

ASYNCHRONOUS THREE-PHASE MOTORS FOR ROLLER TABLES

(TTM RANGE)



COSTRUZIONI ELETTROMECCANICHE s.r.l.

1. INTRODUCTION

Based on a twenty-year experience TTM range motors for roller tables have been studied and designed to be used in auxiliary services within the rolling mill industry involving heavy duty conditions with multiple start-ups, braking and reversal and the possibility for the machine to be under permanent power with blocked rotor.

2. GENERAL FEATURES

The following duties can be identified:

A) “SIF” INTERMITTENT DUTY

The machine is subjected to periodical operating cycles at a rated voltage followed by subsequent no-load operations.

B) “SIR” INTERMITTENT DUTY

The machine is subjected to working phases at a rated voltage followed by subsequent periods at rest.

C) “SIF” INTERMITTENT DUTY WITH REVERSAL

D) “SIR” INTERMITTENT DUTY WITH REVERSAL

In the case of C and D the motor overheating is predominantly due to the starting and braking current.

The four types of duties above mentioned are characterized by the intermittent ratio (ratio between the working length and the operating cycle overall length) and the number of hourly cycles.

Intermittent ratio rated values are 20-40-60-100%.

The intermittent rate is estimated at 100% only when no disconnection occurs. In the catalogue tables only 40% and 100% values are taken into consideration. These values can be obtained by the means of a simple linear interpolation.

Values indicated in the tables are referred to a “SIR” intermittent duty. In the case of a “SIF” duty, values can be communicated upon request.

In the course of the “SIF” and “SIR” duty and during the reversal, motors are submitted to heavier forces than continuous duty and one-direction rated motors.

Roller table motors are characterized by frequent reversal phases at full load and abrupt and frequent counter-current braking.

Thus, they need to have a special electrical and mechanical mounting position which can endure heavy conditions.

They are proved to be particularly efficient for single roller table control given their mounting simplicity, the safety of use and the almost total lack of maintenance required. Furthermore, **TTM** range motors can be supplied at a variable frequency also by the means of an inverter in order to adapt the number of tours at any type of rolling program.

Depending on the operation, a distinction is made between **roller tables** whose direction of rotation changes at each rolling - and **conveyor roller tables** that turns at a constant speed with rare reversal phases.

2.1 ROLLER TABLE MOTORS

The starting of roller table motors requires specific ratings of the motor which needs to provide acceleration and braking moments with high and complex dynamic phases and with the right number of manoeuvres.

In these conditions, the heat of the windings doesn't have to exceed the limit set by the rules. The acceleration of the mass of inertia needs to occur as soon as possible. Therefore, at the starting a high accelerating torque is delimited, at the top, by the rollers which don't have to slide under the bar that needs to be accelerated.

Furthermore, the direction of the motor torque needs to be so that if there is any sudden overload, the motor shall not stop but it just has to slow down keeping on providing the torque. This document describes the motors belonging to the range **TTM**, Torque Table Motors, with a cage rotor, which have been developed on the basis of a highly reliable technology. Motor features are illustrated in the tables of the price list that can be used to choose the right motor according to the duty conditions.

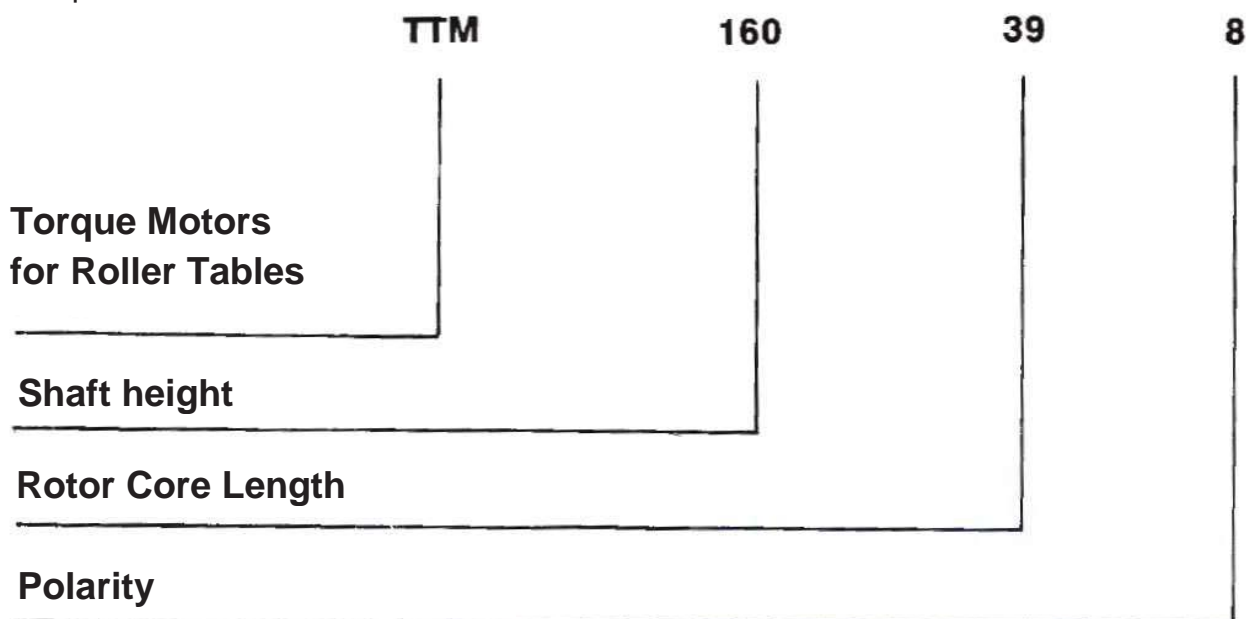
2.2. CONVEYOR ROLLER MOTORS

For conveyor roller control a standard electromagnetic motor can be adopted, the choice is strongly dependent on the continuous or intermittent duty conditions. The choice is thus greatly simplified.

3. MOTOR DENOMINATIONS

Motors are defined by the means of letters and codes as follow:

Example:



4. REGULATIONS

Motors in this price list are in compliance with CEI 2-3 brochure 355 regulating rotating electrical machines. They are also in accordance with IEC 34-5, 34-6, 34-7 and 34-8 recommendations.

As far as the acceleration constants are concerned, as underlined by the tables in the paragraph 7.2, "H" insulation class is considered with an overheating up to 125°C compared to the ambient temperature of 40°C.

As for ambient motors operating at higher temperatures, specific ratings can be communicated according to circumstances. In the case of installation in wet or tropical ambient, specific varnishes need to be used on windings.

5. MECHANICAL FEATURES

5.1 ENCLOSURES

IP44 protection is needed in compliance with UNEL 05515171 standards and IEC 345 and 346 recommendations. Totally enclosed motors, with no external blower, are protected against the penetration of solid bodies which are superior to 1mm and against water splash.

5.2 CONSTRUCTION FORMS

IM 1001 (foot mounting) and IM 3001 (flange mounting) are typical construction forms. Upon request motors with non-standard design and features can be provided.

5.3 FRAME AND SHIELDS

TTM motors are designed and manufactured with spheroid and cast iron frame and shields in order to be extremely robust. The ring ribs of the frame and of the shields increase the rigidity and the cooling surface improving this way the heat dispersion.

The external frame diameter is as small as possible and this is particularly significant when motors are mounted under roller table platforms.

These ways need to be well ventilated in order to have continuous air exchange.

If necessary, flange mounted shields can be supplied with a smoothed top side.



COMPLETE STATOR TTM 132

5.4 ROTOR

TTM range rotors are the most highly stressed part and, consequently, are submitted to a particular attention both in terms of electromagnetic and mechanic frame sizes.

There are special sheets for the rotor core which is preformed according to the socket. The wound rotor core is then heated and mounted, with an eligible interference on the shaft which is always produced with non-standard steel.

The rotor is thus submitted to a simultaneous adjustment of the rotor core in order to ensure maximum precision air gap of the bearing seats and of the coupling ends.

It's also dynamically balanced.



TTM COMPLETE ROTOR 132

5.5 BEARINGS

All **TTM** motors are designed with grease-lubricated bearings as pointed out in Table n.1. The TTM 200 type is provided, on the coupling side, with a rolling-element bearing.

TABLE N. 1

MOTOR TYPE	COUPLING SIDE	OPPOSITE SIDE
TTM 80	62052RS	62052RS
TTM 100	62072RS	62062RS
TTM 132	63092RS	62092RS
TTM 160	6311	6310
TTM 200	NU 313	6313

5.6 TERMINAL BOARD COVER

1P55 protection is needed. The box is normally fitted on the right, seen from the coupling side. Terminals are marked according to the IEC 348 and DIN 42401 recommendations.

TABLE N. 2

	NEW DENOMINATION	OLD DENOMINATION
STARTING	U1 V1 W1	U V W
END	U2 V2 W2	X Y Z
AT THE NETWORK	L1 L1 L1	R S

6. ELECTRICAL FEATURES

6.1 VOLTAGE

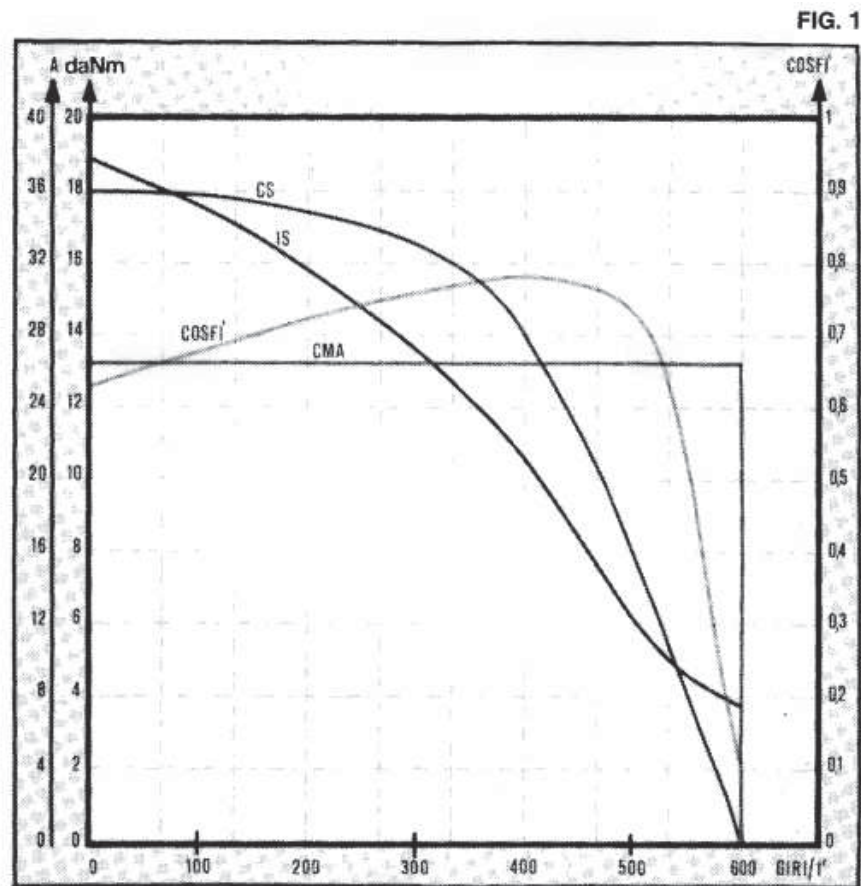
Rated voltages are normally at 220 V. 380 V. 500 V. Motors can be wound also for other voltages as long as they are inferior or equal to 500 V which represents the maximum limit of voltage at the frequency of 50 Hz allowed for wound motors. A tolerance within $\pm 5\%$ on the voltage nameplate is also admitted, when the motor operates at a rated frequency.

6.2 FREQUENCY

Motor speed in the tables is referred to frequency line of 50 Hz. Frequency ensures a tolerance within $\pm 5\%$, when the motor is under rated voltage.

7. TORQUE AND TYPICAL FEATURES

The figure shows the typical features of a TTM 160-41-10 motor, that's to say the coupling (decreasing as the tours increase) and the current way as well as the power factor. Motors can be calculated with torque features different to the ones indicated in the graph in order to adapt them according to the duty required.



TTM CURVE MOTOR FEATURES 160-41-10 - 380V 50Hz- 10 POLES
600 REV/1' - Cs = 18 daNm.

Cs = Starting torque

Is = Starting current

Cma = Starting Average Torque (0,7 Ca)

8. MOTOR TYPE CHOICE

In the choice of roller table motors, a different criterion must be followed compared to the choice of conveyor roller motors, which run constantly into one direction.

The term reversal is normally referred to the speed transfer close to the synchronism in one direction and resulting into the same speed in the opposite direction. During each reversal a quantity of heat is engendered. The heat needs to be dissipated by the external surface of the motor. The quantity of heat is directly proportional to the acceleration constant (A_0).

During the reversal, the temperature limit established by the rules shall not be exceeded. Thermal solicitations are not due, as for normal motors, to the constant torque but rather to the constant and frequent speed change. That is the reason why roller motors don't have a rated voltage in Kw. As a matter of fact acceleration can't be easily drawn to a rated voltage of the motor.

8.1 CALCULATION OF THE TOTAL PD^2 REFERRED TO THE MOTOR SHAFT

Following features are taken into consideration:

D = roller diameter	(m)
G = bar weight	(Kg)
PD^2R = PD^2 rotating parts (rotor + joint + roller)	(Kgm ²)
PD^2L = PD^2 bar	(Kgm ²)
PD^2T = total PD^2	(Kgm ²)

Assuming that the bar always rests on the two rollers, PD^2 of the bar for the roller is referred to the motor shaft as explained by the following expression:

$$PD^2L = 1/2 G D^2$$

Assuming that the roller reversal occurs simultaneously on both parts of the roller cylinders, each roller will have a reversal with PD^2 equal to $PD^2R + PD^2L$ and a reversal with total PD^2 equal to PD^2R .

The set of the two reversals, one for each bar run, is equivalent to two identical reversals with a total PD^2 equal to $PD^2R + 1/2 PD^2L$.

Thus, the operating cycle consists of a number of reversals equal to the number of bar tours with a total PD^2 referred to the motor shaft given by the expression:

$$PD^2T = PD^2R + 1/4 GD^2.$$

8.2 CALCULATION OF THE ACCELERATION CONSTANT

The distinguishing feature of a duty requiring frequent manoeuvres (given that the output power determines the continuous duty) is the “**acceleration constant**”.

The acceleration constant corresponding to a “certain type of motor” can be defined as the product of the total PD^2 referred to the motor shaft multiplied for the number of admissible complete hourly start-ups at heat effect.

The acceleration constant corresponding to a “certain type of duty” can be defined as the product of the total PD^2 referred to the motor shaft multiplied for the number of complete hourly start-ups equivalent to the dissipated power in the overall manoeuvres defined by the duty, as it results from the expression:

$$N_{ae} = N_a (sa_{12} - sa_{22}) + N_f (sf_{12} - sf_{22})$$

where:

N_{ae} = n° of hourly equivalent start-ups

N_a and N_f = n° of start-ups and n° of hourly braking

sa_1 and sa_2 = Sliding at the beginning and at the end of each start-up

sf_1 and sf_2 = Sliding at the beginning and at the end of each braking

In the case of N manoeuvres, as hereby mentioned, the following values can be traced:

TABLE N. 3

TYPE OF MANOEUVRE	sa_1	sa_2	sf_1	sf_2	$\alpha = N_{ae}/N$
START-UP COMPLTE	1	0	-	-	1
START-UP INCOMPLETE	1	s	-	-	$1-s^2$
BRAKING COMPLTE	-	-	2	1	3
BRAKING INCOMPLETE	-	-	$2-s$	1	$4(1-s)-(1-s^2)$
REVERSAL COMPLTE	1	0	2	1	4
REVERSAL INCOMPLETE	1	s	$2-s$	1	$4(1-s)$

By indicating with N the number of manoeuvres, the number of equivalent hourly start-ups is given by the expression:

$$N_{ae} = \alpha N$$

Therefore, the general expression for the calculation of the acceleration constant is given by:

$$A_o = \alpha N PD^2 T$$

from which:

$$N = \frac{A_o}{\alpha PD^2 T} \quad \text{or} \quad N = \frac{A_o}{PD^2 T} \cdot \frac{1}{s_1^2 - s_2^2}$$

Where $\alpha = 1$ in the case of complete start-ups

Where $\alpha = 3$ in the case of complete braking

Where $\alpha = 4$ in the case of complete reversals

Where S_1 = sliding at the beginning of each manoeuvre

Where S_2 = sliding at the end of each manoeuvre

8.3 EXAMPLE OF MOTOR TYPE

When choosing the suitable motor for the duty, the following system can be taken into consideration

Given: PD^2 (roller + bar) - number of tours – maximum torque.

We look for: motor type – number of complete reversals.

Example: PD^2 (roller + bar) = 1,2 kgm² – number of tours = 1000.

Maximum torque = 3 daNm.

The TTM motor type 100.25/6 is chosen, with starting torque 3 daNm and PD^2 motor = 0,03 Kgm²

The motor chosen is suitable for the following complete reversals:

$$N = \frac{A_o}{4 \cdot PD^2 T} = \frac{A_o}{4(1.2 + 0,03)} = \frac{A_o}{4.92}$$

There will be:

Intermittence 100%: $N = 153$

Intermittence 40%: $N = 192$

It's clear that if the time of the intermittence is shorter, the number of motor reversal is higher.

In the case of simple complete start-ups, the same motor would allow the following hourly manoeuvres:

$$N = \frac{A_o}{1 PD^2} = \frac{A_o}{1.2 + 0,03} = \frac{A_o}{1.23}$$

There will be:

Intermittence 100% : $N = 610$

Intermittence 40% : $N = 765$

9. QUESTIONNAIRE

If it is hard to identify the motor type because of the high number of manoeuvres, because of the coupling of the PD² or because of the high intermittence you shall contact us and provide the following information contained in the questionnaire.

- 1) *Use of the roller (roller, conveyor etc.)*
- 2) *Type of the material transferred*
- 3) *Maximum weight of the material transported*
- 4) *Minimum weight of the material transported*
- 5) *Maximum length of the material transported*
- 6) *Moment of inertia of the material transported (referred to the motor shaft)*
- 7) *Temperature of the material transported*
- 8) *Ambient temperature close to the motor*
- 9) *Starting torque and maximum torque required to the roller*
- 10) *Roller speed (rev/1') (or peripheral roller speed)*
- 11) *Roller typology and size*
- 12) *Roller moment of inertia (Kgm²)*
- 13) *Quantity of motorized roller*
- 14) *Subdivision of non-motorized rollers*
- 15) *Subdivision of rollers according to the cage*
- 16) *Distance between rollers*
- 17) *Number of start-up/hour*
- 18) *Number of reversals/hour*
- 19) *Number of braking/hour*
- 20) *Ambient and climate conditions*
- 21) *Braking type*
 - *in counter-current*
 - *in direct current*
 - *other types of frequency*
- 22) *Time of acceleration required sec.*
- 23) *Time of reversals required sec.*
- 24) *Time of braking required sec.*
- 25) *Time of insertion into the network sec.*
- 26) *Motor speed rev/1'*
- 27) *Motor polarity*
- 28) *Motor mounting type*
 - *IM 1001*
 - *IM 3001*
 - *Non-standard forms (provide drawings)*
- 29) *Possible ratio of transmission between the roller and the motor.*
- 30) *Line voltage and frequency. Inverter supply*
- 31) *Other useful information*



10. TABLES OF TECHNICAL DATA

The following tables indicate the ratings of TTM range motors with:

- CONSTRUCTION FORM: **M 1001iM3001**
- ENCLOSURE: **P45 E P55**
- VOLTAGE: **380V**
- FREQUENCY: **50 Hz**
- CLASS INSULATION: **H**
- BLOWER: **C00**

Note: Types, polarity and mechanical executions of this price list are in common use.
Other types, polarities (also superior) and executions can be manufactured upon request.

10.1 MOTORS WITH 6 POLES

VELOCITÀ SINCRONA GIRI/MIN.	COPPIA DI SPUNTO daNm	MOTORE TIPO	COEFFICIENTE DI ACCELERAZIONE KGM ² H ISOL. CLASSE t'I INT.100% INT40%		CORRENTE DI AVVIAMENTO A 380V -50 H	ROTORE KGW	MASSA KG
1000	1.6	TTM 80-25-6	550	700	4.6	0.011	26
1000	2.1	TTM 80-29-6	660	860	6.3	0.015	32
1000	3	TTM100-25-6	740	935	9.1	0.029	44
1000	4	TTM100-29-6	850	1080	11.7	0.038	52
1000	5.5	TTM100-37-6	1150	1530	18	0.062	61
1000	7.5	TTM132-33-6	1250	1580	26	0.125	93
1000	10	TTM132-37-6	1450	1830	32	0.156	105
1000	15	TTM160-33-6	1860	2180	44	0.309	154
1000	20	TTM160-39-6	2280	2730	61	0.428	175
1000	30	TTM160-45-6	2940	3500	88	0.590	210

10.2 MOTORS WITH 8 POLES

750	1.5	TTM 80-29-8	950	1320	4.5	0.015	32
750	2	TTM 80-33-8	1130	1635	5.2	0.0187	34
750	3	TTM100-29-8	1350	1820	8.2	0.045	49
750	4	TTM100-33-8	1600	2100	10.5	0.0575	57
750	5.5	TTM132-29-8	1980	2380	13	0.132	80
750	7.5	TTM132-35-8	2420	2850	17.5	0.188	96
750	10	TTM132-39-8	2850	3480	22.5	0.231	115
750	15	TTM160-39-8	3950	4720	39	0.428	176
750	20	TTM160-45-8	4980	5950	53	0.590	210
750	25	TTM200-37-8	4980	5950	62	1.250	270
750	30	TTM200-41-8	5730	6850	77	1.560	296

10.3 MOTORS WITH 10 POLES

600	1.2	TTM 80-25-10	1250	1900	2.5	0.011	26
600	1.6	TTM 80-33-10	1650	2520	3.7	0.0187	34
600	2.1	TTM100-25-10	1700	2520	4.25	0.0350	44
600	3	TTM100-31-10	2150	3050	6.20	0.0525	54
600	4	TTM100-35-10	2450	3400	7.50	0.065	60
600	5	TTM132-31-10	3050	3900	9.50	0.149	87
600	6.5	TTM132-35-10	3700	4500	12	0.188	96
600	8	TTM132-39-10	4300	5350	15	0.231	112
600	10	TTM160-33-10	4700	5900	25	0.448	146
600	15.5	TTM160-41-10	6300	7950	37.5	0.700	185
600	20	TTM200-35-10	7100	8700	44.5	1.080	255
600	25	TTM200-39-10	7850	9650	57	1.350	285
600	30	TTM200-43-10	9000	11300	72	1.700	325

10.4 MOTORS WITH 12 POLES

500	1.6	TTM100-23-12	2250	3250	3	0.0318	36
500	2	TTM100-27-12	2650	3700	3.6	0.0390	45
500	3.1	TTM100-33-12	3300	4700	5.2	0.0575	57
500	4.2	TTM100-37-12	3900	5650	6.2	0.0728	62
500	5.1	TTM132-33-12	4750	5900	7.6	0.162	92
500	6.2	TTM132-37-12	5700	7100	9.6	0.203	105
500	8	TTM160-31-12	6000	7200	17	0.458	140
500	10	TTM160-35-12	6800	8300	21	0.566	158
500	12.6	TTM160-39-12	7850	9650	26	0.700	175
500	15.2	TTM160-43-12	9800	12300	33	0.900	195
500	20	TTM200-37-12	10500	13100	37	1.430	268
500	25	TTM200-41-12	12300	15300	46	1.780	296
500	30	TTM200-45-12	14800	18300	57	2.250	340

10.5 MOTORS WITH 16 POLES

VELOCITÀ SINCRONA GIRI/IMIN.	COPPIA DI SPUNTO daNm	MOTORE TIPO	COEFFICIENTE DI ACCELERAZIONE KGM ² H ISOL. CLASSE t'I INT.100% INT40%		CORRENTE DI AVVIAMENTO A 380V -50 H	ROTORE KGW	MASSA KG
375	1.3	TTM100-23-16	3200	5050	2	0.0318	37
375	1.7	TTM100-29-16	3950	6400	2.5	0.0465	52
375	2.5	TTM100-35-16	4950	7950	3.5	0.0650	62
375	3.6	TTM132-29-16	6400	9100	4.5	0.132	80
375	4.2	TTM132-33-16	7300	10600	5.5	0.162	93
375	5.1	TTM132-37-16	8600	12250	6.7	0.203	104
375	7.6	TTM160-33-16	11150	14650	12	0.507	148
375	10.2	TTM160-37-16	12650	16650	15	0.625	166
375	12.6	TTM160-41-16	14900	19300	19	0.790	186
375	16.2	TTM200-37-16	16350	21900	27	1.430	268
375	21	TTM200-41-16	18900	25250	31	1.780	300
375	26	TTM200-45-16	22300	29800	39	2.250	342

10.6 MOTORS WITH 20 POLES

300	2.7	TTM132-31-20	9400	14350	3	0.149	85
300	4.1	TTM132-37-20	12350	18350	4.2	0.203	102
300	5.6	TTM160-33-20	17150	23150	5.5	0.507	148
300	7.7	TTM160-37-20	19900	26650	7.6	0.628	165
300	10.5	TTM160-41-20	23000	31000	10.2	0.790	186
300	15	TTM200-41-20	30100	39900	15.1	1.780	300
300	20	TTM200-45-20	35650	47300	20.5	2.250	342

10.7 MOTORS WITH 24 POLES

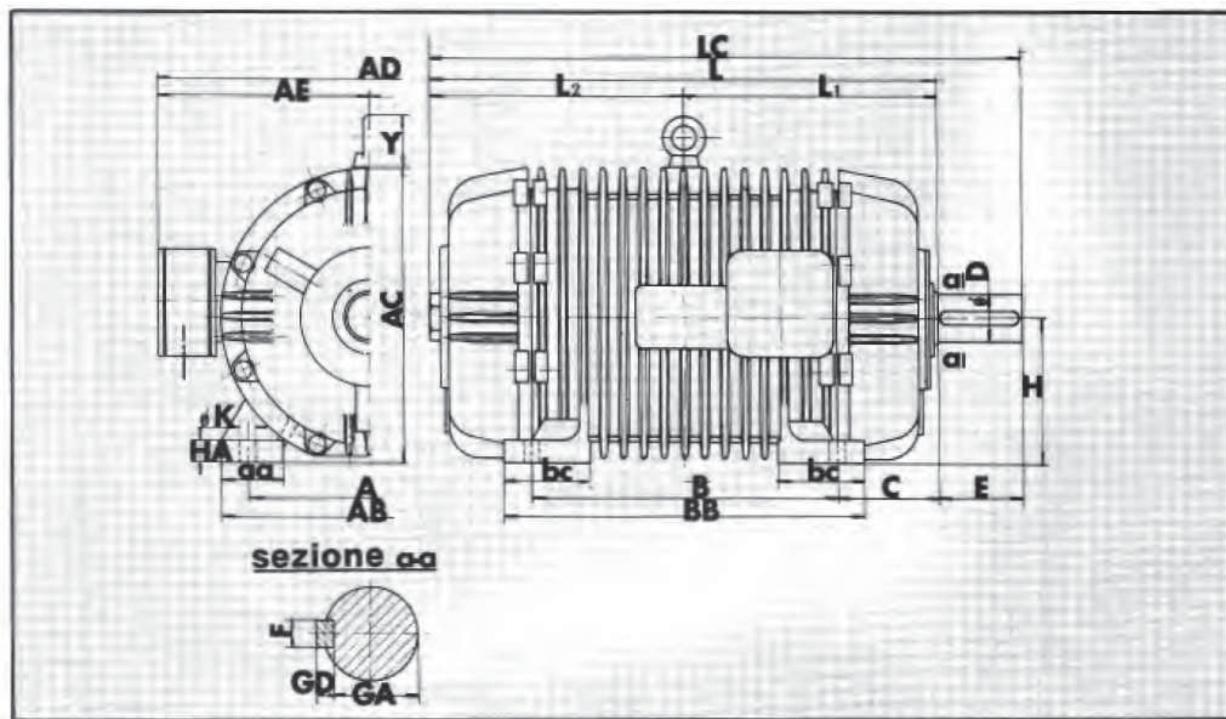
250	3.2	TTM132-35-24	17250	27250	5.5	0.188	96
250	5.3	TTM160-33-24	25300	33300	7.5	0.507	150
250	8.2	TTM160-41-24	33650	44300	12	0.790	186

10.8 MOTORS WITH 30 POLES

200	5.2	TTM160-35-30	34900	52300	5.2	0.565	158
200	7.6	TTM160-41-30	42800	64800	7.6	0.790	186

11. SIZE FEATURES

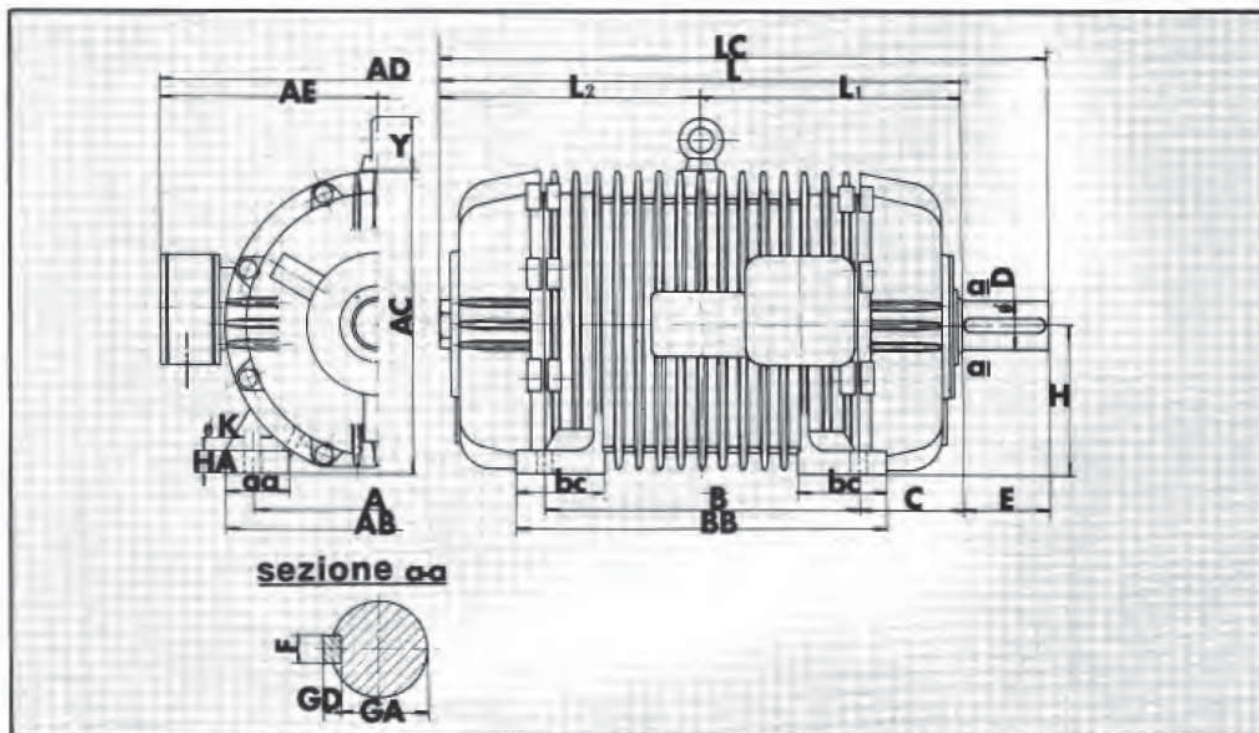
11.1 FORM IM 1001



TIPO TTM	H	A	B	C	D	E	F	GA	GD	K	HA	L	L ₁	L ₂	LC	AC	BC	AA	AB	BB	AD	AE
80 25	80	125	173	50	24	50	8	20	7	10	12	274	136,5	137,5	324	165	40	33	160	200	140	225
80 29	80	125	208	50	24	50	8	20	7	10	12	309	154	155	359	165	40	33	160	235	140	225
80 33	80	125	248	50	24	50	8	20	7	10	12	349	174	175	399	165	40	33	160	275	140	225
100 23 100 25	100	160	187	63	32	50	10	27	8	12	16	310	156,5	153,5	360	205	58	40	200	255	160	265
100 27 100 29	100	160	222	63	32	50	10	27	8	12	16	345	174	171	395	205	58	40	200	255	160	265
100 31 100 33	100	160	262	63	32	50	10	27	8	12	16	385	194	191	435	205	58	40	200	295	160	265
100 35 100 37	100	160	312	63	32	50	10	27	8	12	16	435	219	216	485	205	58	40	200	345	160	265

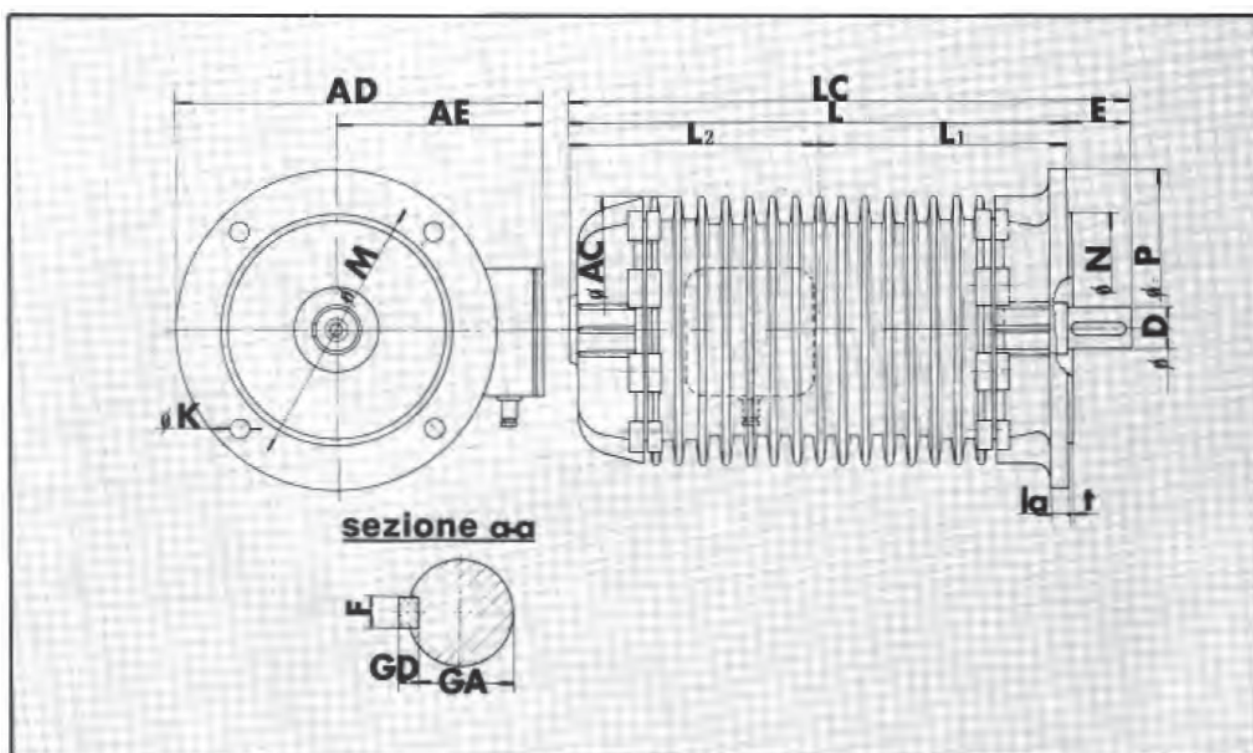
TIPO TTM	H	A	B	C	D	E	F	GA	GD	K	HA	L	L ₁	L ₂	LC	AC	Y	BC	AA	AB	BB	AD	AE
132 29	132	216	232	89	42	75	12	37	8	14	20	412	205	207	487	265	55	77	45	265	280	332	200
132 31 132 33	132	216	272	89	42	75	12	37	8	14	20	452	225	227	527	265	55	77	45	265	320	332	200
132 35 132 37	132	216	322	89	42	75	12	37	8	14	20	502	250	252	577	265	55	77	45	265	370	332	200
132 39	132	216	387	89	42	75	12	37	8	14	20	567	282,5	284,5	642	265	55	77	45	265	435	332	200

11.1 FORM IM 1001



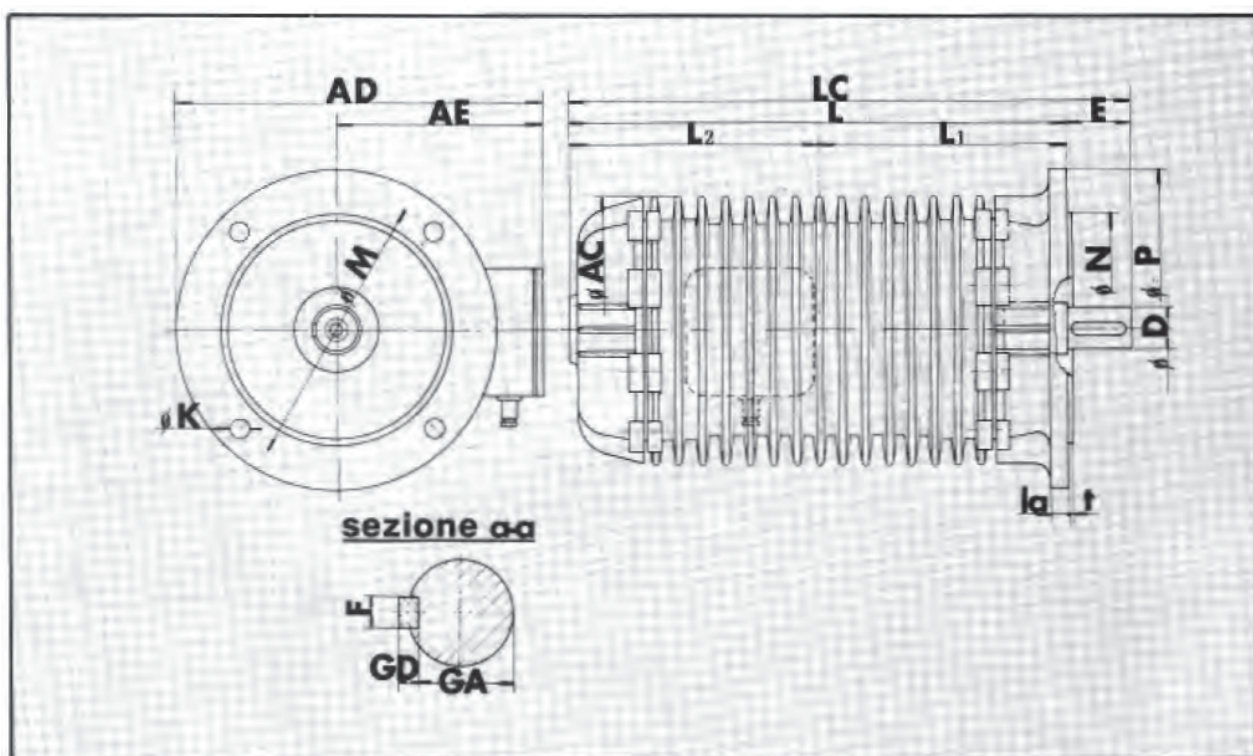
TIPO TTM	H	A	B	C	D	E	F	GA	GD	K	HA	L	L ₁	L ₂	LC	AC	Y	BC	AA	AB	BB	AD	AE
160 31 160 33	160	254	264	108	50	110	14	44,5	9	14	22	480	240	240	590	322	54	85	60	310	314	403	242
160 35 160 37	160	254	314	108	50	110	14	44,5	9	14	22	530	265	265	640	322	54	85	60	310	364	403	242
160 39 160 41	160	254	379	108	50	110	14	44,5	9	14	22	595	297,5	297,5	705	322	54	85	60	310	429	403	242
160 43 160 45	160	254	464	108	50	110	14	44,5	9	14	22	680	340	340	790	322	54	85	60	310	514	403	242
200 35 200 37	200	318	294	133	60	110	18	53	11	18	28	560	280	280	670	400	63	100	78	388	350	515	315
200 39 200 41	200	318	359	133	60	110	18	53	11	18	28	625	312,5	312,5	735	400	63	100	78	388	415	515	315
200 43 200 45	200	318	444	133	60	110	18	53	11	18	28	710	355	355	820	400	63	100	78	388	500	515	315

11.2 FORM IM 3001



TIPO TTM	M	N	P	D	E	F	GA	K	LA	T	AG	L	L ₁	L ₂	LC	GD	AE	AD
80 25	165	130	200	24	50	8	20	11,5(4)	12	3,5	170	274	136,5	137,5	324	7	140	240
80 29	165	130	200	24	50	8	20	11,5(4)	12	3,5	170	309	154	155	359	7	140	240
80 33	165	130	200	24	50	8	20	11,5(4)	12	3,5	170	349	174	175	399	7	140	240
100 23 100 25	215	180	250	32	50	10	27	14 (4)	14	4	210	310	156,5	153,5	360	8	160	285
100 27 100 29	215	180	250	32	50	10	27	14 (4)	14	4	210	345	174	171	395	8	160	285
100 31 100 33	215	180	250	32	50	10	27	14 (4)	14	4	210	385	194	191	435	8	160	285
100 35 100 37	215	180	250	32	50	10	27	14 (4)	14	4	210	435	219	216	485	8	160	285
132 29	265	230	300	42	75	12	37	14 (4)	14	4	265	412	205	207	487	8	200	350
132 31 132 33	265	230	300	42	75	12	37	14 (4)	14	4	265	452	225	227	527	8	200	350
132 35 132 37	265	230	300	42	75	12	37	14 (4)	14	4	265	502	250	252	577	8	200	350
132 39	265	230	300	42	75	12	37	14 (4)	14	4	265	567	282,5	284,5	642	8	200	350

11.2 FORM IM 3001

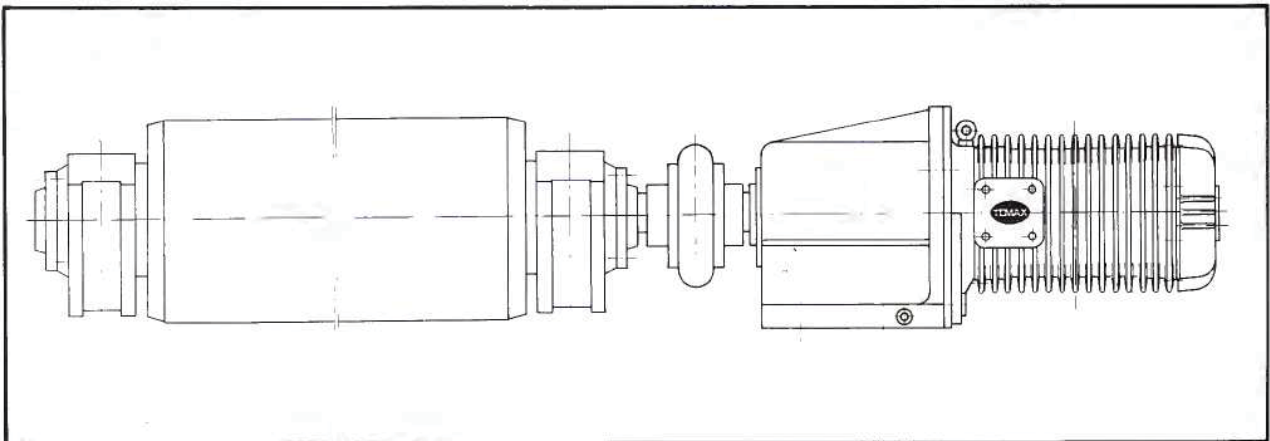


TIPO TTM	M	N	P	D	E	F	GA	K	LA	T	AC	L	L ₁	L ₂	LC	GD	AE	AD
160 31 160 33	300	250	350	50	110	14	44,5	14(8)	16	5	322	480	240	240	590	9	195	420
160 35 160 37	300	250	350	50	110	14	44,5	14(8)	16	5	322	530	265	265	640	9	195	420
160 39 160 41	300	250	350	50	110	14	44,5	14(8)	16	5	322	595	297,5	297,5	705	9	195	420
160 43 160 45	300	250	350	50	110	14	44,5	14(8)	16	5	322	680	340	340	790	9	195	420
200 35 200 37	350	300	400	60	110	18	53	14(8)	16	5	400	560	280	280	670	11	300	500
200 39 220 41	350	300	400	60	110	18	53	14(8)	16	5	400	625	312,5	312,5	735	11	300	500
200 43 200 45	350	300	400	40	110	18	53	14(8)	16	5	400	710	355	355	820	11	300	500

12. GEAR SPEED REDUCER COUPLING

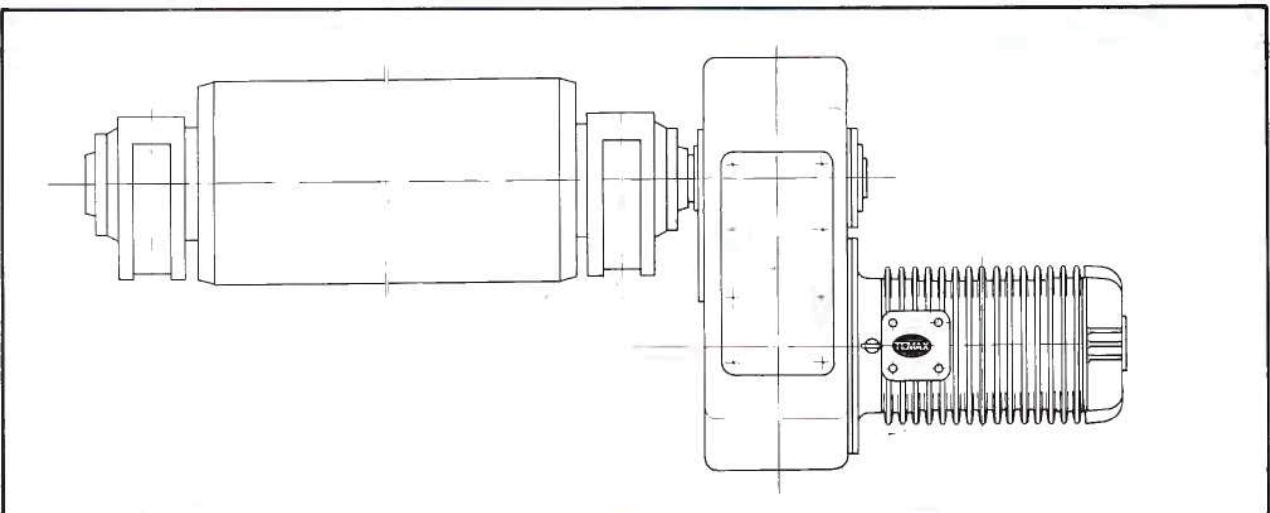
If the motor needs to be coupled to a speed reducer, a mechanical execution can be changed from the catalogue standards in order to create a very composite and economical unit. In this respect, there are different possibilities; from the creation of a coupling flange to the supply of the motor with no coupled side flange but with a non-standard shaft positioned for a direct entry to the reducer body. In these circumstances holding-related issues concerning the lubricator shall be discussed with the manufacturer of the speed reducer. Please contact us where it is necessary as we have already had numerous and very positive experiences with several Manufacturers.

FIG. 2



EXAMPLE OF COUPLING WITH COAXIAL REDUCER BY THE MEANS OF AN ELASTIC JOINT

FIG. 3



EXAMPLE OF COUPLING WITH REDUCER WITH PARALLEL AXIS WITH HOLLOW SHAFT

Based on these experiences, we have drawn a range of tables (see tab. 1-2-3 at the following page) which shows, for a wide range of speed of the slow shaft, (from 20 to 500 rpm), the torques that can be obtained with common reducers with one or two gear torques.

The range of torques obtainable with a slow shaft has a size daNm 2,5 to 500 rpm and daNm 315 to 40 rpm. For higher torques or in case of different speed you shall contact your reducer speed manufacturer. With the right reducers coupled to our **TTM** standard motors it is possible to be provided with torques up to 900 daNm at 30 rpm.

1. REDUCERS WITH MOTORS WITH 12 POLES (500 RPM)

TTM MOTOR	TORQUE IN KGM ON THE SLOW SHAFT AT THE FOLLOWING SPEEDS (RPM)							
	n =	20	25	31.5	40	50	63	80
100.23		31,5	25	20	16	12,5	10	8
100.27		40	31,5	25	20	16	12,5	10
100.27		50	40	31,5	25	20	16	12,5
100.33		63	50	40	31,5	25	20	16
100.37		80	63	50	40	31,5	25	20
132.33		100	80	63	50	40	31,5	25
132.37					63	50	40	31,5
160.31					80	63	50	40
160.35					100	80	63	50
160.39					125	100	80	63
160.43					160	125	100	80
200.37					200	160	125	100
200.41					250	200	160	125
200.45					315	250	200	160

WITH COAXIAL REDUCERS WITH TWO GEAR TORQUES

2. REDUCERS WITH MOTOR WITH 8 POLES (750 RPM)

TTM MOTOR	TORQUE IN KGM ON THE SLOW SHAFT AT THE FOLLOWING SPEEDS (RPM)								
	n =	100	112	125	140	224	250	280	315
80.29		9,4	8,4	7,5	6,7	4,18	3,75	3,35	3
80.33		12	10,7	9,4	8,4	5,35	4,8	4,2	3,75
100.29		15	13,4	12	10,7	6,7	6	5,36	4,8
100.29		18,8	16,8	15	13,4	8,4	7,5	6,7	6
100.33		23,6	21	18,8	16,8	10,7	9,4	8,4	7,5
132.29		30	26,8	23,6	21	13,4	12	10,7	9,4
132.29		37,5	33,5	30	26,8	16,8	15	13,4	12
132.35		48	42	37,5	33,5	21	18,8	16,8	15
132.39		60	53,6	48	42	26,8	23,6	21	18,8
160.39		75	67	60	53,6	33,5	30	26,8	23,6
160.45		120	107	94	84	53,6	48	42	37,5
200.37		150	134	120	107	67	60	53,6	48
200.41		188	168	150	134	84	75	67	60

WITH COAXIAL REDUCERS WITH TWO GEAR TORQUES

WITH COAXIAL REDUCERS WITH ONE TORQUE

3. REDUCER WITH MOTOR WITH 6 POLES (1000 RPM)

TTM MOTOR	TORQUE IN KGM ON THE SLOW SHAFT AT THE FOLLOWING SPEEDS (RPM)						
	n = 160	180	200	355	400	450	500
80.25	8	6,9	6,3	3,5	3,15	2,77	2,5
80.29	10	8,9	8	4,54	4	3,5	3,15
100.25	12,5	11	10	5,55	5	4,44	4
100.25	16	13,9	12,5	6,9	6,3	5,55	5
100.29	20	17,5	16	8,9	8	6,9	6,3
100.37	25	22,2	20	11	10	8,9	8
132.33	31,5	27,7	25	13,9	12,5	11	10
132.33	40	35	31,5	17,5	16	13,9	12,5
132.37	50	44,4	40	22,2	20	17,5	16
160.33	63	55,5	50	27,7	25	22,2	20
160.33	80	69	63	35	31,5	27,7	25
160.39	100	89	80	44,4	40	35	31,5
160.45	125	110	100	55,5	50	44,4	40
160.45	160	139	125	69	63	55,5	50

WITH COAXIAL REDUCERS WITH TWO GEAR TORQUES

WITH COAXIAL REDUCERS WITH ONE GEAR TORQUE

13. CONSTRUCTION EXAMPLES

FIG.4

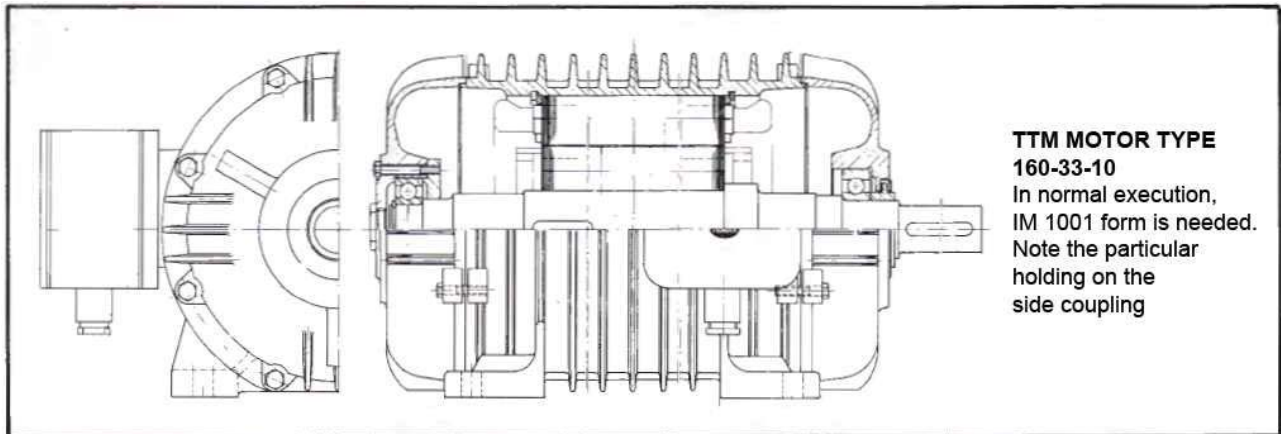
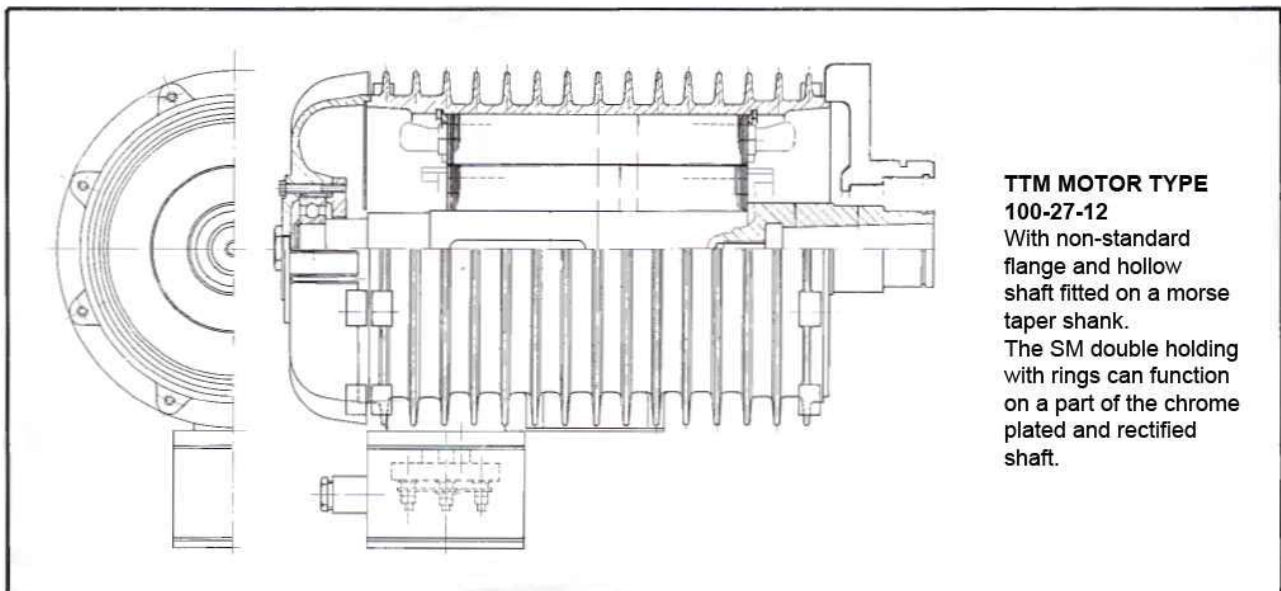


FIG.5



ROLLER TABLE MOTOR WITH DIRECT CURRENT

Furthermore, Temax produces a range of direct current motors which is particularly suitable and experimented for rollers and, in general for heavy duties.

The range, named "**NC**" goes from the shaft length at 100 up to 400, including all intermediate name plates envisaged by the current standards.

The description shows one of these motors, manufactured with a non-standard flange reducer coupling.



**TABLE ROLLER MOTOR C.C
TYPE NC 132 VL**

$C_n = 3,2 \text{ daNm}$ - $C_{\text{max}} = 6,4 \text{ daNm}$
 C – a peak at 25 daNm

Ask for specific documentation. **NC** motor catalogue.