ENERGY SYSTEM AUDIT MEASUREMENT AT RS BHAYANGKARA H. S. SAMSOERI MERTOJOSO SURABAYA

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ABSTRACT

Bhayangkara H.S. Samsoeri Mertojoso Surabaya Hospital is a public service agency (BLU) engaged in public health services and a member of the governmental police. The hospital certainly has electricity. This power source must be controlled honestly and as much as possible. This is used to get stable and maximum electrical energy. For this reason, weekly checks and measurements are required. In addition to inspection, of course it is necessary to clean every nook and cranny of electrical equipment such as wires. According to the researchers' observations, this time the power supply occurred at this hospital was noisy or unstable. This is proven to be because the filler material used is still suboptimal, which causes discomfort for the nurse and, of course, the patient. With this in mind, of course, we need a voltage and current that maintains maximum power.

Keywords: *Motorist, Driver, Max Power*

1. INTRODUCTION

Bhayangkara H.S. Samsoeri Mertojoso Surabaya Hospital is a public service agency (BLU) engaged in public health services and national police members in the eastern region and has a B grade and has a PARIPURNA predicate in hospital service and feasibility. In addition, Bayangkara H.S. Samsoeri Mertojoso Surabaya Hospital is a university hospital, a place or place to learn for young doctors (KOAS) in the medical world, and this hospital also has an advantage that other hospitals do not have. specifically DVI (Disaster Victim Identification) where DVI is a part that participates in the field of Visum and Repertum when there is a natural disaster man-made or earth, as the Visum Division is essential to Discover the identity of the victim. Judging from the above activities, electrical energy is very important in daily life. With the increasing number of patients and technological advancement in the hospitals year by year, and also due to the increasing demand of electricity users. The need for stable and uniform power distribution becomes very important. Since then, this research has been carried out in order to obtain the maximum and satisfying power.

2. RESEARCH METHODS

Energy audit is a process that includes a series of activities to assess energy use in buildings (companies) and identify opportunities that can be taken to reduce energy consumption. The test results are then presented in the form of a report which may also contain certain recommendations for improvement if necessary to assist in the achievement of the expected objectives so that the system can function properly and be able to function properly. Good use time.

A. Cubicle

electrical device or device having the function of controlling, connecting and protecting as well as dividing electrical energy from electrical sources, Cell generally consisting of switching equipment and its combination with control equipment , measure, protect and adjust. Medium voltage cells are electrical equipment or devices that can act as an electrical energy divider, controller, connector and protector. A Cubicle consists of three main parts, namely entrance, counting and exit, each with its own function.

The main function of the cell is to control, protect and distribute electricity. The specific functions of the cabin are as follows

• Circuit control is performed by the main switch.

• Protection of circuits carrying fuses, isolators (PMS) and circuit breakers (PMT).
• Circuits are divided by service/group (busbar) division.
• Measurement of electrical quantities (voltage, current, power, frequency, etc.)

B. LVMDP, MDP and SDP

1. LVMDP
The low voltage distribution main switchboard is an electrical cabinet that operates at low voltage and functions as a main power divider for the distributed power plant.

2. MDP
The main distribution board is a kind of electrical panel with the function of dividing and receiving power from LVMDP. Then give power to the next panel.

3.SDP
The distribution sub panel is an electrical panel that uses a molded case circuit breaker (MCCB) to distribute power from an LVMDP or MDP board.

C. Generator parameters
a device that generates electrical energy. Called generator with the meaning is a combination of two different devices, engine and generator, also known as alternator.

3. RESULT AND DISCUSSION

Bhayangkara Hospital has a power supply capacity of 690 kVa, which is divided and distributed to all parts of the hospital according to capacity. In Bhayangkara Hospital, there are 4 buildings including emergency building, general clinic building, management building and inpatient treatment building. In this discussion, the researchers will take measurements in the emergency room building and the polyclinic building.

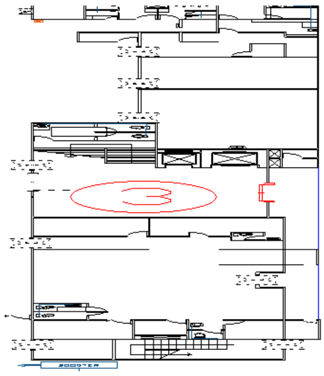

Figure 1. IGD Building Plan.

Based on the above discussion/explanation, the condition of Rs Bhayangkara can be described in terms of measurements at each angle. And this is the result measured at the emergency room building of Bhayangkara hospital, Surabaya city. Here are the results:

Figure 2 Digital Ammeter or Emergency Room Building Current Value.

Figure 2 shows the load generated on the digital power meter in the emergency room building

R = 89.73A

S = 86.66A

T = 76.32A

From the results displayed on the digital power meter, a load unbalance is generated because it has a load difference of ± 10 A - 13 A.

Figure 3 Digital power meters measure the power factor and frequency scales of an emergency room building.

Figure 3 shows the current delivered in the emergency room building listed on a digital meter with a power factor of 0.973 pf and a frequency of 50 Hz, with power factor and frequency conditions the following are in good condition and operable or distributed to support in-service operations.

Figure 4 Electricity meter measuring kW, kV ar and kVa of the IGD . building

Figure 4 shows that the digital wattmeter measures active current power in kW (Kilo Volt) of 56.83KW and gives an average reactive power in kV ar (Kilo Volt Reactive Amps) of 13, 65 KV ar, then give total apparent power in kVa (Kilo Volt Ampere) of 58.45 kVa.

Figure 5 Emergency room building digital power meter measures active capacity.

Figure 5 shows a digital power meter measuring 197 kWh operating power in kWh in the kWh scale.

Figure 6 Line voltage of digital power meter (L – L) between R S T or L1 L2 and L3.

Figure 6 shows a digital power meter in direct measurements between R S T with the following values:

R=404.4V
S = 402.5V
T=403.7V

Figure 7 Digital power meter showing THDv (Total Harmonic Distortion Voltage) value in emergency room building.

Figure 7 shows a digital power meter THDv as a percentage value between the fundamental quantities or in other words it is a quantification of the harmonic distortion of the distribution system, with values listed as after:

L1 or R = 2.9% Volt
L2 or S = 2.5% Volt
L3 or T = 3.0% Volt

In addition to taking measurements in the emergency room building, the researchers also took measurements in the general clinic building. because the clinic building is not far from the previous building. Figure 8 is a diagram of the general clinic building.

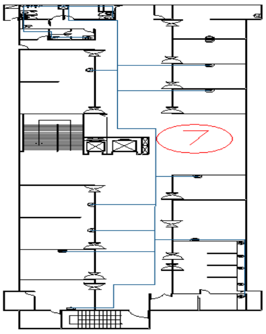

Figure 8 General clinic building diagram

Based on Figure 8, measurements were taken with a digital meter and here are the results of the polyclinic building:

Figure 9 The digital clock in the polyclinic building shows the power.

In the current General Clinic Building located on the RS and T lines or (L1, L2 and L3) there is a huge difference so there is an impact on the load imbalance and from this load imbalance also can cause impact if lost, there is cost loss.

Figure 10 Digital meter in polyclinic building showing voltage on RS and T or L1, L2 and L3 lines.

The digital meter for the polyclinic building indicates the normal voltage on the L1, L2 and L3 lines of the distribution system.

Figure 11 Digital meter in polyclinic building Displays voltage between lines.

On digital meter Displays voltage between normal and fine wires in distribution system.

Figure 12 Digital Meter Shows the dimensions of L1, including voltage, current and frequency.

At L1, it shows very good available distribution system, both voltage and frequency values, but the current is still low.

Figure 13 Digital meter showing the dimensions of L2, including voltage, current and frequency.

At L2, it shows that the available distribution is still good, but it differs from a very different current value than in L1.

Figure 14 Digital Meter Shows L3 Magnitude Including Voltage, Current and Frequency

Line L3 shows if the current value is higher than the current value between L1 and L2, but the distribution system voltage and frequency values are still good

Figure 15 The digital meter shows the individual phase sizes and commutation averages or so-called averages of the distribution system.

A digital meter shows an average or rectified average of 85 amps and a single phase voltage of 232 volts.

Figure 16 Digital meters display phase-to-phase or line-to-line magnitude. A digital meter reads 402 volts phase to phase

Figure 17. Documentation of the 800 kVa Generator Setting at Bhayangkara Hospital H.S. Samsoeri Mertojoso Surabaya

P-ISSN: 2528-0260 E-ISSN: 2579-5392
p.1263 - 1272

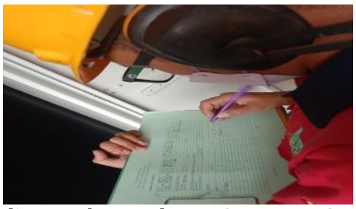

Figure 18. Recording on the Load Test Generator Setting Filling Form

Figure 19. Documentation on Deep Sea Genset

Shows that Single Phase has a normal voltage of 220 Volts, so the distribution system is very safe, it can be seen that the Deep Sea generators L1, L2 to L3 are in good condition.

Figure 20. Line or Line Voltage Document

It shows that the phase-to-phase voltage value of the distribution system is still good and normal voltage, so the power distribution is still orderly and good

Figure 21. Documenting Engine Speed Generator Settings

The generator's generator rotation is very good as it can stabilize at 1500 rpm (revolutions per minute).

Figure 22. Documentation of Generator Load at L1, L2 and L3

On the display of the Deep Sea Genset the fulfilled power capacity is:

L1 = 57%, L2 = 56% and L3 = 55% so that there is still quite a lot of empty space or capacity, because of the maximum space that is fulfilled, only 80 – 90% of the Genset's full capacity.

Figure 23. Generator load documentation on Generator Settings.

In the Deep Sea Generator display, the active power released is 7983.7 kWh (Kilo Watt Hour) and the apparent power released is 8095.2 kVAh (Kilo Volt Ampere Hour) and the Reactive Power issued is 1361.7 kVArh (Kilo Volt Ampere Reactive Hour).

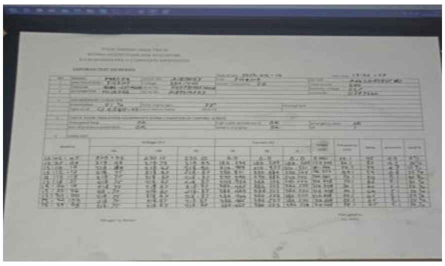

Figure 24. Recording Results during the Generator Setting Load Test Activity

- Genset Load Test Test activities can be completed in ±30 minutes from the initial activity of disconnecting power from the switchboard to completion of activity and execution.
- There is still plenty of free capacity that can be used for generator power distribution, so it can safely contribute to the building load under development, but to withstand this load, empty cabinets must be added to be used as distribution supplies. circuit breaker must be added.
- Single-line voltage value movement is stable at 220 volts and phase-to-phase is stable at 382 volts, so distribution is in good and safe condition.
- Generated power can cover up to 50% beyond the available capacity of 800 kVA.
- The installation of generators during work covers all the power distribution networks in the hospital.

4. CONCLUSION

From the results of direct measurements in the IGD building and in the researcher's clinic, we can conclude that:

1. When measuring current or current, there is a big difference due to the stated maximum ±10A-13A difference

2. The power factor listed on the digital wattmeter exceeds the allowable limit of PLN's specified maximum allowable value of 0.85pf by using tools related to the motor, causing a large power factor. , has suffered heavy losses.

3. The resulting frequency values are also very good. That is, 50Hz according to the normalization set in the distribution system.

4. The current line-to-line RST value shown is still normal, so the power distribution system is still safe to use.

5. The THDv (Total Harmonic Distortion Voltage) value is still below the maximum limit set by the 5% volt maximum limit on each RST line.

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P-ISSN: 2528-0260 E-ISSN: 2579-5392
p.1263 - 1272