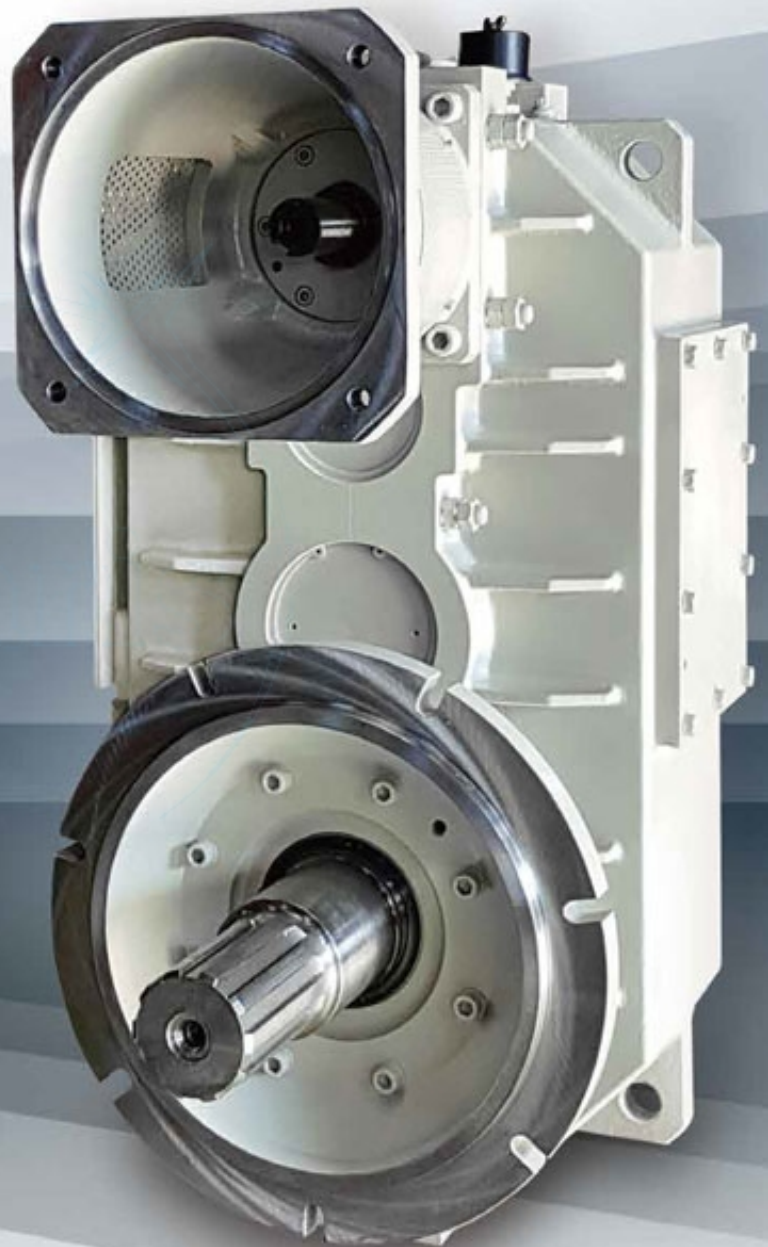




INNOVATION / TECHNOLOGY / QUALITY / SERVICE

GEAR REDUCER for Electric Injection Molding Machine

TGSM



Certificate No. 78Q10407

TIEN YI GEAR WORKS CO., LTD.

TY-TGSM(1)-16

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Design & Technician Features:

- TGSM gear reducer adopted particular design and manufactured method what is suitable for high torque, high rotation speed operation environment. In favor of less abrasion & low noise to enhance high transmission efficiency.
- TGSM takes three steps reductions in between INPUT SHAFT(electrical motor side) and OUTPUT SHAFT(drive screw and tube connected side). It is just embedded the space properly where covered motor, gear reducer and screw connected with tube between the distance of input shaft and output shaft. This U type design occupied the less space but optimized space usage efficiency.
- The design of all gear elements followed AGMA criterion (DIN & JIS standard fabrication are also available), gear elements made by the material of low-carbon alloy steel bar(named SCM420 in general). After carburization heat treatment then transferring into gear grinding fabrication to reach the standard of AGMA level 10 & up to make sure the characteristic of low noise, less abrasion and high efficiency.
- You can either choose the models of motor flange and driving shaft type listed on page 3 or custom design to have wide range application.

How to choose model

Example:

Datum required below

Input Speed(n1)=1800RPM, Output Speed(n2)=82rpm

Power to be transmitted (P)=165KW, SF>1.6

Steps to choose suitable model:

1. Reduction Ratio(i)

$$i = n1/n2 = \frac{1800}{82} = 21.95 \approx 22.$$

2. Torque of output (M)

$$M = P \times 9550 \times SF / n2 = 165 \times 9550 \times 1.6 / 82 = 30746 \text{ Nm}$$

from datum above, check Table of Horse Power & Rated Torque(P.4-P5)

i=22(choose nominal i=22.5), Input Speed(n1)=1800, and Torque in output shaft side(Mn) > Torque of output (M)
TGSM280 (Mn)=36800Nm > (M)=30746Nm meets demand and is the suitable model from Table(P. 4-5)

3. Check TGSM280 rated power whether qualifying SF

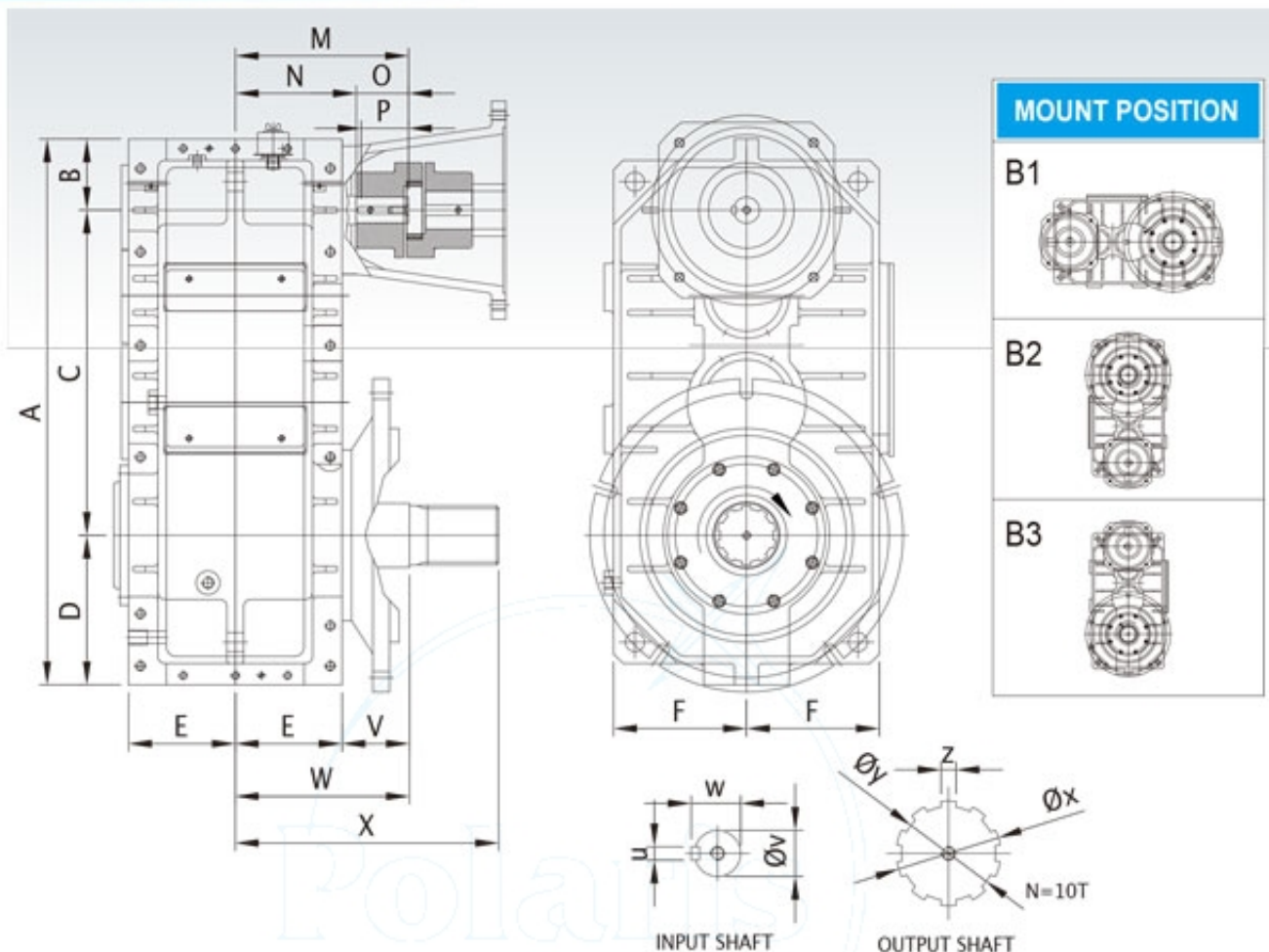
required From Table, i=22.5 n1=1800RPM, its rated power(Pn)=311KW,
SF=Pn/P=311/165=1.885>1.6 It is qualified

4. Determination whether Cooling system required or not

If (P) < power of heat efficiency(Pt), it is not required, on the contrary it is required

*Pt datum listed on Table of Horse Power & Rated Torque(P.4-5)
TGSM280 type i=22.5 n1=1800 RPM, (P)=165KW (Pt)=108KW,
(P) > (Pt) Cooling system is required

Outline Dimension

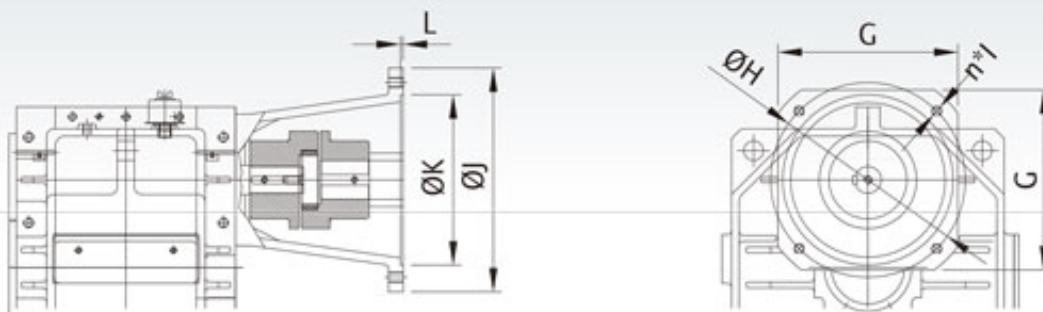


MODEL	A	B	C	D	E	F	M	N	O	P	V
TGSM-3P180	737	105	432	200	145	185	255	175	80	70	50
TGSM-3P200	815	105	485	225	157.5	205	267.5	187.5	80	70	50
TGSM-3P225	910	115	545	250	180	225	290	210	80	70	190
TGSM-3P250	1020	130	610	280	200	250	330	230	100	90	139
TGSM-3P280	1150	150	685	315	225	280	365	255	110	100	142
TGSM-3P320	1290	165	770	355	250	315	415	290	125	110	103
TGSM-3P360	1465	190	865	410	280	355	445	320	125	110	103
TGSM-3P400	1640	210	970	460	315	400	505	365	140	125	113

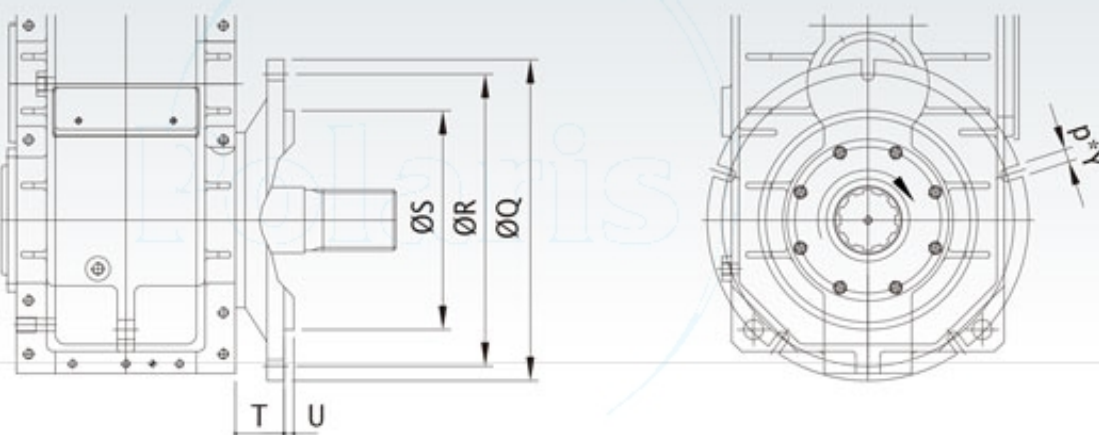
MODEL	W	X	u	v	w	x	y	z	WEIGHT Kg	OIL L
TGSM-3P180	195	315	10	38	41	72	62	10	400	19
TGSM-3P200	207.5	347.5	12	40	43	92	82	12	500	27
TGSM-3P225	370	510	14	45	48.5	92	82	12	700	39
TGSM-3P250	339	479	14	50	53.5	92	82	12	800	50
TGSM-3P280	367	555	16	55	59	125	112	18	1150	84
TGSM-3P320	353	526	18	65	69	125	112	18	1600	107
TGSM-3P360	383	583	20	75	79.5	125	112	18	2200	147
TGSM-3P400	428	628	20	75	79.5	165	152	20	2900	206

Input / Output Shafts Flange Profile

INPUT SHAFT SIDE: FLANGE OUTLINE
(REFERENCE ONLY, CUSTOMIZED DESIGN AS PER REQUEST)



OUTPUT SHAFT SIDE: FLANGE OUTLINE
(REFERENCE ONLY, CUSTOMIZED DESIGN AS PER REQUEST)



MODEL	G	H	n	I	J	K	L	Q	R	S	T	U	p	Y
TGSM-3P180	270	300	4	M16	350	250	5	470	419.1	380.87	125	24	5	20
TGSM-3P200	270	300	4	M16	350	250	5	470	419.1	380.87	125	24	5	20
TGSM-3P225	270	300	4	M16	350	250	5	470	419.1	380.87	125	24	5	20
TGSM-3P250	270	300	4	M16	350	250	5	470	419.1	380.87	125	24	5	20
TGSM-3P280	370	400	4	M20	450	350	6	660	600	450	100	20	5	26
TGSM-3P320	370	400	4	M20	450	350	6	660	600	450	100	20	5	26
TGSM-3P360	370	400	4	M20	450	350	6	660	600	450	100	20	5	26
TGSM-3P400	470	500	8	M16	550	450	8	750	650	450	100	20	5	26

Table of Horse Power & Rated Torque

Gr./Size			180			200			225			250		
i	n ₁	n ₂	MN	PN	Pt	MN	PN	Pt	MN	PN	Pt	MN	PN	Pt
	rpm	rpm	Nm	kW	kW	Nm	kW	kW	Nm	kW	kW	Nm	kW	kW
12.5	2200	176	9550	180	40	13240	236	51	18210	332	67	25140	473	85
	1800	144	9600	148	40	13310	194	51	18300	273	67	25260	389	85
	1500	120	9650	124	40	13370	162	51	18390	229	67	25390	326	85
14	2200	157	9590	163	40	13030	215	51	17850	302	67	25400	427	85
	1800	129	9640	134	40	13090	177	51	17940	248	67	25530	351	85
	1500	107	9690	112	40	13160	148	51	18030	208	67	25660	294	85
16	2200	138	9830	137	40	13300	194	51	18350	258	67	25450	370	85
	1800	113	9880	113	40	13370	159	51	18440	212	67	25570	304	85
	1500	94	9930	95	40	13430	133	51	18530	178	67	25700	255	85
18	2200	122	9680	125	40	13360	175	51	18070	225	67	25690	323	85
	1800	100	9730	103	40	13420	144	51	18160	185	67	25820	266	85
	1500	83	9780	86	40	13490	121	51	18250	155	67	25950	222	85
20	2200	110	9500	114	40	13490	156	51	18280	204	67	25930	303	85
	1800	90	9550	94	40	13560	129	51	18370	167	67	26060	250	85
	1500	75	9600	78	40	13630	108	51	18460	140	67	26190	209	85
22.5	2200	98	9760	95	40	13250	132	51	18520	192	67	25250	251	85
	1800	80	9810	78	40	13320	109	51	18610	158	67	25380	206	85
	1500	67	9860	65	40	13390	91	51	18710	132	67	25510	173	85
25	2200	88	9580	86	40	12990	120	51	18280	164	67	24890	228	85
	1800	72	9630	71	40	13050	98	51	18370	135	67	25020	188	85
	1500	60	9680	59	40	13120	82	51	18460	113	67	25140	157	85
28	2200	79	9360	77	40	13570	109	51	18610	155	67	25920	208	85
	1800	64	9400	64	40	13640	90	51	18700	127	67	26050	171	85
	1500	54	9450	53	40	13700	75	51	18790	107	67	26180	143	85
31.5	2200	70	9850	71	40	13360	99	51	18400	132	67	25540	190	85
	1800	57	9900	58	40	13430	82	51	18500	109	67	25670	156	85
	1500	48	9950	49	40	13500	68	51	18590	91	67	25800	131	85
35.5	2200	62	9640	64	40	13750	92	51	18770	122	67	26100	163	85
	1800	51	9690	53	40	13820	76	51	18860	100	67	26230	134	85
	1500	42	9740	44	40	13890	64	51	18960	84	67	26370	112	85
40	2200	55	9880	54	40	13420	78	51	18500	103	67	25720	149	85
	1800	45	9930	45	40	13490	64	51	18590	85	67	25850	123	85
	1500	37.5	9980	37	40	13550	53	51	18690	71	67	25980	103	85
45	2200	49	9700	49	40	13170	70	51	18120	94	67	25270	135	85
	1800	40	9750	41	40	13230	58	51	18210	77	67	25390	111	85
	1500	33	9800	34	40	13300	49	51	18300	64	67	25520	93	85

i : Reduction Ratio

 n₁ : Input Rotation Speed

 n₂ : Output Rotation Speed

MN : Torque of Output Shaft

PN : Rated Power

Pt : Power of heat efficiency

Table of Horse Power & Rated Torque

Gr./Size			280			320			360			400		
i	n ₁	n ₂	MN	PN	Pt	MN	PN	Pt	MN	PN	Pt	MN	PN	Pt
	rpm	rpm	Nm	kW	kW	Nm	kW	kW	Nm	kW	kW	Nm	kW	kW
12.5	2200	176	35740	683	108	53260	1012	139	74120	1398	170	105690	1924	211
	1800	144	35920	562	108	53530	833	139	74490	1150	170	106220	1582	211
	1500	120	36100	471	108	53800	697	139	74870	963	170	106760	1325	211
14	2200	157	36620	611	108	54210	909	139	74470	1265	170	105800	1738	211
	1800	129	36800	503	108	54480	747	139	74850	1040	170	106340	1429	211
	1500	107	36990	421	108	54760	626	139	75220	871	170	106870	1197	211
16	2200	138	36210	520	108	53010	765	139	76430	1068	170	105320	1475	211
	1800	113	36390	427	108	53280	629	139	76820	878	170	105860	1213	211
	1500	94	36580	358	108	53550	527	139	77200	736	170	106390	1016	211
18	2200	122	36220	484	108	54770	685	139	75290	975	170	103550	1332	211
	1800	100	36400	398	108	55040	563	139	75670	802	170	104070	1096	211
	1500	83	36580	333	108	55320	472	139	76050	671	170	104590	918	211
20	2200	110	37130	415	108	54310	631	139	73970	885	170	108060	1212	211
	1800	90	37320	348	108	54580	519	139	74340	728	170	108610	997	211
	1500	75	37510	286	108	54860	435	139	74720	609	170	109160	835	211
22.5	2200	98	36610	379	108	52610	523	139	76190	741	170	106610	1103	211
	1800	80	36800	311	108	52880	430	139	76580	609	170	107150	907	211
	1500	67	36980	261	108	53140	360	139	76960	510	170	107680	759	211
25	2200	88	36040	344	108	54030	488	139	74780	671	170	104650	994	211
	1800	72	36230	283	108	54310	401	139	75160	552	170	105180	818	211
	1500	60	36410	237	108	54580	336	139	75540	462	170	105710	685	211
28	2200	79	37460	314	108	54090	436	139	73250	605	170	109310	915	211
	1800	64	37650	258	108	54370	358	139	73620	498	170	109860	752	211
	1500	54	37840	216	108	54640	300	139	73990	417	170	110420	630	211
31.5	2200	70	36360	261	108	53120	395	139	76930	551	170	105950	751	211
	1800	57	36540	214	108	53390	325	139	77320	453	170	106490	618	211
	1500	48	36730	179	108	53660	272	139	77710	380	170	107020	517	211
35.5	2200	62	37730	247	108	54440	341	139	75570	500	170	110080	717	211
	1800	51	37920	203	108	54710	280	139	75950	411	170	110640	589	211
	1500	42	38110	170	108	54990	235	139	76330	345	170	111190	493	211
40	2200	55	36600	205	108	53500	309	139	77580	427	170	108630	652	211
	1800	45	36780	168	108	53770	254	139	77970	351	170	109180	536	211
	1500	37.5	36970	141	108	54040	213	139	78360	294	170	109730	449	211
45	2200	49	37390	188	108	54840	284	139	76210	387	170	104210	526	211
	1800	40	37580	154	108	55120	233	139	76590	318	170	104740	432	211
	1500	33	37770	129	108	55390	196	139	76980	267	170	105260	362	211

i : Reduction Ratio

n₁ : Input Rotation Speed

n₂ : Output Rotation Speed

MN : Torque of Output Shaft

PN : Rated Power

Pt : Power of heat efficiency

Information of Lubrication, Cooling Method

Shaft installed type B3(Vertical type, input shaft on the top) is the most popular way for TGSM gear reducer(please reference P.2 outline dimension), oil bath splash used generally. In further considering its operation factors(high torque, high rotation speed) when oil temperature is higher than standard gear reducer it will cause bearings less lubrication and raise its abrasion caused it's abnormal running . Generally we suggest to use forced lubrication device(see below drawing) to reduce oil temperature and lubricate efficiently in bearings and gear elements in further raising up life cycle. Please reference below viscosity table of lubrication.

Viscosity Table of Lubrication

RPM of Low Speed Shaft		Range of Temperature		
		-10°C~+15°C	0°C~+30°C	10°C~+50°C
100RPM以上	ISO AGMA	VG68 2EP	VG150 4EP	VG220 5EP
100RPM以下	ISO AGMA	VG100 3EP	VG220 5EP	VG320 6EP

Note: ISO standard on viscosity at 40°C (mm²/s)

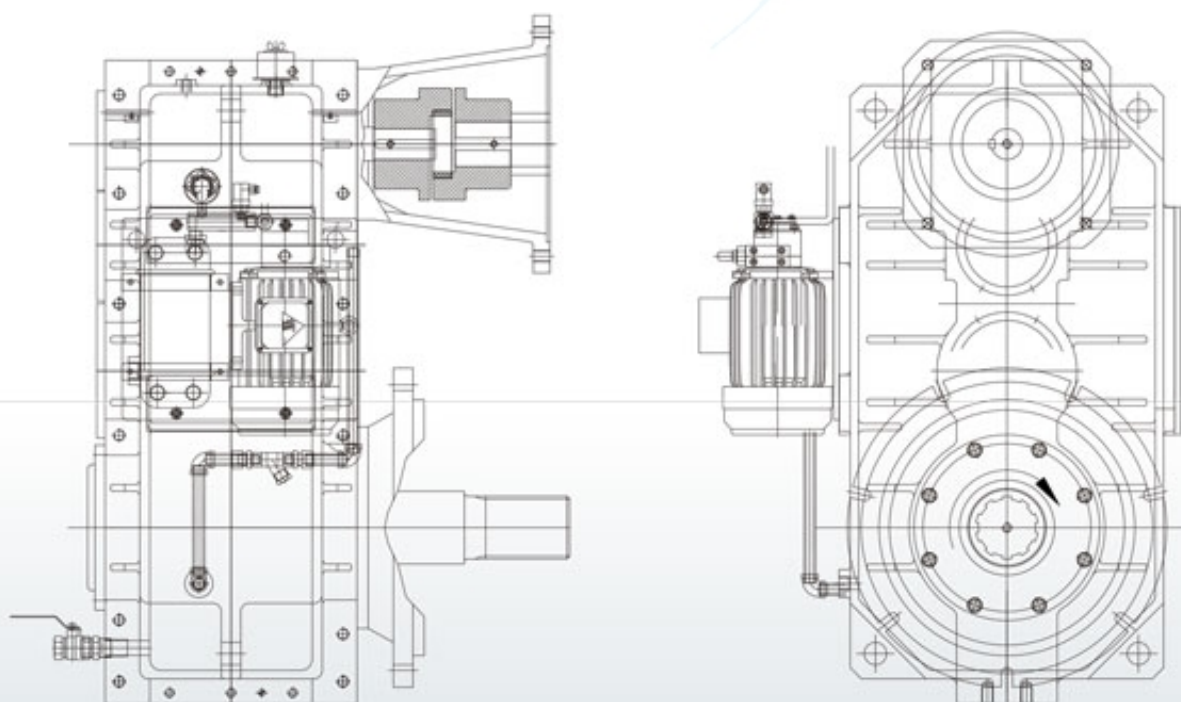


Table 1(Drawing of Forced Lubrication System)



TIEN YI GEAR WORKS CO., LTD.

No. 57, Kwang Fu Rd., Hsin-Chu Industrial Park, 30351 Taiwan

TEL:+886-3-5970-206 FAX:+886-3-5970-210

E-mail:sales122@tienyigear.com.tw

<http://www.tienyigear.com.tw>

