8	64	16	M5	6.9	7R
7X		145	110	165	120	7	21.5	16	Through hole	M8	64	19	M5	6.9	7X
7Z		145	110	165	120	7	21.5	16	Through hole	M8	64	24	M6	6.9	7Z

Note: With motor flange plate.

Dimension Drawings

Frame Size: P130
Reduction Ratio: 81
Flange Shaft

Nomenclature
ANFX-P130F

Keyless: N
With key: W

Output shaft type | Motor flange code | Backlash — Reduction ratio (81)

15 min: LD
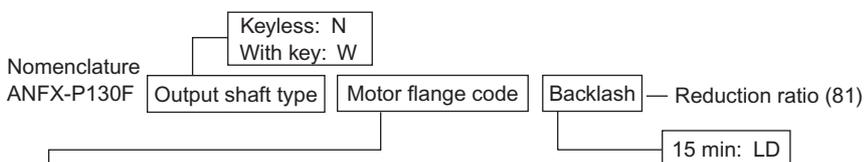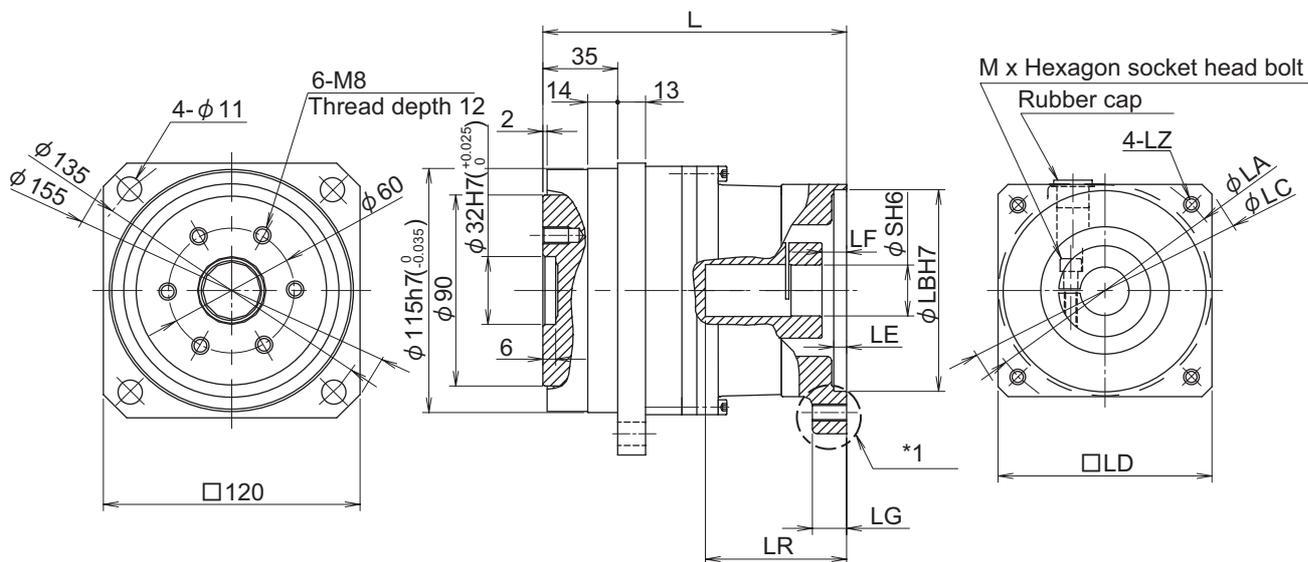
Motor flange code	L	Dimension									LZ	LR	S	M	Mass [kg]	Motor flange code
		LA	LB	LC	LD	LE	LF	LG	Shape *1							
2L	131.5	70	50	80	60	5	4	9	Useful thread length		M4	45.5	11	M4	6.5	2L
2P		70	50	80	60	5	4	9	Useful thread length		M4	45.5	14	M4	6.5	2P
2H		70	50	80	60	5	4	11	Useful thread length		M5	45.5	9	M4	6.5	2H
2R		70	50	80	60	5	4	11	Useful thread length		M5	45.5	14	M4	6.5	2R
8A	134.5	90	70	120	90	6	10	8	Useful thread length		M5	48.5	11	M4	6.6	8A
8B		90	70	120	90	6	10	8	Useful thread length		M5	48.5	14	M4	6.6	8B
2T		90	70	120	90	6	10	8	Useful thread length		M6	48.5	14	M4	6.6	2T

Durability Check of Output Shaft Part

P1 Type of IB Series adopts angular bearing to allow high maximum load moment.

Make sure that your load moment do not exceed the allowable value through the following calculation.

1. Check Maximum Load Moment

Table 4 Symbol of Formula (1)

Frmax	Maximum radial load during the operation pattern	N [kgf]	Refer to Fig. 6.
Famax	Maximum axial load during the operation pattern	N [kgf]	
Lr, Lc, La	Load application location	mm	

$$Mmax = \frac{Frmax \cdot (Lc + Lr) + Famax \cdot La}{10^3} \quad \cdots (1)$$

Make sure that: $Mmax \leqq Mc$

Table 5 Allowable Moment for P1 Type

Frame size	Allowable moment Mc	
	Nm	kgfm
P110	70	7.13
P120	300	30.6
P130	620	63.2

Table 6 Dimensions

Frame size	Dimension [mm]				
	LB	LC	S	L	Z
P110	52.76	42.38	2	28	19.62
P120	82.56	64.53	2	42	25.97
P130	109.02	86.26	4	82	63.24
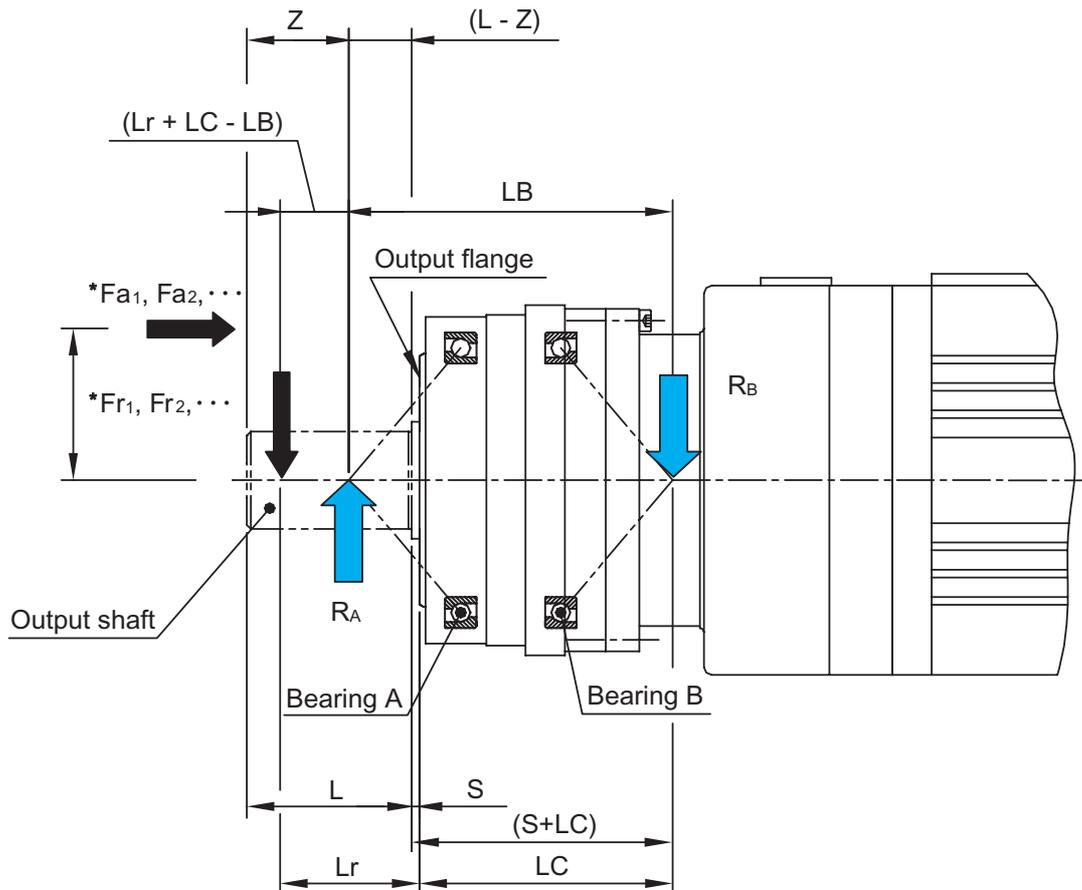
Fig. 5 External Load Effect diagram

*: Refer Fig. 6. (Load on each section per operation pattern.)

Durability Check of Output Shaft Part

2. Check Equivalent Load Bearing Lifetime

Check lifetime by converting to equivalent load when radial or axial load varies.

Equivalent radial load: Fre

$$Fre = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot \left(|Fr_1|\right)^3 + n_2 \cdot t_2 \cdot \left(|Fr_2|\right)^3 + \cdots n_n \cdot t_n \cdot \left(|Fr_n|\right)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots + n_n \cdot t_n}} \cdots (2)$$

Equivalent axial load: Fae

$$Fae = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot \left(|Fa_1|\right)^3 + n_2 \cdot t_2 \cdot \left(|Fa_2|\right)^3 + \cdots n_n \cdot t_n \cdot \left(|Fa_n|\right)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots + n_n \cdot t_n}} \cdots (3)$$

Equivalent autput speed: Neo

$$Neo = \frac{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots + n_n \cdot t_n}{t_1 + t_2 + \cdots t_n} \cdots (4)$$
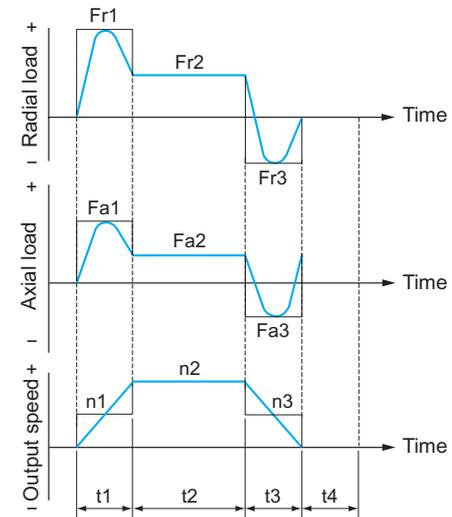
Fig. 6 Example of Load Fluctuation

Table 7 Axial Load Direction and Dynamic Equivalent Load Formula

Axial Load Direction	Load Condition	Bearing Category	Axial Load	Dynamic Equivalent Load
(Applied to motor side)	$\dfrac{R_B}{2Y_2} + Fae \geqq \dfrac{R_A}{2Y_2}$	Bearing A	$F_{aA} = \dfrac{R_B}{2Y_2} + Fae$	$P_A = X \cdot R_A + Y \cdot F_{aA}$ Note: When $P_A < R_A$, use $P_A = R_A$.
		Bearing B	–	$P_B = R_B$
	$\dfrac{R_B}{2Y_2} + Fae < \dfrac{R_A}{2Y_2}$	Bearing A	–	$P_A = R_A$
		Bearing B	$F_{aB} = \dfrac{R_A}{2Y_2} - Fae$	$P_B = X \cdot R_B + Y \cdot F_{aB}$ Note: When $P_B < R_B$, use $P_B = R_B$.
(Applied to output side)	$\dfrac{R_B}{2Y_2} \leqq \dfrac{R_A}{2Y_2} + Fae$	Bearing A	–	$P_A = R_A$
		Bearing B	$F_{aB} = \dfrac{R_A}{2Y_2} + Fae$	$P_B = X \cdot R_B + Y \cdot F_{aB}$ Note: When $P_B < R_A$, use $P_B = R_A$.
	$\dfrac{R_B}{2Y_2} > \dfrac{R_A}{2Y_2} + Fae$	Bearing A	$F_{aA} = \dfrac{R_B}{2Y_2} - Fae$	$P_A = X \cdot R_A + Y \cdot F_{aA}$ Note: When $P_A < R_A$, use $P_A = R_A$.
		Bearing B	–	$P_B = R_B$

Durability Check of Output Shaft Part

Table 8 Main Bearing Specification

Frame size	Dynamic rated load C	Load Factor					e
		X		Y			
	N (kgf)	$F_{aA} / R_A \geqq e$ $F_{aB} / R_B \geqq e$	$F_{aA} / R_A > e$ $F_{aB} / R_B > e$	$F_{aA} / R_A \geqq e$ $F_{aB} / R_B \geqq e$	$F_{aA} / R_A > e$ $F_{aB} / R_B > e$		
P110	3050 (310)	1	0.35	0	0.57		1.14
P120	8950 (910)						
P130	13600 (1390)						

Table 9 Symbols in Table 7 & 8

P	Dynamic equivalent load (Either the larger one of dynamic equivalent load P_A or P_B, each influencing bearing A and B)	N (kgf)	Refer to Table 7 in page 59.
R_A, R_B	Support reaction applied to each bearing A and B calculated from equivalent external load Fre and Fae	N (kgf)	–
X	Radial load factor	–	Refer to Table 8 below.
Y	Axial load factor		
Y_2	Axial load factor $Y_2 = 0.57$ when Fa* / R* > e		
Fa_A, Fa_B	Axial load exerted on each of bearing A and B	N (kgf)	–

Lifetime L_{10h}

$$L_{10h} = \frac{10^6}{60 \cdot Ne\,o} \left[\frac{C}{Cf \cdot Fs \cdot P} \right]^3 \cdots (5)$$

Table 10 Coupling Factor Cf

Coupling Method	Cf
Chain	1.00
Gears	1.25
V-Belt	1.50

Table 11 Shock Factor Fs

Degree of shock	Fs
Practically no shock	1.0
Light shock	1.0-1.2
Severe shock	1.4-1.6

Table 12 Symbols in Formula (5)

Neo	Equivalent output speed	r/min	Refer to formula (4).
P	Dynamic equivalent load	N (kgf)	Refer to Table 4.
C	Dynamic rated load	N (kgf)	Refer to Table 5.
Cf	Connected load	–	Refer to Table 7.
Fs	Shock factor	–	Refer to Table 8.

Formula for Calculation of Moment of Inertia and GD^2

●Formula to Calculate Moment of Inertia and GD^2

Location of rotation	Shape	Mass M [kg]	Moment of Inertia J [kgm^2]	GD^2 GD^2 [kgf·m^2]
Center of axle ρ [kg/m^3]	Cylinder	$\frac{1}{4} \cdot \pi \cdot d^2 \cdot \ell \cdot \rho$	$\frac{1}{32} \cdot \pi \cdot d^4 \cdot \ell \cdot \rho$	$\frac{1}{8} \cdot \pi \cdot d^4 \cdot \ell \cdot \rho$
Center of axle ρ [kg/m^3]	Cylinder hollow	$\frac{1}{4} \cdot \pi \cdot (d_1^2 - d_2^2) \cdot \ell \cdot \rho$	$\frac{1}{32} \cdot \pi \cdot (d_1^4 - d_2^4) \cdot \ell \cdot \rho$	$\frac{1}{8} \cdot \pi \cdot (d_1^4 - d_2^4) \cdot \ell \cdot \rho$
Center of axle ρ [kg/m^3]	Rectangular solid	$a \cdot b \cdot c \cdot \rho$	$\frac{a \cdot b \cdot c}{12} \cdot (b^2 + c^2) \cdot \rho$	$\frac{a \cdot b \cdot c}{3} \cdot (b^2 + c^2) \cdot \rho$
Edge axle ρ [kg/m^3]	Rectangular solid	$a \cdot b \cdot c \cdot \rho$	$\frac{a \cdot b \cdot c}{12} \cdot (4b^2 + c^2) \cdot \rho$	$\frac{a \cdot b \cdot c}{3} \cdot (4b^2 + c^2) \cdot \rho$
Eccentricity ρ [kg/m^3]	Rectangular solid	$a \cdot b \cdot c \cdot \rho$	$\frac{a \cdot b \cdot c}{12} \cdot (4b^2 + c^2 + 12b \cdot y + 12y^2) \cdot \rho$	$\frac{a \cdot b \cdot c}{3} \cdot (4b^2 + c^2 + 12b \cdot y + 12y^2) \cdot \rho$
Horizontal center axis ρ [kg/m^3]	Cylinder	$\frac{1}{4} \cdot \pi \cdot d^2 \cdot \ell \cdot \rho$	$\frac{\pi \cdot d^2 \cdot \ell}{192} \cdot (4\ell + 3d^2) \cdot \rho$	$\frac{\pi \cdot d^2 \cdot \ell}{48} \cdot (4\ell + 3d^2) \cdot \rho$
Horizontal edge axis ρ [kg/m^3]	Cylinder	$\frac{1}{4} \cdot \pi \cdot d^2 \cdot \ell \cdot \rho$	$\frac{\pi \cdot d^2 \cdot \ell}{192} \cdot (16\ell + 3d^2) \cdot \rho$	$\frac{\pi \cdot d^2 \cdot \ell}{48} \cdot (16\ell + 3d^2) \cdot \rho$
Horizontal Eccentricity ρ [kg/m^3]	Cylinder	$\frac{1}{4} \cdot \pi \cdot d^2 \cdot \ell \cdot \rho$	$\frac{\pi \cdot d^2 \cdot \ell}{192} \cdot (16\ell^2 + 3d^2 + 48y \cdot \ell + 48y^2) \cdot \rho$	$\frac{\pi \cdot d^2 \cdot \ell}{48} \cdot (16\ell^2 + 3d^2 + 48y \cdot \ell + 48y^2) \cdot \rho$
Center of axle ρ [kg/m^3]	Sphere	$\frac{1}{6} \cdot \pi \cdot d^2 \cdot \rho$	$\frac{1}{60} \cdot \pi \cdot d^5 \cdot \rho$	$\frac{1}{15} \cdot \pi \cdot d^5 \cdot \rho$
Center of axle ρ [kg/m^3]	Cone	$\frac{1}{12} \cdot \pi \cdot d^2 \cdot \ell \cdot \rho$	$\frac{1}{160} \cdot \pi \cdot d^4 \cdot \ell \cdot \rho$	$\frac{1}{40} \cdot \pi \cdot d^4 \cdot \ell \cdot \rho$
Center of axle ρ [kg/m^3]	Torus	$\frac{1}{2} \cdot \pi^2 \cdot R \cdot d^2 \cdot \rho$	$\frac{\pi^2 \cdot R \cdot d^2}{8} \cdot (4R^2 + \frac{3d^2}{4}) \cdot \rho$	$\frac{\pi^2 \cdot R \cdot d^2}{2} \cdot (4R^2 + \frac{3d^2}{4}) \cdot \rho$
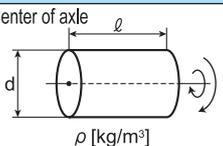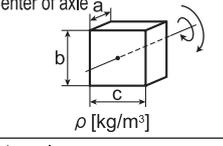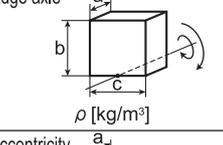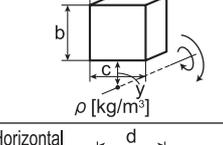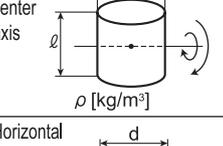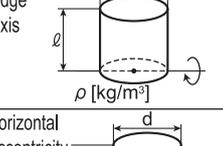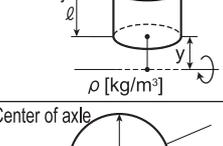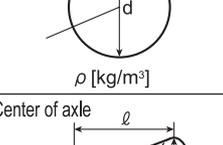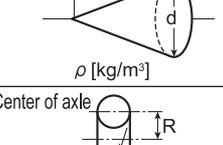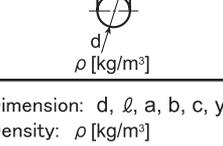
Dimension: d, ℓ, a, b, c, y, R [m]
Density: ρ [kg/m^3]

P1 Type

Formula for Calculation of Moment of Inertia, Load Torque, and Acceleration Torque

●Formula for Calculation of Moment of Inertia, Load Torque, and Acceleration Torque

Specification	Diagram	Load moment of Inertia J [kgm²]	Load torque of Reducer Output Shaft T [Nm]	Acceleration Torque Reducer Output Shaft T_S [N·m]	Relation Ship of Output Speed and Speed N [r/min]
Object in linear motion	J_B: Inertia of ball screw [gm²]	$M(\dfrac{P}{2\pi})^2 + J_B$ M: Mass of load [kg] P: Pitch of ball screw [m]	$\dfrac{P}{2\pi}(\mu \cdot M \cdot g + F)$ μ: Friction coefficient of ball screw g: Gravity acceleration [9.8m/sec²] F: External force [N]	$\dfrac{2\pi \cdot N \cdot J_L}{60ta}$ J_L: Load inertia converted to output shaft of the reducer [kgm²] N: Speed [r/min] t_a: Acceleration time [sec]	$\dfrac{V}{P}$ V: Acceleration [m/min] P: Ball pitch screw [m]
Hoisting object with a pulley	$J=J_1+J_2$ J_1: Inertia of drum [kgm²] J_2: Inertia of substance [kgm²]	$\dfrac{M_1 \cdot D^2}{8} + \dfrac{M_2 \cdot D^2}{4}$ M_1: Mass of cylinder [kg] M_2: Mass of suspended object [kg] D: Diameter of drum [m]	$F \cdot \dfrac{D}{2}$ F: External load [N] = M_2g g : Gravity acceleration [9.8m/sec²]	$\dfrac{2\pi \cdot N \cdot J_L}{60ta}$ J_L: Load inertia converted to output shaft of the reducer [kgm²] N: Speed [r/min] t_a: Acceleration time [sec]	$\dfrac{V}{\pi \cdot D}$ V: Acceleration [m/min] D: Drum diameter [m]
Transfer by rack or pinion		$\dfrac{M \cdot D^2}{4}$ M: Mass of rack [kg] D: PCD of pinion [m]	$F \cdot \dfrac{D}{2} + F\ell$ F: External force [N] g: Gravity acceleration [9.8m/sec²] $F\ell$: Contact loss [Nm]	$\dfrac{2\pi \cdot N \cdot J_L}{60ta}$ J_L: Load inertia converted to output shaft of the reducer [kgm²] N: Speed [r/min] t_a: Acceleration time [sec]	$\dfrac{V}{R}$ V: Velocity [m/min] R = π dp or Zp·Lp dp: P, C, D [m] Zp: Teeth number Lp: Pitch
Transfer by belt conveyer	$J=J_1+J_2+J_3+J_4$ J_1: Inertia of cylinder 1 [kgm²] J_2: Inertia of cylinder 2 [kgm²] J_3: Inertia of substance [kgm²] J_4: Inertia of belt [kgm²]	$\dfrac{M_1 \cdot D_1^2}{8} + \dfrac{M_2 \cdot D_2^2}{8} \cdot \dfrac{D_1^2}{D_2^2}$ $+ \dfrac{M_3 \cdot D_1^2}{4} + \dfrac{M_4 \cdot D_1^2}{4}$ M_1: Mass of cylinder 1 [kg] M_2: Mass of cylinder 2 [kg] M_3: Mass of objec [kg] M_4: Mass of belt [kg] D_1 : Diameter of cylinder 1 [m] D_2 : Diameter of cylinder 2 [m]	$\dfrac{1}{2}D(F + \mu \cdot M_3 \cdot g)$ F : External force [N] g : Gravity acceleration [9.8m/sec²]	$\dfrac{2\pi \cdot N \cdot J_L}{60ta}$ J_L: Load inertia converted to output shaft of the reducer [kgm²] N: Speed [r/min] t_a: Acceleration time [sec]	$\dfrac{V}{D_1}$ V: Velocity [m/min] D_1: Diameter of cylinder 1 [m]
Transfer by roll field	J_1: Inertia of roller 1 [kgm²] J_2: Inertia of roller 2 [kgm²]	$J_1 + (\dfrac{D_1}{D_2})^2 \cdot J_2 + \dfrac{M \cdot D_1^2}{4}$ D_1: Diameter of roll 1 [m] D_2: Diameter of roll 2 [m] M : Equivalent mass of work [kg]	$\dfrac{D(F + N \cdot \mu_1 + Mg \cdot \mu_2)}{2}$ F : Tension [N] g : Gravity acceleration [9.8m/sec²] N: Welding force [N]	$\dfrac{2\pi \cdot N \cdot J_L}{60ta}$ J_L: [kg·m²] N: [r/min] t_a: [sec]	$\dfrac{N}{\pi \cdot D_1}$ V: Velocity [m/min] D_1: Roll diameter [m]

1. Calculate inertia and make additions when using additional apparatus for each drive part.
2. Calculate each element for frictional force and convert to frictional force at output shaft of reducer if necessary.
3. Calculate each element for external force and convert to external torque at output shaft of reducer if necessary.

Moment of Inertia (at Motor Shaft)

Table 13

Unit: $\times 10^{-4} \text{kg} \cdot \text{m}^2$

Frame size	Input shaft hollow [mm]	Motor flange code	Reduction ratio 5		9		15		21		33	
			Solid shaft	Flange shaft	Solid shaft	Flange shaft	Solid shaft	Flange shaft	Solid shaft	Flange shaft	Solid shaft	Flange shaft
P110	6	7J	0.116	0.116	0.098	0.097	0.137	0.137	0.107	0.107	0.092	0.092
	8	2C, 2D, 2E, 2F, 2G	0.116	0.115	0.098	0.097	0.137	0.137	0.107	0.107	0.092	0.092
	9	2H	0.183	0.186	0.168	0.168	0.208	0.208	0.178	0.178	0.160	0.160
	10	2J	0.186	0.185	0.167	0.167						
	11	2K, 2L, 8A	0.184	0.184	0.166	0.165	0.206	0.206	0.176	0.176	0.157	0.157
	14	2P, 2R, 8B, 2T, 2V	0.177	0.176	0.158	0.158	0.199	0.199	0.169	0.169		
	16	7P, 8E, 7A, 7R	0.394	0.396	0.378	0.378						
P120	8	2C, 2D, 2E, 2F, 2G										
	9	2H							0.440	0.440		
	10	2J			0.506	0.485	0.491	0.490	0.441	0.440		
	11	2K, 2L, 8A										
	14	2P, 2R, 8B, 2T, 2V, 0V	0.653	0.640	0.504	0.483	0.483	0.482	0.432	0.432	0.403	0.403
	16	7A, 7P, 8E, 7R, 0U	0.789	0.783	0.647	0.645	0.596	0.595	0.546	0.546		
	19	7S, 1G, 7X, 1U, 7B, 7V	0.766	0.760	0.624	0.622	0.577	0.576	0.527	0.526		
	22	1S, 1V, 0W	1.483	1.477	1.341	1.339	1.316	1.315				
	24	7Y, 7Z, 1L	1.460	1.455	1.318	1.317	1.293	1.293	1.243	1.243		
P130	9	2H										
	10	2J									1.284	1.282
	11	2K, 2L, 8A										
	14	2P, 2R, 8B, 2T, 2V, 0V									1.282	1.280
	16	7A, 7P, 8E, 7R, 0U							1.555	1.551	1.404	1.402
	19	7S, 1G, 7X, 1U, 7B, 7V			1.820	1.797	1.822	1.814	1.533	1.529	1.381	1.380
	22	1S, 1V, 0W	2.866	2.792	2.211	2.188	2.186	2.178	1.897	1.893		
	24	1L, 7Y, 7Z	2.823	2.749	2.168	2.145	2.152	2.143	1.862	1.858	1.711	1.709
	28	1T, 1W, 1X, 0E, 0K	2.943	2.869	2.288	2.265						
	35	1Z, 0M, 0X	6.018	5.943	5.363	5.159						

Frame size	Input shaft hollow [mm]	Motor flange code	Reduction ratio 45		81	
			Solid shaft	Flange shaft	Solid shaft	Flange shaft
P110	6	7J	0.092	0.092	0.092	0.092
	8	2C, 2D, 2E, 2F, 2G	0.092	0.092	0.092	0.092
	9	2H	0.160	0.160		
	10	2J				
	11	2K, 2L, 8A				
	14	2P, 2R, 8B, 2T, 2V				
	16	7P, 8E, 7A, 7R				
P120	8	2C, 2D, 2E, 2F, 2G			0.352	0.352
	9	2H	0.410	0.410	0.408	0.408
	10	2J				
	11	2K, 2L, 8A	0.407	0.407	0.406	0.406
	14	2P, 2R, 8B, 2T, 2V, 0V	0.401	0.401		
	16	7A, 7P, 8E, 7R, 0U				
	19	7S, 1G, 7X, 1U, 7B, 7V				
	22	1S, 1V, 0W				
	24	7Y, 7Z, 1L				
P130	9	2H			1.265	1.265
	10	2J	1.273	1.272		
	11	2K, 2L, 8A			1.265	1.264
	14	2P, 2R, 8B, 2T, 2V, 0V	1.271	1.270	1.263	1.262
	16	7A, 7P, 8E, 7R, 0U	1.393	1.392		
	19	7S, 1G, 7X, 1U, 7B, 7V	1.370	1.370		
	22	1S, 1V, 0W				
	24	1L, 7Y, 7Z	1.700	1.699		
	28	1T, 1W, 1X, 0E, 0K				
	35	1Z, 0M, 0X				

P1 Type

GD^2 (at Motor Shaft)

Table 14   Unit: ×10^{-4}kg·m^2

Frame size	Input shaft hollow [mm]	Motor flange code	Reduction ratio									
			5		9		15		21		33	
			Solid shaft	Flange shaft	Solid shaft	Flange shaft	Solid shaft	Flange shaft	Solid shaft	Flange shaft	Solid shaft	Flange shaft
P110	6	7J	0.465	0.462	0.691	0.390	0.549	0.549	0.429	0.429	0.367	0.367
	8	2C, 2D, 2E, 2F, 2G	0.465	0.462	0.390	0.389	0.548	0.548	0.428	0.428	0.367	0.367
	9	2H	0.747	0.745	0.673	0.672	0.833	0.833	0.713	0.713	0.639	0.639
	10	2J	0.743	0.740	0.668	0.668						
	11	2K, 2L, 8A	0.737	0.734	0.662	0.662	0.824	0.823	0.704	0.703	0.630	0.630
	14	2P, 2R, 8B, 2T, 2V	0.707	0.704	0.632	0.631	0.796	0.796	0.676	0.676		
	16	7P, 8E, 7A, 7R	1.587	1.584	1.512	1.511						
P120	8	2C, 2D, 2E, 2F, 2G										
	9	2H							1.762	1.760		
	10	2J			2.024	1.942	1.964	1.961	1.763	1.761		
	11	2K, 2L, 8A										
	14	2P, 2R, 8B, 2T, 2V, 0V	2.612	2.560	2.015	1.933	1.931	1.928	1.730	1.728	1.612	1.612
	16	7A, 7P, 8E, 7R, 0U	3.156	3.133	2.589	2.581	2.384	2.382	2.183	2.182		
	19	7S, 1G, 7X, 1U, 7B, 7V	3.063	3.040	2.495	2.488	2.307	2.305	2.106	2.105		
	22	1S, 1V, 0W	5.931	5.908	5.364	5.356	5.264	5.261				
	24	7Y, 7Z, 1L	5.841	5.818	5.274	5.266	5.174	5.171	4.973	4.971		
P130	9	2H										
	10	2J									5.136	5.129
	11	2K, 2L, 8A										
	14	2P, 2R, 8B, 2T, 2V, 0V									5.127	5.120
	16	7A, 7P, 8E, 7R, 0U							6.221	6.204	5.616	5.609
	19	7S, 1G, 7X, 1U, 7B, 7V			7.282	7.190	7.288	7.255	6.131	6.114	5.526	5.519
	22	1S, 1V, 0W	11.466	11.167	8.844	8.752	8.746	8.713	7.589	7.572		
	24	1L, 7Y, 7Z	11.294	10.996	8.672	8.580	8.606	8.573	7.449	7.432	6.844	6.837
	28	1T, 1W, 1X, 0E, 0K	11.773	11.475	9.151	9.059						
	35	1Z, 0M, 0X	24.072	23.773	21.450	20.636						

Frame size	Input shaft hollow [mm]	Motor flange code	Reduction ratio			
			45		81	
			Solid shaft	Flange shaft	Solid shaft	Flange shaft
P110	6	7J	0.370	0.370	0.369	0.369
	8	2C, 2D, 2E, 2F, 2G	0.369	0.369	0.368	0.368
	9	2H	0.642	0.642		
	10	2J				
	11	2K, 2L, 8A				
	14	2P, 2R, 8B, 2T, 2V				
	16	7P, 8E, 7A, 7R				
P120	8	2C, 2D, 2E, 2F, 2G			1.407	1.407
	9	2H	1.639	1.639	1.632	1.632
	10	2J				
	11	2K, 2L, 8A	1.630	1.630	1.623	1.623
	14	2P, 2R, 8B, 2T, 2V, 0V	1.602	1.602		
	16	7A, 7P, 8E, 7R, 0U				
	19	7S, 1G, 7X, 1U, 7B, 7V				
	22	1S, 1V, 0W				
	24	7Y, 7Z, 1L				
P130	9	2H			5.061	5.060
	10	2J	5.092	5.088		
	11	2K, 2L, 8A			5.058	5.057
	14	2P, 2R, 8B, 2T, 2V, 0V	5.083	5.079	5.050	5.049
	16	7A, 7P, 8E, 7R, 0U	5.572	5.568		
	19	7S, 1G, 7X, 1U, 7B, 7V	5.482	5.478		
	22	1S, 1V, 0W				
	24	1L, 7Y, 7Z	6.800	6.796		
	28	1T, 1W, 1X, 0E, 0K				
	35	1Z, 0M, 0X				

Mechanical Precision of Output Part of the Reducer

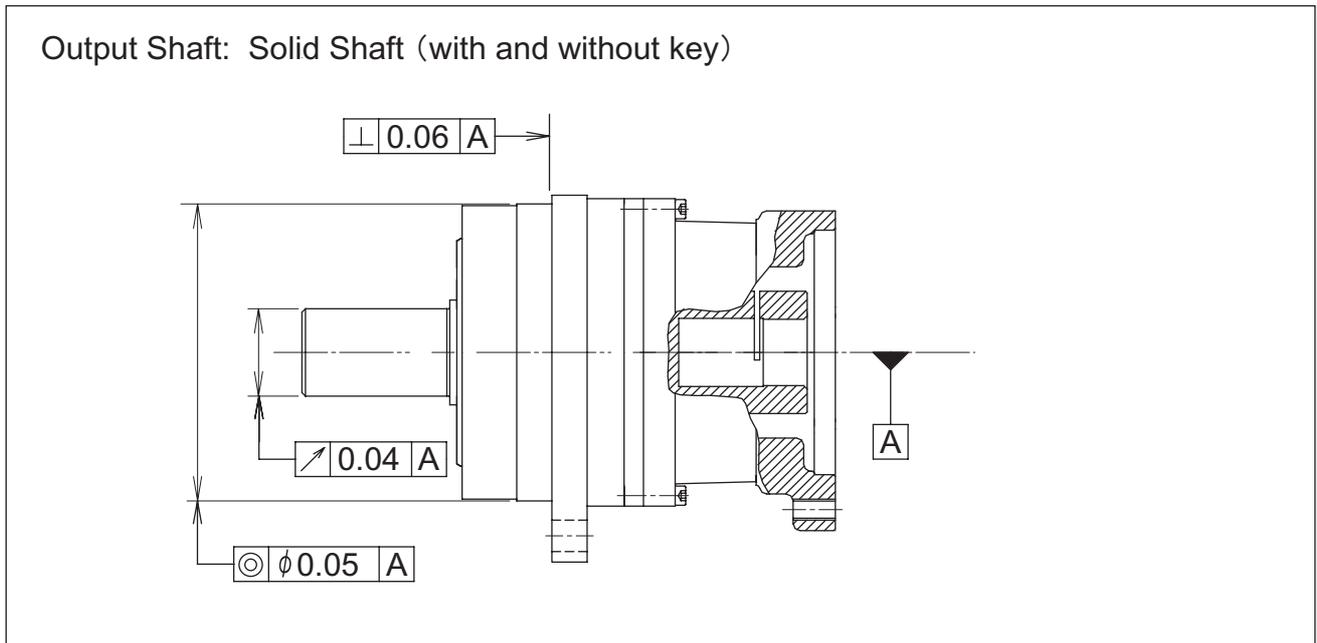Mechanical precision of solid shaft (with and without key) and flange shaft is indicated below.

Output Shaft: Solid Shaft（with and without key）

Fig. 7
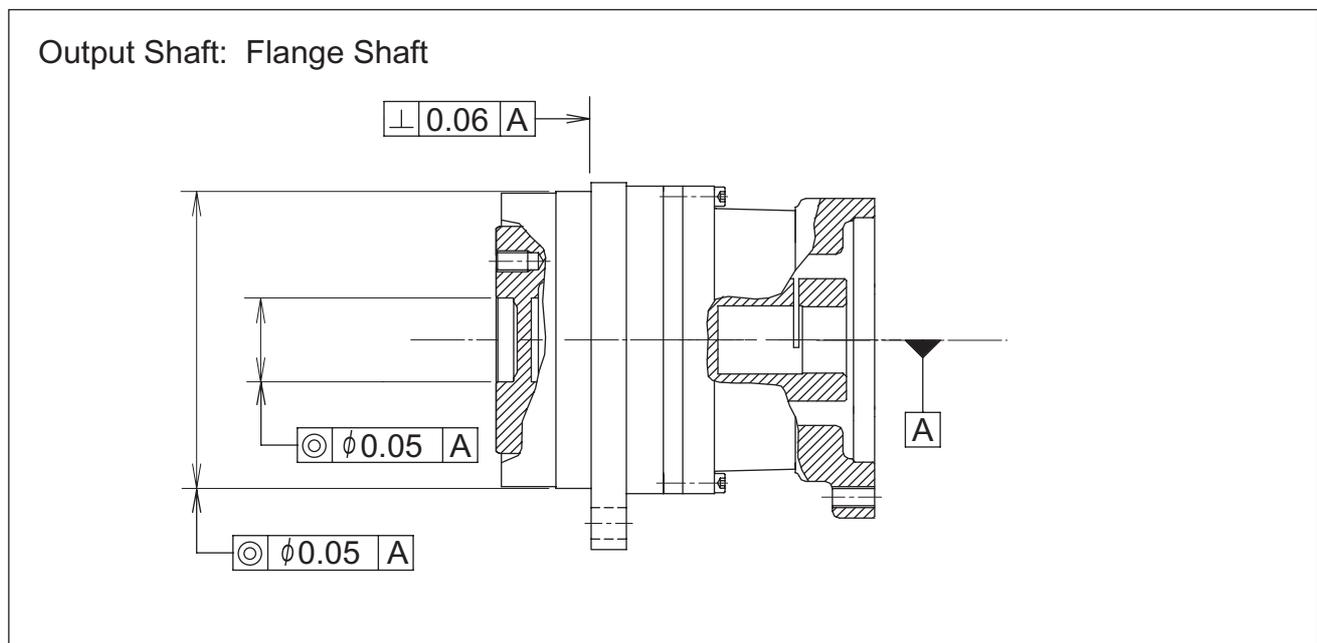
Output Shaft: Flange Shaft

Fig. 8

Motor Attachment Procedure

Either straight type, shaft with keyway, or D shaft may be attached to the motor shaft, because special coupling is used for shaft connection part of reducer and motor. Follow the process below from (1) through (7) for assembly. (Remove key while assembly for shaft with keyway.)

(1) Place reducer on an appropriate worktable with output shaft on the bottom side.
(2) Remove fitting of the setting hole (1 place) of the reducer unit (① in figure below).
(3) Match the location by turning by hand to tighten tightening bolt of the coupling into setting hole of the reducer unit (② in figure below).
(4) Insert motor shaft into the center hole of the coupling, press in vertically and fit the pilot part of the reducer unit and motor.
(5) Tighten motor and reducer unit with motor attachment bolt (④ in figure below).
(6) Tighten coupling tightening bolt through the setting hole of the side of the reducer unit using a torque wrench bolt (④ in figure below). Refer to Table 12 for necessary tightening torque.

Table 15

Tightening bolt	Tightening toraue [Nm]	Coupling hole diameter [mm]
M3	1.67	$\phi6-\phi8$
M4	3.92	$\phi9-\phi14$
M5	7.35	$\phi16-\phi19$
M6	8.83	$\phi24-\phi28$
M8	21.6	$\phi32-\phi38$

(7) Insert fitting (1 place) in the setting hole of the joint cover.

Fig. 10

Motor Precision
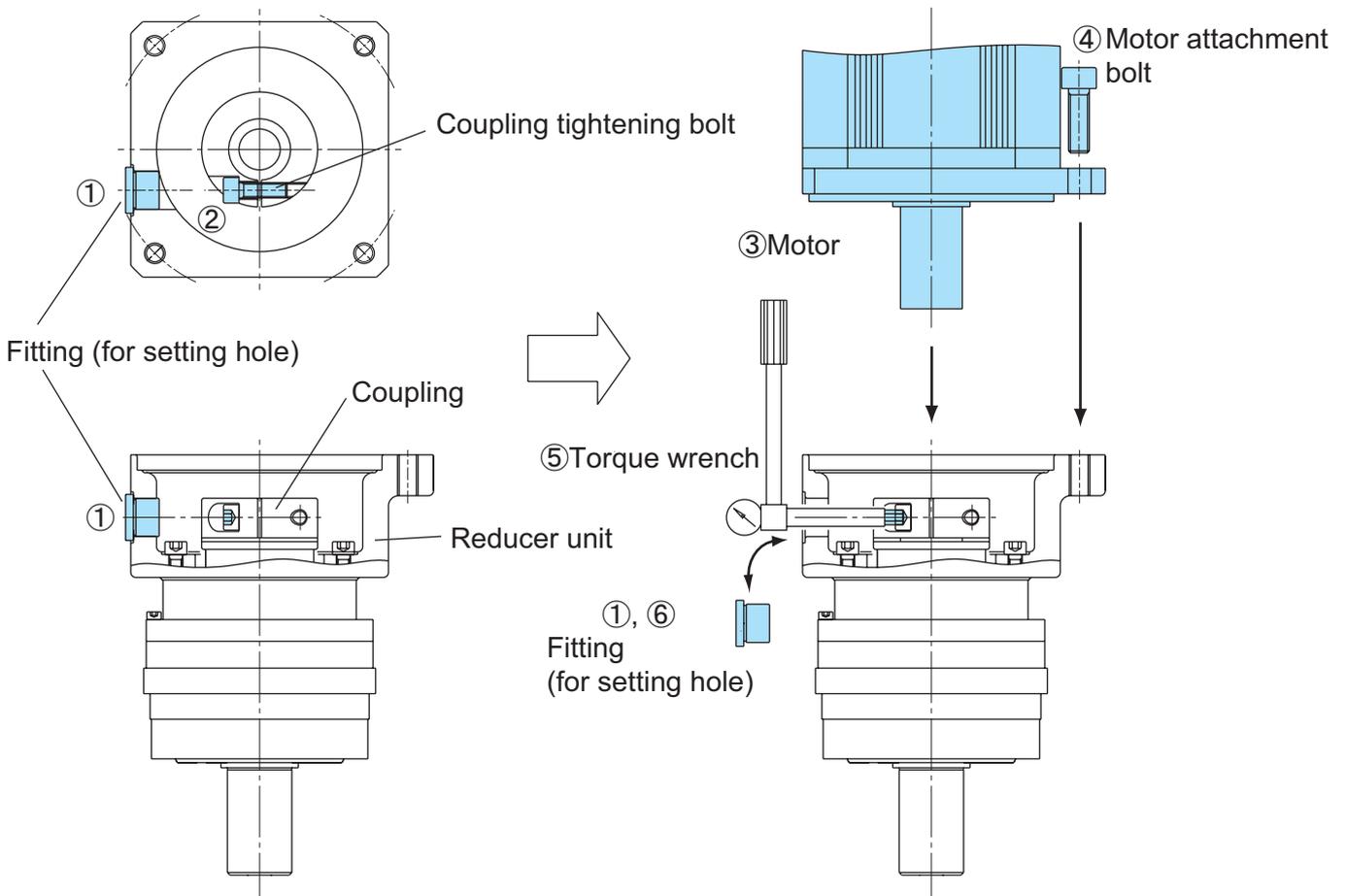
Table 16

Type	Measuring item	Measuring method	Sketch of measurement	Measuring Instrument	Work accuracy		
					Grade AA	Grade A	Grade B
Foot-mount type and flange type	Run-out of shaft end	Secure the dial gauge on the floor or flange surface. Place the probe of the dial gauge on the circumference close to the shaft end. Turn the shaft once. Difference between the observed maximum and minimum values is the measured value.		Dial gauge	Work accuracy = 0.01 when $\ell \leqq 100$ As below when ℓ > 100 0.02 0.01 / 100 200 ℓ	Work accuracy = 0.02 when $\ell \leqq 100$ As below when ℓ > 100 0.04 0.02 / 100 200 ℓ	Work accuracy = 0.04 when $\ell \leqq 100$ As below when ℓ > 100 0.08 0.04 / 100 200 ℓ
Flange type	Eccentricity of flange engagement O.D.	Secure the dial gauge on the shaft close to the flange surface. Place the probe of the dial gauge on the circumference of flange connection. Turn the shaft once. Half of the difference between the observed maximum and minimum values is the measured value.		Dial gauge	Work accuracy = 0.01 when D $\leqq$ 200 As below when D > 200 0.02 0.01 / 200 400 D	Work accuracy = 0.02 when D $\leqq$ 200 As below when D > 200 0.04 0.02 / 200 400 D	Work accuracy = 0.03 when D $\leqq$ 200 As below when D > 200 0.06 0.03 / 200 400 D
	Perpendicularity with respect to flange surface	Secure the dial gauge on the shaft close to the flange surface. Place the probe of the dial gauge on the flange surface close to flange circumference. Turn the shaft once. The difference between the observed maximum and minimum values is the measured value.		Dial gauge	Work accuracy = 0.03 when D $\leqq$ 250 As below when D > 250 0.06 0.03 / 250 500 D	Work accuracy = 0.04 when D $\leqq$ 250 As below when D > 250 0.08 0.04 / 250 500 D	Work accuracy = 0.06 when D $\leqq$ 250 As below when D > 250 0.12 0.06 / 250 500 D
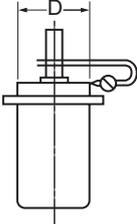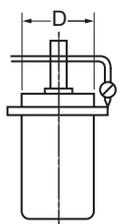
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Warranty

Warranty Period	The warranty period for the Products shall be 18 months after the commencement of delivery or 18 months after the shipment of the Products from the seller's works or 12 months from the Products coming into operation, whichever comes first.
Warranty Condition	In the event that any problem or damage to the Product arises during the "Warranty Period" from defects in the Product whenever the Product is properly installed and combined with the Buyer's equipment or machines, maintained as specified in the maintenance manual, and properly operated under the conditions described in the catalog or as otherwise agree upon in writing between the Seller and the Buyer or its customers; the Seller will provide, at its sole discretion, appropriate repair or replacement of the Product without charge at a designted facility, except as stipulated in the "Warranty Exclusions" as described below. However, if the Product is installed or integrated into the Buyer's equipment or machines, the Seller shall not reimburse the cost of: removal or re-installation of the Product or other incidental costs related thereto, any lost opportunity, any profit loss or other incidental or consequential losses or damages incurred by the Buyer or its customers.
Warranty Exclusions	Notwithstanding the above warranty, the warranty as set forth herein shall not apply to any problem or damage to the Product that is caused by: 1. installation, connection, combination or integration of the Product in or to the other equipment or machine that is rendered by any person or entity other than the Seller; 2. insufficient maintenance or improper operation by the Buyer or its customers, such that the Product is not maintained in accordance with the maintenance manual provided or designated by the Seller; 3. improper use or operation of the Product by the Buyer or its customers that is not informed to the Seller, including, without limitation, the Buyer's or its customers, operation of the Product not in conformity with the specifications, or use of lubricating oil in the Product that is not recommended by the Seller; 4. any problem or damage on any equipment or machine to which the Product is installed, connected or combined or on any specifications particular to the Buyer or its customers; 5. any changes, modifications, improvements or alterations to the Product or those functions that are rendered on the Product by any person or entity other than the Seller; 6. any parts in the Product that are supplied or designated by the Buyer or its customers; 7. earthquake, fire, flood, sea-breeze, gas, thunder, acts of God or any other reasons beyond the control of the Seller; 8. normal wear and tear, or deterioration of the Products, parts, such as bearings, oil-seals; 9. any other troubles, problems or damage to the Product that are not attributable to the Seller.

⚠ SAFETY PRECAUTIONS

- Observe the safety rules for the installation site and equipment strictly (Industrial safety and health law, technical standard for electric facilities, extension rules, plant explosion guidelines, building standards law, etc).
- Read the maintenance manual carefully before use. Request a copy from the distributor of the Product or our Sales Department if the maintenance manual is not handy. A copy of maintenance manual should always reach the actual user of the Product.
- Select a sufficient product for the usage condition and application.
- Install protective equipment on the machine side when the machine is used for applications which may cause loss of human life or significant loss in facility, such as use for human transportation or elevators.
- Install an oil pan or other preventive devices in case of oil leakage due to failure or termination of service life when the machine is used for food processing equipment, clean room, or other applications that are sensitive to oil.