

Coefficient

of friction

M

M

M

M

M

M

M

M

M

H

H

Coefficient

of friction

M

M

Contact

voltage

drop

V

M

M

M

M

M

M

M

M

M

M

M

Contact

voltage

drop

V

M

M

Max.

current

density

A/cm<sub>2</sub>

10

10

10

12

12

12

12

10

10

10

10

Max.

current

density

A/cm<sub>2</sub>

10

15

Features/Application

Good film formation. Suitable for

slip rings that easily generate

Good roughing resistance

because of fine grain isotropic

Same as 502, good roughing resistance because of fine grain

isotropic structure. Suitable for

small/med capacity motors of

faster speed than 502.

medium capacity.

capacity mill motors.

medium capacity.

for traction motors.

Standard material for

universal motors.

Good film formation.Good commutation performance.

Suitable for DC motors up to

Moderate film adjusting function.

BZ-229. Suitable for medium and

Better film adjusting effect than

Good wear resistance. Suitable

commutation brushes. Suitable

for medium capacity DC motors.

Suitable for difficult commutation

Features/Application

Has film adjusting effect. Suitable

Good wear resistance. Suitable

for pump motors for power

for thick film slip rings.

steering.

high capacity DC motors and

176. Suitable for DC motors up to

Suitable for medium and higher

Better film formation than

higher capacity mill motors.

structure. Suitable for low speed,

small capacity DC motors and slip

streaking.

rings.

Max.

peripheral

speed

m/s

30

25

30

45

40

40

40

35

35

40

40

Max.

peripheral

speed

m/s

25

45

## Electro Graphite

Grade

401

502

503

176

BZ-229

BZ-256

213

321

TH-03

351A

641

Grade

402

801

Composition

Electro

Graphite

Composition

Bulk

Density

g/cm<sub>3</sub>

1.68

1.77

1.68

1.62

1.60

1.61

1.61

1.74

1.75

1.63

1.64

Bulk

Density

g/cm3

1.71

1.65

Hardness

HSC

18

51

46

28

23

28

32

62

68

49

59

Hardness

HSC

24

30

Electrical

resistivity

 $\mu\Omega \cdot m$ 

9

11

13

14

22

19

23

34

40

47

75

Electrical

resistivity

 $\mu\Omega \cdot m$ 

10

35

Flexural

strength

MPa

10

37

29

16

11

14

16

31

35

22

12

Flexural

strength

MPa

18

19

	TR-52	1.74	30	14	16	M	M	40	12	Better commutation performance than 788. Suitable for forklifts of 48V or more.  Good wear resistance. Suitable	
Coefficient	TR-19	1.51 n : H0.2		200	19 (measurer	M nent conditio	M n/ Slip rir	40	2 0	for 3-phase commutator motor.  i: 9.3m/s, Current: 0A)	
Contact vol The colored	tage drop I grades ι	: M0.5 use impor	~1.0V/pc	(measure			ana and an analysis			Current: DC10A/cm2)	
Copper	Graph	Bulk	Hardness	Electrica			Contact		Max ral curre		
Composition	Grade	Density g/cms	У	resistivity μΩ·m		Coefficient of friction		speed m/s		ty Features/Application	
	M-90 M-1T	6.30	15	0.32	108	M	VL VL	20	25	High strength copper alloy type Suitable for contacts and grounds.	
	M-2T	5.70	15	0.50	80	М	VL	25	20		
	M-1 M-1F	5.41	12	0.08	42	L	VL VL	30	25 25	High copper content Very low temperature rise and contact voltage drop. Suitable for high electrical capacity generators	
	M-2H M-2HF	4.93 4.80	13	0.10	34 44	M	VL VL	30	20		
	M-2 M-2F	4.40	15 15	0.50	29	L	VL VL	30	20		
	M-3H M-3HF	4.04	16 20	0.70	29 44	M	VL VL	30	18	and alia rings for general rates	
	M-3	3.78	17	1.00	29	E	VL	30	18	Middle grade between graphite and metal graphite and has	
	M-4	3.48	17	2.00	25	Ĕ	L	30	18	features of both. In particular, it is superior in roughing resistance. It is Suitable for small/med capacity generators and motors.	
	M-550 M-750	2.96	25	6.00	39	M	- L	35	15	particularly Suitable for stainles steel slip rings.	
Copper Graphite I	788	2.02	23	9.00	23	М	М	45	12	Good dementional stability in high temperature. Suitable for forklifts of 48V or less.  Lead-free material. As with	
	M-2TB	5.74	12	0.48	65	М	VL	25	20	M-2T, this material is suitable for contacts and grounding.  Lead-free material. As with M-1	
	M-1B	5.30	10	0.10	43	L	VL	30	25	- I SUN	
	M-2B	4.34	13	0.28	31	Ĺ	VL	30	20	Lead-free material. As with M-2 this material is suitable for large-capacity generators and electric motors, as well as slip rings used on generalpurpose rotating machines.	
	M-4B	3.43	20	1.30	32	L	L	30	18	small- to medium-capacity generators and electric motors.  Material designed to resist residual expansion. As with M-1	
	M-1C	5.15	13	0.10	59	Ľ	VL	30	25	largecapacity generators and electric motors.  Material designed to resist	
	M-2C	4.35	13	0.32	34	L	VL	30	20	residual expansion. As with M-2 this material is suitable for	
	M-4C M-550C	3.45 2.96	20	2.50	45 39	L	L	30	18	residual expansion. As with M-4 this material is suitable for small- to medium-capacity generators and electric motors.  Material designed to resist residual expansion. As with	
	W 3333	Bulk		Flectrica			Contact	t Max.	Max	for stainlesssteel slip rings.	
Composition	Grade	Density g/cm <sub>3</sub>		resistivity μΩ·m	y strength		voltage drop V	peripher speed m/s		ty Features/Application	
Copper Graphite II	MF-302	2.65	18	3.00	23	М	L	30	20	Suitable for automobile DC 12V fan.	
	MF-501	3.00 2.90	20	0.90	28	L M	L	30	20	Suitable for automobile DC 12V winch.	
	MF-202 MF-203		10	38.0	23	H	M M	30	15	The property of the section of the property of the proper	
	MF-301 MF-401	2.40	15	10.0	23	M	M M	30	20	Suitable for DC 24V cleaners.	
	MF-204		15	0.30	40	М	L	30	25	Suitable for DC7.2V nower	
	MF-205	3.00	1 1000	0.80	28	М	<u></u>	30	20	TOOIS.	
	MF-701	2.26	18	30.0	30	M	M	30	20	toois.	
	MF-601	2.05	10	50.0	23	М	М	30	15	Suitable for electric wheelchair.	
	MF-1001	Bulk	20 Hardness	5.0 Electrica			M Contact voltage		20 Max		
Composition	Grade	Density g/cms		resistivity μΩ·m		Coefficient of friction	drop V	speed m/s	I densi	1 oddi osyrippiloddori	
Copper Graphite III	TM-08 MK-01	1.78	37 17	400 65	26	E	L	30	20	rectifiers.	
	MK-10 MK-11	2.33	18	6 3.5	43	Ĺ	L L	40	20	Suitable for DC cleaners thanks to its excellent wear resistance and ridability.	
	MK-12	2.33	18	6.5	45	L	L	40	20		
Coefficient DA) Contact vol	tage drop	: M0.5	~1.0V/pc		L~0.2	VL0.25V/	pc and be		lip ring : C	Copper, Speed: 9.0m/s, curre	
Silver G			ing : Copper	, Speed : S	o.om/s, Ci	ırrent : DC10	A(cm2)				
Composition	Grade	Bulk Density	Hardness	Electrical resistivity	Flexural strength	Coefficient of friction	Contact voltage drop	Max. peripheral speed	Max. current density	Features/Application	
	SX-50	g/cm <sub>3</sub>	HSC 15	μΩ·m 2.70	MPa 29	М	V VL	m/s 20	A/cm <sub>2</sub>	Very low temperature rise and	
Silver Graphite	SX-70 SX-90	4.45 6.85	15 18	0.25	40 84	M M	VL VL	20	15 22	contact voltage drop. Suitable for low voltage, low current tachometers and grounds contacts.	
						on/Slip ring : t condition/S				rent : 0A) m/s, Current : DC10A/cm2)	
Resin b	onded	Graph	iite								
Composition	Grade	Bulk Density	Hardness	Electrical resistivity	Flexural strength	Coefficient of friction	Contact voltage drop	speed	Max. current density	Features/Application	
	escaro.	g/cm <sub>3</sub>	HSC	μΩ·m	MPa	ş	V	m/s	A/cm <sub>2</sub>		
	X-03	1.50	12	200	15	<u>L</u>	H	54			
	X-03 X-09 X-17	1.50 1.52 1.54	12 14 15	200 260 330	15 15 18	L L	H H	54 54 54	/11	Goode ridability. Suitable for 100-120V high efficiency cleaners.	
	X-09	1.52	14	260	15	L	Ĥ	54	20	경기가 있다면 되면 이 사이를 하면 생각을 터워지고 있다고 하면 하면 하다가 하셨다면 때 이 원생님이 모르고 있다고 있다고 했다.	
	X-09 X-17 X-72	1.52 1.54 1.47	14 15 19	260 330 380	15 18 14	L L	H H	54 54 48	20	경기가 있다면 되면 이 사이를 하면 생각을 터워지고 있다고 하면 하면 하다가 하셨다면 때 이 원생님이 모르고 있다고 있다고 했다.	
	X-09 X-17 X-72 X-88 X-05 X-10 X-80	1.52 1.54 1.47 1.52 1.48 1.52	14 15 19 14 15 15	260 330 380 360 400 270 360	15 18 14 20 18 17 22		H H H H	54 54 48 54 50 50 48	20 20 20 20 20 20	경기가 있다면 되면 이 사이를 하면 생각을 터워지고 되었다. 하는데 하이지 않는데 하지 않는데 하게 되었다. 그는데 그는데 그는데	
	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48	14 15 19 14 15 15 17 19	260 330 380 360 400 270 360 700 440	15 18 14 20 18 17 22 22 22		H H H	54 54 48 54 50 50 48 50	20 20 20 20 20 20 15	경기가 있다면 되면 이 사이를 하면 생각을 터워지고 있다고 하면 하면 하다가 하셨다면 때 이 원생님이 모르고 있다고 있다고 했다.	
Resin	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53	14 15 19 14 15 15 17 19 16 23 20	260 330 380 360 400 270 360 700 440 340 400	15 18 14 20 18 17 22 22 28 23 14		H H H H H	54 54 48 54 50 50 48 50 50 50 48	20 20 20 20 20 20 15 15 15	Goode ridability. Suitable for	
Resin bonded Graphite	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53	14 15 19 14 15 17 19 16 23 20 19 18	260 330 380 360 400 270 360 700 440 340	15 18 14 20 18 17 22 22 22 28 28		H H H H H	54 54 48 54 50 50 48 50 50	20 20 20 20 20 15 15 15 20 20	Goode ridability. Suitable for	
bonded	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53	14 15 19 14 15 15 17 19 16 23 20 19	260 330 380 360 400 270 360 700 440 340 400	15 18 14 20 18 17 22 22 22 23 14 21		H H H H H	54 54 48 54 50 50 48 50 50 50 48 48 48	20 20 20 20 20 20 15 15 15 20 20 15 13	Goode ridability. Suitable for	
bonded	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53	14 15 19 14 15 17 19 16 23 20 19 18 15	260 330 380 360 400 270 360 700 440 340 400 350 640 1100	15 18 14 20 18 17 22 22 22 28 23 14 21 27 14		H H H H H H H H H H H H H H H H H H H	54 54 48 54 50 50 48 50 50 48 48 48 48 50	20 20 20 20 20 20 15 15 15 20 20 15 13 13	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.	
bonded	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.53 1.53 1.53 1.53	14 15 19 14 15 17 19 16 23 20 19 18 15 15 17 17 19 18 15 15 17 17 19 18 18 15 17 19 18 18 19 18 18 19 18 18 19 18 19 18 18 19 18 18 19 18 18 19 18 18 18 19 18 18 18 18 18 18 18 18 18 18 18 18 18	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1100 1100	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 17		H H H H H H H H VH VH VH	54 54 48 54 50 50 48 50 50 48 48 48 50 54 54 54 54 54	20 20 20 20 20 20 15 15 15 20 20 15 13 13	Goode ridability. Suitable for 120-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance, suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance.	
bonded	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.53 1.53 1.53	14 15 19 14 15 17 19 16 23 20 19 18 15 15 17	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1200 1600 1100	15 18 14 20 18 17 22 22 22 28 23 14 21 27 14 17 17		H H H H H H H VH VH VH	54 54 48 54 50 50 48 50 50 48 48 48 50 54 54 54 54	20 20 20 20 20 15 15 15 20 20 15 13 13 13	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners and towels.	
bonded	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.53 1.53 1.53 1.53	14 15 19 14 15 17 19 16 23 20 19 18 15 15 17 17 17 17 17	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1100 1100 1100	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 17 17		H H H H H H H H H VH VH VH VH	54 54 48 54 50 50 48 50 50 48 48 50 54 54 54 54 54 54 54	20 20 20 20 20 15 15 15 10 10 10	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.	
Coefficient	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14 X-78  X-73 B-2  of friction tage drop	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.53 1.53 1.53 1.53 1.53 1.53 1.50 1.35 1.35 1.35 1.36 1.35 1.36 1.35	14 15 19 14 15 15 17 19 16 23 20 19 18 15 17 17 17 17 17 19 24 25 0.20 (measured) 3.00//pc and	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1200 1600 1100 370 650 920  arement coover H2.	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 17 17 17 24 24 24 24 24	L L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H VH VH VH V	54 54 48 50 50 48 50 50 48 48 50 48 50 54 54 54 54 54 54 54 54 54 54	20 20 20 20 15 13 13 13 13 10 10 10 20 15 13 13 18 ed : 20m/	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.	
Coefficient Contact vol	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14 X-78  B-2  of friction tage drop to a condition tage drop tage a condition tage a c	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.53 1.53 1.50 1.35 1.36 1.36 1.36 1.36 1.36 1.36 1.37 1.38	14 15 19 14 15 15 17 19 16 23 20 19 18 15 17 17 17 17 17 19 24 25 0.20 (measured) 3.00//pc and	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1200 1600 1100 370 650 920  arement coover H2.	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 17 17 17 24 24 24 24 24	L L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H VH VH VH V	54 54 48 50 50 48 50 50 48 48 50 48 50 54 54 54 54 54 54 54 54 54 54	20 20 20 20 15 13 13 13 13 10 10 10 20 15 13 13 18 ed : 20m/	Goode ridability. Suitable for 120-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.  Suitable for juicers, dryers. Moldable by press to size up to 18mm length max.	
Coefficient Contact volumeasuremen	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14 X-78  B-2  of friction tage drop to a condition tage drop tage a condition tage a c	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.53 1.53 1.50 1.35 1.36 1.36 1.36 1.36 1.36 1.36 1.37 1.38	14 15 19 14 15 15 17 19 16 23 20 19 18 15 17 17 17 17 17 19 24 25 0.20 (measured) 3.00//pc and	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1200 1600 1100 370 650 920  arement coover H2.	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 17 17 17 24 24 24 24 24	L L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H VH VH VH V	54 54 48 50 50 48 50 50 48 48 50 48 50 54 54 54 54 54 54 54 54 54 54	20 20 20 20 15 15 13 13 13 13 14 15 13 18 ed : 20m/	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.  Suitable for juicers, dryers. Moldable by press to size up to 18mm length max.  s, Spring pressure: 50kPa)	
Coefficient Contact volumeasuremen	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14 X-78  X-73  B-2  of friction tage drop to condition tage drop tage	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.53 1.50 1.35 1.35 1.36 1.36 1.36 1.36 1.36 1.37 1.44 1.52 1.75 1.44 1.52 1.75	14 15 19 14 15 17 19 16 23 20 19 18 15 17 17 19 18 17 17 19 18 17 17 19 18 17 17 19 18 17 17 19 18 17 19 18 17 17 19 18 17 19 24 25 0.20 (measurable of the content of the	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1100 1100 1100 1100	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 11 17 24  Flexural strength  Flexural strength	L L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H H H H H	54 54 48 54 50 50 48 50 50 48 48 50 50 48 48 50 54 54 54 54 54 54 54 54 54 54 54 54 54	20 20 20 20 20 15 13 13 13 13 13 13 13 13 13 13 13 13 13	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.  Suitable for juicers, dryers. Moldable by press to size up to 18mm length max.  s, Spring pressure: 50kPa)	
Coefficient Contact volueasuremen	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14 X-78  X-78  X-73  B-2  Of friction tage drop to condition tage drop tage tage tage tage tage tage tage tage	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.53 1.50 1.35 1.35 1.36 1.36 1.36 1.36 1.37 1.44 1.52 1.75 1.44 1.52 1.75 1.44 1.52 1.75 1.44 1.52 1.75	14 15 19 14 15 17 19 16 23 20 19 18 15 17 19 18 15 17 19 24 25  0.20 (measurate of the content o	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1200 1600 1100 370 650 920 390  Irement coover H2. AC10A/cm²  Electrical resistivity  μΩ·m 240 100 290	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 11 17 24  Plexural strength  MPa 24 29 27  MPa 24 29 27	L L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H H H H H	54 54 48 50 50 50 48 50 50 48 50 48 50 48 50 48 50 48 50 54 48 50 54 54 54 54 54 54 54 54 54 54 54 54 54	20 20 20 20 15 15 13 13 10 10 10 10 10 10 10 10 10 10 10 10 10	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.  Suitable for juicers, dryers. Moldable by press to size up to 18mm length max.  s, Spring pressure: 50kPa)	
Coefficient Contact volumeasuremen	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14  X-78  X-73  B-2  Of friction tage drop to condition the condition	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.50 1.35 1.36 1.36 1.36 1.36 1.36 1.36 1.37 1.44 1.52 1.75 1.44 1.52 1.75 1.44 1.52 1.75	14 15 19 14 15 15 17 19 16 23 20 19 18 15 15 17 19 18 15 17 19 24 25  0.20 (measured and density: And density	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1100 1200 1600 1100 370 650 920 390  rement coover H2. AC10A/cm2	15 18 14 20 18 17 22 22 28 23 14 21 27 14 17 17 11 17 22 17 24 24 24 Philippy of the color of th	L L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H H H H H	54 54 48 54 50 50 48 50 50 48 50 60 48 48 50 64 54 54 54 54 54 54 54 54 54 54 54 54 54	20 20 20 20 15 15 13 13 13 10 10 10 10 10 10 10 10 10 10 10 10 10	Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Suitable for juicers, dryers. Moldable by press to size up to 18mm length max.  s, Spring pressure: 50kPa)  Comparative low resistivity. Suitable for 100-120V power	
Coefficient Contact volueasuremen	X-09 X-17 X-72 X-88 X-05 X-10 X-80 X-13 X-24 X-26 X-85 X-89 X-93 X-11 X-91 X-94 X-04 X-14 X-78  X-73 B-2  Of friction tage drop to condition tage drop tage drop to condition tage drop tage	1.52 1.54 1.47 1.52 1.48 1.52 1.51 1.48 1.53 1.53 1.53 1.50 1.35 1.35 1.36 1.35 1.36 1.36 1.35 1.36 1.36 1.37 1.51 1.44 1.52 1.75  1.44 1.52 1.75  1.44 1.52 1.75	14 15 19 14 15 15 17 19 16 23 20 19 18 15 15 17 19 18 15 17 19 24 25  0.20 (measured at density : Annier Anness HSC 35 34 37 27	260 330 380 360 400 270 360 700 440 340 400 350 640 1100 1100 1100 1100 1200 1600 1100 370 650 920 390  Irement coooler H2. AC10A/cm2 AC10A/cm2	15 18 14 20 18 17 22 22 28 28 23 14 21 27 14 17 17 17 11 17 24  Particular Strength  MPa 24 29 27 20  Flexural Strength  MPa 24 29 27 20	L L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H H H H H	54 54 48 54 50 50 48 50 50 48 48 50 50 48 48 50 54 48 50 54 54 54 54 54 54 54 54 54 54 54 54 54	20 20 20 20 15 15 13 13 10 10 20 15 13 8 ed : 20m/	Goode ridability. Suitable for 120-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners.  Good commutation performance. Suitable for 200-240V cleaners, small motors.  Good commutation performance. Suitable for 100-120V cleaners and hand towels.  Good commutation performance. Suitable for 200-240V cleaners and hand towels.  Suitable for juicers, dryers. Moldable by press to size up to 18mm length max.  s, Spring pressure: 50kPa)  Features/Application  Comparative low resistivity.  Suitable for 100-120V power tools.	

1.55

1.64

1.64

1.61

1.62

1.62

1.60

1.53

1.59

1.75

1.55

1.58

1.66

Bulk

Density

g/cm3

\*Coefficient of friction: M...0.20.~0.25 L...0.20 and below

\*Contact voltage drop : VH...3.0V/pc and over H...2.0~3.0V/pc

108

118

129

111

114

122

124

127

119

B-1

C-2

C-2N

FX-08

Grade

Composition

Carbon

Graphite

36

34

34

37

35

42

47

33

44

47

44

18

32

Hardness

HSC

390

390

620

600

900

840

790

850

1300

450

660

660

590

Electrical

resistivity

 $\mu\Omega \cdot m$ 

(measurement condition/Current density : AC10A/cm2, Speed : 20m/s, Spring pressure : 50kPa)

(measurement condition/Current density : AC10A/cm2, Speed : 20m/s, Spring pressure : 50kPa)

24

23

20

23

20

22

26

21

20

13

17

14

19

Flexural

strength

MPa

The max speed and current density vary depending on the commutator and slip ring condition and use condition.

The above applications are some examples. Please contact our sales department to consult on selecting the most appropriate grade.

L

L

L

M

M

M

M

M

M

L

L

L

Coefficient

of friction

Н

Н

H

VН

VH

VH

VH

VH

VH

Н

Н

Н

Н

Contact

voltage

drop

V

35

35

35

35

35

35

35

35

35

25

25

25

25

Max.

peripheral

speed

m/s

18

18

18

13

13

13

13

13

13

8

10

10

10

Мах.

current

density

A/cm<sub>2</sub>

Good commutation performance, wear resistance. Good breaking

action. Suitable for 100-120V and

Good commutation performance

and wear resistance. Suitable for

Good commutation performance.

Suitable for 200-240V power tools and washing machines.

Good commutation and sliding

Suitable for small power tools and

juicers. Moldable by press size to

Suitable for small power tools and

juicers. Moldable by press size to

Suitable for small power tools and juicers. Moldable by press size to

up to L15mm max. Better noise

Suitable for small power tools and juicers. Moldable by press size to

Features/Application

up to 18mm max. Better noise

prevention and film adjusting

prevention and film adjusting

performance. Suitable for

200-240V power tools and

washing machines.

up to 12mm max.

up to L15mm max.

effect than C-2.

effect than C-2.

200-240V cleaners.

200-240V power tools and

cleaners.