

**TANGEDCO & ROTARY CLUB OF COIMBATORE GALAXY  
SEMINAR ON ELECTRICAL SYSTEM SAFETY &  
ELECTRICAL ENERGY CONSERVATION**

**Energy Saving is possible in a normal system only,  
but not in a Defective system.**

**We have to first remove the defect and then only, we can  
achieve energy savings automatically.**

மனத்துக்கண் மாசு இலன் ஆதல் அனைத்து

அறன் ஆகுல நீர பிற.

மனசுலே மாசு இல்லாம நாம சுத்தமா இருந்தாலே  
ஒரு வகையிலே நாமும் அறம் செய்த மாதிரி தானே?

## Energy conservation = short cut to generate Power

- **Our beloved President Dr.Abdul Kalam says : -**
- The cost of generation of 1 MW power is Many Crores of Rupees and takes longer months and years to generate.

cost of 1 MW power conservation is only less than Rs. 1 Crore.

- If Conservation done in morning of the day, the same evening we are reaping the rewards of our conservation efforts.

# Energy Conservation



மின்சிக்கன ஊழியம் தேடறவனக்கு ஊதியம் தானாவே கிடைக்குமே !

நாம சேமிச்சா நம்ம சுத்துப்புறம் செழிக்கும்;

நம்ம நகரமும் மின்சிக்கன நகரமாக நாமும் பாடு படலாமே !

# Lighting & loads – power factors

| Load                | Type                | Power Factor |
|---------------------|---------------------|--------------|
| Lighting            | Incandescent lamp   | 1.00         |
|                     | Florescent lamp     | 0.50 - 0.60  |
|                     | Mercury vapour lamp | 0.50         |
|                     | Sodium vapour lamp  | 0.50 - 0.60  |
| Induction motor     | Unloaded-Full load  | 0.15 - 0.85  |
| Welding             | Resistance welding  | 0.60         |
|                     | Arc welding         | 0.50         |
|                     | Induction Furnace   | 0.60 - 0.80  |
| Electrical furnaces | Arc Furnace         | 0.70 - 0.80  |
|                     | Resistance Furnace  | 1.00         |

**It is better to use the Dome Reflector along with CFL  
Lighting Efficiency will improve**

**Make use of the Reflector to improve visual tasking  
and light is diffused not from dot source but 1 sq ft area source.**

- **In door / out door lighting  
Can give all round illumination  
when replacing the**
  - **Line Source**
  - **4 feet Florescent tube to**
  - **Point Source**
  - **Compact Florescent Lamp with  
Dome type Reflector.**



**In Electrical Loads, Motors are Heavy loads and Lighting is Soft load.**

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**Lighting needs Regulated & Reduced Steady voltages  
so as to achieve savings And Avoid this Waste,  
which harm the Environment too.**



THE TABLE BELOW COMPARES THE BEHAVIOUR OF  
**5 H.P MOTOR AT HIGHER THAN 400 VOLTS**

Study taken by Reputed Servo stabilizer Manufacturer  
**The savings are more visible in lower HP motors than  
the higher HP motors in the industry.**

| Input Voltage | Current  | KVA      | PF  |
|---------------|----------|----------|-----|
| 400           | 7.5 Amps | 5.2 Kva  | 0.8 |
| 425           | 8.3 Amps | 6.2 Kva  | 0.7 |
|               | 11% More | 18% More |     |

**Electrician with Pocket Multi meter in hand,  
will work more efficiently, conveniently & safely.**

**How many of us here, have this handy tool at work ?**



- In our daily usage of life we spend Rs.100 lavishly, sometimes.
- Why not we think of buying this digital multi meter and keep as a handy tool everywhere?
- This pocket multi meter will help us to check our EB mains, motor, pumps on & off volt drop, line drop



# **MEASURE VOLTS AT MOTOR TERMINALS FIRST !**

Effect of Voltage Unbalance  
on the performance of 5 HP motor :-  
is more detrimental to motor performance  
and motor life than voltage variation.

**Increased temperature rise is 40 \*C for unbalance of 5 %**

Hence Temperature rise Monitoring is necessary.

| <b>VOLT UNBALANCE</b>                       | <b>400 &amp; 402 VOLTS</b> | <b>400 &amp; 410 VOLTS</b> | <b>395 &amp; 405 VOLTS</b> |
|---|----------------------------|----------------------------|----------------------------|
| <b>Volt unbalance %</b>                     | <b>0.3</b>                 | <b>2.3</b>                 | <b>5.4</b>                 |
| <b>Unbalance in current in %</b>            | <b>0.4</b>                 | <b>17.7</b>                | <b>40</b>                  |
| <b>Increased temp *C Rise above ambient</b> | <b>0</b>                   | <b>30<br/>Hot at 60 *C</b> | <b>40<br/>Hot at 70*C</b>  |

# Improved Power Factor Correction on typical 50HP Motor gives significant results

| <b>50 HP motor<br/>Without Cap</b> | <b>50 HP motor<br/>( with Cap )</b> | <b>% Change in<br/>parameters</b> |
|------------------------------------|-------------------------------------|-----------------------------------|
| 37.3 KW                            | 36.2 KW                             | 3% Decrease                       |
| <b>28 KVAR</b>                     | <b>15.1KVAR</b>                     | 46% Decrease                      |
| <b>46.6 KVA</b>                    | <b>38.4 KVA</b>                     | 17% Decrease                      |
| 0.8 PF                             | 0.92 PF                             | 15% improvement                   |

## METER TO MEASURE KW, KVA, PF & KVAR

When the LT consumer spends more than

Rs.1 Lakh per month, let him measure what he

consumes at a cost of Rs.10,000 only.

**As Electrician please don't talk in Amperes**

**but in KW, KVA, PF etc, that's how we pay to EB.**

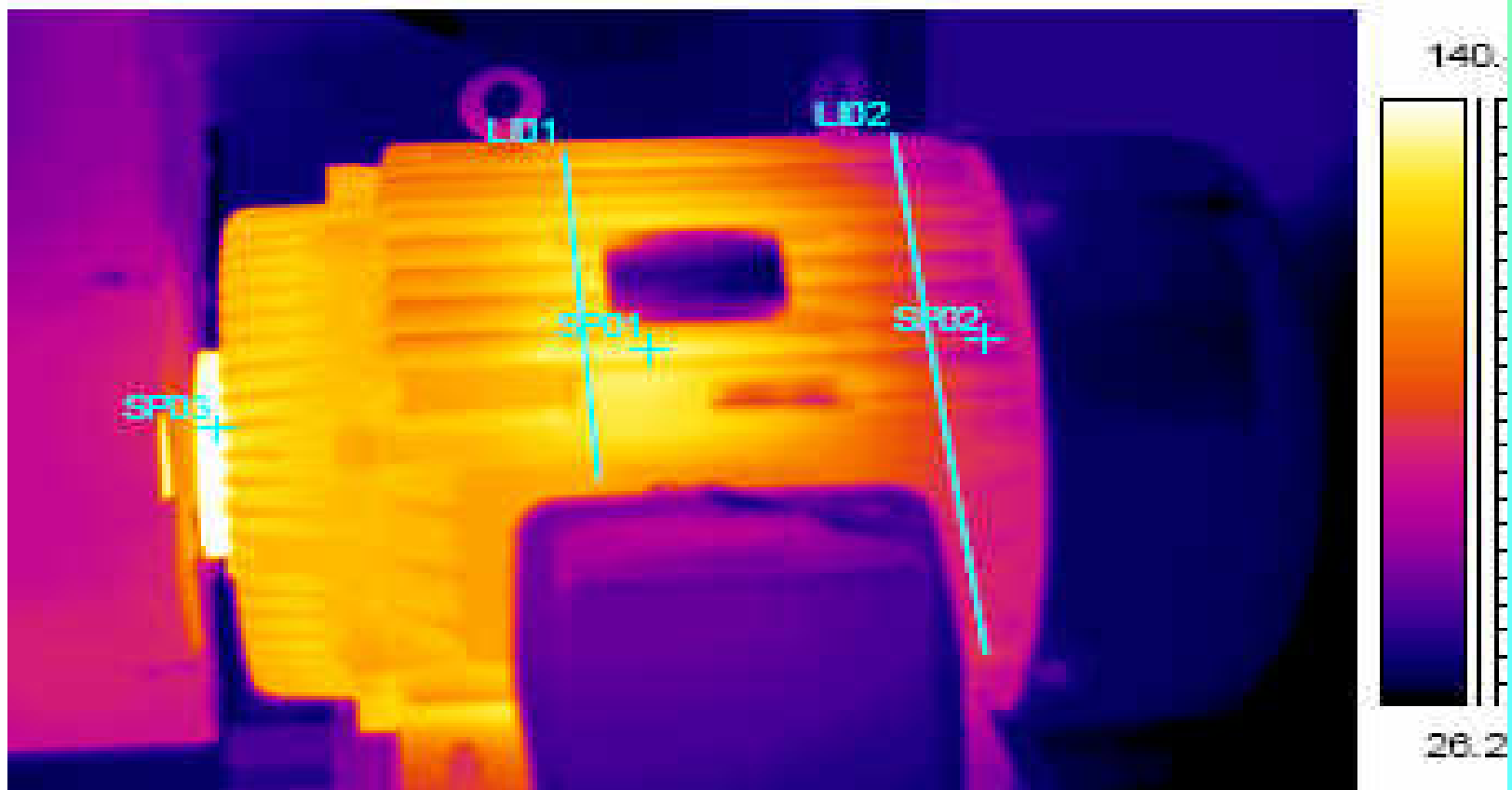
Power measurement of Active power (KW),  
Reactive power (KVAR), Apparent Power (KVA).  
Power Factor (PF) for 3f 4W, 3f 3W, 1f 2W, 1f 3W.  
Reads many parameters V, A, KW, KVA, PF, HZ, etc



**Running MOTOR SKIN TEMPERATURE  
can be less than 20 \*C above Ambient.**

**Symptoms for healthy Running –**

**Warm & not Hot motor, Temperature difference in Drive  
& Non drive, Left & Right, Top & Bottom' to be minimum**



**Thermal Gun costs Rs.4000 + now & Buy Today.**

**This can help the user to find hot spots  
in motor, bearings, contactor, panel, pump etc.  
This instant tool predicts the problems in electrical  
And mechanical maintenance very easily now.**



## Decade old Rewound motor silently kills industry profits

- Our industry motor 15 KW loading at 75 %, unit @ Rs. 4.50  
Existing - running cost per motor per year
- Rewound Motor 75 % efficient – Rs.6.0 Lacs – Rs.50K pm.  
Std. ordinary motor 83 % efficient – Rs.5.4 Lacs – Rs.45 Kpm.  
Energy Efficient motor 91 % efficient - Rs.4.8 Lacs – Rs.40 Kpm.
- Please look into our Existing Running motors working Efficiently & how much we gain / loss in motor running ?
  - Are we losing Rs.10,000/- per month per motor?

**Sustained & Regulated & Metered Energy intake  
makes the industry profitable in the long run.  
This happens to our human body and machine.**

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**நாட்டில் உண்டு களைத்தவனை விட**

**களைத்து உண்டவனே**

**நெடுநாள் ஆரோக்கியமாக**

**உயிர் வாழ்கிறான் !**

**நொறுங்க தின்னா நூறு வயசு, பல்லு**

**சொல்லோட நல்லா வாழலாம் !**

# Purchase cost to Running cost

When we buy motor cycle for Rs.50,000, monthly petrol cost & expenses run for 1000 km in a month = Rs.2000/-

When we buy 20 hp motor for Rs.50,000, our monthly motor power bill is Rs.40,000/ to Rs.50,000/- So measure Motor First

Life cost of a motor is often over 100 times the purchase cost

Every time a motor is rewound, its efficiency drops by 2%

Every 10°C drop in inlet air temperature will lead to a 2% saving in fuel costs



## MOTOR BELT TRANSMISSION

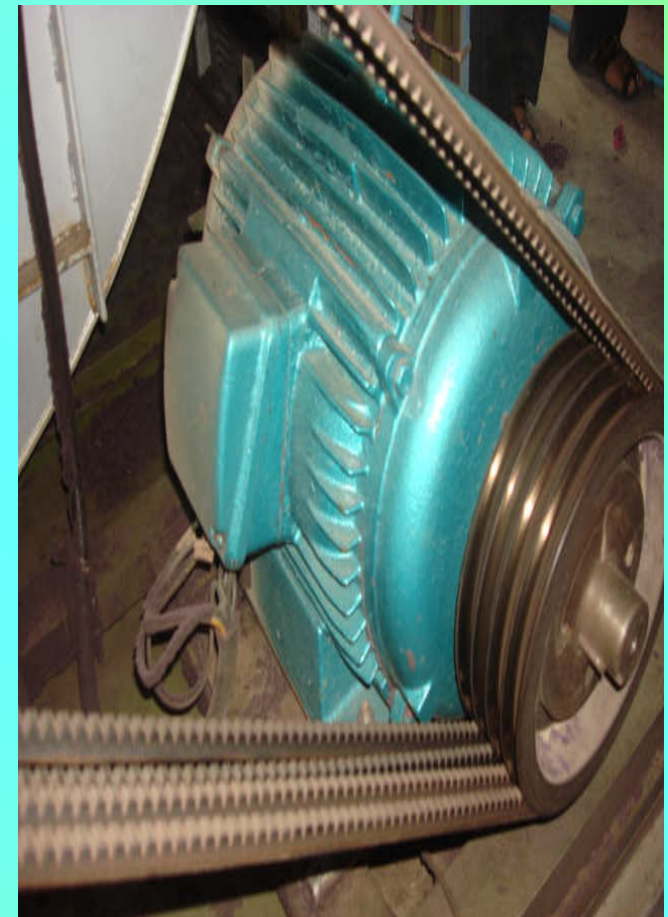
- **BEE TABLE** regarding Motor drive transmission belt losses.
- **Alignment** is one of the area where in the given motor KW can be fully utilized to drive load more, hence more productivity / not less power.

### **Motor drive transmission efficiency - Visible losses seen in Belt Losses from motor to load**

The efficiency of mechanical power transmission depends on grip between pulley and belt, further depends on  $\mu$  (Co-efficient of friction) and strength (Tensile) of the belt. In case of

*Table 3.4: Losses in V Belts*

| Sr. no. | Motor HP | Losses % |
|---------|----------|----------|
| 1       | 2        | 8-15     |
| 2       | 3        | 7-13     |
| 3       | 4        | 6-12     |
| 4       | 6        | 5.5-10   |
| 5       | 8        | 5-9      |
| 6       | 10       | 4.5-8.2  |
| 7       | 20       | 3.5-7    |
| 8       | 30       | 3.2-6    |
| 9       | 40       | 3-5.5    |
| 10      | 60       | 2.8-5    |
| 11      | 80       | 2.5-4.5  |
| 12      | 100      | 2.5-4.5  |



# **EARTHING TO BE WELL MAINTAINED TO PREVENT THE SURGES ATTACKING THE MACHINES**



**CONVENTIONAL  
EARTHING –  
PAINTING LOOKS OK**

**BUT EARTHING IS  
POORLY MAINTAINED**

**MAINTENANCE  
FREE EARTHING :**

**EARTHING IS GOOD  
IN THE LONG RUN**

**and well maintained.**



# Pumping system – savings

| <u>Parameters</u>              | <u>existing pump</u> | <u>new pump</u> |
|--------------------------------|----------------------|-----------------|
| • Motor rating hp              | 7.5                  | 5               |
| • Suction pipe mm              | 65                   | 75              |
| • Delivery pipe mm             | 50                   | 75              |
| • Piping material              | GI                   | White PVC       |
| • Foot valve                   | local                | ISI             |
| • Discharge LPS                | 3.68                 | 5.03            |
| • <b>Input power KW</b>        | <b>6.18</b>          | <b>4.35</b>     |
| <hr/>                          |                      |                 |
| • <b>Increase in discharge</b> | --                   | <b>36 %</b>     |
| • Input power reduction        | 30 %                 | --              |
| • <b>Saving in Energy</b>      | --                   | <b>48 %</b>     |

# **You can Save 1800 EB units every year after year after installing your Solar water heater**

- Let us be rational in using Electricity the high grade energy to be used in High grade application in industry & domestic and not for low grade applications like boiler, heat treatment, kettle etc pre-heating

- **ONE 100 LITER SOLAR WATER HEATER AT HOME OR INDUSTRY SAVES 150 UNITS/ MONTH.**

**SO SERVE NATION BY CONSERVING AT HOME.**

**வீட்டுலே உக்காந்துட்டு நாட்டுக்கு சேவை செய்யலாமே!**

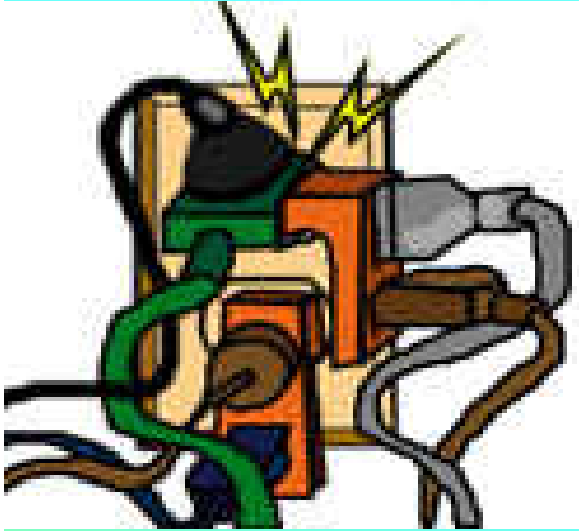
- Energy Auditing leads to Creative House keeping and this craving habit of energy recovery from all possible angles in premises will lead us to pollution-free environment apart from cost effective production.

**Apart from the old 2 STAR Air Conditioner,  
the old stabilizer consumes more power.  
CONVENTIONAL VS SLEEK STABILIZER ( 3 KVA)**

**Please go in for 5 STAR AC along with Sleek Stab.**

| <b>Type stabilizer</b> | <b>Losses for 3 kVA</b> | <b>working hrs/day</b> | <b>Kwh /Units pa</b> | <b>Saving in Rs.</b> |
|------------------------|-------------------------|------------------------|----------------------|----------------------|
| <b>Conventional</b>    | <b>264 watts</b>        | 12 hours               | <b>1156</b>          | 5,780/-              |
| <b>Sleek model</b>     | <b>96 watts</b>         | 12 hours               | <b>420</b>           | 2,100/-              |
|                        |                         | <b>Savings</b>         | <b>736</b>           | 3,680/-              |

# Remember when using electricity at home



**Never stick foreign objects or fingers in an outlet or socket or objects like pen cap or screw driver in a gadget, that's plugged in.**

- **Make sure to use proper extension cords.**

**Overloading can cause the insulation on the cord to overheat, melt & expose live wires.**

- **Live wires can spark and cause a fire.**



- **Make sure you are using an approved outdoor electrical extension cord.**

- **Have we ever changed the extension cord to our 10 year old Iron box !**

## Love to Conserve Energy to become Efficient

Do not conserve out of fear, or force or for publicity.

### Please Cultivate a Passion to ECON.

- அறன் செய விரும்பு - திறன் பெற விரும்பு
  - எல்லாருக்கும் தேவையான சக்தியை
  - நாம மிச்சப்படுத்தறது ஒரு வகையிலே
    - நாமும் அறம் செய்த மாதிரியே
    - விரும்பி நாம அறம் செய்யணும்
  - பயம் கொண்டோ, புண்ணியம் தேடவோ,  
விளம்பரத்துகாகவோ அறம் செய்ய வேண்டாம்

# Conserve Energy & Serve Nation

- Thanks for your kind attention Please !
- to our TANGEDCO & Rotary Club for the initiatives
- To spread Energy Awareness among Electricity consumers.
  
- **S.ASHOK, BEE certified Energy Auditor /**
- **Coimbatore / Please Call - 94437 20220**
  
- **Pls. visit site [www.energymeasuretosave.com](http://www.energymeasuretosave.com)**
  - for practical energy saving tips.
- **Sharing knowledge to SAVE OUR ENERGY!**
- **Conserving Energy is OUR Collective Responsibility,  
for a Better Tomorrow!**