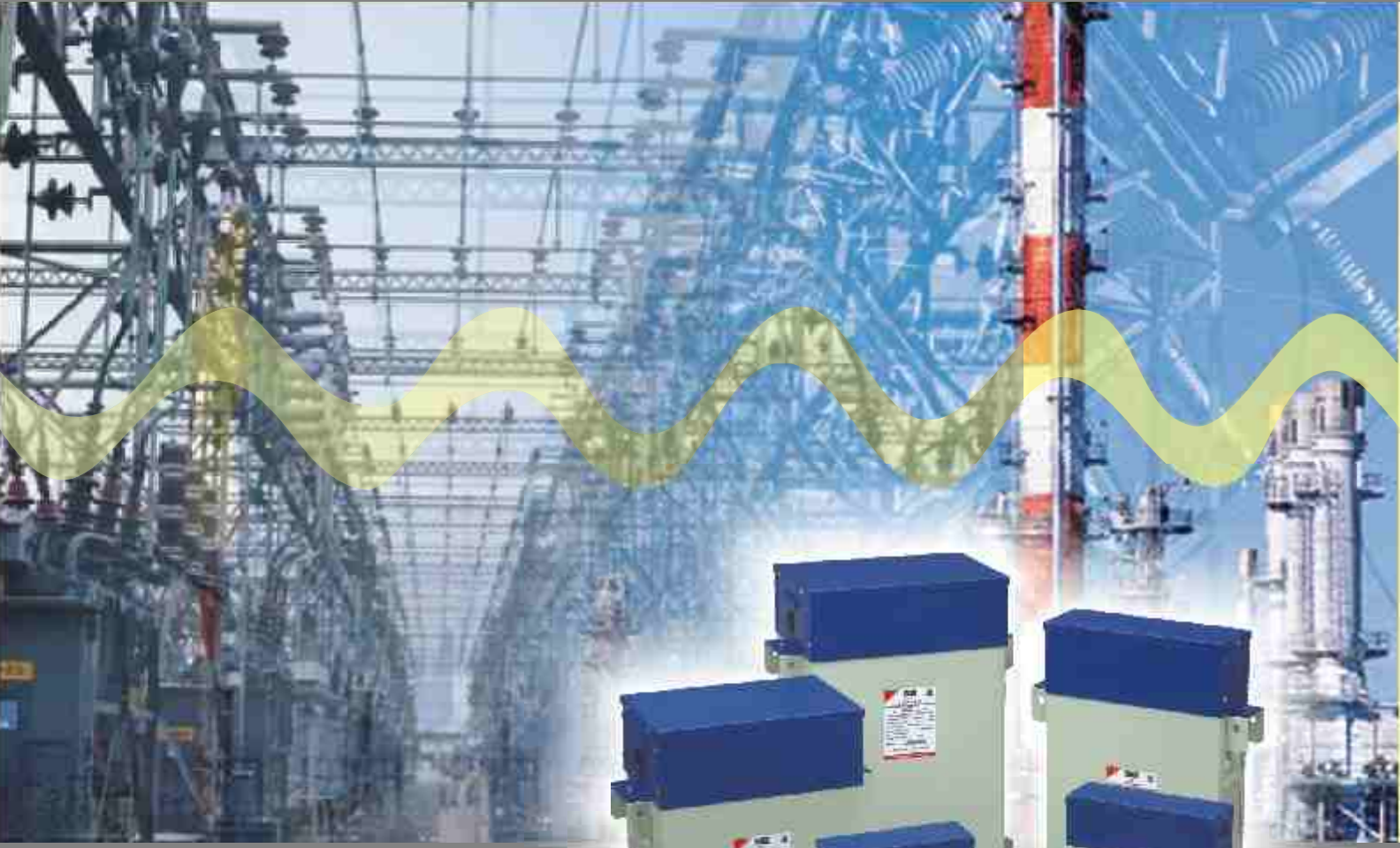


LT POWER CAPACITORS



BHARTIA CUTLER-HAMMER

BHARTIA INDUSTRIES LIMITED
we care for you

Bhartia Industries Limited presents a wide and versatile range of LT power capacitors for power factor Improvement and energy conservation. The manufacturing unit consists of state of the art machinery and sophisticated testing equipments to ensure a reliable and world class product.

Range:

Type	Description
MPP-BN	Normal duty
MPP-BH	Heavy duty, Long Life
BMDXL	Super Heavy duty, Low Loss, Long Life
APP-BH	Super Heavy duty



Features

Metallized Polypropylene Range

MPP FILM

Superior quality Zinc alloy heavy edge metallized polypropylene(PP) film with self healing property .

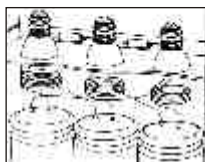
MPP-BN : Around 14% thicker film than available normally to withstand high voltage fluctuations.

MPP-BH : Extra Thick PP film ensures dielectric content to almost double.

BMDXL : 2 Layers of PP film for excellent stress management and life.

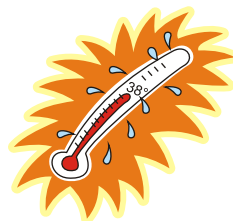
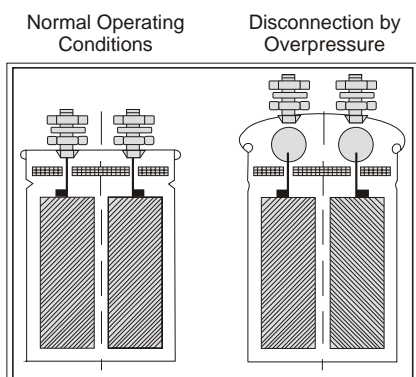
INDUCTOR COILS

To limit inrush and transient currents and ensuring long Life. (wherever applicable)



EXPLOSION PROOF OVERPRESSURE DISCONNECTION

In the event of internal pressure developed due to generation of gases, the expansion occurs in the Can and thereby circuit is disconnected from the power supply.



TEMPERATURE RANGE

-40 Deg C to +55 Deg C

CONSTRUCTION



LEAK PROOF DESIGN

Non toxic, fire retardent PU resin encapsulation used ensuring no leakages.

Range of Capacitors

MPP-BN (Normal duty) Metallized polypropylene film

- Range from 1 kVAr to 30 kVAr in single unit
- Very low Watt loss
- Polyurethane resin filled
- Multi element modular construction
- Inductor coils and Louvers for 10 kVAr and above
- Suitable for applications with linear loads

Harmonics
withstand
capability
I thd 10%



MPP-BH (Heavy duty) Metallized polypropylene film

- Range from 1 kVAr to 30 kVAr in single unit
- Extra thick Film for better stress management
- Permissible over current : 2 In
- Long life
- Polyurethane resin filled
- Multi element modular construction
- Inductor coils and Louvers for 5 kVAr and above
- Suitable for applications with Non linear loads

Harmonics
withstand
capability
I thd 20%

BMDXL (Super Heavy duty low loss) Metallized polypropylene film

- Range from 1kVAr to 30 kVAr in single unit
- Unique design with Two layer of PP film
- Permissible over current : 2.5 In
- Long life
- Polyurethane resin filled
- Multi element modular construction
- Inductor coils and Louvers for 5 kVAr and above
- Suitable for applications with Non linear and frequent fluctuating loads

Harmonics
withstand
capability
I thd 25%



APP-BH (Super Heavy duty) All Polypropylene film

- Range from 5 kVAr to 30 kVAr in single unit
- Very low Watt loss
- Non PCB oil impregnated
- Multi element construction
- Suitable for applications with Non linear loads

Harmonics
withstand
capability
I thd 25%

Technical Specifications

Technical Parameters	MPP-BN	MPP-BH	BMDXL	APP-BH
Rated Voltage	440V			
Rated Frequency	50 Hz			
Maximum Over Voltage (Times Rated V)	1.1	1.3	1.3	1.3
Maximum Over Current (Times Rated I)	1.3	2	2.5	2.5
Peak inrush current on making (Times Rated I)	150	200	250	250
Tolerance on Capacitance value	-5% to 10%	0 to 10%	0 to 10%	-5% to 10%
Temperature Class	-40 Deg C to +55 Deg C			
Operational Losses at Dielectric level	≤ 0.2 W/KVAR			≤ 0.2 W/KVAR
Operational Losses at termination including discharge resistors	≤ 0.45 W/KVAR			≤ 0.45 W/KVAR
Operational Losses at termination including discharge resistors and inductor coils (wherever provided)	≤ 0.65 W/KVAR			-
Internal Connections	3 Phase Delta			
Safety	- Overpressure disconnection system. - Non Toxic PU resin encapsulation"			Internal Fuses
Dielectric	Metallized Polypropylene film - Self healing			PP Film
Insulation level	3 KV			
Installation	Indoor			
Reference Standard	IS:13340-1993/IS:13341-1992, IEC: 60831-1(2002)/ IEC:60831-2(1995)			IS:13585(part-1)-1994/ IEC: 60931-1(1996)
Discharge devices	External discharge resistors in all the three phases			
Life expectancy in hrs	100,000	130,000	150,000	150,000
Termination	Wire / M-6/M-8	Wire / M-6/M-8	Wire / M-6/M-8	M-6/ M-8
Enclosure	CRCA Sheet steel enclosure, Powder coated with dual toned finish.			

Other Voltages and frequencies on request.

Life expectancy under nominal system conditions declared. It may be noted that the Life expectancy of capacitors is largely dependant on various system parameters such as voltage levels, duration of over voltages, presence of harmonics, over currents and wave form distortions due to harmonics or other factors, ambient temperature surrounding the capacitor, etc.

UNIQUE BANKING SYSTEM

- Modular Banking Kit ensuring On-Site banking
- Ease of inspection
- Ease of maintenance
- Dual entry Cable box for user friendly termination



Table of Multiplying factor for calculating required Capacitor Rating

Initial PF	Target PF									
	0.70	0.75	0.80	0.85	0.87	0.90	0.92	0.95	0.97	1.00
0.30	2.15	2.29	2.43	2.56	2.61	2.70	2.75	2.85	2.93	3.18
0.35	1.66	1.80	1.93	2.05	2.11	2.19	2.25	2.35	2.43	2.68
0.40	1.27	1.41	1.54	1.67	1.72	1.81	1.87	1.96	2.04	2.29
0.45	0.96	1.10	1.23	1.36	1.42	1.50	1.56	1.66	1.73	1.98
0.50	0.71	0.85	0.98	1.11	1.17	1.25	1.31	1.40	1.48	1.73
0.52	0.62	0.76	0.89	1.02	1.08	1.15	1.22	1.31	1.39	1.64
0.54	0.54	0.68	0.81	0.94	0.99	1.07	1.13	1.23	1.31	1.56
0.55	0.50	0.64	0.77	0.90	0.95	1.03	1.09	1.19	1.27	1.52
0.56	0.46	0.60	0.73	0.86	0.91	1.00	1.05	1.15	1.23	1.48
0.58	0.38	0.52	0.65	0.78	0.84	0.92	0.98	1.08	1.15	1.40
0.60	0.31	0.45	0.58	0.71	0.77	0.85	0.91	1.00	1.08	1.33
0.62	0.25	0.38	0.52	0.65	0.70	0.78	0.84	0.94	1.01	1.27
0.64	0.18	0.32	0.45	0.58	0.63	0.72	0.77	0.87	0.95	1.20
0.65	0.15	0.29	0.42	0.55	0.60	0.68	0.74	0.84	0.92	1.17
0.66	0.12	0.26	0.39	0.52	0.57	0.65	0.71	0.81	0.89	1.14
0.68	0.06	0.20	0.33	0.46	0.51	0.59	0.65	0.75	0.83	1.08
0.70		0.14	0.27	0.40	0.45	0.54	0.59	0.69	0.77	1.02
0.72		0.08	0.21	0.34	0.40	0.48	0.54	0.63	0.71	0.96
0.74		0.03	0.16	0.29	0.34	0.42	0.48	0.58	0.66	0.91
0.75			0.13	0.26	0.32	0.40	0.46	0.55	0.63	0.88
0.76			0.11	0.24	0.29	0.37	0.43	0.53	0.60	0.86
0.78			0.05	0.18	0.24	0.32	0.38	0.47	0.55	0.80
0.80				0.18	0.18	0.27	0.32	0.42	0.50	0.75
0.82				0.08	0.13	0.21	0.27	0.37	0.45	0.70
0.84				0.03	0.08	0.16	0.22	0.32	0.40	0.65
0.85					0.05	0.14	0.19	0.29	0.37	0.62
0.86					0.03	0.11	0.17	0.26	0.34	0.59
0.88						0.06	0.11	0.21	0.29	0.54
0.90								0.16	0.23	0.48
0.92								0.10	0.18	0.43
0.94								0.03	0.11	0.36
0.95									0.08	0.32
0.96									0.04	0.29
0.98										0.20
1.00										0.00

Example

Load = 500 kw

initial P.F. = 0.8

Target P.F. = 0.9

kVAR compensation required = 500×0.27

= 135 kVAR

Technical Specifications

Application / load	Harmonics withstand capability I thd (%)	MPP-BN Normal Duty	MPP-BH Heavy duty Long life	BMDXL Super Heavy duty, Low loss	APP-BH Super Heavy duty
Industries with linear/steady loads like Small scale Industries, Machine shops, Tool rooms, Small frame motor compensations, Commercial Establishments	Upto 10%	✓			
Non Linear and fluctuating loads like that of Process Industries, IT parks, BPOs, Hospitals, Chemical and Textile Industries	Upto 20%		✓		
Highly Non linear and frequent fluctuating loads like Steel rolling Mills, Cement plants, Sugar plants, Oil refineries	Upto 25%			✓	✓

Recommended Capacitor Rating for direct connection to Induction Motors (For improvement of Power Factor to 0.95 or better)

Motor rating in H.P	Capacitor Rating in kVAR when motor speed in RPM is:						Motor rating in H.P	Capacitor Rating in kVAR when motor speed in RPM is:					
	3000	1500	1000	750	600	500		3000	1500	1000	750	600	500
2.5	1	1	1.5	2	2.5	2.5	105	22	24	27	29	36	41
5	2	2	2.5	3.5	4	4	110	23	25	28	30	38	43
7.5	2.5	3	3.5	4.5	5	5.5	115	24	26	29	31	39	44
10	3	4	4.5	5.5	6	6.5	120	25	27	30	32	40	46
12.5	3.5	4.5	5	6.5	7.5	8	125	26	28	31	33	41	47
15	4	5	6	7.5	8.5	9	130	27	29	32	34	43	49
17.5	4.5	5.5	6.5	8	10	10.5	135	28	30	33	35	44	50
20	5	6	7	9	11	12	140	29	31	34	36	46	52
22.5	5.5	6.5	8	10	12	13	145	30	32	35	37	47	54
25	6	7	9	10.5	13	14.5	150	31	33	36	38	48	55
27.5	6.5	7.5	9.5	11.5	14	16	155	32	34	37	39	49	56
30	7	8	10	12	15	17	160	33	35	38	40	50	57
32.5	7.5	8.5	11	13	16	18	165	34	36	39	41	51	59
35	8	9	11.5	13.5	17	19	170	35	37	40	42	53	60
37.5	8.5	9.5	12	14	18	20	175	36	38	41	43	54	61
40	9	10	13	15	19	21	180	37	39	42	44	55	62
42.5	9.5	11	14	16	20	22	185	38	40	43	45	56	63
45	10	11.5	14.5	16.5	21	23	190	38	40	43	45	58	65
47.5	10.5	12	15	17	22	24	195	39	41	44	46	59	66
50	11	12.5	16	18	23	25	200	40	42	45	47	60	67
55	12	13.5	17	19	24	26	205	41	43	46	48	61	68
60	13	14.5	18	20	26	28	210	42	44	47	49	61	69
65	14	15.5	19	21	27	29	215	42	44	47	49	62	70
70	15	16.5	20	22	28	31	220	43	45	48	50	63	71
75	16	17	21	23	29	32	225	44	46	49	51	64	72
80	17	19	22	24	30	34	230	45	47	50	52	65	73
85	18	20	23	25	31	35	235	46	48	51	53	65	74
90	19	21	24	26	33	37	240	46	48	51	53	66	75
95	20	22	25	27	34	38	245	47	49	52	54	67	75
100	21	23	26	28	35	40	250	48	50	53	55	68	76

Note: The recommended capacitor rating given in the table are only guidance values. Capacitor sizing must be made to compensate upto 90% of the motor magnetising current to avoid self excitation phenomenon.

Rated output & Recommended Ratings of Cables, Fuses

(Recommended rating of controlgear to be used with 415 or 440 Volts, 50Hz AC, 3 phase delta connected Capacitors)

Unit Rating (kVAR)	Rated Current(A)		Recommended			Unit Rating (kVAR)	Rated Current(A)		Recommended		
	415V Rated CAP	440V Rated CAP	Cable Size (sq. mm) Cu.	Al.	HRC Fuse Rating (A)		415V Rated CAP	440V Rated CAP	Cable Size (sq. mm) Cu.	Al.	HRC Fuse Rating (A)
1	1.39	1.31	0.75	1.50	4	8	11.13	10.50	2.50	4	20
2	2.78	2.62	0.75	1.50	6	9	11.52	11.81	4	6	25
3	4.17	3.94	1.00	1.50	10	10	13.91	13.12	4	6	25
4	5.56	5.25	1.00	1.50	10	12.5	17.39	18.00	6	10	32
5	6.96	6.56	1.50	2.50	16	15	20.87	19.68	10	16	40
6	8.35	7.87	2.50	2.50	16	20	27.82	26.24	10	16	50
7	9.74	9.17	2.50	4	20	25	34.78	32.80	16	25	63
7.5	10.43	9.84	2.50	4	20	30	41.74	39.36	25	35	80

We recommend 'BCH' Capacitor duty Contactors type 'CCE' for switching capacitors upto 25 kVAR rating.

Calculations

Capacitor requirement for Transformer compensation

In all HT installations, the metering is on the HT side of the Distribution Transformer. Invariably, reactive power compensation is carried out on the LT side of the Transformer. This compensation takes care of various Inductive loads in the system. Even when the entire system is on no load, the Transformer alone itself is an inductive load viewed from the HT side. Hence, it is necessary to connect a separate fixed Capacitor to take care of Transformer compensation, as indicated below:

Sl. No.	Distribution Transformer Rating	Recommended kVAr Rating
1	Upto & including 315 kVA	4 to 5 % of kVA rating
2	315 kVA 1000 kVA	5 to 6 % of kVA rating
3	Above 1000 kVA	7 to 8 % of kVA rating

Table of Line Current for a 440 V rated delta connected capacitor at various other reduced voltages.

System Voltage	Line Current at 50 Hz/kVAr in amps
360 V	1.07 A
370 V	1.10 A
380 V	1.13 A
390 V	1.16 A
400 V	1.19 A
410 V	1.22 A
415 V	1.24 A
420 V	1.25 A
430 V	1.28 A
440 V	1.31 A

Table of Line Current for a 415 V rated delta connected capacitor at various other reduced voltages.

System Voltage	Line Current at 50 Hz/kVAr in amps
360 V	1.21 A
370 V	1.24 A
380 V	1.27 A
390 V	1.31 A
400 V	1.34 A
410 V	1.37 A
415 V	1.39 A

Catalogue Numbers

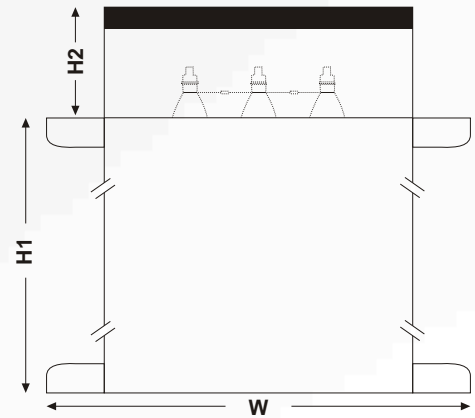
kVAr rating	MPP-BN	MPP-BH	BMDXL	APP-BH
	Normal duty	Heavy duty	Super Heavy duty	Super Heavy duty
1	BMNB350C0010	BMHB350C0010	BMXB350C0010	
2	BMNB350C0020	BMHB350C0020	BMXB350C0020	
3	BMNB350C0030	BMHB350C0030	BMXB350C0030	
4	BMNB350C0040	BMHB350C0040	BMXB350C0040	
5	BMNB350C0050	BMHB350C0050	BMXB350C0050	BAHB350C0050
6	BMNB350C0060	BMHB350C0060	BMXB350C0060	
7	BMNB350C0070	BMHB350C0070	BMXB350C0070	
7.5	BMNB350C0075	BMHB350C0075	BMXB350C0075	BAHB350C0075
8	BMNB350C0080	BMHB350C0080	BMXB350C0080	
9	BMNB350C0090	BMHB350C0090	BMXB350C0090	
10	BMNB350C0100	BMHB350C0100	BMXB350C0100	BAHB350C0100
12	BMNB350C0120	BMHB350C0120	BMXB350C0120	
12.5	BMNB350C0125	BMHB350C0125	BMXB350C0125	BAHB350C0125
15	BMNB350C0150	BMHB350C0150	BMXB350C0150	BAHB350C0150
16	BMNB350C0160	BMHB350C0160	BMXB350C0160	
17.5	BMNB350C0175	BMHB350C0175	BMXB350C0175	
18	BMNB350C0180	BMHB350C0180	BMXB350C0180	
20	BMNB350C0200	BMHB350C0200	BMXB350C0200	BAHB350C0200
25	BMNB350C0250	BMHB350C0250	BMXB350C0250	BAHB350C0250
30	BMNB350C0300	BMHB350C0300	BMXB350C0300	BAHB350C0300

kVAR RATINGS			DIMENSIONS (mm)				TERMINATION		
MPP-BN	MPP-BH	BMDXL	DEPTH (D)	WIDTH (W)	HEIGHT (H)	TOTAL HEIGHT (H)	MPP-BN	MPP-BH	BMDXL
1 & 2	1		55	195	90	90	WT	WT	
3 & 4	2	1	60	210	115	115	WT	WT	WT
5	3		60	210	165+50	215	TT (M6)	TT (M6)	
6 to 8	4 & 5	2	65	225	190+50	240	TT (M6)	TT (M6)	TT (M6)
9, 10,12.5 to 18	6,7,7.5, 8 & 9	3,4 & 5	85	310	250+85	335	TT (M8)	TT (M8)	TT (M8)
20 to 30			170	310	250+85	335	TT (M8)		
	10,12,12.5, 15 & 16	6,7,7.5 & 8	85	310	305+85	390	TT (M8)	TT (M8)	TT (M8)
	17.5 to 30		170	310	305+85	390	TT (M8)	TT (M8)	
		9,10,12 & 12.5	95	335	350+85	435			TT (M8)
		15 to 30	190	335	350+85	435			TT (M8)

TT : Terminal Type
WT : Wire Type

kVAR RATINGS	DIMENSIONS (mm)				
APP-BH	DEPTH (D)	WIDTH (W)	HEIGHT (H)	TOTAL HEIGHT (H)	TERMINATION
5	80	155	275+75	350	TT (M6)
7.5	120	290	170+100	270	TT (M8)
10	120	290	190+100	290	TT (M8)
12.5	120	290	225+100	325	TT (M8)
15	120	290	260+100	360	TT (M8)
20	120	290	315+100	415	TT (M8)
25	120	290	370+100	470	TT (M8)

TT : Terminal Type



Louvers are not provided in APP-BH range of Capacitors

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Bhopal	98266-66093	Gwalior	98268-03658	Mangalore	98457-31944	Renukoot	98399-55117	Trichy	98947-35185
Dehradun	98976-55045	Hubli	98802-90471	Muzaffarnagar	98970-73741	Rudrapur	97194-14866	Udaipur	98292-44085
Durg	98266-12907	Jalandhar	98552-99386	Nagpur	98606-23000	Salem	98430-23393	Vadodara	98256-07606
Durgapur	97320-03364	Jodhpur	98292-18618	Nasik	98900-12944	Siliguri	98320-11433	Vijayawada	98662-20504
Faridabad	98180-10700	Kolhapur	98906-26205	Navi Mumbai	98923-00701	Srinagar	99065-05611	Warangal	98495-51691
Ghaziabad	98107-44937	Kota	98290-14899	Pondichery	98942-22033	Surat	98256-07604		
Gurgaon	98107-44924	Madurai	98431-33990	Rajkot	98256-09602	Tirupathi	98661-30930		

Since product improvement is a continuous process, the data furnished in this brochure may undergo revision without prior notice.