Kaiser-Motoren

List M.02

Torque motors

Construction:
- standard motor design IP 55 with die cast cage rotor
- insulation for the tropics and against humidity
- insulation class F
- noise-tested anti-friction bearings (lifetime lubrication)
- non-ventilated - separately ventilated

Special advantages:
- continued standstill proof
- high operating frequency

Options:
- special shafts
- brakes
- gearing
- special voltages / frequencies
- reverse current operation (unwinding brake)

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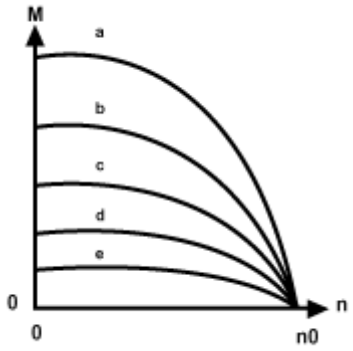
N 3000 / 4 / 02 / Be

Torque motors

Torque motors are asynchronous motors which are constructed for a permanent standstill operation.
The motors are designed so that they can dissipate any heat which occurs without any problems.
All torque motors are provided with specially selected bearings for increased temperatures. In general a high-temperature grease is used.
Special fields of application for torque motors are

- servo-drives
- support drives
- winding drives
- drives with an extreme operating frequency

The torque-speed characteristics of the torque motors correspond to diagram a. Lower torques can be attained by varying the terminal voltage (b - e).
In order to adjust the terminal voltage, variable transformers or electronic voltage adjusting devices can be installed. Please request the corresponding particulars.



Nomenclature

Sign	Dimension	Meaning
η	1	Mechanical efficiency
F	N	tensile force
M	Nm	torque
Pe	Watt	base power
Pn	Watt	nominal power
d	mm	diameter of friction roll
d1	mm	diameter of tube
d2	mm	final diameter of bobbin
i	1	transmission ratio = torque motor speed / machine speed
n	rpm	speed of machine shaft
n0	rpm	no-load speed of torque motor
q	1	winding ratio d2 / d1
v	m/min	material speed

Layout of torque motors

The torque-speed characteristics of the individual types differ in the steepness of the ascending curve so that in many drive applications an exact layout is only possible by using the torque - speed characteristics. Please, if necessary, request the characteristics.

It is possible to roughly lay out the drives according to the data on the following page.

Attention! The listed data refer to the machines at operating temperature. In the cold condition, the torques and currents are approx. 30% higher.

For general technical data, refer to list T.02.

Servo-drives

Drives which are operated in the permanent standstill operation or at very low speeds are considered here as servo-drives.
The selection of the torque motors is effected according to the listed torques.
The application of a 12-pole torque motor, maybe with a series-connected gearing, is normally the case.
When actuating the servo-drives, one should not calculate with more than 2/3 of the no-load speed. Up to this speed, the torque decreases depending on the type by 25 to 50%; above this speed, the torque rapidly decreases.

Support drives

Torque motors are extremely suitable for driving guide rolls with continuous production processes so that the self-generated frictional torque does not have to be produced by the material.
In order to lay out the drive, the torque must be ascertained resp. the circumferential force must be measured (string, spring balance). The nominal power of the torque motors can thus be determined:

$$Pn = \frac{1}{n} \cdot \frac{\pi}{30} \cdot M \cdot n \qquad \text{resp.} \quad Pn = \frac{1}{n} \cdot \frac{1}{60} \cdot F \cdot v$$

roughly with $\eta = 0{,}85$:

$$Pn = 0{,}123 \cdot M \cdot n \qquad \text{resp.} \quad Pn = 0{,}02 \cdot F \cdot v$$

The nominal power of the torque motors always refers to 2/3 of the no-load speed, therefore the following results for the transformation ratio of the series-connected mechanical system:

$$i = \frac{2}{3} \cdot \frac{n0}{n} \qquad \text{resp.} \quad i = \frac{2\,\pi}{3000} \cdot \frac{n0 \cdot d}{v}$$

Roughly

$$i = \frac{1}{480} \cdot \frac{n0 \cdot d}{v}$$

Winding drives

Only the indirectly tensile force controlled (without dancer roll or something similar) drives are to be considered here from the numerous different drive possibilities for winding endless materials.
In this case, the torque of the winding motor must be determined as accurately as possible because if the motors are selected too large, considerable problems can occur due to the limited adjusting range.

Contact winders, circumferential winders

The bobbin is driven via a contact roll on the circumference. The speed of the winding drive remains constant during the winding process. Layout same as with the support drives.

Axle-type winders, central winders

The bobbin is driven via the winding shaft. The speed is first of all high with a low torque and decreases with increasing bobbin diameter and increasing torque. The drive power is constant.
The 'base power' is required for the layout:
Pe = torque at 20% of n0 x speed at 20% standstill torque
Pe: approx. 0,8 . standstill torque no-load speed.

$$Pe = \frac{1}{n} \cdot \frac{1}{60} \cdot F \cdot v \cdot q \qquad Pe = 0{,}02 \cdot F \cdot v \cdot q$$

$$i = \frac{0{,}8 \cdot \pi}{1000} \cdot \frac{n0 \cdot d1}{v} = \frac{1}{400} \cdot \frac{n0 \cdot d1}{v} \cdot \text{for} \leq 0{,}8 \cdot n0$$

Corresponding reserves must be included for acceleration procedures. The above formulas cannot be applied with winding conditions q < 4. Please contact us.

Torque motors

Insulation class F,

temperature rise F

Series **DNK...D**

Series **DNK...DF** Protection **IP 55**

nominal torque at standstill Nm	nominal power at n0 x 2/3 W	Typ	Nominal current at 380 V A	 400 V A	cos. phi	Moment of inertia kg · cm²	Weight Kg
2 poles, no-load operation 3000 rpm .....upon request							
4 poles, no-load operation 1500 rpm							
0,5		**DNKR 71 B / 4 D**				7,4	6,5
1,0		**DNKR 90 L / 4 D**				32	15
1,6		**DNKR 112 M / 4 D**				91	26
2,0		**DNKR 132 S / 4 D**	0,86	0,82	0,86	240	46
2,0		**DNKR 71 B / 4 DF**				7,4	8
2,5 **3,3**	180	**DNKR 80 A / 4 DF** **DNKR 80 B / 4 DF**	1,2 1,5	1,15 1,45	0,81 0,81	11 15	10 11
4,0	280	**DNKR 90 L / 4 DF**	1,75	1,70	0,85	32	16,
5,0	370	**DNKR 100 LB / 4 DF**	2,3	2,2	0,82	61	24,5
6,5	510	**DNKR 112 ML / 4 DF**	3	2,9	0,76	120	33,5
8,0 **10,0**		**DNKR 132 S / 4 DF** **DNKR 132 M / 4 DF**	4,9	4,7	0,72	240 340	48 61
6 poles, no-load operation 1000 rpm .....upon request							
8 poles, no-load operation 750 rpm							
1,0		**DNKR 71 A / 8 D**	0,35	0,33	0,87	9,2	6,0
1,6	46	**DNKR 80 A / 8 D**	0,45	0,40	0,75	22	8,5
2,0	62	**DNKR 90 S / 8 D**	0,55	0,50	0,66	38	12,5
2,6		**DNKR 100 L / 8 D**	0,65	0,60	0,82	100	23
3,0 **3,3**		**DNKR 71 A / 8 DF** **DNKR 71 B / 8 DF**				9,2 12	7,5 8
4,0 **5,0**		**DNKR 80 A / 8 DF** **DNKR 80 B / 8 DF**				22 28	10 11
6,5	220	**DNKR 90 L / 8 DF**	1,6	1,5	0,71	51	16
8,0 **10,0**	300 380	**DNKR 100 LA / 8 DF** **DNKR 100 LB / 8 DF**	2,1 2,4	2,0 2,3	0,82 0,77	78 100	20 24
13,0	480	**DNKR 112 ML / 8 DF**	3,3	3,2	0,77	190	34
15,0 **17,0**		**DNKR 132 S / 8 DF** **DNKR 132 M / 8 DF**	3,8	3,6	0,78	300 400	44 53
12 poles, no-load operation 500 rpm							
0,9 **1,2**	29	**DNK 71 A / 12 D** **DNK 71 B / 12 D**	0,27	0,25	0,70	9,2 12	6,0 6,5
1,5 **1,8**	37 39	**DNK 80 A / 12 D** **DNK 80 B / 12 D**	0,35 0,36	0,33 0,33	0,77 0,74	22 28	8,5 9,5
2,2 **3,0**	50	**DNK 90 S / 12 D** **DNK 90 L / 12 D**	0,75 0,70	0,70 0,65	0,50 0,58	38 51	12,5 15
3,3 **3,5**	75 82	**DNK 100 LA / 12 D** **DNK 100 LB / 12 D**	0,67 0,75	0,65 0,70	0,70 0,70	78 100	19 23
4,4	110	**DNK 112 M / 12 D**	0,9	0,85	0,67	190	32
2,5 **3,0**	59	**DNK 71 A / 12 DF** **DNK 71 B / 12 DF**	0,7	0,65	0,66	9,2 12	7,5 8
5,0 **6,0**	100 120	**DNK 80 A / 12 DF** **DNK 80 B / 12 DF**	1,2 1,2	1,15 1,15	0,73 0,71	22 28	10 11
8,0 **10,0**	180 240	**DNK 90 S / 12 DF** **DNK 90 L / 12 DF**	2,6 2,4	2,5 2,3	0,58 0,63	38 51	14 16
12,0 **15,0**	300 380	**DNK 100 LA / 12 DF** **DNK 100 LA / 12 DF**	2,85	2,75	0,72	78 100	21 25
20,0 **23,0**	530 610	**DNK 112 M / 12 DF** **DNK 112 ML / 12 DF**	3,6 4,6	3,5 4,5	0,73 0,70	190 240	34 40
23,0 **25,0**	610 610	**DNK 132 SA / 12 DF** **DNK 132 M / 12 DF**	4,6	4,5	0,65	320 460	48 58

We reserve the right to carry out changes which result from the continuous development as well as changes concerning the values and dimensions stated in the catalogue.

The stated data are no warranted characteristics in the juristic sense.
Warranted characteristics necessitate an explicit reference in the quotation / confirmation of order.

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