



# CEEAMA E-NEWS

Published by Consulting Electrical Engineers Association of Maharashtra

Now Available on CEEAMA Website: [www.ceeama.org](http://www.ceeama.org)

For Free Private Circulation only

Volume 3 Issue # 17

Electrical Consultants' Newsletter

August 2020

## *From Editor's Desk*

Dear Fellow CEEAMA Members,

Greetings of the 73rd Independence Day to all of you!

As we move towards the 75th anniversary of Independence, there is a new and revolutionary vision of "Be Local, Think Global" enforced by "Atmanirbhar Bharat".

This should bring the paradigm shift in the thinking, policy making, planning, and implementation of schemes to boost earlier emphasis of "Make in India".

It's really heartening to know that the FDIs have been at highest levels even in these trying times of Pandemic & lockdowns. This is like an "Opportunity in Crises" surely, this will boost the confidence of MSMEs as well as big industries to explore new possibilities.

While we all are shuffling through lockdown and Unlocking times, we look forward to resume face to face interactions. In the meantime, CEEAMA has conducted several Online Webinars which received good response enormously. A separate report on the same will help in better understanding.

As you are aware, the technical articles are a very important part of CEEAMA E-News and as always, we want to appeal to all members to send their articles and enhance the technical knowledge of fellow members.

Best wishes for the Ganesh Festival... Follow social distancing, stay safe and stay healthy..

**Warm Regards,**

Abhay Pimpalkhare  
Editor Committee

## *Article :*

### ***Economics of Optimizing KVAh consumption.***

*Mr. Narendra Duvedi - SAS Powertech P Ltd.(LFM-159)*

### ***NEW CEA GUIDELINES ON TYPE TEST VALIDITY***

*Ministry Of Power Central Electricity Authority*

## ***Economics of Optimizing kVAh consumption***

Real time true power factor has been in limelight in Maharashtra in recent times as kVAh billing is introduced here recently. Bihar, Chhattisgarh, Delhi, Uttar Pradesh, Himachal Pradesh have already implemented kVAh billing. Let us consider few techno commercial facts related to this which will be helpful in recommending the solutions or buying them as an end-user. One must also remember that reactive power compensation and harmonic mitigation are two sides of one coin and cannot be considered separately. Excess reactive power correction or simple capacitive correction may lead to resonance and result in increased level of harmonics if loads are nonlinear.

**Following are the options available for compensating reactive power and controlling harmonics:**

Sr No.	Type of correction	Suitability for Type of load
1	Fixed Capacitors	Normal Induction motors installed without VFDs running on fixed loads like fans / blowers / pumps – with over all less % of nonlinear loads in plant / premises.
2	Fixed detuned filters	Normal Induction motors installed without VFDs running on fixed loads like fans / blowers / pumps. Some MCCs with VFDs, where loads are fixed for most of the time.
3	Contactor based APFC	Loads with less variations in reactive power with respect to time and most of the load is linear. Total loads around 100 kVA with extremely low night loads.
4	Thyristor based Detuned RTPFC	Variable load patterns – Engineering Industries with press shops, injection molding etc. High bills with
5	Active harmonic filters	Useful when current harmonic distortion is on very high side and passive filtering is not enough.
6	Static VAR generators	Reactive power requirement is different in different phases and varies from Inductive to capacitive side frequently. Imbalance loads like two phase capacitive welding, Multi occupant medium size commercial buildings without central air-conditioning.
7	STATCOMS	Fast fluctuating heavy and cyclic loads like steel rolling, rubber mixing etc with cycle times in few seconds. Arc furnace load with multiple harmonics etc.
8	Hybrid solutions	Judicious combination of required solutions from above to optimize cost of solution and end results to suit required compliances.

**Following are some interesting facts about these solutions:**

- The investments involved in these options vary from Rs.800/kVAr to Rs.6000/kVAr.
- All these solutions may not be available under one roof and as such most of the vendors try to push whatever they have or whatever is most profitable for them.
- The reactive power requirement and harmonic distortion both exhibit phase cancellation effect and as such vary at various levels in plant distribution system

- Both also vary with respect to time in typical 24 hours load profile of any plant.
- For example, if current harmonic distortion is measured at input terminals of a 6 pulse VFD, the same may be in the range of 45 to 60%, but if 2/3 such VFDs along with 2/3 other normal inductive loads, resistive heaters are drawing power from a single bus – PCC/MCC etc, then some of the harmonics get cancelled in resultant current due to vector addition of harmonic currents drawn by different drives.
- PCC/MCC level harmonic distortion in such case may be as low as 15 to 20%.
- Similarly, lagging and leading currents also get vectorially added at immediate upstream bus and the power factor may improve on its own.
- Considerations related to power quality, power factor compliance at internal levels and at utility interface (Point of common coupling) if studied properly with time domain monitoring, best and cost optimized solutions can be arrived at. It may be justified to undertake electrical system simulation study using software tools to optimize these corrections.
- Each of above option has its own merits, limitations, and demerits as well. Every solution is expected to give designed performance and intended payback.
- It is also important that the system should perform at least 5 years post payback so that the investor gets monitory returns after payback. This requires technical support from vendor at least for 7 years in reasonable cost.

**Considering all above it is worth considering below points while arriving at a decision regarding selection and installation of reactive power compensation solution.**

- 1) Utility companies have not made it compulsory to keep kWh = kVAh. Maintaining this will help in reducing cost of energy and not in reducing noticeable energy consumption.
- 2) Investment decisions will depend upon importance of energy cost in total manufacturing cost. For example, for Cement Industry cost of energy is 45 to 50% of cost of manufacturing, whereas for a pharmaceutical Industry the same may be 3 to 5%.
- 3) kWh = kVAh in real time for entire billing cycle would require maintaining real time power factor at utility and would need installation of complex compensation systems.
- 4) Any PF correction Equipment has internal losses which contributes in increase in bill.
- 5) One should think about compensation only if it is economically viable and the paybacks are attractive after allowing for excess expenditure for losses in compensation system.
- 6) Losses in "ONLY CAPACITOR" based APFC panels are almost negligible but concentration of NONLINEAR loads do not allow use of only capacitors, as they cause resonance and increase in harmonic currents handled by upstream circuits.
- 7) Detuned RTPFC panels can improve power factor to reasonable values in real time if installed after proper study. Selective or Partial detuning can control harmonics also to some extent, without involving electronic correction.

- 8) Losses in RTPFC panels would be around 1 kW per 100 kVAr. In rupee terms for a month with 60% diversity and tariff of Rs. 9 per unit and 24 x 7 operation the same would be  $1 \text{ kW} \times 0.6 \times 24 \text{ hours} \times 26 \text{ Days per month} \times \text{Rs. } 9 = \text{Rs. } 3,370$  – So a 1000 kVAr panel with this duty would use energy worth Rs. 33,700 per month for its own functioning.
- 9) Such losses for any electronic correction are around 3 kW per 100 kVAr. So with same logic in rupee terms they would be Rs. 10,110 per month for 100 kVAr and Rs. 1,10,000 per month for 1000 kVAr. In addition to this electronic correction might need air conditioning and annual maintenance contracts after guarantee period.

## Conclusion

- Refer Jan 2020 bill and calculate difference between kVAh and kWh. For example, say this is 10,000. Assuming plant MD and consumption throughout the year is almost same as above, maximum monthly saving possible is  $10,000 \times \text{Rs. } 9$  (Conservative tariff assumed) = Rs. 90,000 or Rs. 10,08,000 say Rs. 10 Lacs per year.
- If management insists on 1 year payback, allowing for losses and load fluctuations possible conservative annual saving would be Rs. 6 to 7 lacs and this could be allowed budget for investment in new equipment for reactive power compensation. Effect of losses may be corrected after arriving at correct solution. Once the budgets are fixed, it would be a better idea to involve a third party Consultant / auditor for study, simulation and design of reactive power compensation so that all vendors can be made to quote for same BOQ and the Consultant /auditor can take ownership of the end result.

**By,**  
**Narendra Duvedi (LFM-159)**  
Power Quality Consultant  
Executive Director – SAS Powertech P Ltd.

## ***Report on Webinars conducted in July 2020***

<b>Sr No.</b>	<b>Date</b>	<b>Webinar Presenter</b>	<b>Total Attendees</b>
1	03-Jul-20	Samcon Industrial Controls Pvt. Ltd.	83
2	04-Jul-20	Greatwhite Global	142
3	10-Jul-20	DEIF India Pvt Ltd	127
4	11-Jul-20	Power Star Industries	108
5	17-Jul-20	Ravin Cables Ltd	317
6	18-Jul-20	Ravin Cables Ltd	317
7	24-Jul-20	Madhura Power Technologies Pvt Ltd	125
8	25-Jul-20	TSI Power Pvt Ltd	123

The response from presenters as well as attendees is quite encouraging. CEEAMA expresses it's gratitude to both. This month M/S Ravin cables Ltd conducted a training session divided into two parts on 17th and 18th July. Many thanks to them for this training session on basics of cables, their use and selection. These types of sessions will be very useful for budding consultants and young engineers. CEEAMA intends to conduct such webinars on many subjects and appeals product manufacturers to come forward and plan such sessions. Correct, clear and basic knowledge about your product if made available to users – will help in generating hassle free sale.

Look forward to mails from CEEAMA for more such informative webinars. CEEAMA also appeals E News readers to suggest more subjects of their interests.

### ***New Initiative by CEEAMA: Technical Training and Webinars***

We are in process of designing series of technical webinars which will help fresh engineers to acquire technical skills required to perform their duties efficiently. These Webinars may also help in refreshing knowledge of experienced engineers. CEEAMA will be charging bare minimum participation fees, to recover costs and to make participant understand as well to honour, the efforts put in by various stake holders.



# **CEA (Measures relating to Safety and Electric Supply) Regulations, 2010 (as Amended)**



## **CEA (Measures relating to Safety and Electric Supply) Regulations, 2010 (as Amended)**

**SH. R.K. MEENA**  
**Deputy Director, CEA**  
**&**  
**SH. MUKUL KUMAR**  
**Assistant Director, CEA**

**Please Click Here to Download full Presentation**

<https://drive.google.com/file/d/1kXLZcx0w1IDyaq83tY8Dwc2v76EX4XWn/view?usp=sharing>

## ***Appeal for Technical Articles***

Dear Fellow Members,

As you know, that sharing of technical knowledge and expertise is the backbone and fundamental objective of CEEAMA. One good way of achieving this is through technical articles. All of you have a rich experience in variety of fields of Electrical Industry. We sincerely appeal to all of you, to contribute to CEEAMA by sending technical articles to be published in our monthly E News.

A committee of a very Senior Members, does the scrutiny of these articles before being published, and the aim is to share pure technical knowledge without leaning towards any Manufactures.

We appeal to all members, to send their technical articles to us. Kindly send the articles to [admin@ceeama.org](mailto:admin@ceeama.org)

### **Editor Committee Details**

The Editor Committee consists of following members:-

Mr. Subhash Bahulekar  
Mr. Narendra Duvedi  
Mr. Abhay Pimpalkhare

The common email id to contact these members is [admin@ceeama.org](mailto:admin@ceeama.org)

Your views, suggestions and constructive criticism will help us to improve the value of CEEAMA E News, so keep writing and stay connected.