

multitorque[®]

D.C. Electromagnetic Clutches and Brakes (without air gap)

8

Range from 0,45 to 14,5 Nm

Product group

Types **K SM K SF K SB K ZZ**

- According to VDE 0580 and ISO 9001 (conform with article 10 of directions 73/23/EEC – according to CENELEC memorandum no. 3 of March 1987).
- Maximum torque with minimum dimensions – Five sizes - High endurance – Small torque remanence
- Large diameter shaft bores
Shaft or flange mounted for continuous or divided shaft application. High maximum rates of revolution
- Membrane spring armature – optional hub boss (sliding armature on request)
- Coil with class B insulation and free leads
- Dry operation without air gap
Special units for wet armature application
- Protection classification –
DIN VDE 0470/EN 60529 – IP 00
- Clutch bearings shaft mounted, type K SM
size 028/055 plain bearings
size 066/135 ball bearings
- Operating time may be reduced by over-voltage with electronic control components
- General purpose, high endurance, clutches and brakes for arduous service in the fields of:
Office and Data Processing machines,
Packaging and Textile machinery,
Automation and Machine tools.

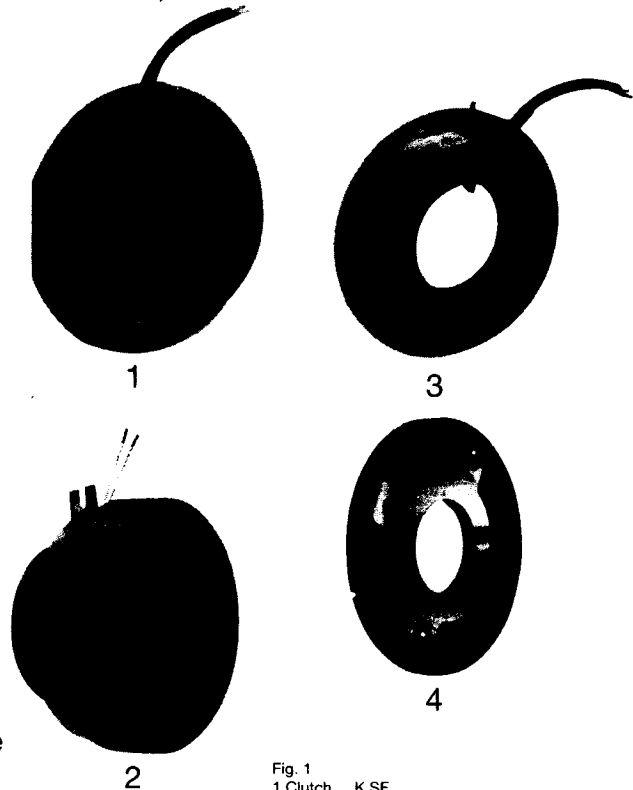


Fig. 1
1 Clutch K SF
2 Clutch K SM
3 Brake K SB
4 Armature K ZZ M

multitorque[®] patented, single disc, clutches and brakes provide considerably higher torque and endurance, without dimensional increase, over conventional designs. The high performance is attained by sub-division of the pole faces with circular bores, providing optimum magnetic flux path and minimum wear of the friction faces.



Performance table for K SM, K SF and K SB clutches and brakes

Clutch: magnet + armature Type: K SM or K SF+ K ZZ M		Size				
		028	034	045	055	066
Torque - Pick up M_{2N}	(Nm)	0,45	0,9	2,0	4,5	9,5
Torque - Transfer M_{1N}	(Nm)	0,5	1,0	2,3	5,2	11
Torque time constant τ	(ms)	8	10	15	20	25
Power consumption P_{20}	(W)	5,3	5,8	7,6	9,5	11,6
Maximum voltage U_N	(V)	60	110	250	250	250
Inductance time constant $\frac{L}{R}$	(ms)	8	11	16	21	28
Response time t_{11}	(ms)	5	6	9	12	16
Torque rise time t_{12}	(ms)	11	16	29	43	64
Engagement time t_1	(ms)	16	22	38	55	80
Disengagement time t_2	(ms)	9	14	23	35	50
Mass inertia - pole ring J	(kgm ²)	$1,6 \cdot 10^{-6}$	$4,0 \cdot 10^{-6}$	$13 \cdot 10^{-6}$	$30 \cdot 10^{-6}$	$90 \cdot 10^{-6}$
Max. number of revolutions n Type K SM (R.P.M.)	(min. ⁻¹)	2.000	1.500	1.000	800	8.000
Type K SF (R.P.M.)	(min. ⁻¹)	10.000	10.000	10.000	8.000	8.000
Mass inertia - armature J ...A 01/A 02	(kgm ²)	$1,2 \cdot 10^{-6}$	$2,0 \cdot 10^{-6}$	$7,5 \cdot 10^{-6}$	$17 \cdot 10^{-6}$	$70 \cdot 10^{-6}$
Magnet assembly weight m_K	(kg)	0,050	0,085	0,170	0,265	0,440
Armature weight m_A ...A 01/A 02	(kg)	0,010	0,011	0,028	0,045	0,120
Brake: magnet + armature Type: K SB + KZZ M		Size				
		028	034	045	055	066
Torque - Pick up M_{2N}	(Nm)	0,63	1,44	3,2	6,3	14,5
Torque - Transfer M_{1N}	(Nm)	0,7	1,6	3,5	7,0	16
Torque time constant τ	(ms)	6	8	12	16	20
Power consumption P_{20}	(W)	5,3	6,5	8,0	8,3	12
Maximum voltage U_N	(V)	60	110	110	220	250
Inductance time constant $\frac{L}{R}$	(ms)	5	6	10	14	18
Response time t_{11}	(ms)	4	5	7	9	11
Torque rise time t_{12}	(ms)	8	12	21	31	44
Engagement time t_1	(ms)	12	17	28	40	55
Disengagement time t_2	(ms)	9	14	23	35	50
Max. number of revolutions n (R.P.M.)	(min. ⁻¹)	10.000	10.000	10.000	8.000	8.000
Mass inertia - armature J ...A 01/A 02	(kgm ²)	$1,2 \cdot 10^{-6}$	$2,0 \cdot 10^{-6}$	$7,5 \cdot 10^{-6}$	$17 \cdot 10^{-6}$	$70 \cdot 10^{-6}$
Magnet assembly weight m_B	(kg)	0,035	0,061	0,108	0,162	0,280
Armature weight m_A ...A 01/A 02	(kg)	0,010	0,011	0,028	0,045	0,120

Sizes 087,107 and 135 available.

PERFORMANCE TABLE terms are explained in Technical Bulletin K XX & VDE 0580/35.

TRANSFER TORQUE (M_{1N}) is the torque which the engaged clutch may be loaded without causing slip and is listed for the HOT condition at 90% of the RATED voltage of 24 V D.C.

PICK-UP TORQUE (M_{2N}) is the torque when slip on engagement ceases, dependent upon the friction factors (slip differential 1 m/s) and is listed for the HOT condition at 90 % of the RATED voltage of 24 V D.C.

TORQUET TIME CONSTANT (τ) is the time for the torque to rise to 0.63 of the Pick-up torque (M_{2N}) and is listed for the HOT condition at 90% of the RATED voltage of 24 V D.C.

TORQUE VALUES may vary by $\pm 30\%$ when correctly installed (page 5) due to inherent and manufacturing factors, and are measured dynamically after a short cycling "run-in" period.

Slow speed or static operation require special consideration, for which application information should be provided.

ENGAGEMENT TIME (t_1) is the time which elapses from energizing the coil until the Pick-up torque (M_{2N}) is attained and comprises the RESPONSE TIME (t_{11}) and the torque RISE TIME (t_{12}) and is listed for the HOT condition at 90% of the RATED voltage of 24 V D.C.

DISENGAGEMENT TIME (t_2) is the time which elapses from de-energizing the coil until the torque drops to 10% of the Pick-up torque (M_{2N}) and is listed for HOT condition at the RATED voltage of 24 V D.C.

AMBIENT TEMPERATURE (ϑ) and continuous DUTY RATING (ED) are the basis for the table.

POWER CONSUMPTION (P_{20}) is listed for a coil temperature of 20° C and at the RATED voltage of 24 V D.C. which will DECREASE by approximately 10% in the HOT condition.

Conversion Factors

1 N = 0,225 lbf
1 Nm = 8,85 in lb
1 mm = 0,039 in
1 kgm² = 23,7 lbft²

Dimension table for type K SM shaft mounting clutch

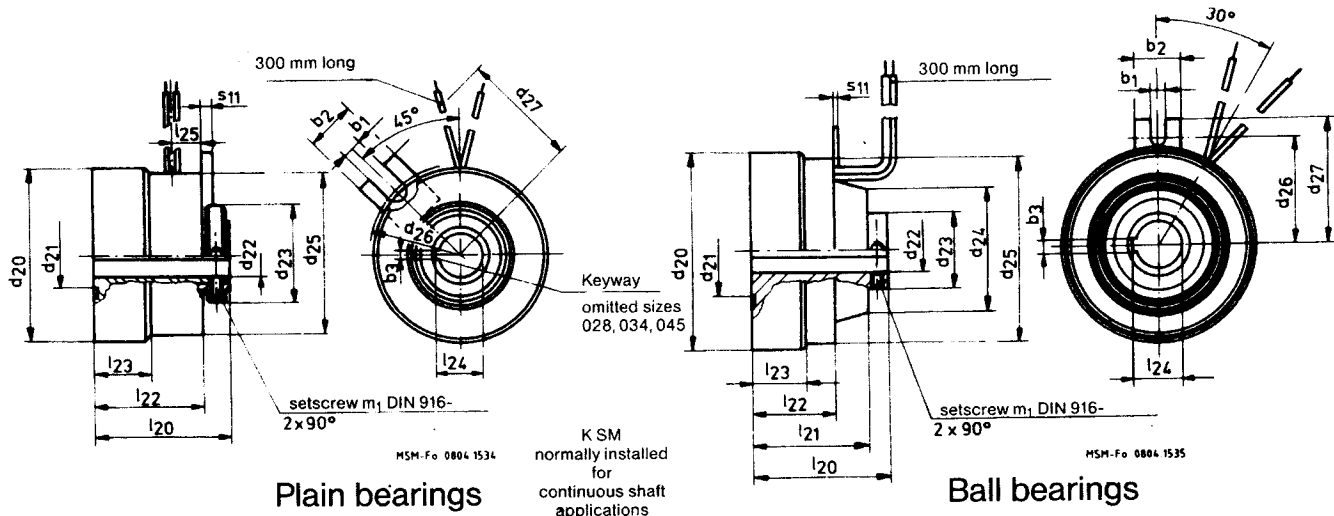


Fig. 2
SHAFT MOUNTING clutch
Type K SM X 028 to 055 X 00 A 01

Fig. 3
SHAFT MOUNTING clutch
Type K SM X 066 X 00 A 01

Type	K SM	Size				
		028	034	045	055	066
Dim.	Tol.	Dimensions (mm)				
∅ d ₂₀	h ¹¹	27	33	41,5	50,5	64
∅ d ₂₁		8	11,5	14,4	16	30
∅ d ₂₂ ¹⁾	H ⁷	6 (max. 6)	6 (max. 6)	6 (max. 8)	8 (max. 12)	10 (max. 16)
∅ d ₂₃		15	16	22	25	25
∅ d ₂₄		-	-	-	-	42
∅ d ₂₅		25	30,7	38,4	47,2	60
d ₂₆		14	18	22	26	35
d ₂₇		18	22	26	30	40
l ₂₀		21	24,7	27	30,8	40
l ₂₁		-	-	-	-	34,5
l ₂₂		16,5	18	20,5	23	24
l ₂₃		9	10,5	12	15	15
l ₂₄	+0,1	-	-	-	9	11,4
l ₂₅		4,5	4,5	5	5	-
b ₁		3,1	4,4	4,4	4,4	4,2
b ₂		8	10	10	10	13
b ₃	J ^{S9}	-	-	-	2	3
S ₁₁		1,5	1,5	1,5	1,5	1,5
m ₁		M 2,5	M 3	M 3	M 4	M 4

¹⁾ Assemblies may be provided with bore diameters up to the maximum

SUPPLY VOLTAGES

The standard supply voltage is 24 V D.C.

PROTECTION

The standard units are available with tropical protection.

DUTY RATING

The duty rating is the % of energized time per operating cycle ($\frac{t_{on}}{t_{on} + t_{off}} \times 100$).

The maximum energized time per cycle is 100% – continuous: 40% – 120 secs., 25% – 75 secs., 15% – 45 secs. 5% – 15 secs.
The clutches are designed for continuous working (Duty Rating 100 % ED).

OPERATING TIMES should be considered and may be decreased or delayed by over-voltage and delay electronic components for minimum slip and reduction of overlap on clutch brake applications.

FRICTION FACE must be maintained clean and free from contamination by handling, oil or grease etc. Trichloro-ethane 1.1.1 may be used for cleaning.

SHAFT BORE may be increased to the maximum listed in tables without significant torque or strength reduction (apart from keyway no additional metal to be removed). Concentric accuracy and avoidance of contamination of the friction face by oil or cutting-fluid is essential.

SHAFTS must run true under full load and speed conditions.

MOUNTING - any attitude of mounting may be used, but disengagement is assisted with the armature on the under side.

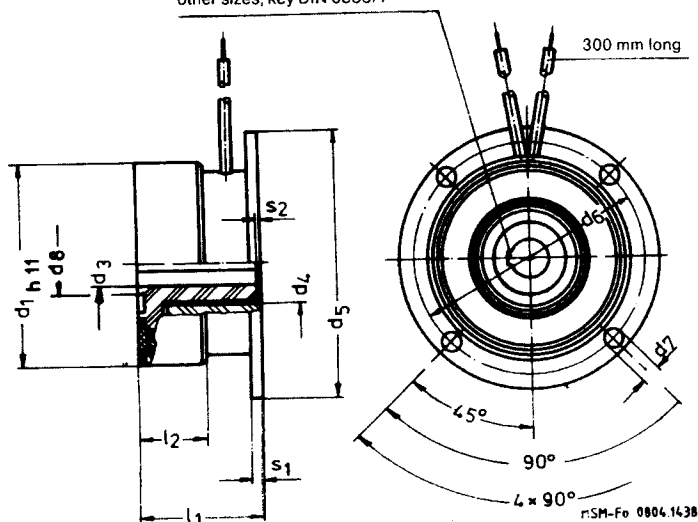
PATENTS

International patents applied for and granted for **multitorque**® clutches and brakes.

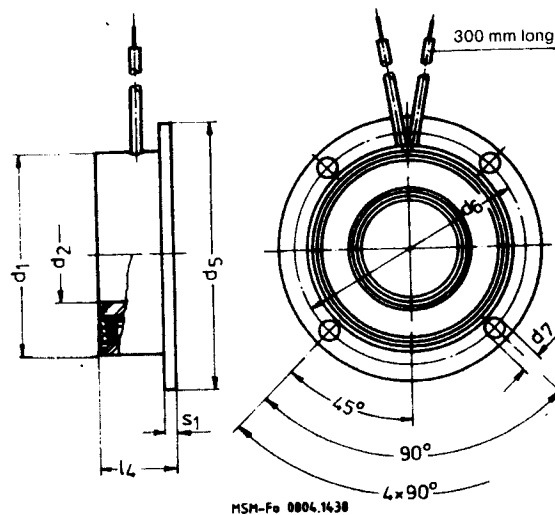
Dimension table for types K SF, K SB flange mounting clutches brakes

K SF clutch

Size 028 to 045 secured to shaft
by pin \varnothing 2 DIN 1481
other sizes, key DIN 6885/1



K SB brake



normally installed
for
divided shaft
applications

Fig. 4
SHAFT MOUNTING clutch
Type K SF X 028 X 00 A 01 to
K SF X 066 X 00 A 01

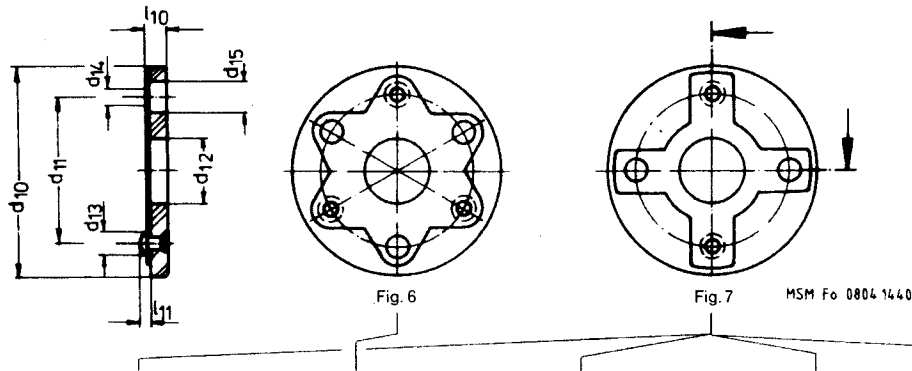
Fig. 5
SHAFT MOUNTING brake
Type K SB X 028 X 00 A 01 to
K SB X 066 X 00 A 01

Type	KSF	Size				
	KSB	028*	034*	045*	055	066
Dim.	Tol.	Dimensions (mm)				
$\varnothing d_1$		27	33	41,5	50,5	64
$\varnothing d_2$		12,6	15	20,5	28	35,5
$\varnothing d_3^{2)}$	H ⁷	6	6 (max. 8)	6 (max. 10)	8 (max. 16)	10 (max. 20)
$\varnothing d_4$	H ⁷	10	14	17	24	30
$\varnothing d_5$	h ⁹	39	47	60	68	82
d_6	$\pm 0,1$	33	40	50	59	73
d_7		3,2	3,2	4,3	4,3	5,4
$\varnothing d_8$		8	11,5	14,4	16	30
l_1		16,5	18	20,5	23	24
l_2		9	10,5	12	15	15
l_4		10	12	14	16	17
S_1		1,5	1,5	2	2	2,5
S_2		1	1	1	1	1

¹⁾ Size 028 to 045 secured of shaft by pin \varnothing 2 DIN 1481 (other sizes key as shown)

²⁾ Assemblies may be provided with bore diameters up to the maximum.

Dimension table for types K ZZ M . . . Armature



Type K ZZ M		028 X 00 A 01	034 X 00 A 02	045 X 00 A 01	055 X 00 A 01	066 X 00 A 01
		Fig. 7	Fig. 6	Fig. 7	Fig. 7	Fig. 7
Dim.	Tol.	Dimensions mm				
$\varnothing d_{10}$		28	34	44	52.5	66
$\varnothing d_{11}$		20	23	32	38	51
$\varnothing d_{12}$	H ¹¹	8.5	12.5	15.4	17	22.5
$\varnothing d_{13}$		3.5	4.5	5.2	5.2	7
$\varnothing d_{14}$	+0.05	2	2.7	4	4	5
$\varnothing d_{15}$		4.5	6	8.5	8	10
l_{10}		2.7	2	3.4	3.2	5.4
l_{11}		1.2	1.6	1.8	1.8	2.4

d_{13} clearance hole to be provided to allow free movement of the armature

Installation details for clutches and brakes type K SM, K SF, K SB, with K ZZ M . . . X

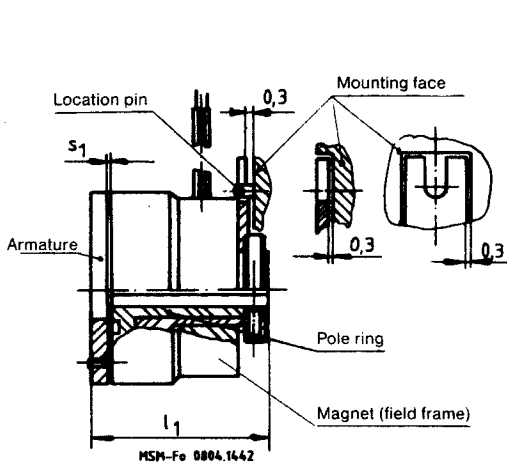


Fig. 8 Clutch (shaft mounting)
Type K SM . . . + K ZZ M

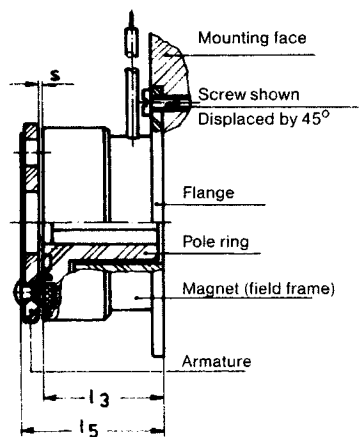


Fig. 9 Clutch (flange mounting)
Type K SF . . . + K ZZ M

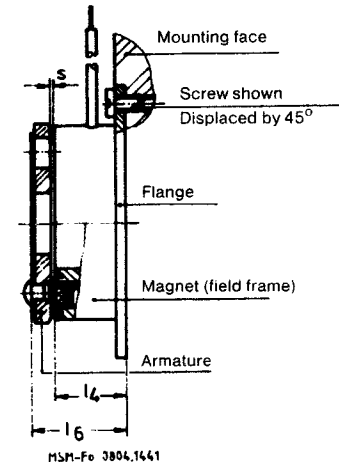


Fig. 10 Brake
Type K SB . . . + K ZZ M

K SM + K ZZ M		Size				
		028	034	045	055	066
Dim.	Tol.	Dimensions mm				
l_1	$\pm 0,2$	23,85	26,9	30,6	34,45	45,65
s_1	$\pm 0,05$	0,2	0,2	0,2	0,25	0,25

K SF + K ZZ M		Size				
		028	034	045	055	066
Dim.	Tol.	Dimensions mm				
l_3	$\pm 0,2$	16,5	18	20,5	23	24
l_4	$\pm 0,2$	10	12	14	16	17
l_5		19,35	20,2	24,1	26,65	29,65
l_6		12,85	14,2	17,6	19,65	22,65
s_1	$\pm 0,05$	0,2	0,2	0,2	0,25	0,25

Shaft mounting clutch

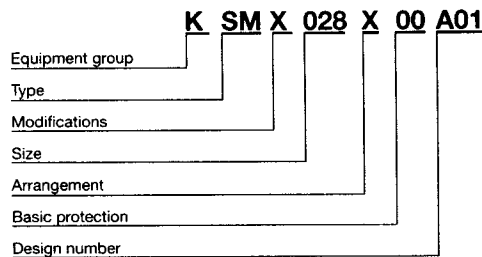
K SM clutches are arranged for shaft mounting with armature K ZZ M. A rigid support is required for the tag. It must not impart axial or radial tilt which could cause malfunction or seizure. Clearance should not exceed 0.3 mm (see fig. 8). SEE NOTES Page 3.

Flange mounting clutch and brake

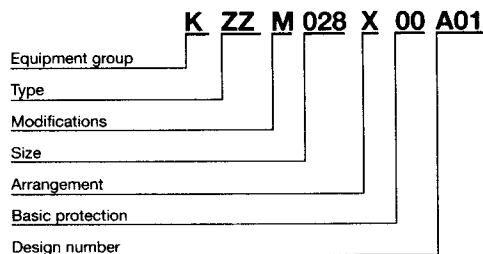
K SF clutches and K SB brakes are arranged for flange mounting with armature K ZZ M. A suitable rigid surface is required for attachment of the flange by four bolts, centred with the shaft axis (figs. 9, 10). Accurate mounting must be maintained to avoid malfunction or torque reduction.

Classification for K SM, K SF and K SB clutches and brakes and K ZZ M armature

Type code - magnet



Type code - armature



Order Example

1. MAGNET

Equipment group	- Group 8: K		- K
Type	- Clutch - flange mounting	- SF	
	- Clutch - shaft mounting	- SM	- SM
	- Brake flange mounting	- SB	
Modifications	- Standard		- X
Size	- Select from tables		- 028
Arrangement	- Standard		- X
Protection	- Flying leads		- 00
Design number	- Standard		- A 01

2. ARMATURE

Equipment group	- Group 8 : K		- K
Type	- Standard		- ZZ
Modification	- Membrane spring		- M
Size	- Select from tables		- 028
Arrangement	- Standard		- X
Protection	- Standard		- 00
Design number	- Membrane (Fig. 7)	- A 01	- A 01
	(All EXCEPT size 034)		
	- Membrane (Fig. 6)	- A 02	
	(Size 034 ONLY)		

3. ASSEMBLY

Assembly comprises MAGNET and ARMATURE parts.

4. VOLTAGE

Standard 24 V - 24 V

Special

Special clutches and brakes are available to meet the requirements of specific applications such as short duty rating, high ambient temperature, special voltages etc. Full operating, application, working conditions and environment should be specified in accordance with Technical Bulletin K XX.