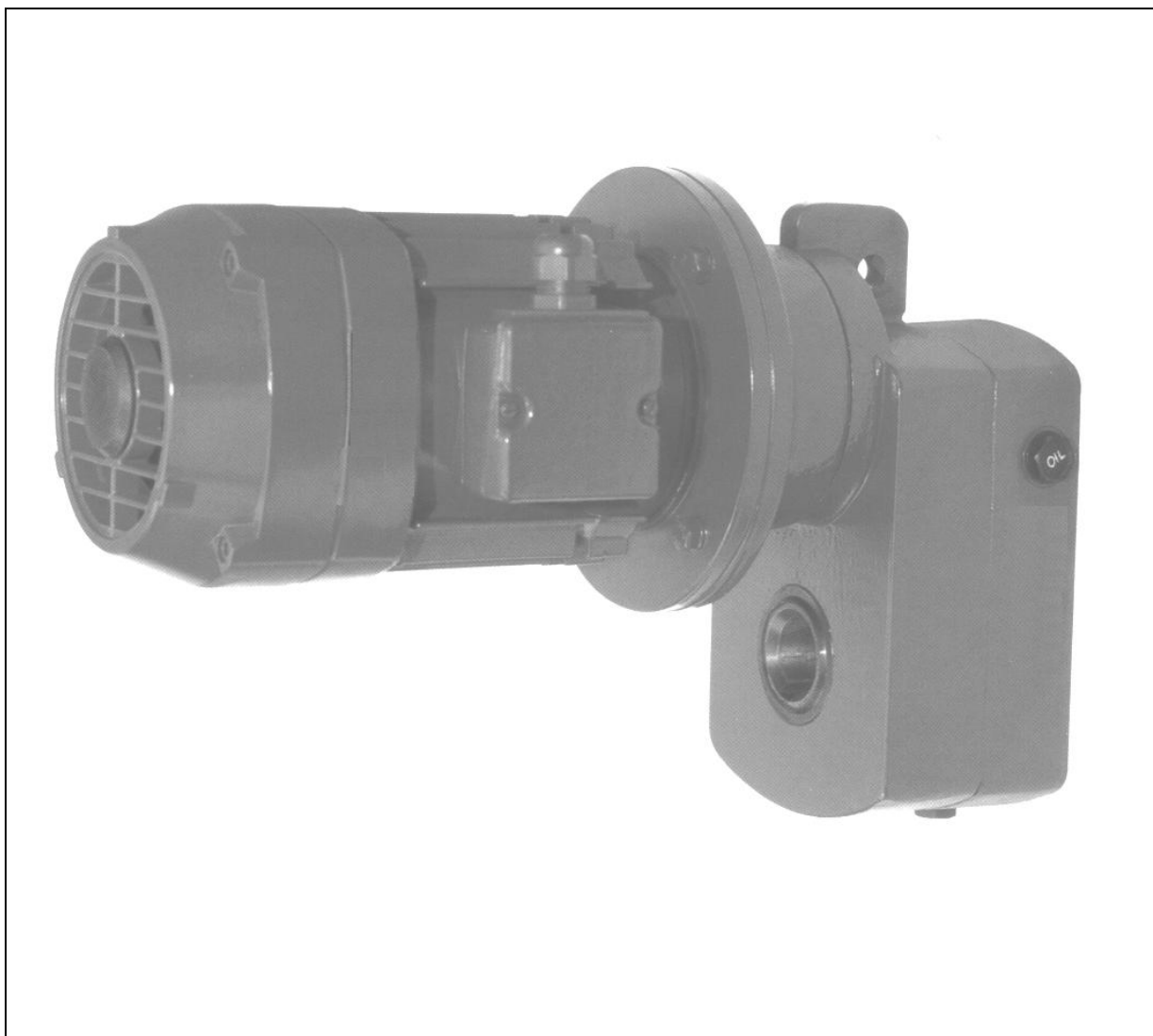


**ASSEMBLY
AND OPERATION MANUAL**
Geared Motor, type TP



1. TECHNICAL DESCRIPTION AND DESIGNATION

The geared motors we offer find wide application in the machine building industry. They are used to transfer power by reduction of the rotation frequency and increase of the moment of rotation. The geared motors are made by modern technology which gives a guarantee for reliable and noiseless operation. The two parts of the casing (body and cover) are made of cast iron. The gear wheels have pitched teeth. The wheels operate in oil bath with reliable sealing. The easy assembly to the transmission and the fixing by elastic bumpers to the bracket give a guarantee for reliability. The connection between the electric motor and the gear unit is achieved by transitional cast iron flange and elastic clutch.

The geared motors are supplied for normal climatic conditions provided there is no special requirement of the customer.

The geared motors are available in four sizes: TP1160; TP1200; TP1250 and TP1315.

Designation of the geared motors:

Type	Size	Gear ratio	Electric motor
TP	1200	35	T80B - 12/4R BRII

2. GEAR RATIO VALUES

Table 1

TP 1160		TP 1200		TP 1250		TP 1315	
Actual	Rated	Actual	Rated	Actual	Rated	Actual	Rated
79.08	79	84.40	84	87.52	88	86.03	86
69.89	70	69.56	70	72.29	72	77.85	78
63.72	64	69.51	69	65.82	66	70.56	70
57.88	58	57.29	57	60.87	61	59.83	60
56.31	56	53.74	54	54.36	54	59.46	59
49.12	49	49.65	50	51.98	52	54.14	54
48.69	48	44.29	44	48.24	48	49.96	50
46.63	47	42.70	43	45.77	46	44.97	45
44.87	45	40.92	41	39.09	39	41.35	41
43.41	43	39.72	40	36.28	36	35.31	35
39.23	39	35.19	35	26.60	27	29.60	30
35.95	36	32.73	33	20.88	21	26.78	27
35.57	35	32.27	32	20.00	20	22.84	23
33.04	33	26.60	27	15.70	16	20.45	20
30.25	30	24.82	25				
28.66	29	21.84	22				
27.87	28	20.46	20				
26.62	27	18.00	18				
22.09	22						
20.52	21						
20.19	20						
16.26	16						
12.54	13						

3. TECHNICAL DATA

The geared motors are equipped with three phase, asynchronous electric motors series T with height of the rotation axis 71, 80, 90, 100 and 112, and built in brake type BR11.

3.1. Electric motors designation

	T	80 A	12/4	R	BR	10
Type designation						
Size						
Number of poles						
Rotor with increased resistance						
Electromagnetic brake						
Brake moment						

3.2. Main characteristics of the electric motors

- voltage 220, 380, 400, 440 V
- current frequency 50Hz and 60Hz
- stage of protection IP 54
- insulation class B or F
- mode of operation
 - single speed with $2p = 2; 4; 6$ and $8 - 60\%$
 - double speed $2 = 4/2; 8/4; 8/2$ and $12/4 - 20/40\%$
- normal and tropical climate

3.3. Technical data for electric motor with rotor with increased resistance

380V; 50Hz; 1500min^{-1} ; 60%; 180h^{-1}

Table 2

Output		Type	Rotation fre- quency	Current at 380V	Power factor	Starting current	Starting moment	Maximum moment	Brake moment		Inertia moment	Weight
						Direct start as multiplicity of rated						
						current	moment		small	large		
						n	I _H	cos	I _N /I _H	M _N /M _H	M _M /M _H	
kW	HP	-	min ⁻¹	A	-	-	Nm				kg.m ²	kg
0.25	0.34	T71A-4R BR11	1320	0.86	0.71	2.5	2.2	2.1	2.5	5	0.00121	8.5
0.37	0.5	T71B-4R BR11	1330	1.19	0.73	2.7	2.2	2.1	2.5	5	0.00134	10
0.55	0.75	T80A-4R BR11	1370	1.75	0.75	2.8	2.0	2.1	4	10	0.00287	12
0.75	1.0	T80B-4R BR11	1370	2.38	0.71	3.0	2.4	2.5	4	10	0.00313	13.5
1.1	1.5	T90S-4R BR11	1380	3.0	0.79	4.0	2.4	2.4	10	20	0.00457	17.5
1.5	2.0	T90L-4R BR11	1370	3.9	0.81	4.2	2.6	2.6	10	20	0.00480	19.5
2.2	3.0	T100LA-4R BR11	1380	5.6	0.83	4.9	2.4	2.6	15	40	0.01020	26
3.0	4.0	T100LB-4R BR11	1380	7.5	0.83	4.9	2.6	2.6	15	40	0.01138	29
4.0	5.5	T112M-4R BR11	1390	9.54	0.83	5.2	3.0	2.9	15	50	0.01213	36
5.5	7.5	T112MB-4R BR11	1370	12.44	0.84	5.5	3.0	3.0	15	50	0.01523	40

380V; 50Hz; 500/1500min⁻¹; 20/40%; 180 h⁻¹

Table 3

Output	Type	Rotation frequency	Current at 380V	Power factor	Starting current	Starting moment	Maximum moment	Brake moment		Weight
					Direct start as multiplicity of rated					
					current	moment		small	large	
		n	I _H	cos	I _N /I _H	M _N /M _H	M _M /M _H	M _{BR}		
kW	-	min ⁻¹	A	-	-			Nm		kg
0.08/0.25	T80A-12/4R BRII	450/1440	1.3/1.2	0.72/0.65	1.1/2.7	1.5/1.5	1.9/2.6	4	10	11.5
0.12/0.37	T80B-12/4R BRII	450/1440	1.8/1.5	0.70/0.66	1.1/2.7	1.5/1.7	2.1/2.5	4	10	12.5
0.18/0.55	T90S-12/4R BRII	450/1400	2.0/1.7	0.63/0.75	1.8/4.7	2.0/2.1	2.5/2.8	10	20	17.3
0.25/0.75	T90L-12/4R BRII	450/1420	2.5/2.2	0.61/0.77	1.6/4.8	2.0/2.2	2.1/2.7	10	20	20.8
0.37/1.1	T100LA-12/4R BRII	400/1400	3.1/2.8	0.63/0.83	1.7/4.3	1.6/1.8	1.6/2.5	15	40	26.0
0.55/1.5	T100LB-12/4R BRII	420/1400	4.0/3.8	0.65/0.82	1.7/4.3	1.6/1.8	1.6/2.5	15	40	29.0
0.75/2.2	T112M-12/4R BRII	440/1400	4.4/5.0	0.68/0.90	2.2/4.9	1.2/1.3	1.4/1.7	15	50	34.6

The variety of gear units and electric motors gives a possibility through correct choice to reach the required outlet parameters - revolutions and turning moment most oftenly used in their application - materials handling machines, crane gear units, transport lines and general machine building, etc.

4. SERVICE FACTOR - shown in Tables 5, 6, 7 and 8

It shows the loading of the gear unit during operation: type of loading, number of switchings per hour, operating duration, dynamic loading, etc.

The service factor is determined by the following relation:

$$f_s = \frac{Mt_{max}}{Mt_u}$$

Mt_{max} - maximum turning moment, the gear unit is made for

Mt_u - outlet moment for each separate case. It corresponds to the applied power, the number of revolutions and the gear ratio of the gear unit.

The following condition must be observed for each separate case:

$$Mt_{max} \geq Mt_u$$

We recommend you to observe the following condition when choosing a geared motor:

$$f_s = \frac{M_{max}}{M_u} \geq 1,75$$

5. MAIN PARAMETERS

5.1. Geared motors

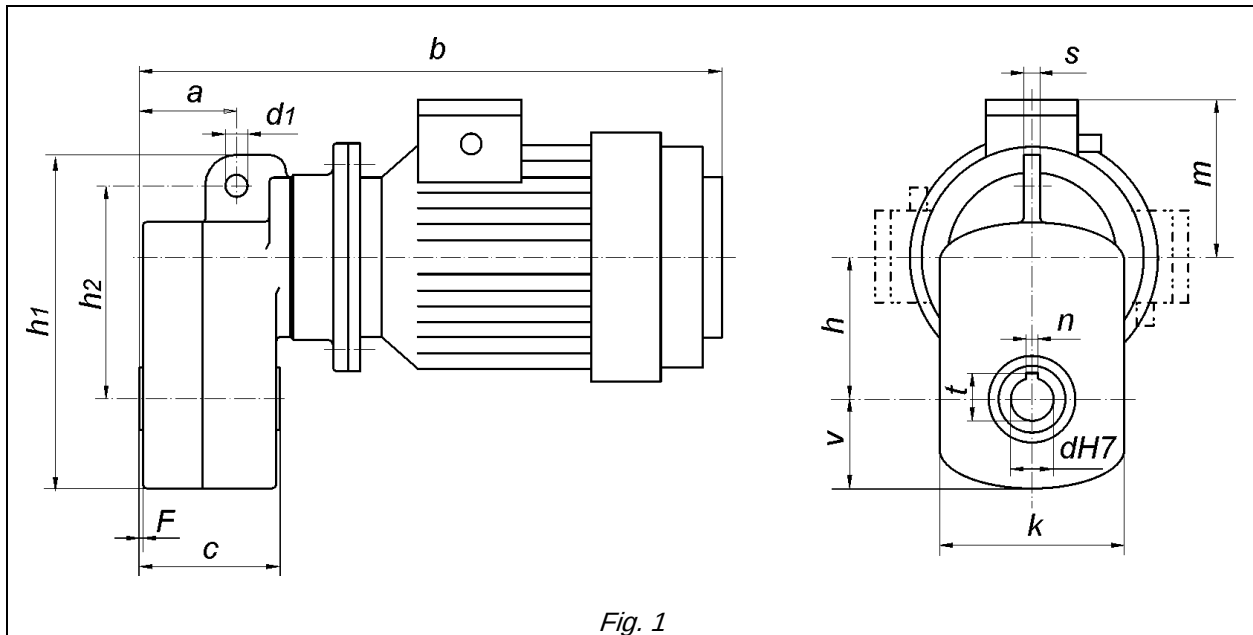


Fig. 1

Table 4

Type		a	b	c	dH7	d1	F	h	h1	h2	k	m	n	s	t	v
TP 1160	T80A-12/4R	70	492	97	30	16	4	100	236	167	132	124	8	12	33.3	72
	T80B-12/4R		510									124				
	T90S-12/4R		530									132				
TP 1200	T80B-12/4R	72	524	106	35	16	2	125	280	178	152	124	10	14	38.3	80
	T90S-12/4R		544									132				
	T90L-12/4R		584									132				
TP 1250	T90S-12/4R	78	548	118	40	18	2	145	323	207	180	132	12	14	43.3	96
	T90L-12/4R		568									132				
	T100LA-12/4R		604									132				
	T100LB-12/4R		638									136				
TP 1315	T100LB-12/4R	98	568	142	50	22	2	174	383	244	210		14	16	54	106
	T112M-12/4R		584													

5.2. Elastic bumpers

	TP1160	TP1200	TP1250	TP1315
A	14	14	14	17
B	32	41	50	50
C	30	30	40	40

6. DATA FOR THE GEARED MOTORS WITH ELECTRIC MOTORS 500/1500 min⁻¹

6.1. TP 1160; M_{max} = 250 Nm; 50 Hz

Table 5

Kw	i	Outlet revolutions	Outlet turning moment	Service factor
		min ⁻¹	Nm	f _s
0.08/0.25	79	5.69/18.21	128/125	1.95/2.00
0.08/0.25	70	6.44/20.60	113/100	2.21/2.27
0.08/0.25	64	7.06/22.60	103/100	2.43/2.50
0.12/0.37	58	7.77/24.86	140/135	1.79/1.85
0.12/0.37	56	7.99/25.57	136/131	1.84/1.91
0.12/0.37	49	9.16/29.31	119/115	2.10/2.19
0.12/0.37	48	9.24/29.57	118/114	2.12/2.20
0.12/0.37	47	9.65/30.88	113/109	2.21/2.29
0.12/0.37	45	10.02/32.06	109/105	2.29/2.38
0.12/0.37	43	10.36/33.15	105/101	2.38/2.48
0.18/0.55	39	11.47/35.68	142/140	1.76/1.79
0.18/0.55	36	12.51/38.92	130/128	1.92/1.95
0.18/0.55	35	12.65/39.36	129/127	1.94/1.97
0.18/0.55	33	13.62/42.38	120/118	2.08/2.12
0.18/0.55	30	14.88/46.29	110/108	2.27/2.31
0.25/0.75	29	15.70/49.54	144/137	1.74/1.82
0.25/0.75	28	16.15/50.96	140/134	1.79/1.87
0.25/0.75	27	16.90/53.33	134/128	1.87/1.95
0.25/0.75	22	20.37/64.28	111/106	2.25/2.36
0.25/0.75	21	21.93/69.20	103/98	2.43/2.55
0.25/0.75	20	19.81/69.34	102/97	2.45/2.58
0.37/1.1	16	24.60/86.10	136/116	1.84/2.16
0.55/1.5	13	34.49/114.96	149/122	1.68/2.05

6.2. TP 1200; M_{max} = 500 Nm; 50 Hz

Table 6

Kw	i	Outlet revolutions	Outlet turning moment	Service factor
		min ⁻¹	Nm	f _s
0.12/0.37	84	5.33/17.06	204/197	2.45/2.54
0.18/0.55	70	6.47/20.13	252/241	1.98/2.07
0.18/0.55	69	6.48/20.14	252/241	1.98/2.07
0.25/0.75	57	7.85/24.77	289/284	1.73/1.82
0.25/0.75	54	8.37/26.42	271/257	1.85/1.95
0.25/0.75	50	9.06/28.60	250/238	2.00/2.09
0.25/0.75	44	10.16/32.06	223/212	2.24/2.36
0.25/0.75	43	10.54/33.26	215/205	2.36/2.44
0.25/0.75	41	11.00/34.70	206/196	2.43/2.55
0.25/0.75	40	10.07/35.25	200/190	2.50/2.63
0.37/1.10	35	11.37/39.78	295/251	1.70/1.99
0.37/1.1	33	12.22/42.77	275/233	1.83/2.15
0.37/1.1	32	12.40/43.38	271/230	1.85/2.17
0.37/1.1	27	15.79/52.63	223/190	2.24/2.63
0.55/1.5	25	16.92/56.41	295/241	1.70/2.01
0.55/1.5	22	19.23/64.10	259/212	1.93/2.36
0.55/1.5	20	21.50/68.42	243/198	2.05/2.53
0.75/2.2	18	24.44/77.78	278/257	1.80/1.95

6.3. TP 1250; $M_{\max} = 800 \text{ Nm}$; 50 Hz

Table 7

Kw	i	Outlet revolutions	Outlet turning moment	Service factor
		min^{-1}	Nm	f_s
0.25/0.75	88	5.14/16.22	441/419	1.81/1.91
0.25/0.75	72	6.22/19.64	364/346	2.19/2.31
0.25/0.75	66	6.84/21.57	332/315	2.41/2.54
0.25/0.75	61	6.57/23.00	307/292	2.60/2.74
0.37/1.1	54	7.36/25.75	456/387	1.75/2.07
0.37/1.1	52	7.70/26.93	436/370	1.83/2.16
0.37/1.1	48	8.29/29.02	405/344	1.98/2.33
0.37/1.1	46	9.18/30.59	384/326	2.08/2.45
0.55/1.5	39	10.74/35.81	464/380	1.73/2.10
0.55/1.5	36	11.58/38.59	431/352	1.86/2.27
0.75/2.2	27	16.54/52.63	411/379	1.95/2.11
0.75/2.2	21	21.07/67.05	323/298	2.47/2.68
0.75/2.2	20	22.00/63.64	309/285	2.59/2.80
0.75/2.2	16	28.03/89.17	242/224	3.30/3.57

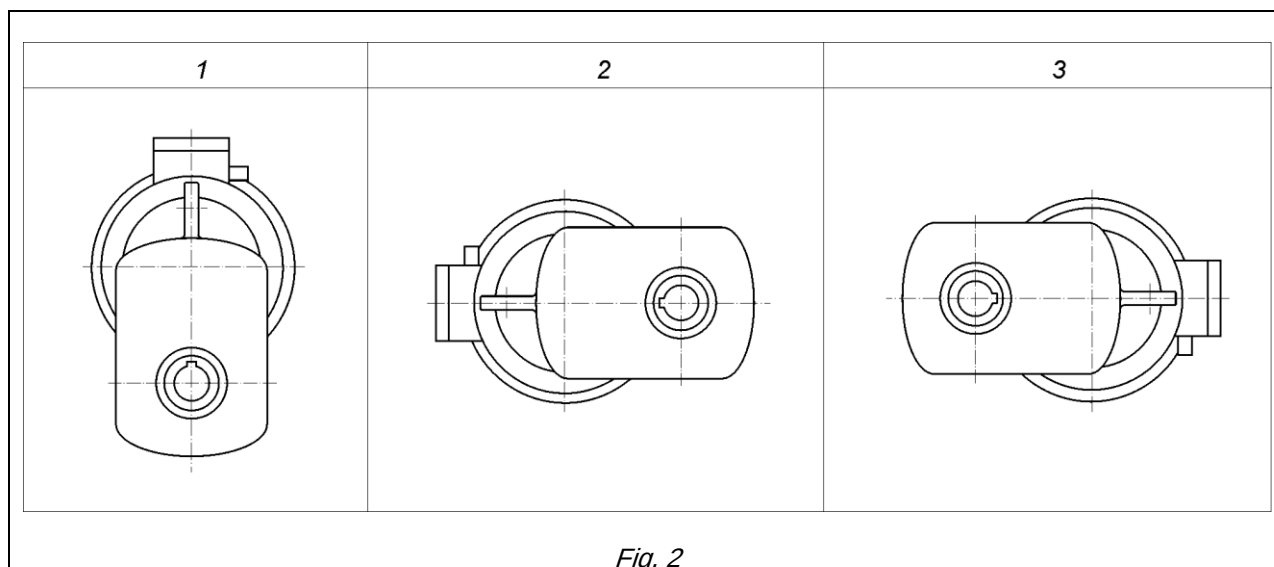
6.4. TP 1315; $M_{\max} = 1200 \text{ Nm}$; 50 Hz

Table 8

Kw	i	Outlet revolutions	Outlet turning moment	Service factor
		min^{-1}	Nm	f_s
0.37/1.1	86	4.65/16.27	722/614	1.66/1.95
0.37/1.1	78	5.13/17.98	653/555	1.84/2.16
0.37/1.1	70	5.67/19.84	592/503	2.03/2.39
0.55/1.5	60	7.02/23.40	711/582	1.69/2.06
0.55/1.5	59	7.06/23.55	706/578	1.70/2.08
0.55/1.5	54	7.76/25.86	643/526	1.87/2.28
0.55/1.5	50	8.41/28.02	594/486	2.02/2.47
0.75/2.2	45	9.78/31.13	695/641	1.73/1.87
0.75/2.2	41	10.64/33.86	639/589	1.88/2.04
0.75/2.2	35	12.46/39.65	546/503	2.20/2.39
0.75/2.2	30	14.86/47.30	458/422	2.62/2.84
0.75/2.2	27	16.43/52.28	414/382	2.90/3.14
0.75/2.2	23	19.26/61.26	353/326	3.40/3.68
0.75/2.2	20	21.52/68.46	316/292	3.80/4.10

7. ASSEMBLY AND COMMISSIONING

Check the geared motor before assembly for eventual damages caused during transportation. The assembly is made upon choice of the end user in one of the stated versions, Fig. 2. Depending on the chosen version, the place of the tap-air drain is fixed. Clean the same if necessary.



Remark: If the gear unit has a name plate "not filled with oil", use suitable oil:

SHELL OMALA 320; SHELL OMALA 460; SHELL OMALA 680; MOBILE CERD 632; ULITA EP90 or their analogue, in the following quantities:

TP 1160	TP 1200	TP 1250	TP 1315
0.5l	0.8l	1.0l	2.0l

The geared motor must be placed in the shaft of the driving unit and fixed by safety ring at the front side. Avoid shocks and force on the shaft of the driving unit during assembly. This may lead to improper operation of the gear unit. The two elastic bumpers should be placed on the bracket axle to absorb the eventual vibrations and shocks that may pass through the gears, bearings and the body. To avoid all problems in case of disassembly, we recommend you to oil very carefully the joints /shaft of the driving unit - gear unit/ with anticorrosion lubricant.

Take care of the sealings in case of painting.

Change the oil after 2000 working hours or once a year.

Remove the sealing taps and drain the oil. Fill with petrol or similar product in double quantity of the oil quantity marked on the gear unit and clean it. After draining the liquid fill the gear unit with the prescribed oil.

8. SPARE PARTS

State the following data for prompt delivery of spare parts:

- gear unit designation (overall dimensions)
- position number (Fig. 3)
- part denomination

Positions 12 and 23 and 13 and 15 are supplied complete and you have to state the gear ratio in this case.

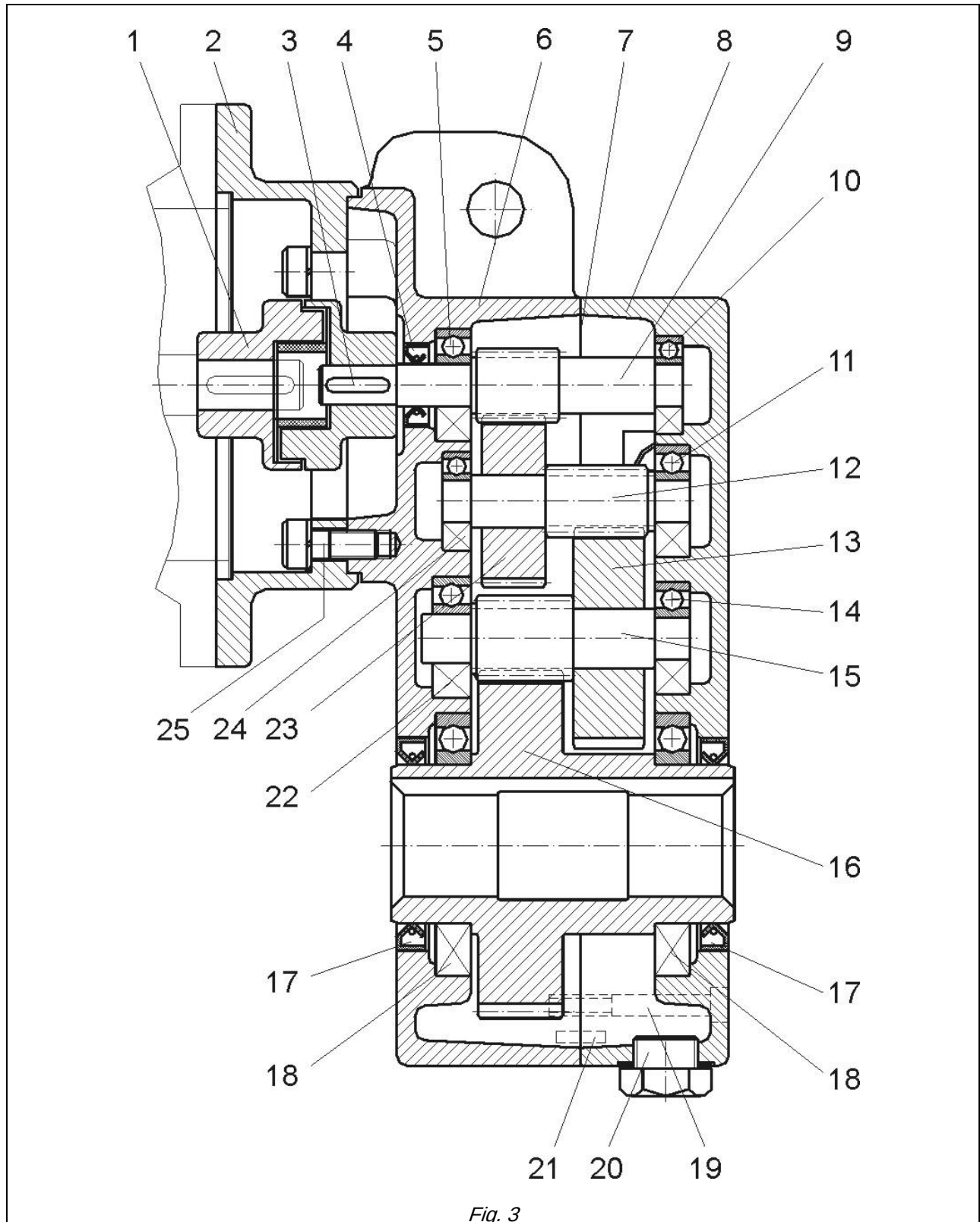


Table 9

	Description	TP 1160	TP 1200	TP 1250	TP 1315
1	Clutch	71-80-90	71-80-90-100	80-90-100	90-100
2	Flange /mm/	dia.160-200	dia.160-200	dia.200-250	dia.200-250
3	Key DIN 6885	4x4x18	5x5x20	5x5x25	6x6x20
4	Shaft seal DIN 3760	12x24x7	15x28x7	17x30x7	20x32x7
5	Bearing DIN 625	6201	6202	6203	6004
6	Body G25	TP160	TP200	TP250	TP315
7	Gasket	TP160	TP200	TP250	TP315
8	Cover G25	TP160	TP200	TP250	TP315
9	Inlet shaft	Z ₁₁ ...	Z ₁₁ ...	Z ₁₁ ...	Z ₁₁ ...
10	Bearing DIN 625	6001	6202	6202	6202
11	Bearing DIN 625	6201	6302	6204	6304
12	Mediate shaft – gear wheel	Z ₂₁ ...	Z ₂₁ ...	Z ₂₁ ...	Z ₂₁ ...
13	Mediate shaft – gear wheel	Z ₂₂ ...	Z ₂₂ ...	Z ₂₂ ...	Z ₂₂ ...
14	Bearing DIN 625	6201	6302	6304	6305
15	Shaft-gear wheel	Z ₁₃ ...	Z ₁₂ ...	Z ₁₂ ...	Z ₁₂ ...
16	Outlet shaft	Z ₆₃ ...	Z ₅₅ ...	Z ₅₅ ...	Z ₅₃ ...
17	Shaft seal DIN 3760	45x60x7	50x65x8	60x80x10	70x90x10
18	Bearing DIN 625	16009	16010	16012	16014
19	Screw 8.8 DIN 912	M8x50	M8x55	M8x55	M8x70
20	Oil plug DIN 7604	M18x1,5	M18x1,5	M18x1,5	M18x1,5
21	Pin DIN 7	8x30	8x30	8x30	8x30
22	Bearing DIN 625	6202	6204	6304	6305
23	Gear wheel	Z ₁₂ ...	Z ₁₂ ...	Z ₁₂ ...	Z ₁₂ ...
24	Bearing DIN 625	6001	6202	6203	6204
25	Screw 8,8 DIN 912	M8x25	M8x25	M8x25	M8x35

9. TROUBLESHOOTING

Table 10

	Problem	Possible cause	Troubleshooting steps
1	The motor does not run when switched on	The brake is stuck	Switch off the motor, remove the seal and push the shaft.
		The motor is blocked	Dismount and repair the motor
2	The motor drones and when loaded does not run	The motor operates at two phases	Check the supply voltage
		Voltage is lower than normal	Check the supply voltage
		Terminal end bolts or other cable ends are loosen	Clean and tighten the terminal ends and bolts
		Gear teeth are broken	Change the broken gears
3	Safety fuses fail and the motor does not run	Earthing rupture	Check the insulation with meqaohmmeter
		Phase rupture	Check the insulation between phases
4	The motor overheats	The motor is overloaded, hence the torque is high	Keep the recommended torque
		Supply voltage is asymmetric	Switch off the motor until the supply voltage is normal
		Voltage is lower than normal	Keep the recommended voltage
		The duty cycle exceeds the nominal	Keep the recommended duty cycle
		The brake is not adjusted correctly	Adjust the brake following the instructions
5	The gearbox emits unusual sounds	The bearings are worn out	Change the bearings
		There is not enough oil in the gear box	Add oil to the needed level
6	Oil leaks from the gear box	The sealing is bad	Change the sealing
		Air-holes are blocked up	Clear the air-holes

10. LUBRICATING

The geared motor is delivered without oil.

Attention!

Regular and correct greasing is of prime importance for every gear operating in oil bath

It is convenient to attach a label "NO OIL" to the machine. After mounting it should be filled with appropriate oil and lubricated according to the following scheme (see Table 11)

Schedule for geared motor lubricating

Table 11

	✓ Before the initial starting				
		✓ After 3 months or 100 hours of operation			
			✓ After 12 months of operation		
				✓ After each period of 12 months	
					✓ After each period of 36 months
Gear box	✓			✓	Check the oil level and add oil if necessary
Gear box		✓	✓		Change the oil
Motor				✓	Change the lubricant

11. STORAGE AND TRANSPORT

11.1. The geared motors should be stored in dry and covered places, wrapped in nylon and packed in wooden cases.

11.2. The geared motors should be transposed in closed trucks.

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