

A Rationalization Electrical Postpaid Device

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Abstract: This paper proposed a palm-size device reads the amount of electricity consumed and displays the cost by local currency. The consumer can monitor the amount of electrical energy consumed on daily basis (per second) even from outside his local area through the internet and other modern means of communication. Also consumer could detect the consumption of all rooms through another device reader engaged in electrician plug to give an instantly reading for the total amount consumed at home. The proposed device consists of two main parts, the first (Distribution panel) is settled at cutters, transformers and meter of the house. It act as transducer device that convert the reading of the energy consumed from analog into a digital form then moving this reading as a specific frequency instantly which moves as digital signs by the Program Line Carrier through the wire entering the feed loads consumed through the frequency modulations device. These signals will be received through a frequency receiver based on the readings of the amount of electricity entering the fund and then transfer it to the readings device for the consumer and then sent to the home of conductive wires. At that point the second device receives, read these waves and convert them to a digital reading.

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Introduction:

The electrical power is the main pillar to the social, scientific and industrial development. Furthermore, it is the base engine for progress and prosperity in various areas of life. It is one of the cleanest types of energy. In general, the rate of energy consumption in the Saudi Arabia Kingdom has increased largely, this increasing consumption led to a great concern with its industry to meet this accelerated growth of consumption. Accordingly, it is necessary to build more power plants. It is known that the establishment of such plants requires a significant investment; hence it became necessary to resort to the means of consumption rationalizing of electrical energy and improve the efficiency of its use [1]. National and international claims have risen towards the rationalization of electricity consumption. Among those claims is the call of His Excellency Prince "Abdul Aziz bin Salman" the minister of petroleum and mineral resources in the Kingdom of Saudi Arabia, for the governmental and private sectors to adopt electricity consumption rationalizing programs, and raise the efficiency of consumption [2].

Definition of rationalization:

Rationalization is the optimum utilization of the available electrical energy which is necessary for the operation of the institution without compromising the comfort of users, their productivity and compromising the efficiency of appliances and equipment, or it is electricity production for the users. It means the effective

participation for the continuity of electrical service needed efficiently by reducing the excess loads in the power stations and networks.

Rationalization objectives:

The main objectives of rationalization include the reducing the value of consumption bills and eliminating of extravagance. The active participation with carrier and distribution companies to realize the continuity of electrical service requires efficiently in reducing the excess loads of electricity stations and networks, which gather a great benefit for the inhabitant and nation [3].

However, several studies indicated that the consumers have poor culture to adjust the amounts of electrical energy consumption, whether at homes or in facilities, and at the inhabitant, national and global level [4]. At present the electrical networks are experiencing one of the biggest shifts throughout their long history. There is an interest in the studies of rationalizing the consumption, and the innovation and inventions of many of the so-called newly-smart networking technology that allows customers to control the consumption of electric energy each according to his needs. [5]. Researcher experience concerning invention of a biller device could be considered as one of the world leading devices and the first Arab device that support the rationalize control and adjust the electric power on basis of consumer needs. The suggested device works as a smart instrument to find out the amount of electricity consumption for a moment, hour and day. The device

allows the consumer to control the amount of energy consumed at any part of the house or the facility with near or remote control through means of communication technology. Here below is a detail of the proposed invention.

Background:

This invention is associated with the scope of the electricity consumption rationalization field by monitoring consumption per moment, providing the observer with the ability to decrease some electrical loads at certain hours, especially if the electricity price tariff is unfixed with time. In topmost consumption times of electricity, some electricity companies develop special price tariff which is a higher than the tariff of the consumption at other times (minimum load time). Thus the owner of the facility could decrease some electrical loads at these times to avoid paying high tariff or the fine of the peak time. Some companies, with the consumer agreement, can decrease the unnecessary loads of the facility throughout wireless signals sent by electrical system

operator to decrease the electric load grid of the company either in case of deficient generated capacity or to avoid running high-price electric generators; bearing in mind that these measures are in agreement with the consumer and are prepaid, which is called smart network that some states began to use after the introduction of renewable energy generation systems from the wind and the sun. A building consisting of six floors with the electrical equipment (lighting, conditioners (cooling, heating), computer, refrigerators, print and copy machines) where – according to the measurements-it was found that 30 % of the monthly consumption of electrical energy is consumed in air conditioners and 30% for the computers, and therefore switching off lines providing air conditioners at peak times will reduce about 30 % the load of the building at certain times through wire or wireless signal sent by the device used by the director or maintenance observer [6]. Tables 1 & 2 illustrate two models for estimating the household consumption of electric power [7].

Table (1): Estimating the household consumption of electric power (Model 1)

No	Electrical device	Sum	Electric power (Watt)	Daily operating hours	Daily consumption (kilowatt / hour)	Monthly consumption (kilowatt / hour)	Percentage (%)
1	Fluorescent lamp	5	40	8	1.6	48	20.4
2	Incandescent lamp	5	60	8	2.4	72	
3	Refrigerator	1	200	8	1.6	48	22.5
4	Deep freezer	1	350	8	2.8	84	
5	Color TV	1	400	8	3.2	96	21.2
6	Radio / Recorder	1	60	2	0.12	3.6	
7	Washing machine (no heating)	1	200	1	0.20	6	
8	Electric iron	1	1250	0.5	0.625	18.75	35.8
9	Electric Fan	4	100	10	4	120	
10	Air cooler	1	300	10	3	90	
Total					19.454	586.35	100

Table (2): Estimating the household consumption of electric power (Model 2)

No	Electrical device	Sum	Electric power (Watt)	Daily operating hours	Daily consumption (kilowatt / hour)	Monthly consumption (kilowatt / hour)	Percentage (%)
1	Fluorescent lamp	5	40	8	1.6	48	9.6
2	Incandescent lamp	5	60	8	2.4	72	
3	Refrigerator	1	200	8	1.6	48	10.6
4	Deep freezer	1	350	8	2.8	84	
5	Color TV	1	400	8	3.2	96	10
6	Radio / Recorder	1	60	2	0.12	3.6	
7	Washing machine (no heating)	1	200	1	0.20	6	
8	Electric iron	1	1250	0.5	0.625	18.75	26.47
9	Electric Fan	5	100	10	5	150	
10	Air cooler	1	300	10	6	180	
11	Water heater	1	3000	6	18	540	43.3
Total					41.454	1246.35	100

The usual electric meter box is unhelpful to show the precise proportion of electric current used during certain periods (daily, monthly.. more or less) and

requires complex and tiring calculations, especially when two or several people living in several apartments and share one electric meter (this is also

applied to the shopkeepers who share one electric meter). As well as, the ordinary meter box does not help in rationalizing, educating people or in the ongoing follow-up for the intensity of the current consumed, as there is no device to provide a service to display the amount of power consumed in the house through any electrical socket. The current invention is trying to overcome the inefficient previous techniques to cope with those problems through a device with two small parts and low-cost which calculates precisely the electric current consumed. Moreover, it has other additional services that help in spreading the social culture of electricity rationalization and showing the electric current consumed in each part in buildings - when needed- at exactly the moment. Consequently, it is clear that, there is an urgent, continuous need for a newly developed device to overcome the problems referred to. This has been done by the present invention which provides easy use, effectiveness and low cost structure and ongoing communication with the owner of the facility and gives respectable results. In this sense, the present invention satisfies this need fully.

General description of the invention:

The present invention is equivalent to the electric Smart meter (Advanced Meter Infrastructure AMI) Figure (4), it is a handy, small sized device that is able to calculate the electric current consumed precisely via accurate reading of the amount of electricity consumed through plugging it into any electric socket of an existing home then it divides of the ratio of the electric current consumed into grades, colors and issuing the necessary reports and also communicate via modern electronic devices with the owner of the commercial or residential establishments.

The invention consists of two complementary parts; where the first device (fixed control unit) puts electronic circuits on each electric cable going into (The distribution panel) then collects readings from them and converts the outcome of the electric capacity to vibrations and then separates the Voltage and an electrical circuits to send them in all electric cable going inside the house, and in this way we have deployed in every electric wire the reading of the total amount of electricity entering the house. The second device (the mobile display unit), which switches off the voltage coming from the power company from sending the readings on it, then reads these readings to measure the capacity to translate it into a visual presentation. So we must join this device in any electric socket inside the house or in any interior room to show us the total amount of energy consumed. The indicator increases and decreases when you turn on or off any bulb or an electrical device inside the house, which helps to educate people the culture of

economizing and rationalizing electricity. The display is either in the form of arrows indicator, electronic numbers or typographical papers or any other way to meet the required purpose to know, If we say that the school is made up of thirty classes, the director of the school can -from his office- monitor the amount of current consumed (at the same moment) in each classroom through a small device put in any electric socket near him. As well as, the general director of education, in the region may also pursue the amount of power consumed in any school belonging to his area, and through access to the Internet, with this electric machine, which provides them the school full details and at the same moment, and the same is true and applies to the general manager of the company as well as the owner of the house and through any means of modern technology, either messages, reports or the current meter reading, and print the report daily or monthly or annual in digital numbers or chart or any view to be carried out. This invention is characterized by the availability of further rationalization advantages that could be developed. On this basis, elements of protection are built which is distinct from previous techniques in these multi-function combinations. It is the objectives of the present invention to provide a quick calculation based on the electrical current and help effectively on rationalization culture education and economic rationalization. It is a newly developed device and contains all qualified features of electrical appliances which calculates the amount of electric current and avoid all their disadvantages. The significance of this invention as a newly-developed device is that it can be manufactured and marketed easily and effectively, as it has a solid reliable structure. It has low cost of manufacturing; few in terms of labor and raw materials making them available at affordable prices and accessible to the hands of consumers, as well as it service to rationalize the power on at the national level.

Brief description of the Figures:

The clear and evident advantages of the invention will be clarified through the detailed description which will be mentioned here below, and which represents to the illustrations that represent Figures as follows:

Figure 1: represents the general shape of the first device for the “the device that converts the normal reading into a digital reading” the transducers electric rationalization postpaid device-“CPU firmware” - the subject of the present invention.

Figure 2: outlines the second portable device which could be describes as the “energy consumed reader” for electric rationalization postpaid device (the mobile display unit) the subject of the present invention.

Figure 3:display the first device with illustrations of the detailed parts.

Figure 4:show the second device with illustrations of the detailed parts.

Figure 5:demonstrate the two devices with more detailed technical demonstration.

Detailed description

Figure(1)displays the overall view to the first part of a rationalization electric postpaid device "theme of the invention " and it is clear that its actual size is approximately hand size to rework the method of calculating the voltage consumed and know the readings for each electric Cable inside the distribution panel and then collecting them all then extract all of the output of the capacity to convert into different readings then distributed and sent them in all electric cable going inside thehouse.

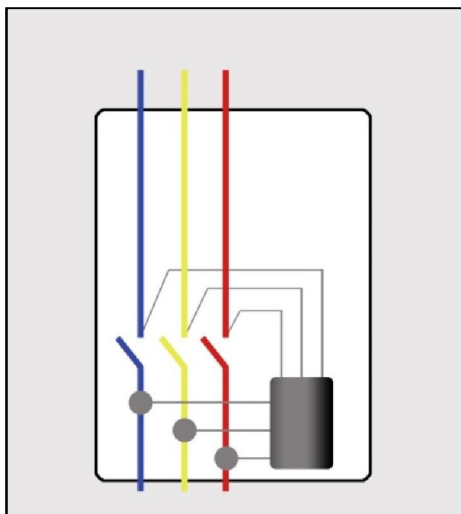


Figure 1: Conversion device regular reading to digital (Transducers)

Figure (2) demonstrate the overall view of the second part of the electric rationalization postpaid device "theme of the invention" and its actual size is small due to the availability of determining the kind of the information required to be displayed. It could be plugged into any electric socket which induces electricity into the device through the filter which is able to separate the voltage coming from the power company readings sent in lines. Then receives these readings and translates them into a visual display (either arrow indicator or electronic digital numbers across the small electronic screen) and displays the date and value of the daily consumption value of electricity in the local currency, and print the report

required either in specific numbers or Graph with prior identification to the duration of the required enquiry(for example, requestingthe cost and consumption ratio during certain week, or month, or any period) and the small headset to gives certain sounds and tones that vary according to the proportion of the amount consumed, and the device offers full service to send any necessary data or information to web sites or any other modern technical devices. So, it provides assistance to spread the electrical consumption rationalization culture in scientific practical way with an emphasis on friendly user feature to be usedby all groups and cultural levels in the society, and even those with special needs e.g. the blind. Form Figure (2), we can find that the device could be manufacturedin differentversions according to the features it hasor the services and data it provides. Where we can manufacture another class that only afford the counter (amps) to you, also in the process of electric rationalization to clarify the proportion of the electric current consumed now and the purpose is to reduce asmuch as possible of the cost of production without reducing the service intended to work out. This is forthe convenience and for savings up to the beneficiary user.

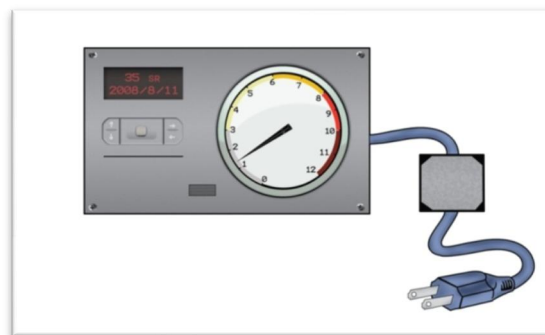


Figure 2: Consumed energy reader - mobile display unit

Figure 3 is the view for " the first device " with its parts in detail , number (1) is the electricity cable coming from the power company and number (2)refer to the electronic circuit (CT), which reads the energy entering through the cable and then connect the information to the device(3) which collects these readings, then collects the total of the capacity then transfer them into to readings bearable to be carried through electric power lines and then distributed them to three points (4) to send these readings to each cable inside the house.

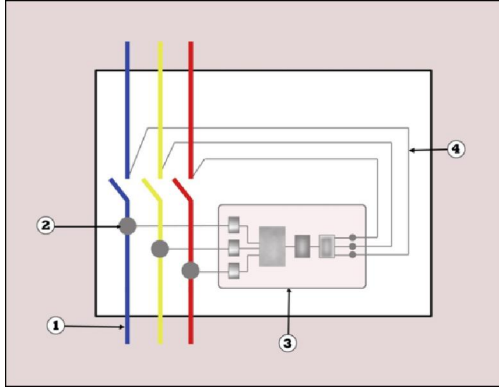


Figure 3: The first device with detailed parts

Figure (4) represents the "second device" where (1) refer to the electric plug, (2) the filter that switches off the voltage and readings sent. It prevents the entry of the voltage coming from the power company and allows the readings to go to the device. The digits (3) is the sagittal indicator, (4) to give the current reading of the electric consumption of the entire house and that across the graded-color-board according to the amount of energy used, (5) refers to the buzzer giving tones and different sounds according to the amount of consumption. It is considered a phonetic alert, while (6) refer to the electronic screen showing today's date, the depreciation in the local currency, the display of information and data. It could be adjusted and can be programmed. It could be an alternative to the sagittal indicator to view the amount of consumption in electronic digits. The digit (7) refers to the panel to enter and adjust the data, and (8) is a paper exit for printed reports or required information.

The "second device" can be produced in several categories where it can be produced without the additional services and only displays the reading on the sagittal Amp.

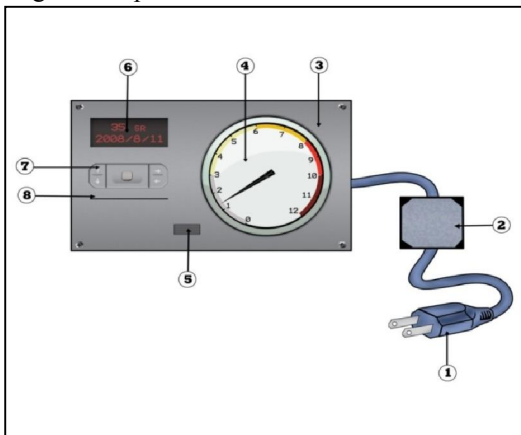


Figure 4: The second device with detailed parts

Figure (5) is a view of the "the two devices together," and is to clarify more of the technical process of the invention, the digit (1) point to the first part of the invention, a control fixed unit (Fixed Computational Unit), and (2) is the second part, a display mobile unit (Movable Display Unit). The operation process of the two parts: is that the current transformers (10) and plug wire transfer the current and voltage readings to the input module (2), which in turn passed them on to the logical programmable console "PLC" (3) where all the calculations are done and then the data is sent to the output unit (4) and then to the filter to send the data across the electrical power wire (5), which sends readings across the lines of electrical power emerging from the main distribution panel (6) for the distribution to the power jacks (Chips) in rooms (7), then the mobile display unit (8) receive the data through the data receiver filter by the receiving data filter (9), which allows the passage of data carrier wave, without the passage of the electrical power wave of frequency 60 Hz. Then display the data on a degraded board and of the digital display unit. Because data has been sent on all phases of electrical power lines, it can be received from any (electric socket) connector in the main distribution unit.

Elements of protection

1 - a rationalization electric postpaid consists of two parts (fixed CPU and the display mobile unit) complementary to the work of each other, unity of treatment move the read current and voltage to gather calculations and converted to data and sent over the lines of electrical power emerging from the distribution board Chairperson for distribution to sockets electricity in the rooms and the display unit to receive electrical power carrier wave of the data and then work on her nomination to allow the passage of wave carrier data without electrical power.

2 - A rationalization according to the protection element (1), the display unit displays the data on a standard runway and on the digital display unit and the statement of the cost in local currency.

3 - A rationalization according to the protection element (1) met with various programmed data, according to the information required to be extracted.

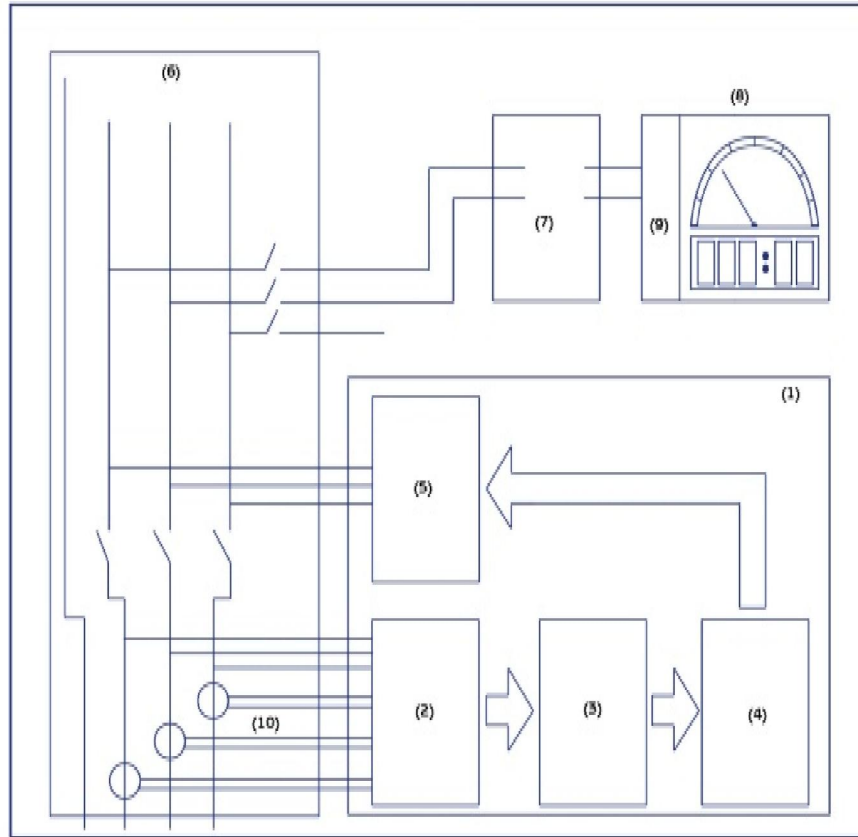


Figure 5: A technical demonstration devices draw in more detailed

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