RUN HOUR + KWH METER is a measure of ENERGY EFFICIENCY

- Of the available energy resources to the industry, Electricity is the only energy which is measured and paid with respect to time in hours like how fast and how much in values namely KVAH, KWH unlike petrol, Diesel, LPG etc. The machines run from no load to full load in a day; so the idea of the "hour + multi function energy meter" can provide to the user what are the no load KWH and loaded KWH of machine. This meter will be a tool to monitor machine health / efficiency during routine checks.

- When we are talking about the input electric power consumption in terms of KW, the same has to be multiplied by the actual running hours daily / weekly / monthly / yearly as KWH - the energy consumed by the machine over the period of time. So we need this run hour meter as mandatory to measure the cumulative energy now and also to know the machine output for the given averaged power input in Units / Hr for the given period of time.

NEED OF THE HOUR: – KW or KWH or KWH + HOUR METERING

- How do we know that we are using our equipments in production & utility efficiently? This simple hour meter retrofit and regular monitoring of the productive hours of the equipment can suggest us that we have used the equipment to the optimum loading levels daily, weekly or monthly etc.

- The brief idea is to retrofit the digital run hour meter costing Rs.300/- in the entire automatic domestic & industry automated equipment and uses this tool as a measure of energy efficiency. This applies to fridge, Air-conditioner, Geyser, water pump in the domestic segment; to pump, heater, fan, AC, compressor, batch process machines etc.

- Add a KWH meter along with the hour meter totally costing Rs.3000/- now we can analyze whether we are running our equipment uselessly as a liability or we are fully utilizing the equipment to its optimum efficiency? So, for steady Watt loads like tube light, fridge, storage water heater, room heater etc, we can think of simple retrofit of hour meter and for the varying KW loads we can plan to add the 3 phase 4 wire KWH meter with CT / direct connect type.

APPLICATION OF HOUR in KWH METER:-

- When the engine vendor ensures safety to his engine in the consumer premises by trending the engine run hours & no. start / stops or the load / unloads etc, we the consumer have to focus on the productivity of the machine per day & cumulatively. Now, a**re we making use of the Run-hour Meter readings in our daily equipment outputs in our production & utility?**

PLUS

Hour meter cost Rs.300/- **Digital KWH meter + 3 CT cost Rs.2500/-**

- This input KWH of the machine over a period can be used as an indicator of relative energy efficiency and can be compared to today & yesterday, this week and last week, this month and the prior month or the same month this year and that of last year or over a span of specified time how much variations in the timing over the years have changed.

- While running the domestic equipments or the industry equipments in the automatic mode, we have to measure the number of times the automatic cycle takes place in the process to know about the day to day process variations due to

the external ambient factors that indirectly affect the process. But after taking a trial, we will understand why is this retrofit has not been done before?

- But we will study the situations that warrant the same. Instead of seeing the macro changes in the monthly bill it is better to keep a close daily watch on the automatic running of the loading / unloading or the cut-in & cut out of machine motors in domestic, commercial and in the industry.

APPLICATION IN AIR- CONDITIONING SEGMENT:-

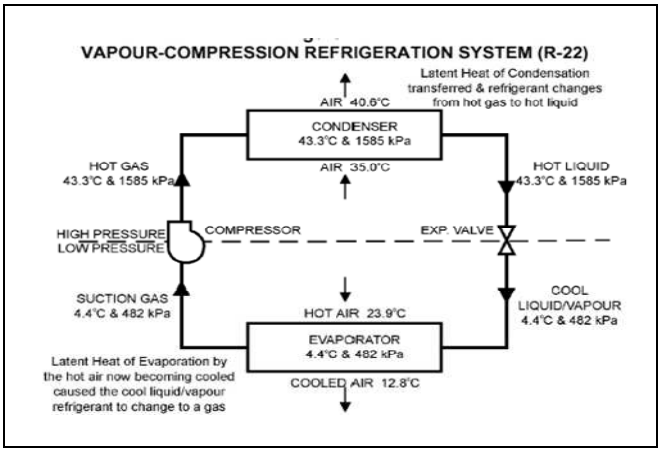
- This is not only with the domestic fridge but also with the room Air conditioner where the savings are more. BEE 1 star rated AC consumes 10 units a day for 8 hour working where as 5 star rated consume 7 units a day only. Hence in the building segment, the AC machine run hours has to be conserved without compromising the comforts practically and the relative measure of efficiency with reference to time is a useful and short cut tool.

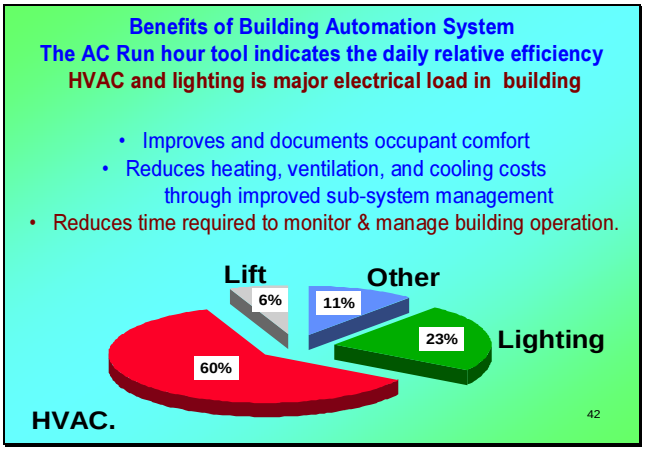
- **As part of Standards & Labeling program, BEE can include this run hour meter as part of 5 Star gadget as the Energy Efficiency Practices lies with the consumer only after initiatives from Govt. on 5 Star gadgets.**

- **The 5 star rating to the gadget like fridge / Geyser is given to the same not only for their cooling / heating efficiency but also for the cool / heat retention in the gadget. That implies that the insulation efficacy is also a factor to determine 5 Star rating. Hence the hour meter to fridge / Geyser is a must to study the actual running efficiency over years, compared to the rated efficiency of the 5 star gadgets.**

- The AC compressor has to run for many minutes before cutting out and later the people say that their split AC power bill has come down due to the following factors like the cleaning of the evaporator, condenser coils, putting the AC outdoor unit under the shade, checking and topping the refrigerant gas R 22 to 70 psi around from the low suction of less than 50 psi etc, reducing the thermostat settings from 22*C to 27*C, arresting the cool air leakages from the conditioned premises.

- **We are adapting to our temperature settings now from "Room AC set at high chill 22*C only" concept to "Room AC + fan set at mild cool 27*C". Here this setting change can be felt only by running hour monitoring.**



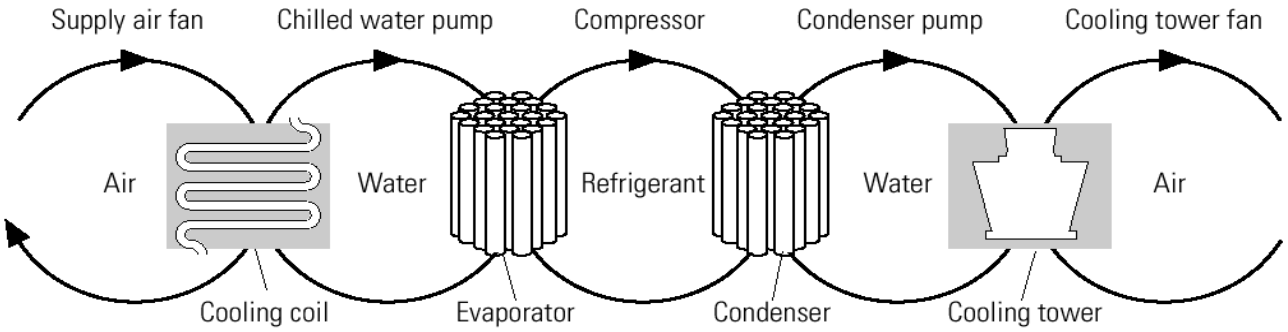


1. **Air-conditioning + sub systems input / output parameters over time period decide efficiency.**
2. **AC consumes 60 % building energy. Relative monitoring of sub system run hours is essential.**

- In the chilled water system, this HVAC motor running cost depends on the major load i.e. the Freon compressor running cost only. Here the Freon compressor run hours depend on the factors say from left to right: - conditioned area temperature, chilled water temperature, its pumping pressure & flow, refrigerant gas pressure & temperature, heat rejection rate in the air condensers / the cooling tower efficiency.

- All the above parameters mentioned within the cascaded loops of cool air circuit / chill water system / Freon gas compressor system / condenser or cooling tower system. Apart from the internal process parameters, the ambient temp and RH varying from season to season and location dependent etc. These auxiliary loop parameters can also monitored by the automation of AHU fans, chilled water temperature etc.

In Air-conditioning, efficiency of each of cascaded loop multiplies to reduce overall system efficiency.



- **Hence in the building segment, the AC machine run hours has to be reduced without compromising the comforts practically and the relative measure of efficiency with reference to time as hour meter monitoring of each sub system is a useful tool to identify energy inefficiencies.**

APPLICATION IN DOMESTIC FRIDGE, GEYSER, PUMP CIRCUITS:-

- Take the case study of BEE tabulations of the 1 star to 5 star rated fridges which show the huge variations from 1 unit to 3 units per day from 5 star rated to 1 star rated fridge like our decade-old fridge running for 24 x 7 mode. The KW load of the fridge compressor is constant and multiplied by the running hours as displayed in the meter gives the fridge KWH consumption daily / weekly / monthly and yearly.

- This run hour minute meter can be fitted across the heating element in the storage electric geyser and the run hour increases due to faulty corroded heating element, insulation is weak on the walls due to water droplets ingress, scaling on the walls inside, scaling on heat element, higher temperature say 70*C setting etc. after each of the correction done, the run hour meter shows the heater ON time per day less. This is applied to room heater in the colder region or season where in active spare change of element brings in instant savings in hours.

- The run hour meter can be fitted to the bore pump (to show the RUN hours) to overhead tank and the pump run time per day per session increases due to foot-valve choke, less water table, leakage in suction piping, corroded pump impeller, pump gland seal leaks, suction & discharge piping dia reduced due to deposits etc, throttled suction / discharge piping etc and after correcting the same, pump run hours gets reduced automatically.

APPLIED TO PRODUCTION & UTLITY IN INDUSTRY SEGMENT:-

- Already the MDC in market now, the Maximum Demand Controller is an application extension of a 3 phase 4 wire meters. The above meter is also similar to the MDC where in the KW or the KVA settings in the meter are used to control the maximum demand by the load. Here the same application can be used to set the KWH with respect to time and display the loaded / unloaded hours of the equipment.

- The domestic analogies very much work on par with the industrial applications on machine motors, pumps, AC compressors, very much to the air compressors, electric / fuel heat treatment furnaces, and all the processes where automatic functioning of the machine can be monitored by this run hour meter.

BEE – BE ENERGY EFFICIENT IN BUYING & IN USING EQUIPMENTS!

- The idea thrusted **by** the Govt. is that to"**BE ENERGY EFFICIENT IN ALL WALKS OF LIFE**" in using the domestic to commercial gadgets energy and as well in the industry. In Energy Management, buying Energy Efficient equipment is half only done. How efficiently we load and run the equipment is other but vital half of energy day to day management. **So BEE can also give thrust to monitoring the performance of the 5 Star rated equipment at the consumer end like retrofitting the run hour meter on the same and this makes both the ends meet in the National Mission of Enhanced Energy Efficiency.**

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