ZLYJ Series Single Screw Extruder Dedicated Gearbox

Product Overview

This product is a special gear transmission device designed for plastic and rubber single screw extruder equipment. The gear parts are made of high-strength alloy steel, and the gear is processed by carburizing, quenching and high-precision grinding process. The gear precision is grade 6 (GB10095), and the tooth surface hardness is HRC58-62.

Large size thrust bearing is arranged at the front end of the hollow output shaft to bear the axial thrust generated when the screw is working.

New generation of products using lightweight design, beautiful shape, more efficient.It has the advantages of compact design structure, high carrying capacity, stable transmission and low noise.

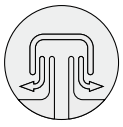
Input mode is more diversified, such as servo direct drive, pulley, coupling connection and so on.

Scope Of Application

- The speed of the reducer input shaft is not higher than 1500 RPM.
- Note: when the reducer input shaft is connected to the prime mover (motor, internal combustion engine) through a belt wheel (gear, sprocket, etc.) for transmission, it will cause changes in the speed and input torque of the reducer input shaft, and generate additional radial load, usually resulting in the selection of the reducer or changes in requirements.
- Working environment temperature:-40°C~50°C.When working at low ambient temperature, preheat the lubricating oil before starting if necessary, or choose low temperature lubricating oil.
- The reducer can be used in both positive and negative directions.
- Note: when the input shaft of the reducer is configured with the lubrication pump at the shaft end for forced lubrication, the default rotation direction is:Rotate clockwise (that is accord with the right screw configuration) in the direction of the output shaft (Thrust pack connection end).If there are different requirements, please state when ordering.

Notes

- All exposed rotating parts of the reducer shall be protected by the user in accordance with the relevant local safety regulations to prevent accidents.
- The operation instruction must be read carefully before the reducer is tested.
- The drawings in the catalogue are only examples and are not binding. The company reserves the right to change.
- The value of the catalogue is an average value and is not binding.
- The amount of lubricating oil injected into the catalogue is only as a reference value, and the actual filling of lubricating oil shall be subject to the oil mark.
- The viscosity of the lubricating oil shall conform to the data shown on the reducer plate.
- The reducer should be installed outdoors to avoid sunlight, and the user should be equipped with appropriate protective devices.
- The corresponding graphic description of the reducer is as follows:



Breather plug

Oil filler

Oil level mark

Oil drain hole

Product Selection

● Confirm nominal ratio i_N:

Example: Reducer input shaft speed n_1=1500rpm Output shaft speed n_2=152rpm

Required ratio: $i_S = \frac{n_1}{n_2} = \frac{1500}{152} = 9.868$ Choose nominal ratio i_N =10

● Choose reducer model specifications

Choose according to input power P(or output torque T),should meet the conditions: $P_1 \geq P$ ($T_2 \geq T$)

Example: Input power P=45kW Query table A-1: Choose ZLYJ200

Rated power P_1 =60kW 60kW≥45kW meet requirement

● Calibrate the thermal power of reducer

Reducer standard configuration,meet conditions: $P \leq P_{G2}$ Query table A-2 45 kW ≤ 81.5 kW

Standard configuration cooling coil, meet operating requirement

● Confirm assembling form of reducer

Confirm assembling form of reducer according to installation requirements

● Calculate axial thrust

$F_a = \pi \times \frac{d_S{}^2 \times P_S}{4 \times 1000}[kN]$ Screw diameter d_S=90mm Screw pressure P_S =26MPa

Axial thrust $F_a = \pi \times \frac{90^2 \times 26}{4 \times 1000} = 165.4[kN]$

● Calculate thrust bearing lifetime

$L_{h10} = \frac{10^6}{60 \times n_2} \times (\frac{C_r}{F_a})^{(\frac{10}{3})}$ [Hour] thrust bearing rated load C_r=923 kN

thrust bearing calculating lifetime $L_{h10} = \frac{10^6}{60 \times 152} \times (\frac{923}{165.4})^{(\frac{10}{3})} = 33798$[Hour]

Note:

The rotation axis transmits power P(kW),torque T(Nm) and rotation speed n(rpm) reduction formula: $T = 9550 \times \frac{P}{n}$

When require higher accuracy of transmission ratio, please check the actual transmission ratio of the reducer

When the input shaft of the reducer has a large additional radial load due to the connection mode and other factors, it is necessary to check the allowable additional radial load F at the extension of the input shaft,check method see page A9 allowable additional radial load.

When the actual speed of the reducer input shaft is lower than 600rpm and forced lubrication is required, the motor driven lubrication pump is recommended

Permissible Axial Thrust Of Reducer

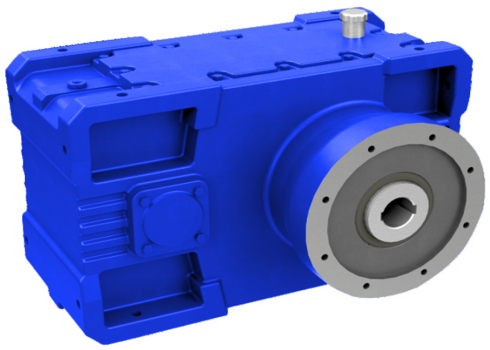
Reducer	ZLYJ112	ZLYJ133	ZLYJ146	ZLYJ173	ZLYJ200	ZLYJ225	ZLYJ250
Thrust KN	41	54	60	153	187	250	268
Reducer	ZLYJ280	ZLYJ315	ZLYJ330	ZLYJ375	ZLYJ420	ZLYJ450	
Thrust KN	356	403	448	495	545	590	

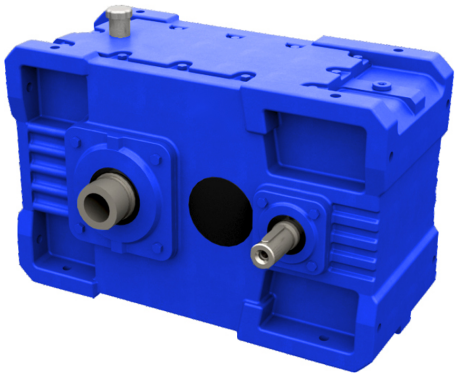
Recommended Configuration

Reducer	112	133	146	173	200	225	250	280	315	330	375	420	450
Ratio	8	8	10	10	12.5	12.5	16	16	16	16	16	16	16
Screw diameter	35	45,50	55	65	75	90	100	105,110	120	130,150	150,160	165	165
Motor power	5.5-4P	7.5-4P	11-4P	18.5-4P	25-4P	45-4P	45-4P	55-6P	75-6P	132-6P	132-6P	160-6P	200-6P
Input speed	800	800	900	900	1000	1000	1120	960	960	960	960	960	960
Output speed	100	100	90	90	80	80	70	60	60	60	60	60	60
Note	Motor and reducer are driven by pulley							Motor connected with reducer by coupling					

Product series

ZLYJ series





Type Designations:

In the model, it include series code,specification no.,nominal ratio,mounting position.

ZLYJ 225 - 12.5 - I(II、III、IV、V、VI、VII、VIII)

- mounting position.
- nominal ratio
- specification no.
- include series code

ZLYJ series rated power and output torque

Rated Power P1 (kW) and Rated output torque T2(kNm) — Table A-1

Nominal Ratio	Nominal Speed(rpm)		Model													
			112		133		146		173		200		225		250	
i_N	Input n_1	Output n_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2
8	1500	188	12.8	0.65	20.8	1.06	28.3	1.44	46.9	2.39	73	3.7	100	5.09	139	7.07
	1000	125	8.6	0.66	14.4	1.1	19.4	1.48	32.7	2.5	50	3.85	69	5.29	96	7.37
	750	94	6.8	0.69	11.2	1.14	14.9	1.52	24.6	2.51	39	3.95	53	5.42	74	7.58
10	1500	150	10.4	0.66	17.0	1.08	22.5	1.43	37.9	2.41	60	3.8	82	5.2	114	7.23
	1000	100	7.2	0.69	11.7	1.12	15.5	1.48	26.0	2.48	41	3.94	57	5.42	79	7.53
	750	75	5.6	0.71	9.0	1.15	11.8	1.5	19.9	2.54	32	4.08	44	5.55	61	7.74
12.5	1500	120	8.4	0.67	13.6	1.08	18.1	1.44	29.7	2.36	47	3.71	66	5.25	92	7.29
	1000	80	5.6	0.67	9.5	1.13	12.4	1.48	20.3	2.42	32	3.87	46	5.44	64	7.59
	750	60	4.4	0.7	7.2	1.15	9.5	1.51	15.6	2.49	25	4.01	35	5.6	49	7.77
14	1500	107	-	-	12.2	1.09	16.2	1.44	26.4	2.35	42	3.74	59	5.28	82	7.35
	1000	71	-	-	8.5	1.14	11.1	1.49	18.2	2.43	29	3.9	41	5.46	57	7.59
	750	54	-	-	6.4	1.14	8.5	1.52	13.9	2.48	22	3.99	32	5.63	44	7.84
16	1500	94	-	-	10.6	1.08	14.2	1.45	24.5	2.5	39	3.99	53	5.42	74	7.54
	1000	63	-	-	7.3	1.11	9.8	1.49	16.8	2.57	27	4.16	37	5.62	51	7.82
	750	47	-	-	5.7	1.16	7.7	1.56	13.1	2.66	21	4.32	28	5.79	40	8.07
18	1500	83	-	-	9.5	1.09	12.8	1.47	21.5	2.46	34	3.94	46	5.27	64	7.38
	1000	56	-	-	6.6	1.14	8.8	1.52	14.8	2.54	24	4.09	32	5.5	44	7.63
	750	42	-	-	5.1	1.17	6.8	1.55	11.3	2.58	18	4.22	24	5.59	34	7.88
20	1500	75	-	-	8.7	1.11	11.5	1.47	20.1	2.56	31	3.92	41	5.25	57	7.23
	1000	50	-	-	6.0	1.14	8.1	1.55	14.0	2.67	21	4.09	29	5.5	38	7.26
	750	38	-	-	4.7	1.2	6.2	1.58	10.8	2.74	16	4.18	22	5.6	30	7.74

Nominal Ratio	Nominal Speed(rpm)		Model													
			280		315		330		375							
i_N	Input n_1	Output n_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2						
8	1500	188	188	9.56	271	13.8	340	17.3	436	22.2	-	-	-	-	-	-
	1000	125	130	9.93	188	14.4	236	18	302	23.1	-	-	-	-	-	-
	750	94	100	10.2	145	14.8	182	18.5	233	23.7	-	-	-	-	-	-
10	1500	150	153	9.75	221	14.1	278	17.7	357	22.7	-	-	-	-	-	-
	1000	100	107	10.2	154	14.7	193	18.4	247	23.6	-	-	-	-	-	-
	750	75	82	10.4	119	15.1	148	18.9	190	24.2	-	-	-	-	-	-
12.5	1500	120	124	9.9	180	14.3	225	17.9	289	23	-	-	-	-	-	-
	1000	80	86	10.3	125	14.9	156	18.6	200	23.9	-	-	-	-	-	-
	750	60	67	10.6	96	15.3	120	19.1	154	24.5	-	-	-	-	-	-
14	1500	107	112	9.95	162	14.4	202	18	259	23.1	-	-	-	-	-	-
	1000	71	77	10.3	112	15	140	18.7	180	24	-	-	-	-	-	-
	750	54	59	10.6	86	15.4	108	19.3	139	24.7	-	-	-	-	-	-
16	1500	94	100	10.2	145	14.8	182	18.5	233	23.7	-	-	-	-	-	-
	1000	63	69	10.6	100	15.3	126	19.2	161	24.6	-	-	-	-	-	-
	750	47	54	10.9	77	15.7	97	19.7	124	25.3	-	-	-	-	-	-
18	1500	83	90	10.3	130	14.9	163	18.7	209	24	-	-	-	-	-	-
	1000	56	62	10.7	90	15.5	113	19.4	145	24.9	-	-	-	-	-	-
	750	42	48	11	70	16	87	20	112	25.6	-	-	-	-	-	-
20	1500	75	82	10.4	119	15.1	150	19.1	196	24.9	-	-	-	-	-	-
	1000	50	57	10.8	82	15.7	102	19.5	130	24.9	-	-	-	-	-	-
	750	38	44	11.1	63	16.1	78	19.8	98	25	-	-	-	-	-	-

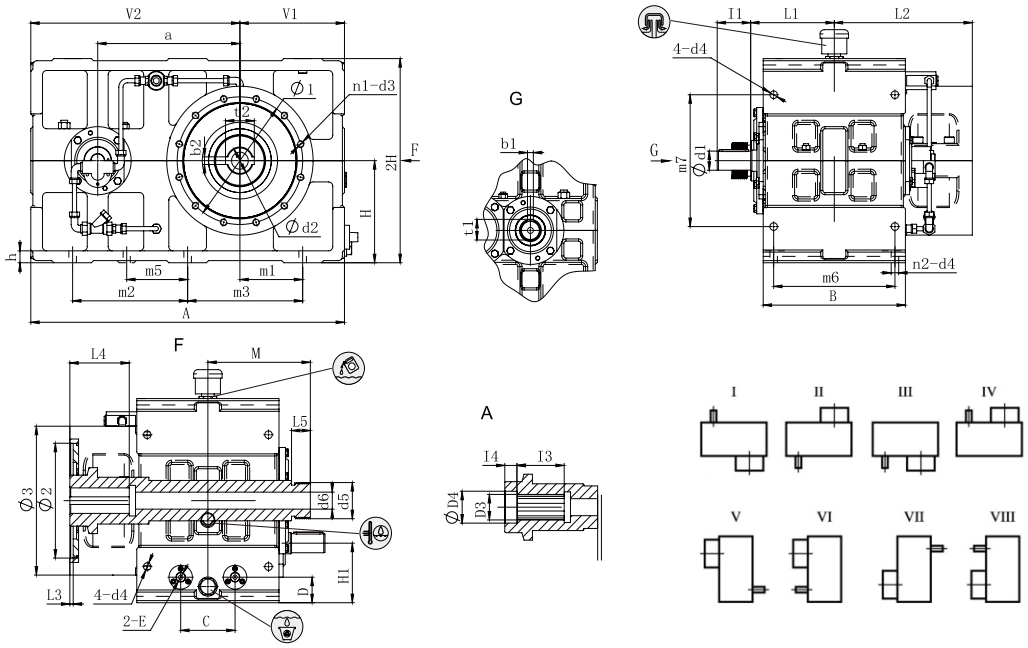
Noted:
The data in the above table is the data of the ordinary type reducer. The enhanced type reducer can be multiplied by the corresponding normal type data by a factor of 1.12
The power and torque in the table have taken into account the working condition factor and safety factor, which can be directly referenced when gearbox running in plastic extruders. For rubber extruders, the data must be multiplied by a factor of 0.9
When the error between the input speed or output speed and the nominal speed in the table is more than 4%, the power shall be converted according to the principle of equal torque according to the latest speed.

ZLYJ Series Reducer Thermal Capacities

Reducer Thermal Capacities(kW)													
Model	112	133	146	173	200	225	250	280	315	330	375	-	-
Thermal Capacities P_{G1}	13.4	17.4	23.4	25.3	45.9	51.1	64.1	72.3	97.5	100.9	118.4		
Thermal Capacities P_{G2}	-	-	-	52.6	81.5	89.1	108.2	118.3	-	-	-	-	-
Thermal Capacities P_{G3}	-	-	-	-	110.6	115.8	128.9	184.5	209.7	230.4	277.4	-	-

Noted: P(G1) is the thermal capacities of reducer without auxiliary cooling measures.
P(G2) is the thermal capacities of reducer with cooling coil.
P(G3) is the thermal capacities of reducer with forced circulation and cooler.
It is marked as the speed reducer standard configuration.

ZLYJ series outline and mounting dimensions



Model	Overall dimensions															Input shaft					Output shaft		Table A-3 Flat key	
	a	A	B	H^{0}_{-1}	$H1^{0}_{-1}$	$V1^{0}_{-1}$	$V2^{0}_{-1}$	h	n2	d4	m1	m2	m3	m5	m6	m7	L1	I1	d1 (m6)	t1	b1	d2 (H8) (GB/T 1095)	t2	b2 (F9)	L4
ZLYJ112	184	426	170	130	-	146	280	18	4	Φ14	96	-	326	-	136	170	106	60	28	31	8	35	38.3	10	52
ZLYJ133	218	478	215	140	-	165	313	20	6	Φ16	104	-	370	-	180	184	125	60	28	31	8	38	41.3	10	80
ZLYJ146	256	560	250	160	-	190	370	22	6	Φ16	118	-	425	-	210	210	148	70	32	35	10	45	48.8	14	120
ZLYJ173	285	576	256	170	-	181.5	394.5	22	6	Φ18	113.5	-	440	-	225	214	148	80	38	41	10	50	57.6	14×2	140
ZLYJ200	340	750	340	240	-	250	500	36	6	Φ18	150	-	550	-	290	310	200	80	45	48.5	14	60	68.8	18×2	170
ZLYJ225	385	800	360	250	-	255	545	36	6	Φ26	165	-	620	-	315	330	205	110	55	59	16	70	78.8	18×2	170
ZLYJ250	430	930	380	280	-	310	620	45	6	Φ26	205	360	360	-	330	340	220	110	60	64	18	80	90.8	22×2	180
ZLYJ280	480	970	410	300	-	300	670	50	6	Φ30	200	385	385	-	355	380	240	125	65	69	18	90	100.8	25×2	180
ZLYJ315	539	1160	450	350	-	390	770	55	6	Φ30	260	450	450	-	390	460	250	140	75	79.5	20	100	112.8	28×2	200
ZLYJ330	575	1160	450	350	-	355	805	60	6	Φ30	225	450	450	-	390	425	260	170	85	90	22	110	122.8	28×2	220
ZLYJ375	625	1280	466	400	-	415	865	60	8	Φ32	250	475	500	265	400	500	265	170	85	90	22	110	122.8	28×2	255

Model	Output shaft												Thrust structure							Thrust bearings and screw(reference)			Cooling joint			Weight	Oil qty
	Rectangular spline R				Involute spline K				d5	d6	L5	M	L2	Φ1	Φ2 (H7)	L3	Φ3	n1	d3	Model	Rated load Cr (kN)	Max. screw diameter (mm)	C	D	E	(kg)	(L)
	D3 (GB/T 1144-2001)	I3	D4 (H8)	I4	D3 (GB/T 3478.1-2008)	I3	D4 (H8)	I4																			
ZLYJ112	8×32×38×6	30	40	10	INT 22z×1.5m×30P×7H	28	40	15	Internal thread M24	22	30	125	203	185	160	8	210	6	M10	51413	215	45	-	-	-	90	4
ZLYJ133	8×36×42×7	45	45	10	INT 24z×1.5m×30P×7H	35	45	15				137	205	205	180	8	230	8	M12	29415E	468	55	-	-	-	135	7
ZLYJ146	8×42×48×8	55	50	15	INT 28z×1.5m×30P×7H	35	50	20				167	245	230	200	8	260	8	M12	29417E	582	65	-	-	-	195	10
ZLYJ173	8×46×54×9	65	60	15	INT 23z×2m×30P×7H	55	55	20				167	250	260	230	8	300	8	M16	29420E	778	75	95	45	$ZG\frac{1}{2}"$	240	12
ZLYJ200	8×52×60×10	80	65	15	INT 28z×2m×30P×7H	55	65	20	M85×4	55	50	250	330	300	270	8	350	12	M16	29422E	923	90	120	55		475	28
ZLYJ225	8×62×72×12	90	75	15	INT 33z×2m×30P×7H	60	75	20				265	355	370	330	8	420	12	M20	29426E	1249	105	140	55		620	33
ZLYJ250	10×72×82×12	80	85	20	INT 24z×3m×30P×7H	65	85	25				285	380	370	330	8	420	12	M20	29428E	1288	110	160	55		775	46
ZLYJ280	10×82×92×12	100	95	20	INT 28z×3m×30P×7H	70	95	25				300	405	400	360	8	450	12	M24	29432E	1589	120	160	55		970	55
ZLYJ315	10×82×92×12	130	95	20	INT 31z×3m×30P×7H	70	105	25	M90×4			335	440	405	365	8	450	12	M24	29434E	1878	130	160	55	$ZG\frac{3}{4}"$	1340	84
ZLYJ330	10×92×102×14	150	105	20	INT 34z×3m×30P×7H	75	115	25	M85×4			350	445	450	400	10	500	12	M24	29436E	2056	130	160	55		1445	87
ZLYJ375	10×92×102×14	180	105	20	INT 34z×3m×30P×7H	90	115	25				345	445	450	400	10	500	12	M24	29438E	2297	150	160	55		1710	110

Note: *2 in b2 means symmetric double flat key.

Reducer General Technical Specification

Safety instructions

Only professionals with corresponding operating qualifications are allowed to carry out operations related to transportation, warehousing, installation, assembly, connection, operation, maintenance and inspection and must comply with the following requirements as below.

-Read the product manual and circuit diagram carefully and keep it properly

-Pay attention to the warning and safety signs of the reducer

-Comply with specific regulations and requirements related to equipment

-Follow national/local government/industry-specific safety and accident prevention regulations

Service conditions

Reducer products usually meet the following conditions of use:

-Temperature of working atmosphere:-40℃~50℃, when the ambient temperature are below 0℃, the lubrication oil should be heated up to above 0℃ or Select low temperature lubricating oil. Temperature rise of reducer ≤70℃, Working oil temperature ≤90℃.

-Environment humidity:≤85%

-No corrosive, explosive gas or steam, well ventilated place

Transport storage

The reducer should be reliably fixed during transportation and necessary protective measures should be taken. Reducer lubricating oil should be drained clean.

-If the reducer is not used for a long time, it must be operated once every 2-3 weeks

-If the reducer is out of service for more than 6 months, it is necessary to take additional anti-rust measures for the reducer: the interior is filled with lubricating oil, and the exterior is treated with a wax anti-rust coating to protect the shaft ends and unpainted surfaces from Apply grease to the sealing lip of the oil seal to prevent the penetration of anti-rust agent.

-After the reducer has been out of use for a long time, it must be checked whether the oil seal is aging and failed and maintained and replaced before starting operation again.

Installation and conduction

-The reducer must be installed on a smooth, reliable and stable foundation without vibration.

-The connection between the reducer and the input prime mover should give priority to the elastic connection for error compensation.

-When the reducer is connected with the input prime mover by pulley, gear and sprocket, the attached radial load must be checked.

-No hammering is allowed at the shaft end of the reducer.

-The exposed rotating part of the reducer (coupling, pulley) should be protected.

-During the installation and connection operation, the power should be cut off and measures should be taken to prevent the power from being accidentally connected.

-After installation, should add lubricating oil to the reducer.

Start running

-Checking the oil level if it's in line with the require before the machine running. Check whether the lubricating oil pour point meets the starting requirements when the environment temperature is below 0 .

-Check whether the connection parts are loose before starting, and whether the safety protection devices are complete.

-When the reducer is equipped with a motor-driven lubrication pump, the lubrication pump should be turned on before the reducer starts.

-The reducer should run without load for 5-10 minutes, so that the internal bearing and gear of the reducer can be fully lubricated before loading and using.If the reducer is used for the first time, it shall be loaded step by step after no-load operation, and run for 1-2 hours with 20% rated load added to each stage until it is in normal operation without any abnormal phenomenon

Inspection and maintenance

-The inspection and maintenance of the reducer should be carried out in the state of shutdown. The shutdown is usually carried out according to the following steps

-Workload offload-The main motor shuts down-Lubricating device shuts down-Cooling device shuts down

-The reducer works normally and should be checked daily

-According to the time limit and inspection situation, the reducer should be maintained according to the requirements of the instruction manual

Lubrication cooling

-The lubricating oil of the reducer is CKD220 or CKD320 heavy duty industrial closed gear oil

-When the reducer is equipped with a forced lubrication device, the oil supply pressure of the lubrication pipeline is generally 0.1Mpa-0.4Mpa

-When the reducer is equipped with water cooling device, the supply pressure of cooling water is generally 0.2mpa-0.3mpa, and the temperature of the cooling water inlet should not exceed 30 .When the reducer is equipped with a forced lubrication cooling system, the ratio of cooling water flow to lubricating oil flow is 1.5: 1.

Malfunction and measure

It must be stopped immediately for check more once if you find any problem during running the gear units.

Malfunction	Causes	Measures
Abnormal, uniform operating noise or vibration	Rolling/rolling noise:damaged gears/bearings	Check gears/ bearings
	Knock noise: uneven meshing of gears	consult us freely
	Incorrect coupling installation	Check couplings
Abnormal, uneven operating noise or vibration	Lubricant impurities/deterioration	Check lubricating oil
	Reducer installation foundation	consult us freely
Abnormal noise in the fixed area of the reducer	Loose of tightening parts	Check fastener
Oil leakage at shaft sealing (oil sealing)	Seals are severely worn/aged	Replace the seal
	Wrong seal installing	Reinstall
	Lubricant impurities/Excessive amount of lubricating oil	Check Lubricant/oil scavenge
	High pressure at the seal/poor oil return	Improve ventilation
Oil leakage at binding face of parts	Joint fastener of parts loose	Check fasteners
	Parts are not connected tightly	Check binding face
Running temperature of reducer is high	Overmuch lubricating oil	Check lubricating oil level
	Oil impurity/metamorphic	Change lubricating oil
	Poor lubrication/Lubrication pump damaged	Check/change lubrication components
	Cooling system failure	Check cooling device
	Poor ventilation around reducer	Keep ventilation,no not pile up sundry
High temperature of bearing position	Poor oil supply	Check lubricating oil qty
	Oil impurity/metamorphic	Change lubricating oil
	Bearing damage/impurity	Check/change bearing
	Bearing bears extra load	Check load/consult us freely
	Bearing play	Check/adjust play
Oil pressure of forced lubrication too low	Pipeline leak	Check/tighten the pipeline
	Low backpressure of oil injection	Adjust injection components
	Filter clogging	Clean/change filter element
	Oil pump damage/low oil pump flow	Change oil pump

Note:
If the reducer breaks down during the warranty period, it shall be repaired by the after-sales service personnel of the company.
If the fault is still unresolved after maintenance/replacement of spare parts, please consult us freely.