

■ Distributer



URAS TECHNO CO., LTD.

Overseas Sales Department

Senbo Bldg. 2F, 16-9, Uchikanda 2-Chome, Chiyoda-ku, Tokyo 101-0047, JAPAN

Phone : +81-3-3254-6101 Fax : +81-3-3254-6105

<http://www.uras-techno.co.jp/en>

E-mail : utc-overseas@uras-techno.co.jp

■ Manufacture



MURAKAMI SEIKI MFG. CO., LTD.

1-1, Douhoku-machi, Yahatanishi-ku, Kitakyushu City, Fukuoka, 807-0811

Phone : +81-93-601-1037 Fax : +81-93-601-1041

<http://www.murakami-seiki.co.jp>

Inquiries:



Sanwest Pty Ltd.

60 Beringarra Ave Malaga, WA 6090 AUSTRALIA

Phone : +61 8 9249-1133 Fax : +61 8 9249-1144

<http://www.sanwest.com.au>

E-mail : info@sanwest.com.au

Note: The contents of this catalog are current as of May 2011. The specifications, appearance, and other aspects are subject to change without notice due to product improvements or other reasons.

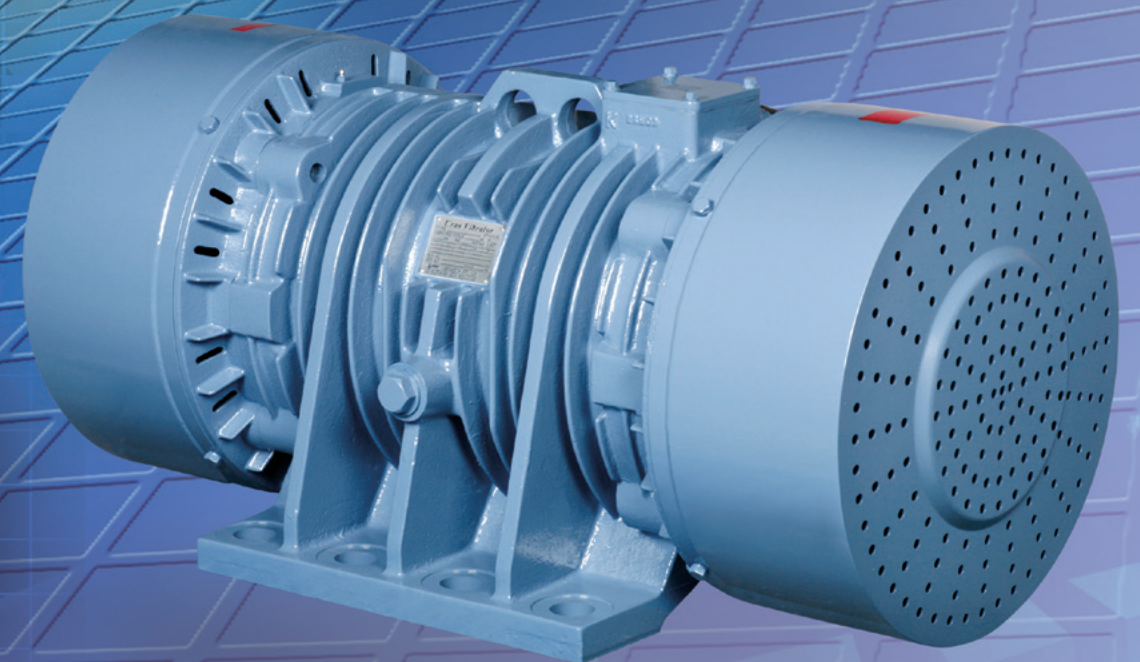
UTC-A1E Ver5.0 2012.05.00



High-Performance Vibrators

Uras® Vibrator

The World Standard for Vibrators

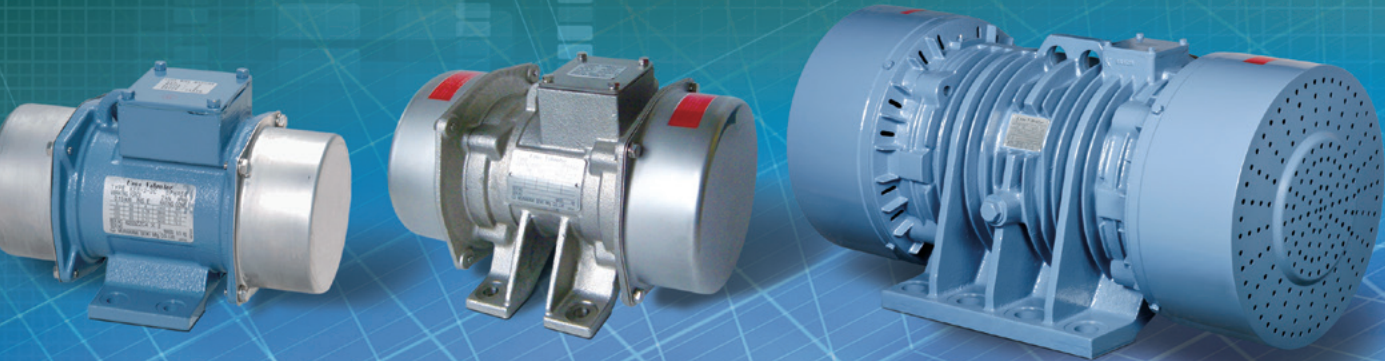


Certified under ISO 9001,
the international standard for quality systems.

The World Standard for Vibrators

URAS

All series redesigned as all-weather types with the standard specifications!
You can use our vibrators under a wide variety of weather conditions.



Examples of main Uras Vibrator applications

Application	No. of poles P	Vibrating Strength G	Amplitude α [mm]
Feeding and Conveying	4, 6, or 8	2 to 5	Medium
Screening	4, 6, or 8	3 to 7	Large
Bridging prevention	2	Low	Small
Filling	2 or 4	2 to 10	Small to medium

You can select the model in our extensive line-up that is ideally suited to the intended applications. (Refer to page 5 for details and list of available models.)

Uras Vibrators are motor-driven high-performance vibration generators. Ever since they were initially launched on the market back in 1959, they have undergone a continuous evolution, and the total number of units delivered to date has broken through the 800,000-unit barrier. Uras Vibrators are making an active contribution in various industries throughout the world, but principally in the materials industry.

Our multi-model lineup meets the varied needs of our customers. Our Uras Vibrators feature a long service life, easy maintenance, and high reliability. Their performance, endorsed by a decades-long performance track record and high critical praise, is the true global standard. Delivered to your door is the Uras quality that brings to life the feeling of how machines change and are changing.

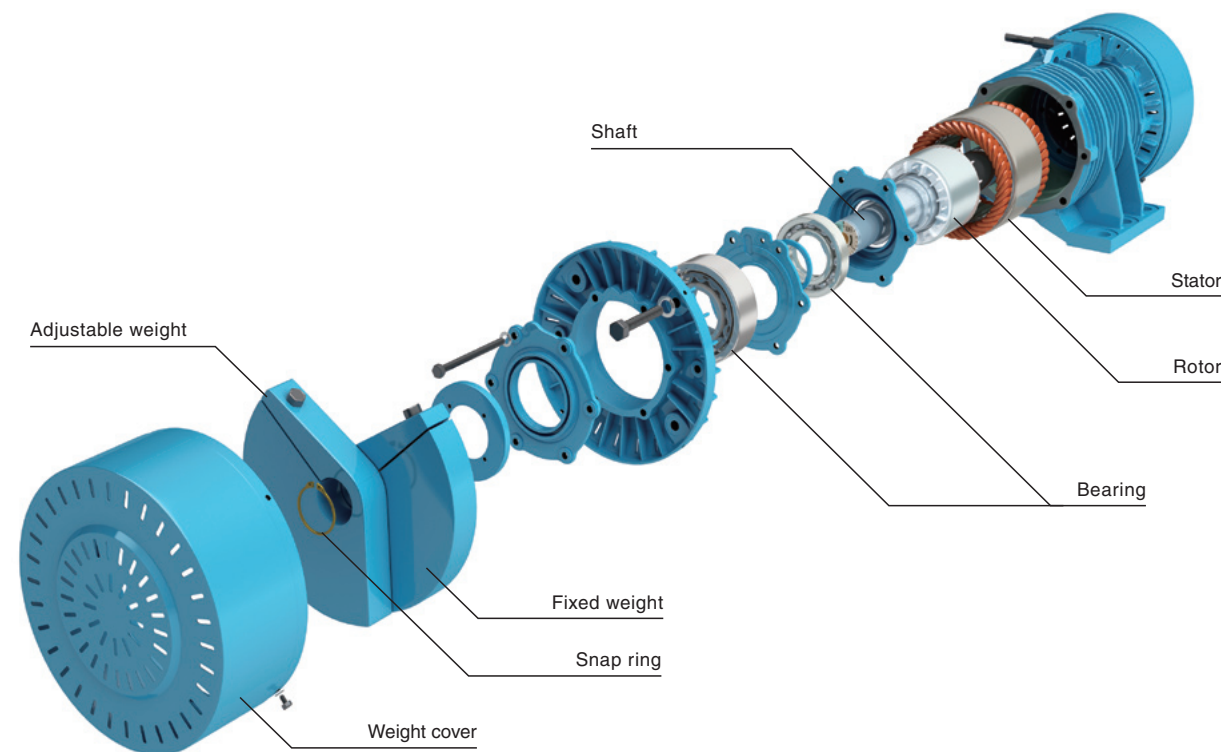
Uras Vibrators:
Making a big difference all over the world



CONTENTS

- Construction / How our vibrators work 4
- Uras Vibrator Models and Manufacturing Range / Standard Specifications of KEE and SEE Series ... 5
- KEE Standard Uras Vibrators, Two poles 6
- KEE Standard Uras Vibrators, Four poles 7
- KEE Standard Uras Vibrators, Six poles 8
- KEE Standard Uras Vibrators, Eight poles 9
- SEE Standard Single-phase Uras Vibrators 10
- KEEV Flange-type Uras Vibrators 11
- KHE High-frequency Uras Vibrators 12
- Options 14
- How to Adjust the Vibrating Force / Circular Vibration and Linear Vibration 15
- Vibration Amplitude α and Vibration Strength G Calculations / Terminal Box and Lead Cable 16
- Application to Hoppers 17
- Vibration Prevention / Method Used to Mount Uras Vibrators on Small Hoppers 18

Construction



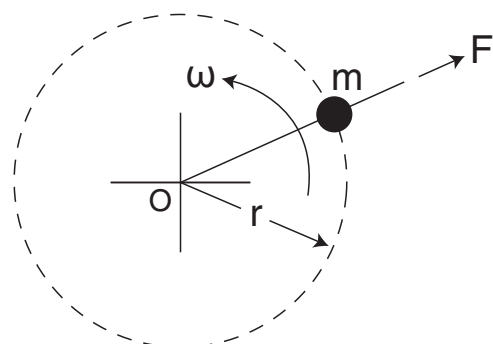
Uras Vibrators feature an extremely simple mechanism whereby the vibrating force is led out by rotating the unbalanced weights that are attached to both ends of the induction motor shaft. Drawing on research and a proven track record that spans a half-century since our vibrators were originally developed, we have perfected vibrators with tough anti-vibration structures and an

extremely high level of reliability.

These vibrators, usable under all weather conditions, for instance, have been designed to prevent the unbalanced weights from dropping down during adjustment so that they can be handled with complete safety. At the same time they have been designed to extend the service life of their bearings.

How our vibrators work

How many of us remember when we were children swinging a bucket around but not totally succeeding in the experiment and getting ourselves wet in the process? If we managed not to get wet, it was thanks to the centrifugal force that was exerted when we swung the bucket. Uras Vibrators work in the same way. Unbalanced weights are attached to both ends of the shaft of an induction motor (which is a regular motor) and rotated in our vibrators. This generates a great deal of centrifugal force, which is used as the vibrating force.



$$F = mr\omega^2$$

F : Centrifugal force = vibrating force (N)

m : Mass of weights (kg)

O : The center of rotation (the center of shaft)

r : Distance from the weight's center of gravity to the center of the shaft (m)

ω : Angular velocity = $2\pi f$ (rad/s)

f : No. of revolutions (Hz) or (1/s)

Uras Vibrator Models and Manufacturing Range

Model	No. of Poles	No. of Models	Vibrating Force (kN)	Voltage Class (V)	Synchronous Revolutions (r/min)	Output (kW)
Standard model	KEE	2	10	200 to 690	3000/3600	0.04 to 3
		4	12		1500/1800	0.065 to 7.5
		6	14		1000/1200	0.2 to 13
		8	9		750/900	0.4 to 11
Flange-type model	KEEV	4	3	200 to 690	1500/1800	0.4 to 1.2
		6	3		1000/1200	0.35 to 1.2
Single-phase model	SEE	2	5	100 to 240	3000/3600	0.015 to 0.22
High-frequency model	KHE	2	7	200 to 690	6000/7200	0.075 to 2.2
		2	5		9000/10800	0.075 to 1.2

We can also manufacture vibrators for voltages other than the standard voltage specifications given above. Contact Sanwest for information on how to find the best product for your needs. Custom orders are also available.

Standard Specifications of KEE and SEE Series

Specification	Three-phase				Single-phase
	2 poles	4 poles	6 poles	8 poles	2 poles (capacitor start)
Power Supply	230/460V 60Hz, 380V 50Hz, 415V 50Hz, 525V 50Hz, 575V 60Hz				230/240V 50Hz 100V 50/60Hz 110V 60Hz
Time Rating	Continuous rating				
Thermal Class	Class E insulation				
External Cover Structure (Vibrating Force kN)	Totally Enclosed	0.5 to 6	1.5 to 34	3 to 60	5 to 54
	Totally enclosed, Fan-cooled	10 to 40	52 to 110	80 to 185	85 to 170
Protection Structure	Totally Enclosed	IP66 (JIS C 0920)			
	Totally Enclosed, Fan-cooled	IP55 (JIS C 4034-5)	IP66 (JIS C 0920)		
Output (kW)	0.040 to 3	0.065 to 7.5	0.2 to 13	0.4 to 11	0.015 to 0.22
Synchronous Revolutions	Power Supply Frequency (Hz)	50/60			
	(r/min)	3000/3600	1500/1800	1000/1200	750/900
Vibrating Force (kN)	0.5 to 40	1.5 to 110	3 to 185	5 to 170	0.1 to 3.5
Bearing (Vibrating Force kN)	Sealed ZZ Bearings	0.5 to 10kN	1.5 to 12kN	3 to 18kN	5 to 20kN
	NJ roller Bearings	16 to 40kN	17 to 110kN	24 to 185kN	32 to 170kN
Enclosed Cable	2PNCT (4-core) x 2 m cable, Wire sizes: 0.75 mm ² , 1.25 mm ² , 2 mm ² , 5.5 mm ² , 8 mm ² , 14 mm ² Note: The KEE-0.5-2CW has a 1 m cable, and the SEE-0.5-2CW has a 2-core 1 m cable.				
Installation Method	Frame leg installation (at any installation angle). For vertical or inclined installation, however, the vibrator must be installed so that the terminal box is on the top.				
Coating Color	Munsell 2.5PB5/2				
Installation and Operating Environment	Can be used indoors and outdoors. Ambient (including installation base) temperature: -15°C to +40°C Altitude: 1,000 m max. Relative humidity: 85% max. with no condensation				

The KEE Uras Vibrator is certified under the CSA standards or CE marking.(Optional)

KEE Standard Uras Vibrators, Two Poles

Specifications

Three-phase, Two Poles

	Model	Vibrating Force (kN)	Output (kW)	Full-load Current (A)				
				230/460V 60Hz	380V 50Hz	415V 50Hz	525V 50Hz	575V 60Hz
Greased and Sealed	KEE-0.5-2CW	0.5	40W	*1	0.16	0.17	–	Custom
	KEE-1-2CW	1	75W	0.41	0.25	0.28	0.30	Custom
	KEE-2-2CW	2	0.15	0.65	0.39	0.41	0.4	Custom
	KEE-3.5-2BW	3.5	0.25	1.1	0.64	0.66	0.67	0.5
	KEE-6-2BW	6	0.4	1.6	0.84	0.88	0.83	0.64
Periodic Greasing	KEE-10-2BW	10	0.75	2.7	1.4	1.6	1.5	1.2
	KEE-16-2W	16	1.2	4	2	2.5	2.3	1.8
	KEE-23-2W	23	1.7	5.7	2.8	3.5	3.2	2.6
	KEE-30-2WS	30	2.2	7.2	3.7	4.3	4.0	Custom
	KEE-40-2WS	40	3	9.8	4.9	5.8	6.7	Custom

Vibration Rating
Power supply frequency of 50 Hz
...50 Hz (3000 r/min)
Power supply frequency of 60 Hz
...60 Hz (3600 r/min)

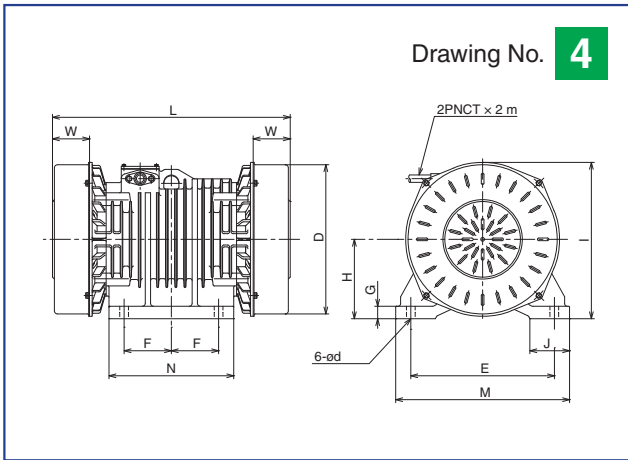
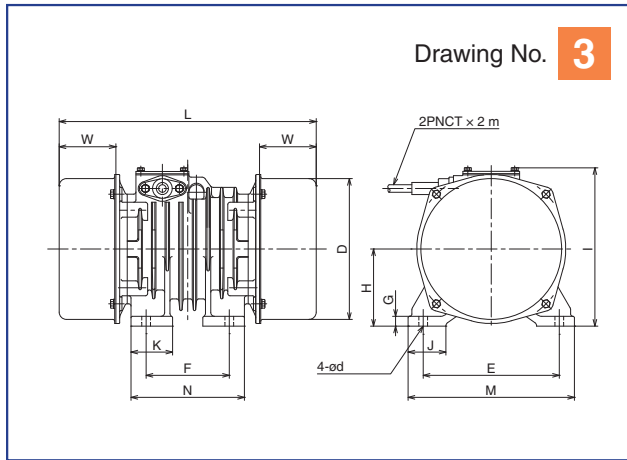
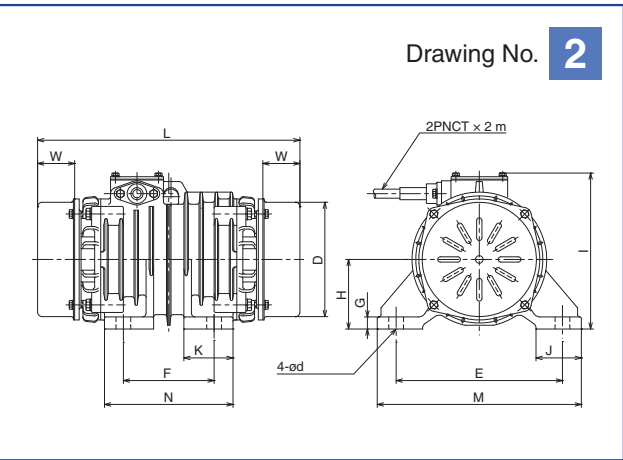
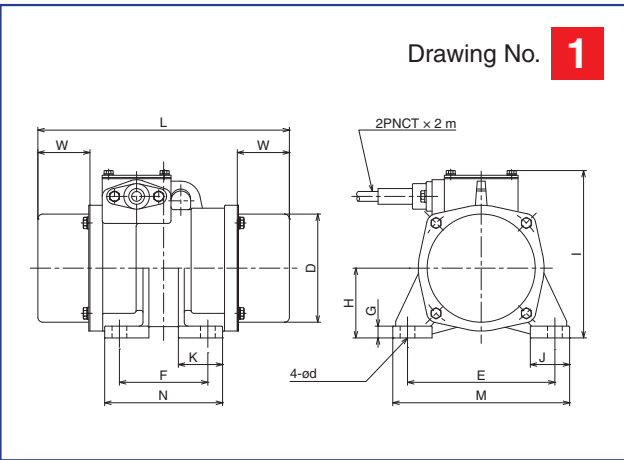


KEE-3.5-2BW

Model		Dimensions(mm)														Mass (kg)	Drawing No.	Vents	Protection Structure	Min. Allowable Cable Bending Radius (mm)	Stainless Steel Cover
		D	E	F	G	H	I	J	K	L	M	N	W	ød	Bolt Dia.						
Greased and Sealed	KEE-0.5-2CW	110	120	40	10	63	150	33	—	205	145	70	40	10	M8	6.5	1	Without	IP66	R90 or more	With
	KEE-1-2CW	110	120	40	10	63	150	33	—	205	145	70	40	10	M8	7.5	1	Without	IP66	R90 or more	With
	KEE-2-2CW	110	120	40	10	63	150	33	—	230	145	70	50	10	M8 ²	8.5	1	Without	IP66	R90 or more	With
	KEE-3.5-2BW	110	150	90	12	71	175	40	45	260	180	120	55	14	M12	14	1	Without	IP66	R90 or more	With
	KEE-6-2BW	125	190	110	13	84	195	50	55	300	230	150	60	18	M16	22	1	Without	IP66	R90 or more	With
Periodic Greasing	KEE-10-2BW	155	220	120	16	92	210	60	65	350	270	170	50	22	M20	35	2	With	IP55	R100 or more	With
	KEE-16-2W	170	240	140	20	130	260	70	75	425	300	200	65	26	M24	52	2	With	IP55	R100 or more	Without
	KEE-23-2W	190	260	150	22	142	280	70	80	445	320	210	60	26	M24	64	2	With	IP55	R100 or more	Without
	KEE-30-2WS	225	310	170	25	158	320	85	95	500	380	240	70	33	M30	92	2	With	IP66	R145 or more	Without
	KEE-40-2WS	225	350	220	30	185	360	100	110	560	430	300	70	39	M36	135	2	With	IP66	R145 or more	Without

*1: Custom-orders are possible for Vibrators using the following single voltage: 230 V or 460 V. Contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.
*2: Use high-tension bolts.

Outline Drawings



KEE Standard Uras Vibrators, Four Poles

Specifications

Three-phase, Four Poles

	Model	Vibrating Force (kN)	Output (kW)	Full-load Current (A)				
				230V/460V 60Hz	380V 50Hz	415V 50Hz	525V 50Hz	575V 60Hz
Greased and Sealed	KEE-1.5-4BW	1.5	65W	0.50	0.33	0.3	0.32	0.23
	KEE-3-4BW	3	0.13	0.80	0.52	0.53	0.58	0.37
	KEE-6-4BW	6	0.25	1.2	0.78	0.78	0.81	0.64
	KEE-9-4BW	9	0.4	1.7	0.99	1.1	1.1	0.81
	KEE-12-4BW	12	0.6	2.3	1.3	1.5	1.4	1.0
Periodic Greasing	KEE-17-4W	17	0.85	3.2	2.1	2.0	1.9	1.5
	KEE-24-4W	24	1.1	3.9	2.2	2.5	2.4	1.8
	KEE-34-4W	34	1.5	5.0	2.6	3.1	3.0	2.1
	KEE-52-4BWS	52	2.2	7.5	3.8	4.6	4.2	3.6
	KEE-75-4BWS	75	3.7	12.3	6.2	7.5	6.9	5.3
	KEE-84-4CWS	84	5.5	18.2	9.4	11.0	10.2	Custom
	KEE-110-4WS	110	7.5	*1	14.7	13.9	Custom	Custom

Vibration Rating
Power supply frequency of 50 Hz
...25 Hz (1500 r/min)
Power supply frequency of 60 Hz
...30 Hz (1800 r/min)



KEE-9-4BW

Model		Dimensions(mm)														Mass (kg)	Drawing No.	Vents	Protection Structure	Min. Allowable Cable Bending Radius (mm)	Snap Ring	Thrust Bearing	Stainless Steel Cover
		D	E	F	G	H	I	J	K	L	M	N	W	ød	Bolt Dia.								
Greased and Sealed	KEE-1.5-4BW	110	120	40	10	63	150	33	—	255	145	70	65	10	M8	11	1	Without	IP66	R90 or more	Without	Without	With
	KEE-3-4BW	155	150	80	10	84	180	35	40	265	180	110	55	12	M10	17	1	Without	IP66	R90 or more	Without	Without	With
	KEE-6-4BW	170	160	100	12	92	195	40	45	315	190	130	75	14	M12	24	1	Without	IP66	R90 or more	Without	Without	With
	KEE-9-4BW	190	180	110	13	102	210	50	55	340	220	150	75	18	M16	34	3	Without	IP66	R90 or more	Without	Without	With
	KEE-12-4BW	225	220	140	16	120	240	60	65	360	270	190	65	22	M20	46	3	Without	IP66	R100 or more	Without	Without	With
Periodic Greasing	KEE-17-4W	245	240	140	20	130	260	70	75	420	300	200	80	26	M24	62	3	Without	IP66	R100 or more	Without	Without	Without
	KEE-24-4W	265	260	150	22	142	280	70	80	480	320	210	95	26	M24	84	3	Without	IP66	R100 or more	Without	Without	Without
	KEE-34-4W	295	310	170	25	158	320	85	95	525	380	240	95	33	M30	122	3	Without	IP66	R145 or more	With	Without	Without
	KEE-52-4BWS	345	350	220	30	185	365	100	110	585	430	300	85	39	M36	180	3	With	IP66	R145 or more	With	Without	Without
	KEE-75-4BWS	395	380	125	33	210	415	105	—	630	460	330	100	39	M36x6	245	4	With	IP66	R195 or more	With	Without	Without
	KEE-84-4CWS	395	380	125	33	210	415	105	—	665	460	330	100	39	M36x6	270	4	With	IP66	R195 or more	With	Without	Without
	KEE-110-4WS	465	440	140	36	240	475	125	—	730	530	370	120	45	M42x6	395	4	With	IP66	R215 or more	With	With	Without

*1: Custom-orders are possible for Vibrators using the following single voltage: 230 V or 460 V. Contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.

KEE Standard Uras Vibrators, Six Poles

Specifications

Three-phase, Six Poles

	Model	Vibrating Force (kN)	Output (kW)	Full-load Current (A)				
				230/460V 60Hz	380V 50Hz	415V 50Hz	525V 50Hz	575V 60Hz
Greased and Sealed	KEE-3-6W	3	0.2	1.1	0.65	0.75	0.82	0.52
	KEE-5-6W	5	0.35	1.7	1.0	1.1	0.84	0.74
	KEE-9-6BW	9	0.6	2.9	1.7	1.9	1.4	1.2
	KEE-13-6BW	13	0.85	3.9	2.1	2.3	1.7	1.5
Periodic Greasing	KEE-18-6BW	18	1.2	4.8	2.7	3.2	2.3	2.1
	KEE-24-6CW	24	1.6	6.5	3.8	4.1	3.0	Custom
	KEE-34-6W	34	2.2	8.2	4.6	5.3	3.9	3.6
	KEE-45-6BW	45	3	10.8	5.7	6.9	5.0	4.6
	KEE-60-6BW	60	3.7	13.4	7.4	8.1	7.8	5.2
	KEE-80-6CWS	80	5.5	18.5	9.8	11.6	10.8	8.2
	KEE-110-6WS	110	7.5	*1	16.1	15.7	11.8	Custom
	KEE-140-6WS	140	9		20	18.9	15	13
	KEE-165-6WS	165	11		24	22.2	24	Custom
	KEE-185-6WS	185	13		27	25	Custom	Custom

Vibration Rating
Power supply frequency of 50 Hz
...16.7 Hz (1000 r/min)
Power supply frequency of 60 Hz
...20 Hz (1200 r/min)

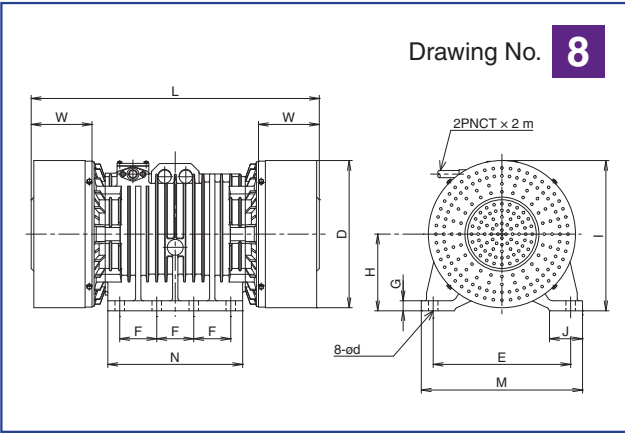
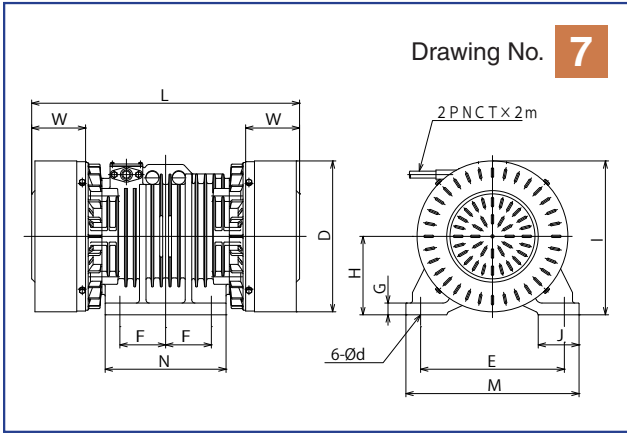
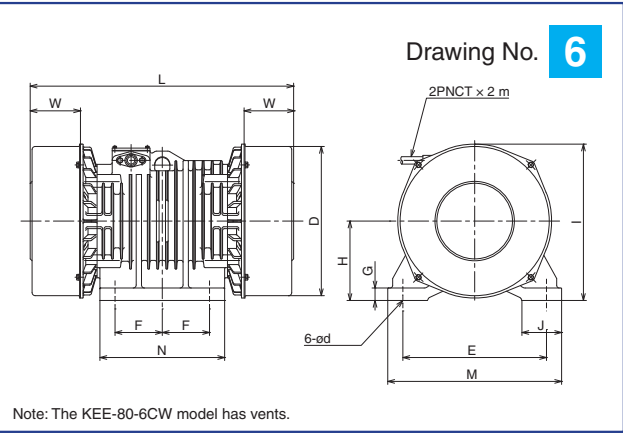
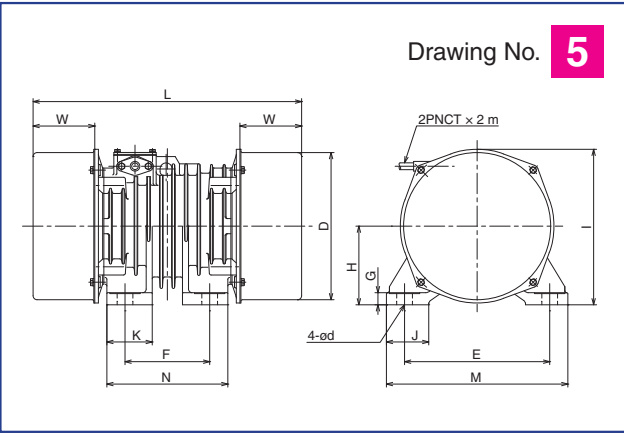


KEE-60-6BW

Model		Dimensions(mm)														Eyebolt on Side	Mass (kg)	Drawing No.	Vents	Protection Structure	Min. Allowable Cable Bending Radius (mm)	Snap Ring	Thrust Bearing	Stainless Steel Cover
		D	E	F	G	H	I	J	K	L	M	N	W	ød	Bolt Dia.									
Greased and Sealed	KEE-3-6W	170	160	100	12	92	195	40	45	330	190	130	85	14	M12	Without	25	5	Without	IP66	R90 or more	Without	Without	With
	KEE-5-6W	190	180	110	13	102	210	50	55	365	220	150	90	18	M16	Without	36	5	Without	IP66	R90 or more	Without	Without	With
	KEE-9-6BW	225	220	140	16	120	240	60	65	410	270	190	95	22	M20	Without	54	5	Without	IP66	R100 or more	Without	Without	Without
	KEE-13-6BW	245	240	140	20	130	260	70	75	445	300	200	105	26	M24	Without	71	5	Without	IP66	R100 or more	Without	Without	Without
	KEE-18-6BW	265	260	150	22	142	280	70	80	505	320	210	120	26	M24	Without	94	5	Without	IP66	R100 or more	With	Without	Without
Periodic Greasing	KEE-24-6CW	295	310	170	25	158	320	85	95	550	380	240	120	33	M30	Without	127	5	Without	IP66	R145 or more	With	Without	Without
	KEE-34-6W	345	350	220	30	185	365	100	110	605	430	300	105	39	M36	Without	175	5	Without	IP66	R145 or more	With	Without	Without
	KEE-45-6BW	345	350	220	30	185	365	100	110	685	430	300	135	39	M36	Without	213	5	Without	IP66	R145 or more	With	Without	Without
	KEE-60-6BW	395	380	125	33	210	415	105	—	700	460	330	135	39	M36x6	Without	270	6	Without	IP66	R195 or more	With	Without	Without
	KEE-80-6CWS	395	380	125	33	210	445	105	—	800	460	330	165	39	M36x6	Without	335	6	With	IP66	R195 or more	With	Without	Without
	KEE-110-6WS	465	440	140	36	240	475	125	—	820	530	370	165	45	M42x6	Without	460	7	With	IP66	R215 or more	With	With	Without
	KEE-140-6WS	515	480	140	38	265	525	125	—	940	570	510	155	45	M42x8	M24	630	8	With	IP66	R215 or more	With	With	Without
	KEE-165-6WS	515	480	140	38	265	525	125	—	980	570	510	180	45	M42x8	M24	690	8	With	IP66	R215 or more	With	With	Without
	KEE-185-6WS	560	520	140	38	290	570	125	—	970	610	510	170	45	M42x8	M24	810	8	With	IP66	R215 or more	With	With	Without

*1: Custom-orders are possible for Vibrators using the following single voltage: 230 V or 460 V. Contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.

Outline Drawings



KEE Standard Uras Vibrators, Eight Poles

Specifications

Three-phase, Eight Poles

	Model	Vibrating Force (kN)	Output (kW)	Full-load Current (A)				
				230/460V 60Hz	380V 50Hz	415V 50Hz	525V 50Hz	575V 60Hz
Greased and Sealed	KEE-5-8W	5	0.4	2.4	1.5	1.0	1.7	Custom
	KEE-10-8BW	10	0.75	4.5	2.9	3.0	3.3	Custom
	KEE-20-8BW	20	1.5	7.5	4.4	4.8	5.1	Custom
Periodic Greasing	KEE-32-8W	32	2.2	9.5	5.5	6.0	6.2	4.7
	KEE-54-8BW	54	3.7	14.6	8.6	9.1	9.4	6.8
	KEE-85-8WS	85	6	*1	17.3	18	13	12
	KEE-110-8BWS	110	7.5		19.8	21	15.2	Custom
	KEE-135-8BWS	135	9		21.0	22	15.9	14.0
	KEE-170-8BWS	170	11		29.0	33	21	Custom

Vibration Rating
Power supply frequency of 50 Hz
...12.5 Hz (750 r/min)
Power supply frequency of 60 Hz
...15 Hz (900 r/min)



KEE-135-8BW

Model		Dimensions(mm)														Eyebolt on Side	Mass (kg)	Drawing No.	Vents	Protection Structure	Min. Allowable Cable Bending Radius (mm)	Snap Ring	Thrust Bearing	Stainless Steel Cover
		D	E	F	G	H	I	J	K	L	M	N	W	ød	Bolt Dia.									
Greased and Sealed	KEE-5-8W	225	220	140	16	120	240	60	65	410	270	190	75	22	M20	Without	52	5	Without	IP66	R100 or more	Without	Without	Without
	KEE-10-8BW	265	260	150	22	142	280	70	80	505	320	210	120	26	M24	Without	88	5	Without	IP66	R100 or more	Without	Without	Without
	KEE-20-8BW	295	310	170	25	158	320	85	95	610	380	240	150	33	M30	Without	149	5	Without	IP66	R145 or more	With	Without	Without
Periodic Greasing	KEE-32-8W	345	350	220	30	185	365	100	110	710	430	300	165	39	M36	Without	230	5	Without	IP66	R145 or more	With	Without	Without
	KEE-54-8BW	395	380	125	33	210	415	105	—	785	460	330	175	39	M36×6	Without	327	6	Without	IP66	R195 or more	With	Without	Without
	KEE-85-8WS	465	440	140	36	240	475	125	—	900	530	370	205	45	M42×6	Without	520	7	With	IP66	R215 or more	With	With	Without
	KEE-110-8BWS	515	480	140	38	265	525	125	—	1030	570	510	195	45	M42×8	M24	685	8	With	IP66	R215 or more	With	With	Without
	KEE-135-8BWS	515	480	140	38	265	525	125	—	1080	570	510	230	45	M42×8	M24	765	8	With	IP66	R215 or more	With	With	Without
	KEE-170-8BWS	560	520	140	38	290	570	125	—	1090	610	510	230	45	M42×8	M24	895	8	With	IP66	R215 or more	With	With	Without

*1: Custom-orders are possible for Vibrators using the following single voltage: 230 V or 460 V. Contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.

SEE Standard Single-phase Uras Vibrators

Specifications

Single-phase, Two Poles

Model	Vibrating Force (kN)	Output (W)	Full-load Current (A)					
			110V 60Hz	200V 50Hz	200V 60Hz	220V 60Hz	220V 50Hz	240V 50Hz
SEE-0.1-2	0.1/0.15	15	0.39	*1			0.2	0.22
SEE-0.5-2CW	0.5	30	0.53	0.32	0.27	0.26	0.28	0.29
SEE-1-2BW	1	65	1.2	0.61	0.62	0.6	0.51	0.54
SEE-2-2BW	2	120	1.9	1.11	0.98	0.97	0.94	0.94
SEE-3.5-2BW	3.5	220	2.9	1.7	1.6	1.6	1.4	1.4

Vibration Rating

Power supply frequency of 50 Hz
...50 Hz (3000 r/min)
Power supply frequency of 60 Hz
...60 Hz (3600 r/min)

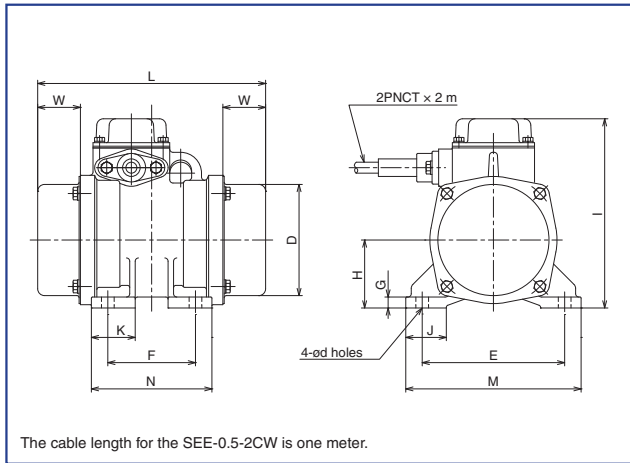
Model	Dimensions(mm)										Mass (kg)	Protection Structure	Min. Allowable Cable Bending Radius (mm)	Stainless Steel Cover
	D	E	F	G	H	I	J	K	L	M	N	W	ød	Bolt Dia.
SEE-0.1-2	85	90	44	2.3	45	90	18	75	135	107	60	40	8.5	6
SEE-0.5-2CW	90	120	40	10	63	170	33	—	205	145	70	40	10	8
SEE-1-2BW	105	130	80	10	62	180	37	40	210	160	110	40	12	10
SEE-2-2BW	110	150	90	12	71	175	40	45	230	180	120	40	14	12
SEE-3.5-2BW	125	190	110	13	84	195	50	55	300	230	150	60	18	16

*1: Contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.
The five SEE models use Greased and Sealed bearings.
The vibrating force of the SEE-0.1-2 is fixed. This model is only for indoor use.
Use the SEE-0.1-2, -0.5-2CW, and -1-2BW at an ambient temperature between -15°C to +35°C.



SEE-1-2BW

Outline Drawings



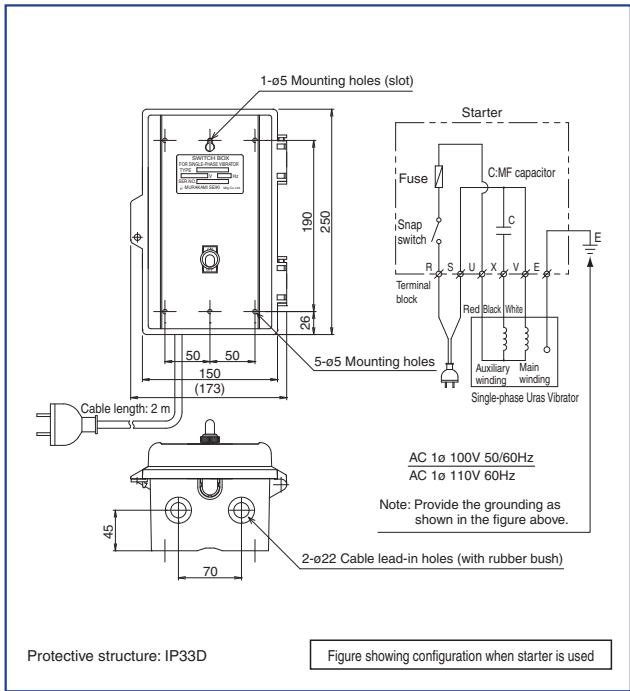
The cable length for the SEE-0.5-2CW is one meter.



SEE-0.1-2 (The smallest Uras Vibrator)

Starter

The three SEE-0.1-2, SEE-0.5-2CW, and SEE-1-2BW models use a capacitor. The starter (accessory) shown here is used in model SEE-2-2BW and higher.



Protective structure: IP33D

Figure showing configuration when starter is used

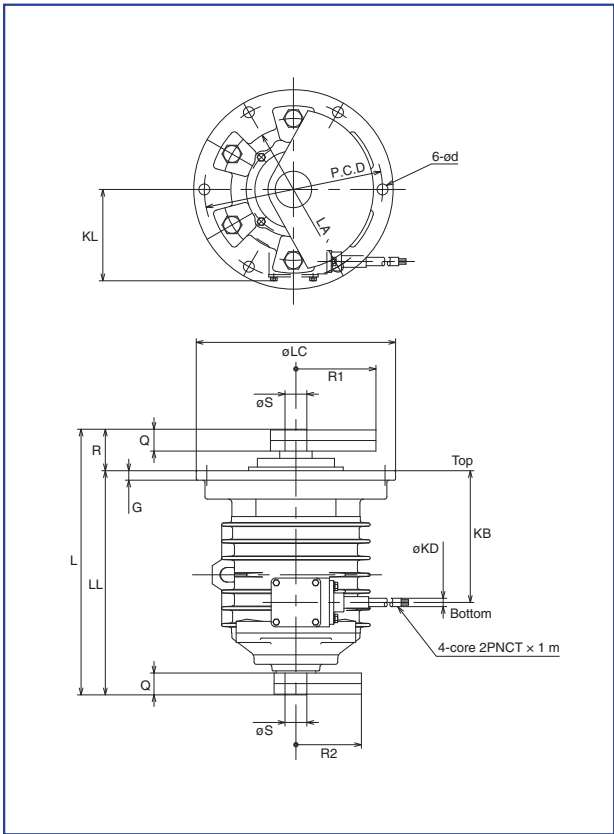
KEEV Flange-type Uras Vibrators

Specifications

Model	Output (kW)	Full-load Current (A)	Vibrating Force 50/60Hz					
			Flange Side			Counter-flange Side		
			200V 50/60Hz	Eccentric Moment (kg.cm)	Vibrating Force (kN)	Weight Radius R1 (mm)	Eccentric Moment (kg.cm)	Vibrating Force (kN)
KEEV-7-4	0.4	2.3/2.2		18.0/12.5	4.4	104/92	11.6/8.1	2.7
KEEV-15-4	0.85	3.8/3.7		42.0/29.0	10.4	130/116	21/15	4.9
KEEV-20-4	1.2	4.9/4.8		57.0/40.0	14.1	137/122	27.4/19	6.4
KEEV-8-6	0.35	2.5/2.2		46.0/32.0	5.0	142/126	30/21	3.1
KEEV-16-6	0.85	4.8/4.6		100.0/69.0	11.0	174/154	51/35.4	5.3
KEEV-22-6	1.2	6.3/5.8		140.0/97.0	15.4	185/164	68/47	7.0

Model	Dimensions (mm)									Mass (kg)	Bearing Lubrication Type
	L	D	G	R	Q	A	P.C.D	ød	Bolt Dia.		
KEEV-7-4	355	240	12	55	33	174	215	14	M12	30/28	Greased and Sealed
KEEV-15-4	395	275	13	66	39	172	245	18	M16	52/50	Periodic Greasing
KEEV-20-4	406	275	13	74	45	172	245	18	M16	63/60	Periodic Greasing
KEEV-8-6	355	240	12	55	33	174	215	14	M12	36/33	Greased and Sealed
KEEV-16-6	395	275	13	66	39	172	245	18	M16	67/63	Periodic Greasing
KEEV-22-6	406	275	13	74	45	172	245	18	M16	78/72	Periodic Greasing

Outline Drawings



KEEV-20-4



Vibrating Screen

KHE High-frequency Uras Vibrators

Easy compaction with high-frequency Uras Vibrators

In the vibration range from 20 to 30 Hz, powder acts like a fluid with a vibration acceleration of approximately twice the gravity acceleration.

In contrast, at a vibration of 50 Hz or higher, strong compaction will occur instead of fluidization, even with a vibration acceleration that is several times the gravity acceleration.

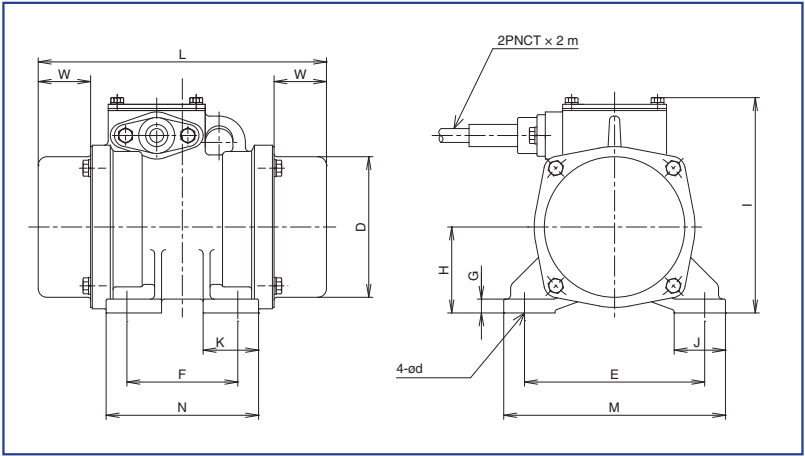
The high-frequency Uras Vibrators generate high-frequency vibration to effectively utilize this characteristic.

Specifications

Three-phase,Two Poles					Vibration Rating																	
					Power supply frequency of 100 Hz (6000 r/min) Power supply frequency of 120 Hz (7200 r/min)																	
Model		Vibrating Force (kN)	Output (kW)	Full-load Current (A)		Dimensions(mm)													Mass (kg)	Protection Structure	Min. Allowable Cable Bending Radius (mm)	
				415V 100Hz	415V 120Hz	D	E	F	G	H	I	J	K	L	M	N	W	ød				Bolt Dia.
Greased and Sealed	KHE-1-2	1	75W	0.35	0.3	90	120	40	9	56	145	35	—	190	145	65	40	10	M8	7	IP66	R90 or more
	KHE-2-2	2	0.15	Custom		105	130	80	10	62	160	37	40	210	160	110	40	12	M10	9	IP66	R90 or more
	KHE-4-2	4	0.4	0.98	0.95	115	150	90	12	71	175	40	45	290	180	120	40	14	M12	17	IP66	R90 or more
Periodic Greasing	KHE-7.5-2	7.5	0.75	Custom		125	190	110	13	84	195	50	55	310	230	150	40	18	M16	24	IP66	R100 or more
	KHE-12-2	12	1.2	2.2	2.2	135	220	120	16	92	210	60	65	365	270	170	51	22	M20	34	IP55	R100 or more
	KHE-16-2	16	1.6	2.9	3	170	240	140	20	130	260	70	75	415	300	200	62	26	M24	49	IP55	R100 or more
	KHE-22-2	22	2.2	Custom		190	260	150	22	142	280	70	80	445	320	210	61	26	M24	62	IP55	R100 or more

Three-phase,Two Poles					Vibration Rating																	
					Power supply frequency of 150 Hz (9000 r/min) Power supply frequency of 180 Hz (10800 r/min)																	
Model		Vibrating Force (kN)	Output (kW)	Full-load Current (A)		Dimensions(mm)													Mass (kg)	Protection Structure	Min. Allowable Cable Bending Radius (mm)	
				200V 150Hz	200V 180Hz	D	E	F	G	H	I	J	K	L	M	N	W	ød				Bolt Dia.
Greased and Sealed	KHE-1-2T	1	75W	0.61	0.55	90	120	40	9	56	145	35	—	190	145	65	40	10	M8	7	IP66	R90 or more
	KHE-2-2T	2	0.15	0.9	0.91	105	130	80	10	62	160	37	40	210	160	110	40	12	M10	9	IP66	R90 or more
	KHE-4-2T	4	0.4	2.2	2.2	115	150	90	12	71	175	40	45	290	180	120	40	14	M12	17	IP66	R90 or more
Periodic Greasing	KHE-7.5-2T	7.5	0.75	3.6	3.5	125	190	110	13	84	195	50	55	310	230	150	40	18	M16	24	IP66	R100 or more
	KHE-12-2T	12	1.2	4.7	4.8	135	220	120	16	92	210	60	65	365	270	170	51	22	M20	34	IP55	R100 or more

Outline Drawings



KHE-4-2T

Features

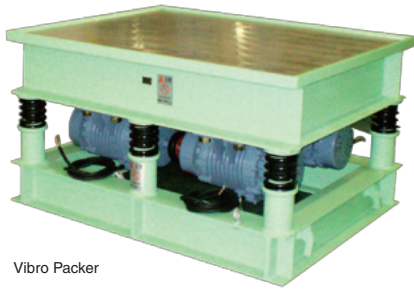
Motorized vibrator generates vibrations ranging from 100 to 180 Hz.

Inverter operation is required to generate high-frequency vibration.

Table showing the applicable capacity of inverter for driving high-frequency Uras Vibrators (using the example of the V1000 inverter (heavy load rating) made by Yaskawa Electric Corporation)

Model	Vibrating Force (kN)	Output (kW)	Full-load Current (A)		Inverter Model: CIMR-□(kW)	
			415V/100Hz	415V/120Hz	With 1 Uras Vibrator	With 2 Uras Vibrators
KHE-1-2	1	75W	0.35	0.3	VA4A0001 (0.1)	VA4A0002 (0.2)
KHE-2-2	2	0.15	Custom		VA4A0002 (0.2)	VA4A0004 (0.4)
KHE-4-2	4	0.4	0.98	0.95	VA4A0004 (0.4)	VA4A0006 (0.75)
KHE-7.5-2	7.5	0.75	Custom		VA4A0006 (0.75)	VA4A0010 (1.5)
KHE-12-2	12	1.2	2.2	2.2	VA4A0010 (1.5)	VA4A0010 (3.0)
KHE-16-2	16	1.6	2.9	3.0	VA4A0010 (1.5)	VA4A0020 (3.7)
KHE-22-2	22	2.2	Custom		Contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.	

Model	Vibrating Force (kN)	Output (kW)	Full-load Current (A)		Inverter Model: CIMR-□(kW)	
			200V/150Hz	200V/180Hz	With 1 Uras Vibrator	With 2 Uras Vibrators
KHE-1-2T	1	75W	0.61	0.55	VA2A0001 (0.1)	VA2A0002 (0.2)
KHE-2-2T	2	0.15	0.9	0.91	VA2A0002 (0.2)	VA2A0004 (0.4)
KHE-4-2T	4	0.4	2.2	2.2	VA2A0004 (0.4)	VA2A0008 (0.75)
KHE-7.5-2T	7.5	0.75	3.6	3.5	VA2A0006 (0.75)	VA2A0010 (1.5)
KHE-12-2T	12	1.2	4.7	4.8	VA2A0010 (1.5)	VA2A0018 (2.2)



Vibro Packer



V1000 inverter by Yaskawa Electric Corporation

Options

A wide range of options are available to ensure that Uras Vibrators meet the needs of our customers. Do not hesitate to contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.

- Protruding shaft (shaft position: one or two protruding shaft ends)
- Special voltages
- Insulation classes (class F, class B)
- Divided weight cover-type
- Extension of lead cable
- Coating: Non-standard colors available as custom orders
- Support for IP66 by models equipped with vents (excluding the KEE-10-2BW, 16-2W and 23-2W)
- Mounting base interchangeable with old models (example: KEB-5-4 → KEE-6-4BW)
- CSA standards or CE marking support
- Drop-prevention wire

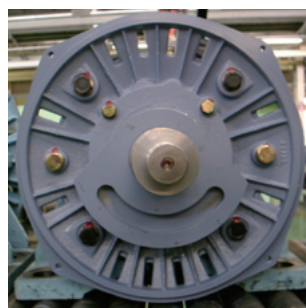
Recommended Wire Size for Two Poles

Uras Vibrator Model	Wire Diameter (mm)
KEE-0.5-2CW	ø6
KEE-1-2CW	ø6
KEE-2-2CW	ø6
KEE3.5-2BW	ø6
KEE-6-2BW	ø6
KEE-10-2BW	ø6
KEE-16-2W	ø6
KEE-23-2W	ø6
KEE-30-2W	ø8
KEE-40-2W	ø8

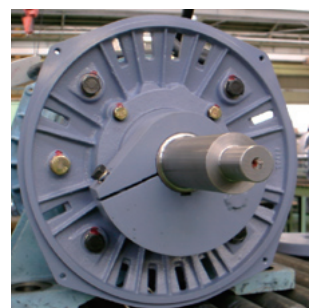


Drop-prevention wire

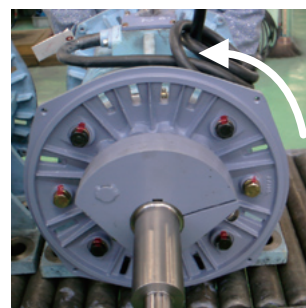
- Reversible variable Uras Vibrators (vibrating force varied by changing the direction of revolution)



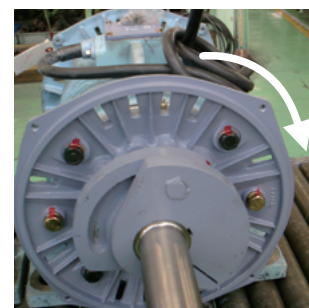
With adjustable weight



With fixed weight



Operation in forward direction



Operation in reverse direction

- Service for setting the vibrating force (Custom orders are adjusted to the vibrating force specified by the customer)

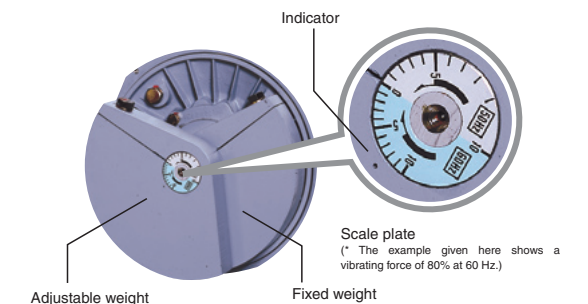
How to Adjust the Vibrating Force

Fan-shaped weight adjustment

Unbalanced weights are attached at both ends of the shaft. As shown in the photo on the right, one fixed weight and one adjustable weight whose angle can be varied are attached to each end of the shaft. To adjust the vibrating force of the Uras Vibrator, the combined eccentric moment of the fixed and adjustable weights is changed by changing the angle of the center of gravity of the fixed and adjustable weights.

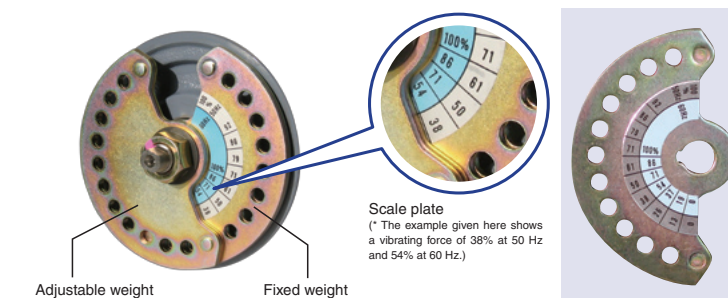
The required vibrating force can be set by loosening the locking bolt used to secure the adjustable weight and aligning the indicator with the required scale marking on the scale plate. The photo shows an example of an adjustment to 80% of the maximum vibrating force at 60 Hz.

• Fan-shaped weight system



Press weight adjustment (for the SEE-0.5-2CW/KEE-0.5-2CW, 1-2CW and 2-2CW)

• Press weight system



Loosen the locking bolts securing the weights at both ends of the rotor shaft. Move the adjustable weight slightly toward the end of the shaft until the weight can move freely. Place the bump on the adjustable weight into the recess on the fixed weight and then tighten the locking bolts. The value (unit: %) displayed on the fixed weight along the edge of the adjustable weight is the selected vibrating force.

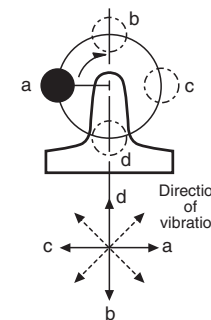
The vibrating force for this type can be set in 10 levels from a minimum of 13% up to 100% with 50 Hz operation, and in 6 levels from a minimum of 19% up to 100% with 60 Hz operation. When shipped, it is set to 38% of the maximum vibrating force at 50 Hz and to 54% of the maximum vibrating force at 60 Hz.

Circular Vibration and Linear Vibration

a) When generating vibration using one Uras Vibrator

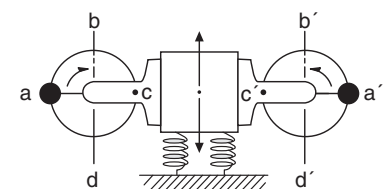
When one Uras Vibrator is installed and used to generate vibration, revolution occurs while the position of the unbalanced weight changes instantaneously in the sequence of a, b, c, and d. This means that the vibration direction also changes in the same way, generating circular vibration.

Examples of the uses of circular vibration include the prevention of blockages in hoppers as well as applications in vibration milling machines and barrel finishing machines.



b) When generating linear vibration using two Uras Vibrators

Two identical Uras Vibrators set to the same vibrating force are supported by soft springs as shown in the figure on the right and their vibrator shafts are installed in parallel. These vibrators are run concurrently in mutually opposing directions. In this configuration, a synchronous torque is produced and, even without transmission through gears or other mechanisms, the two vibrators start a synchronous operation in which the forces in the horizontal direction cancel each other out while only vertical vibration is generated. This principle is used for forced packers, vibrating feeders, conveyors, screens, and many other kinds of machines that apply vibration.



Vibration Amplitude α and Vibration Strength G Calculations

As examples for a simple vibration system (forced vibration with a single degree of freedom), these calculations are shown using the "Vibropot" which is a milling machine for test purposes.

$$\text{Vibration acceleration} = \frac{F}{W} = \alpha \omega^2 \left[\frac{m}{s^2} \right] \dots (1)$$

$$\text{Vibration strength } G = \frac{\text{Vibration acceleration}}{\text{Gravity acceleration}} = \frac{F}{W \times g} \text{ (-)} \dots (2)$$

$$\text{Angular speed } \omega = 2 \pi f \left[\frac{1}{s} \right]$$

[Operating conditions]

Uras Vibrator model used: KEE-12-4B ... 12 [kN] maximum vibrating force, 4 poles
 Vibrating body mass $W = 115$ [kg]
 Operating frequency: 60 [Hz]
 Maximum vibrating force $F_{\max} = 12$ [kN] ... 8.4 [kN] at 70% setting
 Vibration frequency $f = \frac{N[\text{rpm}]}{60[\text{s}]} = \frac{1750}{60} = 29.2$ [Hz]
 Angular speed $\omega = 2 \pi f = 2 \times \pi \times 29.2 = 183$ [$\frac{1}{s}$]

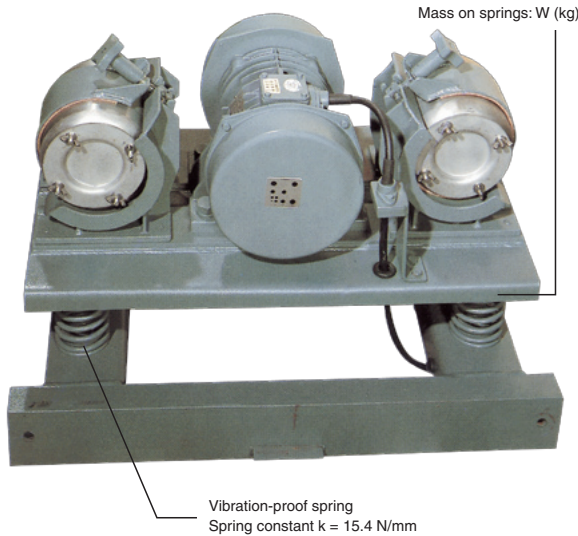
1. To calculate the vibration strength:

$$\text{From (2), } G = \frac{F}{W \times g} = \frac{8.4 \times 10^3}{115 \times 9.8} \div 7.5 \text{ (-)}$$

2. To calculate the amplitude:

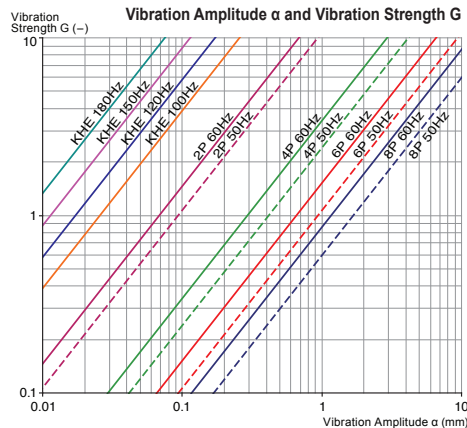
$$\text{From (1), } \pm \alpha = \frac{F}{W \times \omega^2} = \frac{8.4 \times 10^3}{115 \times 183^2} = 2.2 \times 10^{-3} [\text{m}]$$

$$\therefore \alpha = \pm 2.2 [\text{mm}]$$



Formula for calculating vibration strength (G) from amplitude α (mm)

No. of Uras Vibrator Poles	Power Supply Frequency (Hz)	No. of Revolutions (r/min)	Vibration Frequency (Hz)	Formula for Calculating G
2	50	2900	48.3	$G = \alpha(\text{mm}) \times 9.4$
	60	3500	58.3	$G = \alpha(\text{mm}) \times 13.7$
4	50	1460	24.3	$G = \alpha(\text{mm}) \times 2.4$
	60	1750	29.2	$G = \alpha(\text{mm}) \times 3.4$
6	50	970	16.2	$G = \alpha(\text{mm}) \times 1.1$
	60	1160	19.3	$G = \alpha(\text{mm}) \times 1.5$
8	50	730	12.2	$G = \alpha(\text{mm}) \times 0.6$
	60	870	14.5	$G = \alpha(\text{mm}) \times 0.85$

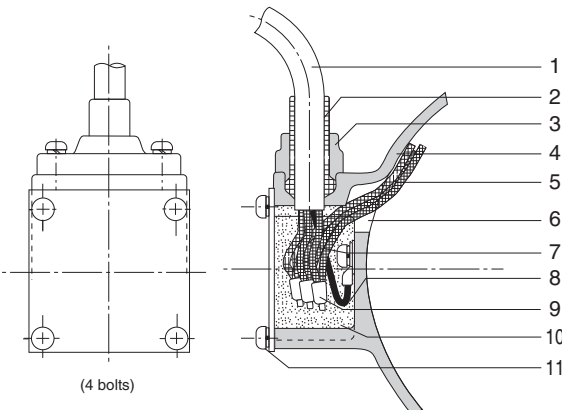


Terminal Box and Lead Cable

Uras Vibrator terminal boxes are filled with a special Uras Compound. This non-hardening, high-adhesion compound was developed to provide superior vibration-, humidity-, and dust-resistance. The lead cable is an anti-vibration butyl rubber insulated chloroprene cab-tire that ensures long life.

No.	Part Name	No.	Part Name
1	2PNCT (anti-vibration butyl rubber insulated chloroprene cab-tire cable)	6	Epoxy resin adhesive
		7	Single-core, lead-in wire
		8	Ground wire
2	Rubber bush	9	Insulated closed-end connector
3	Bellmouth		
4	Frame	10	Uras Compound (non-hardening, high-adhesion compound)
5	Vibrator lead cable	11	Cover

The red, white, black, and green wires on the cable are wired to phase U, phase V, phase W, and the ground line (E), respectively. If U, V, W, and E are respectively wired to R, S, T, and E, the motor will be rotated in the direction of the cable inlet. Wire U to phase S and V to phase R to reverse the rotation direction.



Application to Hoppers

Preventing Bridge Formation in Hoppers

Mount the Uras Vibrators on the hopper wall and apply circular vibration to prevent bridge formation. The success depends largely on the Vibrator models, number of Vibrators, mounting positions, operating method, and particle characteristics.

Standard Data and Dimensions of Uras Vibrators for Conical and Angular Hoppers without Reinforced Ribs

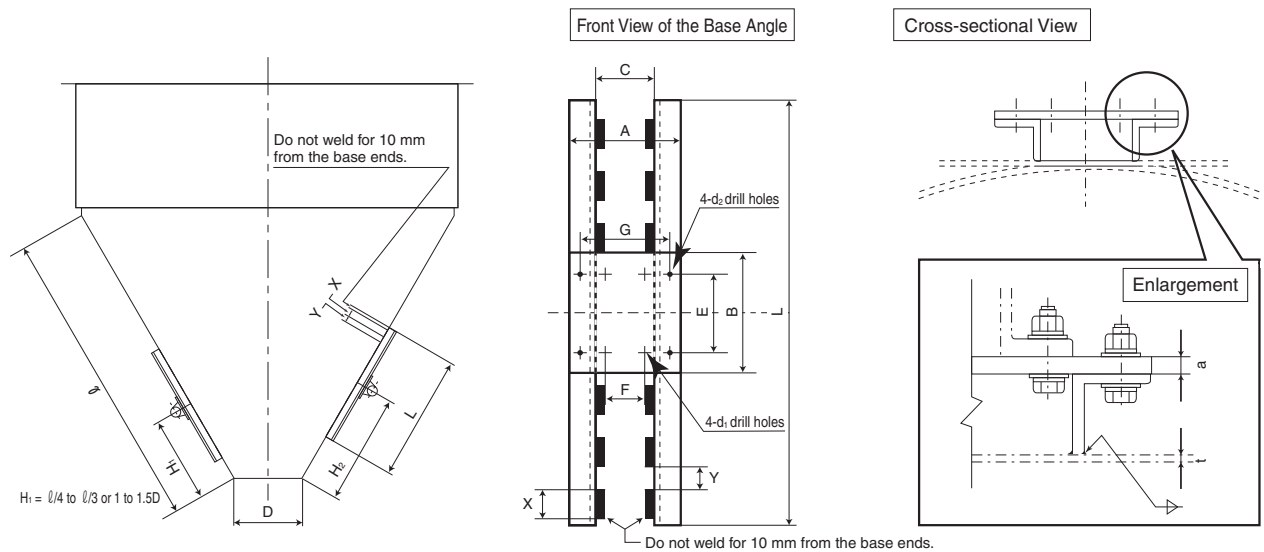
Select an appropriate Uras Vibrator based on plate thickness (t) from the following table. These thicknesses are designed to minimize the amount of welding required. The double amplitude generally ranges from 0.3 to 0.5 mm at the center of the mounted Uras Vibrator. Refer to the following table and adjust plate thickness (t) until the amplitude falls within this range.

Unit: mm (m for L)

Model	Angle Dimension	Hopper Plate Thickness (t)	E	F	G	A	B	C	L (m)	a	d ₁	d ₂	X	Y	Bolt Dimension for d ₁	Bolt Dimension for d ₂
KEE-0.5-2CW	30×30×3	1.6 to 2.3	120	40	90	120	150	60	0.5 to 0.7	6	10	10	75	50	8×30	8×30
KEE-1-2CW	30×30×5	2.3 to 3.2	120	40	90	120	150	60	0.6 to 0.8	6	10	10	75	50	8×30	8×30
KEE-2-2CW	40×40×5	3.2 to 4.5	120	40	100	140	150	60	0.7 to 1.0	9	10	10	75	50	8×35	8×35
KEE-3.5-2BW	50×50×6	4.5 to 6	150	90	170	220	190	120	0.8 to 1.2	12	14	14	75	50	10×40	10×40
KEE-6-2BW	65×65×6	6 to 9	190	110	210	275	240	145	0.9 to 1.3	12	18	18	75	50	16×55	16×55
KEE-10-2BW	75×75×9	9 to 12	220	120	240	315	280	165	1.1 to 1.5	16	22	22	100	80	20×60	20×60
KEE-16-2W	90×90×10	12	240	140	280	370	310	190	1.2 to 1.6	16	26	26	100	80	24×80	24×70
KEE-23-2W	100×100×13	16	260	150	300	400	330	200	1.4 to 1.8	19	26	26	100	80	24×80	24×70
KEE-30-2W	130×130×15	16 to 19	310	170	370	500	390	240	1.4 to 1.8	22	33	33	150	100	30×100	30×90
KEE-40-2W	150×150×15	19 to 22	350	220	450	600	440	300	1.5 to 2.0	25	39	39	150	100	36×120	36×100

- Notes: 1. When two or more Vibrators are mounted on one hopper, separate the Vibrators by at least 100 mm. (| H₁ - H₂ | > 100 mm) Otherwise, blockages may occur.
 2. When welding the base angle to the hopper, temporarily tighten the base plate to keep it flat.
 3. Use bolts, Spring washers, flat washers, and nuts to secure the Vibrator.
 4. Use 8T (SCM) mounting bolts for the KEE-2-2CW.

Reference Drawing for Base Angle Manufacture and Mounting

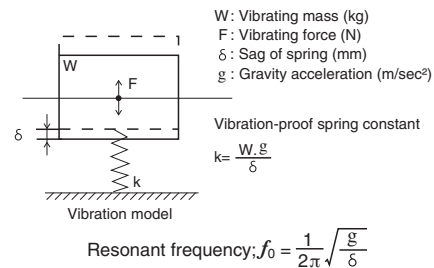


Vibration Prevention

Transmission of vibrations to the floor

The transmission of vibrations differs depending on the vibration frequency and spring constant of the vibration-proof springs. The transmission of vibrations from vibrating machinery to the floor must be minimized. The table on the right gives the general selection guidelines.

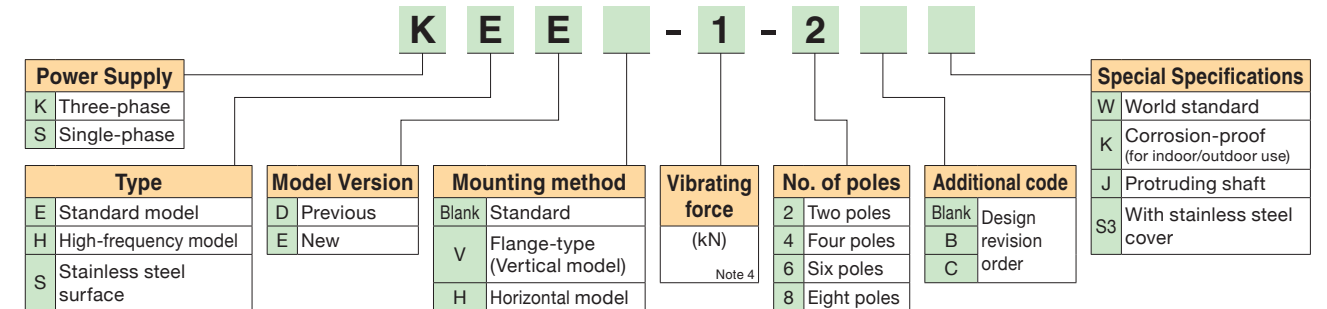
- (1) A vibrating machine must be operated at a vibration frequency at least two times higher than the resonance point. In fact, a vibration frequency that is 5 to 10 times higher is used as indicated in the table on the right.
- (2) The vibrating force transmitted to the floor is expressed as the product of the single amplitude and spring constant. Therefore, the total load applied to the floor is the sum (\pm) of what is exerted by the weight of the machine itself plus that exerted by the vibration.
- (3) Because the vibration of a vibrating machine is temporarily increased when the machine passes through the resonance point when it is stopped, it will be greater than the values given in the table on the right. Safe values for the total load are 1.5 times the machine weight for a 2-pole or 4-pole vibrator, and 2.0 times the machine weight for a 6-pole or 8-pole vibrator.
- (4) Note that when the resonance point of the floor and building is close to the vibration frequency of operation (especially when the vibration frequency is changed by the vibration feeder), strong vibrations may be generated in locations other than the installation location due to resonance, possibly causing trouble.



No. of Poles	Frequency (Hz)	Vibration Frequency f (Hz)	Sag of Spring upon Mounting δ (mm)	Spring Constant k (N/mm) *1	Resonant Frequency of system f_0 (Hz)	Double Amplitude 2α (mm) *2
2P	60	58.3	10	980	5.0	0.74
	50	48.3	12	810	4.6	1.06
4P	60	29.1	20	490	3.5	2.95
	50	24.3	24	410	3.2	4.25
6P	60	19.3	30	320	2.9	6.7
	50	16.1	36	270	2.6	9.6
8P	60	14.5	40	250	2.5	11.7
	50	12.1	48	210	2.3	17.0

*1: These values are per 1,000 kg of machine mass. The values for other masses are calculated proportionately.
*2: The values given apply for a vibration acceleration of 5G. The values for other accelerations are calculated proportionately.
Note: The spring stress is approximately 250 N/mm².

Model Designation



- Notes: 1. This table shows how to read the model numbers of standard Uras Vibrators.
2. Note that it is not possible to manufacture vibrators in every possible combination.
3. If a non-standard Uras Vibrator is required, contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.
4. For details on the vibrating force, refer to the pages concerned.
5. Models prior to D (that is, models A, B, and C) are also previous models.
6. 10, 12-pole vibrators are also available. Contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno.
7. Provide some means to ensure protection against surges for 400 V-class inverters.
Means of protection: (1) Enhance the insulation of the Uras Vibrator (class F insulation).
(2) Use an inverter equipped with a surge protection function (such as the G7 series / V1000 made by Yaskawa Electric Corporation).

Ambient Environment

Provide us with details if any of the following items applies to the ambient environment in which the Uras Vibrator will be used.

- Locations subject to temperatures below -15°C or above 40°C.
- When the temperature of the mounting base of the Uras Vibrator is below -15°C or above 40°C.
- Locations subject to corrosive gases or liquid.
- Locations subject to significant vibration.

Safety Precautions

In the photos provided in this catalog showing examples of how the Uras Vibrators may be used, the vibrators are shown without the safety fences and other safety-related devices or equipment, which are required by the laws and regulations, in order to facilitate comprehension. Similarly, the illustrations and other drawings are graphical representations only. Before using a Uras Vibrator, read the through its instruction manual carefully—rather than depend on photos and illustrations alone—and then proceed to use it.

[General Precautions]

- Observe the safety regulations that are applicable to the location where the Uras Vibrator will be installed and to the equipment that will be used with the Uras Vibrator. (These regulations include the occupational, health and safety regulations, the technical standards for electrical equipment, the interior wiring regulations, the explosion protection guidelines for factories, and the Building Standards Law.)
- Before using the Uras Vibrator, read the instruction manual carefully to ensure correct usage. If you do not have a copy of the instruction manual, contact Sanwest Pty Ltd or Overseas Sales Department of Uras Techno to provide you with a copy.

[Selection Precautions]

- Select the Uras Vibrator that is suited to the intended application and usage environment.
- In food processing equipment or other equipment that must be protected from oil, install oil pans or other forms of protection against oil leakage resulting from equipment failure or problems caused by the equipment nearing the end of its service life.

Precautions for Exportation

If the Uras Vibrator is to be exported and the end user of the Uras Vibrator is related to the armed forces, or if the Uras Vibrator is to be involved in the manufacture of weapons or other such items, the Uras Vibrator may be subject to the export controls stipulated in the Foreign Exchange and Overseas Sales Act, in which case a thorough screening and the necessary export formalities must be undertaken.

Method Used to Mount Uras Vibrators on Small Hoppers

Application to Small Hoppers and Chutes

Use of a base angle in a size given in the table on the previous page is also recommended when mounting a Uras Vibrator on a small hopper or chute. But when the space available is limited, use one of the bases listed below.

Unit: mm

Model	Hopper Plate Thickness (t)	External Dimensions of Base Plate	Base Plate Thickness	E	F	A	B	D	R	d Tapped Holes
KEE-0.5-2C	1.2 to 2.3	75×300	12	120	40	75	300	40	30	8
KEE-1-2C	2.3 to 3.2	90×400	12	120	40	90	400	40	30	8
KEE-2-2C	3.2 to 4.5	200×500	16	120	40	200	500	80	40	8
KEE-3.5-2B	4.5 to 6	220×500	16	150	90	220	500	120	50	12
KEE-6-2B	6 to 9	250×550	22	190	110	250	550	140	60	16
KEE-10-2B	9 to 12	300×600	25	220	120	300	600	150	60	20

