WINMAN®

güce yön verin...

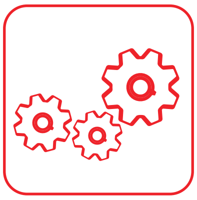
CT-CRV-P®

SERIES

REDUCER PRODUCT BROCHURE

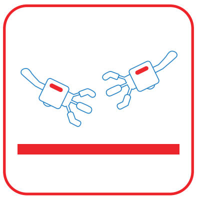
İçindekiler

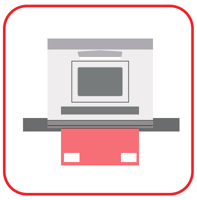
1. With its unique tooth design and modification technology, Chietom is able to produce the parts with optimized load distribution, strong anti-abrasion ability and self-adaptability to manufacturing error. The products also show superior quality in stable transmission and low noise.



2. Chietom's factories are equipped with customized world-class CNC manufacturing equipments, which ensure high precision, efficiency, and stability of mass production.

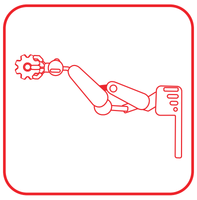
3. With company's self-designed manufacturing technology and clamping device, the final products are manufactured with high precision and efficiency.





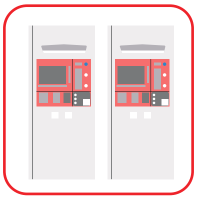
4. Chietom's technology enables fast measurement, real-time data acquisition and analysis through self-designed measuring equipments, testing rigs and experimental devices.

5. With company's self-designed assembly tools and tolerance allocation technology, Chietom is able to assemble the final products very efficiently in large quantities.



6. Chietom also develops specialized heat treatment equipment to fulfill the design performance and product uniformity requirements.

7. The professional testing platform (with the same standard of National Testing Center) allows Chietom to fully test various performances of final products and issue test reports.



Main Purpose

ROBOT
4,6-axis joint robot (series robot)
parallel robot
SCARA robot
truss robot
semiconductor robot (stacker, LCD robot)

AUTOMATIC
positioner
circular dividing table
moveable slider

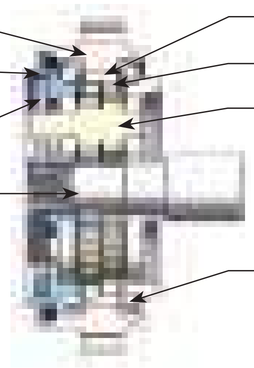
MACHINE TOOL
pipe bending machine, bending machine
5-axis machining center
tool library

OTHERS
medical equipment (CT machine)
semiconductor equipment
human exoskeleton
Angle deflection of wind and solar equipment
printing machine

1. Structure, features and principle of CT-CRV-P series

1.1 Structure and features of CT-CRV-P series

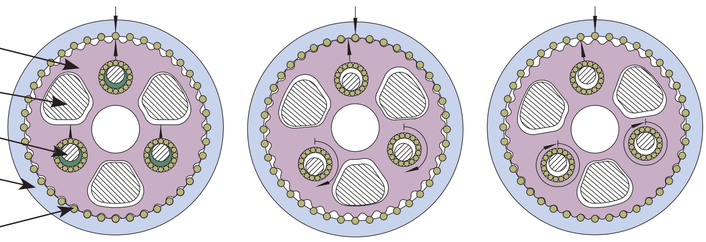
(1) Structure



(2) Features

- ☆ High precision
- ☆ High rigidity
- ☆ High shock load capability
- ☆ Excellent acceleration/ deceleration performance
- ☆ Large speed ratio
- ☆ Less noise
- ☆ Less vibration
- ☆ Long service life
- ☆ Compactness
- ☆ Light weight

1.2. Principle of CT-CRV-P speed reduction



Crankshaft rotation angle: 0 degree   Rotation angle: 180 degrees   Rotation angle: 360 degrees

The first stage is spur gear deceleration, and the rotation of the input shaft is transferred from the input gear to the spur gear, and the gear number is decelerated according to the gear ratio.

The second stage is cycloidal pin-wheel deceleration. The spur gear is connected with the crankshaft. The rotation of the crankshaft drives the cycloidal wheel to do eccentric motion, when the crankshaft rotates for one cycle, the cycloid wheel will rotate a tooth along the opposite direction of the crankshaft.

2. Speed ratio calculation of CT-CRV series

$$R=1+\frac{Z_2}{Z_1}\cdot Z_3$$

R : Speed ratio
Z_1 : Number of teeth on input gear
Z_2 : Number of teeth on planetary gear
Z_3 : Number of pins

3. CT-CRV-P explanation of codes

CT-CRV 25 P 126 B

- CT-CRV — Type code
- 25 — Specification code
- P — Series code
- 126 — Speed ratio code
- B — Input gear structure code
  - A: Standard thin shaft type
  - B: Standard thick shaft type
  - Z: Nothing

Exploded view of CT-CRV-P reducer

4. CT-CRV-P rating table

	Output speed r/min			5	10	15	20	25	30	40	50	60
Model	Speed ratio	Speed ratio		Output torque N.m Input power kW								
		Shaft speed	Casing speed									
	41	41	40									
	81	81	80									
CT-CRV	107.66	323/3	320/3	341	277	245	255	210	199	183	171	162
25P	126	126	125	0.25	0.41	0.55	0.67	0.79	0.89	1.09	1.28	1.45
	137	137	136									
	164.07	2133/13	2120/13									
	41	41	40									
	81	81	80									
CT-CRV	105	105	104	573	465	412	378	353	335	307	287	272
42P	126	126	125	0.43	0.70	0.92	1.13	1.32	1.50	1.84	2.15	2.44
	141	141	140									
	164.07	2133/13	2120/13									
	41	41	40									
	81	81	80									
CT-CRV	102.17	1737/17	1720/17	834	678	600	550	515	487	447	418	396
60P	121	121	120	0.62	1.01	1.35	1.65	1.93	2.19	2.68	3.13	3.55
	145.61	1893/13	1880/13									
	161	161	160									
	41	41	40									
	81	81	80									
CT-CRV	101	101	100	1090	885	784	719	673	637	584	546	517
80P	129	129	128	0.82	1.32	1.76	2.15	2.52	2.86	3.50	4.09	4.64
	141	141	140									
	171	171	170									
	41	41	40									
	81	81	80									
CT-CRV	102.17	1737/17	1720/17	1390	1129	1000	917	858	812	745	697	660
100P	121	121	120	1.04	1.69	2.24	2.74	3.21	3.65	4.46	5.12	5.92
	141	141	140									
	161	161	160									
	41	41	40									
	81	81	80									
CT-CRV	102.17	1737/17	1720/17	1703	1383	1225	1124	1051	995	913	854	808
125P	121	121	120	1.27	2.07	2.75	3.36	3.93	4.47	5.46	6.39	7.25
	145.61	1893/13	1880/13									
	161	161	160									
	41	41	40									
	81	81	80									
CT-CRV	102.81	1131/11	1120/11	2225	1807	1600	1468	1373	1300	1192		
160P	125.21	2379/19	2360/19	1.66	2.70	3.59	4.39	5.13	5.83	7.13		
	156	156	155									
	201	201	200									
	75	75	74									
	93	93	92									
CT-CRV	117	117	116	5178	4206	3724	3416	3195				
380P	139	139	138	3.87	6.29	8.36	10.22	11.95				
	162	162	161									
	185	185	184									
	81	81	80									
	105	105	104									
CT-CRV	123	123	122	6813	5534	4900	4495	4204				
500P	144	144	143	5.10	8.28	11.00	13.45	15.72				
	159	159	158									
	192.75	192.75	191.75									
	105	105	104									
	118	118	117									
CT-CRV	142.44	142.44	141.44	9733	7905	7000						
700P	159	159	158	7.28	11.83	15.71						
	183	183	182									
	203.52	3867/19	3848/19									

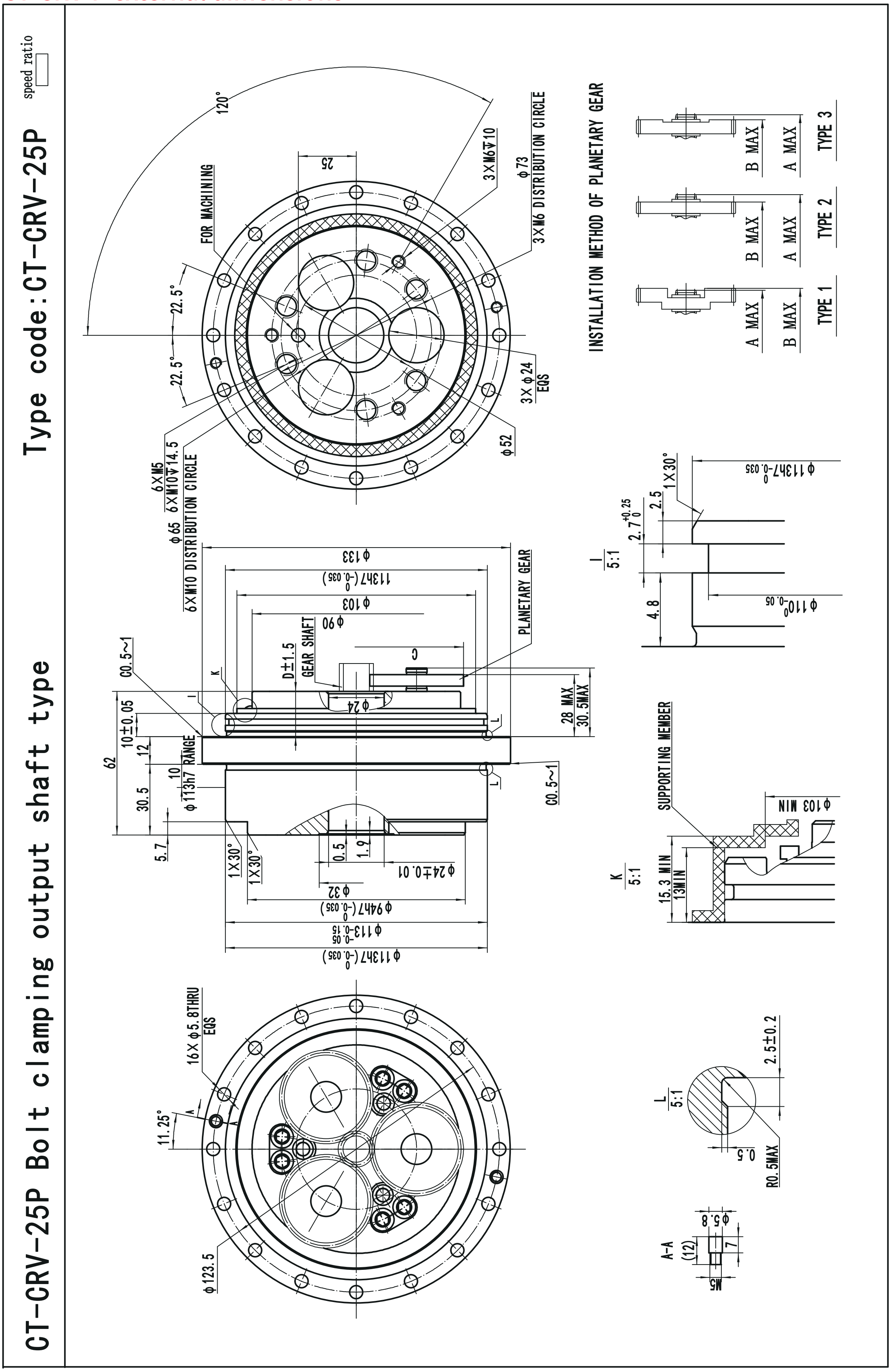
Input power kw = $\frac{2\pi \cdot N \cdot T}{60 \cdot \frac{\eta}{100} \cdot 10^3}$

N: Output speed r/min
T: Output torque N · m
η=70: Reducer efficiency %

Rated torque N·m	Rated output speed r/min	Rated life h	Allowable acceleration/ deceleration torque N·m	Momentary maximum allowable torque N·m	Allowable output speed operation rate: 100% r/min	Allowable output rotational speed: 40% r/min	Backlash arcmin	Lost motion arcmin	Angle transfer error arcsec	Representive value of startup efficiency %	Allowable bending moment N·m	Momentary maximum allowable bending moment N·m	Moment of inertia Kgm^2	Allowable radial load N	Weight Kg
245	15	6000	612	1225	57	110	1.0	1.0	70	80	784	1568	1.71×10^{-5} 6.79×10^{-6} 4.91×10^{-6} 4.03×10^{-6} 3.62×10^{-6} 3.26×10^{-6}	6975	3.8
412	15	6000	1029	2058	52	100	1.0	1.0	60	80	1660	3320	4.43×10^{-5} 1.87×10^{-5} 1.42×10^{-5} 1.07×10^{-5} 1.01×10^{-5} 7.66×10^{-6}	12662	6.3
600	15	6000	1500	3000	44	94	1.0	1.0	50	80	2000	4000	8.51×10^{-5} 3.93×10^{-5} 2.86×10^{-5} 2.33×10^{-5} 1.84×10^{-5} 1.61×10^{-5}	13605	8.9
784	15	6000	1960	3920	40	88	1.0	1.0	50	80	2150	4300	1.16×10^{-4} 5.17×10^{-5} 3.57×10^{-5} 2.68×10^{-5} 2.40×10^{-5} 1.86×10^{-5}	14163	9.3
1000	15	6000	2500	5000	35	83	1.0	1.0	50	80	2700	5400	1.58×10^{-4} 7.30×10^{-5} 5.82×10^{-5} 4.85×10^{-5} 4.05×10^{-5} 3.43×10^{-5}	16052	13.0
1225	15	6000	3062	6125	35	79	1.0	1.0	50	80	3430	6860	2.59×10^{-4} 9.61×10^{-5} 7.27×10^{-5} 5.88×10^{-5} 4.60×10^{-5} 4.01×10^{-5}	19804	13.9
1600	15	6000	4000	8000	19	48	1.0	1.0	50	80	4000	8000	3.32×10^{-4} 1.54×10^{-4} 1.13×10^{-4} 8.95×10^{-5} 6.75×10^{-5} 4.75×10^{-5}	20619	22.1
3724	15	6000	9310	18620	11.5	27	1.0	1.0	50	80	7050	14100	7.30×10^{-4} 5.16×10^{-4} 4.93×10^{-4} 3.84×10^{-4} 3.28×10^{-4} 2.64×10^{-4}	28325	44
4900	15	6000	12250	24500	11	25	1.0	1.0	50	80	11000	22000	1.35×10^{-3} 9.50×10^{-4} 7.44×10^{-4} 6.16×10^{-4} 5.62×10^{-4} 4.16×10^{-4}	40486	57.2
7000	15	6000	17500	35000	7.5	19	1.0	1.0	50	80	15000	30000	1.61×10^{-3} 1.28×10^{-3} 1.18×10^{-3} 9.11×10^{-4} 8.42×10^{-4} 7.46×10^{-4}	46368	102

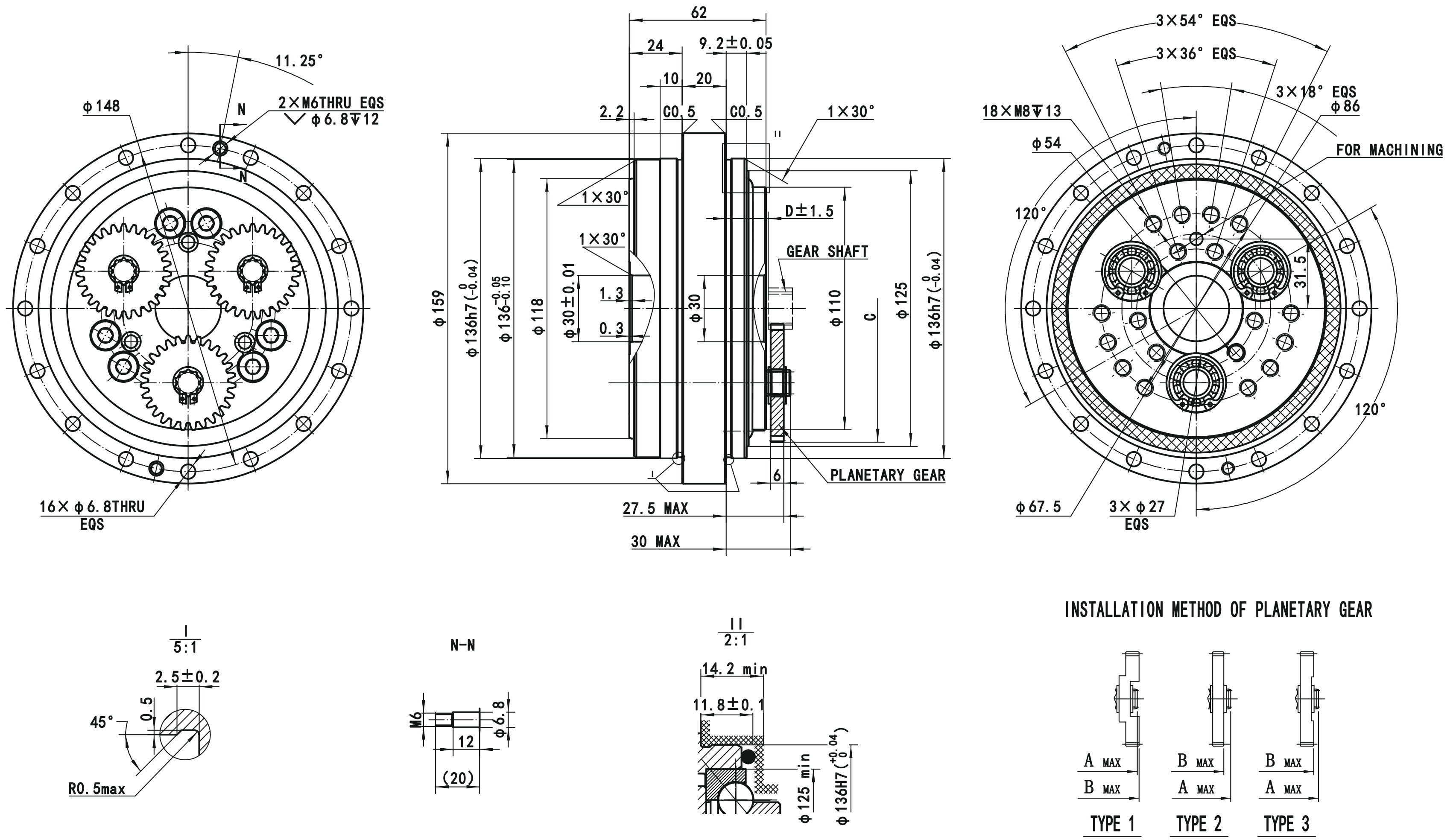
1. The allowable bending moment will vary according to the thrust load. Refer to the allowable bending moment curve.
2. The moment of inertia value is the main value of the reducer. The moment of inertia of the input gear is not included.
3. Calculation of reference inclination and torsion Angle for torque stiffness and torsional rigidity.
4. Rated torque refers to the torque value reflecting the rated life when rated output speed, not the data showing the upper limit of the load.
5. Please use within the allowable radial load range.

5. CT-CRV-P external dimensions



CT-CRV-42P Bolt clamping output shaft type

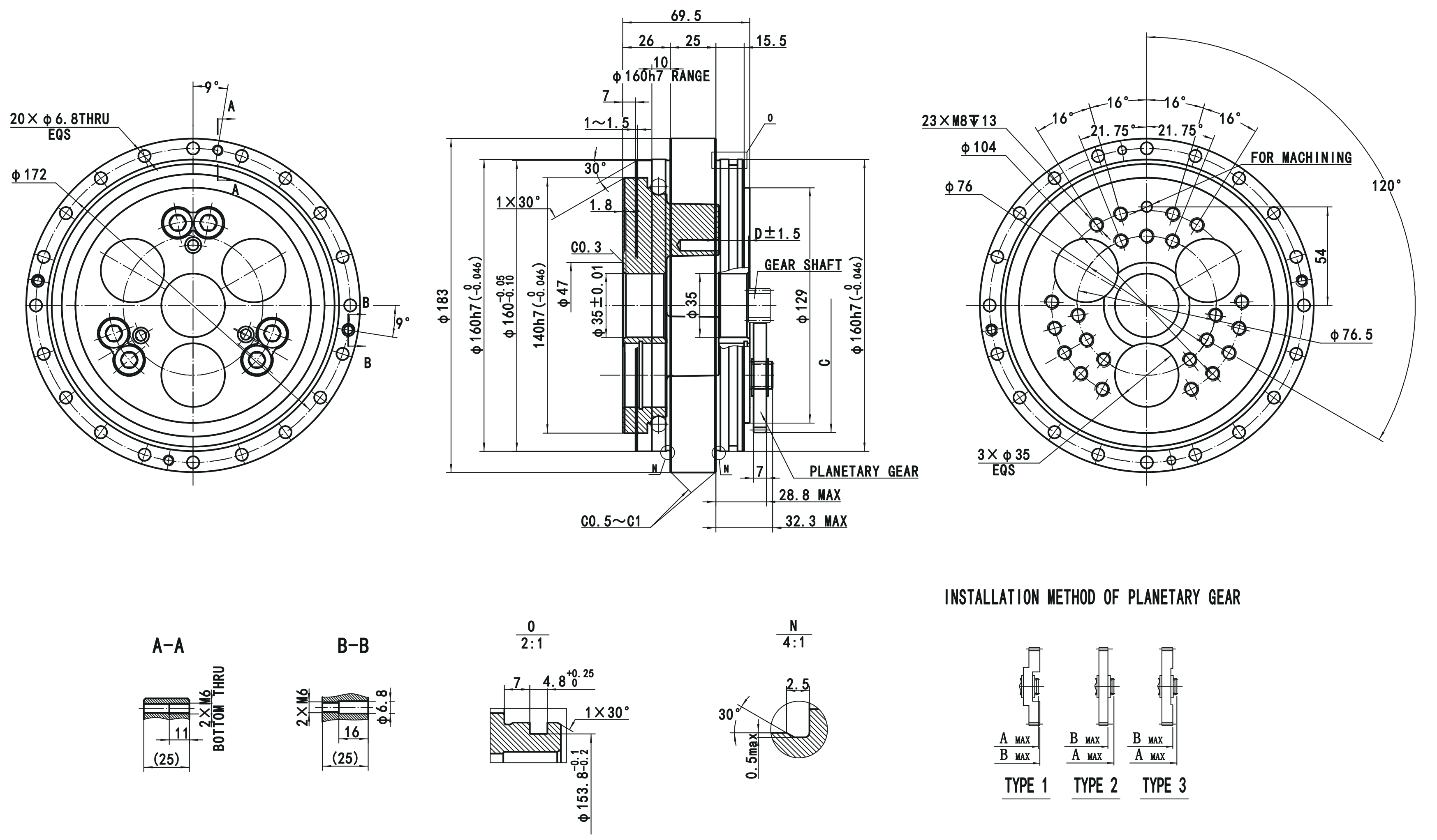
Type code:CT-CRV-42P speed ratio



CT-CRV-60P Bolt clamping output shaft type

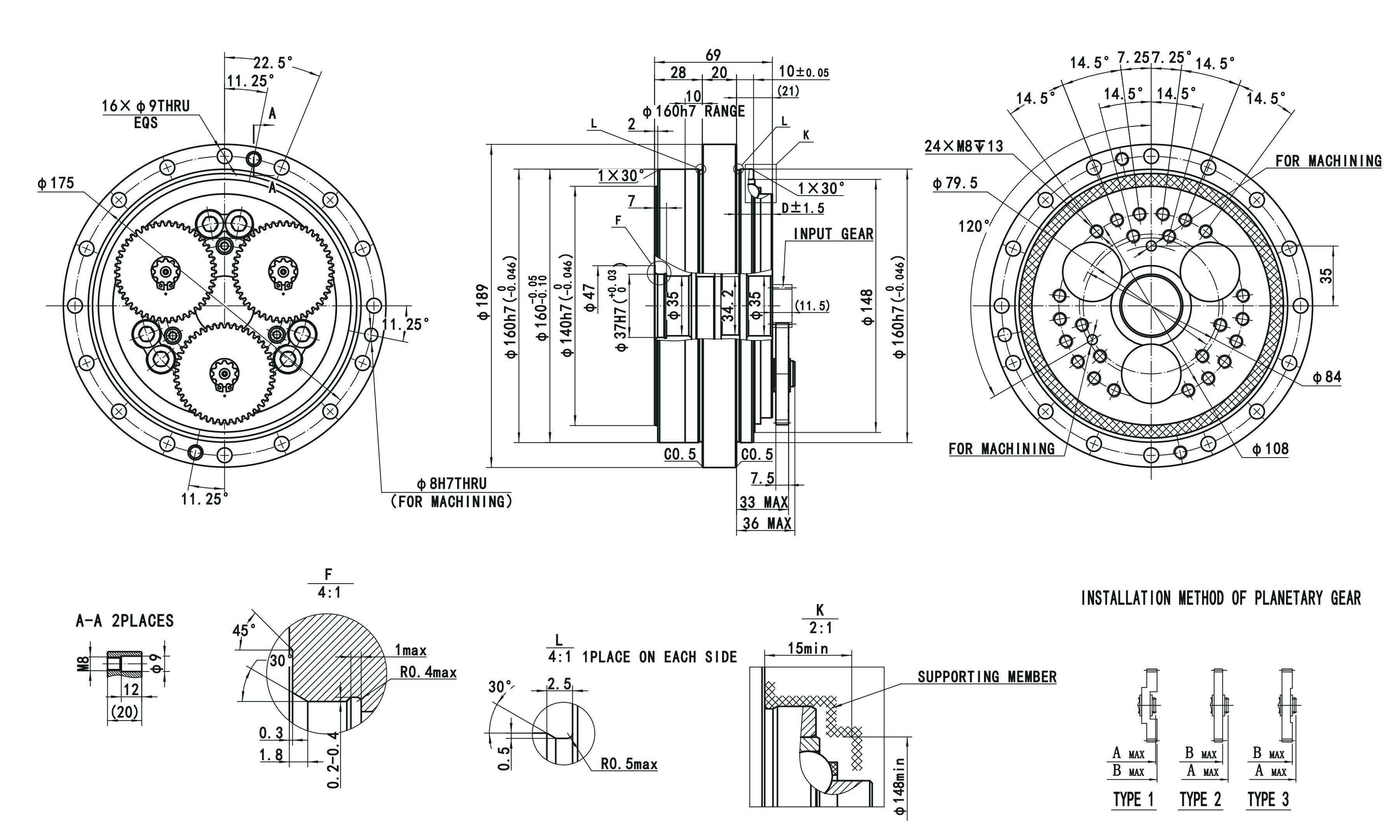
Type code:CT-CRV-60P

speed ratio



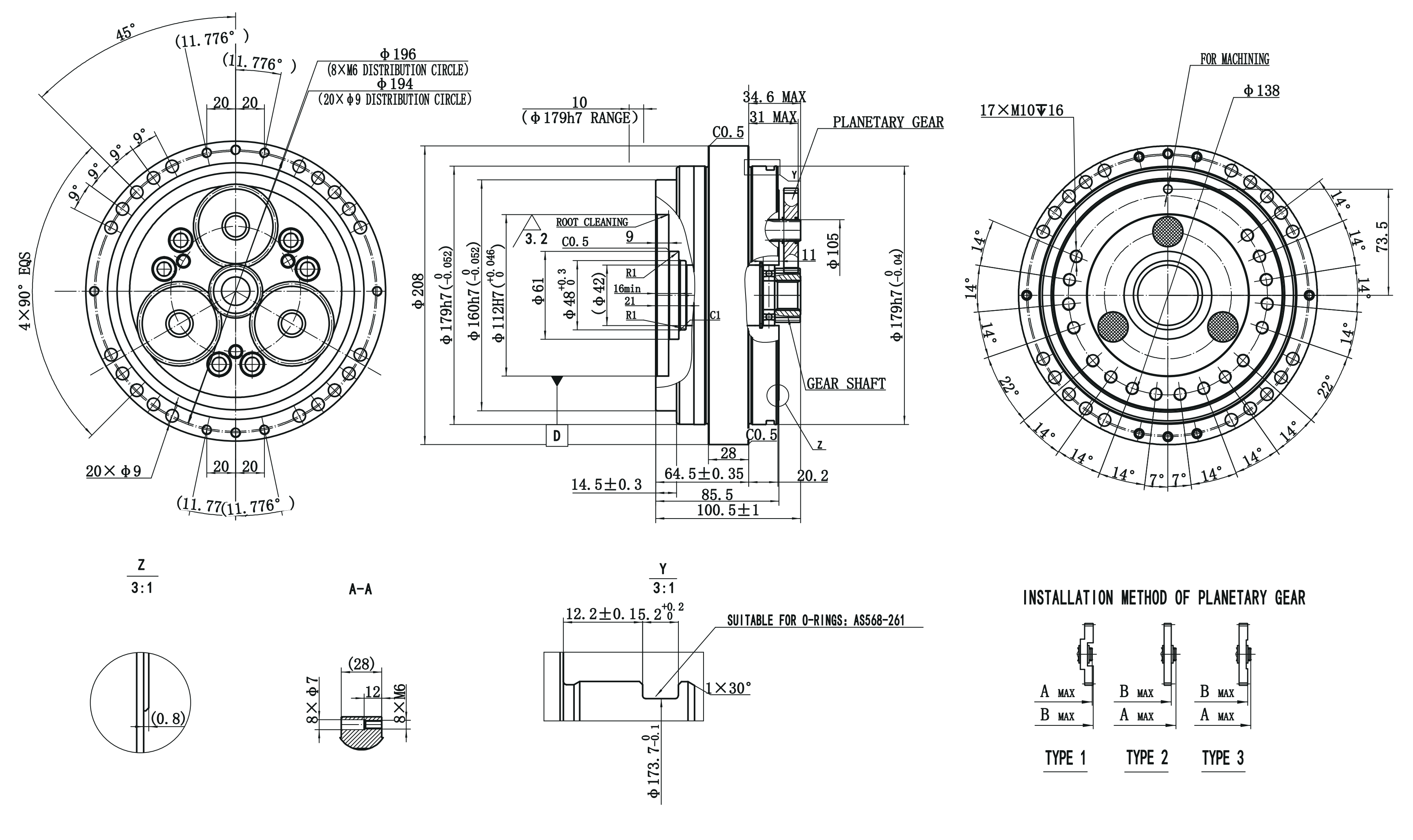
CT-CRV-80P Bolt clamping output shaft type

Type code:CT-CRV-80P speed ratio



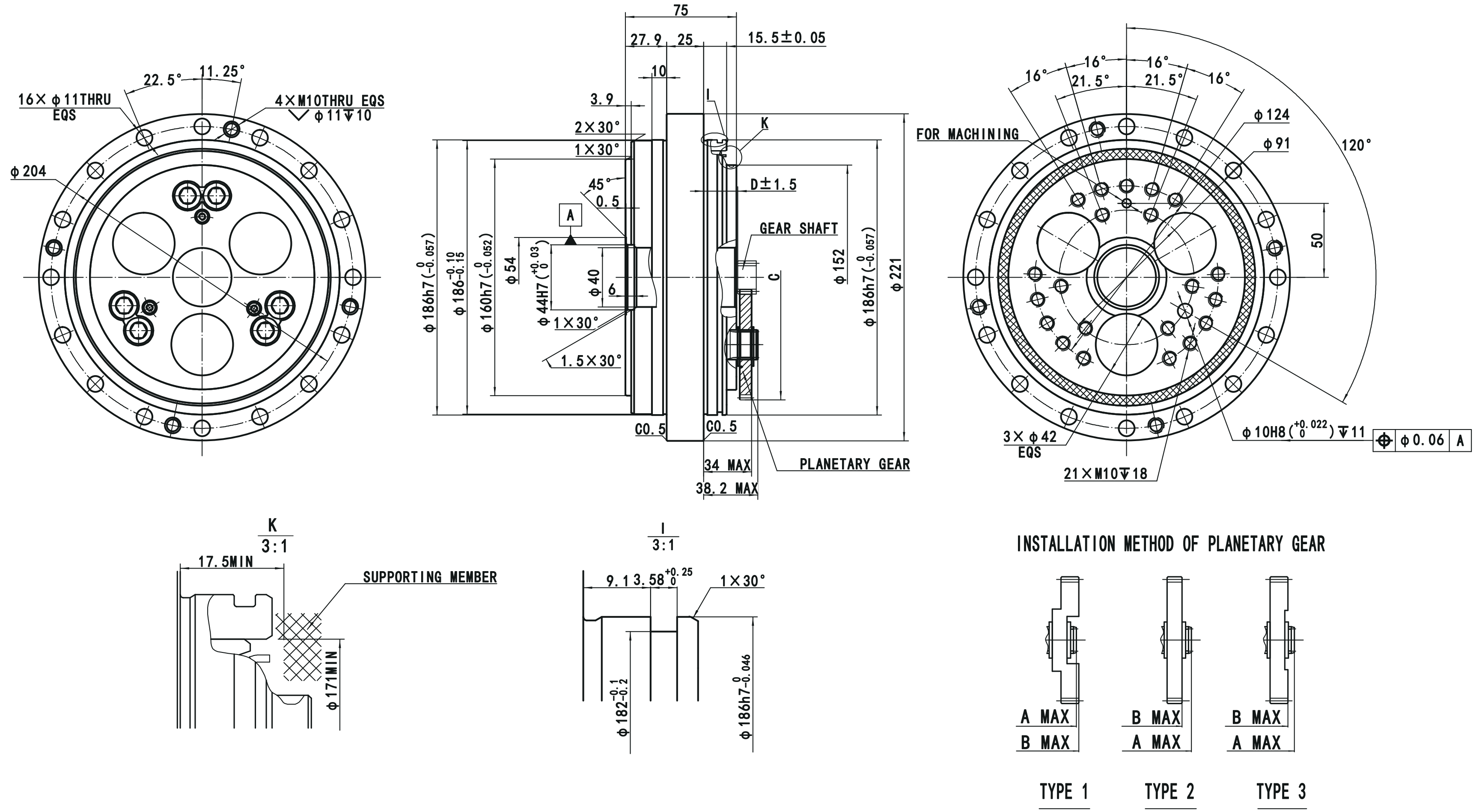
CT-CRV-100P Bolt clamping output shaft type

Type code:CT-CRV-100P speed ratio



CT-CRV-125P Bolt clamping output shaft type

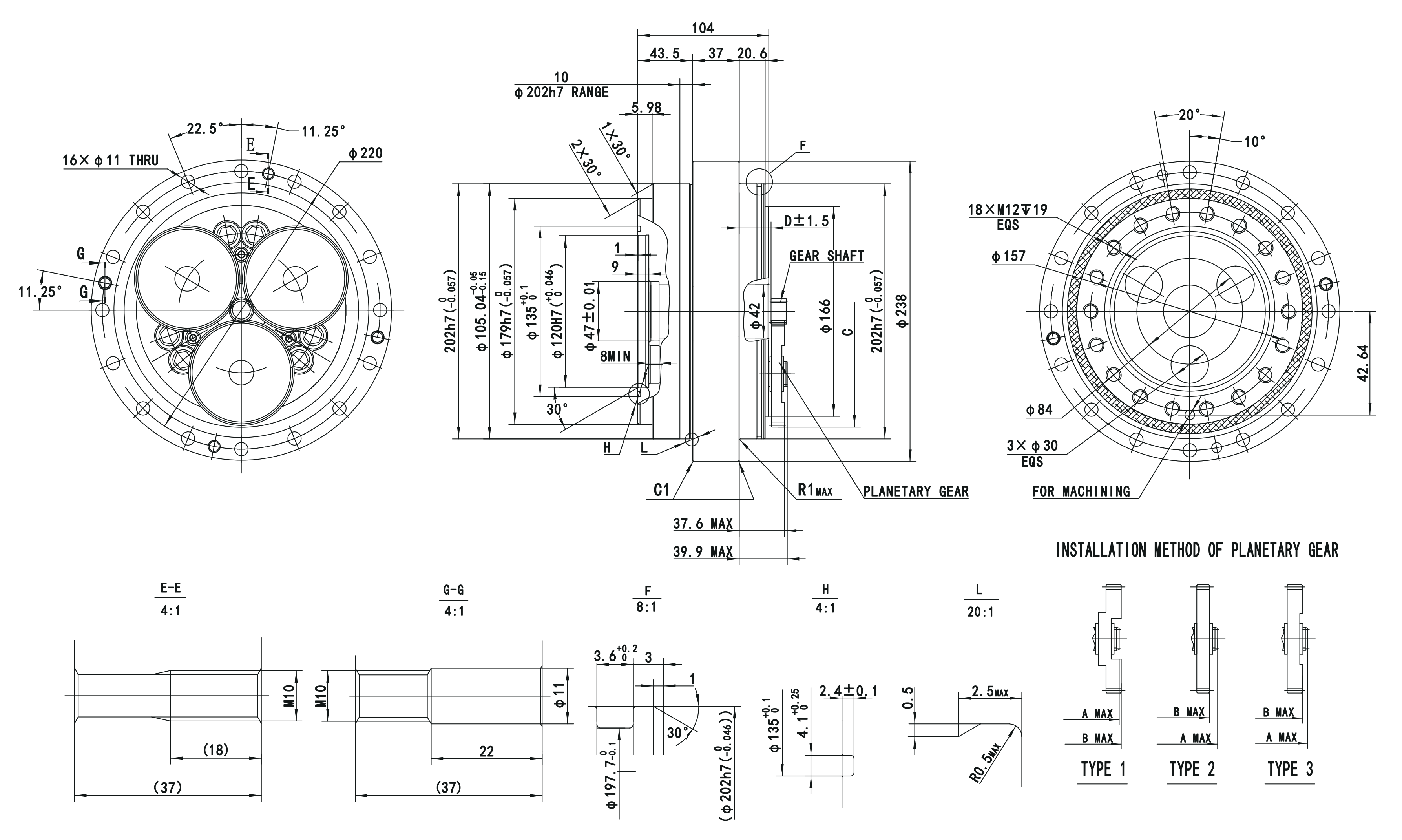
Type code:CT-CRV-125P speed ratio



CT-CRV-160P Bolt clamping output shaft type

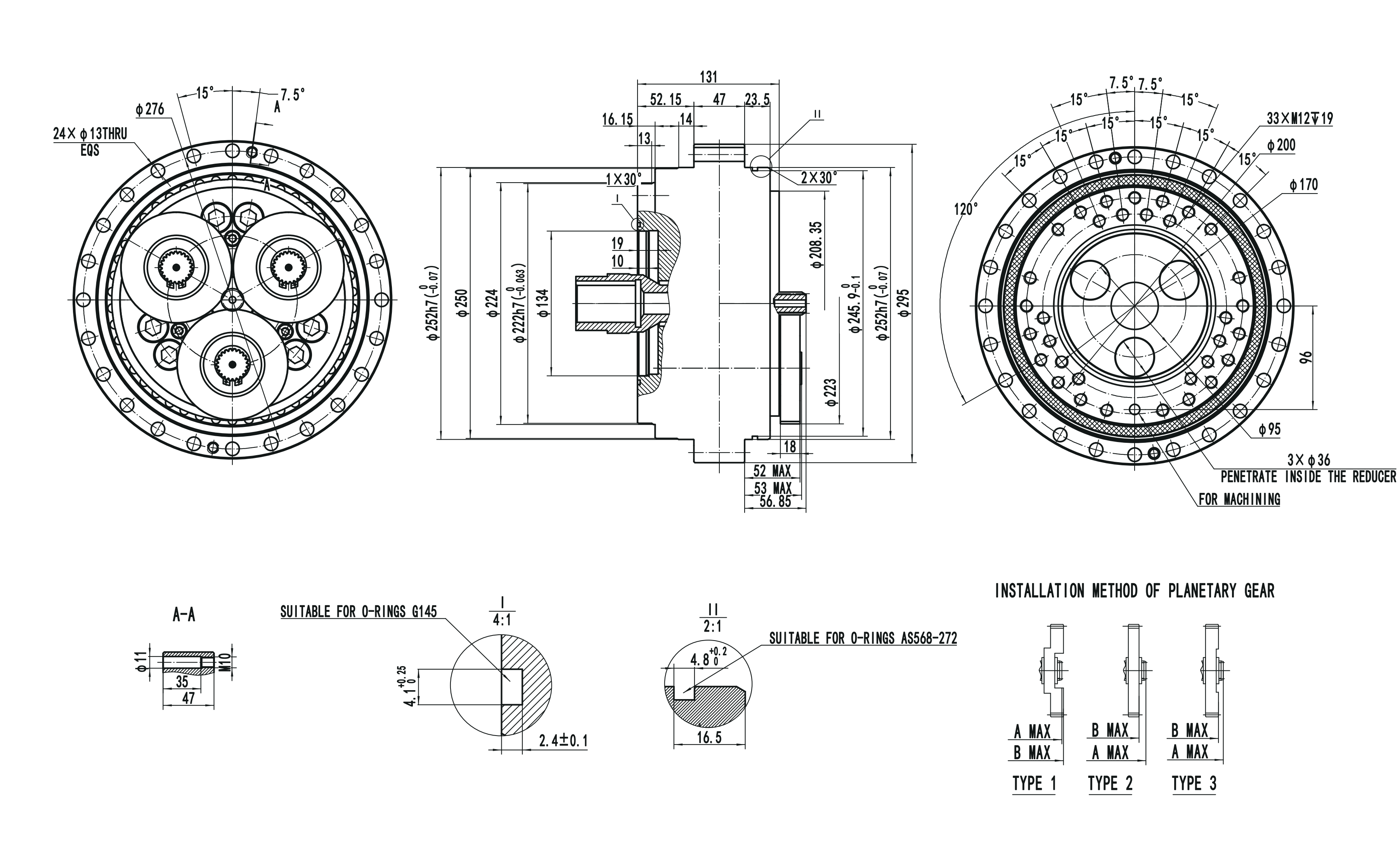
Type code:CT-CRV-160P

speed ratio



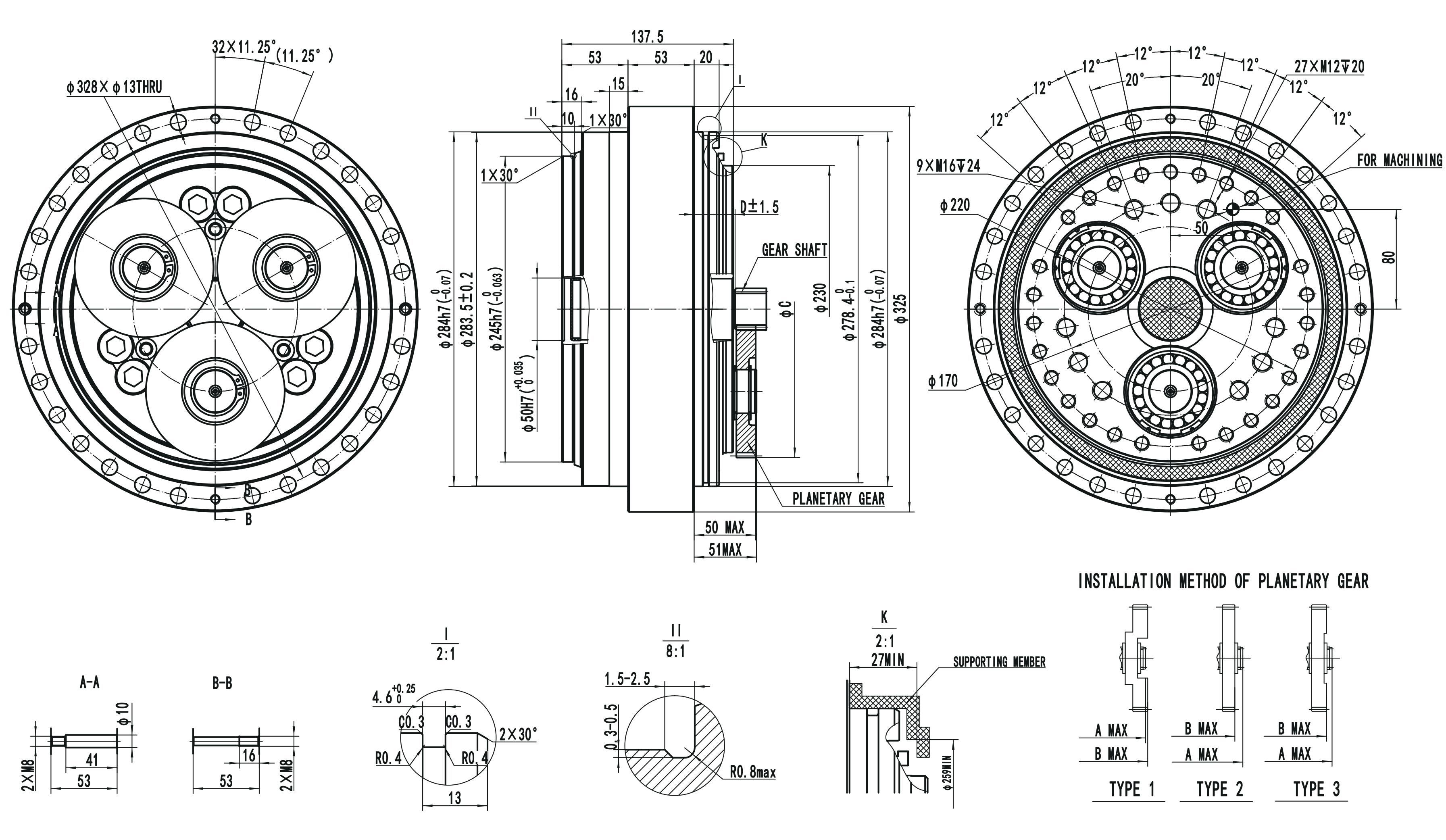
CT-CRV-380P Bolt clamping output shaft type

Type code:CT-CRV-380P speed ratio



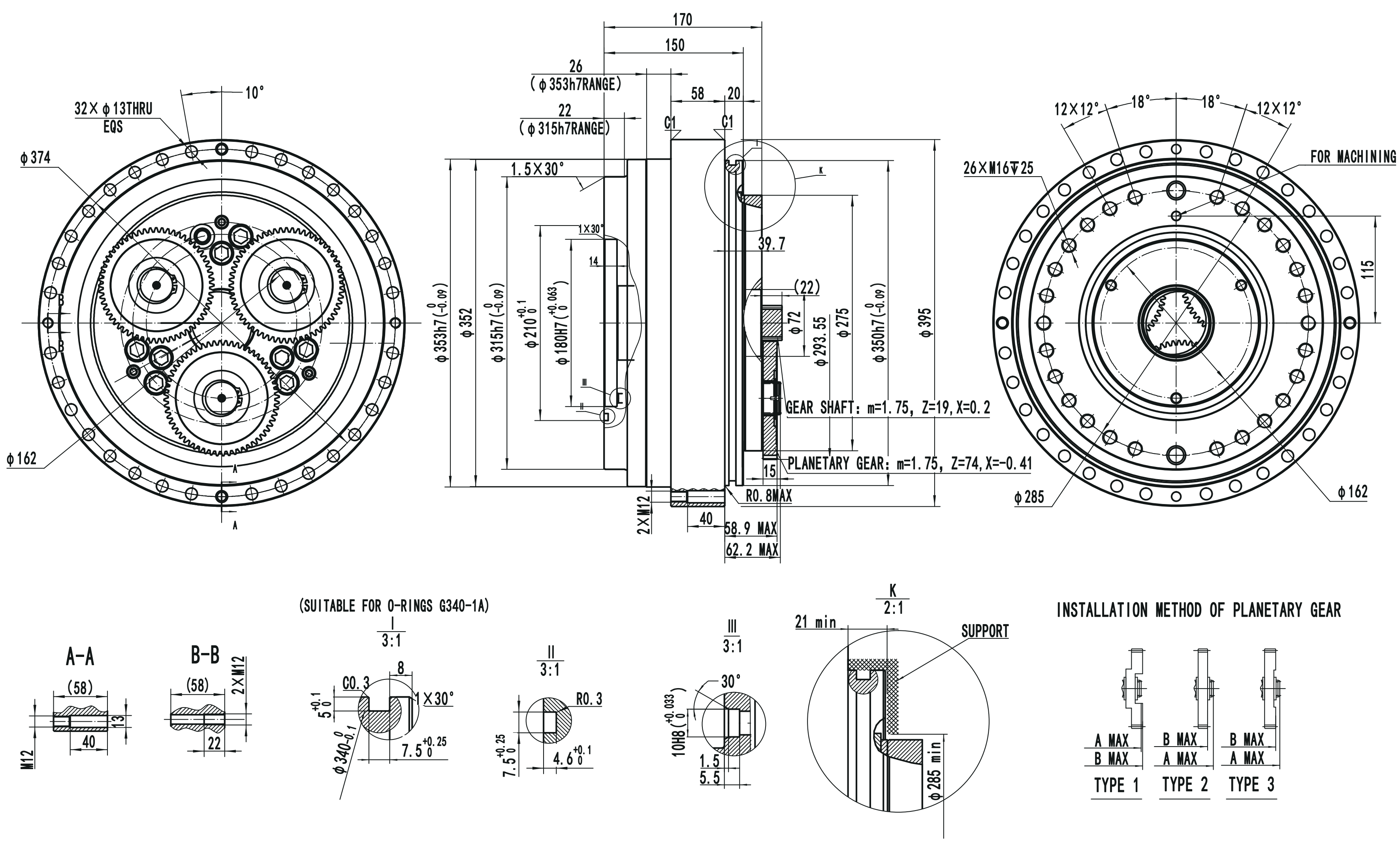
CT-CRV-500P Bolt clamping output shaft type

Type code:CT-CRV-500P speed ratio



CT-CRV-700P Bolt clamping output shaft type

Type code: CT-CRV-700P speed ratio



1.Glossary

● Rated service life

The lifetime resulting from the operation with the rated torque and the rated output speed is referred to as the "rated service life".

● Allowable acceleration/deceleration torque

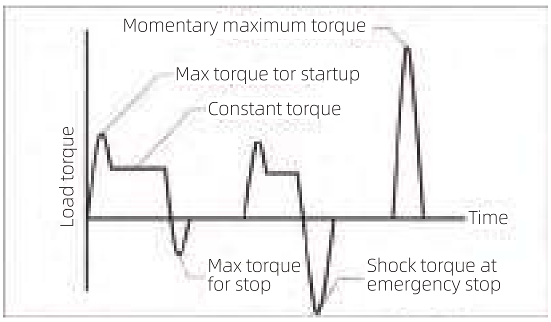
When the machine starts or stops, the load torque to be applied to the reduction gear is larger than the constant-speed load torque due to the effect of the inertia torque of the rotating part. In such a situation, the allowable torque during acceleration/deceleration is referred to as "allowable acceleration/deceleration torque".

Note: Be careful that the load torque, which is applied at startup and stop, does not exceed the allowable acceleration/deceleration torque.

● Momentary maximum allowable torque

A large torque may be applied to the reduction gear due to execution of emergency stop or by an external shock. In such a situation, the allowable value of the momentary applied torque is referred to as "momentary maximum allowable torque".

Note: Be careful that the momentary excessive torque does not exceed the momentary maximum allowable torque.



● Allowable input speed

The allowable value for the reducer's input speed is referred to as the "allowable input speed"

Notes:Depending on the speed ratio,the reducer temperature may rise significantly even when the speed is under the allowable speed. In such a case, use the reducer at a speed that keeps the surface temperature at 60°C or lower.

● Allowable output speed

The allowable value for the reduction gear's output speed during operation without a load is referred to as the "allowable output speed".

Notes: Depending on the conditions of use (duty ratio, load, ambient temperature), the reduction gear temperature may exceed 60°C even when the speed is under the allowable output speed. In such a case, either take cooling measures or use the reduction gear at a speed that keeps the surface temperature at 60°C or lower.

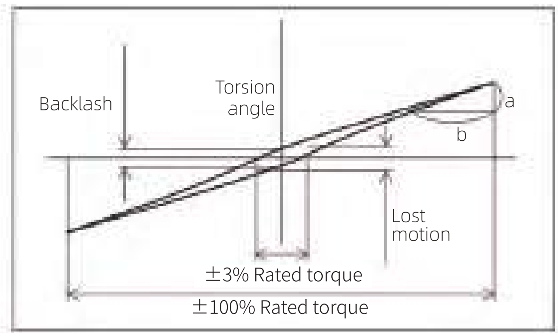
● Allowable output speed reference

When the reducer rotates continuously in one direction, the allowable value of the output speed with temperature rise below 40°C value is referred to as the "allowable output speed".

Note: Please use the reducer at a speed that keeps the surface temperature at 60°C or lower.

● Torsional rigidity, lost motion, backlash

When a torque is applied to the output shaft while the input shaft is fixed, torsion is generated according to the torque value. The torsion can be shown in the hysteresis curves. The value of b/a is referred to as"torsional rigidity".The torsion angle at the mid point of the hysteresis curve width within ±3% of the rated torque is referred to as "lost motion". The torsion angle when the torque indicated by the hysteresis curve is equal to zero is referred to as "backlash".



Hysteresis curve

● Startup efficiency

The efficiency of the moment when the reduction gear starts up is referred to as "startup efficiency".

● No-load running torque (input shaft)

The torque for the input shaft that is required to run the reduction gear without load is referred to as "no-load running torque".

● Allowable moment and allowable thrust

The external load moment may be applied to the reduction gear during normal operation. The allowable values of the external moment and the external axial load at this time are each referred to as "allowable moment" and "allowable thrust".

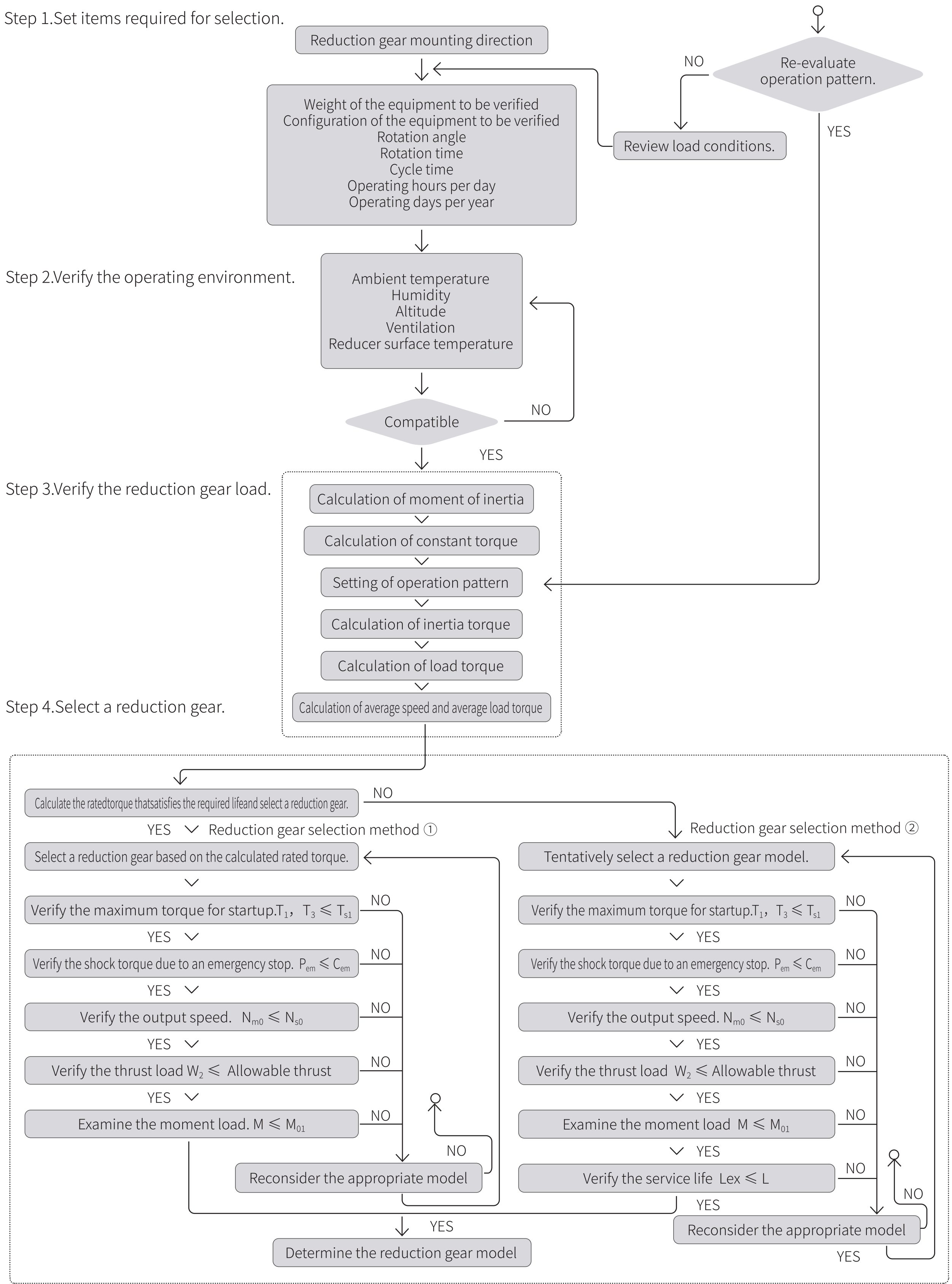
● Rated moment of input shaft

The moment for the input shaft that satisfies the rated service life is referred to as the "rated moment of input shaft". Generally, the moment applied to the input shaft should be less than the rated moment.

● Allowable moment of input shaft

The moment for the input shaft when the reducer starts or stops is referred to as the "allowable moment of input shaft".

2.Prodect Selection Flowchart



If it is used in special conditions (such as vacuum, water or requirements like flame-retardant and salt-fog resistance, ect.), please contact us.

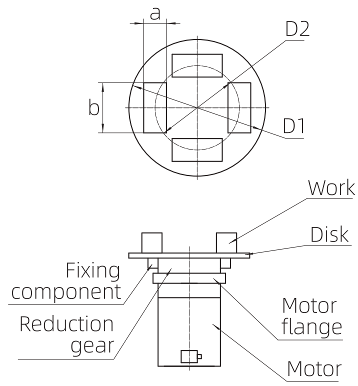
3.Model code selection examples

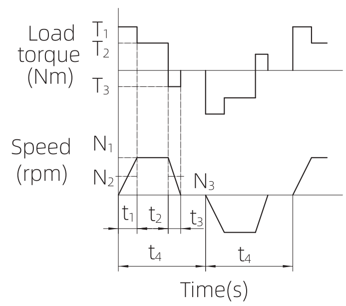
With horizontal rotational transmission

Step 1. Set the items required for selection.

Setting item	Setting
Reduction gear mounting direction	Vertical shaft installation
Equipment weight to be considered	
W_A——Disk weight (kg)	180
W_B——Work weight (kg)	20×4
Equipment configuration to be considered	
D_1——Disk: D dimension（mm）	1200
a——Work piece: a dimension（mm）	100
b——Work piece: b dimension（mm）	300
D_2——Disk: D dimension（mm）	1000
Operation conditions	
θ——Rotation angle（°）	180
【$t_1+t_2+t_3$】——Rotation time（s）	2.5
【t_4】—— Cycle time（s）	20
Q_1——Equipment operation hours per day (hours/day)	12
Q_2——Equipment operation days per year (days/year)	365

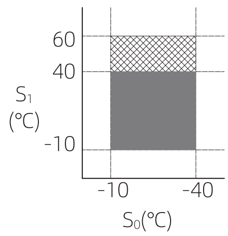
When the range of the rotation angle is small (10 degrees or less), the rating life of the reduction gear may be reduced due to poor lubrication or the internal parts being subject to a concentrated load.





Step 2. Verify the operating environment.

Checkpoint	Standard value
S_0——Ambient temperature（℃）	-10~40
S_1——Reduction gear surface temperature（℃）	60 or less



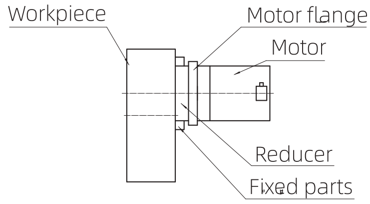
Step 3-1. Examine the reduction gear load

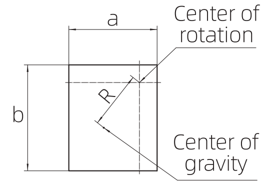
Setting item		Calculation formula	Selection examples
① Calculate the inertia moment			
I_R	Load moment of inertia (kgm^2)	$I_{R1}=\dfrac{W_a\times\left(\frac{D_1}{2\times1000}\right)^2}{2}$ $I_{R2}=\left[\dfrac{W_B}{12}\left\{\left(\dfrac{a}{1000}\right)^2+\left(\dfrac{b}{1000}\right)^2\right\}+W_B\times\left(\dfrac{D_2}{2\times1000}\right)^2\right]\times n$ I_{R1}=Disk moment of inertia I_{R2}=Work inertia $I_R=I_{R1}+I_{R2}$ n=Number of work pieces	$I_{R1}=\dfrac{180\times\left(\frac{1200}{2\times1000}\right)^2}{2}=32.4(kgm^2)$ $I_{R2}=\left[\dfrac{20}{12}\left\{\left(\dfrac{100}{1000}\right)^2+\left(\dfrac{300}{1000}\right)^2\right\}+20\times\left(\dfrac{1000}{2\times1000}\right)^2\right]\times4$ $=20.7(kgm^2)$ $I_R=32.4+20.7=53.1(kgm^2)$
② Examine the constant torque.			
T_R	Constant torque (Nm)	$T_R=(W_A+W_B)\times9.8\times\dfrac{D_{in}}{2\times1000}\times\mu$ μ= Friction factor Note: Use 0.015 for this example as the load is applied to the bearing of the CT-CRV-P precision reduction gear. Din= Rolling diameter: Use the pilot diameter which is almost equivalent to the rolling diameter in this selection calculation. Maximum pilot diameter: 353 mm (CT-CRV-700P)	$T_R=(180+20\times4)\times9.8\times\dfrac{353}{2\times1000}\times0.015$ $=6.7(Nm)$

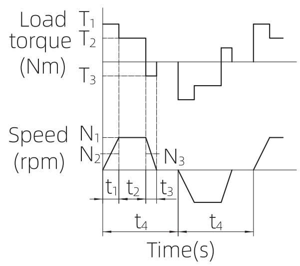
With vertical rotational transfer

Step 1. Set the items required for selection.

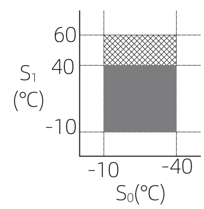
Setting item	Setting
Reduction gear mounting direction	Horizontal shaft installation
Equipment weight to be considered	
W_c—— Mounted work weight (kg)	490
Equipment configuration to be considered	
a—— a dimension(mm)	500
b—— b dimension(mm)	500
R—— R dimension(mm)	320
Operation conditions	
θ——Rotation angle(°)	90
【$t_1+t_2+t_3$】 ——Rotation time(s)	1.5
【t_4】 —— Cycle time(s)	20
Q_1——Equipment operation hours per day (hours/day)	24
Q_2——Equipment operation days per year (days/year)	365







When the range of the rotation angle is small (10 degrees or less), the rating life of the reduction gear may be reduced due to poor lubrication or the internal parts being subject to a concentrated load.



Step 2. Verify the operating environment.

Checkpoint	Standard value
S0——Ambient temperature(℃)	-10~40
S1——Reduction gear surface temperature(℃)	60 or less

Step 3-1. Examine the reduction gear load

Setting item		Calculation formula	Selection examples
① Calculate the inertia moment			
I_R	Load moment of intertia (kgm^2)	$I_R=\frac{W_C}{12}\left\{\left(\frac{a}{1000}\right)^2+\left(\frac{b}{1000}\right)^2\right\}+W_C\times\left(\frac{R}{1000}\right)^2$	$I_R=\frac{490}{12}\times\left\{\left(\frac{500}{1000}\right)^2+\left(\frac{500}{1000}\right)^2\right\}+490\times\left(\frac{320}{1000}\right)^2$ $=70.6(kgm^2)$
② Examine the constant torque			
T_R	Constant torque(Nm)	$T_R=W_C\times 9.8\times\frac{R}{1000}$	$T_R=490\times 9.8\times\frac{320}{1000}=1537(Nm)$

Step 3-2. Set items required for selection

Setting item	Calculation formula	Selection examples (With horizontal rotational transfer)
③ Set the acceleration/deceleration time, constant-speed operation time, and output speed.		
t_1——Acceleration time (s) t_2——Constant-speed operation time (s) t_3——Deceleration time (s) N_2——Constant speed (rpm)	The operation pattern does not need to be verified if it is already set. If the operation pattern has not been determined, use the following formula to calculate the reference operation pattern. Note: 1. Assume that t1 and t3 are the same. Note: 2. N2 = 15 rpm if the reduction gear output speed (N2) is not known. Note: 3. If t1 and t3 is less than 0, increase the output speed or extend the rotation time. $t_2 = \text{Rotation } [t_1+t_2+t_3]-(t_1+t_3)$ $t_1 = t_3 = \text{Rotation } [t_1+t_2+t_3]-\dfrac{\theta}{\left(\dfrac{N_2}{60}\times 360\right)}$	Examine the operation pattern using N2 = 15 rpm as the reduction gear output speed is unknown. $t_1 = t_3 = 2.5-\dfrac{180}{\left(\dfrac{15}{60}\times 360\right)} = 0.5(s)$ $t_2 = 2.5-(0.5+0.5) = 1.5(s)$ $t_1 = t_3 = 0.5(s)$ $t_2 = 1.5(s)$ $N_2 = 15(rpm)$
N_1——Average speed for startup (rpm)	$N_1 = \dfrac{N_2}{2}$	$N_1 = \dfrac{15}{2} = 7.5(rpm)$
N_3——Average speed for stop (rpm)	$N_3 = \dfrac{N_2}{2}$	$N_3 = \dfrac{15}{2} = 7.5(rpm)$
④ Calculate the inertia torque for acceleration/deceleration.		
T_A——Inertia torque for acceleration (Nm)	$T_A = \left\{\dfrac{I_R \times (N_2-0)}{t_1}\right\} \times \dfrac{2\pi}{60}$	$T_A = \left\{\dfrac{53.1\times(15-0)}{0.5}\right\}\times\dfrac{2\pi}{60} = 166.8(Nm)$
T_D——Inertia torque for deceleration (Nm)	$T_D = \left\{\dfrac{I_R \times (0-N_2)}{t_3}\right\} \times \dfrac{2\pi}{60}$	$T_D = \left\{\dfrac{53.1\times(0-15)}{0.5}\right\}\times\dfrac{2\pi}{60} = -166.8(Nm)$
⑤ Calculate the load torque for acceleration/deceleration.		
T_1——Maximum torque for startup (Nm)	$T_1 = \lvert T_A + T_R \rvert$ TR: Constant torque With horizontal rotational transfer Refer to page 32 With vertical rotational transfer Refer to page 33	$T_1 = \lvert 166.8+6.7 \rvert = 173.5(Nm)$
T_2——Constant maximum torque (Nm)	$T_2 = \lvert T_R \rvert$	$T_2 = 6.7(Nm)$
T_3——Maximum torque for stop (Nm)	$T_3 = \lvert T_D + T_R \rvert$ TR: Constant torque With horizontal rotational transfer Refer to page 32 With vertical rotational transfer Refer to page 33	$T_3 = \lvert -166.8+6.7 \rvert = 160.1(Nm)$
⑥ Calculate the average speed.		
N_m——Average speed (rpm)	$N_m = \dfrac{t_1\times N_1 + t_2\times N_2 + t_3\times N_3}{t_1+t_2+t_3}$	$N_m = \dfrac{0.5\times7.5+1.5\times15+0.5\times7.5}{0.5+1.5+0.5} = 12(rpm)$
⑦ Calculate the average load torque.		
T_m——Average load torque (Nm)	$T_m = \sqrt[\frac{10}{3}]{\dfrac{t_1\times N_1\times T_1^{\frac{10}{3}} + t_2\times N_2\times T_2^{\frac{10}{3}} + t_3\times N_3\times T_3^{\frac{10}{3}}}{t_1\times N_1+t_2\times N_2+t_3\times N_3}}$	$T_m = \sqrt[\frac{10}{3}]{\dfrac{0.5\times7.5\times 173^{\frac{10}{3}} + 1.5\times15\times6.7^{\frac{10}{3}} + 0.5\times7.5\times160.1^{\frac{10}{3}}}{0.5\times7.5+1.5\times15+0.5\times7.5}}$ $= 110.3(Nm)$

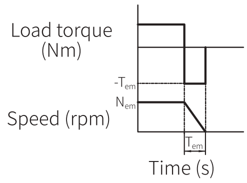
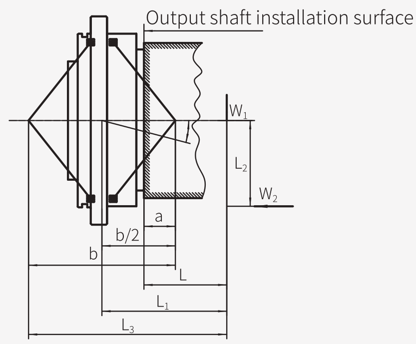
Go to page 22 if the reduction gear model is verified based on the required life. Go to page 24 if the service life is verified based on the reduction gear model.

Step 4. Select a reduction gear

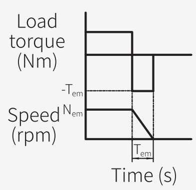
Reduction gear selection method (1) Calculate the required torque based on the load conditions and required life and select a reduction gear.

Setting/verification item	Calculation formula	Selection examples (With horizontal rotational transfer)
① Calculate the rated torque for the reduction gear that satisfies the required life.		
L_{ex}——Required life (year)	Based on the operation conditions	5 years
Q_{1cy}——Number of cycles per day(times)	$Q_{1cy}=\frac{Q_1\times 60\times 60}{t_4}$	$Q_{1cy}=\frac{12\times 60\times 60}{20}=2{,}160$ (times)
Q_3——Operating hours of reduction gear per day(h)	$Q_3=\frac{Q_{1cy}\times(t_1+t_2+t_3)}{60\times 60}$	$Q_3=\frac{2160\times(0.5+1.5+0.5)}{60\times 60}=1.5(h)$
Q_4——Operating hours of reduction gear per year(h)	$Q_4=Q_3\times Q_2$	$Q_4=1.5\times 365=548(h)$
L_{hour}——Reduction gear service life (h)	$L_{hour}=Q_4\times L_{ex}$	$L_{hour}=548\times 5=2740(h)$
T_0'——Reduction gear rated torque that satisfies the required life(Nm)	$T_0'=T_m\times\sqrt[\left(\frac{10}{3}\right)]{\frac{L_{hour}}{K}\times\frac{N_m}{N_0}}$	$T_0'=110.2\times\sqrt[\left(\frac{10}{3}\right)]{\frac{2740}{6000}\times\frac{12}{15}}=81.5(Nm)$
② Tentatively select a reduction gear model based on the calculated rated torque.		
Tentative selection of the reduction gear	Select a reduction gear for which the rated torque of the reduction gear [T_0] is equal to or greater than the rated torque of the reduction gear that satisfies the required life [T_0'].	CT-CRV-25P that meets the following condition is tentatively selected: [T_0] 245 (Nm) ≥ [T_0'] 81.5 (Nm)
③ Verify the maximum torque for startup and stop.		
Verification of maximum torque for startup and stop	Check the following conditions:The allowable acceleration/deceleration torque [T_{s1}] is equal to or greater than the maximum starting torque [T_1] and maximum stopping torque [T_3]	[T_{s1}] 613 (Nm) ≥ [T_1] 173.1 (Nm) [T_3] 160.5 (Nm) According to the above conditions, the tentatively selected model should be no problem.
④ Verify the output speed.		
N_{m0}——Average speed per cycle(rpm)	$N_{m0}=\frac{t_1\times N_1+t_2\times N_2+t_3\times N_3}{t_4}$	$N_{m0}=\frac{0.5\times 7.5+1.5\times 15+0.5\times 7.5}{20}=1.5(rpm)$
Verification of output speed	Check the following condition: The allowable output speed [N_{s0}] is equal to or greater than the average speed per cycle [N_{m0}] If the tentatively selected reduction gear is outside of the specifications, change the reduction gear model. Contact us regarding use of the model at a speed outside the allowable output speed [N_{s0}]. Note: The value of [N_{s0}] is the speed at which the case temperature is balanced at 60°C for 30 minutes.	[N_{s0}] 57 (rpm) ≥ [N_{m0}] 1.5 (rpm) According to the above condition, the tentatively selected model should be no problem.

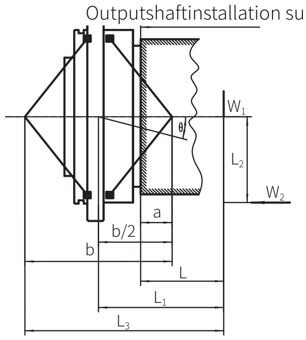
Reduction gear selection method (1) Calculate the required torque based on the load conditions and required life and select a reduction gear.

Setting/verification item	Calculation formula	Selection examples (With horizontal rotational transfer)
⑤ Verify the shock torque at the time of an emergency stop.		
P_{em}——Expected number of emergency stop times (times)	Based on the operation conditions.	For example, an emergency stop occurs once a month. [P_{em}] = 1 x 12 x required life (year) [L_{ex}]=12x5=60 (times)
T_{em}——Shock torque due to an emergency stop (Nm)		For example, 【T_{em}】 =500（Nm）
N_{em}——Speed at the time of an emergency stop(rpm)		For example, 【N_{em}】 =15（rpm）
t_{em}——Deceleration time at the time of an emergency stop (Nm)	Set the operation conditions that meet the following requirement: Shock torque due to an emergency stop [T_{em}] is equal to or less than the momentary maximum allowable torque [T_{s2}]	For example, 【t_{em}】 =0.05（s）
Z_4——Number of pins for reduction gear	Model / Num: 25P, 42P, 60P, 80P, 100P — 40; 125P, 160P — 40; 380P — 46; 500P, 700P — 52	Number of pins for CT-CRV-25P: 40
C_{em}——Allowable number of shock torque application times	$C_{em} = \dfrac{775 \times \left(\dfrac{T_{s2}}{T_{em}}\right)^{\frac{10}{3}}}{Z_4 \times \dfrac{N_{em}}{60} \times t_{em}}$	$C_{em} = \dfrac{775 \times \left(\dfrac{1225}{500}\right)^{\frac{10}{3}}}{40 \times \dfrac{15}{60} \times 0.05} = 30729\text{(times)}$
Verification of shock torque due to an emergency stop	Check the following condition:The allowable shock torque application count [C_{em}] is equal to or greater than the expected emergency stop count [P_{em}]If the tentatively selected reduction gear is outside of the specifications, change the reduction gear.	[C_{em}] 30729 ≥ [P_{em}] 60 According to the above condition, the tentatively selected model should be no problem.
⑥ Verify the thrust load and moment load. (It is not necessary to determine these for the Original series.)		
W_1——Radial load (N)		0（N）
l——Distance to the point of radial load application (mm)		0（mm）
W_2——Thrust load (N)		In this example, W2=WA+WB=(180+20×4)×9.8=2,458 (N)
l_2——Distance to the point of thrust load application (mm)		0（mm）（As the workpiece center is located on the rotation axis)
M——Moment load (Nm)	$M = \dfrac{W_1 \times (L+b-a) + W_2 \times L_2}{1000}$	CT-CRV-25P As dimension a = 22.1 (mm) and dimension b = 112.4 (mm): $M = \dfrac{0 \times (0+112.4-22.1)+2548 \times 0}{1000}$ $= 0$（Nm）
Verify the thrust load and moment load	Check that the thrust load and moment load are within the range in the allowable moment diagram. When radial load W_1 is applied within dimension b, use the reduction gear within the allowable radial load. W_r: Allowable radial load,refer to the rating table. Refer to the individual rating tables. If the tentatively selected reduction gear is outside of the specifications, change the reduction gear model.	For this example,Thrust load [W_2] = 2,548 (N) Moment load [M] = 0 (N) As the above values are within the range in the allowable moment diagram, the tentatively selected model should be no problem.
Select the reduction gear model that satisfies all the conditions of the above verification items. The actual reduction ratio is determined based on the motor speed, input torque, and inertia moment. Check with the motor manufacturer.		Based on the above verification result, CT-CRV-25P is selected.

Reduction gear selection method (2): Tentatively select a reduction gear model and evaluate the service life.

Setting/verification item	Calculation formula	Selection examples (With horizontal rotational transfer)
① Tentatively select a desired reduction gear model.		
Tentative selection of a reduction gear	Tentatively select a desired reduction gear model.	For example, tentatively select CT-CRV-25P.
② Verify the maximum torque for startup and stop.		
Verification of maximum torque for startup and stop	Check the following conditions: The allowable acceleration/deceleration torque [Ts1] is equal to or greater than the maximum starting torque [T_1] and maximum stopping torque [T_3] If the tentatively selected reduction gear is outside of the specifications, change the reduction gear model.	[T_{s1}] 612 (Nm) ≥ [T1] 173.1 (Nm) [T_3] 160.5 (Nm) According to the above conditions, the tentatively selected model should be no problem.
③ Verify the output speed.		
N_{m0}——Average speed per cycle (rpm)	$N_{m0}=\dfrac{t_1\times N_1+t_2\times N_2+t_3\times N_3}{t_4}$	$N_{m0}=\dfrac{0.5\times7.5+1.5\times15+0.5\times7.5}{20}=1.5(rpm)$
Verification of output speed	Check the following condition: The allowable output speed [N_{S0}] is equal to or greater than the average speed per cycle [N_{m0}] If the tentatively selected reduction gear is outside of the specifications, change the reduction gear model.Contact us regarding use of the model at a speed outside the allowable output speed [N_{S0}]. Note: The value of [N_{S0}] is the speed at which the case temperature is balanced at 60ºC for 30 minutes.	[N_{s0}] 57 (rpm) ≥ [N_{m0}] 1.5 (rpm) According to the above condition, the tentatively selected model should be no problem.
④ Verify the shock torque at the time of an emergency stop.		
P_{em}——Expected number of emergency stop times (times)	Based on the operation conditions.	For example, an emergency stop occurs once a month.[P_{em}] = 1 x 12 x required life (year) [L_{ex}] = 12 x 5 = 60 (times)
T_{em}——Shock torque due to an emergency stop (Nm)	 Set the operation conditions that meet the following requirement: Shock torque due to an emergency stop [T_{em}] is equal to or less than the momentary maximum allowable torque [T_{s2}]	For example,【T_{em}】=500（Nm）
N_{em}——Speed at the time of an emergency stop (rpm)		For example,【N_{em}】=15（rpm）
t_{em}——Deceleration time at the time of an emergency stop (s)		For example,【t_{em}】=0.05（s）
Z_4——Number of pins for reduction gear	Model / Num: 25P, 42P, 60P, 80P, 100P: 40 125P, 160P: 40 380P: 46 500P, 700P: 52	Number of pins for CT-CRV-25P: 40
C_{em}——Allowable number of shock torque application times	$C_{em}=\dfrac{775\times\left(\dfrac{T_{s2}}{T_{em}}\right)^{\frac{10}{3}}}{Z_4\times\dfrac{N_{em}}{60}\times t_{em}}$	$C_{em}=\dfrac{775\times\left(\dfrac{1225}{500}\right)^{\frac{10}{3}}}{40\times\dfrac{15}{60}\times0.05}=30729(times)$
Verification of shock torque due to an emergency stop	Check the following condition: The allowable shock torque application count [C_{em}] is equal to or greater than the expected emergency stop count [P_{em}].If the tentatively selected reduction gear is outside of the specifications, change the reduction gear model.	[C_{em}] 32729 ≥ [P_{em}] 60 According to the above condition, the tentatively selected model should be no problem.

Reduction gear selection method (2): Tentatively select a reduction gear model and evaluate the service life.

Setting/verification item	Calculation formula	Selection examples (With horizontal rotational transfer)
⑤ Verify the thrust load and moment load.		
W_1——Radial load (N)		0 (N)
l——Distance to the point of radial load application (mm)		0 (mm)
W_2——Thrust load (N)		In this selection example, $W2=W_A+W_B=(180+20\times4)\times9.8=2548(N)$
l_2——Distance to the point of thrust load application (mm)		0 (mm)(As the workpiece center is located on the rotation axis)
M——Moment load (Nm)	$M=\dfrac{W_1\times(L+b-a)+W_2\times L_2}{1000}$	CT-CRV-25P As dimension a = 22.1 (mm) and dimension b = 112.4 (mm): $M=\dfrac{0\times(0+112.4-22.1)+2548\times0}{1000}=0(Nm)$
Verify the thrust load and moment load	Check that the thrust load and moment load are within the range in the allowable moment diagram. Wr: Allowable radial load. If the tentatively selected reduction gear is outside of the specifications, change the reduction gear model.	For this example,Thrust load $[W_2]$ = 2,548 (N) Moment load [M] = 0 (N) As the above values are within the range in the allowable moment diagram, the tentatively selected model should be no problem.
⑥ Verify the reduction gear service life.		
L_h——Life (h)	$L_h=6000\times\dfrac{N_0}{N_m}\times\left(\dfrac{T_0}{T_m}\right)^{\frac{10}{3}}$	$L_h=6000\times\dfrac{15}{12}\times\left(\dfrac{245}{110.3}\right)^{\frac{10}{3}}=107{,}242(h)$
Q_{1cy}——Number of cycles per day (times)	$Q_{1cy}=\dfrac{Q_1\times60\times60}{t_4}$	$Q_{1cy}=\dfrac{12\times60\times60}{20}=2{,}160$ (times)
Q_3——Operating hours per day (h)	$Q_3=\dfrac{Q_{1cy}\times(t_1+t_2+t_3)}{60\times60}$	$Q_3=\dfrac{2160\times(0.5+1.5+0.5)}{60\times60}=1.5(h)$
Q_4——Operating hours per year (h)	$Q_4=Q_3\times Q_2$	$Q_4=1.5\times365=548(h)$
L_{hour}——Reduction gear service life (year)	$L_{hour}=\dfrac{L_h}{Q_4}$	$L_{hour}=\dfrac{107242}{548}=195.7$ (year)
L_{ex}——Required life (year)	Based on the operation conditions	5 years
Verification of the service life	Check the following condition:$[L_{ex}]$ is equal to or less than $[L_{year}]$If the tentatively selected reduction gear is outside of the specifications, change the reduction gear model.	$[L_{ex}]$ 5 (year) ≤ $[L_{year}]$ 195.7 (year) According to the above condition, the tentatively selected model should be no problem.
Select the reduction gear model that satisfies all the conditions of the above verification items. The actual reduction ratio is determined based on the motor speed, input torque,and inertia moment. Check with the motor manufacturer.		Based on the above verification result, CT-CRV-25P is selected.

Limitation on the motor torque

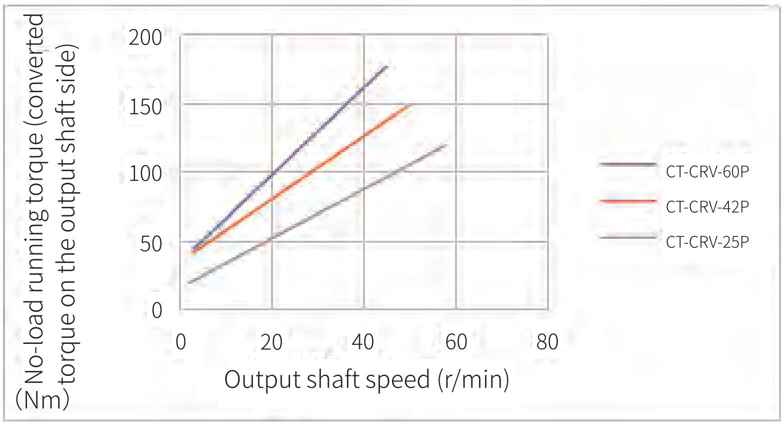
Setting/verification item	Calculation formula	Selection examples (With horizontal rotational transfer)
T_{M1}——Motor momentary maximum torque (Nm)	determined based on the motor specifications.	For example,T_{M1}=10（Nm）
T_{M1OUT}——Maximum torque generated at the output shaft for the reduction gear (Nm), outside shock by an emergency stop or an motor stop	$T_{M1out}=T_{M1}\times R\times\dfrac{100}{\eta}$ R：Speed ratio　η：Startupefficiency（%）	For example, calculate the maximum torque based on the specifications when CT-CRV-25P-164.07 was selected. $T_{M1out}=10\times164.07\times\dfrac{100}{80}=2051(Nm)$
T_{M2OUT}——Maximum torque generated at the output shaft for the reduction gear (Nm), crash shock by the output shaft and obstacle	$T_{M2out}=T_{M1}\times R\times\dfrac{\eta}{100}$	$T_{M2out}=10\times164.07\times\dfrac{80}{100}=1313(Nm)$
Limitation on motor torque value	Check the following condition: The momentary maximum allowable torque $[T_{S2}]$ is equal to or greater than the maximum torque generated at the output shaft for the reduction gear $[T_{M1OUT}]$ and $[T_{M2OUT}]$. If the above condition is not satisfied, a limitation is imposed on the maximum torque value of the motor.	$[T_{S2}]$ 1225 (Nm) ≤ $[T_{M1OUT}]$ 2051 (Nm) and $[T_{M2OUT}]$ 1313 (Nm) According to the above condition, the torque limit is set for the motor.

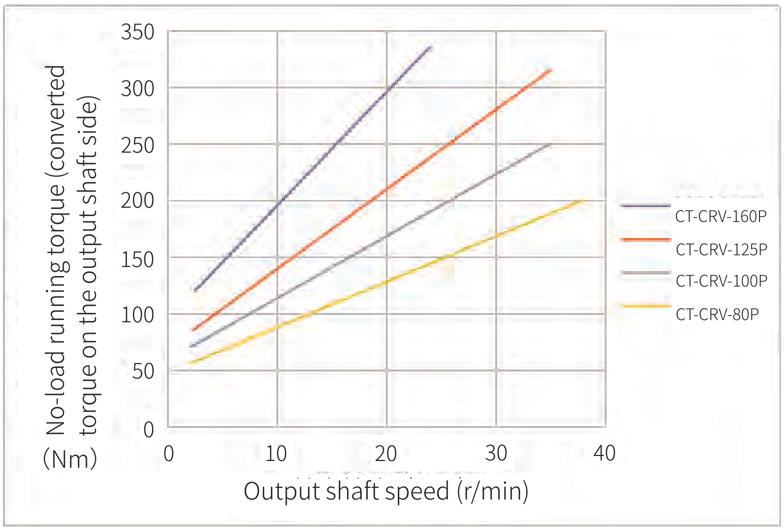
1. No-load running torque

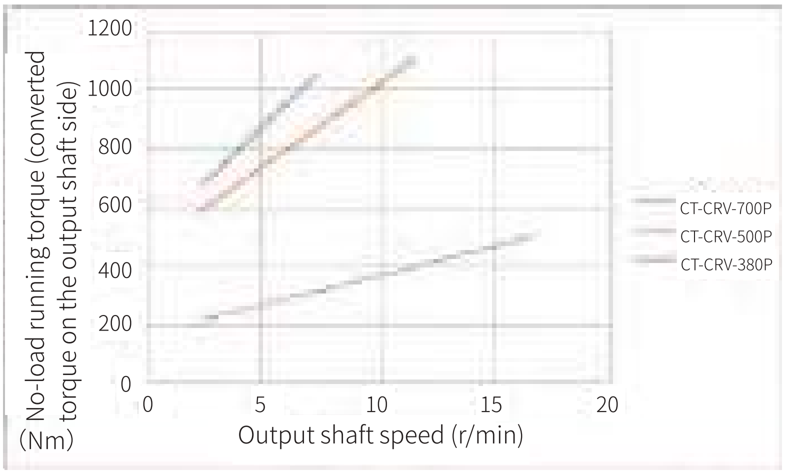
Use the following formula to calculate the no-load running torque converted to the motor shaft.

$$\text{No-load running torque converted to the motor (Nm)} = \frac{\text{Torque converted into the output shaft (Nm)}}{R} \quad \text{(R: speed ratio value)}$$

Note: The values in the following graphs are for a single reduction gear, and indicate the average values after the break-in period.







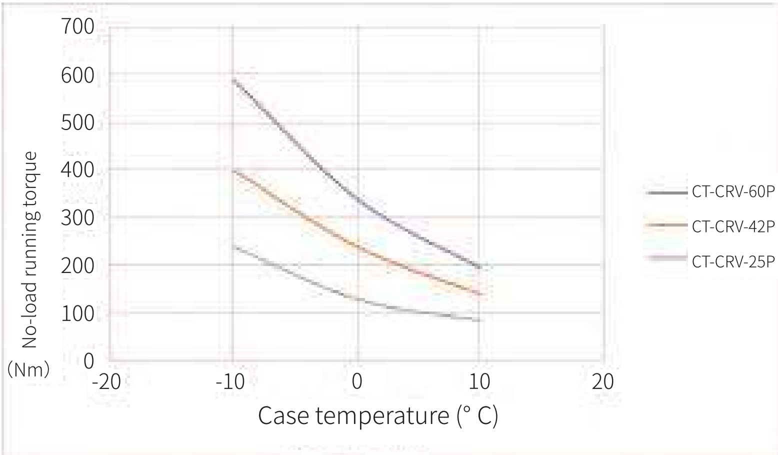
2.Low-temperature characteristic

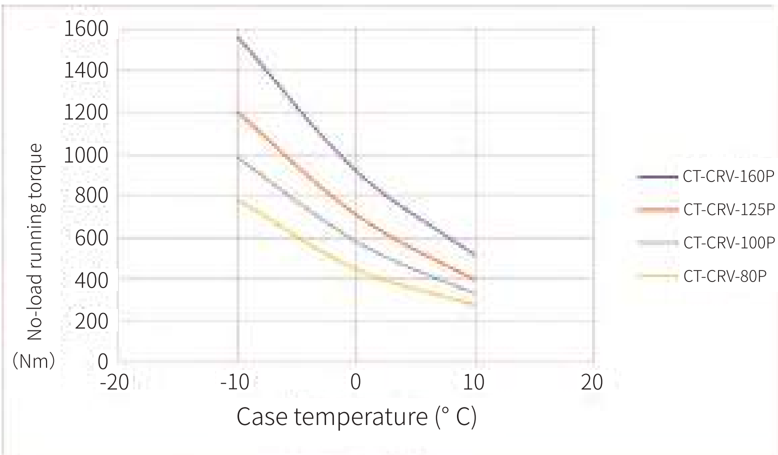
When the reduction gear is running at a low temperature, the viscosity of the lubricant will increase. Therefore, the no-load running torque will get larger.

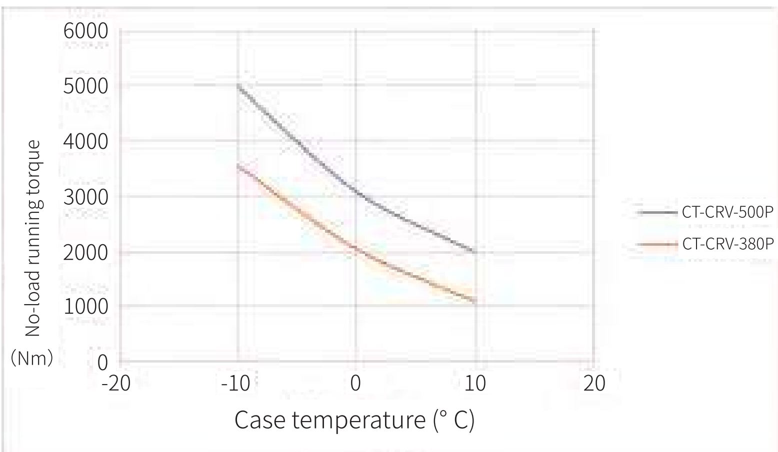
The no-load running torque at low temperature is shown below.

Use the following formula to calculate the no-load running torque converted to the input shaft.

No-load running torque converted to the input shaft (Nm)= Torque converted into the output shaft (Nm)/ R (R: speed ratio value)





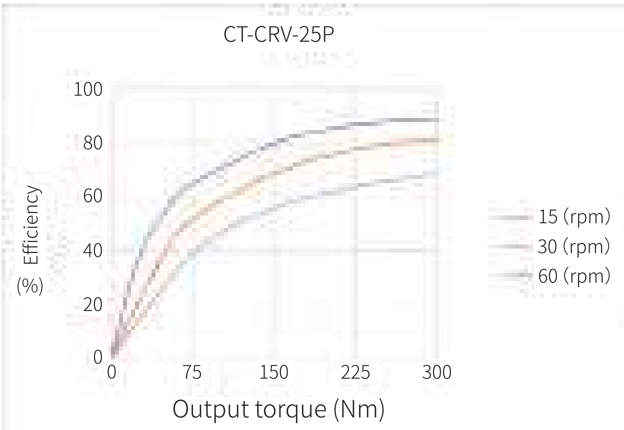


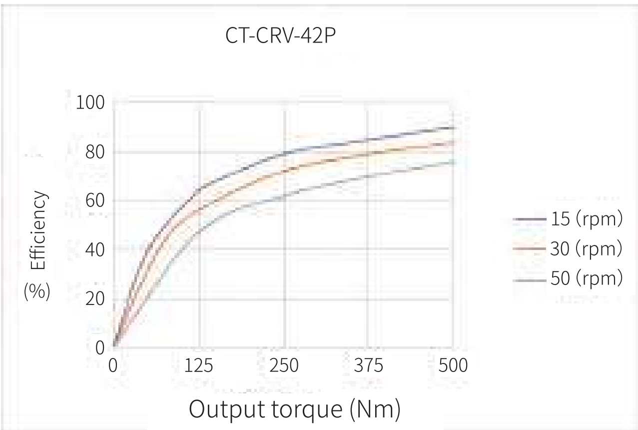
3. Efficiency table

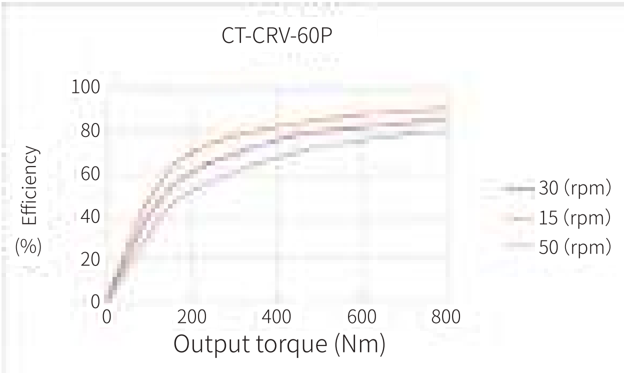
Measurement conditions

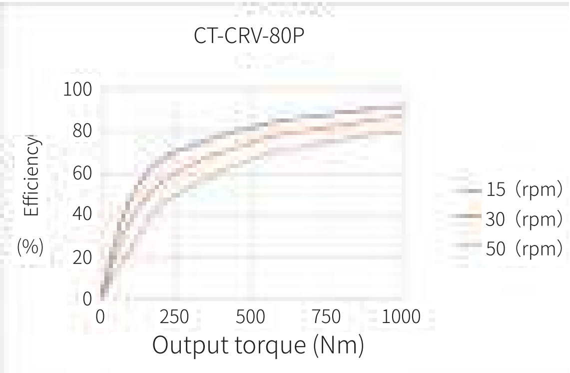
Case temperature: 30 (° C)

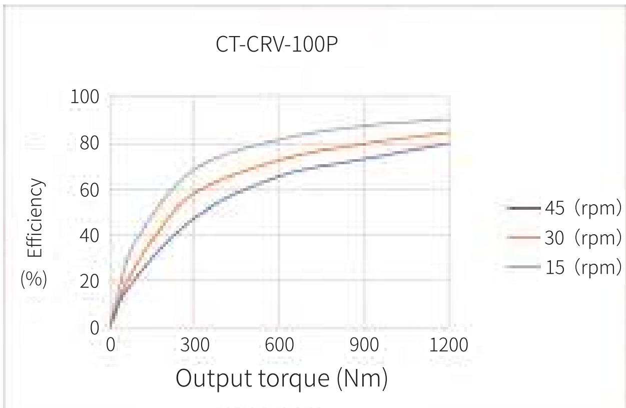
Lubricant: Grease (Molywhite RE00)

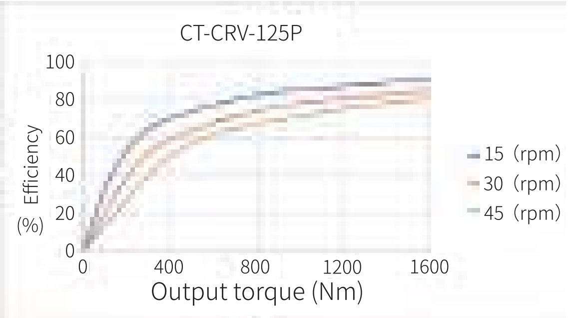


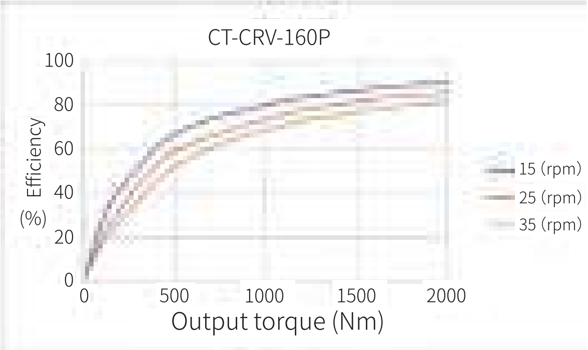


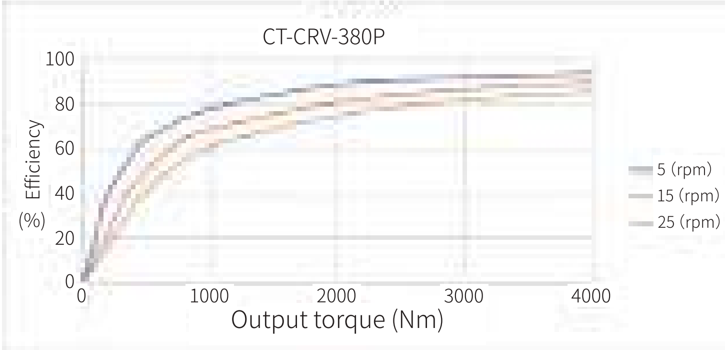


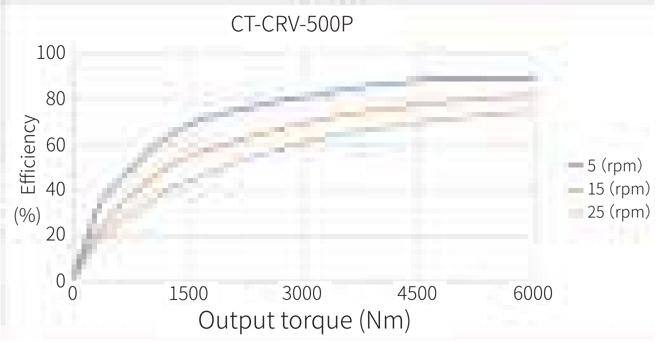


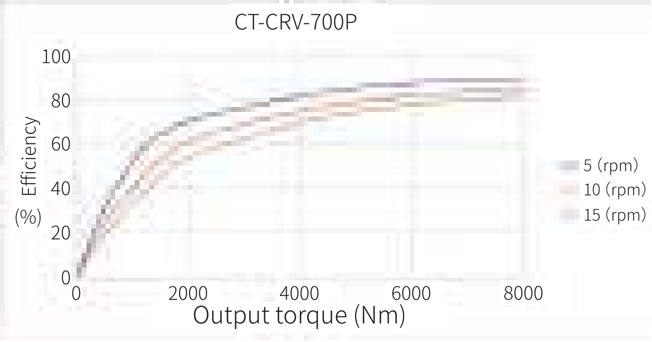




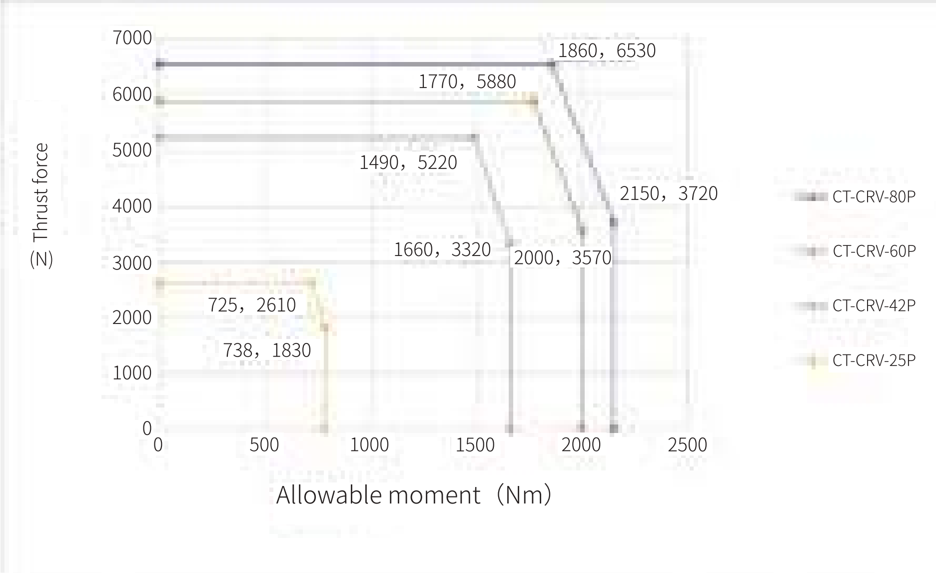

CT-CRV-160P
100
80
60
40
20
0
Efficiency
(%)
0
500
1000
1500
2000
Output torque (Nm)
15 (rpm)
25 (rpm)
35 (rpm)

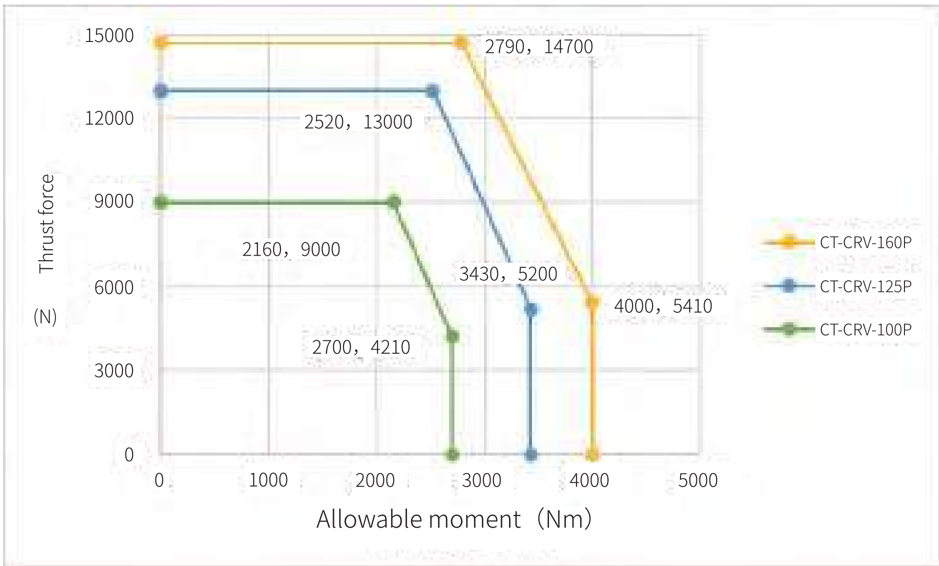

CT-CRV-380P
100
80
60
40
20
0
Efficiency
(%)
0
1000
2000
3000
4000
Output torque (Nm)
5 (rpm)
15 (rpm)
25 (rpm)

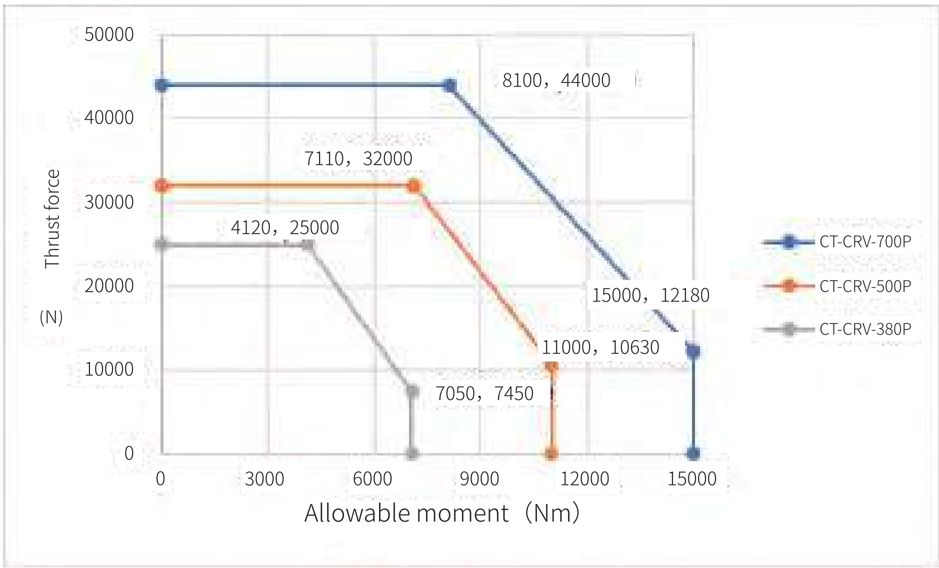

CT-CRV-500P
100
80
60
40
20
0
Efficiency
(%)
0
1500
3000
4500
6000
Output torque (Nm)
5 (rpm)
15 (rpm)
25 (rpm)


CT-CRV-700P
100
80
60
40
20
0
Efficiency
(%)
0
2000
4000
6000
8000
Output torque (Nm)
5 (rpm)
10 (rpm)
15 (rpm)

4. Allowable moment diagram







5.Moment rigidity

When a load occurs to the reducer with an external moment, the output planetary carrier will tilt in proportion to the load moment. The overturning rigidity indicates the rigidity of the main bearing, and it is represented by the load moment value required for tilting the main bearing by 1 arc.min.

$$\theta=\frac{W_1L_1+W_2L_2}{M_1X10^3}$$

θ: Tilt angle of the output planetary carrier (arc.min.)

M_1: Overturning rigidity (Nm/arc.min.)

W_1、W_2: Load (N)

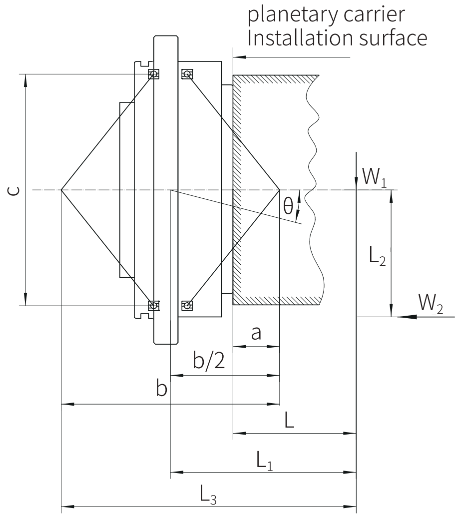
L_1、L_2: Distance to the point of load application (mm)

L_1: $L+\frac{b}{2}-a$

L: Distance from the planetary carrier installation surface to the point of load application (mm)

M: moment

$M=(L+b-a)W_1+L_2\times W_2$



Model	Moment rigidity Nm/arc.min	Size(mm)		
		a	b	c
25P	530	22.1	112.4	91
42P	840	29	131.1	111
60P	1140	35	147.0	130
80P	1190	33.8	151.8	133
100P	1400	38.1	168.2	148

Model	Moment rigidity Nm/arc.min	Size(mm)		
		a	b	c
125P	1600	41.6	173.2	154
160P	2050	35.0	194.0	168
380P	5200	48.7	248.9	210
500P	6850	56.3	271.7	232
700P	9000	66.3	323.5	283

6. Calculation of torsion angle

Calculate the torsion angle when the torque is applied in a single direction, using an example of CT-CRV-160P.

(1) When the load torque is 30 Nm,Torsion angle (ST_1)   When the load torque is less than 3% of the rated torque.

$$ST_1=\frac{30}{48}\times\frac{1(\text{arc.min.})}{2}=0.31\text{arc.min. or less}$$

(2) When the load torque is 1,300 Nm, Torsion angle (ST_2)

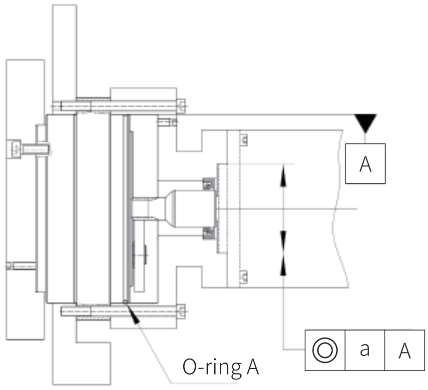
When the load torque is more than 3% of the rated torque or less than the rated torque.

$$ST_2=\frac{1}{2}+\frac{1{,}300-48.0}{490}=3.06\text{arc.min.}$$

Note: The torsion angles that are calculated above are for a single reduction gear.

Model	Torsional rigidity Nm/arc.min	Lost motion		Backlash arc.min.	Model	Torsional rigidity Nm/arc.min	Lost motion		Backlash arc.min.
		Lost motion arc.min.	Measured torque Nm				Lost motion arc.min.	Measured torque Nm	
25P	61		±7.35		125P	334		±36.8	
42P	113		±12.4		160P	490		±48.0	
60P	200	1.0	±18.0	1.0	380P	948	1.0	±112	1.0
80P	212		±23.5		500P	1620		±147	
100P	321		±30.0		700P	2600		±210	

1.Installation precision



Model	Tolerance for concentricity a (mm)	Model	Tolerance for concentricity a (mm)
25P	MAX ϕ0.03	125P	MAX ϕ0.03
42P	MAX ϕ0.03	160P	MAX ϕ0.03
60P	MAX ϕ0.03	380P	MAX ϕ0.05
80P	MAX ϕ0.03	500P	MAX ϕ0.05
100P	MAX ϕ0.03	700P	MAX ϕ0.05

Dimensions of O-ring A

Model	Nominal model	O-ring size	
		Inner diameter	Cross-sectional diameter
25P	S110	ϕ109.5	ϕ2
42P	AS568-159	ϕ126.67	ϕ2.62
60P	AS568-258	ϕ151.99	ϕ3.53
80P	AS568-258	ϕ151.99	ϕ3.53
100P	AS568-166	ϕ171.12	ϕ2.62
125P	AS568-167	ϕ177.47	ϕ2.62
160P	AS568-170	ϕ196.52	ϕ2.62
380P	AS568-272	ϕ240.89	ϕ3.53
500P	AS568-275	ϕ266.29	ϕ3.53
700P	G340	ϕ339.3	ϕ5.7

Dimensions of O-ring B

Model	Nominal model	O-ring size	
		Inner diameter	Cross-sectional diameter
160P	G130	ϕ129.4	ϕ3.1
380P	G145	ϕ144.4	ϕ3.1
500P	G185	ϕ184.3	ϕ5.7
700P	G200	ϕ199.3	ϕ5.7

2.Installation instructions

☆ Be sure to read "CT-CRV-P series Reducer instruction manual" carefully before installing (Each product is shipped with "CT-CRV -P series Reducer instruction manual").

☆ Be sure to apply the specified amount of the specified grease during assembly.

☆ Refer to the O-ring seals shown to make a seal design for the reducer input mounting side.

☆ The output of the reducer should be sealed. If O-ring cannot be used due to the structure, apply the appropriate liquid sealant from the table on the below.

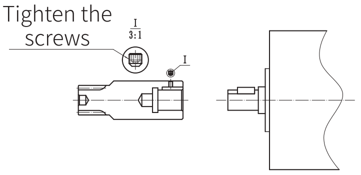
Recommended liquid sealant	
Manufacturer	Characteristics and applications
ThreeBond 1211 (ThreeBond)	Silicone-based, solventless type Semi-dry gasket
HermeSeal SS-60F (Nihon-Hermetics)	Non-solvent elastic sealant Metal contact side seal
Loctite 515 (Henkel)	Anaerobic flange sealant Metal contact side seal

3.Installation of input gear shaft

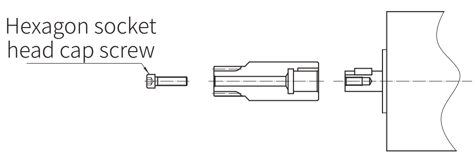
The standard gear shaft is not machined with motor mounting holes, and Chietom can customize the input gear according to customer needs.

The input gear and motor shaft installation of the reducer are mainly in the following ways, customers need to prepare their own detent screws, traction screws, and hexagon socket head cap screw.

Straight shaft

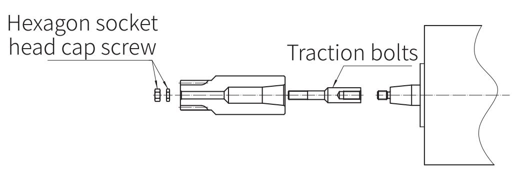


There are no internal threads on the servo motor



There is an internal thread on the servo motor

Tapered shaft



There is an external thread on the servo motor

4. Lubricant

☆ Molywhite Re No,00 grease is recommended as the lubricant for the reducer.
☆ Reducers are not applied with lubricant when shipped. Be sure to design your equipment so that the necessary amount of our authorized lubricant can be applied. (set the pressure below 0.03 MPa.)
☆ The recommended fill size for grease inside the reducer is shown in the table below, where each amount does not include the space on the motor mounting side. Therefore, if there is a blank space, also fill the space. The actual filling amount is 85% of the total volume of the internal capacity of the reduction gear plus the space on the motor mounting side.
☆ The standard grease replacement time is 20,000 hours. However, When the grease is contaminated or used in a harsh environment, the state of the lubricant should be checked in advance and the grease should be replaced as early as necessary.

The recommended fill size for grease inside the CT-CRV-P series reducer

Model	The recommended fill size for grease inside the reducer (Reference)			
	Horizontal shaft installation		Vertical shaft installation	
	cc	g	cc	g
25P	209	188	239	215
42P	313	282	358	322
60P	439	395	503	453
80P	504	454	577	519
100P	673	606	770	693
125P	736	662	843	759
160P	860	774	984	886
380P	1811	1630	2073	1866
500P	2245	2021	2569	2312
700P	3780	3402	4327	3894

Note: Density of lubricant : 0.9 g/cc

5. Bolt tightening torque and allowable transmission torque

When installing the reducer and mounting it to the output shaft, use hexagon socket head cap screws and tighten to the torque, as specified below. The use of the Belleville spring washers are recommended to prevent the bolt from loosening and protect the bolt seat surface from flaws.

Hexagon socket head cap screw nominal size × pitch(mm)	Tightening torque N.m	Tightening force N	Bolt specification
M5×0.8	9.01±0.49	9310	Hexagon socket head cap screw GB/T 70.1-2008 Performance level Grade 12.9 Thread GB/T 197-1981 6g
M6×1.0	15.6±0.78	13180	
M8×1.25	37.2±1.86	23960	
M10×1.5	73.5±3.43	38080	
M12×1.75	128.4±6.37	55100	
M14×2.0	204.8±10.2	75860	
M16×2.0	318.5±15.9	103410	
M18×2.5	441.0±22.1	126720	

Note: The tightening torque values listed are for steel or cast iron material.

Calculation of allowable transmission torque of bolts

$$T_1 = F \times \frac{D_1}{2\times1000} \times \mu \times n_1$$

T_1 : Allowable transmission torque by tightening bolt (Nm)

F : Bolt tightening force (N)

D_1: Bolt mounting P.C.D (mm)

μ : Friction factor, μ=0.15When lubricant remains on the mating face.
μ=0.20When lubricant is removed from the mating face.

n_1 : Number of bolts

1. Troubleshooting checksheet

Check the following items in the case of trouble like abnormal noise, vibration, or malfunctions. When it is not possible to resolve an abnormality even after verifying the corresponding checkpoint, please contact our Customer Support Center.

Troubleshooting Checksheet

When?	Checkpoint	Is it abnormal?
The trouble started immediately after installation of the reducer.	Make sure the equipment section is not interfering with another component.	
	Make sure the required number of bolts are tightened uniformly with the specified tightening torque.	
	Make sure the reducer, motor, or your company's components are not installed at a slant.	
	Make sure the equipment is not under a greater than expected load (torque, moment load, thrust load).	
	Make sure the input gear is appropriately installed on the motor.	
	Make sure there is no damage to the surface of the input gear teeth.	
	Make sure the input gear specifications (precision, number of teeth, module, shift coefficient, dimensions of each part) are correct.	
	Make sure there are no components resonating in unity	
	Make sure the specified amount of Chietom-specified lubricant has been added.	
	Make sure there are no problems with the motor's parameter settings.	
	Make sure the flange and other components are designed and manufactured with the correct tolerances.	
The trouble started during operation	Make sure the equipment has not been in operation longer than the calculated service life.	
	Make sure the surface temperature of the reducer is not higher than normal during operation.	
	Make sure there are no loose or missing bolts.	
	Make sure the equipment's drive section is not interfering with another component.	
	Make sure the operation conditions have not been changed.	
	Make sure the equipment is not under a greater than expected load (torque, moment load, thrust load).	
	Make sure there are no external contaminants in the gear, such as moisture or metal powder.	
	Make sure an oil leak is not causing a drop in the amount of lubricant.	
	Make sure no lubricant other than that specified is being used.	

2. Warranty

☆ In the case where Chietom confirms that a defect of the Product was caused due to Chietom 's design or manufacture within the Warranty Period of the Product, Chietom shall return or replace such defective Product at its cost. The Warranty Period shall be from the delivery of the Product by Chietom to you ("Customer") until the end of one (1) year thereafter.

☆ The warranty obligations for the Product shall be limited to the repair or replacement set forth herein.

☆ Chietom will not be responsible for any performance or safety problems caused by the customer's unauthorized dismantling or reassembling of the reducer.

3. Application worksheet

1. How used

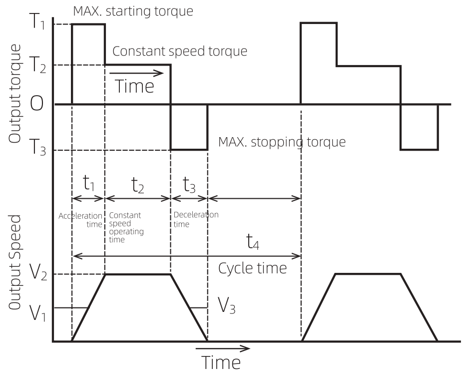
Name of machine: ______

Applied to: ______

2. Model

______

3. Conditions of load



Max starting torque T_1 (Nm): ______

Constant torqueT_2 (Nm): ______

Max stopping torque T_3 (Nm): ______

Average speed for starting V_1(rpm): ______

Constant speed V_2(rpm): ______

Average speed for stopping V_3(rpm): ______

Acceleration time t_1 (s): ______

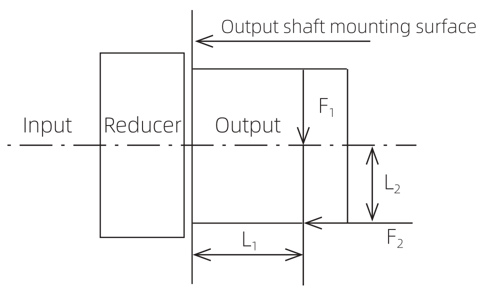
Constant time t_2 (s): ______

Deceleration time t_3(s) ______

Cycle time t_0(s) : ______

Working hours: Cycle/Day: Day/Year: Year ______

4. External load conditions



Radial force F1 (N): ______

Radial moment L1(mm): ______

Axial force F2(N): ______

Axial moment L2(mm): ______

5. Operating environment

Operating environment temperature(°C): ______

______

6. Installation

☐ Horizontal installation

☐ Vertical installation(☐ Upper motor

☐ Lower motor))

Illustration for installation

7. Input gear specification

Reduction speed ratio: i= ______

☐ Standard size

☐ other

Input gear prepared by ☐ User

☐ Chietom

Required dimension of input gear (illustration)

8. Driving portion

☐ servo motor

☐ Other(______)

Capacity:(kW): ______

Rated torque:(Nm): ______

Speed:(rpm): ______

Shape of the shaft:(mm): ______

9. Other

HİD-TEK LTD. ŞTİ.

Üçevler Mah. Ünalp Sok. No: 1/A
Nilüfer / BURSA / TÜRKİYE
Tel: 0.224.443 16 20
Fax : 0.224.443 16 37

İkitelli / İSTANBUL
Tel : 0.212.549 98 36
Fax :0.212 549 98 39

Bornova / İZMİR
Tel : 0.232.433 54 44
Fax :0.232.433 00 31

Plovdiv / BULGARİSTAN
Tel : +359 32 941 963
Fax : +359 32 941 970

www.hid-tek.com.tr | hid-tek@hid-tek.com.tr