Kaiser-Motoren

List R.02

KAISER Reluctance motors

A component of modern drive technology

Today drive technology demands a constant high precision of the speed adjustment as well as an exact reproducibility of once found adjusting values. With conventional controlling methods, the work involved for measuring and controlling the speed increases overproportionally with increasing demands on the accuracy.

KAISER reluctance motors have a speed deviation of
0 %
from the set point !

This means that the speed deviation only depends on the accuracy of the used frequency inverter.

Construction:
- non-excited synchronous motor
- squirrel-cage motor with damper cage
- noise-tested anti-friction bearings (lifetime lubrication)
- no carbon brushes
- no permanent magnets
- standard motor housing IP 55

Special advantages:
- insulating system universally suitable for inverter operation
- digitally selectable speed
- speed deviation 0% in the entire operating range
- no long-term drift
- synchronous or asynchronous starting possible
- nominal torque during standstill

Options:
- separately driven fan
- special shafts (also tapered shafts)
- incremental encoders
- brakes
- gearing
- temperature switch (ETW) or PTC thermistor (ETF)
- high speeds up to 20 000 rpm
- higher insulation class H
- higher degrees of protection (max. IP 66)

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N 1500 / 4 / 02 / 1000 / 4 / 02 / Be

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General technical data, refer to list T.02

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 must be explicitly mentioned in the quotation / order confirmation.

Layout instructions

Layout of motors:
- only star connection
- maximum frequency = nominal frequency (no 'field weakening')
- torque:

$$M = \frac{P \times 30.000}{n \times \pi}$$

- select motor from list according to the maximum operating speed
- smallest motor: external ventilation
- most economical motor:
  up to size 100 : self-ventilation
  starting from size 112: external ventilation
- motors for temporary operation and / or higher acceleration power: please make a corresponding inquiry

The motors can be manufactured for all nominal frequencies up to maximum frequencies due to technical marginal conditions. With regard to the dimensioning, please do not hesitate to use our free-of-charge services.

Layout of inverters:
- base frequency = maximum frequency = nominal frequency
- linear U/f characteristic
- voltage increase with frequencies < 20 Hz
- nominal current (static) I .. = 1,2 • motor nominal current
  (dynamic) I (dyn) = 1,0 x motor nominal current
- nominal current of group drives with z motors:
  I .. = 1,2 • z • In(motor)
  I (dyn) = {1,2 • (z - 1) + 1,5} • In(motor)
- group drives with direct switching on of a motor:
  consider the short-circuit current of the switched motor!

Inverter for maximum adjusting ranges:
- freely programmable U/f characteristic (optimal: 3 - 4 support points)
- frequency 0 Hz adjustable (holding torque)
- sinusoidal evaluation min. 16 bit

Reluctance motors for inverter operation

Frequency range (0)-5-50 Hz

Series **DNK ...Rs** self-ventilated

Type of cooling **IC 411**

Insulation class F, temperature rise B

Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 50 Hz kW	Type		Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	m kg
2 poles; 300 - 3000 rpm								
0,57	0,18	**DNK**	**71 A / 2 Rs**	0,85	0,48	67	3,5	6
0,80	0,25	**DNK**	**71 B / 2 Rs**	1,20	0,5	63,3	4,6	6,5
1,18	0,37	**DNK**	**80 A / 2 Rs**	1,70	0,5	66,1	6,8	8,5
1,75	0,55	**DNK**	**80 B / 2 Rs**	2,50	0,5	66,8	8,5	9,5
2,39	0,75	**DNK**	**90 S / 2 Rs**	3,50	0,48	67,8	14	13,5
3,50	1,10	**DNK**	**90 L / 2 Rs**	4,60	0,48	75,7	19	16
4,78	1,50	**DNK**	**100 L / 2 R**	6,60	0,48	71,9	38	24
7,00	2,20	**DNK**	**112 M/ 2 Rs**	8,80	0,48	79,1	63	32
9,55	3,00	**DNK**	**132 S/ 2 Rs**	13,50	0,46	73,4	140	47
12,7	4,00	**DNK**	**132 M/ 2 Rs**	18,00	0,44	76,7	190	58
4 poles; 150 - 1500 rpm								
0,9	0,14	**DNK**	**71 A / 4 Rs**	0,60	0,51	59,6	5,7	6
1,35	0,21	**DNK**	**71 B / 4 Rs**	0,80	0,53	64,5	7,4	6,5
2,0	0,31	**DNK**	**80 B / 4 Rs**	1,10	0,52	66,4	15	9,5
2,75	0,43	**DNK**	**90 S / 4 Rs**	1,50	0,49	76,5	24	12,5
4,0	0,63	**DNK**	**90 L / 4 Rs**	2,20	0,54	70,3	32	15
4,78	0,75	**DNK**	**100 LA / 4 Rs**	3,20	0,47	75,8	46	20
6,4	1,00	**DNK**	**100 LB / 4 Rs**	4,60	0,50	72,7	61	23
9,6	1,50	**DNK**	**112 M / 4 Rs**	6,30	0,48	75,4	120	32
14,0	2,20	**DNK**	**132 S / 4 Rs**	9,50	0,47	74,9	240	46
19,1	3,00	**DNK**	**132 M / 4 Rs**	12,30	0,47	78,8	340	58
6 poles; 100 - 1000 rpm								
1,0	0,10	**DNK**	**71B / 6 Rs**	0,55	0,46	54,0	12	6,5
1,4	0,15	**DNK**	**80 A / 6 Rs**	0,70	0,48	54,3	22	8,5
2,0	0,21	**DNK**	**80 B / 6 Rs**	0,95	0,47	61,2	28	9,5
2,39	0,25	**DNK**	**90 S / 6 Rs**	1,30	0,48	60,9	38	12,5
3,53	0,37	**DNK**	**90 L / 6 Rs**	1,70	0,49	67,5	51	15
5,25	0,55	**DNK**	**100 L / 6 Rs**	2,60	0,48	67,0	100	23
7,16	0,75	**DNK**	**112 M / 6 Rs**	3,50	0,44	74,0	190	32
10,5	1,10	**DNK**	**112 ML / 6 Rs**	5,60	0,43	69,4	240	38
14,3	1,50	**DNK**	**132 S / 6 Rs**	7,40	0,44	70,0	320	46
21,0	2,20	**DNK**	**132 M / 6 Rs**	10,80	0,42	73,7	460	58

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

U/f = 7,6! Other U / f - ratios upon request

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction. The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for inverter operation

Frequency range (0)-5-50 Hz

Series **DNK ...RsF** separately ventilated Type of cooling **IC 415**

Insulation class F, temperature rise B Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease - separate ventilator 230 V
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 50 Hz kW	Type	Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	m kg
2 poles; 300 - 3000 rpm		**upon request**					
4 poles; 150 - 1500 rpm							
1,15	0,18	**DNK 71 A / 4 RsF**	0,85	0,51	63,1	5,7	6
1,59	0,25	**DNK 71 B / 4 RsF**	1,20	0,53	59,7	7,4	7
2,75	0,43	**DNK 80 B / 4 RsF**	1,60	0,52	67,6	15	10
4,0	0,63	**DNK 90 S / 4 RsF**	2,30	0,49	74,1	24	13
5,5	0,86	**DNK 90 L / 4 RsF**	2,90	0,54	72,8	32	15
8	1,26	**DNK 100 LA / 4 RsF**	4,20	0,47	84,7	46	20
11	1,73	**DNK 100 LB / 4 RsF**	6,30	0,50	72,3	61	23
14,6	2,3	**DNK 112 M / 4 RsF**	9,00	0,48	77,4	120	32
20	3,1	**DNK 132 S / 4 RsF**	13,00	0,47	74,6	240	46
27,5	4,3	**DNK 132 M / 4 RsF**	17,00	0,47	76,1	340	58
6 poles; 100 - 1000 rpm							
1,15	0,12	**DNK 71B / 6 RsF**	0,75	0,50	48,6	9,2	7,5
1,72	0,18	**DNK 80 A / 6 RsF**	1,10	0,50	49,7	12	9
2,39	0,25	**DNK 80 B / 6 RsF**	1,30	0,50	58,4	22	10
3,53	0,37	**DNK 90 S / 6 RsF**	2,00	0,47	59,8	29	11
5,25	0,55	**DNK 90 L / 6 RsF**	2,60	0,49	65,6	51	16,5
7,16	0,75	**DNK 100 L / 6 RsF**	3,90	0,46	63,5	78	21,5
10,5	1,10	**DNK 112 M / 6 RsF**	5,20	0,46	69,9	100	24,5
14,3	1,50	**DNK 112 ML / 6 RsF**	7,50	0,44	69,1	190	33,5
21,0	2,20	**DNK 132 S / 6 RsF**	12,00	0,43	64,8	320	48
28,7	3,00	**DNK 132 M / 6 RsF**	14,00	0,43	75,7	460	60
8 poles; 75 - 750 rpm		**upon request**					

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

U/f = 7,6! Other U / f - ratios upon request

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction. The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for inverter operation

Frequency range (0)-5-50 Hz

Series **DNK ...Rs** not ventilated

Type of cooling **IC 410**

Insulation class F, temperature rise F

Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 50 Hz kW	Type	Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	m kg
2 poles; 300 - 3000 rpm		**upon request**					
4 poles; 150 - 1500 rpm							
0,96	0,15	**DNK 71 B / 4 Rs**	0,65	0,53	66,2	7,4	6,5
1,27	0,20	**DNK 80 B / 4 Rs**	0,85	0,51	70,1	15	9,5
1,59	0,25	**DNK 90 S / 4 Rs**	1,10	0,52	66,4	24	12,5
2,36	0,37	**DNK 90 L / 4 Rs**	1,70	0,50	66,1	32	15
3,5	0,55	**DNK 100 LA / 4 Rs**	2,25	0,51	72,8	46	20
4,78	0,75	**DNK 100 LB / 4 Rs**	3,40	0,51	65,7	61	23
7,0	1,10	**DNK 112 M / 4 Rs**	4,50	0,50	74,3	120	32
8,0	1,25	**DNK 112 ML / 4 Rs**	5,00	0,50	76,0	160	38
9,6	1,50	**DNK 132 S / 4 Rs**	6,50	0,50	70,1	240	46
11,8	1,85	**DNK 132 M / 4 Rs**	7,30	0,50	77,0	340	58
6 poles; 100 - 1000 rpm		**upon request**					

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

U/f = 7,6! Other U / f - ratios upon request

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction.
The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for inverter operation

Frequency range (0)-5-87 Hz

Series **DNK ...Rs** self-ventilated

Type of cooling **IC 411**

Insulation class F, temperature rise B

Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 87 Hz kW	Type	Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	m kg
2 poles; 300 - 5220 rpm		**upon request**					
4 poles; 150 - 2610 rpm							
0,90	0,25	**DNK 71 A / 4 Rs**	1,20	0,51	62,0	5,7	6
1,35	0,37	**DNK 71 B / 4 Rs**	1,70	0,54	61,0	7,4	6,5
1,70	0,46	**DNK 80 A / 4 Rs**	2,3	0,53	62,0	11	8,5
2,00	0,55	**DNK 80 B / 4 Rs**	2,8	0,49	61,0	15	9,5
2,75	0,75	**DNK 90 S / 4 Rs**	3,2	0,5	71,0	24	12,5
4,0	1,1	**DNK 90 L / 4 Rs**	4,5	0,5	74,0	32	15
5,8	1,6	**DNK 100 LB / 4 Rs**	6,5	0,5	70,0	61	23
9,5	2,6	**DNK 112 M / 4 Rs**	11,0	0,48	75,0	120	32
11,0	3,0	**DNK 112 ML / 4 Rs**	13,0	0,48	73,0	160	38
14,7	4,0	**DNK 132 S / 4 Rs**	18,2	0,47	71,0	240	46
20,0	5,5	**DNK 132 M / 4 Rs**	23,0	0,48	76,0	340	58
6 poles; 100 - 1740 rpm							
0,65	0,12	**DNK 71A / 6 Rs**	0,8	0,49	46,5	9,2	6
1,0	0,18	**DNK 71B / 6 Rs**	1,2	0,48	46,5	12	6,5
1,4	0,25	**DNK 80 A / 6 Rs**	1,45	0,47	56,0	22	8,5
2,0	0,37	**DNK 80 B / 6 Rs**	2,00	0,47	60,0	29	9,5
3,0	0,55	**DNK 90 L / 6 Rs**	2,75	0,47	65,0	51	15
4,4	0,8	**DNK 100 L / 6 Rs**	3,5	0,46	71,0	100	23
8,2	1,5	**DNK 112 M / 6 Rs**	7,6	0,45	67,0	190	32
12,1	2,2	**DNK 112 ML / 6 Rs**	11,0	0,45	68,0	240	38
14,3	2,6	**DNK 132 S / 6 Rs**	13,0	0,46	66,0	320	46
16,5	3,0	**DNK 132 MA / 6 Rs**	15,0	0,46	69,0	380	52
20,3	3,7	**DNK 132 M / 6 Rs**	18,0	0,44	71,0	460	58

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

U/f = 4,4! Other U / f - ratios upon request

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction. The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for inverter operation

Frequency range (0)-5-87 Hz

Series **DNK ...RsF** separately ventilated Type of cooling **IC 415**

Insulation class F, temperature rise B Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease - separate ventilator 230 V
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 87 Hz kW	Type	Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	M kg
2 poles; 300 - 5220 rpm		**upon request**					
4 poles; 150 - 2610 rpm							
2,0	0,55	**DNK 80 A / 4 RsF**	2,6	0,52	62,0	11	10
2,75	0,75	**DNK 80 B / 4 RsF**	3,1	0,52	71,0	15	11
4,0	1,10	**DNK 90 S / 4 RsF**	4,9	0,48	71,0	24	14
5,5	1,50	**DNK 90 L / 4 RsF**	6,3	0,49	74,0	32	16,5
8,0	2,2	**DNK 100 LA / 4 RsF**	9,6	0,48	73,0	46	21,5
11,0	3,0	**DNK 100 LB / 4 RsF**	13,5	0,48	70,0	61	24,5
14,7	4,0	**DNK 112 M / 4 RsF**	17,6	0,47	74,0	120	33,5
17,4	4,75	**DNK 112 ML / 4 RsF**	18,8	0,50	77,0	160	40
20,0	5,5	**DNK 132 S / 4 RsF**	24	0,47	74,0	240	48
27,5	7,5	**DNK 132 M / 4 RsF**	31	0,47	78,0	340	61
6 poles; 100 – 1740 rpm							
2,5	0,46	**DNK 80 A / 6 RsF**	2,3	0,50	61,0	22	10
3,0	0,55	**DNK 80 B / 6 RsF**	3,0	0,47	59,0	28	11
3,6	0,65	**DNK 90 S / 6 RsF**	3,5	0,47	60,0	38	14
4,1	0,75	**DNK 90 L / 6 RsF**	3,7	0,47	66,0	51	16,5
6,0	1,1	**DNK 100 LA / 6 RsF**	6,0	0,45	62,0	78	21,5
9,0	1,5	**DNK 100 L / 6 RsF**	7,2	0,46	69,0	100	24,5
14,4	2,6	**DNK 112 M / 6 RsF**	13,0	0,43	71,0	190	33,5
16,5	3,0	**DNK 112 ML / 6 RsF**	16,0	0,41	70,0	240	40
19,2	3,5	**DNK 132 S / 6 RsF**	17,0	0,44	71,0	320	48
22,0	4,0	**DNK 132 MA / 6 RsF**	20,0	0,44	69,0	380	54
27,4	5,0	**DNK 132 M / 6 RsF**	24,5	0,44	71,0	460	60

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

U/f = 4,4! Other U / f - ratios upon request

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction.
The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for inverter operation

Frequency range (0)-5-120 Hz

Series **DNK ...Rs** self-ventilated

Type of cooling **IC 411**

Insulation class F, temperature rise B

Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 120 Hz kW	Type	Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	M kg
2 poles; 300 - 7200 rpm		**upon request**					
4 poles; 150 - 3600 rpm							
0,66	0,25	**DNK 71 A / 4 Rs**	1,10	0,54	64,0	5,7	6
1,00	0,37	**DNK 71 B / 4 Rs**	1,60	0,53	66,0	7,4	6,5
1,5	0,55	**DNK 80 A / 4 Rs**	2,4	0,53	66,0	11	8,5
2,00	0,75	**DNK 80 B / 4 Rs**	3,3	0,51	68,0	15	9,5
2,9	1,10	**DNK 90 S / 4 Rs**	4,5	0,54	69,0	24	12,5
4,0	1,50	**DNK 90 L / 4 Rs**	6,8	0,50	67,0	32	15
5,8	2,2	**DNK 100 LB / 4 Rs**	9,8	0,50	68,0	61	23
9,3	3,5	**DNK 112 M / 4 Rs**	15	0,48	74,0	120	32
10,6	4	**DNK 112 ML / 4 Rs**	18,5	0,46	71,0	160	38
14,6	5,5	**DNK 132 S / 4 Rs**	24	0,47	74,0	240	46
20,0	7,5	**DNK 132 M / 4 Rs**	31	0,48	77,0	340	58
6 poles; 100 - 2400 rpm							
0,45	0,12	**DNK 71A / 6 Rs**	0,75	0,48	51,0	9,2	6
0,72	0,18	**DNK 71B / 6 Rs**	1,05	0,48	54,0	12	6,5
1,00	0,25	**DNK 80 A / 6 Rs**	1,20	0,49	65,0	22	8,5
1,50	0,37	**DNK 80 B / 6 Rs**	1,90	0,47	63,0	29	9,5
2,2	0,55	**DNK 90 S / 6 Rs**	2,6	0,49	66,0	38	12,5
3,0	0,75	**DNK 90 L / 6 Rs**	3,5	0,47	69,0	51	15
4,4	1,10	**DNK 100 L / 6 Rs**	5,5	0,46	66,0	100	23
8,8	2,2	**DNK 112 M / 6 Rs**	11,2	0,45	66,0	190	32
12,0	3,0	**DNK 112 ML / 6 Rs**	15,3	0,44	68,0	240	38
14,0	3,5	**DNK 132 S / 6 Rs**	17,8	0,46	65,0	320	46
16,0	4,0	**DNK 132 MA / 6 Rs**	20,5	0,44	67,0	380	52
20,0	5,0	**DNK 132 M / 6 Rs**	25	0,44	69,0	460	58

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

U/f = 3,2! Other U / f - ratios upon request

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction.
The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for inverter operation Frequency range (0)-20-100 Hz

Series **DNK ...Rs** self-ventilated Type of cooling **IC 411**

Insulation class F, temperature rise B Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 100 Hz kW	Type	Nominal current at 380 V A	Cos phi	eta %	J kg*cm^2	m kg
4 poles; 600 - 3000 rpm							
1,75	0,55	**DNK 71 B / 4 Rs**	2,5	0,53	63,1	7,4	6,5
2,39	0,75	**DNK 80 A / 4 Rs**	3,6	0,52	60,9	11	8,5
3,50	1,10	**DNK 80 B / 4 Rs**	5,1	0,48	68,3	15	9,5
4,78	1,50	**DNK 90 S / 4 Rs**	6,5	0,48	73,0	24	12,5
5,89	1,85	**DNK 90 L / 4 Rs**	8,0	0,48	73,2	32	15
7,00	2,20	**DNK 100 LA / 4 Rs**	9,2	0,48	75,7	46	20
14,0	4,40	**DNK 112 M / 4 Rs**	18	0,48	77,4	120	32
17,5	5,50	**DNK 132 S / 4 Rs**	24	0,48	72,5	240	46
23,9	7,50	**DNK 132 M / 4 Rs**	31	0,47	78,2	340	58
6 poles; 400 - 2000 rpm							
1,19	0,25	**DNK 71B / 6 Rs**	1,5	0,48	52,8	12	6,5
1,77	0,37	**DNK 80 A / 6 Rs**	2,2	0,48	53,2	22	8,5
2,63	0,55	**DNK 80 B / 6 Rs**	3,0	0,47	59,3	29	9,5
3,58	0,75	**DNK 90 S / 6 Rs**	4,1	0,47	59,1	38	12,5
5,25	1,10	**DNK 90 L / 6 Rs**	6,2	0,47	57,4	51	15
7,16	1,50	**DNK 100 LA / 6 Rs**	7,2	0,46	68,8	78	20
8,83	1,85	**DNK 100 L / 6 Rs**	8,8	0,46	69,4	100	23
14,3	3,00	**DNK 112 ML / 6 Rs**	16,5	0,42	65,8	240	38
19,1	4,00	**DNK 132 S / 6 Rs**	20,0	0,44	69,1	320	46
26,3	5,50	**DNK 132 M / 6 Rs**	27,5	0,44	69,1	460	58

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

U/f = 3,8! Other U / f - ratios upon request

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction.
The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for inverter operation

Frequency range (0)-5-87 Hz and 5 - 120 Hz

Series **DNK ... /46 Rs**

Type of cooling **IC 411+415**

Insulation class F, temperature rise B

Degree of protection **IP 55**

Design: 380 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease
bimetal contacts or PTC = mandatory option

Torque Nm	Power at 87 Hz kW	Type	Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	m kg
4 poles; 150 - 2610 rpm, 5 – 87 Hz, self-ventilated, type of cooling IC 411							
1,70	0,46	**DNK 80 A / 46 Rs**	1,55	0,68	0,66	22	9
2,00	0,55	**DNK 80 B / 46 Rs**	1,55	0,67	0,71	28	10
2,75	0,75	**DNK 90 A / 46 Rs**	2,4	0,66	0,72	38	13
4,0	1,10	**DNK 90 L / 46 Rs**	3,3	0,66	0,77	51	15
5,5	1,50	**DNK 100 L / 46 Rs**	4,25	0,68	0,79	100	23
9,5	2,6	**DNK 112 M / 46 Rs**	7,7	0,67	0,77	190	32
11,0	3,0	**DNK 112 ML / 46 Rs**	8,8	0,68	0,76	240	38
4 poles; 150 - 2610 rpm, 5 – 87 Hz, series DNK ... / 46 RsF, separate ventilator 230 V, type of cooling IC 415							
2,00	0,55	**DNK 80 A / 46 RsF**	1,85	0,68	0,66	22	9
2,75	0,75	**DNK 80 B / 46 RsF**	2,35	0,67	0,72	28	10
4,0	1,10	**DNK 90 S / 46 RsF**	3,6	0,64	0,73	38	13
5,5	1,50	**DNK 90 L / 46 RsF**	5,0	0,64	0,71	51	15
8,0	2,2	**DNK 100 LA / 46 RsF**	6,6	0,67	0,76	78	19
11,0	3,0	**DNK 100 L / 46 RsF**	9,0	0,66	0,77	100	23
14,7	4,0	**DNK 112 M / 46 RsF**	12,0	0,68	0,75	190	32
17,4	4,75	**DNK 112 ML / 46 RsF**	14,0	0,67	0,77	240	38
4 poles; 150 - 3600 rpm, 5 – 120 Hz, self-ventilated, type of cooling IC 411							
Torque Nm	Power at 120 Hz kW	Type	Nominal current at 380 V A	cos phi	eta %	J kg*cm^2	m kg
1,5	0,55	**DNK 80 A / 46 Rs**	1,8	0,67	0,69	22	9
2	0,75	**DNK 80 B / 46 Rs**	2,5	0,67	0,68	28	10
2,9	1,1	**DNK 90 S / 46 Rs**	3,5	0,66	0,72	38	13
4	1,5	**DNK 90 L / 46 Rs**	4,5	0,66	0,77	51	15
5,8	2,2	**DNK 100 L / 46 Rs**	6,8	0,67	0,73	100	23
9,3	3,5	**DNK 112 M / 46 Rs**	10,6	0,67	0,75	190	32
10,6	4	**DNK 112 ML / 46 Rs**	11,8	0,68	0,76	240	38

RELUCTANCE MOTORS MUST NOT BE OPERATED IN THE FIELD WEAKENING RANGE

With motors of the series / 46 R, the instructions on page 14 must be taken into consideration.

The torques are admissible in continuous operation on the frequency inverter in the entire speed range without reduction. The project planning instructions on page 13 must be taken into consideration for the parameterization of the frequency inverters.

Reluctance motors for mains power supply

Frequency 50 Hz

Series **DNK ...Rs** self-ventilated

Type of cooling **IC 411**

Insulation class F, temperature rise B

Degree of protection **IP 55**

Design: 400 V Y-connection - synchronous pull-out torque approx. 150%
special high-temperature grease

Torque Nm	Power at 50 Hz kW	Type		Nominal current at 380 V A	cos phi	eta %	starting-/ nominal current Ia / In	J kg*cm^2	M Kg
2 poles; 3000 rpm									
0,64	0,2	**DNK**	**71 A / 2 R**	1,0	0,47	61,4	5,7	3,5	6
0,95	0,3	**DNK**	**71 B / 2 R**	1,4	0,47	64,0	5,9	4,6	6,5
1,27	0,4	**DNK**	**80 A / 2 R**	2	0,45	64,1	5,5	6,8	8,5
1,90	0,6	**DNK**	**80 B / 2 R**	3,1	0,44	64,4	5,9	8,5	9,5
2,54	0,8	**DNK**	**90 S / 2 R**	3,8	0,45	68,8	7,0	14	13,5
4,13	1,3	**DNK**	**90 L / 2 R**	5,7	0,45	73,5	7,6	19	16
5,10	1,6	**DNK**	**100 LA / 2 R**	7,0	0,5	66,0	8,1	28	21
6,36	2,0	**DNK**	**100 L / 2 R**	8,8	0,5	65,6	9,1	38	24
9,54	3,0	**DNK**	**112 M/ 2 R**	15,7	0,4	69,0	10,1	63	32
11,1	3,5	**DNK**	**112 M/ 2 R**	18,4	0,38	72,1	11,5	83	39
14,0	4,4	**DNK**	**132 S/ 2 R**	23,3	0,39	69,9	12	140	47
19,1	6,0	**DNK**	**132 M/ 2 R**	32	0,39	69,6	12,3	190	58
4 poles; 1500 rpm									
0,78	0,12	**DNK**	**63 B / 4 R**	0,65	0,52	52,6	4,0	2,6	4,5
1,10	0,17	**DNK**	**71 A / 4 R**	0,78	0,51	61,7	4,3	5,7	6
1,65	0,26	**DNK**	**71 B / 4 R**	1,2	0,51	63,7	4,5	7,4	6,5
2,35	0,37	**DNK**	**80 A / 4 R**	1,7	0,49	64,0	4,5	11	8,5
3,20	0,5	**DNK**	**80 B / 4 R**	2,3	0,48	65,4	4,6	15	9,5
4,80	0,75	**DNK**	**90 S / 4 R**	3,4	0,47	67,6	4,9	24	12,5
6,36	1	**DNK**	**90 L / 4 R**	4,7	0,46	67,2	5,2	32	15
8,90	1,4	**DNK**	**100 LA / 4 R**	6,7	0,44	68,1	7,0	46	20
12,72	2	**DNK**	**100 LB / 4 R**	9,6	0,43	69,9	7,3	61	23
22,3	3,5	**DNK**	**112 M / 4 R**	15,3	0,44	75,2	8,2	120	32
28,0	4,4	**DNK**	**112 ML / 4 R**	18,6	0,44	77,5	8,4	160	38
28,0	4,4	**DNK**	**132 S / 4 R**	18,9	0,43	78,1	8,5	240	46
38,2	6	**DNK**	**132 M / 4 R**	25,7	0,43	78,4	8,6	340	58
6 poles; 1000 rpm			**upon request**						
4 poles; 1500 rpm series 46			**upon request**						

Project planning instructions

Power

The powers stated in the tables pages 4 to 12 are full-load powers under the prerequisite that a constant torque is required in the entire speed range.

Temporary higher powers for acceleration procedures are possible on inverters which allow a "boost".

The lowest, constantly possible operating speed with full torque depends on the adjusting possibilities of the inverter. The voltage adjustment and voltage formation with frequencies below 10 Hz are important in this case.

Motor selection

The selection of a KAISER reluctance motor should always be effected according to the necessary **torque in the control range**. The possible continuous torques differ depending on the maximum operating frequency and type of ventilation.

Other torques can be admissible with the maximum and minimum frequency which deviate from the list frequencies. We recommend to contact us.

Inverter adjustment
There are no adjusting stipulations for all inverters available on the market because the adjusting possibilities of the various inverters strongly differ. At KAISER, the data on inverters with a user-programmability of the U / f characteristic curve are measured on three interpolation points. For a constant torque from 5 Hz onwards in continuous operation, characteristic curves which coincide with fig. 1 to a great extent result for all motors.

Small corrections can be necessary in concrete applications.

Attention! The voltages shown in fig. 1 are measured actual values not nominal parameters set according to inverter instructions. Only the fundamental component must be taken into consideration with the measured voltage. The measurement is practically carried out with an r.m.s. responding instrument with a lower critical frequency (soft iron).

Nominal current
If the voltage frequency characteristic curve acc. to fig. 1 is adjusted so that the nominal torque can be continuously transmitted at 5 Hz, a current overshoot of approx. 10 to 20% results for most inverters below approx. 5 Hz when the motor runs at no load. With a load with nominal torque, the current goes back to the nominal value (refer to fig. 2).

This fact must definitely be taken into consideration when selecting the inverter. KAISER reluctance motors are suitable for continuous operation with the stated increased current.

Initial adjustment inverter for M = const.

Nominal characteristic curve
Theoretical U/f characteristic curve
U nominal / f nominal

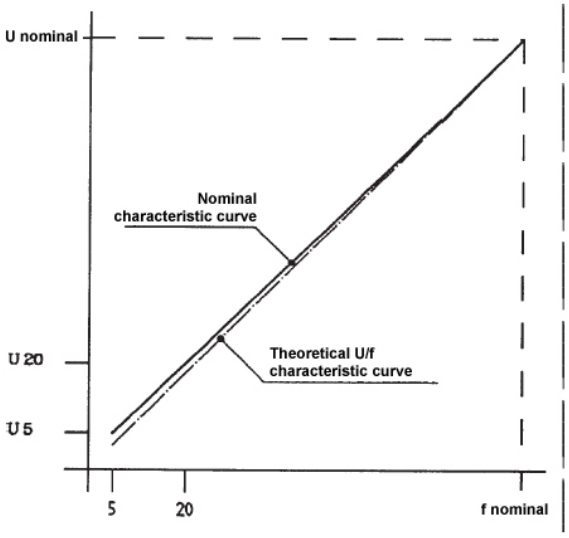

Fig. 1

No-load current with base adjustment

I nominal
I idle
f nominal

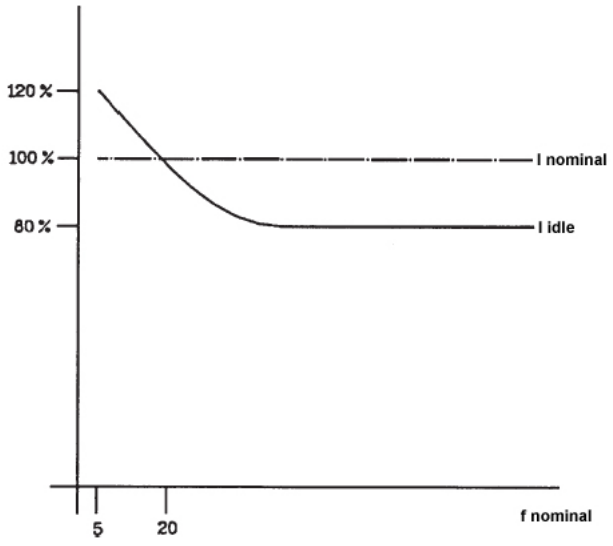

Fig. 2

Smooth running

With inverters of a good industrial quality, an adequate smooth running can presently be attained for many applications with frequencies starting with approx. 1,5 Hz. Preliminary trials on our testing station are definitely recommended in such cases before series application.

Noise
With noise-sensitive applications, inverters with a variable chopper frequency should be selected because, according to motor size and number of poles, random resonances can occur which can only be eliminated by changing the chopper frequency or with a complicated filtering. A preliminary calculation of such resonances is unfortunately economically not possible due to the complexity of the entire system.

The use of a high pulse inverter (10 to 20 kHz) with KAISER reluctance motors is unrestrictedly admissible.

Bearings
Only 100% noise-tested bearings of top quality are used in KAISER reluctance motors. A trial run is effected on the assembled motor and subsequently a noise test is carried out.

Grease
KAISER reluctance motors are lubricated with heavy-duty EP grease (Mobiltemp SHC 100). This grease also allows a lifetime lubrication with the higher temperature due to the speed control. There is a large selection of special greses available for special applications.

Balancing
KAISER reluctance motors are balanced according to DIN ISO 8821 with half a slot key. Should a balancing be necessary with a full feather key, this must be explicitly noted in the order!

Series 46 - only upon special request
KAISER reluctance motors of the series 46 (4-poles) have a better power factor (cos phi). This improvement is accompanied by a higher oscillation tendency.
These motors should therefore not be applied in plants with a considerable or extreme centrifugal mass and temporary operation close to no-load operation. With series-connected gear boxes with a transmission ratio > 15, an application is in general possible without any problems.

Motor protection
As with all variable-speed motors, KAISER reluctance motors should definitely be protected by PTC thermistors or bimetal contacts (option).

Construction
KAISER reluctance motors have a conventional three phase stator and a special "reluctance" rotor.

The reluctance rotor has 2 p large reluctance slots and a couple of normal rotor slots.

All slots and the short circuit rings are compound filled with aluminium in the pressure die casting procedure.

Through this rotor construction, an extreme robustness and stability against high speeds is attained (refer to fig. 3).

Housing
KAISER reluctance motors are installed in normal three phase standard motor housings. Traditional foot and flange mountings as well as standard shafts can thus be carried out. All possible special designs of KAISER standard motors can also be supplied.

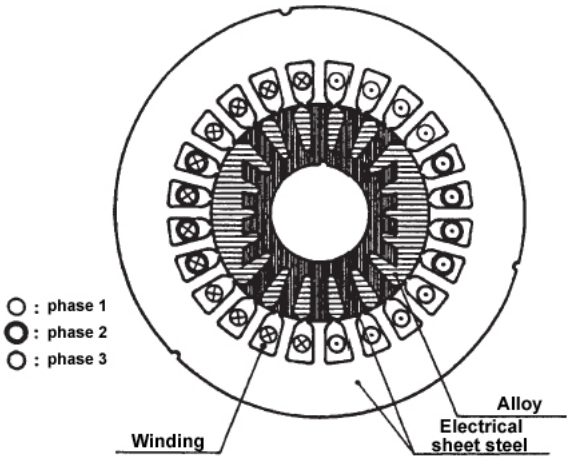

Fig.3

Insulation system

As with all KAISER motors, a high-quality insulation system is used for KAISER reluctance motors. The winding is made out of enamelled copper wire of the insulation class H with a particularly high mechanical stability.

Triplex material is generally used for the slot insulation. The finished windings are impregnated with impregnating varnish.

This results in a particularly high stability against voltage peaks as well as against moisture.

Up to now no winding failures caused by inverter-operation are known if the EMC stipulations are met.

Function

A different inductivity of the motor results through the reluctance slots, depending on the rotor position. As the aim of the rotor is to always go into the position of the lowest energy level (the highest inductivity), it runs synchronously with the stator rotating field as long as the maximum possible load torque (synchronous pull-out torque) is not exceeded. Due to the also existing asynchronous rotor cage, an asynchronous starting is possible. Furthermore, the rotor cage serves as a damper cage against torsional vibrations.

Theoretically one can consider KAISER reluctance motors as non-excited salient-pole machines with damper cage (refer to fig. 3).

Operational performance

The torque-speed characteristic of the KAISER reluctance motors consists of two ranges. In the first range, the characteristic corresponds to that of normal asynchronous motors, this range is only traversed with the asynchronous starting. In the normal operating condition, the characteristic is a straight line from zero up to the synchronous pull-out torque at synchronous speed (refer to fig. 4).

Torque - speed diagram

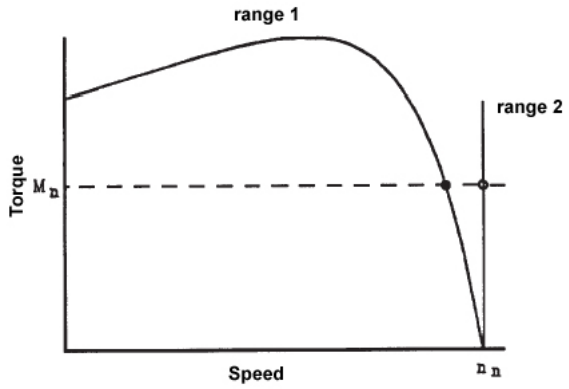

Fig. 4

If the motors are accelerated via a frequency inverter on a frequency ramp, one only works in the second range.

During operation, KAISER reluctance motors perform as ideal speed stable motors to which the load is connected via a torsion spring, i.e. with load, the shaft lags behind the rotating field by a load torque dependent angle. In the normal operating range, the dependency between the load torque and the load angle is linear in the first approximation.

Synchronizing procedure

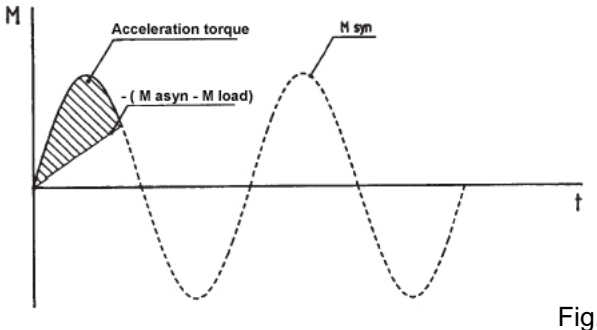

Fig. 5

Synchronizing performance

If KAISER reluctance motors are switched on with a fixed frequency, they first of all accelerate on the asynchronous characteristic up to the point of intersection with the load torque.

At this point in time, a sinusoidal shaped torque with slip frequency (refer to fig. 5) superimposes the asynchronous torque.

A positive half-wave of this torque must accelerate the drive by the slip speed in order to synchronize.

This directly results in the sychronizing performance being dependent on the load torque and the load moment of inertia.

In comparison to permanent-magnet synchronous motors KAISER reluctance motors can accelerate and synchronize significantly higher external moments of inertia.

Loss of synchronism

The characteristic of the load torque over the load angle has a practically sinusoidal shape. If the load torque is increased up to the maximum of the first sinus half-wave, the rotor pulls out into the next stable working step. If the load torque is still too high, the motor continues to pull out, it runs asynchronously. This operating condition is recognizable by a strongly fluctuating electrical current and a pulsating sound.

With a longer asynchronous operation, the motor will be damaged.

Oscillatory characteristics

As KAISER reluctance motors - like every synchronous motor - form a spring-mass system with the load, mechanical sympathetic oscillations are possible. Especially with 2 and 4-pole motors with an external centrifugal mass, such oscillations can occur in the operating range below approx. 25 Hz. Preliminary trials are also advisable in this case - as already mentioned above with the noises.