



Company Profile

Australian owned and operated, GWA Industries' broad product range offers our customers greater confidence in quality and profitability. Exceptional engineering and manufacturing capabilities enables GWA to offer our gearbox range across all industrial applications.



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1. **PRODUCT PICTURE**



TKM28B ~ 58B



TKM28C ~ 58C

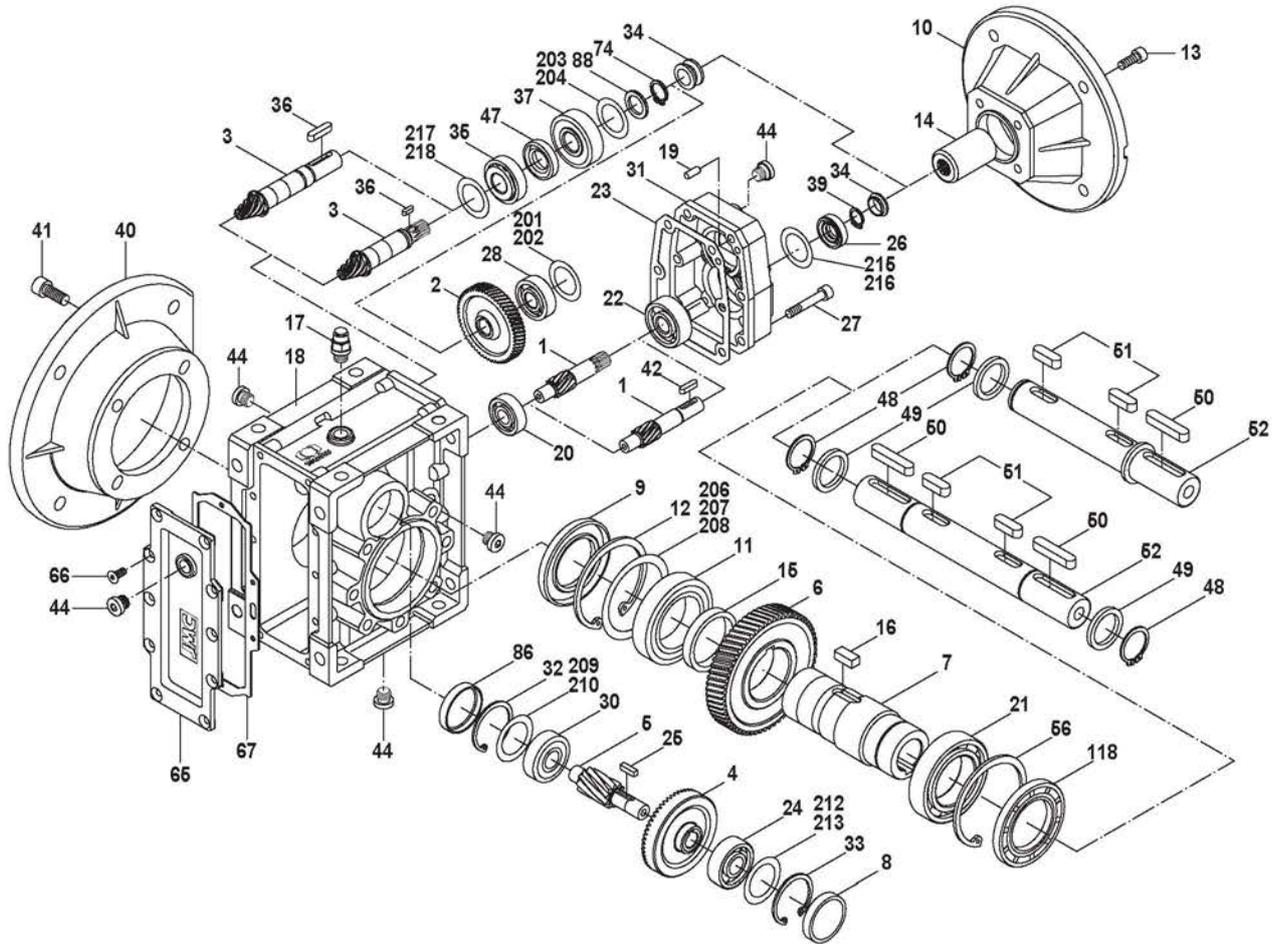


TKB38B ~ 58B



TKB38C ~ 58C

1.1 Basic structure



1 Pinion	25 Key	56 Hole-circlip
2 Gear	26 Oil seal	65 Gearcase cover
3 Pinion shaft	27 Inner hex screw	66 Hexagon sunk screw
4 Gear	28 Bearing	67 Rubber gasket
5 Pinion shaft	30 Bearing	74 Shaft-circlip
6 Gear	31 3 stage gearcase	86 Closing cap
7 Hollow shaft	32 Hole-circlip	88 Washer
8 Closing cap	33 Hole-circlip	118 Oil seal
9 Oil seal	34 Rubber boot	201 Shim ring
10 Input flange	35 Bearing	202 Shim ring
11 Bearing	36 Key	203 Shim ring
12 Hole-circlip	37 Bearing	204 Shim ring
13 Inner hex screw	39 Shaft-circlip	206 Shim ring
14 Input shaft	40 Output flange	207 Shim ring
15 Spacer	41 Inner hex screw	208 Shim ring
16 Key	42 Key	209 Shim ring
17 Breather valve	44 Oil plug	210 Shim ring
18 Gearcase	47 Oil seal	212 Shim ring
19 Stifte	48 Shaft-circlip	213 Shim ring
20 Bearing	49 Gasket	215 Shim ring
21 Bearing	50 Key	216 Shim ring
22 Bearing	51 Key	217 Shim ring
23 Housing gasket	52 Double output shaft	218 Shim ring
24 Bearing	53 Single output shaft	

2. SUMMARIZE

2.1 Products characteristics

TKM、TKB series helical-hypoid gear units is a new-generation of product developed by our company . with a compromise of advanced technology both at home and abroad, its main features are as follows:

1. Driven by hypoid gear,has big ratios.
2. Large in output torque,high efficiency,energy saving and environmental protection. .
3. Made of high-quality aluminum alloy, light in weight and nonrusting.
4. Smooth in running and low in noise, can work long time in dreadful conditions.
5. Good-looking in appearance, durable in service life and small in volume.
6. Suitable for all round installation,wide application and easy of use.
7. The mounting dimension of **TKM** series are compatible with **TNRV** series worm gear unit(A part of **TNRV050** dimensions are different from **TKM28**).
8. The mounting dimension of **TKB** series are compatible with **W** series worm gear unit.
9. Modular and multistructure can meet the demands of various conditions .

2.2 Main materials

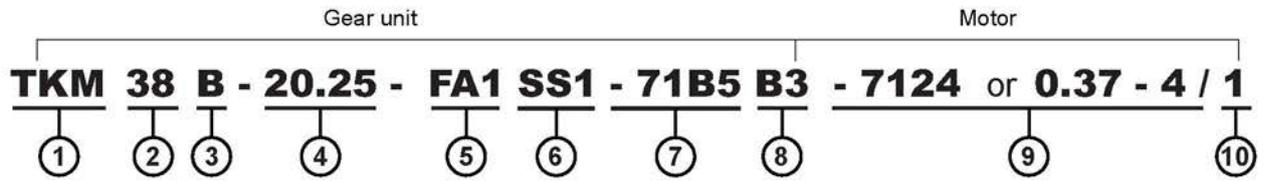
1. Housing: die-cast aluminum alloy (frame size: 28 to 58); .
2. gear wheel: 20CrMnTiH1, carbonize & quenched heat treatment make the hardness of gear's surface up to 56~62 HRC, retain carburization layer's thickness between 0.3 and 0.5mm after precise grinding.

2.3 Surface painting

Aluminum alloy housing:

1. Shot blasting and special antiseptic treatment on the aluminum alloy surface.
2. After phosphating,spray the paint RAL9022 in silver white.

3. MODEL ILLUMINATE



No	Comments
1	Code for gear units series: TKM , TKB
2	Specification code of gear units 28, 38, 48, 58
3	1). B : Means 2 stages 2). C : Means 3 stages
4	Speed ratio of reducer i
5	1). No mark means without output flange 2). FA,FB,FC,FD,FE(1/2) : output Flange and position
6	1). No mark means hole output 2). SS(1/2) : Single output shaft and position 3). DS : Double output shaft
7	1). Input flange code(63B5, 71B5, 71B14.....) 2). HS : means shaft input
8	Installation position code
9	1). No mark means without motor 2). Model motos (poles of power)
10	Position diagram for motor terminal box default position 1 not to write out is ok

When ordering, you should show whether the reducers are equipped with motors, otherwise reducers aren't supplied with motors.

Example: **TKM48B - 15.09 - FA1 - 71B5 - 7124**

4. RELEVANT PARAMETER

4.1 Power P

$$P_1 = \frac{P_2}{\eta} \text{ [kW]}$$
$$P_{1n} \geq P_1 \cdot f_s \text{ [kW]}$$

P_1	Input power
P_2	Output power
P_{1n}	Rated power driving motor
f_s	Service factor
η	Transmission efficiency

The efficiency of TKM, TKB gear units varies with the number of gear stages, between 94 % (2-stage), 92 % (3-stage).

4.2 Rotation speed n

n_1	Gear units input speed
n_2	Gear units output speed

If driven by the external gearing, 1400r/min or lower rotation speed is suggested so as to optimize the working conditions and prolong the service life. Higher input rotation speed is permitted, but in this situation, the rated torque M_2 will be reduced.

4.3 Transmission ratio i

$$i = \frac{n_1}{n_2}$$

Usually transmission ratio is decimal fraction with 2 radix point tagged in selection tables.

4.4 Torque M

$$M_2 = \frac{9550 \cdot P_1 \cdot \eta}{n_2} \text{ [Nm]}$$

$$M_{2n} \geq M_2 \cdot f_s \text{ [Nm]}$$

M_2	Output torque
M_{2n}	Selected output torque
P_1	Input power
η	Transmission efficiency
f_s	Service factor

4.5 Service factor f_s

The effect of the driven machine on the gear unit is taken into account to a sufficient level of accuracy using the service factor f_s . The service factor is determined according to the daily operating time and the starting frequency Z .

RELEVANT PARAMETER

Three load classifications are considered depending on the mass acceleration factor. You can read off the service factor applicable to your application in following Figure. The service factor selected using this diagram must be less than or equal to the service factor as given in the performance parameter table.

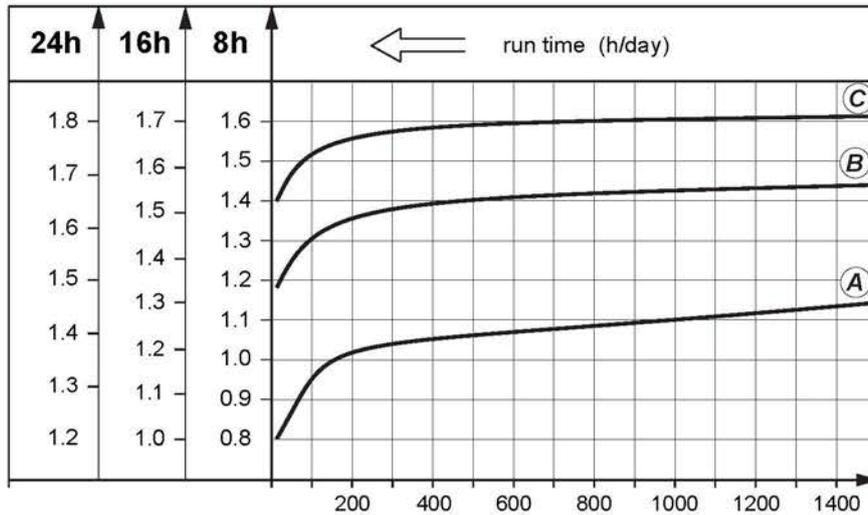


Fig: Service factor (fs)

start up frequency Z (1/h) #

starting frequency Z: The cycles include all starting and braking procedures as well as change overs from low to high speed.

4.5.1 load classifications

- (A) Uniform, permitted mass acceleration factor $fa \leq 0.2$
- (B) Moderate shock load, permitted mass acceleration factor $fa \leq 3$
- (C) Heavy shock load, permitted mass acceleration factor $fa \leq 10$

load classifications:

Screw feeders for light materials, fans, assembly lines, conveyor belts for light materials, small mixers, lifts, cleaning machines, fillers, control machines.

Winding devices, woodworking machine feeders, goods lifts, balancers, threading machines, medium mixers, conveyor belts for heavy materials, winches, sliding doors, fertilizer scrapers, packing machines, concrete mixers, crane mechanisms, milling cutters, folding machines, gear pumps.

Mixers for heavy materials, shears, presses, centrifuges, rotating supports, winches and lifts for heavy materials, grinding lathes, stone mills, bucket elevators, drilling machines, hammer mills, cam presses, folding machines, turntables, tumbling barrels, vibrators, shredders.

4.5.2 Mass acceleration factor

The mass acceleration factor is calculated as follows:

$$f_a = \frac{J_c}{J_m}$$

f_a Mass acceleration factor

J_c All external mass moments of inertia (kgm^2)

J_m Mass moment of inertia on the motor end (kgm^2)

If mass acceleration factors $f_a > 10$, please call our Technical Service.

To keep the service-life of gear units, the use factor f_s selected from the catalogue must be equal or slightly higher than the calculated use factor f_s .

Example:

Mass acceleration factor 2.5 (load classification \textcircled{B}), 14 hours/day operating time (read off at 16 h/d) and 200 cycles/hour result in a service factor $f_s = 1.48$.

choose the service factor $f_s = 1.48$ according to the parameter sheet .

4.6 Overhung loads and axial forces

When determining the resulting radial loads, the type of transmission elements, mounted on the shaft end must be considered. Various transmission elements are corresponding with following transmission element factors f_z :

Transmission element	Transmission element factor F_z	Comments
Gears	1.15	< 17 teeth
Chain sprockets	1.25	< 20 teeth
	1.40	< 13 teeth
Narrow V-belt pulleys	1.75	Influence of the tensile force
Flat belt pulleys	2.50	Influence of the tensile force
Toothed belt pulleys	2.50	Influence of the tensile force

The overhung loads exerted on the motor or gear shaft is then calculated as follows:

$$F_r = \frac{M \cdot 2000 \cdot f_z}{d_0} \text{ [N]}$$

F_r Resulting radial load [N]

M Torque on the shaft [Nm]

d_0 Mean diameter of the mounted transmission element in [mm]

f_z Transmission element factor

The basis for determining the permitted radial loads is the computation of the rated service life **L10h** of the bearings (according to **ISO281**). For special operating conditions, the permitted radial loads can be determined with regard to the modified service life **Lna**.

The permitted radial loads given in the selection tables must be calculated using the following formula in the event of force application not in the center of the shaft end. The smaller of the two values **F_{xL}** (according to bearing service life)

F_{xL} according to bearing service life:

$$F_{xL} = F_{r(1,2)} \cdot \frac{a}{b+x} \text{ [N]}$$

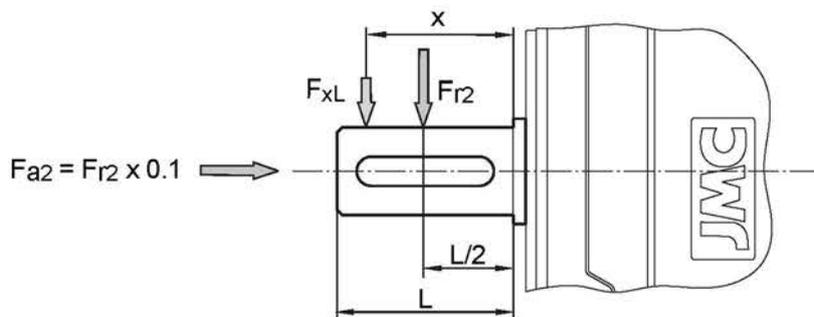
$$F_{xL} = F_{r(1,2)} \cdot \frac{a}{b+x} \text{ [N]}$$

F_{r1}, F_{r2} = Permitted overhung load ($x = L/2$) for foot-mounted gear units according to the selection tables in [N]

x = Distance from the shaft shoulder to the force application point in [mm]

a, b = Gear unit constant for overhung load conversion [mm]

Output shafts radial loads



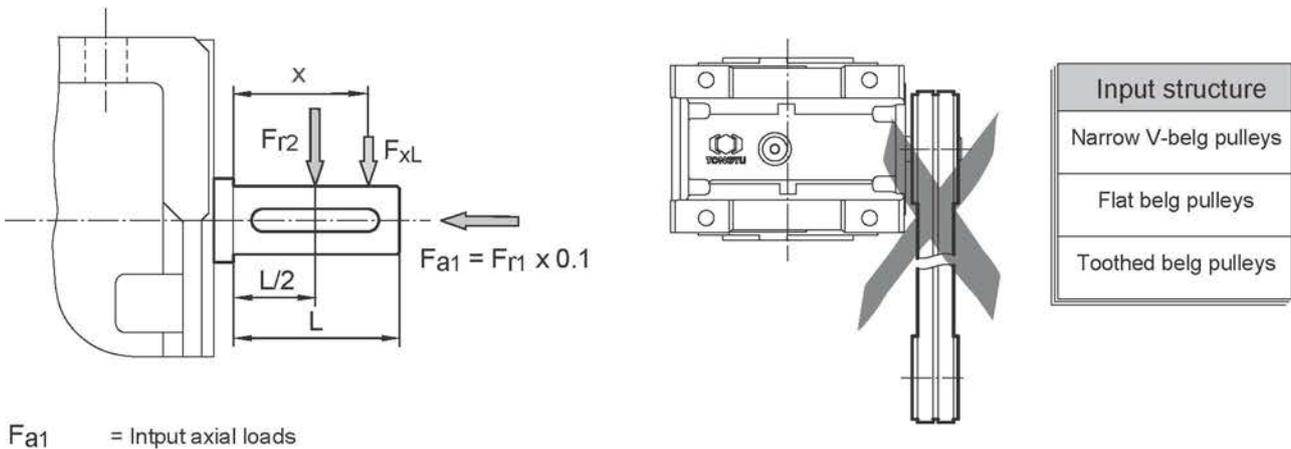
Fa2 = Output axial loads

TKM Gear unit constants for overhung load conversion:

	TKM28B	TKM28C	TKM38B	TKM38C	TKM48B	TKM48C	TKM58B	TKM58C
a	104	104	118	118	131	131	159	159
b	78	78	93	93	101	101	119	119

TKB Gear unit constants for overhung load conversion:

			TKB38B	TKB38C	TKB48B	TKB48C	TKB58B	TKB58C
a			128	128	135	135	148.5	148.5
b			98	98	105	105	118.5	118.5

Input shafts radial loads


It is forbidden to use the input on the right chart (including 3 stage input).

TKM / TKB Gear unit constants for overhung load conversion:

	TKM28B	TKM28C	TKM38B TKB38B	TKM38C TKB38C	TKM48B TKB48B	TKM48C TKB48C	TKM58B TKB58B	TKM58C TKB58C
a	51.5	56	58	56	73	70	81	70
b	40	44.5	43	44.5	53	55	61	55

4.7 Selection tables comments

	Combination with the motor in the header row is possible
	Combination with the motor in the header row is not possible
*	Finite gear unit reduction ratio;
P_{1n}	Rated power driving motor [kW];
n_2	Output speed [r/min];
M_{2n}	Output torque [Nm];
M_{2max}	Max. permissible output torque [Nm]
F_{r2}	Permissible overhung load output side [N]
i	Gear unit nominal ratio;
i_a	Gear unit actual ratio;
f_s	Service factor;
	Gear unit type;
	Motor type;
Page	Dimension sheet page no;

5 SELECTION EXAMPLE

5.1 Gear motor

Example: Required power 0.25kW on driven machine, work for 8 h/day, moderate shock load, start up frequency 100(1/h), $n_2=35$ r/min, **B3** mounted, So:

Check the service factor table at page 7 ,choose $f_s=1.3$

$$i = \frac{n_1}{n_2} = \frac{1400}{35} = 40$$

$$P_{1n} \geq P_1 \cdot f_s = \frac{P_2}{\eta} \cdot f_s = \frac{0.25}{0.94} \times 1.3 = 0.345 \text{ [kW]}$$

Choose type:

TKM28B - 40.09 - 71B5 - 7124 - B3

5.2 Gear units

Example: Required torque 200Nm on driven machine, work 8 h/day, uniform load, start up frequency 400(1/h), **FA1** mounted, $n_1=900$ r/min,

$n_2=2.5$ r/min, so the only selection is 3 stage after checked the table:

Check the service factor table at page 7 ,choose $f_s=1.05$

$$i = \frac{n_1}{n_2} = \frac{900}{6} = 150$$

$$M_{2n} \geq M_2 \cdot f_s = 200 \times 1.05 = 210 \text{ [Nm]}$$

$$P_{1n} \geq P_1 \cdot f_s = \frac{M_2 \cdot n_1}{9550 \cdot \eta \cdot i} \cdot f_s = \frac{210 \times 900}{9550 \times 0.92 \times 150} \times 1.05 = 0.151 \text{ [kW]}$$

Choose type:

TKM48C-151.20-FA1

6. GEAR UNIT SELECTION TABLES

6.1 Possible geometrical combinations

TKM28..
 $n_1=1400$ r/min

130Nm

Gear units		i Nominal	i Actual	n_2 [r/min]	M_{2n} [Nm]	F_{r2} [N]	63B5	71B5 71B14	80B5 80B14	90B5 90B14
3 Stage										
TKM28C		300	291.79	4.8	110	4100				
TKM28C		250	244.29	5.8	130	4100				
TKM28C		200	200.44	7.0	130	4100				
TKM28C		150	146.67	9.6	130	4000				
TKM28C		125	120.34	12	130	3770				
TKM28C		100	101.04	14	130	3560				
TKM28C		75	74.62	19	130	3220				
TKM28C		60	62.36	23	120	3030				
TKM28C		50	52.36	27	110	2860				
2 Stage										
TKM28B		60	58.36	24	110	2960				
TKM28B		50	48.86	29	130	2790				
TKM28B		40	40.09	35	130	2610				
TKM28B		30	29.33	48	130	2350				
TKM28B		25	24.07	59	130	2200				
TKM28B		20	20.21	70	130	2080				
TKM28B		15	14.92	94	130	1880				
TKM28B		12.5	12.47	113	130	1770				
TKM28B		10	10.47	134	130	1670				
TKM28B		7.5	7.73	182	100	1510				

TKM38..,TKB38..
 $n_1=1400$ r/min

200Nm

Gear units		i Nominal	i Actual	n_2 [r/min]	M_{2n} [Nm]	F_{r2} [N]	63B5	71B5 71B14	80B5 80B14	90B5 90B14
3 Stage										
TKM38C	TKB38C	300	302.50	4.7	170	4800				
TKM38C	TKB38C	250	243.57	5.8	200	4800				
TKM38C	TKB38C	200	196.43	7.2	200	4800				
TKM38C	TKB38C	150	151.56	9.3	200	4650				
TKM38C	TKB38C	125	122.22	12	200	4330				
TKM38C	TKB38C	100	101.27	14	200	4070				
TKM38C	TKB38C	75	73.33	20	160	3650				
TKM38C	TKB38C	60	63.33	23	140	3480				
TKM38C	TKB38C	50	52.48	27	120	3270				
2 Stage										
TKM38B	TKB38B	60	60.50	24	170	3430				
TKM38B	TKB38B	50	48.71	29	200	3190				
TKM38B	TKB38B	40	39.29	36	200	2970				
TKM38B	TKB38B	30	30.31	47	200	2720				
TKM38B	TKB38B	25	24.44	58	200	2530				
TKM38B	TKB38B	20	20.25	70	200	2380				
TKM38B	TKB38B	15	14.67	96	190	2130				
TKM38B	TKB38B	12.5	12.67	111	165	2030				
TKM38B	TKB38B	10	10.50	134	135	1910				
TKM38B	TKB38B	7.5	7.60	185	100	1710				

TKM48..,TKB48.. $n_1=1400$ r/min **350Nm**

Gear units		i Nominal	i Actual	n_2 [r/min]	M_{2n} [Nm]	F_{r2} [N]	63B5	71B5 71B14	80B5 80B14	90B5 90B14	100B5 100B14	112B5 112B14
3 Stage												
TKM48C	TKB48C	300	297.21	4.8	350	6500						
TKM48C	TKB48C	250	240.89	5.9	350	6500						
TKM48C	TKB48C	200	200.66	7.0	350	6500						
TKM48C	TKB48C	150	151.20	9.3	350	6500						
TKM48C	TKB48C	125	125.95	12	350	5980						
TKM48C	TKB48C	100	99.22	15	350	5520						
TKM48C	TKB48C	75	75.45	19	350	5040						
TKM48C	TKB48C	60	62.43	23	350	4730						
TKM48C	TKB48C	50	49.18	29	350	4370						
2 Stage												
TKM48B	TKB48B	60	59.44	24	350	4660						
TKM48B	TKB48B	50	48.18	30	350	4340						
TKM48B	TKB48B	40	40.13	35	350	4080						
TKM48B	TKB48B	30	30.24	47	350	3720						
TKM48B	TKB48B	25	25.19	56	350	3500						
TKM48B	TKB48B	20	19.84	71	350	3230						
TKM48B	TKB48B	15	15.09	93	350	2950						
TKM48B	TKB48B	12.5	12.49	113	350	2770						
TKM48B	TKB48B	10	9.84	143	350	2550						
TKM48B	TKB48B	7.5	7.48	188	280	2330						

TKM58..,TKB58.. $n_1=1400$ r/min **500Nm**

Gear units		i Nominal	i Actual	n_2 [r/min]	M_{2n} [Nm]	F_{r2} [N]	63B5	71B5 71B14	80B5 80B14	90B5 90B14	100B5 100B14	112B5 112B14
3 Stage												
TKM58C	TKB58C	300	295.18	4.8	460	8300						
TKM58C	TKB58C	250	240.89	5.9	500	8300						
TKM58C	TKB58C	200	200.66	7.0	500	8300						
TKM58C	TKB58C	150	151.20	9.3	500	8050						
TKM58C	TKB58C	125	125.95	12	500	7580						
TKM58C	TKB58C	100	99.22	15	500	7000						
TKM58C	TKB58C	75	75.45	19	500	6390						
TKM58C	TKB58C	60	62.43	23	450	6000						
TKM58C	TKB58C	50	49.18	29	350	5540						
2 Stage												
TKM58B	TKB58B	60	59.04	24	460	5890						
TKM58B	TKB58B	50	48.18	30	500	5500						
TKM58B	TKB58B	40	40.13	35	500	5170						
TKM58B	TKB58B	30	30.24	47	500	4710						
TKM58B	TKB58B	25	25.19	56	500	4430						
TKM58B	TKB58B	20	19.84	71	500	4090						
TKM58B	TKB58B	15	15.09	93	500	3730						
TKM58B	TKB58B	12.5	12.49	113	460	3510						
TKM58B	TKB58B	10	9.84	143	360	3240						
TKM58B	TKB58B	7.5	7.48	188	280	2950						

6.2 TKM.. / TKB..(IEC).. Performance parameter

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page					
0.12	5.7	184	250	244.29	4100	0.7	TKM28C	63B5	6314	31				
	7.0	151	200	200.44	4100	0.9								
	9.5	110	150	146.67	4000	1.2								
	11.6	91	125	120.34	3770	1.4								
	13.9	76	100	101.04	3560	1.7								
	18.8	56	75	74.62	3220	2.3								
	22.5	47	60	62.36	3030	2.6								
	26.7	39	50	52.36	2860	2.8								
	24.0	45	60	58.36	2960	2.4	TKM28B	63B5	6314	30				
	28.7	38	50	48.86	2790	3.5								
	35	31	40	40.09	2610	4.2								
	48	23	30	29.33	2350	5.8								
	58	18.5	25	24.07	2200	7.0								
	69	15.6	20	20.21	2080	8.4								
	94	11.5	15	14.92	1880	11.3								
	112	9.6	12.5	12.47	1770	13.5								
	134	8.1	10	10.47	1670	16.1								
	181	5.9	7.5	7.73	1510	16.8								
	5.7	183	250	243.57	4800	1.1	TKM38C	63B5	6314	33				
	7.1	148	200	196.43	4800	1.4	TKB38C	63B5	6314	39				
	9.2	114	150	151.56	4650	1.8								
	11.5	92	125	122.22	4330	2.2								
	13.8	76	100	101.27	4070	2.6								
	19.1	55	75	73.33	3650	2.9								
	22.1	48	60	63.33	3480	2.9								
	26.7	40	50	52.48	3270	3.0								
	23.1	47	60	60.50	3430	3.7	TKM38B	63B5	6314	32				
	28.7	37	50	48.71	3190	5.3	TKB38B	63B5	6314	38				
36	30	40	39.29	2970	6.6									
46	23	30	30.31	2720	8.6									
4.7	224	300	297.21	6500	1.6	TKM48C	63B5	6314	35					
5.8	181	250	240.89	6500	1.9	TKB48C	63B5	6314	41					
7.0	151	200	200.66	6500	2.3									
9.3	114	150	151.20	6500	3.1									
11.1	95	125	125.95	5980	3.7									
4.7	222	300	295.18	8300	2.1	TKM58C	63B5	6314	37					
5.8	181	250	240.89	8300	2.8	TKB58C	63B5	6314	43					
7.0	151	200	200.66	8300	3.3									
9	114	150	151.20	8050	4.4									
0.18	9.6	165	300	291.79	4000	0.7	TKM28C	63B5	6312	31				
	11.5	138	250	244.29	3790	0.9								
	14.0	113	200	200.44	3550	1.1								
	19.1	83	150	146.67	3200	1.6								
	23.3	68	125	120.34	2990	1.9								
	27.7	57	100	101.04	2820	2.3								
	38	42	75	74.62	2550	3.1								
	45	35	60	62.36	2400	3.4								
	53	30	50	52.36	2270	3.7								
	48	34	60	58.36	2350	3.3					TKM28B	63B5	6312	30
	57	28	50	48.86	2220	4.6								
	70	23	40	40.09	2070	5.6								
	95	16.9	30	29.33	1870	7.7								
	116	13.9	25	24.07	1750	9.4								

P _{1n} [kW]	n ₂ [r/min]	M _{2n} [Nm]	i		F _{r2} [N]	fs	 			Page
			Nominal	Actual						
0.18	11.6	136	125	120.34	3770	1.0	TKM28C	63B5	6324	31
	13.9	114	100	101.04	3560	1.1				
	18.8	84	75	74.62	3220	1.5				
	22.5	70	60	62.36	3030	1.7				
	26.7	59	50	52.36	2860	1.9				
	24.0	67	60	58.36	2960	1.6	TKM28B	63B5	6324	30
	28.7	56	50	48.86	2790	2.3				
	35	46	40	40.09	2610	2.8				
	48	34	30	29.33	2350	3.8				
	58	28	25	24.07	2200	4.7				
	69	23	20	20.21	2080	5.6				
	94	17.2	15	14.92	1880	7.5				
	112	14.4	12.5	12.47	1770	9.0				
	134	12.1	10	10.47	1670	10.8				
	181	8.9	7.5	7.73	1510	11.2				
	12.1	131	75	74.62	3730	1.0	TKM28C	71B5/B14	7116	31
	14.4	110	60	62.36	3510	1.1				
	17.2	92	50	52.36	3310	1.2				
15.4	105	60	58.36	3430	1.0	TKM28B	71B5/B14	7116	30	
18.4	88	50	48.86	3240	1.5					
22.4	72	40	40.09	3030	1.8					
31	53	30	29.33	2730	2.5					
37	43	25	24.07	2550	3.0					
45	36	20	20.21	2410	3.6					
60	27	15	14.92	2180	4.9					
72	22	12.5	12.47	2050	5.8					
9.3	171	300	302.50	4650	1.0	TKM38C	63B5	6312	33	
11.5	138	250	243.57	4330	1.5	TKB38C	63B5	6312	39	
14.3	111	200	196.43	4030	1.8					
18.5	86	150	151.56	3690	2.3					
22.9	69	125	122.22	3440	2.9					
27.6	57	100	101.27	3230	3.5					
38	41	75	73.33	2900	3.9					
44	36	60	63.33	2760	3.9					
53	30	50	52.48	2590	4.0					
7.1	222	200	196.43	4800	0.9	TKM38C	63B5	6324	33	
9.2	171	150	151.56	4650	1.2	TKB38C	63B5	6324	39	
11.5	138	125	122.22	4330	1.4					
13.8	114	100	101.27	4070	1.7					
19.1	83	75	73.33	3650	1.9					
22.1	72	60	63.33	3480	2.0					
26.7	59	50	52.48	3270	2.0					
23.1	70	60	60.50	3430	2.4	TKM38B	63B5	6324	32	
28.7	56	50	48.71	3190	3.6	TKB38B	63B5	6324	38	
36	45	40	39.29	2970	4.4					
7.4	215	125	122.22	4800	0.9	TKM38C	71B5/B14	7116	33	
8.9	178	100	101.27	4720	1.1	TKB38C	71B5/B14	7116	39	
12.3	129	75	73.33	4230	1.2					
14.2	111	60	63.33	4030	1.3					
17.1	92	50	52.48	3790	1.3					
14.9	109	60	60.50	3970	1.6	TKM38B	71B5/B14	7116	32	
18.5	87	50	48.71	3690	2.3	TKB38B	71B5/B14	7116	38	
22.9	71	40	39.29	3440	2.8					
29.7	54	30	30.31	3150	3.7					
9.4	168	300	297.21	6320	2.1	TKM48C	63B5	6312	35	
11.6	136	250	240.89	5890	2.6	TKB48C	63B5	6312	41	
14.0	113	200	200.66	5540	3.1					
18.5	85	150	151.20	5040	4.1					

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page		
0.18	4.7	336	300	297.21	6500	1.0	TKM48C	63B5	6324	35	
	5.8	272	250	240.89	6500	1.3	TKB48C	63B5	6324	41	
	7.0	227	200	200.66	6500	1.5					
	9.3	171	150	151.20	6500	2.0					
	11.1	142	125	125.95	5980	2.5					
	14.1	112	100	99.22	5520	3.1					
	18.6	85	75	75.45	5040	4.1					
	4.5	353	200	200.66	6500	1.0	TKM48C	71B5/B14	7116	35	
	6.0	266	150	151.20	6500	1.3	TKB48C	71B5/B14	7116	41	
	7.1	221	125	125.95	6500	1.6					
	9.1	174	100	99.22	6400	2.0					
	11.9	133	75	75.45	5840	2.6					
	14.4	110	60	62.43	5480	3.2					
	18.3	86	50	49.18	5060	4.1					
	15.1	107	60	59.44	5390	3.3	TKM48B	71B5/B14	7116	34	
	18.7	87	50	48.18	5030	4.0	TKB48B	71B5/B14	7116	40	
	9.5	167	300	295.18	7990	2.8	TKM58C	63B5	6312	37	
	11.6	136	250	240.89	7470	3.7	TKB58C	63B5	6312	43	
	4.7	333	300	295.18	8300	1.4	TKM58C	63B5	6324	37	
	5.8	272	250	240.89	8300	1.8	TKB58C	63B5	6324	43	
	7.0	227	200	200.66	8300	2.2					
	9.3	171	150	151.20	8050	2.9					
	11.1	142	125	125.95	7580	3.5					
	3.7	423	250	240.89	8300	1.2	TKM58C	71B5/B14	7116	37	
	4.5	353	200	200.66	8300	1.4	TKB58C	71B5/B14	7116	43	
	6.0	266	150	151.20	8300	1.9					
	7.1	221	125	125.95	8300	2.3					
	9.1	174	100	99.22	8110	2.9					
	11.9	133	75	75.45	7400	3.8					
	14.4	110	60	62.43	6950	4.1					
	0.25	19.1	115	150	146.67	3200	1.1	TKM28C	63B5	6322	31
		23.3	94	125	120.34	2990	1.4				
27.7		79	100	101.04	2820	1.6					
38		59	75	74.62	2550	2.2					
45		49	60	62.36	2400	2.5					
53		41	50	52.36	2270	2.7					
48		47	60	58.36	2350	2.4	TKM28B	63B5	6322	30	
57		39	50	48.86	2220	3.3					
70		32	40	40.09	2070	4.0					
18.8		117	75	74.62	3220	1.1	TKM28C	71B5/B14	7114	31	
22.5		98	60	62.36	3030	1.2					
26.7		82	50	52.36	2860	1.3					
24.0		94	60	58.36	2960	1.2	TKM28B	71B5/B14	7114	30	
28.7		78	50	48.86	2790	1.7					
35		64	40	40.09	2610	2.0					
48		47	30	29.33	2350	2.8					
58		39	25	24.07	2200	3.4					
69		32	20	20.21	2080	4.0					
94		24	15	14.92	1880	5.4					
18.4		122	50	48.86	3240	1.1	TKM28B	71B5/B14	7126	30	
22.4		100	40	40.09	3030	1.3					
31		73	30	29.33	2730	1.8					
37		60	25	24.07	2550	2.2					
45		50	20	20.21	2410	2.6					
60	37	15	14.92	2180	3.5						
72	31	12.5	12.47	2050	4.2						
86	26	10	10.47	1930	5.0						
116	19	7.5	7.73	1750	5.2						

P _{1n} [kW]	n ₂ [r/min]	M _{2n} [Nm]	i Nominal	i Actual	F _{r2} [N]	fs			Page	
0.25	11.5	191	250	243.57	4330	1.0	TKM38C	63B5	6322	33
	14.3	154	200	196.43	4030	1.3	TKB38C	63B5	6322	39
	18.5	119	150	151.56	3690	1.7				
	22.9	96	125	122.22	3440	2.1				
	27.6	79	100	101.27	3230	2.5				
	38	58	75	73.33	2900	2.8				
	44	50	60	63.33	2760	2.8				
	53	41	50	52.48	2590	2.9				
	11.5	192	125	122.22	4330	1.0	TKM38C	71B5/B14	7114	33
	13.8	159	100	101.27	4070	1.3	TKB38C	71B5/B14	7114	39
	19.1	115	75	73.33	3650	1.4				
	22.1	99	60	63.33	3480	1.4				
	26.7	82	50	52.48	3270	1.5				
	23.1	97	60	60.50	3430	1.8	TKM38B	71B5/B14	7114	32
	28.7	78	50	48.71	3190	2.6	TKB38B	71B5/B14	7114	38
	36	63	40	39.29	2970	3.2				
	46	49	30	30.31	2720	4.1				
	12.3	179	75	73.33	4230	0.9	TKM38C	71B5/B14	7126	33
	14.2	155	60	63.33	4030	0.9	TKB38C	71B5/B14	7126	39
	17.1	128	50	52.48	3790	0.9				
	14.9	151	60	60.50	3970	1.1	TKM38B	71B5/B14	7126	32
	18.5	121	50	48.71	3690	1.6	TKB38B	71B5/B14	7126	38
	22.9	98	40	39.29	3440	2.0				
	29.7	76	30	30.31	3150	2.6				
	37	61	25	24.44	2930	3.3				
	44	50	20	20.25	2760	4.0				
	9.4	233	300	297.21	6320	1.5	TKM48C	63B5	6322	35
	11.6	189	250	240.89	5890	1.9	TKB48C	63B5	6322	41
	14.0	157	200	200.66	5540	2.2				
	18.5	119	150	151.20	5040	3.0				
	22.2	99	125	125.95	4750	3.5				
	5.8	378	250	240.89	6500	0.9	TKM48C	71B5/B14	7114	35
	7.0	315	200	200.66	6500	1.1	TKB48C	71B5/B14	7114	41
	9.3	237	150	151.20	6500	1.5				
	11.1	198	125	125.95	5980	1.8				
	14.1	156	100	99.22	5520	2.2				
	18.6	118	75	75.45	5040	3.0				
	22.4	98	60	62.43	4730	3.6				
	6.0	369	150	151.20	6500	0.9	TKM48C	71B5/B14	7126	35
	7.1	307	125	125.95	6500	1.1	TKB48C	71B5/B14	7126	41
	9.1	242	100	99.22	6400	1.4				
	11.9	184	75	75.45	5840	1.9				
	14.4	152	60	62.43	5480	2.3				
	18.3	120	50	49.18	5060	2.9				
	15.1	148	60	59.44	5390	2.4	TKM48B	71B5/B14	7126	34
	18.7	120	50	48.18	5030	2.9	TKB48B	71B5/B14	7126	40
	22.4	100	40	40.13	4730	3.5				
	9.5	232	300	295.18	7990	2.0	TKM58C	63B5	6322	37
11.6	189	250	240.89	7470	2.6	TKB58C	63B5	6322	43	
14.0	157	200	200.66	7030	3.2					
18.5	119	150	151.20	6390	4.2					
4.7	463	300	295.18	8300	1.0	TKM58C	71B5/B14	7114	37	
5.8	378	250	240.89	8300	1.3	TKB58C	71B5/B14	7114	43	
7.0	315	200	200.66	8300	1.6					
9.3	237	150	151.20	8050	2.1					
11.1	198	125	125.95	7580	2.5					
14.1	156	100	99.22	7000	3.2					
18.6	118	75	75.45	6390	4.2					

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page	
0.25	4.5	490	200	200.66	8300	1.0	TKM58C	71B5/B14	7126	37
	6.0	369	150	151.20	8300	1.4	TKB58C	71B5/B14	7126	43
	7.1	307	125	125.95	8300	1.6				
	9.1	242	100	99.22	8110	2.1				
	11.9	184	75	75.45	7400	2.7				
	14.4	152	60	62.43	6950	3.0				
	18.3	120	50	49.18	6420	2.9				
	15.2	147	60	59.04	6820	3.1	TKM58B	71B5/B14	7126	36
	18.7	120	50	48.18	6370	4.2	TKB58B	71B5/B14	7126	42
	0.37	23.3	140	125	120.34	2990	0.9	TKM28C	71B5/B14	7112
27.7		117	100	101.04	2820	1.1				
38		87	75	74.62	2550	1.5				
45		72	60	62.36	2400	1.7				
53		61	50	52.36	2270	1.8				
48		69	60	58.36	2350	1.6	TKM28B	71B5/B14	7112	30
57		58	50	48.86	2220	2.2				
70		48	40	40.09	2070	2.7				
95		35	30	29.33	1870	3.7				
28.7		116	50	48.86	2790	1.1	TKM28B	71B5/B14	7124	30
35		95	40	40.09	2610	1.4				
48		70	30	29.33	2350	1.9				
58		57	25	24.07	2200	2.3				
69		48	20	20.21	2080	2.7				
94		35	15	14.92	1880	3.7				
112		30	12.5	12.47	1770	4.4				
134		25	10	10.47	1670	5.2				
181		18	7.5	7.73	1510	5.5				
31		108	30	29.33	2730	1.2	TKM28B	80B5/B14	8016	30
37		89	25	24.07	2550	1.5				
45		75	20	20.21	2410	1.7				
60		55	15	14.92	2180	2.4				
72		46	12.5	12.47	2050	2.8				
86		39	10	10.47	1930	3.4				
116		29	7.5	7.73	1750	3.5				
14.3		228	200	196.43	4030	0.9	TKM38C	71B5/B14	7112	33
18.5		176	150	151.56	3690	1.1	TKB38C	71B5/B14	7112	39
22.9		142	125	122.22	3440	1.4				
27.6		118	100	101.27	3230	1.7				
38		85	75	73.33	2900	1.9				
44		74	60	63.33	2760	1.9				
53		61	50	52.48	2590	2.0				
46		72	60	60.50	2720	2.4	TKM38B	71B5/B14	7112	32
57		58	50	48.71	2530	3.5	TKB38B	71B5/B14	7112	38
71		47	40	39.29	2350	4.3				
13.8		235	100	101.27	4070	0.9	TKM38C	71B5/B14	7124	33
19.1		170	75	73.33	3650	0.9	TKB38C	71B5/B14	7124	39
22.1		147	60	63.33	3480	1.0				
26.7		122	50	52.48	3270	1.0				
23.1		144	60	60.50	3430	1.2	TKM38B	71B5/B14	7124	32
28.7		116	50	48.71	3190	1.7	TKB38B	71B5/B14	7124	38
36		93	40	39.29	2970	2.1				
46	72	30	30.31	2720	2.8					
57	58	25	24.44	2530	3.4					
69	48	20	20.25	2380	4.2					
18.5	180	50	48.71	3690	1.1	TKM38B	80B5/B14	8016	32	
22.9	145	40	39.29	3440	1.4	TKB38B	80B5/B14	8016	38	
29.7	112	30	30.31	3150	1.8					

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page	
0.37	37	90	25	24.44	2930	2.2	TKM38B	80B5/B14	8016	32
	44	75	20	20.25	2760	2.7	TKB38B	80B5/B14	8016	38
	61	54	15	14.67	2470	3.5				
	71	47	12.5	12.67	2360	3.5				
	86	39	10	10.50	2210	3.5				
	118	28	7.5	7.60	1990	3.6				
	9.4	345	300	297.21	6320	1.0	TKM48C	71B5/B14	7112	35
	11.6	280	250	240.89	5890	1.3	TKB48C	71B5/B14	7112	41
	14.0	233	200	200.66	5540	1.5				
	18.5	176	150	151.20	5040	2.0				
	22.2	146	125	125.95	4750	2.4				
	28.2	115	100	99.22	4380	3.0				
	37	88	75	75.45	4000	4.0				
	9.3	351	150	151.20	6500	1.0	TKM48C	71B5/B14	7124	35
	11.1	292	125	125.95	5980	1.2	TKB48C	71B5/B14	7124	41
	14.1	230	100	99.22	5520	1.5				
	18.6	175	75	75.45	5040	2.0				
	22.4	145	60	62.43	4730	2.4				
	28.5	114	50	49.18	4370	3.1				
	23.6	141	60	59.44	4660	2.5	TKM48B	71B5/B14	7124	34
	29.1	114	50	48.18	4340	3.1	TKB48B	71B5/B14	7124	40
	35	95	40	40.13	4080	3.7				
	9.1	358	100	99.22	6400	1.0	TKM48C	80B5/B14	8016	35
	11.9	273	75	75.45	5840	1.3	TKB48C	80B5/B14	8016	41
	14.4	225	60	62.43	5480	1.6				
	18.3	178	50	49.18	5060	2.0				
	15.1	219	60	59.44	5390	1.6	TKM48B	80B5/B14	8016	34
	18.7	178	50	48.18	5030	2.0	TKB48B	80B5/B14	8016	40
	22.4	148	40	40.13	4730	2.4				
	29.8	112	30	30.24	4310	3.1				
	36	93	25	25.19	4050	3.8				
	9.5	343	300	295.18	7990	1.3	TKM58C	71B5/B14	7112	37
	11.6	280	250	240.89	7470	1.8	TKB58C	71B5/B14	7112	43
	14.0	233	200	200.66	7030	2.1				
	18.5	176	150	151.20	6390	2.8				
	22.2	146	125	125.95	6010	3.4				
	5.8	559	250	240.89	8300	0.9	TKM58C	71B5/B14	7124	37
	7.0	466	200	200.66	8300	1.1	TKB58C	71B5/B14	7124	43
	9.3	351	150	151.20	8050	1.4				
	11.1	292	125	125.95	7580	1.7				
	14.1	230	100	99.22	7000	2.2				
	18.6	175	75	75.45	6390	2.9				
	22.4	145	60	62.43	6000	3.1				
	28.5	114	50	49.18	5540	3.1				
	23.7	140	60	59.04	5890	3.3	TKM58B	71B5/B14	7124	36
29.1	114	50	48.18	5500	4.4	TKB58B	71B5/B14	7124	42	
6.0	546	150	151.20	8300	0.9	TKM58C	80B5/B14	8016	37	
7.1	455	125	125.95	8300	1.1	TKB58C	80B5/B14	8016	43	
9.1	358	100	99.22	8110	1.4					
11.9	273	75	75.45	7400	1.8					
14.4	225	60	62.43	6950	2.0					
18.3	178	50	49.18	6420	2.0					
15.2	218	60	59.04	6820	2.1	TKM58B	80B5/B14	8016	36	
18.7	178	50	48.18	6370	2.8	TKB58B	80B5/B14	8016	42	
22.4	148	40	40.13	6000	3.4					
0.55	38	129	75	74.62	2550	1.0	TKM28C	71B5/B14	7122	31
	45	108	60	62.36	2400	1.1				
	53	90	50	52.36	2270	1.2				

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page	
0.55	48	103	60	58.36	2350	1.1	TKM28B	71B5/B14	7122	30
	57	86	50	48.86	2220	1.5				
	70	71	40	40.09	2070	1.8				
	95	52	30	29.33	1870	2.5				
	116	42	25	24.07	1750	3.1				
	139	36	20	20.21	1650	3.6				
	35	141	40	40.09	2610	0.9	TKM28B	80B5/B14	8014	30
	48	103	30	29.33	2350	1.3				
	58	85	25	24.07	2200	1.5				
	69	71	20	20.21	2080	1.8				
94	53	15	14.92	1880	2.5					
112	44	12.5	12.47	1770	3.0					
134	37	10	10.47	1670	3.5					
181	27	7.5	7.73	1510	3.7					
37	132	25	24.07	2550	1.0	TKM28B	80B5/B14	8026	30	
45	111	20	20.21	2410	1.2					
60	82	15	14.92	2180	1.6					
72	68	12.5	12.47	2050	1.9					
86	57	10	10.47	1930	2.3					
116	42	7.5	7.73	1750	2.4					
22.9	211	125	122.22	3440	0.9	TKM38C	71B5/B14	7122	33	
27.6	175	100	101.27	3230	1.1	TKB38C	71B5/B14	7122	39	
38	127	75	73.33	2900	1.3					
44	109	60	63.33	2760	1.3					
53	91	50	52.48	2590	1.3					
46	107	60	60.50	2720	1.6	TKM38B	71B5/B14	7122	32	
57	86	50	48.71	2530	2.3	TKB38B	71B5/B14	7122	38	
71	69	40	39.29	2350	2.9					
92	53	30	30.31	2160	3.7					
28.7	172	50	48.71	3190	1.2	TKM38B	80B5/B14	8014	32	
36	139	40	39.29	2970	1.4	TKB38B	80B5/B14	8014	38	
46	107	30	30.31	2720	1.9					
57	86	25	24.44	2530	2.3					
69	71	20	20.25	2380	2.8					
95	52	15	14.67	2130	3.7					
110	45	12.5	12.67	2030	3.7					
133	37	10	10.50	1910	3.6					
184	27	7.5	7.60	1710	3.7					
22.9	216	40	39.29	3440	0.9	TKM38B	80B5/B14	8026	32	
29.7	166	30	30.31	3150	1.2	TKB38B	80B5/B14	8026	38	
37	134	25	24.44	2930	1.5					
44	111	20	20.25	2760	1.8					
61	80	15	14.67	2470	2.4					
71	70	12.5	12.67	2360	2.4					
86	58	10	10.50	2210	2.3					
118	42	7.5	7.60	1990	2.4					
14.0	346	200	200.66	5540	1.0	TKM48C	71B5/B14	7122	35	
18.5	261	150	151.20	5040	1.3	TKB48C	71B5/B14	7122	41	
22.2	217	125	125.95	4750	1.6					
28.2	171	100	99.22	4380	2.0					
37	130	75	75.45	4000	2.7					
45	108	60	62.43	3750	3.2					
57	85	50	49.18	3470	4.1					
47	105	60	59.44	3690	3.3	TKM48B	71B5/B14	7122	34	
58	85	50	48.18	3440	4.1	TKB48B	71B5/B14	7122	40	
14.1	342	100	99.22	5520	1.0	TKM48C	80B5/B14	8014	35	
18.6	260	75	75.45	5040	1.3	TKB48C	80B5/B14	8014	41	

P _{1n} [kW]	n ₂ [r/min]	M _{2n} [Nm]	i Nominal	i Actual	F _{r2} [N]	fs			Page	
0.55	22.4	215	60	62.43	4730	1.6	TKM48C	80B5/B14	8014	35
	28.5	170	50	49.18	4370	2.1	TKB48C	80B5/B14	8014	41
	23.6	210	60	59.44	4660	1.7	TKM48B	80B5/B14	8014	34
	29.1	170	50	48.18	4340	2.1	TKB48B	80B5/B14	8014	40
	35	142	40	40.13	4080	2.5				
	46	107	30	30.24	3720	3.3				
	56	89	25	25.19	3500	3.9				
	14.4	335	60	62.43	5480	1.0	TKM48C	80B5/B14	8026	35
	18.3	264	50	49.18	5060	1.3	TKB48C	80B5/B14	8026	41
	15.1	326	60	59.44	5390	1.1	TKM48B	80B5/B14	8026	34
	18.7	264	50	48.18	5030	1.3	TKB48B	80B5/B14	8026	40
	22.4	220	40	40.13	4730	1.6				
	29.8	166	30	30.24	4310	2.1				
	36	138	25	25.19	4050	2.5				
	45	109	20	19.84	3740	3.2				
	60	83	15	15.09	3410	4.2				
	9.5	509	300	295.18	7990	0.9	TKM58C	71B5/B14	7122	37
	11.6	416	250	240.89	7470	1.2	TKB58C	71B5/B14	7122	43
	14.0	346	200	200.66	7030	1.4				
	18.5	261	150	151.20	6390	1.9				
	22.2	217	125	125.95	6010	2.3				
	28.2	171	100	99.22	5550	2.9				
	37	130	75	75.45	5070	3.8				
	45	108	60	62.43	4760	4.2				
	57	85	50	49.18	4390	4.1				
	9.3	522	150	151.20	8050	1.0	TKM58C	80B5/B14	8014	37
	11.1	435	125	125.95	7580	1.2	TKB58C	80B5/B14	8014	43
	14.1	342	100	99.22	7000	1.5				
	18.6	260	75	75.45	6390	1.9				
	22.4	215	60	62.43	6000	2.1				
	28.5	170	50	49.18	5540	2.1				
	23.7	208	60	59.04	5890	2.2	TKM58B	80B5/B14	8014	36
	29.1	170	50	48.18	5500	2.9	TKB58B	80B5/B14	8014	42
	35	142	40	40.13	5170	3.5				
	9.1	533	100	99.22	8110	0.9	TKM58C	80B5/B14	8026	37
	11.9	405	75	75.45	7400	1.2	TKB58C	80B5/B14	8026	43
14.4	335	60	62.43	6950	1.3					
18.3	264	50	49.18	6420	1.3					
15.2	324	60	59.04	6820	1.4	TKM58B	80B5/B14	8026	36	
18.7	264	50	48.18	6370	1.9	TKB58B	80B5/B14	8026	42	
22.4	220	40	40.13	6000	2.3					
29.8	166	30	30.24	5460	3.0					
36	138	25	25.19	5130	3.6					
0.75	57	117	50	48.86	2220	1.1	TKM28B	80B5/B14	8012	30
	70	96	40	40.09	2070	1.3				
	95	71	30	29.33	1870	1.8				
	116	58	25	24.07	1750	2.2				
	139	49	20	20.21	1650	2.7				
	188	36	15	14.92	1490	3.6				
	48	141	30	29.33	2350	0.9	TKM28B	80B5/B14	8024	30
	58	116	25	24.07	2200	1.1				
	69	97	20	20.21	2080	1.3				
	94	72	15	14.92	1880	1.8				
	112	60	12.5	12.47	1770	2.2				
	134	50	10	10.47	1670	2.6				
	181	37	7.5	7.73	1510	2.7				

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page	
0.75	60	112	15	14.92	2180	1.2	TKM28B	90B5/B14	90S6	30
	72	93	12.5	12.47	2050	1.4				
	86	78	10	10.47	1930	1.7				
	116	58	7.5	7.73	1750	1.7				
	38	173	75	73.33	2900	0.9	TKM38C	80B5/B14	8012	33
	44	149	60	63.33	2760	0.9	TKB38C	80B5/B14	8012	39
	53	124	50	52.48	2590	1.0				
	46	145	60	60.50	2720	1.2	TKM38B	80B5/B14	8012	32
	57	117	50	48.71	2530	1.7	TKB38B	80B5/B14	8012	38
	71	94	40	39.29	2350	2.1				
	92	73	30	30.31	2160	2.7				
	115	59	25	24.44	2010	3.4				
	138	49	20	20.25	1890	4.1				
	28.7	234	50	48.71	3190	0.9	TKM38B	80B5/B14	8024	32
	36	189	40	39.29	2970	1.1	TKB38B	80B5/B14	8024	38
	46	146	30	30.31	2720	1.4				
	57	118	25	24.44	2530	1.7				
	69	97	20	20.25	2380	2.1				
	95	71	15	14.67	2130	2.7				
	110	61	12.5	12.67	2030	2.7				
	133	50	10	10.50	1910	2.7				
	184	37	7.5	7.60	1710	2.7				
	37	183	25	24.44	2930	1.1	TKM38B	90B5/B14	90S6	32
	44	151	20	20.25	2760	1.3	TKB38B	90B5/B14	90S6	38
	61	110	15	14.67	2470	1.7				
	71	95	12.5	12.67	2360	1.7				
	86	79	10	10.50	2210	1.7				
	118	57	7.5	7.60	1990	1.8				
	18.5	356	150	151.20	5040	1.0	TKM48C	80B5/B14	8012	35
	22.2	296	125	125.95	4750	1.2	TKB48C	80B5/B14	8012	41
	28.2	234	100	99.22	4380	1.5				
	37	178	75	75.45	4000	2.0				
	45	147	60	62.43	3750	2.4				
	57	116	50	49.18	3470	3.0				
	47	143	60	59.44	3690	2.4	TKM48B	80B5/B14	8012	34
	58	116	50	48.18	3440	3.0	TKB48B	80B5/B14	8012	40
	70	96	40	40.13	3240	3.6				
	18.6	355	75	75.45	5040	1.0	TKM48C	80B5/B14	8024	35
	22.4	294	60	62.43	4730	1.2	TKB48C	80B5/B14	8024	41
	28.5	231	50	49.18	4370	1.5				
	23.6	286	60	59.44	4660	1.2	TKM48B	80B5/B14	8024	34
	29.1	232	50	48.18	4340	1.5	TKB48B	80B5/B14	8024	40
	35	193	40	40.13	4080	1.8				
	46	145	30	30.24	3720	2.4				
	56	121	25	25.19	3500	2.9				
	71	95	20	19.84	3230	3.7				
	18.7	360	50	48.18	5030	1.0	TKM48B	90B5/B14	90S6	34
	22.4	300	40	40.13	4730	1.2	TKB48B	90B5/B14	90S6	40
	29.8	226	30	30.24	4310	1.5				
	36	188	25	25.19	4050	1.9				
	45	148	20	19.84	3740	2.4				
	60	113	15	15.09	3410	3.1				
	72	93	12.5	12.49	3210	3.7				
	11.6	567	250	240.89	7470	0.9	TKM58C	80B5/B14	8012	37
	14.0	472	200	200.66	7030	1.1	TKB58C	80B5/B14	8012	43
	18.5	356	150	151.20	6390	1.4				
	22.2	296	125	125.95	6010	1.7				

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	fs			Page	
0.75	28.2	234	100	99.22	5550	2.1	TKM58C	80B5/B14	8012	37
	37	178	75	75.45	5070	2.8	TKB58C	80B5/B14	8012	43
	45	147	60	62.43	4760	3.1				
	57	116	50	49.18	4390	3.0				
	14.1	467	100	99.22	7000	1.1	TKM58C	80B5/B14	8024	37
	18.6	355	75	75.45	6390	1.4	TKB58C	80B5/B14	8024	43
	22.4	294	60	62.43	6000	1.5				
	28.5	231	50	49.18	5540	1.5				
	23.7	284	60	59.04	5890	1.6	TKM58B	80B5/B14	8024	36
	29.1	232	50	48.18	5500	2.2	TKB58B	80B5/B14	8024	42
	35	193	40	40.13	5170	2.6				
	46	145	30	30.24	4710	3.4				
	56	121	25	25.19	4430	4.1				
	11.9	552	75	75.45	7400	0.9	TKM58C	90B5/B14	90S6	37
	14.4	457	60	62.43	6950	1.0	TKB58C	90B5/B14	90S6	43
	18.3	360	50	49.18	6420	1.0				
	15.2	442	60	59.04	6820	1.0	TKM58B	90B5/B14	90S6	36
	18.7	360	50	48.18	6370	1.4	TKB58B	90B5/B14	90S6	42
	22.4	300	40	40.13	6000	1.7				
	29.8	226	30	30.24	5460	2.2				
36	188	25	25.19	5130	2.7					
45	148	20	19.84	4740	3.4					
60	113	15	15.09	4330	4.4					
1.1	70	141	40	40.09	2070	0.9	TKM28B	80B5/B14	8022	30
	95	103	30	29.33	1870	1.3				
	116	85	25	24.07	1750	1.5				
	139	71	20	20.21	1650	1.8				
	188	53	15	14.92	1490	2.5				
	225	44	12.5	12.47	1400	3.0				
	267	37	10	10.47	1320	3.5				
	362	27	7.5	7.73	1200	3.7				
	69	143	20	20.21	2080	0.9	TKM28B	90B5/B14	90S4	30
	94	105	15	14.92	1880	1.2				
	112	88	12.5	12.47	1770	1.5				
	134	74	10	10.47	1670	1.8				
	181	55	7.5	7.73	1510	1.8				
	72	137	12.5	12.47	2050	1.0	TKM28B	90B5/B14	90L6	30
	86	115	10	10.47	1930	1.1				
	116	85	7.5	7.73	1750	1.2				
	57	172	50	48.71	2530	1.2	TKM38B	80B5/B14	8022	32
	71	139	40	39.29	2350	1.4	TKB38B	80B5/B14	8022	38
	92	107	30	30.31	2160	1.9				
	115	86	25	24.44	2010	2.3				
	138	71	20	20.25	1890	2.8				
	191	52	15	14.67	1690	3.7				
	221	45	12.5	12.67	1610	3.7				
	267	37	10	10.50	1510	3.6				
	368	27	7.5	7.60	1360	3.7				
	46	214	30	30.31	2720	0.9	TKM38B	90B5/B14	90S4	32
	57	172	25	24.44	2530	1.2	TKB38B	90B5/B14	90S4	38
	69	143	20	20.25	2380	1.4				
	95	103	15	14.67	2130	1.8				
	110	89	12.5	12.67	2030	1.8				
133	74	10	10.50	1910	1.8					
184	54	7.5	7.60	1710	1.9					
44	222	20	20.25	2760	0.9	TKM38B	90B5/B14	90L6	32	
61	161	15	14.67	2470	1.2	TKB38B	90B5/B14	90L6	38	

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page	
1.1	71	139	12.5	12.67	2360	1.2	TKM38B	90B5/B14	90L6	32
	86	115	10	10.50	2210	1.2	TKB38B	90B5/B14	90L6	38
	118	83	7.5	7.60	1990	1.2				
	28.2	342	100	99.22	4380	1.0	TKM48C	80B5/B14	8022	35
	37	260	75	75.45	4000	1.3	TKB48C	80B5/B14	8022	41
	45	215	60	62.43	3750	1.6				
	57	170	50	49.18	3470	2.1				
	47	210	60	59.44	3690	1.7	TKM48B	80B5/B14	8022	34
	58	170	50	48.18	3440	2.1	TKB48B	80B5/B14	8022	40
	70	142	40	40.13	3240	2.5				
	93	107	30	30.24	2950	3.3				
	111	89	25	25.19	2770	3.9				
	29.1	340	50	48.18	4340	1.0	TKM48B	90B5/B14	90S4	34
	35	283	40	40.13	4080	1.2	TKB48B	90B5/B14	90S4	40
	46	213	30	30.24	3720	1.6				
	56	178	25	25.19	3500	2.0				
	71	140	20	19.84	3230	2.5				
	93	106	15	15.09	2950	3.3				
	112	88	12.5	12.49	2770	4.0				
	29.8	332	30	30.24	4310	1.1	TKM48B	90B5/B14	90L6	34
	36	276	25	25.19	4050	1.3	TKB48B	90B5/B14	90L6	40
	45	218	20	19.84	3740	1.6				
	60	166	15	15.09	3410	2.1				
	72	137	12.5	12.49	3210	2.6				
	91	108	10	9.84	2960	3.2				
	120	82	7.5	7.48	2700	3.4				
	18.5	522	150	151.20	6390	1.0	TKM58C	80B5/B14	8022	37
	22.2	435	125	125.95	6010	1.2	TKB58C	80B5/B14	8022	43
	28.2	342	100	99.22	5550	1.5				
	37	260	75	75.45	5070	1.9				
	45	215	60	62.43	4760	2.1				
	57	170	50	49.18	4390	2.1				
	47	208	60	59.04	4670	2.2	TKM58B	80B5/B14	8022	36
	58	170	50	48.18	4360	2.9	TKB58B	80B5/B14	8022	42
	70	142	40	40.13	4110	3.5				
	18.6	521	75	75.45	6390	1.0	TKM58C	90B5/B14	90S4	37
	22.4	431	60	62.43	6000	1.0	TKB58C	90B5/B14	90S4	43
	28.5	340	50	49.18	5540	1.0				
	23.7	416	60	59.04	5890	1.1	TKM58B	90B5/B14	90S4	36
	29.1	340	50	48.18	5500	1.5	TKB58B	90B5/B14	90S4	42
	35	283	40	40.13	5170	1.8				
	46	213	30	30.24	4710	2.3				
	56	178	25	25.19	4430	2.8				
	71	140	20	19.84	4090	3.6				
	18.7	529	50	48.18	6370	0.9	TKM58B	90B5/B14	90L6	36
	22.4	440	40	40.13	6000	1.1	TKB58B	90B5/B14	90L6	42
	29.8	332	30	30.24	5460	1.5				
	36	276	25	25.19	5130	1.8				
45	218	20	19.84	4740	2.3					
60	166	15	15.09	4330	3.0					
72	137	12.5	12.49	4060	3.4					
91	108	10	9.84	3750	3.3					
120	82	7.5	7.48	3420	3.4					
1.5	116	116	25	24.07	1750	1.1	TKM28B	90B5/B14	90S2	30
	139	97	20	20.21	1650	1.3				
	188	72	15	14.92	1490	1.8				
	225	60	12.5	12.47	1400	2.2				

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page	
1.5	267	50	10	10.47	1320	2.6	TKM28B	90B5/B14	90S2	30
	362	37	7.5	7.73	1200	2.7				
	94	144	15	14.92	1880	0.9	TKM28B	90B5/B14	90L4	30
	112	120	12.5	12.47	1770	1.1				
	134	101	10	10.47	1670	1.3				
	181	74	7.5	7.73	1510	1.3				
	57	234	50	48.71	2530	0.9	TKM38B	90B5/B14	90S2	32
	71	189	40	39.29	2350	1.1	TKB38B	90B5/B14	90S2	38
	92	146	30	30.31	2160	1.4				
	115	118	25	24.44	2010	1.7				
	138	97	20	20.25	1890	2.1				
	191	71	15	14.67	1690	2.7				
	221	61	12.5	12.67	1610	2.7				
	267	50	10	10.50	1510	2.7				
	368	37	7.5	7.60	1360	2.7				
	57	235	25	24.44	2530	0.9	TKM38B	90B5/B14	90L4	32
	69	195	20	20.25	2380	1.0	TKB38B	90B5/B14	90L4	38
	95	141	15	14.67	2130	1.3				
	110	122	12.5	12.67	2030	1.4				
	133	101	10	10.50	1910	1.3				
	184	73	7.5	7.60	1710	1.4				
	37	355	75	75.45	4000	1.0	TKM48C	90B5/B14	90S2	35
	45	294	60	62.43	3750	1.2	TKB48C	90B5/B14	90S2	41
	57	231	50	49.18	3470	1.5				
	47	286	60	59.44	3690	1.2	TKM48B	90B5/B14	90S2	34
	58	232	50	48.18	3440	1.5	TKB48B	90B5/B14	90S2	40
	70	193	40	40.13	3240	1.8				
	93	145	30	30.24	2950	2.4				
	111	121	25	25.19	2770	2.9				
	141	95	20	19.84	2560	3.7				
	35	386	40	40.13	4080	0.9	TKM48B	90B5/B14	90L4	34
	46	291	30	30.24	3720	1.2	TKB48B	90B5/B14	90L4	40
	56	242	25	25.19	3500	1.4				
	71	191	20	19.84	3230	1.8				
	93	145	15	15.09	2950	2.4				
	112	120	12.5	12.49	2770	2.9				
	142	95	10	9.84	2550	3.7				
	187	72	7.5	7.48	2330	3.9				
	28.2	467	100	99.22	5550	1.1	TKM58C	90B5/B14	90S2	37
	37	355	75	75.45	5070	1.4	TKB58C	90B5/B14	90S2	43
	45	294	60	62.43	4760	1.5				
	57	231	50	49.18	4390	1.5				
	47	284	60	59.04	4670	1.6	TKM58B	90B5/B14	90S2	36
	58	232	50	48.18	4360	2.2	TKB58B	90B5/B14	90S2	42
	70	193	40	40.13	4110	2.6				
	93	145	30	30.24	3740	3.4				
	111	121	25	25.19	3520	4.1				
	29.1	463	50	48.18	5500	1.1	TKM58B	90B5/B14	90L4	36
35	386	40	40.13	5170	1.3	TKB58B	90B5/B14	90L4	42	
46	291	30	30.24	4710	1.7					
56	242	25	25.19	4430	2.1					
71	191	20	19.84	4090	2.6					
93	145	15	15.09	3730	3.4					
112	120	12.5	12.49	3510	3.8					
142	95	10	9.84	3240	3.8					
187	72	7.5	7.48	2950	3.9					

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	f_s			Page	
2.2	139	143	20	20.21	1650	0.9	TKM28B	90B5/B14	90L2	30
	188	105	15	14.92	1490	1.2				
	225	88	12.5	12.47	1400	1.5				
	267	74	10	10.47	1320	1.8				
	362	55	7.5	7.73	1200	1.8				
	92	214	30	30.31	2160	0.9	TKM38B	90B5/B14	90L2	32
	115	172	25	24.44	2010	1.2	TKB38B	90B5/B14	90L2	38
	138	143	20	20.25	1890	1.4				
	191	103	15	14.67	1690	1.8				
	221	89	12.5	12.67	1610	1.8				
	267	74	10	10.50	1510	1.8				
	368	54	7.5	7.60	1360	1.9				
	58	340	50	48.18	3440	1.0	TKM48B	90B5/B14	90L2	34
	70	283	40	40.13	3240	1.2	TKB48B	90B5/B14	90L2	40
	93	213	30	30.24	2950	1.6				
	111	178	25	25.19	2770	2.0				
	141	140	20	19.84	2560	2.5				
	186	106	15	15.09	2340	3.3				
	224	88	12.5	12.49	2190	4.0				
	56	355	25	25.19	3500	1.0	TKM48B	100B5/B14	100LA4	34
	71	280	20	19.84	3230	1.3	TKB48B	100B5/B14	100LA4	40
	93	213	15	15.09	2950	1.6				
	112	176	12.5	12.49	2770	2.0				
	142	139	10	9.84	2550	2.5				
	187	106	7.5	7.48	2330	2.7				
	60	331	15	15.09	3410	1.1	TKM48B	112B5/B14	112M6	34
	72	274	12.5	12.49	3210	1.3	TKB48B	112B5/B14	112M6	40
	91	216	10	9.84	2960	1.6				
	120	164	7.5	7.48	2700	1.7				
	37	521	75	75.45	5070	1.0	TKM58C	90B5/B14	90L2	37
	45	431	60	62.43	4760	1.0	TKB58C	90B5/B14	90L2	43
	57	340	50	49.18	4390	1.0				
	47	416	60	59.04	4670	1.1	TKM58B	90B5/B14	90L2	36
	58	340	50	48.18	4360	1.5	TKB58B	90B5/B14	90L2	42
	70	283	40	40.13	4110	1.8				
	93	213	30	30.24	3740	2.3				
	111	178	25	25.19	3520	2.8				
	141	140	20	19.84	3250	3.6				
	35	566	40	40.13	5170	0.9	TKM58B	100B5/B14	100LA4	36
	46	427	30	30.24	4710	1.2	TKB58B	100B5/B14	100LA4	42
	56	355	25	25.19	4430	1.4				
	71	280	20	19.84	4090	1.8				
	93	213	15	15.09	3730	2.3				
	112	176	12.5	12.49	3510	2.6				
	142	139	10	9.84	3240	2.6				
187	106	7.5	7.48	2950	2.7					
36	553	25	25.19	5130	0.9	TKM58B	112B5/B14	112M6	36	
45	435	20	19.84	4740	1.1	TKB58B	112B5/B14	112M6	42	
60	331	15	15.09	4330	1.5					
72	274	12.5	12.49	4060	1.7					
91	216	10	9.84	3750	1.7					
120	164	7.5	7.48	3420	1.7					
3	70	386	40	40.13	3240	0.9	TKM48B	100B5/B14	100L2	34
	93	291	30	30.24	2950	1.2	TKB48B	100B5/B14	100L2	40
	111	242	25	25.19	2770	1.4				
	141	191	20	19.84	2560	1.8				

P_{1n} [kW]	n_2 [r/min]	M_{2n} [Nm]	i Nominal	i Actual	F_{r2} [N]	fs			Page	
3	186	145	15	15.09	2340	2.4	TKM48B	100B5/B14	100L2	34
	224	120	12.5	12.49	2190	2.9	TKB48B	100B5/B14	100L2	40
	285	95	10	9.84	2030	3.7				
	374	72	7.5	7.48	1850	3.9				
	93	290	15	15.09	2950	1.2	TKM48B	100B5/B14	100LB4	34
	112	240	12.5	12.49	2770	1.5	TKB48B	100B5/B14	100LB4	40
	142	189	10	9.84	2550	1.8				
	187	144	7.5	7.48	2330	1.9				
	47	568	60	59.04	4670	0.8	TKM58B	100B5/B14	100L2	36
	58	463	50	48.18	4360	1.1	TKB58B	100B5/B14	100L2	42
	70	386	40	40.13	4110	1.3				
	93	291	30	30.24	3740	1.7				
	111	242	25	25.19	3520	2.1				
	141	191	20	19.84	3250	2.6				
	186	145	15	15.09	2960	3.4				
	224	120	12.5	12.49	2780	3.8				
	285	95	10	9.84	2570	3.8				
	374	72	7.5	7.48	2340	3.9				
	56	485	25	25.19	4430	1.0	TKM58B	100B5/B14	100LB4	36
	71	382	20	19.84	4090	1.3	TKB58B	100B5/B14	100LB4	42
93	290	15	15.09	3730	1.7					
112	240	12.5	12.49	3510	1.9					
142	189	10	9.84	3240	1.9					
187	144	7.5	7.48	2950	1.9					
4	111	323	25	25.19	2770	1.1	TKM48B	112B5/B14	112M2	34
	141	254	20	19.84	2560	1.4	TKB48B	112B5/B14	112M2	40
	186	194	15	15.09	2340	1.8				
	224	160	12.5	12.49	2190	2.2				
	285	126	10	9.84	2030	2.8				
	374	96	7.5	7.48	1850	2.9				
	112	320	12.5	12.49	2770	1.1	TKM48B	112B5/B14	112M4	34
	142	252	10	9.84	2550	1.4	TKB48B	112B5/B14	112M4	40
	187	192	7.5	7.48	2330	1.5				
	70	515	40	40.13	4110	1.0	TKM58B	112B5/B14	112M2	36
	93	388	30	30.24	3740	1.3	TKB58B	112B5/B14	112M2	42
	111	323	25	25.19	3520	1.5				
	141	254	20	19.84	3250	2.0				
	186	194	15	15.09	2960	2.6				
	224	160	12.5	12.49	2780	2.9				
	285	126	10	9.84	2570	2.9				
	374	96	7.5	7.48	2340	2.9				
	71	509	20	19.84	4090	1.0	TKM58B	112B5/B14	112M4	36
	93	387	15	15.09	3730	1.3	TKB58B	112B5/B14	112M4	42
	112	320	12.5	12.49	3510	1.4				
142	252	10	9.84	3240	1.4					
187	192	7.5	7.48	2950	1.5					

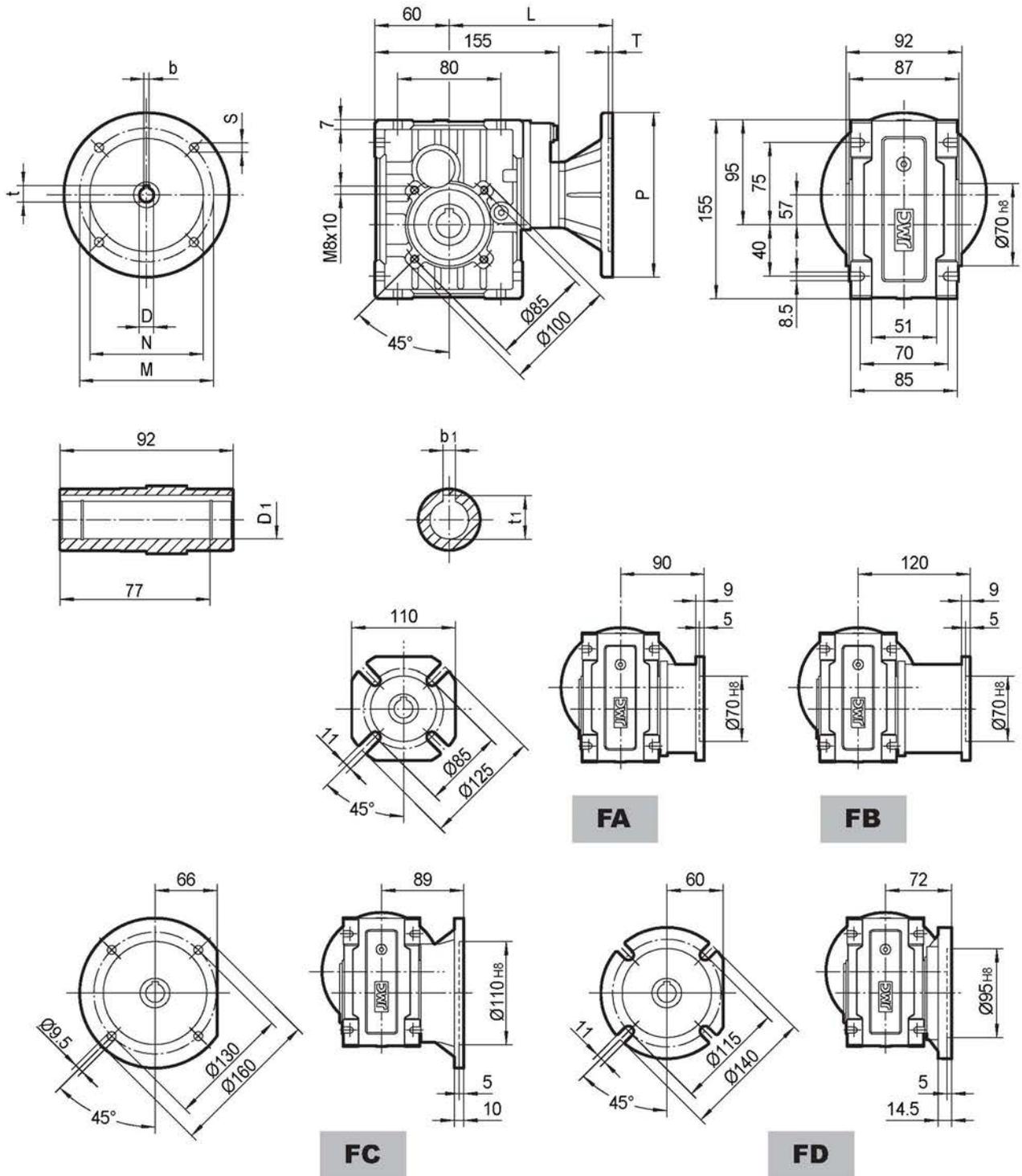
6.3 TKM / TKB.. HS Performance parameter
 $n_1=1400\text{r/min}$

$M_{2\text{max}}$ [Nm]	n_2 [r/min]	i Nominal	i Actual	P_{1n} [kW]	Fr_2 [N]	Fr_1 [N]		Page 
110	4.8	300	291.79	0.06	4100	400	TKM28C..HS	44
130	5.7	250	244.29	0.08	4100	400		
130	7	200	200.44	0.10	4100	400		
130	10	150	146.67	0.14	4000	400		
130	12	125	120.34	0.17	3770	400		
130	14	100	101.04	0.21	3560	400		
130	19	75	74.62	0.28	3220	400		
120	22	60	62.36	0.31	3030	400		
110	27	50	52.36	0.33	2860	400		
110	24	60	58.36	0.29	2960	400	TKM28B..HS	44
130	29	50	48.86	0.41	2790	400		
130	35	40	40.09	0.51	2610	400		
130	48	30	29.33	0.69	2350	400		
130	58	25	24.07	0.84	2200	400		
130	69	20	20.21	1.0	2080	400		
130	94	15	14.92	1.4	1880	400		
130	112	12.5	12.47	1.6	1770	400		
130	134	10	10.47	1.9	1670	400		
100	181	7.5	7.73	2.0	1510	400		
170	4.6	300	302.50	0.09	4800	400		
200	5.7	250	243.57	0.13	4800	400	TKB38C..HS	44
200	7.1	200	196.43	0.16	4800	400		
200	9.2	150	151.56	0.21	4650	400		
200	11	125	122.22	0.26	4330	400		
200	14	100	101.27	0.31	4070	400		
160	19	75	73.33	0.35	3650	400		
140	22	60	63.33	0.35	3480	400		
120	27	50	52.48	0.36	3270	400		
170	23	60	60.50	0.44	3430	530	TKM38B..HS	44
200	29	50	48.71	0.64	3190	530	TKB38B..HS	44
200	36	40	39.29	0.79	2970	530		
200	46	30	30.31	1.0	2720	530		
200	57	25	24.44	1.3	2530	530		
200	69	20	20.25	1.5	2380	530		
190	95	15	14.67	2.0	2130	530		
165	110	12.5	12.67	2.0	2030	530		
135	133	10	10.50	2.0	1910	530		
100	184	7.5	7.60	2.05	1710	530		
350	4.7	300	297.21	0.19	6500	560	TKM48C..HS	44
350	5.8	250	240.89	0.23	6500	560	TKB48C..HS	44
350	7	200	200.66	0.28	6500	560		
350	9.3	150	151.20	0.37	6500	560		
350	11	125	125.95	0.44	5980	560		
350	14	100	99.22	0.56	5520	560		
350	19	75	75.45	0.74	5040	560		
350	22	60	62.43	0.89	4730	560		
350	28	50	49.18	1.1	4370	560		
350	24	60	59.44	0.92	4660	860	TKM48B..HS	44
350	29	50	48.18	1.1	4340	860	TKB48B..HS	44
350	35	40	40.13	1.4	4080	860		
350	46	30	30.24	1.8	3720	860		
350	56	25	25.19	2.2	3500	860		

$n_1 = 1400 \text{ r/min}$

$M_{2 \text{ max}}$ [Nm]	n_2 [r/min]	i Nominal	i Actual	P_{1n} [kW]	Fr_2 [N]	Fr_1 [N]		Page
350	71	20	19.84	2.8	3230	860	TKM48B..HS TKB48B..HS	44
350	93	15	15.09	3.6	2950	860		44
350	112	12.5	12.49	4.4	2770	860		
350	142	10	9.84	5.5	2550	860		
280	187	7.5	7.48	5.8	2330	860		
460	4.7	300	295.18	0.25	8300	560	TKM58C..HS TKB58C..HS	44
500	5.8	250	240.89	0.33	8300	560		44
500	7	200	200.66	0.40	8300	560		
500	9.3	150	151.20	0.53	8050	560		
500	11	125	125.95	0.63	7580	560		
500	14	100	99.22	0.80	7000	560		
500	19	75	75.45	1.1	6390	560		
450	22	60	62.43	1.1	6000	560		
350	28	50	49.18	1.1	5540	560		
460	24	60	59.04	1.2	5890	1260		TKM58B..HS TKB58B..HS
500	29	50	48.18	1.6	5500	1260	44	
500	35	40	40.13	1.9	5170	1260		
500	46	30	30.24	2.6	4710	1260		
500	56	25	25.19	3.1	4430	1260		
500	71	20	19.84	3.9	4090	1260		
500	93	15	15.09	5.2	3730	1260		
460	112	12.5	12.49	5.7	3510	1260		
360	142	10	9.84	5.7	3240	1260		
280	187	7.5	7.48	5.8	2950	1260		

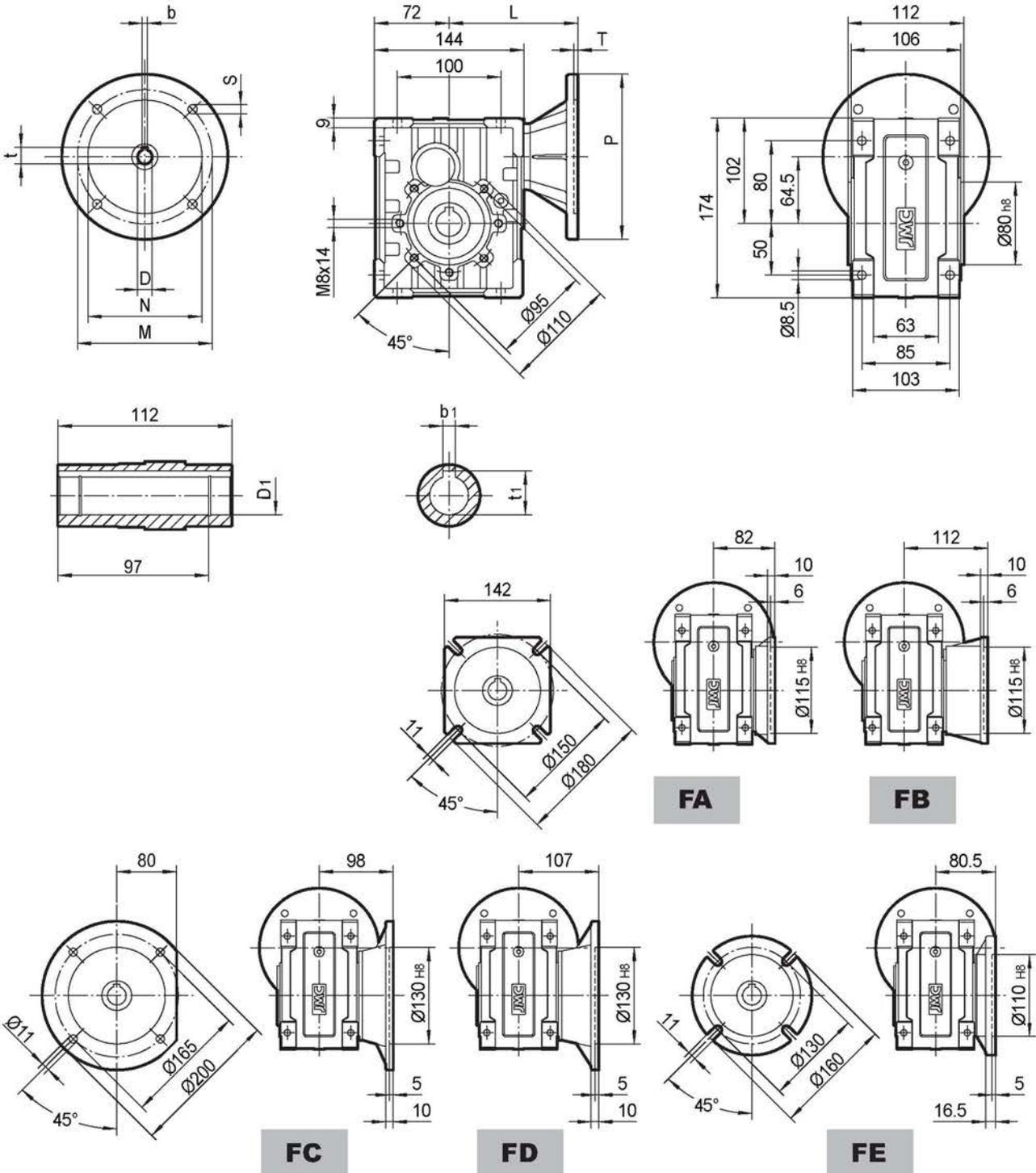
TKM28C..



IEC	D _{E8}	b	t	P	M	N	S	T	L	D1 H8	b1	t1
63B5	11	4	12.8	140	115	95	9	4	140	20*	6*	22.8*
71B5	14	5	16.3	160	130	110	9	4	147	24*	8*	27.3*
71B14	14	5	16.3	105	85	70	7	4	147	25	8	28.3
80B5	19	6	21.8	200	165	130	11	4	167	* Only on request		
80B14	19	6	21.8	120	100	80	7	4	167			
90B14	24	8	27.3	140	115	95	9	4	167			

Weight without motor
≈ 5 kg

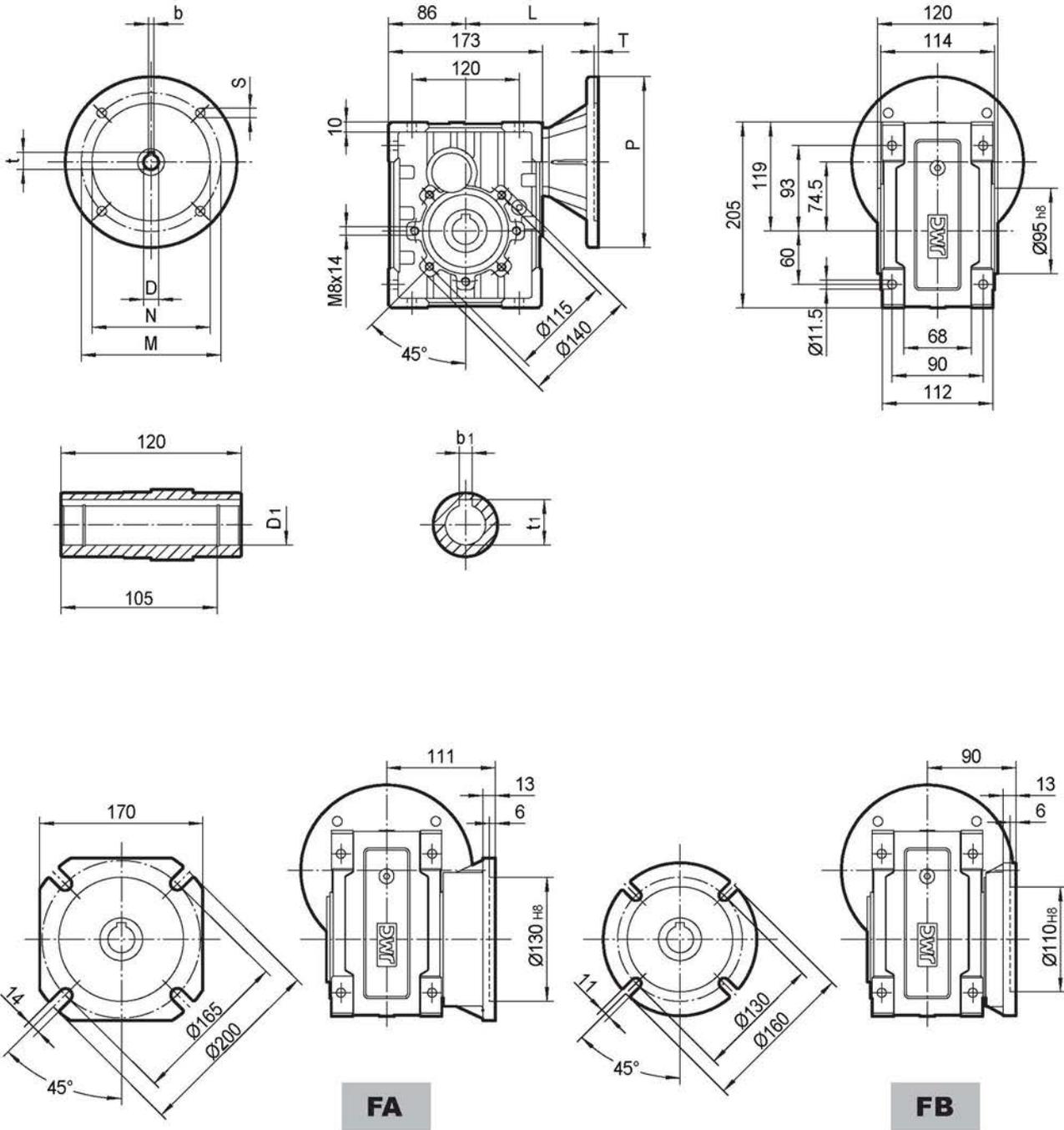
TKM38B..



IEC	D E8	b	t	P	M	N	S	T	L	D1 H8	b1	t1
71B5	14	5	16.3	160	130	110	9	4	124	25	8	28.3
71B14	14	5	16.3	105	85	70	7	4	124	28*	8*	31.3*
80B5	19	6	21.8	200	165	130	11	4	144	30*	8*	33.3*
80B14	19	6	21.8	120	100	80	7	4	144	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	144			
90B14	24	8	27.3	140	115	95	9	4	144			

Weight without motor
≈ 6.0 kg

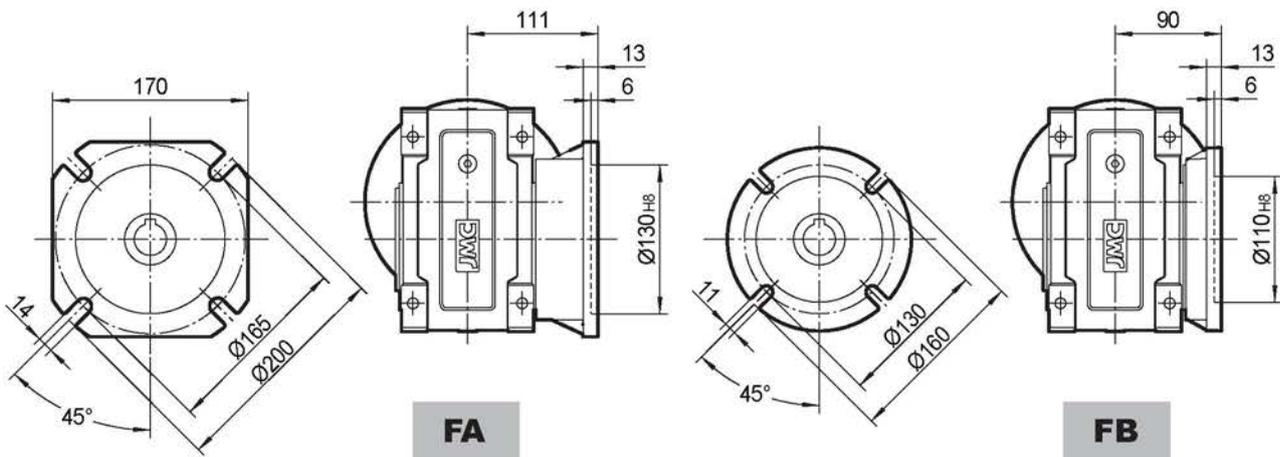
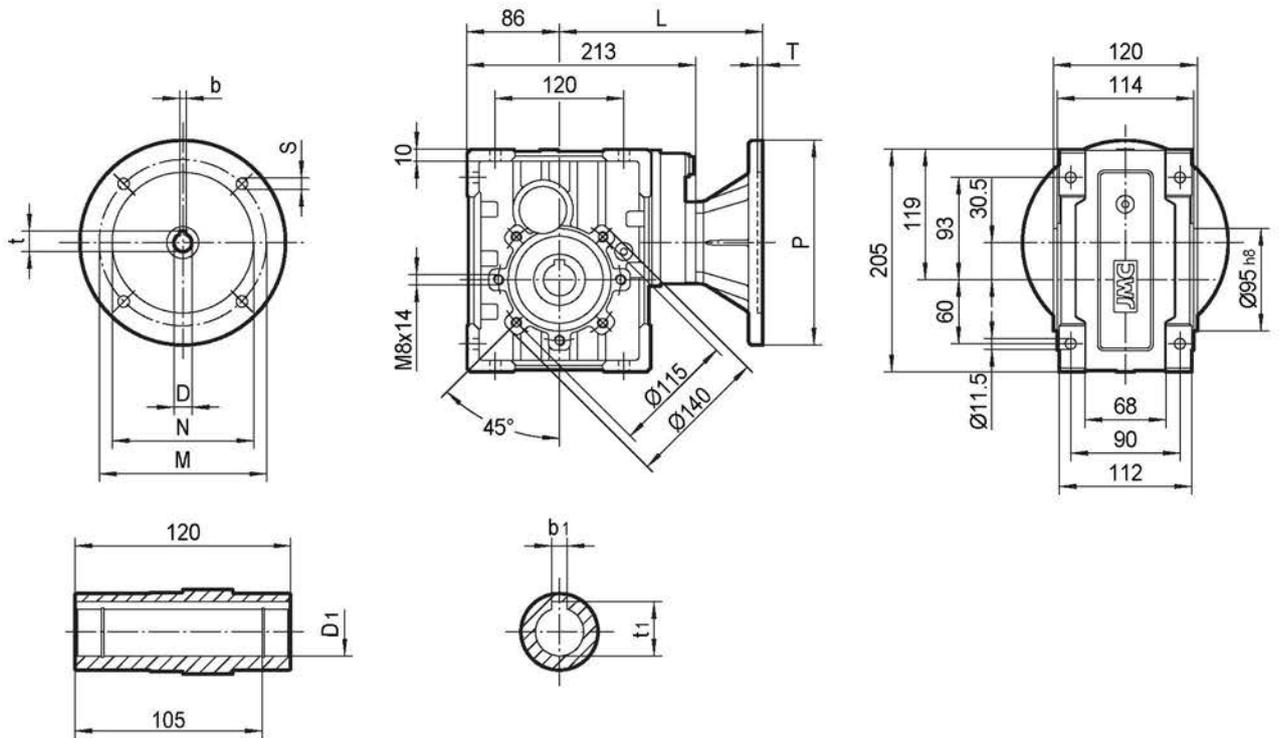
TKM48B..



IEC	D E8	b	t	P	M	N	S	T	L	D1 H8	b1	t1
63B5	11	4	12.8	140	115	95	9	4	139	28	8	31.3
71B5	14	5	16.3	160	130	110	9	4	146	30*	8*	33.3*
80B5	19	6	21.8	200	165	130	11	4	166	35*	10*	38.3*
80B14	19	6	21.8	120	100	80	7	4	166	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	166			
90B14	24	8	27.3	140	115	95	9	4	166			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	176			
100/112B14	28	8	31.3	160	130	110	9	4.5	176			

Weight without motor
≈ 9.2 kg

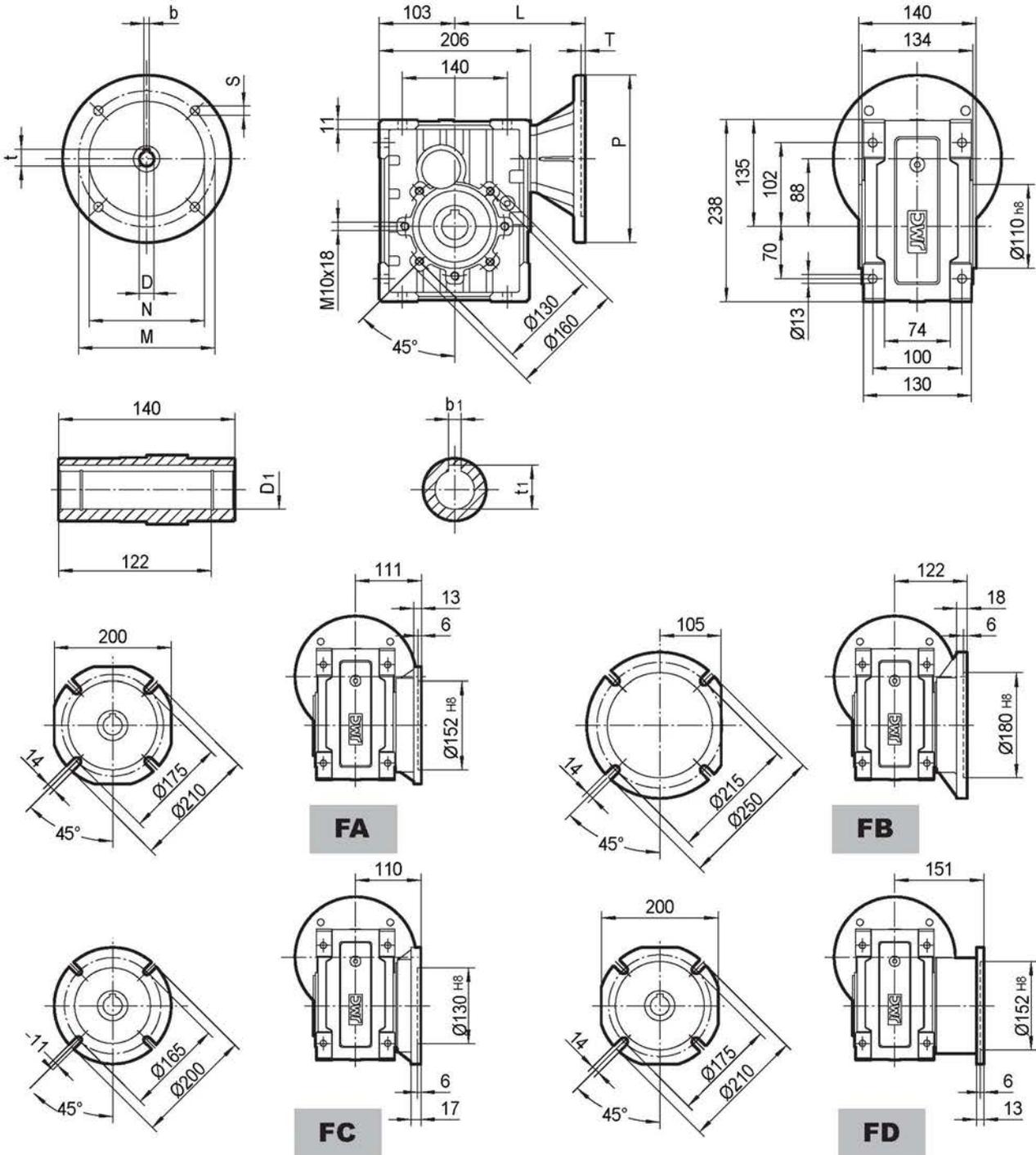
TKM48C..



IEC	D E8	b	t	P	M	N	S	T	L	D1 H8	b1	t1
63B5	11	4	12.8	140	115	95	9	4	179	28	8	31.3
71B5	14	5	16.3	160	130	110	9	4	186	30*	8*	33.3*
80B5	19	6	21.8	200	165	130	11	4	206	35*	10*	38.3*
80B14	19	6	21.8	120	100	80	7	4	206	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	206			
90B14	24	8	27.3	140	115	95	9	4	206			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	216			
100/112B14	28	8	31.3	160	130	110	9	4.5	216			

Weight without motor
 ≈ 10.8 kg

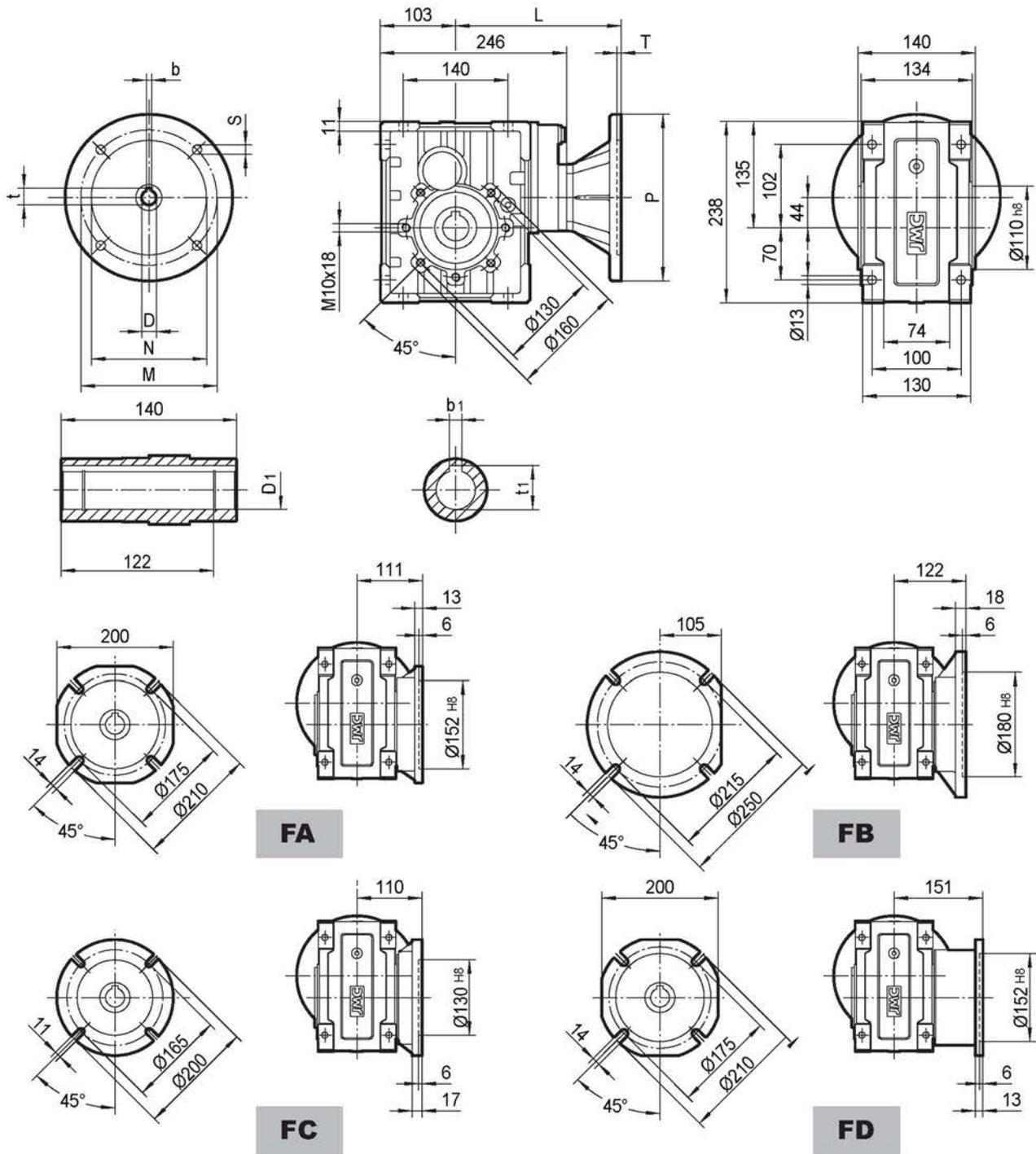
TKM58B..



IEC	D _{E8}	b	t	P	M	N	S	T	L	D1 _{H8}	b1	t1
63B5	11	4	12.8	140	115	95	9	4	155	35	10	38.3
71B5	14	5	16.3	160	130	110	9	4	162	38*	10*	41.3*
80B5	19	6	21.8	200	165	130	11	4	182	40*	10*	43.3*
80B14	19	6	21.8	120	100	80	7	4	182	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	182			
90B14	24	8	27.3	140	115	95	9	4	182			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	192			
100/112B14	28	8	31.3	160	130	110	9	4.5	192			

Weight without motor
≈ 13.3 kg

TKM58C..

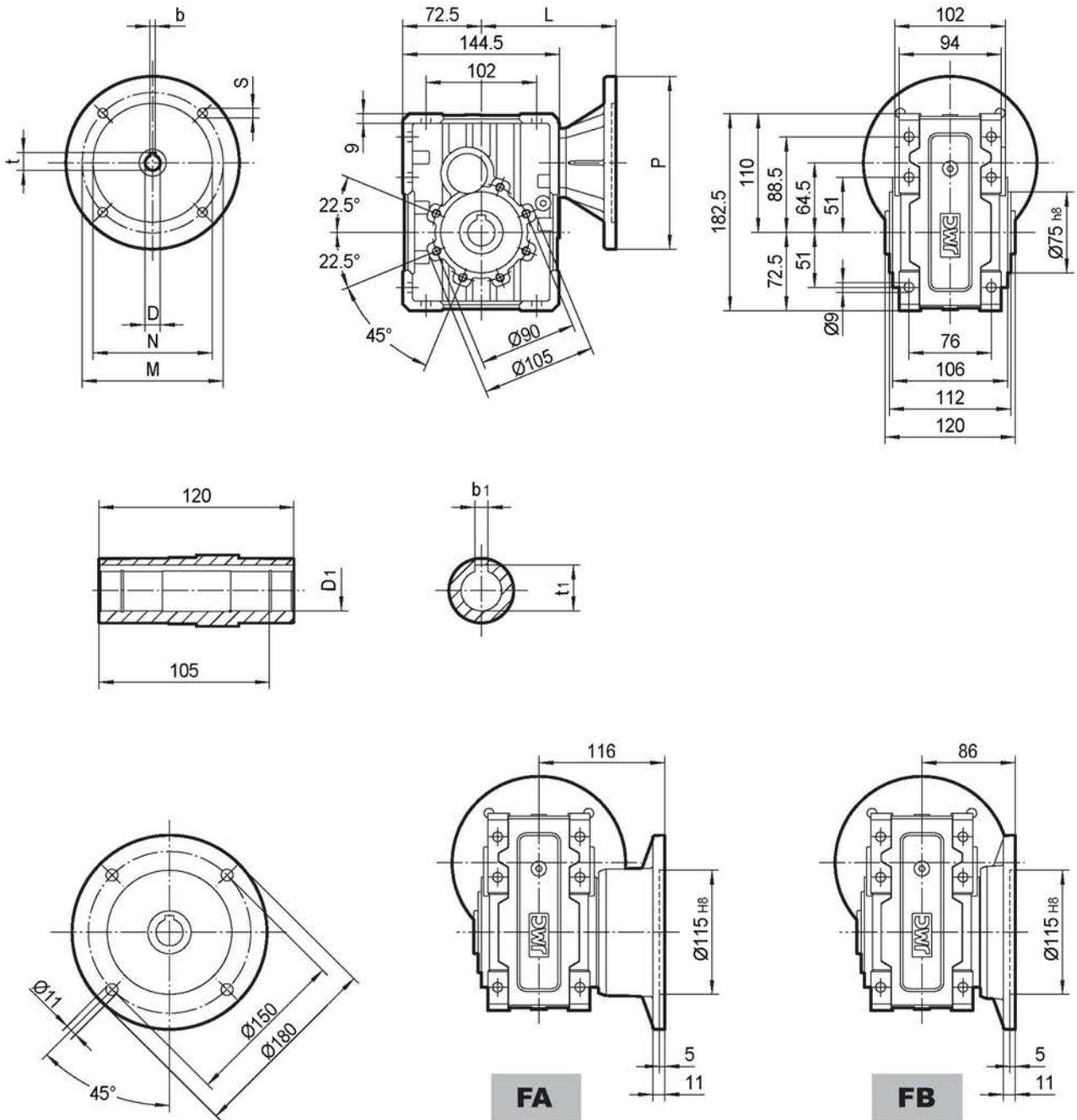


IEC	D _{E8}	b	t	P	M	N	S	T	L	D1 H ₈	b1	t1
63B5	11	4	12.8	140	115	95	9	4	195	35	10	38.3
71B5	14	5	16.3	160	130	110	9	4	202	38*	10*	41.3*
80B5	19	6	21.8	200	165	130	11	4	222	40*	10*	43.3*
80B14	19	6	21.8	120	100	80	7	4	222	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	222			
90B14	24	8	27.3	140	115	95	9	4	222			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	232			
100/112B14	28	8	31.3	160	130	110	9	4.5	232			

Weight without motor
≈ 14.8 kg

7.2 TKB.. Outline Dimension

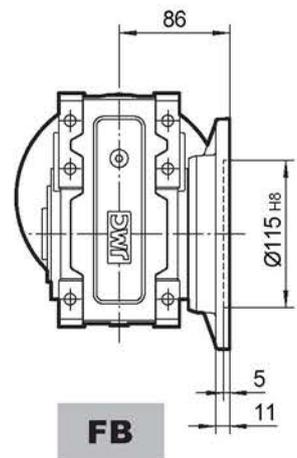
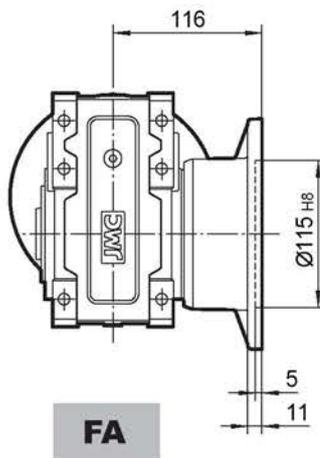
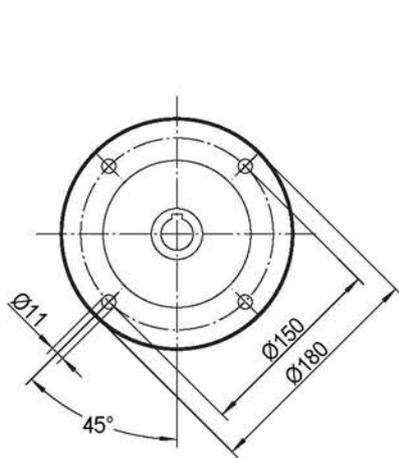
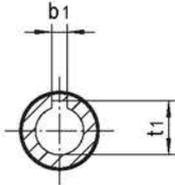
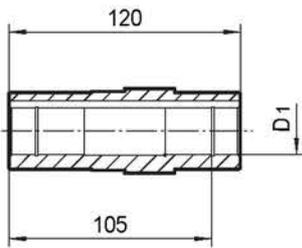
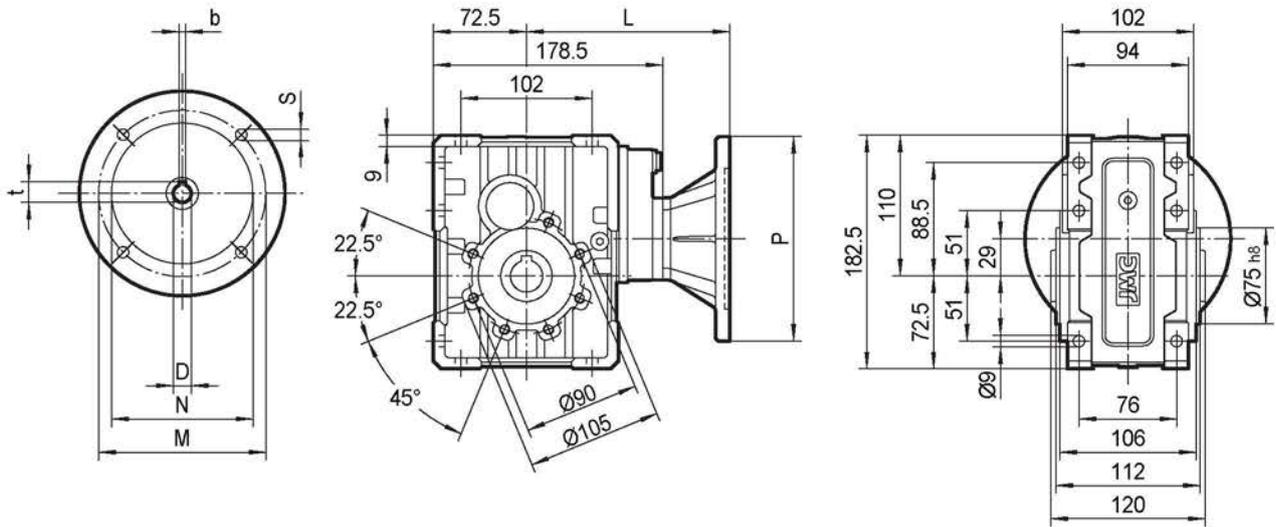
TKB38B..



IEC	D _{E8}	b	t	P	M	N	S	T	L	D _{1 H8}	b ₁	t ₁
71B5	14	5	16.3	160	130	110	9	4	124	25	8	28.3
71B14	14	5	16.3	105	85	70	7	4	124	28*	8*	31.3*
80B5	19	6	21.8	200	165	130	11	4	144	30*	8*	33.3*
80B14	19	6	21.8	120	100	80	7	4	144	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	144			
90B14	24	8	27.3	140	115	95	9	4	144			

Weight without motor
≈ 6.0 kg

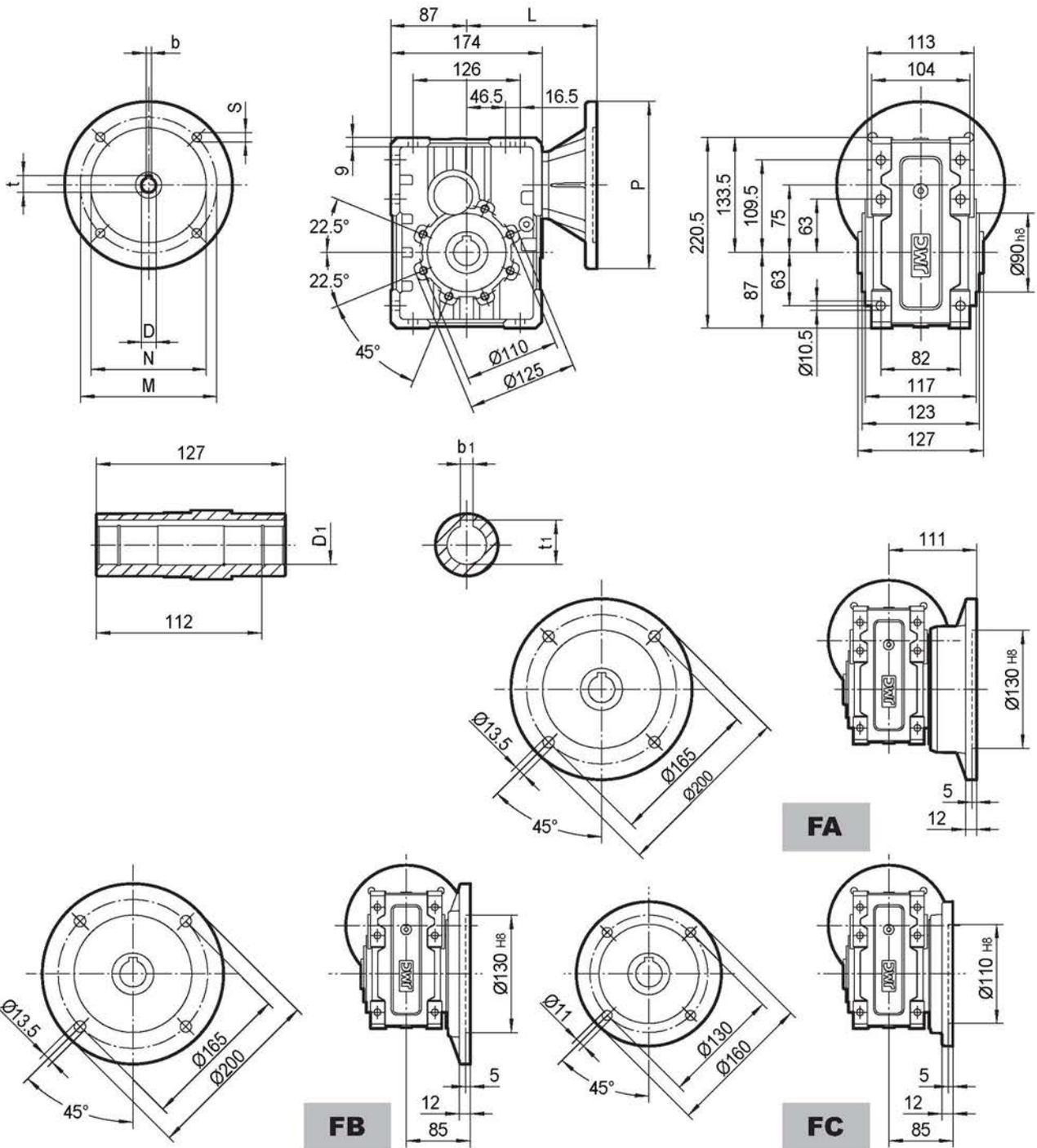
TKB38C..



IEC	D _{E8}	b	t	P	M	N	S	T	L	D1 _{H8}	b1	t1
71B5	14	5	16.3	160	130	110	9	4	158	25	8	28.3
71B14	14	5	16.3	105	85	70	7	4	158	28*	8*	31.3*
80B5	19	6	21.8	200	165	130	11	4	178	30*	8*	33.3*
80B14	19	6	21.8	120	100	80	7	4	178	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	178			
90B14	24	8	27.3	140	115	95	9	4	178			

Weight without motor
≈ 6.8 kg

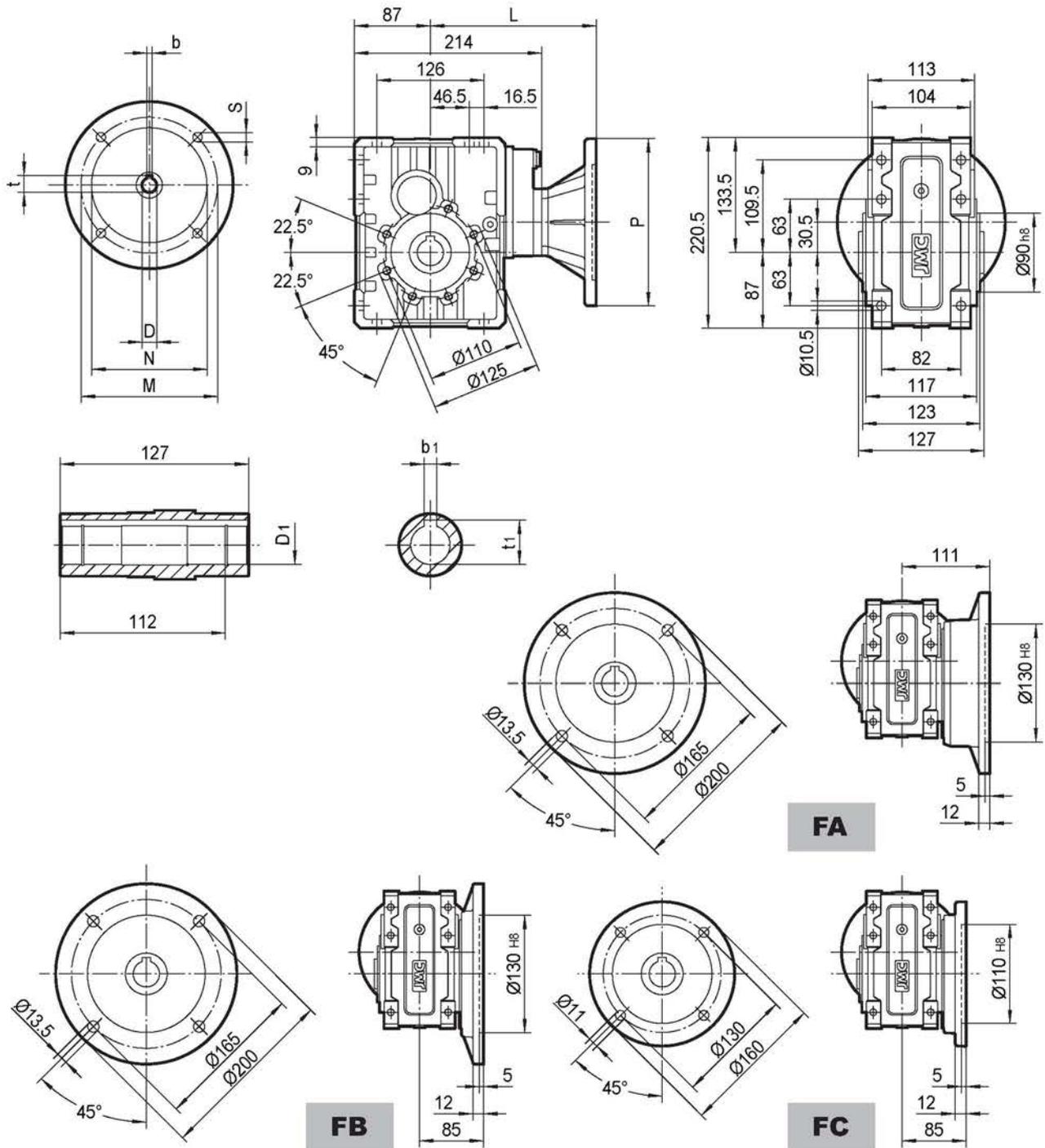
TKB48B..



IEC	D _{E8}	b	t	P	M	N	S	T	L	D ₁ H ₈	b ₁	t ₁
63B5	11	4	12.8	140	115	95	9	4	139	28	8	31.3
71B5	14	5	16.3	160	130	110	9	4	146	30*	8*	33.3*
80B5	19	6	21.8	200	165	130	11	4	166	35*	10*	38.3*
80B14	19	6	21.8	120	100	80	7	4	166	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	166			
90B14	24	8	27.3	140	115	95	9	4	166			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	176			
100/112B14	28	8	31.3	160	130	110	9	4.5	176			

Weight without motor
≈ 9.5 kg

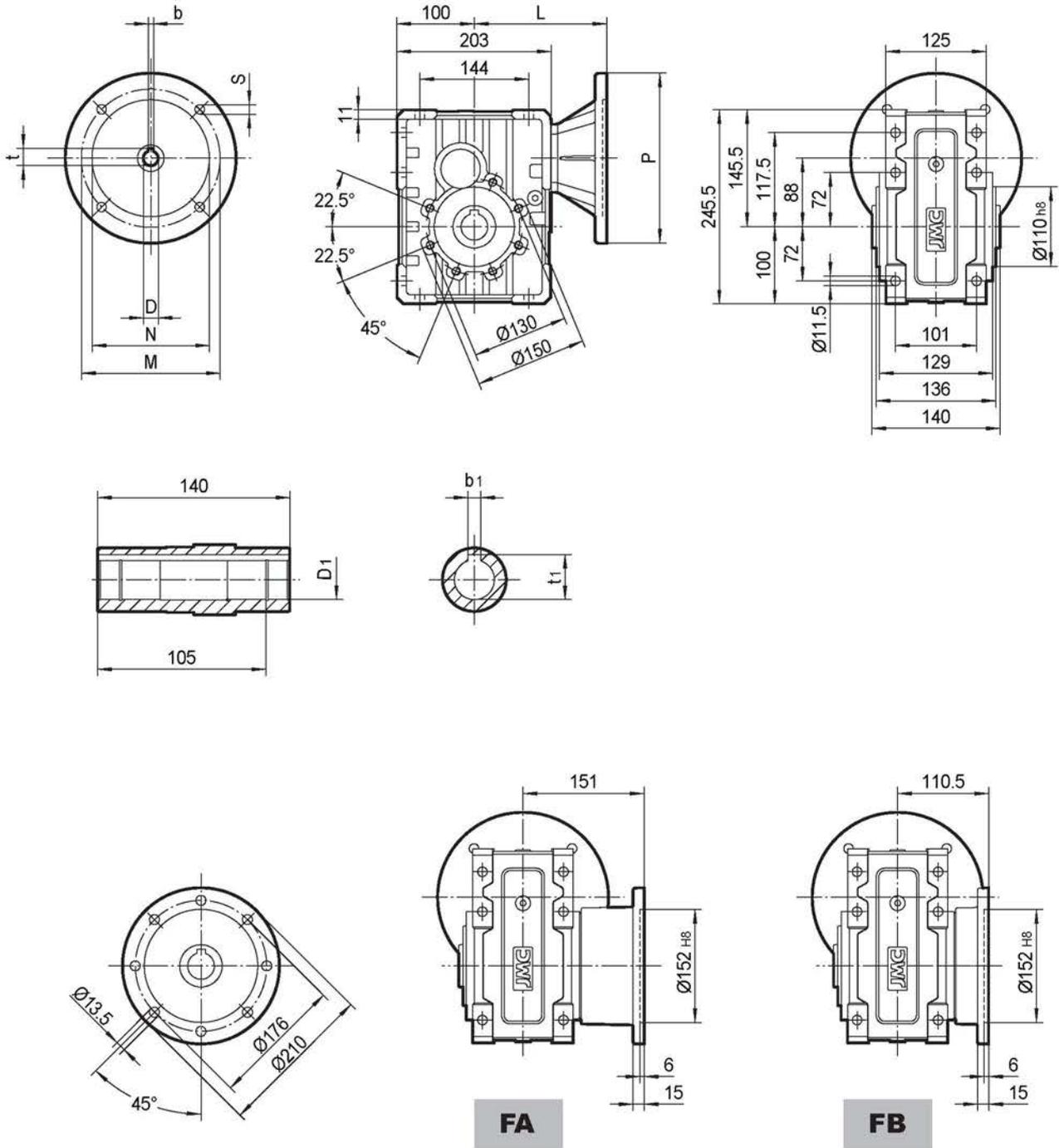
TKB48C..



IEC	D E8	b	t	P	M	N	S	T	L	D1 H8	b1	t1
63B5	11	4	12.8	140	115	95	9	4	179	28	8	31.3
71B5	14	5	16.3	160	130	110	9	4	186	30*	8*	33.3*
80B5	19	6	21.8	200	165	130	11	4	206	35*	10*	38.3*
80B14	19	6	21.8	120	100	80	7	4	206	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	206			
90B14	24	8	27.3	140	115	95	9	4	206			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	216			
100/112B14	28	8	31.3	160	130	110	9	4.5	216			

Weight without motor
≈ 10.8 kg

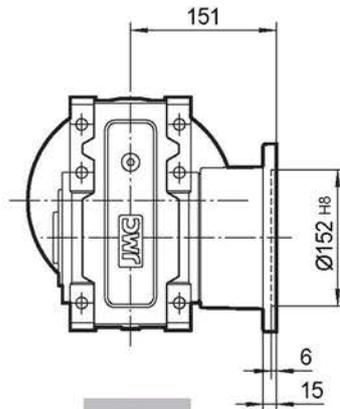
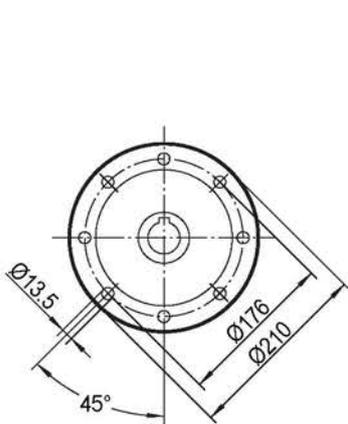
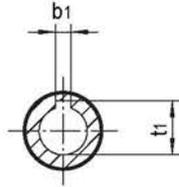
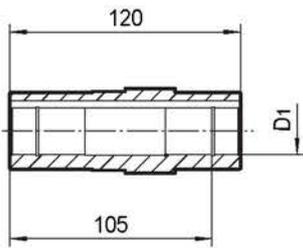
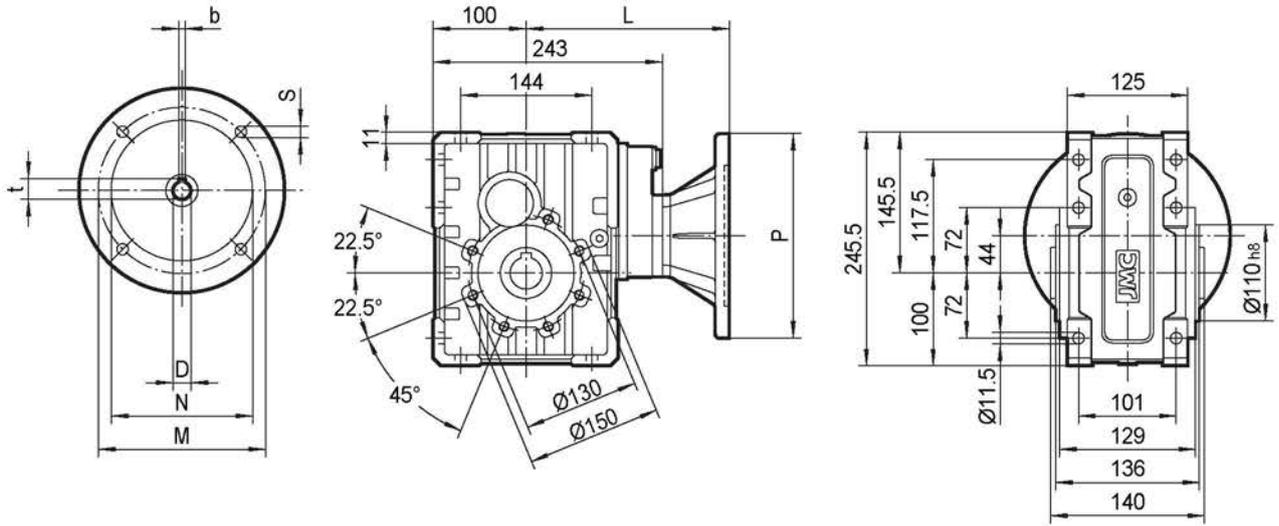
TKB58B..



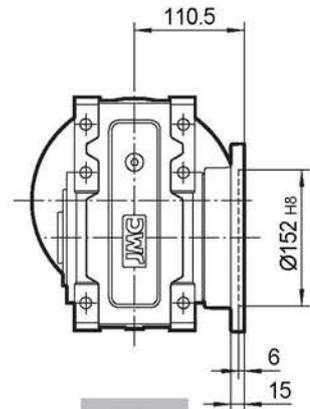
IEC	D _{E8}	b	t	P	M	N	S	T	L	D ₁ H ₈	b ₁	t ₁
63B5	11	4	12.8	140	115	95	9	4	155	35	10	38.3
71B5	14	5	16.3	160	130	110	9	4	162	38*	10*	41.3*
80B5	19	6	21.8	200	165	130	11	4	182	40*	10*	43.3*
80B14	19	6	21.8	120	100	80	7	4	182	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	182			
90B14	24	8	27.3	140	115	95	9	4	182			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	192			
100/112B14	28	8	31.3	160	130	110	9	4.5	192			

Weight without motor
≈ 13.5 kg

TKB58C..



FA



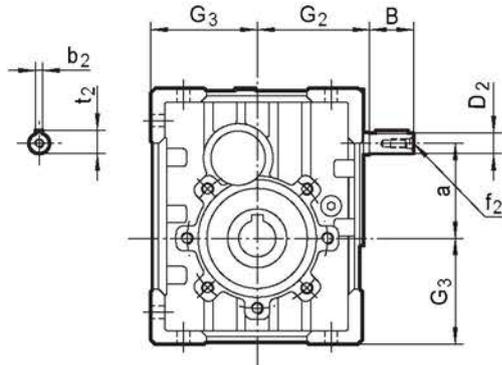
FB

IEC	D E8	b	t	P	M	N	S	T	L	D1 H8	b1	t1
63B5	11	4	12.8	140	115	95	9	4	195	35	10	38.3
71B5	14	5	16.3	160	130	110	9	4	202	38*	10*	41.3*
80B5	19	6	21.8	200	165	130	11	4	222	40*	10*	43.3*
80B14	19	6	21.8	120	100	80	7	4	222	* Only on request		
90B5	24	8	27.3	200	165	130	11	4	222			
90B14	24	8	27.3	140	115	95	9	4	222			
100/112B5	28	8	31.3	250	215	180	13.5	4.5	232			
100/112B14	28	8	31.3	160	130	110	9	4.5	232			

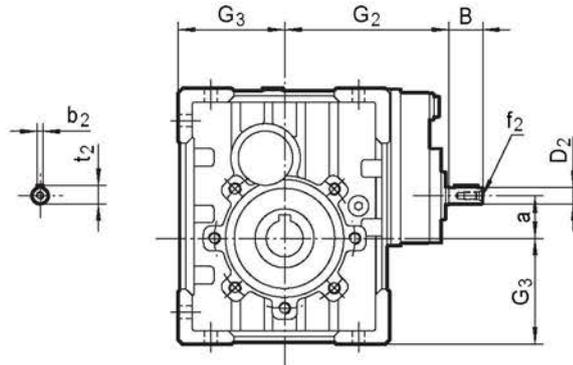
Weight without motor
≈ 14.8 kg

7.3 TKM..HS Outline Dimension

TKM..B..HS



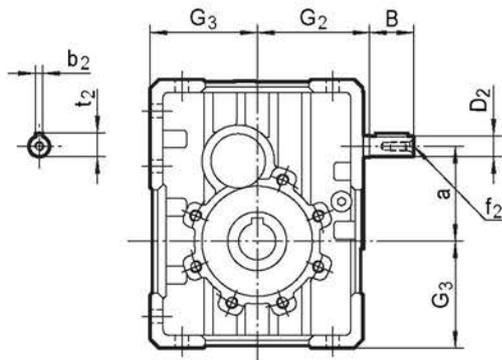
TKM..C..HS



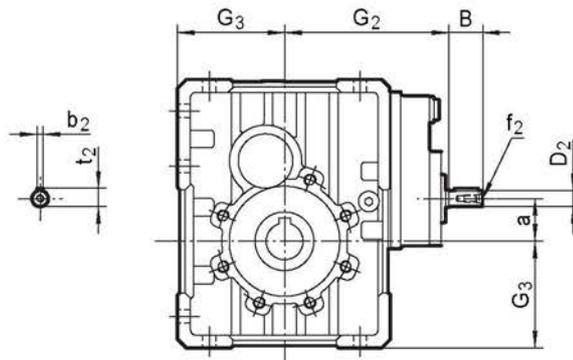
	B	D _{2 j6}	G ₂	G ₃	a	b ₂	f ₂	t ₂
TKM28B	23	11	65	60	57	4	-	12.5
TKM28C	23	11	100	60	21.5	4	-	12.5
TKM38B	30	14	76	72	64.5	5	M6	16
TKM38C	23	11	111	72	29	4	-	12.5
TKM48B	40	16	91	86	74.5	5	M6	18
TKM48C	30	14	132	86	30.5	5	M6	16
TKM58B	40	19	107	103	88	6	M6	21.5
TKM58C	30	14	148	103	44	5	M6	16

7.4 TKB..HS Outline Dimension

TKB..B..HS



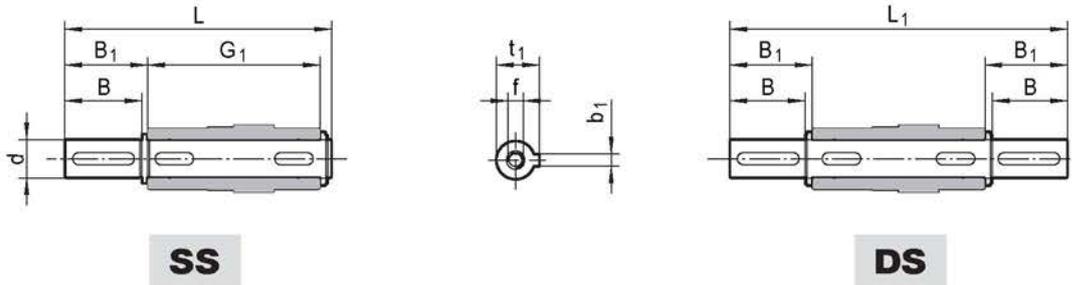
TKB..C..HS



	B	D _{2 j6}	G ₂	G ₃	a	b ₂	f ₂	t ₂
TKB38B	30	14	76	72.5	64.5	5	M6	16
TKB38C	23	11	111	72.5	29	4	-	12.5
TKB48B	40	16	91	87	74.5	5	M6	18
TKB48C	30	14	132	87	30.5	5	M6	16
TKB58B	40	19	107	100	88	6	M6	21.5
TKB58C	30	14	148	100	44	5	M6	16

8. ACCESSORIES OUTLINE DIMENSION SHEET

8.1 Output Shafts

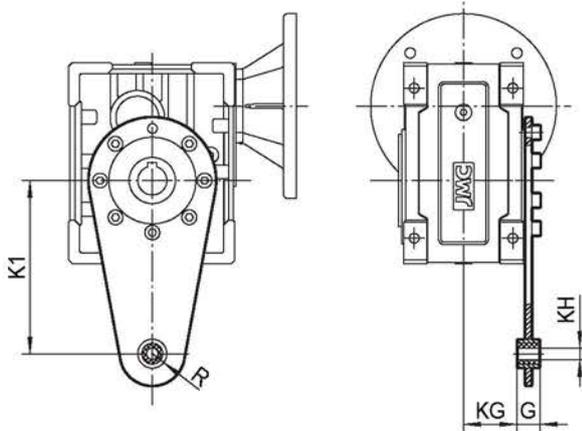


	d h6	B	B ₁	G ₁	L	L ₁	f	b ₁	t ₁
TKM28	25	50	53.5	92	153	199	M10	8	28
TKM38	25	50	53.5	112	173	219	M10	8	28
TKM48	28	60	63.5	120	192	247	M10	8	31
TKM58	35	80	84.5	140	234	309	M12	10	38
TKB38	25	60	65	120	192	246.4	M8	8	28
TKB48_d 28	28	60	65	127	199	255	M8	8	31
TKB48_d 30	30	60	65	127	199	255	M10	8	33
TKB58	35	60	65	140	214	268	M12	10	38

* Only on request

8.2 Torque Arm

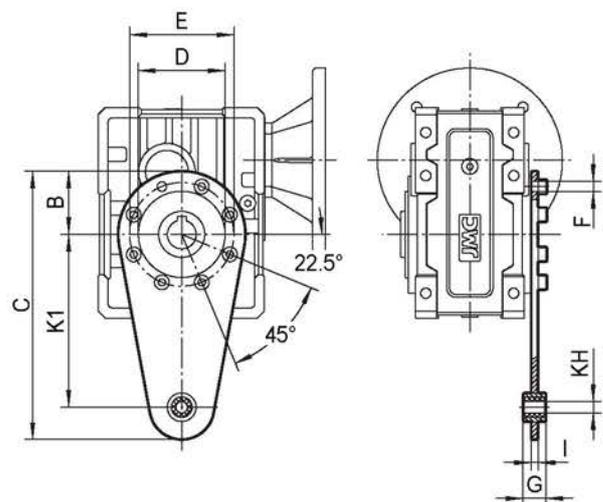
8.2.1 TKM.. Torque Arm



	K ₁	G	KG	KH	R
TKM28	100	14	38.5	10	18
TKM38	150	14	49	10	18
TKM48	200	25	47.5	20	30
TKM58	200	25	57.5	20	30

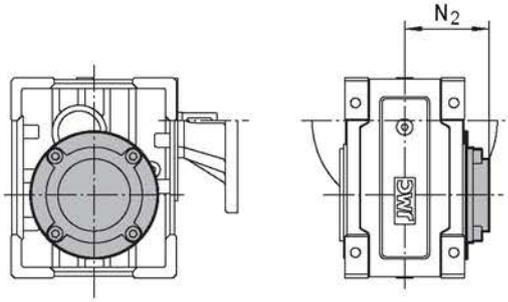
8.2.2 TKB.. Torque Arm

	K ₁	B	C	D	E	F	G	KH	I
TKB38	150	55	233	75	90	9	20	10	6
TKB48	200	63	300	90	110	9	25	20	6
TKB58	200	80	318	110	130	11	25	20	6



8.3 Cover

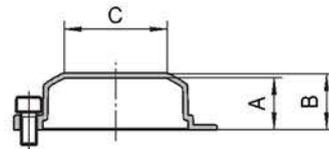
8.3.1 TKM.. Cover



	N₂
TKM28	63
TKM38	73
TKM48	79
TKM58	94

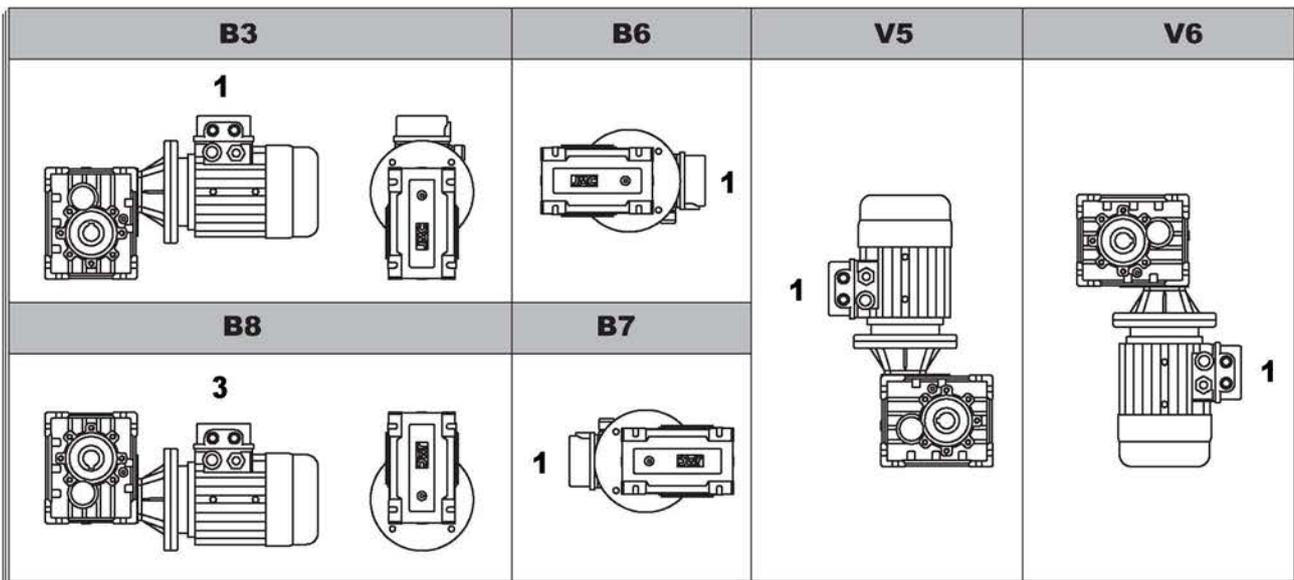
8.3.2 TKB.. Cover

	A	B	C
TKB38	26.5	29	Φ35
TKB48	24.5	27	Φ54
TKB58	26.5	29	Φ71

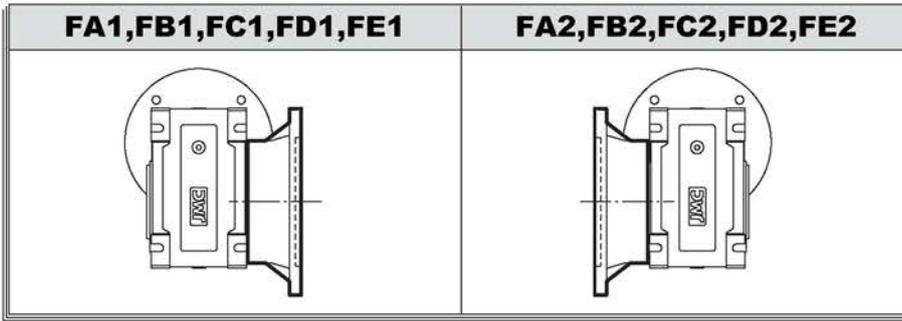


9. INSTALLATION POSITIONS DIAGRAM

9.1 TKM.. OR TKB.. Mounting Positions

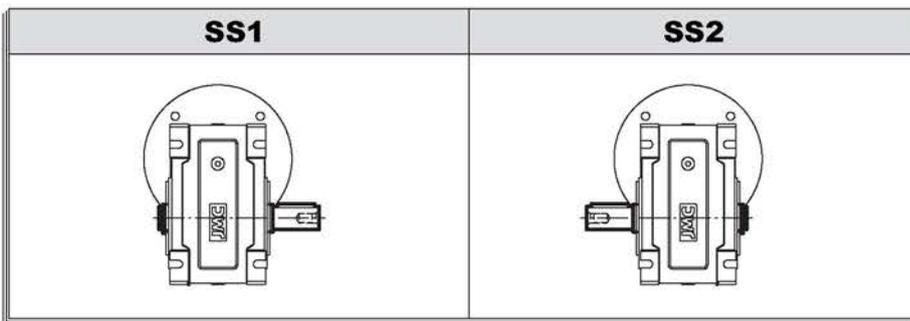


9.2 Position diagram for output flange

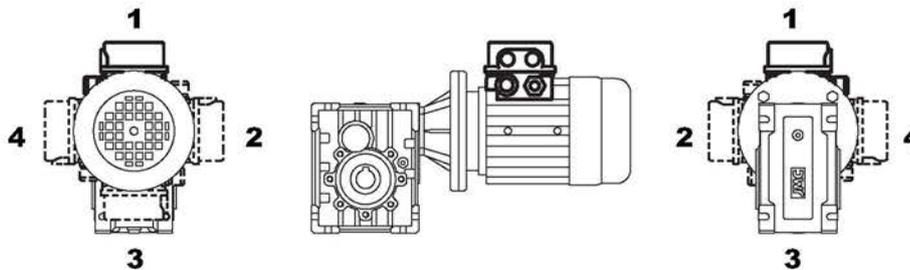


Unless specified otherwise, the reduction unit is supplied with the flange in pos. F.1 referred to position B3.

9.3 Position diagram for single output shaft



9.4 Position of terminal box



In the case of specific requirements, when ordering, specify the position of the terminal box as shown in the diagram.

10. INSTALLATION

10.1 Note recommendations

To install the reduction unit it is necessary to note the following recommendations:

1. Check the correct direction of rotation of the reduction unit output shaft before fitting the unit to the machine.
2. Before mount with the prime mover and device, please check the reducer's every axial diameter, aperture, key and key slot, to be sure their dimensions are not deviation, and avoid assembling too tight or too loose, unless it will influence the reducer's performance.
3. The mounting on the machine must be stable to avoid any vibration.
4. Whenever possible, protect the reduction unit against solar radiation and bad weather.
5. In the case of particularly lengthy periods of storage (4-6 months), if the oil seal is not immersed in the lubricant inside the unit, it is recommended to change it since the rubber could stick to the shaft or may even have lost the elasticity it needs to function properly.
6. Painting must definitely not go over rubber parts and the holes on the breather plugs, if any.
7. When connect with hollow or solid shaft, please grease the joint to avoid lock or oxidation.
8. Check the correct level of the lubricant through the indicator, if there is one.
9. Starting must take place gradually, without immediately applying the maximum load.
10. Supporting unit is required when using various of reducer matched with motor directly and the weight of motor is a little bigger than common.
11. Ensure the motor cools correctly by assuring good passage of air from the fan side.
12. In the case of ambient temperatures $< -5^{\circ}\text{C}$ or $> +40^{\circ}\text{C}$ call the Technical Service.

10.2 Critical applications

The performance given in the catalogue correspond to mounting position B3 or similar, when the first stage is not entirely immersed in oil. For other mounting positions and/or particular input speeds, refer to the tables that highlight different critical situations for each size of reduction unit. It is also necessary to take due consideration of and carefully assess the following applications by calling our Technical Service:

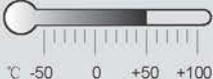
1. As a speed increasing.
2. Applications with especially high inertia.
3. Use in services that could be hazardous for people if the reduction unit fails.
4. Applications with high dynamic strain on the case of the reduction unit.
5. In places with T° under -5°C or over 40°C .
6. Use in chemically aggressive environments.
7. Use in a salty environment.
8. Use in radioactive environments.
9. Use in environments pressures other than atmospheric pressure.
10. Mounting positions not envisaged in the catalogue.

Avoid applications where even partial immersion of the reduction unit is required.

The maximum torque that the gear reducer can support must not exceed two times the nominal torque ($f_s = 1$) stated in the performance tables. Intended for momentary overloads due to starting at full load, braking, shocks or other causes, particularly those that are dynamic.

11. LUBRICATION

11.1 Types of lubrication

						lubrication type
TKM.. TKB..	Standard -10 +40	VG 220	Shell Omala 220	Mobilgear 630	BP Energol GR-XP 220	Mineral oil
	-20 +25	VG 150 VG 100	Shell Omala 100	Mobilgear 627	BP Energol GR-XP 100	
	-30 +10	VG 68-46 VG 32	Shell Tellus T 32	Mobil D.T.E. 13M		
	-40 -20	VG 22 VG 15	Shell Tellus T 15	Mobil D.T.E. 11M	BP Energol HLP-HM 15	
	-40 +80	VG 220	Shell Omala HD 220	Mobil SHC 630		Synthetic oil
	-40 +40	VG 150		Mobil SHC 629		
	-40 +10	VG 32		Mobil SHC 624		

11.2 Lubricant fill quantity

The specified fill quantities are recommended values. The precise values vary depending on the number of stages and gear ratio. When filling, it is essential to check the oil level plug since it indicates the precise oil capacity. The following tables show guide values for lubricant fill quantities in relation to the mounting position (B3、B6、B7……)

TKM.. Lubricant fill quantity

Gear units	Fill quantity in liters (L)					
	B3	B6	B7	B8	V5	V6
TKM28B	0.22	0.20*	0.13*	0.15	0.25	0.14
TKM28C	0.07	0.04	0.04	0.05	0.08	0.09
TKM38B	0.42	0.35*	0.24*	0.22	0.46	0.25
TKM38C	0.07	0.04	0.04	0.05	0.08	0.09
TKM48B	0.70	0.58*	0.42*	0.42	0.75	0.45
TKM48C	0.13	0.09	0.09	0.09	0.15	0.17
TKM58B	1.21	0.95*	0.72*	0.67	1.30	0.74
TKM58C	0.13	0.09	0.09	0.09	0.15	0.17

TKB.. Lubricant fill quantity

Gear units	Fill quantity in liters (L)					
	B3	B6	B7	B8	V5	V6
TKB38B	0.38	0.35*	0.25*	0.26*	0.44	0.25
TKB38C	0.07	0.04	0.04	0.05	0.08	0.09
TKB48B	0.66	0.60*	0.45*	0.48	0.78	0.47
TKB48C	0.13	0.09	0.09	0.09	0.15	0.17
TKB58B	1.15	0.93*	0.70*	0.74*	1.25	0.75
TKB58C	0.13	0.09	0.09	0.09	0.15	0.17

*: It means the lubricant can't be added according to the oil level line plug, but also higher the plug the fill quantity as shown in the table

12. MAINTENANCE

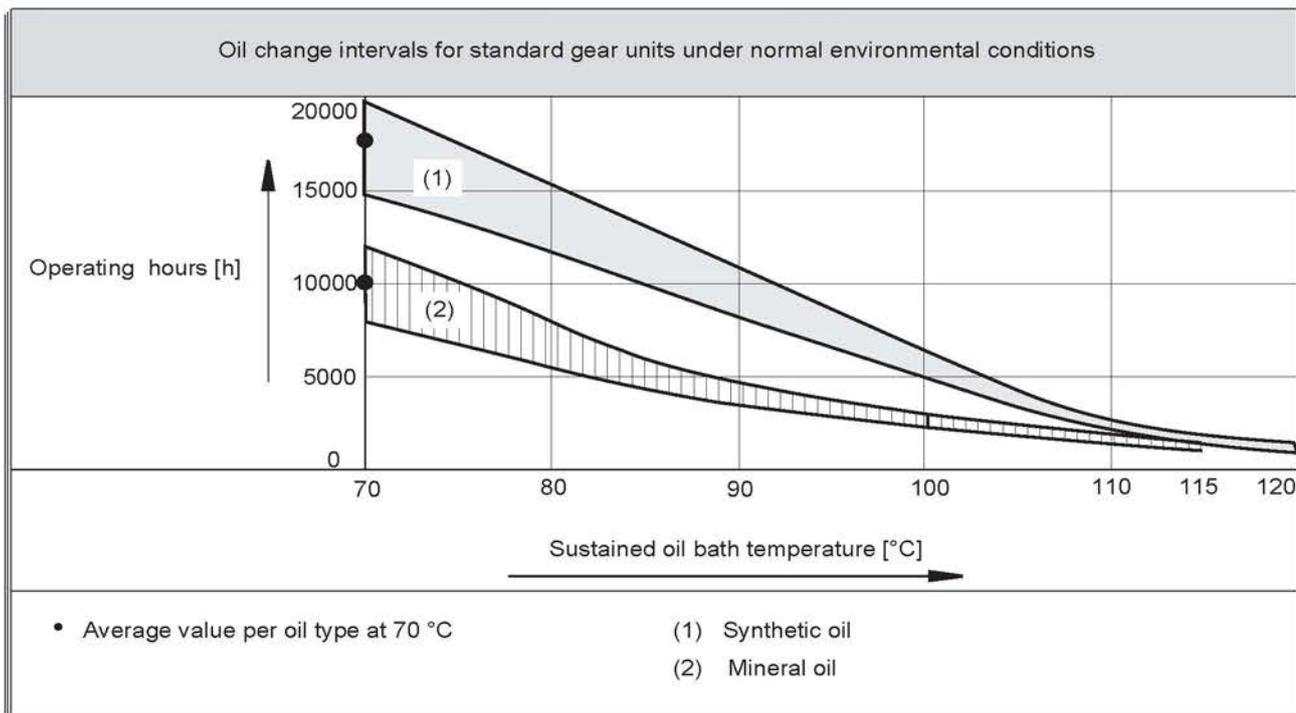
1). For gear units, first oil change should be after about 300 hours (run-in period). The right lotion is required to clean the gear units with care. Never mix the synthetic oil and mineral oil together.

2). Every 3000 working time, at least every 6 months, you have to check the oil and oil level, the seals visually for leakage. For IEC input gear units, the elastomer should be tested or replaced if necessary.

3). Depending on the operating conditions (see chart below), every 3 years at the latest for inspection is needed. Then change the mineral oil and replace the bearing grease.

4). Depending on the operating conditions, change the oil seals on output shaft.

5). Once the malfunctions appear, stop disassembling the parts, and firstly please contact the customer service (the information about specification, delivery date, series number, time used, name of machine, machine manufacturer, malfunction problems is required) , then take the reasonable measures.



13. STORAGE

- 1). Under roof, protected against rain and snow, no shock loads.
- 2). Underlay the block and other material between the ground and equipment.
- 3). The opened but not used gear units should be added with the anti-corrosive oil on its surface, and then return to the packing containers timely.
- 4). Two years or more given regular inspections. Check for cleanliness and mechanical damage as part of the inspection, Check corrosion protection.

14. NOTICE FOR ORDER

Please offer the following information when place the orders:

- 1). the model mark of the gear units(type, ratio, power and mounting position).
- 2). generally the gear units paint in silver.
- 3). quantity ordered.
- 4). other special requirements.
- 5). company, contact and telephone.

15. GEAR UNIT MALFUNCTIONS

Problem	Possible cause	Remedy
Unusual, regular running noise	A. Meshing/grinding noise: Bearing damage. B. Knocking noise: Irregularity in the gearing	A. Check the oil, change bearings B. Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	<ul style="list-style-type: none"> • Check the oil • Stop the drive, contact customer service
Oil leaking ¹⁾ <ul style="list-style-type: none"> • From the gear cover plate • From the motor flange • From the motor oil seal • From the gear unit flange • From the output end oil sea 	A. Rubber seal on the gear cover plate leaking B. Seal defective C. Gear unit not vented	A. Tighten the bolts on the gear cover plate and observe the gear unit. Oil still leaking: Contact customer service B. Contact customer service C. Vent the gear unit (see "Mounting Positions")
Oil leaking from breaking valve	A. Too much oil B. Drive operated in incorrect mounting position C. Frequent cold starts(oil foams) and/or high oillevel	A. Correct the oil level (see Sec. "Inspection and Maintenance") B. Mount the breather valve correctly (see Sec."Mounting Positions")and correct the oil level(see"Lubricants")
Output shaft does not turn although the motor is running or the input shaft is rotated	Connection between shaft and hub in gear unit interrupted	Send in the gear unit/gearmotor for repair

1) Short-term oil/grease leakage at the oil seal is possible in the run-in phase (24 hours running time).

16. Charge Characteristic Chart (for reference)

AIR BLOWERS		Hoist gear assembly	A
Air blower(axial or radial)	A	Derrick gear assembly	B
Fan of cooling tower	B	Steering gear assembly	B
Induced draught fan	B	Moving gear assembly	C
Rotary piston type fan	B	LAND DREDGER	
Turbo-fan	A	Drum-type conveyer	C
CONSTRUCTION MACHINERY		Drum-type rotation wheel	C
Concrete mixer	B	Dredger head	C
Hoist	B	Powered crab	B
Road building machinery	B	Pump	B
Boring mill	B	Pump turning gear assembly	B
CHEMICAL MACHINERY		Moving gear assembly (apron wheel)	C
Mixer (liquid)	A	Moving gear assembly (track)	B
Mixer (half liquid)	B	FOODSTUFF PROCESSING MACHINERY	
Centrifuge (heavy)	B	Placer or box filler	A
Centrifuge(light)	A	Cane crusher	A
** Cooling rolling drum	B	** Cane cutter	B
** Dry rolling drum	B	** Cane crusher	C
Mixer	B	Mixer	B
COMPRESSOR		Paste bucket	B
Piston type compressor	C	Packager	A
Turbo-compressor	B	Beet slicer	B
TRANSMISSION FREIGHTER		Beet washing machine	B
Pan conveyer	B	MOTOR AND CONVERSION EQUIPMENTS	
Balance lifter	B	Frequency converter	C
Trough conveyer	B	Motor	C
Ribbon conveyer (large piece)	C	Welding motor	C
Ribbon conveyer (small piece)	B	WASHING MACHINE	
Drum-type flour conveyer	A	Rolling drum	B
Chain conveyer	B	Washing machine	B
Ring type conveyer	B	METAL ROLLER MACHINE	
Lifter	B	** Steel cutter	C
Hoist	B	** Chain conveyer	B
Crank-connecting conveyer	B	** Cold mill	C
Lifter	B	Continuous casting equipments	B
Worm conveyer	B	** Cold bed	B
Steel-band conveyer	B	** Cropper	C
Chain reed-type conveyer	B	** Cross steering transmitter	B
Crab freighter	B	** Deruster	C
HOIST		** Heavy and medium steel mill	C
Bracket swing gear assembly	B	** Bar mill	C

ADDENDUM

BAR TRANSMISSION EQUIPMENTS	B	PUMPS	
Bar pusher	B	Centrifugal pump (thin liquid)	A
Push bed	B	Centrifugal pump (half liquid)	B
** Shears	C	Displacement pump	C
** Lumber elevator platform	B	Plunger pump	C
ROLL ADJUSTING EQUIPMENTS	B	Force pump	C
Roller leveling machine	B	PLASTIC EQUIPMENTS	
** Mill rolling way (heavy)	C	** Glazing press	B
** Mill rolling way (light)	B	** Ejecting press	B
** Sheet rolling mill	C	** Spiral extruding machine	B
** Trimming shears	B	** Mixing machine	B
Pipe welder	C	RUBBER EQUIPMENT	
Soldering machine(belt material and wire rod)	B	** Glazing press	B
Wire drawbench	B	** Ejecting press	C
METAL PROCESSING MACHINE TOOLS		** Mixing stir machine	B
Power shaft	A	Kneading machine	B
** Forging machine	C	** Roller machine	C
Drop hammer	C	STONE PORCELAIN CLAY PROCESSING EQUIPMENTS	
Machine tool and necessary	A		
Machine tool and main driving equipment	B	Ball crusher	B
Metal facing machine	C	** Ejecting press and breaker	C
Plate-leveling machine tool	C	Breaker	C
Backing-out punch	C	Brick press	C
Press machine tool	C	** Beating crusher	C
Cutting machine	B	** Converter	C
Sheet bending machine tool	B	** Cylinder mill	C
PETROLEUM PROCESSING MACHINERY		TEXTILE MACHINERY	
** Pump of oil pipe line	B	Feeding machine	B
Rotary drilling equipment	C	Loom machine	B
PAPERING MACHINE		Dyeing machine	B
** Glazing press	C	Purified drum	B
** Multilayer paper board machine	C	Welon machine	B
** Drying cylinder	C	WASTER TREATMENT EQUIPMENTS	
** Glazing cylinder	C	** Air blast	B
** Masher	C	Screw pump	B
** Mashing and breaking machine	C	WOOD PROCESSING MACHINE TOOL	
** Suction roll	C	Barker	C
** Wet paper roller machine	C	Facing machine	B
** Water absorbing roller machine	C	Saw bench	C
Welon machine	C	Wood processing machine tool	A

Note: A - Uniform load; B - Moderate shock load; C - Heavy shock load; ** - for 24hour system.

SHOW THE SERIES PRODUCTS

TR Series helical geared motors



TS Series helical-worm geared motors



TK Series helical-bevel geared motors



TF Series parallel shaft helical geared motors

G3 Series mini helical geared motors



TRC Series mini helical gear units



TNRV Series worm gear units

UDL Series stepless speed variator

