

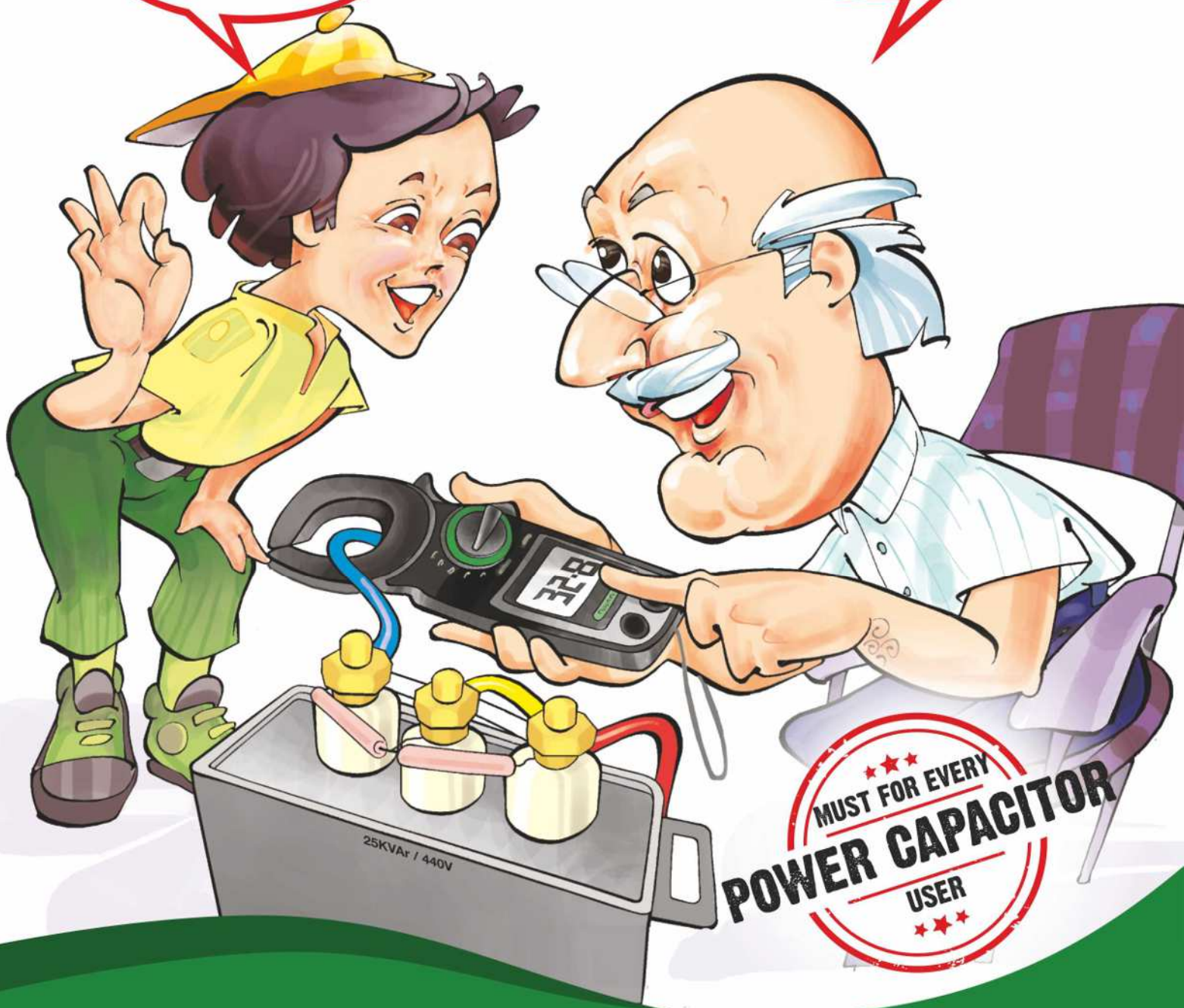
**Malde**

SINCE 1975

**मालदे**

Dadaji, How to Check  
the Performance of  
Power Capacitor?

Very Easy!!!  
Measure Capacitive  
Current per Phase  
with Tong Tester



If the current has reduced or capacitor has failed, within  
guarantee period, protest at once and get replacement  
or money back from the supplier

**Demand For 60 Months Meaningful Guarantee**

## Capacitor current ratings at various test voltages - 3 Ph

KVAR	Capacitor rated at 415 V.A.C.			Capacitor rated at 440 V.A.C.				Capacitor rated at 480 V.A.C.				Capacitor rated at 525 V.A.C.				
	380	415	440	380	415	440	480	380	415	440	480	380	415	440	480	525
1	1.27	1.39	1.47	1.13	1.24	1.31	1.43	0.95	1.04	1.10	1.20	0.80	0.87	0.92	1.01	1.10
2	2.55	2.78	2.95	2.27	2.48	2.62	2.86	1.90	2.08	2.21	2.41	1.59	1.74	1.84	2.01	2.20
3	3.82	4.17	4.42	3.40	3.71	3.94	4.29	2.86	3.12	3.31	3.61	2.39	2.61	2.76	3.02	3.30
4	5.10	5.56	5.90	4.53	4.95	5.25	5.73	3.81	4.16	4.41	4.81	3.18	3.48	3.69	4.02	4.40
5	6.37	6.96	7.37	5.67	6.19	6.56	7.16	4.76	5.20	5.51	6.01	3.98	4.35	4.61	5.03	5.50
6	7.64	8.35	8.85	6.80	7.43	7.87	8.59	5.71	6.24	6.62	7.22	4.78	5.22	5.53	6.03	6.60
7	8.92	9.74	10.32	7.93	8.66	9.18	10.02	6.67	7.28	7.72	8.42	5.57	6.08	6.45	7.04	7.70
7.5	9.55	10.43	11.06	8.50	9.28	9.84	10.74	7.14	7.80	8.27	9.02	5.97	6.52	6.91	7.54	8.25
10	12.74	13.91	14.75	11.33	12.38	13.12	14.31	9.52	10.40	11.03	12.03	7.96	8.69	9.22	10.05	11.00
12.5	15.92	17.39	18.44	14.16	15.47	16.40	17.89	11.90	13.00	13.78	15.03	9.95	10.87	11.52	12.57	13.75
15	19.11	20.87	22.12	17.00	18.56	19.68	21.47	14.28	15.60	16.54	18.04	11.94	13.04	13.82	15.08	16.50
20	25.48	27.82	29.50	22.66	24.75	26.24	28.63	19.04	20.80	22.05	24.06	15.92	17.39	18.43	20.11	21.99
25	31.85	34.78	36.87	28.33	30.94	32.80	35.79	23.80	26.00	27.56	30.07	19.90	21.73	23.04	25.14	27.49
30	38.22	41.73	44.25	34.00	37.13	39.36	42.94	28.57	31.20	33.08	36.08	23.88	26.08	27.65	30.16	32.99
40	50.95	55.65	59.00	45.33	49.50	52.48	57.26	38.09	41.60	44.10	48.11	31.84	34.77	36.87	40.22	43.99
50	63.69	69.56	73.75	56.66	61.88	65.61	71.57	47.61	52.00	55.13	60.14	39.80	43.46	46.08	50.27	54.98

With the help of above table the technician can test a capacitor designed for Rate Voltage (VR) as 415 V, 440 V, 480V & 525V at the available voltage (VA) in accordance with the following relation for interpolation.

Current at Rated Voltage VR from above table = IR  
 Current (IA) at available test voltage (VA) i.e.  $I_A = \frac{V_A \times I_R}{V_R}$

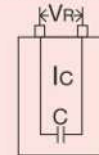
Say, at 525V (VR) rated current for 25KVAR is 27.49A (IR)  
 Than at 438V.A.C. (VA) the measured current (IA) for above capacitor will be  $I_A = \frac{438}{525} \times 27.47 = 22.93$  Amps

Hence KVAR at available voltage becomes =  $KVAR \text{ rated} \times \left(\frac{V_A}{V_R}\right)^2$   
 $= 25 \times \left(\frac{438}{525}\right)^2 = 17.40$  KVAR  
 i.e. Instead of 25 KVAR you will get only 17.4 KVAR effective.

KVAR	Current in Amps at for Three Phase				Cable Size in mm Sq		Fuse Rating		Switch Gear Rating	
	415 V	440 V	480 V	525 V	Al	Cu	Hrc (Amp)	Tinned Cu Wire (SWG)	MCB C- Curve	Switch Fuse Unit
1	1.39	1.31	1.20	1.10	1.5	1.5	4	33	3	20
2	2.78	2.62	2.41	2.20	1.5	1.5	6	32	6	20
3	4.17	3.94	3.61	3.30	1.5	1.5	10	29	8	20
4	5.56	5.25	4.81	4.40	1.5	1.5	10	26	13	20
5	6.96	6.56	6.01	5.50	2.5	2.5	16	24	16	20
6	8.35	7.87	7.22	6.60	4	2.5	16	23	16	32
7	9.74	9.18	8.42	7.70	4	4	20	22	20	32
7.5	10.43	9.84	9.02	8.25	6	4	20	22	20	32
10	13.91	13.12	12.03	11.00	10	6	25	20	25	32
12.5	17.39	16.40	15.03	13.75	10	6	32	19	32	63
15	20.87	19.68	18.04	16.50	16	10	40	18	40	63
20	27.82	26.24	24.06	21.99	25	10	50	18	50	63
25	34.78	32.80	30.07	27.49	35	16	63	16	63	63
30	41.73	39.36	36.08	32.99	50	25	80	14	MCCB	100
40	55.65	52.48	48.11	43.99	70	35	100	13	MCCB	100
50	69.56	65.61	60.14	54.98	95	50	125	-	MCCB	125

### Useful Formulas For Power Capacitor

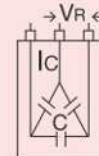
(a) For Single Phase



$$I_C = \frac{1000 \text{ KVAR}}{V_R}$$

$$C = \frac{\text{KVAR} \cdot 10^9}{2\pi f V_R^2}$$

(b) For Three Phase



$$I_C = \frac{1000 \cdot \text{KVAR}}{\sqrt{3} V_R}$$

$$C = \frac{\text{KVAR} \cdot 10^9}{4 \cdot \pi \cdot f \cdot V_R^2}$$

IC = Capacitor Current  
 C = Capacitance in MFD  
 VR = Rated Voltage

**Note:** The Protection of Capacitors should be provided by delayed action fuses which must be capable of carrying about 1.8 times the rated capacitor current. The above figures are an approximate guide only and the current at which tinned copper fuse will blow will depend upon the type & construction of fuse holder in which the wire is used. Therefore fuse selection is left to the discretion of the users. These specification or references are only given for information upto our best knowledge, but without any guarantee as regards to either mistakes or omissions.

**Table 1: Capacitor Rating in KVAR to improve PF of Motors to about 0.99:**

Motor Rating in HP	Motor Rating in KW	Capacitor rating in KVAR for improving PF to about 0.99 or better when motor speed (Rev/Min) is:			
		3000	1500	1000	750
3	2.25	1	2	2	2.5
5	3.75	2	3	3	3.5
7.5	5.5	3	4	4	5
10	7.5	4	5	5	6
15	11	5	7	7.5	9
20	15	6.5	8	9	10
25	18.5	8	10	11	12.5
30	22	10	12.5	14	15
40	30	14	15	18	20
50	37	15	20	20	23
60	45	20	25	25	25
75	55	23	30	30	35
100	75	35	40	40	45
120	90	40	45	45	50
150	110	45	60	60	70
180	132	50	70	70	80
215	160	60	75	80	100
270	200	75	100	100	125
335	250	90	125	130	150
425	315	110	150	160	200

**Distribution of capacitors has the following advantages**

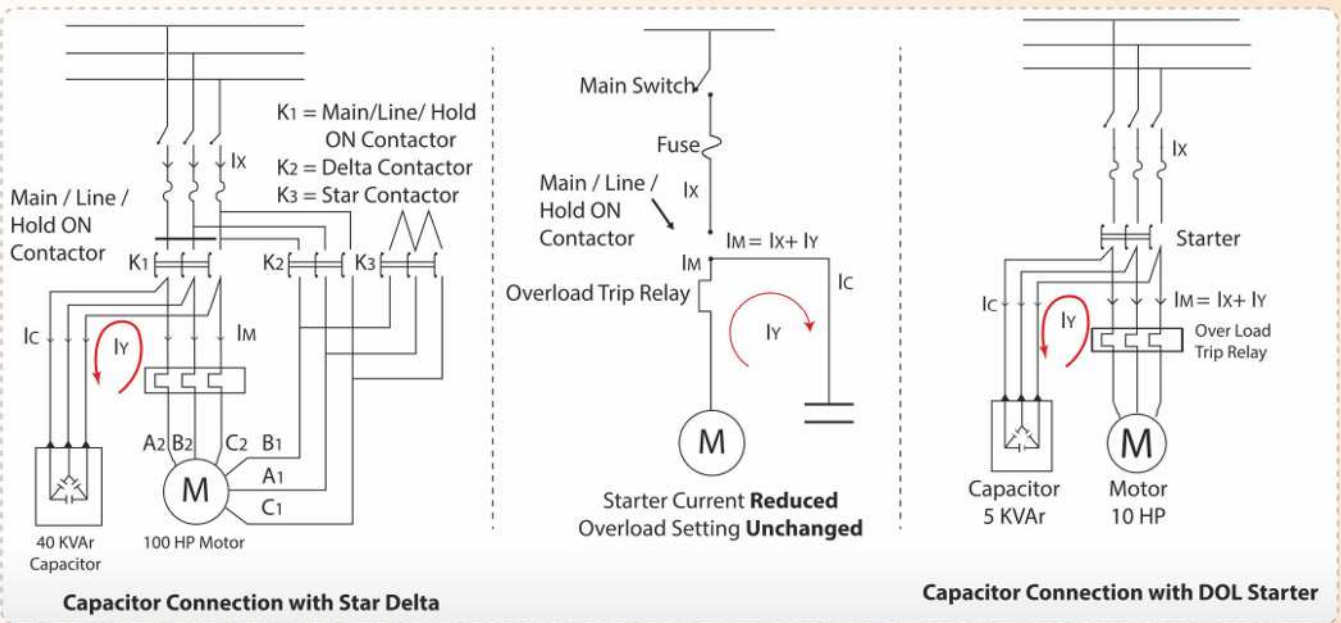
1. Distribution of capacitors results in a self-automatic system as capacitor is energized only when motor is running. i.e. it eliminates human importance in maintaining P.F.
2. Since capacitors are connected in parallel to the motor, the magnetizing current of the motor and capacitive current make a localized circuit, hence there is substantial reduction of current in the motor starter, fuses, cables and further switchgear.
3. Due to reduction in line current, sparking at the contacts of switchgear will reduce as Sparking  $\propto I^2$ . Hence life of switchgear increases.

**Note: Individual Connection Not for VFD Drives and Inching Loads were Start Stop is there in less than One Minute**

For Other Small Loads Which Cannot be Connected Directly as given Above

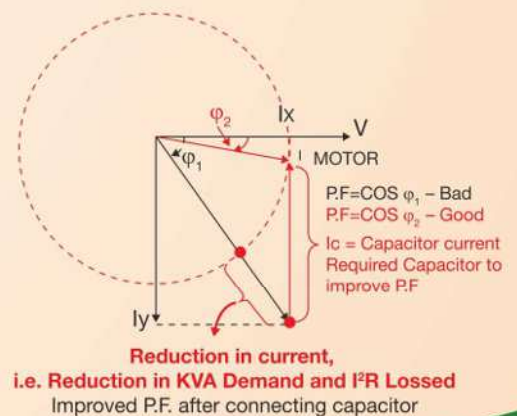
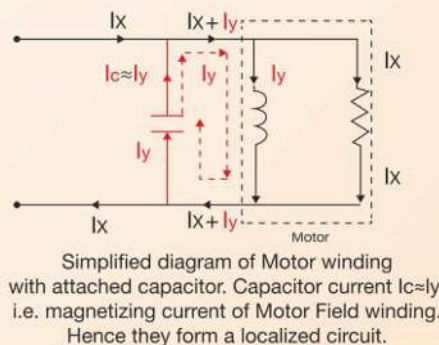
- Connect a Small APFC Panel Having Minimum Steps like 1KVAR, 2KVAR, 4KVAR, 7.5KVAR, 15KVAR, 25KVAR and 25KVAR So on.

The above information is given upto the best of our knowledge without any guarantee as regards to either mistake or omissions.



**Presume Voltage is in Direction of +x-axis**

- I<sub>x</sub>** Active Current in Phase with Voltage giving Output =  $I_x \times V = \text{Watts (KW)}$
- I<sub>y</sub>** Magnetizing Current (which Lags the Voltage by 90°) =  $(I_y \times V = \text{RKVA Lag})$
- I<sub>c</sub>** Capacitive Current (which Leads the Voltage by 90°) =  $(I_c \times V = \text{RKVA Lead})$
- I<sub>m</sub>** Motor Current =  $\sqrt{I_x^2 + I_y^2} = (I_m \times V = \text{KVA})$



## YOUR FATE IS IN YOUR HANDS !

I took care to take written meaningful guarantee and measured current periodically

**Financial gain**

I showed negligence in taking written meaningful guarantee and never measured current periodically

**Financial gain**

**NOW CHOICE IS YOURS  
IF YOU REALLY WANT TO BECOME THE HAPPIEST PERSON  
THEN KINDLY FOLLOW THE BELOW MESSAGES.**

Ask for a performance based meaningful guarantee:

“No reduction in output (or no fall in current) for 60 months. If any reduction is found capacitor should be replaced free of charge and the same guarantee should be given from the date of replacement or you can insist for a refund of your hard earned money.

Make a routine habit to measure capacitor current with the help of ammeter / tong tester every month and maintain records. If any reduction in current / failure of capacitors is noticed, please protest to the supplier / manufacturer immediately. This may help you to protect your investment in power capacitors.”

Power capacitor is a power saving device, hence it is very important for our nation's economy. If you adhere to the above messages, we are sure that you will make power capacitor manufacturer more responsible towards quality. By doing so you will be doing good deed for our nation.

Read

**Check the Name Plate of failed capacitor - May find Type as "SH-MPP", May Conclude As Not suitable for our voltage supply system and Ambient Temperature**

If you feel that we are providing Good Information, then please send the Name, Contact Number & Address of Electrical Consultants / Contractor / Panel Builder

Given for information upto our best of knowledge without any guarantee as regards either for mistake or omission



25 KVAR x 4 Nos. in Bank form