

ABSTRAK

RANCANG BANGUN SISTEM *DATA LOGGER* LISTRIK TIGA FASA BERBASIS *WEBSITE* DAN *INTERNET OF THINGS* DI PT BUKIT ASAM TBK KERTAPATI PORT

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Lampiran)

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Pemantauan kelistrikan kontinu menjadi prasyarat *condition-based maintenance* pada peralatan industri, namun PT Bukit Asam Tbk Kertapati port bergantung pada satu unit Fluke 3-Phase Power Logger 1738 yang dipakai bergantian, sehingga pemantauan multititik terbatas. Penelitian ini bertujuan merancang dan membangun sistem *data logger* tiga fasa berbasis *Internet of Things* dan *website* sebagai pelengkap pemantauan kontinu murah. Sistem mengintegrasikan ESP32 yang membaca tiga modul PZEM-004T-100A dan mempublikasikan data via MQTT ke *website* dengan basis data MySQL/Prisma. Pengujian pada motor induksi 2,2 kW konfigurasi WYE selama 40 menit 22 detik menghasilkan 2.423 baris data pengukuran; komparasi terhadap Fluke 1738 pada sembilan parameter menunjukkan korelasi $r = 0,67-0,9999$, dengan MAPE 0,04-0,15% untuk tegangan dan frekuensi, serta 6-11% untuk parameter turunan akibat propagasi *error* pada kondisi faktor daya rendah (0,11-0,24). Sistem ini diposisikan sebagai instrumen pelengkap pemantauan kelistrikan multititik yang kontinu, alih-alih pengganti *power quality analyzer* kelas industri.

Kata Kunci: Data Logger, Internet of Things, MQTT, Website, Fluke 1738, ESP32

ABSTRACT

DESIGN AND IMPLEMENTATION OF A WEB-BASED THREE-PHASE ELECTRICAL DATA LOGGER SYSTEM USING INTERNET OF THINGS AT PT BUKIT ASAM TBK KERTAPATI PORT

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Continuous electrical monitoring underpins condition-based maintenance, yet PT Bukit Asam Tbk Kertapati Port depended on a single Fluke 3-Phase Power Logger 1738 rotated among measurement points. This study aimed to design and build a low-cost, continuous three-phase data logger system based on the Internet of Things and a website. The system integrated an ESP32 reading three PZEM-004T-100A modules and publishing data via MQTT to a website with a MySQL/Prisma database. Testing on a 2.2 kW WYE-connected induction motor over 40 minutes 22 seconds produced 2,423 rows of measurement data; comparison against the Fluke 1738 across nine parameters showed correlations of $r = 0.67$ - 0.9999 , with MAPE of 0.04 - 0.15% for voltage and frequency and 6 - 11% for derived parameters attributable to error propagation under the low power factor (0.11 - 0.24) recorded during testing. The system was positioned as a continuous multipoint monitoring complement rather than a substitute for industrial-grade power quality analyzers.

Keywords: *Data Logger, Internet of Things, MQTT, Website, Fluke 1738, ESP32*