DAFTAR PUSTAKA

[1] P. Pawar and P. Vittal K, "Design and Development of Advanced Smart Energy Management System Integrated with IoT Framework in Smart Grid Environment," *Jurnal Energy Storage*, vol. 25, pp. 1–12, 2019.

[2] M. Gopal, C. T. Prakash, N. V. Ramakrishna and B. P. Yadav, "IoT Based Solar Power Monitoring System," *Materials Science and Engineering*, 2020.

[3] B. Prayitno, A. Muhammad, R. I. Putra, E. Putra and P. Palupiningsih, "Rancang Bangun Sistem Monitoring dan Controlling Penggunaan Daya Peralatan Listrik Rumah Tangga Menggunakan IoT," *Jurnal Pengkajian dan Penerapan Teknik Informatika*, vol. 15, no. 1, pp. 57–62, 2022.

[4] E. Mufida, M. I. Adriansyah, N. M. Ihsan and R. S. Anwar, "Perancangan Alat Pendeteksi KWH Meter Berbasis Arduino Uno R3 dan ESP8266," *Jurnal Inovasi dan Sains Teknik Elektro*, vol. 2, no. 1, pp. 28–34, 2021.

[5] M. R. Alfidro, I. A. Rozaq and M. Iqbal, "Alat Monitoring Pemakaian Energi Listrik Menggunakan Web Cayenne," *Jurnal ELKON*, vol. 2, no. 2, pp. 1–17, 2022.

[6] N. Qodari, Y. Christyono and Sukiswo, "Perancangan Prototipe Realtime Akuisisi Data dan Kontrol Stop Kontak menggunakan ESP32 Berbasis Web," *TRANSIENT*, vol. 9, no. 3, pp. 2685–0206, 2020.

[7] I. A. Tarigan and A. A. Nasution, "Rancang Bangun Pengukuran dan Perhitungan Energi Listrik Menggunakan ACS712 Berbasis Arduino," *Jurnal SIMETRI REKAYASA*, vol. 03, no. 01, pp. 152–158, 2021.

[8] PLN, *Buku Statistik PT PLN (PERSERO)*, PT PLN. 2022. www.pln.co.id

[9] I. Chairunnisa and W. Wildian, "Rancang Bangun Alat Pemantau Biaya Pemakaian Energi Listrik Menggunakan Sensor PZEM-004T dan Aplikasi Blynk," *Jurnal Fisika Unand*, vol. 11, no. 2, pp. 249–255, 2022.

[10] K. Wicaksono and Amirullah, "Implementasi Sistem Monitoring Konsumsi Energi dan Penghematan Harga Listrik Rumah Tangga Menggunakan Arduino Uno dan LabVIEW," *Kukuh Wicksana, SNTEM*, vol. 1, pp. 828–840, 2021.

[11] S. Hidayaturrahman, Misbahuddin and A. Natsir, “Rancang Bangun KWH Meter Online Berbasis Website Menggunakan Protokol Komunikasi HTTP (Hypertext Transfer Protocol)”. *Jurnal*, 2017.

[12] Rasmi, I. A. Palalloi and H. Hamrul, “Aplikasi Perhitungan Tagihan Listrik Menggunakan Image Processing”, 2021.

[13] N. M. Yoeseph, M. A. Safi’Ie and F. A. Purnomo, “Smart Energy Meter Based on Arduino and Internet Of Things”, *Materials Science and Engineering*, 2019.

[14] S. O. Sanni, K. O. Olusuyi and I. Mahmud, “Design and Implementation of Home Appliance Energy Monitoring Device,” *International Journal of Electrical, Energy and Power System Engineering*, vol. 2, no. 2, pp. 1–6, 2019.

[15] V. Lumentut, S. B. Walukow, F. C. Lahinta, F. Doringin and M. Sendiang, “IoT based Customer KWH Meter Design,” *Int J Comput Appl*, vol. 184, no. 53, pp. 975–8887, 2023.

[16] R. A. G. Ramadhianti, C. G. I. Partha and G. A. P. R. Agung, “Rancang Bangun Monitoring Energi Listrik Menggunakan SMS Berbasis Mikrokontroler ATMega328,” *E-Journal SPEKTRUM*, vol. 5, no. 1, pp. 130–138, 2018.

[17] I. S. Hudan and T. Rijianto, “Rancang Bangun Sistem Monitoring Daya Listrik Pada Kamar Kos Berbasis Internet of Things (IoT),” *Jurnal*, vol. 8, no. 1, pp. 91–99, 2019.

[18] H. Ndikade, S. Salim and S. Abdussamad, “Studi Perbaikan Faktor Daya Pada Jaringan Listrik Konsumen di Kecamatan Katobu Kabupaten Muna,” *JJEEE, Jambura Journal Of Electrical and Electronics Engineering*, vol. 4, no. 1, pp. 52–59, 2022.

[19] D. P. Alfauzi, A. G. Permana and A. Novianti, “Rancang Bangun Alat Perbaikan Faktor Daya Listrik Satu Fasa Berbasis Mikrokontroller,” *e Proceeding of Applied Science*, vol. 5, no. 3, pp. 3082–3094, 2019.

[20] A. Ramelan, F. Adriyanto, B. A. C. Hermanu, M. H. Ibrahim, J. S. Saputro and O. Setiawan, “IoT Based Building Energy Monitoring and Controlling

System Using LoRa Modulation and MQTT Protocol," *IOP Conf Ser Mater Sci Eng*, vol. 1096, no. 1,2021

[21] M. R. N. Jayadi, I. M. Wartana and I. B. Sulistiawati, "Rancang Bangun Sistem Monitoring Energi Listrik dan Biaya Konsumsi Listrik Berbasis ATMega2560," in *Prosiding Fintek*, 2021.

[22] R. Risfendra, G. F. Ananda and A. Stephanus, "Internet of Things on Electrical Energy Monitoring Using Multi-Electrical Parameter Sensors," *Journal of Mechanical, Electrical and Industrial Engineering*, vol. 3, no. 1, pp. 1–10, 2021.

[23] M. N. Hidayat, F. Ronilaya and I. H. Eryk, "Design and Analysis of a Portable Web-Based Monitoring System for Electrical Parameters Measurement," *IOP Conf Ser Mater Sci Eng*, vol. 1073, no. 1, 2021.

[24] W. A. Suteja and A. S. Antara, "Analisis Sensor Arus Invasif ACS712 dan Sensor Arus Non Invasif SCT013 Berbasis Arduino," *Jurnal Ilmiah Teknik Elektro*, vol. 8, no. 1, pp. 13–21, 2021.

[25] T. Ratnasari and A. Senen, "Perancangan Prototipe Alat Ukur Listrik AC dan DC Berbasis Mikrokontroler Arduino dengan Sensor Arus ACS712 30 Ampere," *Jurnal Sutet*, vol. 7, no. 2, pp. 28–33, 2017.

[26] A. Al Rakib, M. Rahman, A. Rahman, S. Chakraborty, M. M. A. S. Shawon, and F. I. Abbas, "IoT based Controlling of Power Grid," *European Journal of Engineering and Technology Research*, vol. 6, no. 6, pp. 54–57, 2021.

[27] B. Winardi, A. Nugroho and Y. Alvin, "Monitoring and Automatic Cooling Systems in Realtime Photovoltaic Based on IoT," *Bulletin of Computer Science and Electrical Engineering*, vol. 3, no. 2, pp. 55–65, 2022.

[28] I. N. Perekalskiy and S. E. Kokin, "Development of a Smart Electricity Meter for Households Based on Existing Infrastructure," *IOP Conf Ser Earth Environ Sci*, vol. 510, no. 2, pp. 1–7, 2020.

[29] E. Kurniawan, D. S. Pangaudi and E. N. Widjatmoko, "Perancangan Sistem Monitoring Konsumsi Daya Listrik Berbasis Android," *CYCLOTRON : Jurnal Teknik Elektro*, vol. 5, no. 1, pp. 63–68, 2022.

[30] H. N. Isnianto, M. Arrofiq, R. Rahmawati and B. M. Tyoso, “Sistem Telemonitoring KWH Meter Menggunakan Modul Wi-Fi ESP8266 Berbasis Arduino Uno,” *Jurnal Rekayasa Elektrika*, vol. 15, no. 1, pp. 26–33, 2019.

[31] L. Prihasworo, D. W. Fittrin, U. Y. Oktiawati, H. N. Isnianto and Y. W. Setyono, “Rancang Bangun Smart DC Current and Voltage Monitoring Dengan ThingSpeak Pada Simulator PLN Laboratorium Teknik Tenaga Listrik UGM,” *Jurnal Listrik, Instrumentasi dan Elektronika Terapan*, vol. 1, no. 2, pp. 39–49, 2020.

[32] M. A. R. Chandra, T. H. Nufus and B. Santoso, “Sistem Monitoring dan Controlling Berbasis IoT pada Studi Kasus PLT Hybrid,” *Prosiding Seminar Nasional Teknik Mesin Politeknik Negeri Jakarta*, pp. 881–887, 2022.

[33] A. C. M. Utomo, T. Andromeda and B. Setiyono, “Pembuatan User Interface Pada PC dan Pembacaan Sensor Pada Purwarupa Data Logger,” *TRANSIENT*, vol. 8, no. 4, pp. 311–317, 2019.

[34] N. Ratnawati and Sunardi, “Load Characteristics with Current Detection Using an Arduino Based ACS712 Sensor,” *Buletin Ilmiah Sarjana Teknik Elektro*, vol. 2, no. 2, pp. 83–90, 2020.

[35] S. Hadi, A. S. Anas and L. G. R. Putra, “Rancang Bangun Sistem Monitoring Penggunaan Daya Listrik Berbasis Internet of Things,” *CIRCUIT : Jurnal Imiah Pendidikan Teknik Elektro*, vol. 6, no. 1, pp. 54–66, 2022.

[36] I. R. S. Siregar, B. Dwi Prabowo, N. R. Alham, A. Faidil and M. Jurdun, “Pengukuran Arus dan Tegangan pada Prototipe PLTMH Berbasis Arduino dan Multimeter,” *Jurnal Media Elektro*, vol. 9, no. 2, pp. 45–52, 2020.

[37] P. S. Macheso and D. Thotho, “ESP32 Based Electric Energy Consumption Meter,” *International Journal of Computer Communication and Informatics*, vol. 4, no. 1, pp. 23–35, 2022.

[38] Jumrianto, Wahyudi and A. Syakur, “Pengujian Sensitivitas Sensor Arus dan Sensor Tegangan pada Sistem Pengukuran Electrical Tracking Test,” *Journal of Systems, Information Technology, and Electronics Engineering*, vol. 1, no. 2, pp. 30–39, 2021.

[39] L. A. Kumar, V. Indragandhi, R. Selvamathi, V. Vijayakumar, L. Ravi and V. Subramaniyaswamy, “Design, power quality analysis, and implementation of smart energy meter using internet of things,” *Computers and Electrical Engineering*, vol. 93, pp. 1–15, 2021.

[40] A. Salisu, A. Bugaje and A. Z. Loko, “IoT Based Household Electricity Energy Monitoring and Control,” *FUDMA Journal of Sciences(FJS)*, vol. 4, no. 4, pp. 77–84, 2021.

LAMPIRAN

Lampiran 1. Tabel perbandingan nilai tegangan analog sensor arus dan *clamp* meter

No	Nilai Tegangan analog (mV)	*Clamp* Meter (A)
1	0,02	0,02
2	0,29	0,24
3	0,48	0,42
4	0,75	0,67
5	0,94	0,86
6	1,58	1,47
7	2,40	2,26
8	2,70	2,55
9	3,11	2,95
10	3,26	3,09
11	3,90	3,71
12	4,13	3,94
13	4,75	4,54
14	5,24	5,02
15	5,68	5,44
16	6,50	6,24
17	7,06	6,77
18	7,17	6,91
19	7,93	7,65
20	8,49	8,17
21	8,81	8,49
22	9,25	8,93

Lampiran 2. Tabel perbandingan nilai arus pada sensor dengan nilai arus pada *clamp* meter.

No	**Nilai Arus pada *Clamp* Meter (A)**	**Nilai Arus pada Sensor (A)**	***Error* (%)**
1	0,02	-0,03	0,00
2	0,24	0,23	3,79
3	0,42	0,41	1,44
4	0,67	0,67	0,62
5	0,86	0,86	0,14
6	1,47	1,48	0,55
7	2,26	2,27	0,54
8	2,55	2,56	0,50
9	2,95	2,96	0,35
10	3,09	3,11	0,49
11	3,71	3,73	0,41
12	3,94	3,95	0,21
13	4,54	4,55	0,20
14	5,02	5,02	0,08
15	5,44	5,45	0,18
16	6,24	6,24	0,07
17	6,77	6,79	0,24
18	6,91	6,89	0,23
19	7,65	7,63	0,25
20	8,17	8,17	0,03
21	8,49	8,48	0,09
22	8,93	8,91	0,23
Rata-Rata *Error*			0,51
Nilai Akurasi			99,49

Lampiran 3. Tabel perbandingan nilai ADC sensor dan multimeter

No	Nilai ADC Sensor	Multimeter (V)
1	552,27	40,22
2	560,43	50,72
3	571,97	60,75
4	583,00	70,55
5	591,63	80,87
6	602,77	90,70
7	612,90	100,81
8	622,00	110,18
9	632,67	120,81
10	642,73	130,69
11	653,20	140,93
12	662,23	149,90
13	673,53	160,65
14	684,10	170,88
15	693,97	180,47
16	704,27	190,56
17	714,60	201,21
18	723,30	210,43
19	735,00	221,36
20	744,83	230,46
21	755,23	240,78

Lampiran 4. Tabel perbandingan nilai tegangan pada sensor dengan nilai tegangan pada multimeter.

No	**Nilai Tegangan pada Multimeter (V)**	**Nilai Tegangan pada Sensor (V)**	***Error* (%)**
1	40,22	41,34	2,79
2	50,72	49,37	2,66
3	60,75	60,73	0,04
4	70,55	71,58	1,46
5	80,87	80,07	0,98
6	90,70	91,04	0,37
7	100,81	101,00	0,19
8	110,18	109,96	0,20
9	120,81	120,46	0,29
10	130,69	130,36	0,26
11	140,93	140,66	0,19
12	149,90	149,54	0,24
13	160,65	160,66	0,01
14	170,88	171,06	0,11
15	180,47	180,78	0,17
16	190,56	190,91	0,18
17	201,21	201,08	0,07
18	210,43	209,64	0,38
19	221,36	221,15	0,09
20	230,46	230,82	0,16
21	240,78	241,06	0,11
Rata-Rata *Error*			0,52
Nilai Akurasi			99,48

Lampiran 5. Tabel hasil pengambilan data hari pertama sistem *monitoring* daya listrik rumah tangga

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
1	12/09/2023 04:09:32	0,82	227,36	185,95	0,00	1,11
2	12/09/2023 04:09:48	0,75	226,77	170,60	0,00	1,60
3	12/09/2023 04:10:05	0,71	226,22	161,13	0,00	2,04
4	12/09/2023 04:10:21	0,77	226,52	174,05	0,00	2,54
5	12/09/2023 04:10:38	0,71	226,19	161,11	0,00	3,01
6	12/09/2023 04:10:54	0,06	227,91	13,77	0,00	3,44
7	12/09/2023 04:11:11	0,33	228,31	74,23	0,00	3,55
8	12/09/2023 04:11:27	0,28	228,07	63,88	0,00	3,74
9	12/09/2023 04:11:44	0,27	227,90	61,98	0,00	3,92
10	12/09/2023 04:12:00	0,23	227,00	51,67	0,00	4,08
11	12/09/2023 04:12:16	0,68	227,60	154,13	0,00	4,53
12	12/09/2023 04:12:33	0,59	227,70	135,09	0,00	4,93
13	12/09/2023 04:12:49	0,58	227,81	132,35	0,00	5,31
14	12/09/2023 04:13:06	0,52	227,58	119,36	0,00	5,66
15	12/09/2023 04:13:22	2,26	222,25	502,02	0,00	6,56
16	12/09/2023 04:13:39	2,22	222,50	494,53	0,01	7,95
17	12/09/2023 04:13:55	0,94	233,13	219,43	0,01	8,68
18	12/09/2023 04:14:12	0,96	227,84	218,59	0,01	9,29
19	12/09/2023 04:14:28	0,96	227,85	218,60	0,01	9,91
20	12/09/2023 04:14:45	0,96	229,00	219,11	0,01	10,52
21	12/09/2023 04:15:01	0,96	228,60	219,33	0,01	11,14
22	12/09/2023 04:15:18	0,95	229,11	218,63	0,01	11,75
23	12/09/2023 04:15:34	0,96	229,22	219,33	0,01	12,37
24	12/09/2023 04:15:51	0,96	229,39	220,67	0,01	12,98
25	12/09/2023 04:16:07	0,96	229,33	220,61	0,01	13,60
26	12/09/2023 04:16:23	0,96	229,77	221,04	0,01	14,22
27	12/09/2023 04:16:40	0,95	229,95	218,23	0,01	14,84
28	12/09/2023 04:16:56	0,95	229,79	219,28	0,01	15,45
29	12/09/2023 04:17:13	0,95	229,89	218,77	0,01	16,07
30	12/09/2023 04:17:29	0,95	229,82	218,11	0,01	16,68
31	12/09/2023 04:17:46	0,95	230,11	219,58	0,01	17,30
32	12/09/2023 04:18:02	0,95	230,43	219,89	0,01	17,91
33	12/09/2023 04:18:19	0,95	230,58	219,43	0,01	18,53
34	12/09/2023 04:18:35	0,95	230,40	219,26	0,01	19,15

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
35	12/09/2023 04:18:52	0,95	230,04	218,92	0,01	19,76
36	12/09/2023 04:19:08	0,95	230,03	218,91	0,01	20,38
37	12/09/2023 04:19:25	1,16	229,01	265,86	0,01	21,21
38	12/09/2023 04:19:41	1,16	228,80	265,13	0,02	21,96
39	12/09/2023 04:19:58	1,16	228,96	264,82	0,02	22,70
40	12/09/2023 04:20:14	1,16	229,28	265,19	0,02	23,44
41	12/09/2023 04:20:31	1,15	228,89	264,24	0,02	24,19
42	12/09/2023 04:20:47	1,15	228,87	263,23	0,02	24,93
43	12/09/2023 04:21:03	1,16	228,96	264,82	0,02	25,67
44	12/09/2023 04:21:20	1,15	229,27	264,19	0,02	26,41
45	12/09/2023 04:21:37	1,15	228,96	263,34	0,02	27,15
46	12/09/2023 04:21:53	1,15	228,99	263,37	0,02	27,89
47	12/09/2023 04:22:09	1,15	229,48	263,94	0,02	28,63
48	12/09/2023 04:22:26	1,15	229,04	263,43	0,02	29,37
49	12/09/2023 04:22:42	1,15	229,28	263,70	0,02	30,11
50	12/09/2023 04:22:59	1,15	228,93	262,31	0,02	30,84
51	12/09/2023 04:23:15	1,15	229,00	262,38	0,02	31,58
52	12/09/2023 04:23:32	0,94	229,83	215,10	0,02	32,24
53	12/09/2023 04:23:48	0,94	230,24	216,70	0,02	32,84
54	12/09/2023 04:24:05	0,94	230,22	215,47	0,02	33,45
55	12/09/2023 04:24:21	0,94	230,22	215,47	0,02	34,06
56	12/09/2023 04:24:38	0,94	229,61	215,51	0,02	34,66
57	12/09/2023 04:24:54	0,94	229,94	215,81	0,02	35,27
58	12/09/2023 04:25:11	0,94	229,63	215,53	0,02	35,87
59	12/09/2023 04:25:27	0,94	229,46	214,76	0,03	36,48
60	12/09/2023 04:25:44	0,93	229,04	213,76	0,03	37,08
61	12/09/2023 04:26:00	0,94	229,56	215,46	0,03	37,68
62	12/09/2023 04:26:17	0,94	229,56	216,06	0,03	38,29
63	12/09/2023 04:26:33	0,94	228,94	215,48	0,03	38,89
64	12/09/2023 04:26:49	0,91	229,59	209,98	0,03	39,49
65	12/09/2023 04:27:06	0,91	228,88	208,70	0,03	40,08
66	12/09/2023 04:27:22	0,91	228,70	209,16	0,03	40,66
67	12/09/2023 04:27:39	0,92	228,79	209,86	0,03	41,25
68	12/09/2023 04:27:55	0,92	228,63	209,72	0,03	41,84
69	12/09/2023 04:28:12	0,92	228,26	209,38	0,03	42,43
70	12/09/2023 04:28:28	0,92	228,10	209,23	0,03	43,02
71	12/09/2023 04:28:45	0,92	228,57	210,27	0,03	43,61

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
72	12/09/2023 04:29:01	0,92	228,10	209,84	0,03	44,19
73	12/09/2023 04:29:16	0,92	228,33	210,05	0,03	44,70
74	12/09/2023 04:29:32	0,92	228,09	209,22	0,03	45,29
75	12/09/2023 04:29:48	0,92	228,21	209,33	0,03	45,87
76	12/09/2023 04:30:05	0,92	227,55	208,72	0,03	46,46
77	12/09/2023 04:30:21	0,91	228,04	207,32	0,03	47,04
78	12/09/2023 04:30:38	0,93	227,25	210,88	0,03	47,63
79	12/09/2023 04:30:54	0,93	228,02	212,20	0,03	48,22
80	12/09/2023 04:31:11	0,93	227,98	211,56	0,03	48,82
81	12/09/2023 04:31:27	0,93	228,95	212,46	0,03	49,42
82	12/09/2023 04:31:44	0,93	228,77	213,50	0,03	50,01
83	12/09/2023 04:32:00	0,93	228,56	212,70	0,04	50,61
84	12/09/2023 04:32:17	0,93	228,81	212,94	0,04	51,21
85	12/09/2023 04:32:33	0,93	228,47	213,23	0,04	51,81
86	12/09/2023 04:32:50	0,93	228,53	213,28	0,04	52,41
87	12/09/2023 04:33:06	0,93	228,45	213,21	0,04	53,01
88	12/09/2023 04:33:22	0,94	228,82	214,16	0,04	53,61
89	12/09/2023 04:33:39	0,94	229,12	214,44	0,04	54,21
90	12/09/2023 04:33:55	0,94	228,69	214,64	0,04	54,81
91	12/09/2023 04:34:12	0,94	228,40	213,77	0,04	55,41
92	12/09/2023 04:34:28	0,94	228,80	214,75	0,04	56,01
93	12/09/2023 04:34:45	1,15	227,94	262,16	0,04	56,86
94	12/09/2023 04:35:01	1,15	227,80	262,49	0,04	57,59
95	12/09/2023 04:35:18	1,08	228,02	247,01	0,04	58,32
96	12/09/2023 04:35:34	1,09	227,40	246,86	0,04	59,02
97	12/09/2023 04:35:51	1,08	227,26	245,14	0,04	59,71
98	12/09/2023 04:36:07	1,08	227,66	246,10	0,04	60,40
99	12/09/2023 04:36:24	1,07	227,50	243,82	0,04	61,08
100	12/09/2023 04:36:40	1,08	227,59	246,54	0,04	61,78
101	12/09/2023 04:36:57	1,08	228,14	246,09	0,04	62,47
102	12/09/2023 04:37:13	1,08	227,90	245,83	0,04	63,16
103	12/09/2023 04:37:30	1,08	228,11	245,53	0,04	63,85
104	12/09/2023 04:37:46	1,08	228,05	245,99	0,04	64,54
105	12/09/2023 04:38:03	1,24	227,56	281,23	0,05	65,30
106	12/09/2023 04:38:19	1,23	227,65	280,88	0,05	66,09
107	12/09/2023 04:38:35	1,24	227,61	281,75	0,05	66,88
108	12/09/2023 04:38:52	1,23	227,33	280,02	0,05	67,67

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
109	12/09/2023 04:39:08	1,23	227,38	279,17	0,05	68,45
110	12/09/2023 04:39:25	1,15	227,52	260,70	0,05	69,23
111	12/09/2023 04:39:41	0,97	228,61	221,09	0,05	69,85
112	12/09/2023 04:40:00	0,96	228,55	219,87	0,05	70,47
113	12/09/2023 04:40:17	0,96	228,63	219,35	0,05	71,17
114	12/09/2023 04:40:33	0,96	229,14	220,43	0,05	71,79
115	12/09/2023 04:40:50	0,96	229,08	219,19	0,05	72,41
116	12/09/2023 04:41:06	0,97	228,94	221,42	0,05	73,03
117	12/09/2023 04:41:23	0,96	228,63	220,52	0,05	73,65
118	12/09/2023 04:41:39	0,96	228,75	220,64	0,05	74,27
119	12/09/2023 04:41:56	0,96	228,72	220,03	0,05	74,89
120	12/09/2023 04:42:12	0,97	228,56	221,05	0,05	75,51
121	12/09/2023 04:42:29	0,97	228,30	221,38	0,05	76,12
122	12/09/2023 04:42:45	0,97	228,47	221,54	0,05	76,75
123	12/09/2023 04:43:01	0,96	229,50	220,78	0,05	77,37
124	12/09/2023 04:43:18	0,97	228,75	221,81	0,05	77,99
125	12/09/2023 04:43:34	0,96	229,14	221,02	0,05	78,61
126	12/09/2023 04:43:51	0,97	228,93	221,41	0,05	79,23
127	12/09/2023 04:44:07	0,97	228,59	221,07	0,06	79,85
128	12/09/2023 04:44:24	0,97	228,79	222,44	0,06	80,48
129	12/09/2023 04:44:40	0,97	228,67	222,90	0,06	81,10
130	12/09/2023 04:44:57	0,97	229,00	222,06	0,06	81,72
131	12/09/2023 04:45:13	0,97	229,43	223,06	0,06	82,35
132	12/09/2023 04:45:30	0,97	228,98	222,04	0,06	82,97
133	12/09/2023 04:45:46	0,97	228,59	221,07	0,06	83,59
134	12/09/2023 04:46:03	0,97	228,86	221,92	0,06	84,22
135	12/09/2023 04:46:19	0,97	228,70	221,18	0,06	84,84
136	12/09/2023 04:46:36	0,97	229,26	222,89	0,06	85,47
137	12/09/2023 04:46:52	0,97	228,86	223,09	0,06	86,09
138	12/09/2023 04:47:09	0,97	229,37	223,58	0,06	86,72
139	12/09/2023 04:47:25	0,97	228,82	221,88	0,06	87,34
140	12/09/2023 04:47:42	0,97	229,23	222,28	0,06	87,96
141	12/09/2023 04:47:58	0,97	229,29	222,92	0,06	88,59
142	12/09/2023 04:48:15	0,97	229,16	222,21	0,06	89,22
143	12/09/2023 04:48:31	0,97	228,70	222,35	0,06	89,84
144	12/09/2023 04:48:47	0,97	229,44	223,65	0,06	90,47
145	12/09/2023 04:49:04	0,97	229,39	223,02	0,06	91,10

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
146	12/09/2023 04:49:20	0,97	228,37	221,44	0,06	91,72
147	12/09/2023 04:49:37	0,97	229,51	223,14	0,06	92,35
148	12/09/2023 04:49:53	0,97	229,34	223,56	0,06	92,97
149	12/09/2023 04:50:10	0,97	229,49	223,70	0,06	93,60
150	12/09/2023 04:50:26	1,26	228,29	287,62	0,07	94,45
151	12/09/2023 04:50:43	1,25	228,32	286,30	0,07	95,25
152	12/09/2023 04:50:59	1,26	228,30	287,18	0,07	96,06
153	12/09/2023 04:51:16	1,25	228,56	285,68	0,07	96,86
154	12/09/2023 04:51:32	1,25	228,66	286,26	0,07	97,67
155	12/09/2023 04:51:49	1,25	228,89	286,09	0,07	98,47
156	12/09/2023 04:52:05	1,24	228,57	284,32	0,07	99,28
157	12/09/2023 04:52:22	1,25	228,52	285,63	0,07	100,08
158	12/09/2023 04:52:38	1,25	228,33	285,85	0,07	100,88
159	12/09/2023 04:52:55	1,25	228,66	285,80	0,07	101,68
160	12/09/2023 04:53:11	1,25	228,83	285,10	0,07	102,47
161	12/09/2023 04:53:27	1,25	228,79	285,05	0,07	103,27
162	12/09/2023 04:53:44	1,25	228,64	285,78	0,07	104,07
163	12/09/2023 04:54:00	1,24	228,38	283,17	0,07	104,87
164	12/09/2023 04:54:17	1,24	228,41	283,66	0,07	105,67
165	12/09/2023 04:54:33	0,98	229,47	224,26	0,07	106,44
166	12/09/2023 04:54:50	0,98	229,40	224,78	0,07	107,07
167	12/09/2023 04:55:06	0,98	228,65	224,04	0,07	107,69
168	12/09/2023 04:55:23	0,97	229,00	222,05	0,08	108,32
169	12/09/2023 04:55:39	0,97	228,83	223,06	0,08	108,95
170	12/09/2023 04:55:56	0,97	229,35	223,56	0,08	109,57
171	12/09/2023 04:56:12	0,97	229,19	222,83	0,08	110,20
172	12/09/2023 04:56:29	0,98	229,15	223,95	0,08	110,83
173	12/09/2023 04:56:45	0,97	229,06	222,70	0,08	111,45
174	12/09/2023 04:57:02	0,97	229,18	222,23	0,08	112,08
175	12/09/2023 04:57:18	0,97	229,40	223,61	0,08	112,71
176	12/09/2023 04:57:35	0,98	229,49	224,28	0,08	113,34
177	12/09/2023 04:57:51	0,97	228,91	223,13	0,08	113,96
178	12/09/2023 04:58:08	0,98	229,04	224,42	0,08	114,50
179	12/09/2023 04:58:24	0,97	229,11	223,33	0,08	115,22
180	12/09/2023 04:58:41	0,98	228,95	223,76	0,08	115,85
181	12/09/2023 04:58:57	0,98	229,13	223,93	0,08	116,47
182	12/09/2023 04:59:14	0,98	229,35	224,15	0,08	117,10

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
183	12/09/2023 04:59:30	0,97	229,60	223,22	0,08	117,73
184	12/09/2023 04:59:47	0,97	229,47	223,68	0,08	118,36
185	12/09/2023 05:00:03	0,98	229,45	224,25	0,08	118,99
186	12/09/2023 05:00:20	0,98	229,37	224,17	0,08	119,62
187	12/09/2023 05:00:36	0,98	228,94	223,75	0,08	120,24
188	12/09/2023 05:00:53	0,97	229,23	223,45	0,08	120,87
189	12/09/2023 05:01:09	0,97	229,00	222,64	0,08	121,50
190	12/09/2023 05:01:26	0,98	229,74	224,53	0,08	122,13
191	12/09/2023 05:01:42	0,95	229,65	218,55	0,09	122,75
192	12/09/2023 05:01:59	0,95	229,38	217,70	0,09	123,36
193	12/09/2023 05:02:15	0,95	229,80	219,29	0,09	123,97
194	12/09/2023 05:02:32	0,95	229,64	218,54	0,09	124,59
195	12/09/2023 05:02:48	0,95	229,84	219,33	0,09	125,20
196	12/09/2023 05:03:05	0,95	230,05	219,53	0,09	125,82
197	12/09/2023 05:03:21	0,95	229,59	218,49	0,09	126,43
198	12/09/2023 05:03:38	1,12	229,33	257,22	0,09	127,10
199	12/09/2023 05:03:54	1,08	228,81	247,34	0,09	127,81
200	12/09/2023 05:04:11	0,91	229,21	209,63	0,09	128,42

Seterusnya hingga 5166 baris

Lampiran 6. Tabel hasil pengambilan data hari kedua sistem *monitoring* daya listrik rumah tangga

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
5167	13/09/2023 04:10:05	0,35	224,44	77,58	2,88	4160,05
5168	13/09/2023 04:10:21	0,35	224,16	77,49	2,88	4160,27
5169	13/09/2023 04:10:38	0,35	224,74	77,69	2,88	4160,48
5170	13/09/2023 04:10:54	0,35	223,92	77,40	2,88	4160,70
5171	13/09/2023 04:11:10	0,34	224,07	75,95	2,88	4160,91
5172	13/09/2023 04:11:27	0,35	224,08	77,46	2,88	4161,13
5173	13/09/2023 04:11:44	0,34	223,98	75,92	2,88	4161,34
5174	13/09/2023 04:12:00	0,35	223,63	77,30	2,88	4161,56
5175	13/09/2023 04:12:17	0,35	223,96	77,42	2,88	4161,78
5176	13/09/2023 04:12:33	0,35	223,99	77,43	2,88	4161,99
5177	13/09/2023 04:12:50	0,35	223,74	77,34	2,88	4162,21
5178	13/09/2023 04:13:06	0,35	223,76	77,35	2,88	4162,43
5179	13/09/2023 04:13:23	0,35	223,97	77,42	2,88	4162,65
5180	13/09/2023 04:13:39	0,35	223,14	77,13	2,88	4162,87
5181	13/09/2023 04:13:56	0,35	223,76	77,35	2,88	4163,08
5182	13/09/2023 04:14:12	0,35	223,55	77,28	2,88	4163,30
5183	13/09/2023 04:14:28	0,35	223,83	77,37	2,88	4163,49
5184	13/09/2023 04:14:45	0,35	223,71	77,33	2,88	4163,74
5185	13/09/2023 04:15:02	0,35	224,16	77,49	2,88	4163,96
5186	13/09/2023 04:15:18	0,35	223,94	77,41	2,88	4164,18
5187	13/09/2023 04:15:35	0,35	224,00	78,91	2,88	4164,39
5188	13/09/2023 04:15:51	0,43	223,69	96,16	2,88	4164,62
5189	13/09/2023 04:16:08	0,42	223,34	93,54	2,88	4164,88
5190	13/09/2023 04:16:24	0,41	223,62	92,39	2,88	4165,15
5191	13/09/2023 04:16:41	0,42	223,97	93,80	2,88	4165,41
5192	13/09/2023 04:16:57	0,42	223,96	93,80	2,88	4165,67
5193	13/09/2023 04:17:14	0,42	223,99	93,81	2,88	4165,94
5194	13/09/2023 04:17:30	0,42	223,88	95,01	2,89	4166,20
5195	13/09/2023 04:17:47	0,42	223,96	95,04	2,89	4166,47
5196	13/09/2023 04:18:03	0,42	223,07	94,67	2,89	4166,74
5197	13/09/2023 04:18:20	0,42	223,59	94,89	2,89	4167,01
5198	13/09/2023 04:18:36	0,42	223,98	95,05	2,89	4167,27
5199	13/09/2023 04:18:53	0,42	223,71	94,94	2,89	4167,54
5200	13/09/2023 04:19:09	0,42	223,53	94,86	2,89	4167,81

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
5201	13/09/2023 04:19:26	0,42	223,56	93,63	2,89	4168,08
5202	13/09/2023 04:19:42	0,42	222,78	93,30	2,89	4168,34
5203	13/09/2023 04:19:59	0,42	222,95	93,37	2,89	4168,60
5204	13/09/2023 04:20:15	0,41	222,90	90,82	2,89	4168,86
5205	13/09/2023 04:20:32	0,41	222,80	92,05	2,89	4169,08
5206	13/09/2023 04:20:48	0,40	222,65	89,43	2,89	4169,37
5207	13/09/2023 04:21:05	0,41	222,07	90,48	2,89	4169,62
5208	13/09/2023 04:21:21	0,40	222,24	89,26	2,89	4169,88
5209	13/09/2023 04:21:38	0,40	222,60	89,41	2,89	4170,13
5210	13/09/2023 04:21:54	0,40	222,31	89,29	2,89	4170,38
5211	13/09/2023 04:22:11	0,40	221,82	89,10	2,89	4170,63
5212	13/09/2023 04:22:27	0,82	221,09	182,15	2,89	4171,27
5213	13/09/2023 04:22:44	0,82	220,84	181,28	2,89	4171,78
5214	13/09/2023 04:23:00	0,81	221,01	180,09	2,89	4172,28
5215	13/09/2023 04:23:17	0,82	221,32	181,02	2,89	4172,79
5216	13/09/2023 04:23:33	0,82	221,71	181,33	2,89	4173,30
5217	13/09/2023 04:23:50	0,82	221,65	181,28	2,89	4173,81
5218	13/09/2023 04:24:07	0,81	221,71	180,67	2,89	4174,31
5219	13/09/2023 04:24:23	0,81	222,04	179,59	2,89	4174,82
5220	13/09/2023 04:24:40	0,81	221,68	179,97	2,89	4175,33
5221	13/09/2023 04:24:56	0,81	221,65	179,28	2,89	4175,83
5222	13/09/2023 04:25:13	0,81	222,22	179,74	2,89	4176,34
5223	13/09/2023 04:25:29	0,82	223,40	182,71	2,89	4176,84
5224	13/09/2023 04:25:46	0,82	223,44	183,42	2,89	4177,36
5225	13/09/2023 04:26:02	0,81	223,34	182,00	2,89	4177,87
5226	13/09/2023 04:26:19	0,81	223,02	181,73	2,89	4178,38
5227	13/09/2023 04:26:35	0,81	223,44	181,40	2,89	4178,89
5228	13/09/2023 04:26:52	0,81	223,58	182,19	2,89	4179,40
5229	13/09/2023 04:27:08	0,81	223,72	180,95	2,89	4179,91
5230	13/09/2023 04:27:25	0,81	223,57	180,83	2,90	4180,42
5231	13/09/2023 04:27:41	0,41	224,28	91,38	2,90	4180,68
5232	13/09/2023 04:27:58	0,41	224,21	91,35	2,90	4180,93
5233	13/09/2023 04:28:14	0,41	223,80	91,19	2,90	4181,18
5234	13/09/2023 04:28:31	0,40	223,06	89,59	2,90	4181,44
5235	13/09/2023 04:28:47	0,40	222,56	88,09	2,90	4181,68
5236	13/09/2023 04:29:04	0,40	222,66	88,13	2,90	4181,93
5237	13/09/2023 04:29:20	0,40	222,69	88,14	2,90	4182,18

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
5238	13/09/2023 04:29:37	0,40	222,64	88,12	2,90	4182,43
5239	13/09/2023 04:29:54	0,40	222,86	88,21	2,90	4182,68
5240	13/09/2023 04:30:10	0,40	222,90	88,22	2,90	4182,93
5241	13/09/2023 04:30:27	0,39	222,84	86,87	2,90	4183,17
5242	13/09/2023 04:30:43	0,39	222,82	86,86	2,90	4183,41
5243	13/09/2023 04:31:00	0,38	223,76	85,88	2,90	4183,66
5244	13/09/2023 04:31:16	0,38	223,59	85,82	2,90	4183,90
5245	13/09/2023 04:31:33	0,39	224,46	87,51	2,90	4184,15
5246	13/09/2023 04:31:49	0,48	224,66	108,24	2,90	4184,42
5247	13/09/2023 04:32:06	0,49	225,04	109,53	2,90	4184,73
5248	13/09/2023 04:32:22	0,48	224,53	108,18	2,90	4185,03
5249	13/09/2023 04:32:39	0,48	224,64	107,12	2,90	4185,33
5250	13/09/2023 04:32:55	0,46	224,47	103,63	2,90	4185,63
5251	13/09/2023 04:33:12	0,48	224,12	106,87	2,90	4185,93
5252	13/09/2023 04:33:28	0,47	224,25	105,81	2,90	4186,23
5253	13/09/2023 04:33:45	0,47	224,20	105,79	2,90	4186,52
5254	13/09/2023 04:34:01	0,48	223,22	106,44	2,90	4186,82
5255	13/09/2023 04:34:20	0,48	223,43	106,54	2,90	4187,12
5256	13/09/2023 04:34:37	0,47	222,56	105,01	2,90	4187,45
5257	13/09/2023 04:34:53	0,47	222,39	103,81	2,90	4187,75
5258	13/09/2023 04:35:10	0,47	222,72	105,09	2,90	4188,04
5259	13/09/2023 04:35:26	0,47	222,01	104,75	2,90	4188,34
5260	13/09/2023 04:35:43	0,46	222,40	102,68	2,90	4188,63
5261	13/09/2023 04:35:59	0,48	223,70	106,67	2,90	4188,93
5262	13/09/2023 04:36:16	0,48	223,83	106,74	2,90	4189,23
5263	13/09/2023 04:36:32	0,47	223,81	104,47	2,90	4189,52
5264	13/09/2023 04:36:52	0,47	223,38	105,40	2,90	4189,82
5265	13/09/2023 04:37:08	0,48	224,16	106,89	2,90	4190,16
5266	13/09/2023 04:37:24	0,48	223,93	106,78	2,90	4190,46
5267	13/09/2023 04:37:41	0,48	224,55	108,19	2,90	4190,76
5268	13/09/2023 04:37:57	0,48	225,09	108,45	2,90	4191,07
5269	13/09/2023 04:38:14	0,49	225,22	109,62	2,90	4191,37
5270	13/09/2023 04:38:30	0,48	225,36	108,58	2,90	4191,67
5271	13/09/2023 04:38:47	0,48	225,09	108,45	2,90	4191,97
5272	13/09/2023 04:39:04	0,47	225,41	106,36	2,90	4192,28
5273	13/09/2023 04:39:20	0,48	225,08	108,44	2,90	4192,58
5274	13/09/2023 04:39:37	0,48	225,05	107,31	2,90	4192,89

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
5275	13/09/2023 04:39:53	0,48	225,37	108,59	2,90	4193,19
5276	13/09/2023 04:40:10	0,48	225,10	108,45	2,90	4193,49
5277	13/09/2023 04:40:26	0,48	225,34	108,57	2,90	4193,80
5278	13/09/2023 04:40:43	0,47	224,39	104,74	2,90	4194,10
5279	13/09/2023 04:40:59	0,48	224,38	108,11	2,90	4194,40
5280	13/09/2023 04:41:16	0,48	224,41	107,01	2,90	4194,70
5281	13/09/2023 04:41:32	0,90	223,93	201,76	2,91	4195,39
5282	13/09/2023 04:41:49	0,90	223,79	201,02	2,91	4195,96
5283	13/09/2023 04:42:05	0,89	223,55	199,57	2,91	4196,52
5284	13/09/2023 04:42:22	0,89	223,81	199,80	2,91	4197,08
5285	13/09/2023 04:42:39	0,89	224,22	200,16	2,91	4197,64
5286	13/09/2023 04:42:55	0,89	223,38	198,18	2,91	4198,20
5287	13/09/2023 04:43:12	0,89	224,11	200,07	2,91	4198,77
5288	13/09/2023 04:43:28	0,89	225,21	199,80	2,91	4199,32
5289	13/09/2023 04:43:45	0,88	224,90	198,90	2,91	4199,88
5290	13/09/2023 04:44:01	0,88	224,96	198,33	2,91	4200,44
5291	13/09/2023 04:44:18	0,88	224,84	197,59	2,91	4201,00
5292	13/09/2023 04:44:34	0,88	224,66	198,07	2,91	4201,56
5293	13/09/2023 04:44:51	0,88	224,66	197,43	2,91	4202,11
5294	13/09/2023 04:45:07	0,88	224,41	196,58	2,91	4202,67
5295	13/09/2023 04:45:26	0,88	224,31	197,12	2,91	4203,22
5296	13/09/2023 04:45:43	0,88	223,87	196,11	2,91	4203,85
5297	13/09/2023 04:45:59	0,87	223,67	195,31	2,91	4204,40
5298	13/09/2023 04:46:16	0,48	224,52	108,17	2,91	4204,87
5299	13/09/2023 04:46:32	0,48	223,88	106,76	2,91	4205,17
5300	13/09/2023 04:46:49	0,47	223,33	105,38	2,91	4205,47
5301	13/09/2023 04:47:05	0,47	223,34	105,38	2,91	4205,76
5302	13/09/2023 04:47:22	0,47	223,41	105,42	2,91	4206,06
5303	13/09/2023 04:47:39	0,47	223,37	105,39	2,91	4206,36
5304	13/09/2023 04:47:55	0,49	223,97	109,01	2,91	4206,61
5305	13/09/2023 04:48:12	0,48	223,40	107,63	2,91	4206,96
5306	13/09/2023 04:48:28	0,48	224,16	108,00	2,91	4207,26
5307	13/09/2023 04:48:45	0,48	223,47	106,56	2,91	4207,56
5308	13/09/2023 04:49:01	0,48	224,07	107,96	2,91	4207,86
5309	13/09/2023 04:49:18	0,49	224,19	109,12	2,91	4208,16
5310	13/09/2023 04:49:34	0,48	224,73	108,28	2,91	4208,47
5311	13/09/2023 04:49:51	0,48	224,58	108,20	2,91	4208,77

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
5312	13/09/2023 04:50:07	0,49	224,89	109,46	2,91	4209,08
5313	13/09/2023 04:50:24	0,49	224,66	110,44	2,92	4209,38
5314	13/09/2023 04:50:41	0,48	224,89	108,35	2,92	4209,69
5315	13/09/2023 04:50:57	0,48	225,01	107,30	2,92	4209,99
5316	13/09/2023 04:51:14	0,49	224,48	109,26	2,92	4210,30
5317	13/09/2023 04:51:30	0,49	224,33	109,19	2,92	4210,60
5318	13/09/2023 04:51:47	0,48	224,66	107,13	2,92	4210,91
5319	13/09/2023 04:52:03	0,49	224,63	110,43	2,92	4211,21
5320	13/09/2023 04:52:20	0,48	224,61	107,10	2,92	4211,47
5321	13/09/2023 04:52:36	0,49	224,01	109,03	2,92	4211,82
5322	13/09/2023 04:52:53	0,49	224,54	109,29	2,92	4212,12
5323	13/09/2023 04:53:12	0,48	224,58	107,09	2,92	4212,42
5324	13/09/2023 04:53:29	0,49	224,36	109,20	2,92	4212,77
5325	13/09/2023 04:53:45	0,48	224,59	108,21	2,92	4213,07
5326	13/09/2023 04:54:02	0,48	224,25	106,93	2,92	4213,37
5327	13/09/2023 04:54:18	0,47	224,94	106,14	2,92	4213,68
5328	13/09/2023 04:54:34	0,48	224,84	107,22	2,92	4213,94
5329	13/09/2023 04:54:51	0,48	224,79	107,19	2,92	4214,28
5330	13/09/2023 04:55:08	0,48	224,72	107,16	2,92	4214,54
5331	13/09/2023 04:55:24	0,48	224,69	107,15	2,92	4214,89
5332	13/09/2023 04:55:41	0,47	225,40	106,35	2,92	4215,19
5333	13/09/2023 04:55:58	0,49	224,83	109,43	2,92	4215,49
5334	13/09/2023 04:56:14	0,53	224,80	119,94	2,92	4215,82
5335	13/09/2023 04:56:31	0,56	224,93	124,96	2,92	4216,16
5336	13/09/2023 04:56:47	0,56	225,33	127,12	2,92	4216,51
5337	13/09/2023 04:57:04	0,56	225,25	125,14	2,92	4216,87
5338	13/09/2023 04:57:20	0,55	225,20	123,15	2,92	4217,22
5339	13/09/2023 04:57:37	0,54	225,42	121,27	2,92	4217,58
5340	13/09/2023 04:57:54	0,56	225,13	126,04	2,92	4217,93
5341	13/09/2023 04:58:10	0,57	225,29	128,05	2,92	4218,28
5342	13/09/2023 04:58:27	0,56	224,59	124,77	2,92	4218,63
5343	13/09/2023 04:58:43	0,55	224,14	123,55	2,92	4218,98
5344	13/09/2023 04:59:00	0,55	224,15	123,55	2,92	4219,33
5345	13/09/2023 04:59:16	0,56	224,09	124,49	2,92	4219,68
5346	13/09/2023 04:59:33	0,57	223,90	127,26	2,92	4220,03
5347	13/09/2023 04:59:50	0,56	223,65	126,17	2,92	4220,38
5348	13/09/2023 05:00:06	0,54	223,86	121,43	2,92	4220,73

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
5349	13/09/2023 05:00:23	0,56	223,68	125,23	2,92	4221,08
5350	13/09/2023 05:00:39	0,55	223,78	123,35	2,92	4221,44
5351	13/09/2023 05:00:56	0,57	223,43	126,99	2,92	4221,79
5352	13/09/2023 05:01:12	0,56	223,82	124,34	2,92	4222,14
5353	13/09/2023 05:01:29	0,55	224,78	123,90	2,92	4222,49
5354	13/09/2023 05:01:45	0,97	223,68	217,47	2,92	4223,05
5355	13/09/2023 05:02:02	0,95	223,32	212,52	2,92	4223,65
5356	13/09/2023 05:02:18	0,96	223,98	215,47	2,93	4224,25
5357	13/09/2023 05:02:35	0,96	224,06	216,12	2,93	4224,86
5358	13/09/2023 05:02:51	0,95	223,86	213,62	2,93	4225,46
5359	13/09/2023 05:03:08	0,96	223,98	216,04	2,93	4226,07
5360	13/09/2023 05:03:24	0,96	224,20	215,68	2,93	4226,67
5361	13/09/2023 05:03:41	0,95	223,79	213,55	2,93	4227,27
5362	13/09/2023 05:03:57	0,96	223,74	214,66	2,93	4227,87
5363	13/09/2023 05:04:14	0,96	223,57	215,07	2,93	4228,47
5364	13/09/2023 05:04:31	0,94	222,55	208,29	2,93	4229,07
5365	13/09/2023 05:04:47	0,94	222,91	209,21	2,93	4229,66
5366	13/09/2023 05:05:04	0,95	223,15	211,78	2,93	4230,25

Seterusnya hingga 10304 baris

Lampiran 7. Tabel hasil pengambilan data hari ketiga sistem *monitoring* daya listrik rumah tangga

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
10305	14/09/2023 04:10:10	1,04	225,20	233,40	6,02	8699,29
10306	14/09/2023 04:10:27	1,03	224,76	231,86	6,02	8699,95
10307	14/09/2023 04:10:43	0,90	225,89	203,52	6,03	8700,54
10308	14/09/2023 04:11:00	0,90	225,97	202,98	6,03	8701,11
10309	14/09/2023 04:11:16	1,04	225,12	234,39	6,03	8701,71
10310	14/09/2023 04:11:33	1,05	225,47	235,83	6,03	8702,37
10311	14/09/2023 04:11:49	0,90	226,56	204,13	6,03	8703,01
10312	14/09/2023 04:12:06	0,90	226,60	204,16	6,03	8703,58
10313	14/09/2023 04:12:22	0,90	226,84	203,13	6,03	8704,15
10314	14/09/2023 04:12:39	1,04	225,83	235,13	6,03	8704,80
10315	14/09/2023 04:12:55	1,03	225,68	233,36	6,03	8705,46
10316	14/09/2023 04:13:12	0,89	228,05	202,95	6,03	8706,04
10317	14/09/2023 04:13:28	0,89	227,98	202,26	6,03	8706,62
10318	14/09/2023 04:13:45	1,03	227,18	234,91	6,03	8707,23
10319	14/09/2023 04:14:01	1,03	227,18	233,81	6,03	8707,88
10320	14/09/2023 04:14:18	0,89	227,61	202,56	6,03	8708,50
10321	14/09/2023 04:14:34	0,89	227,43	202,40	6,03	8709,07
10322	14/09/2023 04:14:51	0,91	227,13	207,11	6,03	8709,64
10323	14/09/2023 04:15:07	1,03	226,51	232,58	6,03	8710,29
10324	14/09/2023 04:15:24	1,01	226,28	229,04	6,03	8710,94
10325	14/09/2023 04:15:40	0,88	227,29	199,11	6,03	8711,50
10326	14/09/2023 04:15:57	0,87	226,97	198,19	6,03	8712,06
10327	14/09/2023 04:16:13	1,00	225,25	226,33	6,03	8712,66
10328	14/09/2023 04:16:30	1,01	225,90	228,65	6,03	8713,31
10329	14/09/2023 04:16:46	0,87	226,87	196,81	6,03	8713,91
10330	14/09/2023 04:17:03	0,86	226,85	196,15	6,03	8714,46
10331	14/09/2023 04:17:19	1,26	225,34	284,35	6,04	8715,34
10332	14/09/2023 04:17:36	1,33	224,49	298,01	6,04	8716,18
10333	14/09/2023 04:17:52	1,33	225,14	298,89	6,04	8717,01
10334	14/09/2023 04:18:09	1,15	225,76	260,15	6,04	8717,75
10335	14/09/2023 04:18:25	1,15	225,82	259,23	6,04	8718,48
10336	14/09/2023 04:18:42	1,32	225,10	297,13	6,04	8719,27
10337	14/09/2023 04:18:58	1,31	225,45	295,02	6,04	8720,10
10338	14/09/2023 04:19:15	1,14	226,58	259,12	6,04	8720,88

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
10339	14/09/2023 04:19:31	1,14	226,22	257,73	6,04	8721,60
10340	14/09/2023 04:19:48	1,31	224,70	294,89	6,04	8722,35
10341	14/09/2023 04:20:04	1,31	224,72	294,49	6,04	8723,18
10342	14/09/2023 04:20:21	1,15	225,58	259,44	6,04	8723,99
10343	14/09/2023 04:20:37	1,15	225,81	259,23	6,04	8724,71
10344	14/09/2023 04:20:54	1,14	225,88	256,84	6,04	8725,44
10345	14/09/2023 04:21:10	1,31	224,42	293,24	6,04	8726,24
10346	14/09/2023 04:21:27	1,31	224,40	293,21	6,04	8727,07
10347	14/09/2023 04:21:43	1,14	225,16	257,01	6,04	8727,82
10348	14/09/2023 04:22:00	1,13	224,41	254,19	6,04	8728,54
10349	14/09/2023 04:22:16	1,00	224,41	225,49	6,05	8729,15
10350	14/09/2023 04:22:33	1,00	224,19	224,15	6,05	8729,78
10351	14/09/2023 04:22:49	0,86	225,09	193,34	6,05	8730,39
10352	14/09/2023 04:23:06	0,85	225,40	192,31	6,05	8730,93
10353	14/09/2023 04:23:22	0,86	225,59	193,77	6,05	8731,47
10354	14/09/2023 04:23:39	1,00	224,88	225,96	6,05	8732,09
10355	14/09/2023 04:23:55	0,99	225,07	223,36	6,05	8732,73
10356	14/09/2023 04:24:12	0,86	226,52	193,92	6,05	8733,29
10357	14/09/2023 04:24:28	0,85	226,29	193,07	6,05	8733,83
10358	14/09/2023 04:24:45	1,00	225,57	226,66	6,05	8734,41
10359	14/09/2023 04:25:02	1,01	225,87	227,51	6,05	8735,05
10360	14/09/2023 04:25:18	0,86	226,39	193,81	6,05	8735,65
10361	14/09/2023 04:25:35	0,86	226,67	194,05	6,05	8736,12
10362	14/09/2023 04:25:51	0,90	226,09	202,46	6,05	8736,74
10363	14/09/2023 04:26:07	1,00	225,71	225,12	6,05	8737,37
10364	14/09/2023 04:26:24	0,99	225,59	224,44	6,05	8738,01
10365	14/09/2023 04:26:40	0,84	226,92	191,64	6,05	8738,55
10366	14/09/2023 04:26:57	0,85	226,73	192,80	6,05	8739,09
10367	14/09/2023 04:27:13	0,99	226,43	224,71	6,05	8739,69
10368	14/09/2023 04:27:30	0,99	226,48	224,19	6,05	8740,32
10369	14/09/2023 04:27:46	0,85	227,01	193,03	6,05	8740,90
10370	14/09/2023 04:28:03	0,85	226,05	192,21	6,05	8741,44
10371	14/09/2023 04:28:19	1,00	225,92	225,89	6,05	8742,00
10372	14/09/2023 04:28:36	0,99	225,99	224,83	6,05	8742,62
10373	14/09/2023 04:28:52	0,87	226,72	197,33	6,05	8743,24
10374	14/09/2023 04:29:09	0,84	226,24	189,74	6,06	8743,78
10375	14/09/2023 04:29:25	0,83	226,14	188,32	6,06	8744,31

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
10376	14/09/2023 04:29:42	0,98	225,76	222,35	6,06	8744,91
10377	14/09/2023 04:29:58	0,99	226,56	223,70	6,06	8745,54
10378	14/09/2023 04:30:15	0,84	227,03	191,73	6,06	8746,11
10379	14/09/2023 04:30:31	0,84	227,86	191,77	6,06	8746,65
10380	14/09/2023 04:30:48	1,00	226,81	226,22	6,06	8747,22
10381	14/09/2023 04:31:04	1,00	227,53	227,50	6,06	8747,85
10382	14/09/2023 04:31:21	0,84	227,87	192,44	6,06	8748,46
10383	14/09/2023 04:31:37	0,84	227,88	191,78	6,06	8749,00
10384	14/09/2023 04:31:54	0,84	227,72	191,64	6,06	8749,53
10385	14/09/2023 04:32:10	0,99	227,21	224,92	6,06	8750,16
10386	14/09/2023 04:32:27	0,98	226,99	222,42	6,06	8750,79
10387	14/09/2023 04:32:43	0,83	227,84	189,07	6,06	8751,34
10388	14/09/2023 04:33:00	0,84	227,56	191,51	6,06	8751,87
10389	14/09/2023 04:33:16	0,99	227,06	224,77	6,06	8752,45
10390	14/09/2023 04:33:33	0,98	226,48	223,06	6,06	8753,08
10391	14/09/2023 04:33:52	0,84	227,19	190,54	6,06	8753,67
10392	14/09/2023 04:34:08	0,84	226,68	189,44	6,06	8754,28
10393	14/09/2023 04:34:25	0,98	225,67	221,12	6,06	8754,82
10394	14/09/2023 04:34:41	0,97	225,91	218,48	6,06	8755,44
10395	14/09/2023 04:34:58	0,84	225,83	190,06	6,06	8756,05
10396	14/09/2023 04:35:14	0,82	226,33	185,11	6,06	8756,57
10397	14/09/2023 04:35:31	0,82	226,33	185,11	6,06	8757,09
10398	14/09/2023 04:35:47	0,96	226,16	216,98	6,06	8757,68
10399	14/09/2023 04:36:04	0,96	226,47	217,28	6,07	8758,29
10400	14/09/2023 04:36:20	1,12	225,33	252,74	6,07	8759,11
10401	14/09/2023 04:36:37	1,13	225,93	254,92	6,07	8759,82
10402	14/09/2023 04:36:53	1,30	224,38	291,02	6,07	8760,57
10403	14/09/2023 04:37:10	1,30	225,46	292,42	6,07	8761,39
10404	14/09/2023 04:37:26	1,11	227,18	252,79	6,07	8762,18
10405	14/09/2023 04:37:43	1,11	226,79	252,87	6,07	8762,89
10406	14/09/2023 04:37:59	1,11	226,64	251,18	6,07	8763,60
10407	14/09/2023 04:38:16	1,29	226,02	290,96	6,07	8764,40
10408	14/09/2023 04:38:32	1,29	225,96	291,33	6,07	8765,22
10409	14/09/2023 04:38:49	1,11	226,87	251,43	6,07	8765,95
10410	14/09/2023 04:39:05	1,11	226,83	252,91	6,07	8766,66
10411	14/09/2023 04:39:22	1,29	226,64	292,21	6,07	8767,41
10412	14/09/2023 04:39:38	1,29	227,24	292,54	6,07	8768,23

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
10413	14/09/2023 04:39:55	1,11	227,70	251,83	6,07	8769,01
10414	14/09/2023 04:40:11	1,10	226,99	249,51	6,07	8769,71
10415	14/09/2023 04:40:28	1,10	227,33	249,88	6,07	8770,32
10416	14/09/2023 04:40:44	1,27	226,12	287,12	6,07	8771,22
10417	14/09/2023 04:41:01	1,28	226,46	289,33	6,07	8772,03
10418	14/09/2023 04:41:17	0,80	227,60	181,30	6,08	8772,66
10419	14/09/2023 04:41:34	0,80	227,71	182,79	6,08	8773,17
10420	14/09/2023 04:41:50	0,95	227,55	216,55	6,08	8773,73
10421	14/09/2023 04:42:07	0,95	227,69	217,28	6,08	8774,34
10422	14/09/2023 04:42:23	0,79	228,57	181,38	6,08	8774,90
10423	14/09/2023 04:42:40	0,80	228,06	182,38	6,08	8775,41
10424	14/09/2023 04:42:56	0,95	227,49	215,90	6,08	8775,93
10425	14/09/2023 04:43:13	0,95	227,57	215,98	6,08	8776,54
10426	14/09/2023 04:43:29	0,81	227,89	185,02	6,08	8777,14
10427	14/09/2023 04:43:46	0,80	228,21	183,19	6,08	8777,65
10428	14/09/2023 04:44:02	0,80	228,26	182,53	6,08	8778,16
10429	14/09/2023 04:44:19	0,95	227,83	216,81	6,08	8778,74
10430	14/09/2023 04:44:35	0,95	227,50	217,09	6,08	8779,35
10431	14/09/2023 04:44:52	0,80	228,33	181,89	6,08	8779,89
10432	14/09/2023 04:45:08	0,79	228,63	181,42	6,08	8780,40
10433	14/09/2023 04:45:25	0,95	228,17	216,55	6,08	8780,94
10434	14/09/2023 04:45:41	0,95	228,02	217,00	6,08	8781,55
10435	14/09/2023 04:45:58	0,79	228,55	181,36	6,08	8782,13
10436	14/09/2023 04:46:14	0,79	228,11	180,30	6,08	8782,64
10437	14/09/2023 04:46:31	0,80	228,54	182,05	6,08	8783,15
10438	14/09/2023 04:46:47	0,95	227,80	217,38	6,08	8783,66
10439	14/09/2023 04:47:04	0,95	227,39	216,39	6,08	8784,35
10440	14/09/2023 04:47:20	0,80	227,85	181,50	6,08	8784,88
10441	14/09/2023 04:47:37	0,80	228,54	182,06	6,08	8785,39
10442	14/09/2023 04:47:53	0,95	227,71	216,70	6,08	8785,94
10443	14/09/2023 04:48:10	0,94	227,16	213,20	6,08	8786,54
10444	14/09/2023 04:48:26	0,80	228,29	181,85	6,09	8787,11
10445	14/09/2023 04:48:43	0,79	228,05	180,25	6,09	8787,62
10446	14/09/2023 04:48:59	0,79	228,74	181,51	6,09	8788,13
10447	14/09/2023 04:49:16	0,95	227,74	216,73	6,09	8788,74
10448	14/09/2023 04:49:32	0,95	227,17	215,00	6,09	8789,35
10449	14/09/2023 04:49:49	0,79	228,35	181,20	6,09	8789,86

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
10450	14/09/2023 04:50:05	0,80	227,71	181,39	6,09	8790,37
10451	14/09/2023 04:50:22	0,95	226,88	214,73	6,09	8790,93
10452	14/09/2023 04:50:38	0,95	227,40	215,22	6,09	8791,53
10453	14/09/2023 04:50:55	0,79	228,53	180,64	6,09	8792,09
10454	14/09/2023 04:51:11	0,79	228,01	180,22	6,09	8792,60
10455	14/09/2023 04:51:28	0,92	226,71	207,96	6,09	8793,12
10456	14/09/2023 04:51:44	0,94	226,52	213,80	6,09	8793,72
10457	14/09/2023 04:52:01	0,87	226,24	197,55	6,09	8794,31
10458	14/09/2023 04:52:17	0,79	226,12	178,73	6,09	8794,81
10459	14/09/2023 04:52:34	0,79	226,29	178,86	6,09	8795,31
10460	14/09/2023 04:52:50	0,94	225,96	211,48	6,09	8795,88
10461	14/09/2023 04:53:07	0,94	225,49	211,64	6,09	8796,47
10462	14/09/2023 04:53:23	0,79	225,69	177,68	6,09	8797,01
10463	14/09/2023 04:53:40	0,78	225,93	176,47	6,09	8797,51
10464	14/09/2023 04:53:56	0,94	225,81	211,34	6,09	8798,03
10465	14/09/2023 04:54:13	0,95	226,11	214,59	6,09	8798,63
10466	14/09/2023 04:54:29	0,79	226,55	179,77	6,09	8799,21
10467	14/09/2023 04:54:46	0,79	226,35	178,21	6,09	8799,71
10468	14/09/2023 04:55:02	0,78	226,98	177,28	6,09	8800,20
10469	14/09/2023 04:55:19	0,94	226,43	213,11	6,09	8800,78
10470	14/09/2023 04:55:35	1,29	226,12	292,41	6,10	8801,60
10471	14/09/2023 04:55:52	1,11	227,15	252,76	6,10	8802,34
10472	14/09/2023 04:56:08	1,11	227,47	252,60	6,10	8803,05
10473	14/09/2023 04:56:25	1,28	226,77	291,05	6,10	8803,79
10474	14/09/2023 04:56:41	1,29	226,43	291,05	6,10	8804,61
10475	14/09/2023 04:56:58	1,09	226,97	246,92	6,10	8805,39
10476	14/09/2023 04:57:14	1,09	226,36	245,73	6,10	8806,09
10477	14/09/2023 04:57:31	1,09	227,17	247,65	6,10	8806,78
10478	14/09/2023 04:57:47	1,28	227,26	290,80	6,10	8807,57
10479	14/09/2023 04:58:04	1,26	226,12	285,78	6,10	8808,38
10480	14/09/2023 04:58:20	1,07	226,57	243,35	6,10	8809,08
10481	14/09/2023 04:58:37	1,08	226,29	244,10	6,10	8809,77
10482	14/09/2023 04:58:53	1,25	225,42	281,31	6,10	8810,50
10483	14/09/2023 04:59:10	1,24	225,02	279,45	6,10	8811,29
10484	14/09/2023 04:59:26	1,06	225,70	239,79	6,10	8812,03
10485	14/09/2023 04:59:43	1,06	226,14	240,26	6,10	8812,71
10486	14/09/2023 04:59:59	1,06	225,72	239,29	6,10	8813,39

Banyak Data (n)	Tanggal/Waktu	Arus (A)	Tegangan (V)	Daya (watt)	Energi (kWh)	Rp.
10487	14/09/2023 05:00:16	1,24	225,34	280,31	6,10	8814,17
10488	14/09/2023 05:00:32	0,95	225,91	213,81	6,10	8814,92
10489	14/09/2023 05:00:49	0,76	226,36	171,76	6,10	8815,42
10490	14/09/2023 05:01:05	0,76	227,31	172,48	6,11	8815,91
10491	14/09/2023 05:01:22	0,92	226,28	208,77	6,11	8816,42
10492	14/09/2023 05:01:38	0,91	226,26	206,32	6,11	8817,00
10493	14/09/2023 05:01:57	0,76	227,37	171,79	6,11	8817,56
10494	14/09/2023 05:02:13	0,76	227,51	171,90	6,11	8818,11
10495	14/09/2023 05:02:30	0,75	227,61	171,23	6,11	8818,59
10496	14/09/2023 05:02:47	0,92	226,96	208,79	6,11	8819,17
10497	14/09/2023 05:03:03	0,91	227,44	208,01	6,11	8819,75
10498	14/09/2023 05:03:20	0,76	228,38	173,29	6,11	8820,24
10499	14/09/2023 05:03:36	0,76	228,69	174,26	6,11	8820,73
10500	14/09/2023 05:03:53	0,92	228,43	209,53	6,11	8821,27
10501	14/09/2023 05:04:09	0,90	226,63	203,56	6,11	8821,85
10502	14/09/2023 05:04:25	0,76	228,09	172,33	6,11	8822,37
10503	14/09/2023 05:04:42	0,75	228,05	170,82	6,11	8822,86
10504	14/09/2023 05:04:59	0,91	226,51	205,32	6,11	8823,35

Seterusnya hingga 15506 baris

Lampiran 8. Program keseluruhan pada Arduino Uno

```
#include <Filters.h>
#include <LiquidCrystal_I2C.h>
#include <Wire.h>
#define acs712 A2
#define zmpt101b A3

LiquidCrystal_I2C lcd(0x27, 20, 4);
float peak = 0;
float peaksebelum= 0;
float vmax = 0;
float i = 0;
float v = 0;
```

```
float energy;
float P = 0;
float cost, energi;
float vpc = 4.8875855327;

int sampleCount = 0;
int Sensor = 0;
int perkwh = 1444.70;

long lastSample = 0;
long sampleSum = 0;

void setup() {
  Serial.begin(115200);
  Wire.begin();
  lcd.init();
  lcd.backlight();
  lcd.setCursor(0,0);
  lcd.print("V : ");
  lcd.setCursor(0,1);
  lcd.print ("I : ");
  lcd.setCursor(0,2);
  lcd.print ("P :");
  lcd.setCursor(10,2);
  lcd.print (",kWh: ");
  lcd.setCursor(0,3);
  lcd.print ("Rp: ");

}

void loop () {
```

```
peak = analogRead(zmpt101b);
 if(peak > peaksebelum){
   peaksebelum = peak;
   vmax = peak;
 }

   if (peak < peaksebelum){
   peaksebelum = peak;
   //vmin = peak;
  v = 0.984*vmax - 502.09;

   }

 if (millis()> lastSample + 1){
 sampleSum += sq(analogRead(acs712)-511);
 sampleCount++;
 lastSample = millis();
 }
if (sampleCount == 1000){
   float Mean = sampleSum/sampleCount;
   float value = sqrt(Mean);
   float mv = value * vpc;
   i = 0.9687*mv - 0.0519;

P = i*v;
energi += P/3600.0;  // satuan wh
energy += P/3600000.000; //satuan kwh
cost = energy*perkwh;

if (isnan(i) || isnan (v) || isnan (P) || isnan (energy) || isnan(cost))
{
```

```
 Serial.println ("No data Available");
}

  Serial.print (i);
  Serial.print(",");
  Serial.print (v);
  Serial.print(",");
  Serial.print (P);
  Serial.print(",");
  Serial.print (energy);
  Serial.print(",");
  Serial.println (cost);


  lcd.setCursor(3,0);
  lcd.print(v);
  lcd.setCursor(3,1);
  lcd.print(String(i));
  lcd.setCursor(3,2);
  lcd.print (P);
  lcd.setCursor(15,2);
  lcd.print(energy);
  lcd.setCursor(3,3);
  lcd.print(cost);

  sampleSum = 0;
  sampleCount = 0;
 }
}
}
```

Lampiran 9. Program pengiriman data ke NodeMCU ESP8266

```
#include <ESP8266WiFi.h>
#include <WiFiClient.h>
#include <ESP8266HTTPClient.h>

String URL =
"http://api.thingspeak.com/update?api_key=SFIPS8JH65KE393O&field1=";

void setup () {
  Serial.begin(115200);
  WiFi.disconnect();
  delay(2000);
  Serial.println("Start Connection");
  WiFi.begin("dei's wifi", "29122019");
  while (WiFi.status()!= WL_CONNECTED) {
    delay (200);
    Serial.print("..");
  }
  Serial.println("Connected");
}

void loop () {
  if (Serial.available() > 0) {
    String data = Serial.readStringUntil('\n');
    Serial.println(data);
    int comma = data.indexOf(",");

    if (comma != -1 && comma + 4 < data.length()) {
       float i = data.substring(0, comma).toFloat();
       float v = data.substring(comma + 1, comma + 1 + 1).toFloat();
```

```
      float P = data.substring(comma + 2, comma + 2 + 1).toFloat();
      float energy = data.substring(comma + 3, comma + 3 + 1).toFloat();
      float cost = data.substring(comma + 4).toFloat();
    Serial.print(i);
    Serial.print(v);
    Serial.print(P);
    Serial.print(energy);
    Serial.println(cost);
    sendData(i,v,P,energy,cost);
   }
  }
}

void sendData (float i, float v, float P, float energy, float cost) {
  WiFiClient client;
  HTTPClient http;
  String newUrl = URL+String(i)+"&field2="+String(v)+"&field3="+String(P) +
"&field4=" +String(energy) + "&field5=" + String(cost);
  http.begin(client,newUrl);
  int responsecode = http.GET();
  String data = http.getString();
  Serial.println(data);
  http.end();

}
```