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Lampiran 1a

Tabel Data Termoelektrik Tunggal pada Tegangan 8 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
0	29	30	1	29	29	30	0	0
5	27	42	15	29	29	30	2.25	8
10	26	41	15	28	29	30	2.25	8
15	26	41	15	28	29	30	2.25	8
20	25	41	16	27	29	30	2.25	8
25	25	41	16	27	29	30	2.25	8
30	24	41	17	25	29	30	2.25	8
35	24	41	17	25	29	30	2.25	8
40	24	41	17	25	29	30	2.25	8
45	23	41	18	25	29	30	2.25	8
50	23	41	18	24	29	30	2.25	8
55	22	41	19	24	29	30	2.25	8
60	22	41	19	23	29	30	2.25	8
65	22	41	19	23	29	30	2.25	8
70	21	41	20	23	29	30	2.25	8
75	21	41	20	22	29	31	2.25	8
80	21	41	20	22	29	31	2.25	8
85	21	41	20	22	29	31	2.25	8
90	21	41	20	22	29	31	2.25	8
95	21	41	20	22	29	31	2.25	8
100	20	41	21	22	29	31	2.25	8
105	20	41	21	21	29	31	2.25	8
110	20	41	21	21	29	31	2.25	8
115	20	40	20	20	29	31	2.25	8
120	19	40	21	20	29	31	2.25	8
125	19	40	21	20	29	31	2.25	8
130	19	40	21	19	29	31	2.25	8
135	19	40	21	19	29	31	2.25	8
140	18	40	22	19	29	31	2.25	8
145	18	40	22	19	29	31	2.25	8
150	18	40	22	18	29	31	2.25	8
155	18	40	22	18	29	31	2.25	8
160	18	40	22	18	29	31	2.25	8
165	18	40	22	18	29	31	2.25	8
170	18	40	22	18	29	31	2.25	8
175	17	40	23	18	29	31	2.25	8
180	17	40	23	18	29	31	2.25	8

Lampiran 1a

Tabel Data Termoelektrik Tunggal pada Tegangan 8 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
185	17	40	23	18	29	31	2.25	8
190	17	40	23	17	29	31	2.24	8
195	17	40	23	17	29	31	2.24	8
200	17	40	23	17	29	31	2.24	8
205	17	40	23	17	29	31	2.25	8
210	17	40	23	17	29	31	2.25	8
215	17	40	23	17	29	31	2.25	8
220	17	40	23	17	29	31	2.25	8
225	17	40	23	17	29	31	2.25	8
230	17	40	23	17	29	31	2.25	8
235	17	40	23	17	29	31	2.25	8
240	17	40	23	17	29	31	2.25	8
245	17	40	23	17	29	31	2.25	8
250	17	40	23	17	29	31	2.25	8
255	17	40	23	16	29	31	2.24	8
260	17	40	23	16	29	31	2.24	8
265	16	40	24	16	29	31	2.24	8
270	16	40	24	16	29	31	2.24	8
275	16	40	24	16	29	31	2.24	8
280	16	40	24	16	29	31	2.24	8
285	16	40	24	16	29	31	2.23	8
290	16	40	24	16	29	31	2.23	8
295	16	40	24	16	29	31	2.23	8
300	16	40	24	16	29	31	2.23	8
305	16	40	24	16	29	31	2.23	8
310	16	40	24	16	29	31	2.23	8
315	16	40	24	16	29	31	2.23	8
320	16	40	24	16	29	31	2.23	8
325	16	40	24	16	29	31	2.23	8
330	16	40	24	16	29	31	2.25	8
335	16	40	24	16	29	31	2.25	8
340	16	40	24	16	29	31	2.25	8
345	16	40	24	16	29	31	2.25	8
350	16	40	24	16	29	31	2.25	8
355	16	40	24	16	29	31	2.25	8
360	16	40	24	16	29	31	2.25	8

Lampiran 1b

Tabel Hasil Perhitungan Termoelektrik Tunggal pada Tegangan 8 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64887	4196.8	0	0	0.00021	0.01640	0.00112	0.00247	0	0	0	0
5	0.64774	4173.6	0	0	0.00021	0.01627	0.00115	0.00247	12.19237	1.90417	23.21629	35.40866
10	0.64778	4174.4	1	9.01360	0.00021	0.01630	0.00114	0.00247	12.13403	1.90016	23.05656	35.19059
15	0.64782	4175.2	0	0	0.00021	0.01630	0.00114	0.00247	12.13403	1.90016	23.05656	35.19059
20	0.64786	4176	1	9.01814	0.00021	0.01631	0.00114	0.00247	12.10491	1.85165	22.41405	34.51896
25	0.64789	4176.8	0	0	0.00021	0.01631	0.00114	0.00247	12.10491	1.85165	22.41405	34.51896
30	0.64793	4177.6	1	9.02268	0.00021	0.01632	0.00114	0.00247	12.07583	1.80284	21.77076	33.84659
35	0.64797	4178.4	0	0	0.00021	0.01632	0.00114	0.00247	12.07583	1.80284	21.77076	33.84659
40	0.64801	4179.2	1	9.02723	0.00021	0.01632	0.00114	0.00247	12.07583	1.80284	21.77076	33.84659
45	0.64805	4180	0	0	0.00021	0.01634	0.00113	0.00247	12.04678	1.75372	21.12666	33.17344
50	0.64809	4180.8	1	9.03177	0.00021	0.01634	0.00113	0.00247	12.04678	1.75372	21.12666	33.17344
55	0.64813	4181.6	0	0	0.00021	0.01635	0.00113	0.00247	12.01776	1.70429	20.48175	32.49951
60	0.64817	4182.4	1	9.03631	0.00021	0.01635	0.00113	0.00247	12.01776	1.70429	20.48175	32.49951
65	0.64821	4183.2	0	0	0.00021	0.01635	0.00113	0.00247	12.01776	1.70429	20.48175	32.49951
70	0.64821	4183.2	0	0	0.00021	0.01636	0.00113	0.00247	11.98878	1.65455	19.83601	31.82478
75	0.64825	4184	1	9.04086	0.00021	0.01636	0.00113	0.00247	11.98878	1.65455	19.83601	31.82478
80	0.64828	4184.8	0	0	0.00021	0.01636	0.00113	0.00247	11.98878	1.65455	19.83601	31.82478
85	0.64828	4184.8	0	0	0.00021	0.01636	0.00113	0.00247	11.98878	1.65455	19.83601	31.82478
90	0.64828	4184.8	0	0	0.00021	0.01636	0.00113	0.00247	11.98878	1.65455	19.83601	31.82478
95	0.64828	4184.8	0	0	0.00021	0.01636	0.00113	0.00247	11.98878	1.65455	19.83601	31.82478
100	0.64828	4184.8	0	0	0.00021	0.01637	0.00113	0.00247	11.95983	1.60449	19.18941	31.14923
105	0.64832	4185.6	1	9.04540	0.00021	0.01637	0.00113	0.00247	11.95983	1.60449	19.18941	31.14923
110	0.64836	4186.4	0	0	0.00021	0.01637	0.00113	0.00247	11.95983	1.60449	19.18941	31.14923
115	0.64840	4187.2	1	9.04995	0.00021	0.01639	0.00112	0.00247	11.93091	1.64876	19.67116	31.60207
120	0.64844	4188	0	0	0.00021	0.01640	0.00112	0.00247	11.90202	1.59835	19.02355	30.92557
125	0.64844	4188	0	0	0.00021	0.01640	0.00112	0.00247	11.90202	1.59835	19.02355	30.92557
130	0.64848	4188.8	1	9.05450	0.00021	0.01640	0.00112	0.00247	11.90202	1.59835	19.02355	30.92557
135	0.64852	4189.6	0	0	0.00021	0.01640	0.00112	0.00247	11.90202	1.59835	19.02355	30.92557
140	0.64852	4189.6	0	0	0.00021	0.01642	0.00112	0.00247	11.87317	1.54761	18.37504	30.24821
145	0.64852	4189.6	0	0	0.00021	0.01642	0.00112	0.00247	11.87317	1.54761	18.37504	30.24821
150	0.64856	4190.4	1	9.05904	0.00021	0.01642	0.00112	0.00247	11.87317	1.54761	18.37504	30.24821
155	0.64860	4191.2	0	0	0.00021	0.01642	0.00112	0.00247	11.87317	1.54761	18.37504	30.24821
160	0.64860	4191.2	0	0	0.00021	0.01642	0.00112	0.00247	11.87317	1.54761	18.37504	30.24821
165	0.64860	4191.2	0	0	0.00021	0.01642	0.00112	0.00247	11.87317	1.54761	18.37504	30.24821
170	0.64860	4191.2	0	0	0.00021	0.01642	0.00112	0.00247	11.87317	1.54761	18.37504	30.24821
175	0.64860	4191.2	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
180	0.64860	4191.2	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997

Lampiran 1b

Tabel Hasil Perhitungan Termoelektrik Tunggal pada Tegangan 8 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	K_m (W/cmK)	ρ (Ω cm)	Z [K ⁻¹]	P [W]	COP	q_c [W]	q_h [W]
185	0.64860	4191.2	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
190	0.64864	4192	1	9.06359	0.00021	0.01643	0.00111	0.00247	11.73931	1.50106	17.62142	29.36072
195	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.73931	1.50106	17.62142	29.36072
200	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.73931	1.50106	17.62142	29.36072
205	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
210	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
215	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
220	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
225	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
230	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
235	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
240	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
245	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
250	0.64867	4192.8	0	0	0.00021	0.01643	0.00111	0.00247	11.84436	1.49654	17.72561	29.56997
255	0.64871	4193.6	1	9.06814	0.00021	0.01643	0.00111	0.00247	11.73931	1.50106	17.62142	29.36072
260	0.64875	4194.4	0	0	0.00021	0.01643	0.00111	0.00247	11.73931	1.50106	17.62142	29.36072
255	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.71078	1.44923	16.97159	28.68237
270	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.71078	1.44923	16.97159	28.68237
275	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.71078	1.44923	16.97159	28.68237
280	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.71078	1.44923	16.97159	28.68237
285	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
290	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
295	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
300	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
305	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
310	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
315	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
320	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
325	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.60645	1.45330	16.8677	28.47415
330	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.81557	1.44515	17.07525	28.89083
335	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.81557	1.44515	17.07525	28.89083
340	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.81557	1.44515	17.07525	28.89083
345	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.81557	1.44515	17.07525	28.89083
350	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.81557	1.44515	17.07525	28.89083
355	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.81557	1.44515	17.07525	28.89083
360	0.64875	4194.4	0	0	0.00021	0.01644	0.00111	0.00247	11.81557	1.44515	17.07525	28.89083

Lampiran 2a

Tabel Data Termoelektrik Tunggal pada Tegangan 10 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
0	29	30	1	29	29	30	0	0
5	27	46	19	29	29	30	2.73	10
10	26	46	20	28	29	31	2.73	10
15	26	45	19	28	29	31	2.73	10
20	25	45	20	27	29	31	2.73	10
25	25	45	20	26	29	31	2.73	10
30	25	45	20	26	29	31	2.73	10
35	24	45	21	26	29	31	2.73	10
40	24	45	21	25	29	31	2.73	10
45	24	45	21	25	29	31	2.73	10
50	23	45	22	24	29	31	2.73	10
55	23	45	22	24	29	31	2.73	10
60	23	45	22	24	29	31	2.73	10
65	22	45	23	23	29	31	2.73	10
70	22	45	23	23	29	31	2.73	10
75	22	45	23	23	29	31	2.73	10
80	21	45	24	22	29	31	2.73	10
85	21	44	23	22	29	31	2.73	10
90	21	44	23	22	29	31	2.73	10
95	21	44	23	21	29	31	2.74	10
100	20	44	24	21	29	31	2.74	10
105	20	44	24	21	29	31	2.74	10
110	20	44	24	20	29	31	2.74	10
115	20	44	24	20	29	31	2.74	10
120	20	44	24	20	29	31	2.74	10
125	19	44	25	20	29	31	2.73	10
130	19	44	25	20	29	31	2.73	10
135	19	44	25	19	29	31	2.73	10
140	19	44	25	19	29	31	2.73	10
145	19	44	25	19	29	31	2.73	10
150	19	44	25	19	29	31	2.74	10
155	19	44	25	19	29	31	2.74	10
160	19	44	25	19	29	31	2.74	10
165	19	44	25	18	29	31	2.74	10
170	18	44	26	18	29	31	2.74	10
175	18	44	26	18	29	31	2.74	10
180	18	44	26	18	29	31	2.74	10

Lampiran 2a

Tabel Data Termoelektrik Tunggal pada Tegangan 10 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
185	18	44	26	18	29	31	2.74	10
190	18	44	26	18	29	31	2.74	10
195	18	44	26	18	29	30	2.74	10
200	18	44	26	18	29	30	2.74	10
205	18	44	26	18	29	30	2.74	10
210	18	44	26	18	29	30	2.74	10
215	18	44	26	18	29	30	2.74	10
220	18	44	26	18	29	30	2.74	10
225	18	44	26	17	29	30	2.74	10
230	18	44	26	17	29	30	2.74	10
235	18	44	26	17	29	30	2.74	10
240	17	44	27	17	29	30	2.74	10
245	17	44	27	17	29	30	2.74	10
250	17	44	27	17	29	30	2.74	10
255	17	44	27	17	29	30	2.74	10
260	17	44	27	17	29	31	2.74	10
265	17	44	27	17	29	31	2.74	10
270	17	44	27	17	29	31	2.74	10
275	17	44	27	16	29	30	2.74	10
280	17	44	27	16	29	30	2.74	10
285	17	44	27	16	29	30	2.74	10
290	17	44	27	16	29	30	2.74	10
295	17	44	27	16	29	30	2.74	10
300	17	44	27	16	29	30	2.74	10
305	17	44	27	16	29	31	2.74	10
310	17	44	27	16	29	31	2.74	10
315	17	44	27	16	29	31	2.74	10
320	17	44	27	16	29	31	2.74	10
325	17	44	27	16	29	30	2.74	10
330	17	44	27	16	29	30	2.74	10
335	17	44	27	16	29	30	2.74	10
340	17	44	27	16	29	31	2.74	10
345	17	44	27	16	29	31	2.74	10
350	17	44	27	16	29	31	2.74	10
355	17	44	27	16	29	31	2.74	10
360	17	44	27	16	29	31	2.74	10

Lampiran 2b

Tabel Hasil Perhitungan Termoelektrik Tunggal pada Tegangan 10 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_n (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64887	4196.8	29	0	0.00021	0.01640	0.00112	0.00247	0	0	0	0
5	0.64774	4173.6	0	0	0.00022	0.01623	0.00116	0.00247	18.12168	1.44934	25.26441	44.38609
10	0.64778	4174.4	1	9.01360	0.00022	0.01624	0.00116	0.00247	18.07852	1.41594	25.59312	43.67664
15	0.64782	4175.2	0	0	0.00022	0.01625	0.00115	0.00247	18.03541	1.44599	25.07909	44.1145
20	0.64786	4176	1	9.01814	0.00021	0.01626	0.00115	0.00247	17.99234	1.41238	25.41194	43.40428
25	0.64793	4177.6	1	9.02268	0.00021	0.01626	0.00115	0.00247	17.99234	1.41238	25.41194	43.40428
30	0.64797	4178.4	0	0	0.00021	0.01626	0.00115	0.00247	17.99234	1.41238	25.41194	43.40428
35	0.64797	4178.4	0	0	0.00021	0.01627	0.00115	0.00247	17.94933	1.37855	24.74404	42.69337
40	0.64801	4179.2	1	9.02723	0.00021	0.01627	0.00115	0.00247	17.94933	1.37855	24.74404	42.69337
45	0.64805	4180	0	0	0.00021	0.01627	0.00115	0.00247	17.94933	1.37855	24.74404	42.69337
50	0.64809	4180.8	1	9.03177	0.00021	0.01629	0.00114	0.00247	17.90637	1.34451	24.07538	41.98174
55	0.64813	4181.6	0	0	0.00021	0.01629	0.00114	0.00247	17.90637	1.34451	24.07538	41.98174
60	0.64813	4181.6	0	0	0.00021	0.01629	0.00114	0.00247	17.90637	1.34451	24.07538	41.98174
65	0.64817	4182.4	1	9.03631	0.00021	0.01630	0.00114	0.00247	17.86345	1.31027	23.40593	41.26938
70	0.64821	4183.2	0	0	0.00021	0.01630	0.00114	0.00247	17.86345	1.31027	23.40593	41.26938
75	0.64821	4183.2	0	0	0.00021	0.01630	0.00114	0.00247	17.86345	1.31027	23.40593	41.26938
80	0.64825	4184	1	9.04086	0.00021	0.01631	0.00114	0.00247	17.82058	1.27581	22.73569	40.55627
85	0.64828	4184.8	0	0	0.00021	0.01632	0.00114	0.00247	17.77777	1.30592	23.21538	40.99414
90	0.64828	4184.8	0	0	0.00021	0.01632	0.00114	0.00247	17.77777	1.30592	23.21538	40.99414
95	0.64832	4185.6	1	9.04540	0.00021	0.01632	0.00114	0.00247	17.90825	1.30169	23.311	41.21925
100	0.64836	4186.4	0	0	0.00021	0.01634	0.00113	0.00247	17.86516	1.26723	22.63927	40.50443
105	0.64836	4186.4	0	0	0.00021	0.01634	0.00113	0.00247	17.86516	1.26723	22.63927	40.50443
110	0.64840	4187.2	1	9.04995	0.00021	0.01634	0.00113	0.00247	17.86516	1.26723	22.63927	40.50443
115	0.64844	4188	0	0	0.00021	0.01634	0.00113	0.00247	17.86516	1.26723	22.63927	40.50443
120	0.64844	4188	0	0	0.00021	0.01634	0.00113	0.00247	17.86516	1.26723	22.63927	40.50443
125	0.64844	4188	0	0	0.00021	0.01635	0.00113	0.00247	17.69228	1.23631	21.87308	39.56536
130	0.64844	4188	0	0	0.00021	0.01635	0.00113	0.00247	17.69228	1.23631	21.87308	39.56536
135	0.64848	4188.8	1	9.05450	0.00021	0.01635	0.00113	0.00247	17.69228	1.23631	21.87308	39.56536
140	0.64852	4189.6	0	0	0.00021	0.01635	0.00113	0.00247	17.69228	1.23631	21.87308	39.56536
145	0.64852	4189.6	0	0	0.00021	0.01635	0.00113	0.00247	17.69228	1.23631	21.87308	39.56536
150	0.64852	4189.6	0	0	0.00021	0.01635	0.00113	0.00247	17.82213	1.23255	21.96569	39.78882
155	0.64852	4189.6	0	0	0.00021	0.01635	0.00113	0.00247	17.82213	1.23255	21.96569	39.78882
160	0.64852	4189.6	0	0	0.00021	0.01635	0.00113	0.00247	17.82213	1.23255	21.96569	39.78882
165	0.64856	4190.4	1	9.05904	0.00021	0.01635	0.00113	0.00247	17.82213	1.23255	21.96569	39.78882
170	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
175	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
180	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241

Lampiran 2b

Tabel Hasil Perhitungan Termoelektrik Tunggal pada Tegangan 10 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m [V/K]	κ_m (W/cmK)	ρ (Ω cm)	z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
185	0.6486	4191.2	0	0	0.000214	0.016361	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
190	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
195	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
200	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
205	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
210	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
215	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
220	0.64860	4191.2	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
225	0.64864	4192	1	9.06359	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
230	0.64867	4192.8	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
235	0.64867	4192.8	0	0	0.00021	0.01636	0.00113	0.00247	17.77915	1.19765	21.29326	39.07241
240	0.64867	4192.8	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
245	0.64867	4192.8	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
250	0.64867	4192.8	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
255	0.64867	4192.8	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
260	0.64867	4192.8	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
265	0.64867	4192.8	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
270	0.64867	4192.8	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
275	0.64871	4193.6	1	9.06814	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
280	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
285	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
290	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
295	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
300	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
305	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
310	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
315	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
320	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
325	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
330	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
335	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
340	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
345	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
350	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
355	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516
360	0.64875	4194.4	0	0	0.00021	0.01637	0.00113	0.00247	17.73521	1.16253	20.51895	38.35516

Lampiran 3a

Tabel Data Termoelektrik Tunggal pada Tegangan 12 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
0	29	30	1	29	29	30	0	0
5	29	50	21	28	29	31	3.09	12
10	29	50	21	28	29	31	3.09	12
15	28	50	22	27	29	31	3.1	12
20	28	50	22	27	29	31	3.1	12
25	28	50	22	27	29	31	3.1	12
30	27	50	23	26	29	31	3.1	12
35	27	50	23	26	29	31	3.1	12
40	27	50	23	26	29	31	3.1	12
45	26	50	24	26	29	31	3.1	12
50	26	50	24	25	29	31	3.1	12
55	26	50	24	25	29	31	3.1	12
60	26	49	23	25	29	31	3.1	12
65	26	49	23	25	29	31	3.1	12
70	26	49	23	25	29	31	3.1	12
75	25	49	24	24	29	31	3.1	12
80	25	49	24	24	29	31	3.1	12
85	25	49	24	23	29	31	3.1	12
90	25	49	24	23	29	31	3.1	12
95	25	49	24	23	29	31	3.1	12
100	25	49	24	23	29	31	3.1	12
105	24	49	25	23	29	31	3.11	12
110	24	49	25	23	29	31	3.11	12
115	24	49	25	23	29	31	3.11	12
120	24	49	25	23	29	31	3.11	12
125	24	49	25	22	29	31	3.11	12
130	24	49	25	22	29	31	3.11	12
135	24	49	25	22	29	31	3.11	12
140	23	49	26	22	29	31	3.11	12
145	23	49	26	22	29	31	3.11	12
150	23	49	26	22	29	31	3.11	12
155	23	49	26	21	29	31	3.11	12
160	23	49	26	21	29	31	3.11	12
165	23	49	26	21	29	31	3.11	12
170	23	49	26	21	29	31	3.12	12
175	23	49	26	21	29	31	3.12	12
180	23	49	26	21	29	31	3.12	12

Lampiran 3a

Tabel Data Termoelektrik Tunggal pada Tegangan 12 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
185	23	49	26	21	29	31	3.12	12
190	23	49	26	21	29	31	3.12	12
195	23	49	26	21	29	31	3.12	12
200	23	49	26	21	29	31	3.12	12
205	22	49	27	21	29	31	3.12	12
210	22	49	27	20	29	31	3.12	12
215	22	49	27	20	29	31	3.12	12
220	22	49	27	20	29	31	3.12	12
225	22	49	27	20	29	31	3.12	12
230	22	49	27	20	29	31	3.12	12
235	22	49	27	20	29	31	3.12	12
240	22	49	27	20	29	31	3.12	12
245	22	48	26	20	29	31	3.12	12
250	22	48	26	20	29	31	3.12	12
255	22	48	26	20	29	31	3.12	12
260	22	48	26	20	29	31	3.12	12
265	22	48	26	20	29	31	3.12	12
270	22	48	26	20	29	31	3.12	12
275	22	48	26	20	29	31	3.12	12
280	22	48	26	20	29	31	3.12	12
285	22	48	26	20	29	31	3.12	12
290	22	48	26	19	29	31	3.12	12
295	22	48	26	19	29	31	3.12	12
300	22	48	26	19	29	31	3.12	12
305	22	48	26	19	29	31	3.12	12
310	22	48	26	19	29	31	3.12	12
315	22	48	26	19	29	31	3.12	12
320	22	48	26	19	29	31	3.12	12
325	22	48	26	19	29	31	3.12	12
330	22	48	26	19	29	31	3.12	12
335	22	48	26	19	29	31	3.12	12
340	22	48	26	19	29	31	3.12	12
345	22	48	26	19	29	31	3.12	12
350	22	48	26	19	29	31	3.12	12
355	21	48	27	19	29	31	3.12	12
360	21	48	27	19	29	31	3.11	12

Lampiran 3b

Tabel Hasil Perhitungan Termoelektrik Tunggal pada Tegangan 12 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64887	4196.8	-29	0	0.00021	0.01640	0.00112	0.00247	0	0	0	0
5	0.64778	4174.4	1	9.01360	0.00022	0.01617	0.00117	0.00246	23.54923	1.23413	29.06290	52.61213
10	0.64782	4175.2	0	0	0.00022	0.01617	0.00117	0.00246	23.54923	1.23413	29.06290	52.61213
15	0.64786	4176	1	9.01814	0.00022	0.01618	0.00117	0.00246	23.64587	1.20400	28.46971	52.11558
20	0.64789	4176.8	0	0	0.00022	0.01618	0.00117	0.00246	23.64587	1.20400	28.46971	52.11558
25	0.64789	4176.8	0	0	0.00022	0.01618	0.00117	0.00246	23.64587	1.20400	28.46971	52.11558
30	0.64793	4177.6	1	9.02268	0.00022	0.01619	0.00117	0.00246	23.58990	1.17789	27.78628	51.37618
35	0.64797	4178.4	0	0	0.00022	0.01619	0.00117	0.00246	23.58990	1.17789	27.78628	51.37618
40	0.64797	4178.4	0	0	0.00022	0.01619	0.00117	0.00246	23.58990	1.17789	27.78628	51.37618
45	0.64797	4178.4	0	0	0.00022	0.01620	0.00117	0.00247	23.53399	1.15162	27.10217	50.63616
50	0.64801	4179.2	1	9.02723	0.00022	0.01620	0.00117	0.00247	23.53399	1.15162	27.10217	50.63616
55	0.64805	4180	0	0	0.00022	0.01620	0.00117	0.00247	23.53399	1.15162	27.10217	50.63616
60	0.64805	4180	0	0	0.00022	0.01621	0.00116	0.00247	23.47815	1.17485	27.58336	51.06151
65	0.64805	4180	0	0	0.00022	0.01621	0.00116	0.00247	23.47815	1.17485	27.58336	51.06151
70	0.64805	4180	0	0	0.00022	0.01621	0.00116	0.00247	23.47815	1.17485	27.58336	51.06151
75	0.64809	4180.8	1	9.03177	0.00022	0.01622	0.00116	0.00247	23.42237	1.14841	26.89839	50.32076
80	0.64813	4181.6	0	0	0.00022	0.01622	0.00116	0.00247	23.42237	1.14841	26.89839	50.32076
85	0.64817	4182.4	1	9.03631	0.00022	0.01622	0.00116	0.00247	23.42237	1.14841	26.89839	50.32076
90	0.64821	4183.2	0	0	0.00022	0.01622	0.00116	0.00247	23.42237	1.14841	26.89839	50.32076
95	0.64821	4183.2	0	0	0.00022	0.01622	0.00116	0.00247	23.42237	1.14841	26.89839	50.32076
100	0.64821	4183.2	0	0	0.00022	0.01622	0.00116	0.00247	23.42237	1.14841	26.89839	50.32076
105	0.64821	4183.2	0	0	0.00022	0.01623	0.00116	0.00247	23.51765	1.11829	26.29967	49.81732
110	0.64821	4183.2	0	0	0.00022	0.01623	0.00116	0.00247	23.51765	1.11829	26.29967	49.81732
115	0.64821	4183.2	0	0	0.00022	0.01623	0.00116	0.00247	23.51765	1.11829	26.29967	49.81732
120	0.64821	4183.2	0	0	0.00022	0.01623	0.00116	0.00247	23.51765	1.11829	26.29967	49.81732
125	0.64825	4184	1	9.04086	0.00022	0.01623	0.00116	0.00247	23.51765	1.11829	26.29967	49.81732
130	0.64828	4184.8	0	0	0.00022	0.01623	0.00116	0.00247	23.51765	1.11829	26.29967	49.81732
135	0.64828	4184.8	0	0	0.00022	0.01623	0.00116	0.00247	23.51765	1.11829	26.29967	49.81732
140	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	23.46164	1.09169	25.61276	49.07440
145	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	23.46164	1.09169	25.61276	49.07440
150	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	23.46164	1.09169	25.61276	49.07440
155	0.64832	4185.6	1	9.04540	0.00022	0.01624	0.00116	0.00247	23.46164	1.09169	25.61276	49.07440
160	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.46164	1.09169	25.61276	49.07440
165	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.46164	1.09169	25.61276	49.07440
170	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.61276	1.08835	25.69900	49.31176
175	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.61276	1.08835	25.69900	49.31176
180	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.61276	1.08835	25.69900	49.31176

Lampiran 3b

Tabel Hasil Perhitungan Termoelektrik Tunggal pada Tegangan 12 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	z (K^{-1})	P [W]	COP	q_c [W]	q_h [W]
185	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.61276	1.08835	25.69900	49.31176
190	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.61276	1.08835	25.69900	49.31176
195	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.61276	1.08835	25.69900	49.31176
200	0.64836	4186.4	0	0	0.00022	0.01624	0.00116	0.00247	23.61276	1.08835	25.69900	49.31176
205	0.64836	4186.4	0	0	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
210	0.64840	4187.2	1	9.04995	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
215	0.64844	4188	0	0	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
220	0.64844	4188	0	0	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
225	0.64844	4188	0	0	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
230	0.64844	4188	0	0	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
235	0.64844	4188	0	0	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
240	0.64844	4188	0	0	0.00022	0.01625	0.00115	0.00247	23.55645	1.06174	25.01086	48.56731
245	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
250	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
255	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
260	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
265	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
270	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
275	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
280	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
285	0.64844	4188	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
290	0.64848	4188.8	1	9.05450	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
295	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
300	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
305	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
310	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
315	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
320	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
325	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
330	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
335	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
340	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
345	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
350	0.64852	4189.6	0	0	0.00021	0.01626	0.00115	0.00247	23.50020	1.08475	25.49181	48.99202
355	0.64852	4189.6	0	0	0.00021	0.01627	0.00115	0.00247	23.44402	1.05795	24.80271	48.24673
360	0.64852	4189.6	0	0	0.00021	0.01627	0.00115	0.00247	23.29398	1.06111	24.71738	48.01136

Lampiran 4a

Tabel Data Termoelektrik Ganda-Seri pada Tegangan 8 V

Waktu [menit]	T_c [°C]	T_h [°C]	ΔT [K]	$T_{\text{air dingin}}$ [°C]	T_{air} [°C]	T_{ambient} [°C]	I [A]	V [V]
0	29	29	0	28	29	30	0	0
5	21	35	14	28	29	30	1.5	8
10	21	35	14	28	29	30	1.5	8
15	20	35	15	27	29	30	1.5	8
20	20	35	15	27	29	30	1.5	8
25	20	35	15	27	29	30	1.5	8
30	20	35	15	27	29	30	1.5	8
35	19	35	16	26	29	30	1.5	8
40	19	35	16	25	30	30	1.5	8
45	19	35	16	25	30	30	1.5	8
50	19	35	16	24	30	30	1.5	8
55	19	35	16	24	30	30	1.5	8
60	18	35	17	24	30	30	1.5	8
65	18	35	17	23	30	30	1.5	8
70	18	35	17	23	30	30	1.51	8
75	18	35	17	23	30	30	1.51	8
80	17	35	18	22	30	30	1.51	8
85	17	35	18	22	30	30	1.51	8
90	16	35	19	22	30	30	1.51	8
95	16	35	19	21	30	30	1.51	8
100	16	35	19	21	30	30	1.51	8
105	16	35	19	21	30	30	1.51	8
110	15	35	20	21	30	30	1.51	8
115	15	35	20	20	30	30	1.51	8
120	15	35	20	20	30	30	1.51	8
125	15	35	20	20	30	30	1.51	8
130	15	35	20	20	30	30	1.51	8
135	14	35	21	19	30	30	1.51	8
140	14	35	21	19	30	30	1.51	8
145	14	35	21	19	30	30	1.51	8
150	14	35	21	19	30	30	1.51	8
155	14	35	21	19	30	30	1.51	8
160	14	35	21	18	30	30	1.51	8
165	14	35	21	18	30	30	1.51	8
170	13	35	22	18	31	31	1.51	8
175	13	35	22	18	31	31	1.51	8
180	13	35	22	18	31	31	1.51	8

Lampiran 4a

Tabel Data Termoelektrik Ganda-Seri pada Tegangan 8 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
185	13	35	22	17	31	31	1.51	8
190	13	35	22	17	31	31	1.51	8
195	13	35	22	17	31	31	1.51	8
200	13	35	22	17	31	31	1.51	8
205	13	35	22	17	31	31	1.51	8
210	13	35	22	17	31	31	1.51	8
215	13	35	22	17	31	31	1.51	8
220	12	35	23	17	31	31	1.51	8
225	12	34	22	16	31	30	1.51	8
230	12	34	22	16	31	30	1.51	8
235	12	35	23	16	31	30	1.51	8
240	12	35	23	16	31	30	1.51	8
245	12	34	22	16	31	30	1.51	8
250	12	34	22	16	31	30	1.51	8
255	11	34	23	15	31	30	1.51	8
260	11	34	23	15	31	30	1.51	8
265	11	34	23	15	31	30	1.51	8
270	11	34	23	15	31	30	1.51	8
275	11	34	23	15	31	30	1.51	8
280	12	34	22	15	31	30	1.51	8
285	12	34	22	15	31	30	1.51	8
290	12	34	22	15	31	30	1.51	8
295	12	34	22	15	31	30	1.51	8
300	12	34	22	14	31	30	1.51	8
305	12	34	22	14	31	30	1.51	8
310	11	34	23	14	31	30	1.51	8
315	11	34	23	14	31	30	1.51	8
320	11	34	23	14	31	30	1.51	8
325	11	34	23	14	31	30	1.51	8
330	11	34	23	14	31	30	1.51	8
335	11	34	23	14	31	30	1.51	8
340	11	34	23	14	31	30	1.51	8
345	11	34	23	14	31	30	1.51	8
350	11	34	23	14	31	30	1.52	8
355	10	34	24	13	31	30	1.52	8
360	10	34	24	13	31	30	1.52	8

Lampiran 4b

Tabel Hasil Perhitungan Termoelektrik Ganda-Seri pada Tegangan 8 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64891	4197.6	0	0	0.00021	0.01642	0.00112	0.00247	0	0	0	0
5	0.64782	4175.2	0	0	0.00021	0.01644	0.00111	0.00247	10.50273	2.68733	28.2243	38.72703
10	0.64782	4175.2	0	0	0.00021	0.01644	0.00111	0.00247	10.50273	2.68733	28.2243	38.72703
15	0.64786	4176	1	9.01814	0.00021	0.01646	0.00111	0.00247	10.47718	2.57831	27.01342	37.4906
20	0.64789	4176.8	0	0	0.00021	0.01646	0.00111	0.00247	10.47718	2.57831	27.01342	37.4906
25	0.64789	4176.8	0	0	0.00021	0.01646	0.00111	0.00247	10.47718	2.57831	27.01342	37.4906
30	0.64789	4176.8	0	0	0.00021	0.01646	0.00111	0.00247	10.47718	2.57831	27.01342	37.4906
35	0.64793	4177.6	1	9.02268	0.00021	0.01647	0.00111	0.00247	10.45165	2.46857	25.80067	36.25232
40	0.64801	4179.2	1	9.02723	0.00021	0.01647	0.00111	0.00247	10.45165	2.46857	25.80067	36.25232
45	0.64805	4180	0	0	0.00021	0.01647	0.00111	0.00247	10.45165	2.46857	25.80067	36.25232
50	0.64809	4180.8	1	9.03177	0.00021	0.01647	0.00111	0.00247	10.45165	2.46857	25.80067	36.25232
55	0.64813	4181.6	0	0	0.00021	0.01647	0.00111	0.00247	10.45165	2.46857	25.80067	36.25232
60	0.64813	4181.6	0	0	0.00021	0.01649	0.00110	0.00247	10.42615	2.35811	24.58601	35.01217
65	0.64817	4182.4	1	9.03631	0.00021	0.01649	0.00110	0.00247	10.42615	2.35811	24.58601	35.01217
70	0.64821	4183.2	0	0	0.00021	0.01649	0.00110	0.00247	10.56563	2.35005	24.8298	35.39544
75	0.64821	4183.2	0	0	0.00021	0.01649	0.00110	0.00247	10.56563	2.35005	24.8298	35.39544
80	0.64825	4184	1	9.04086	0.00021	0.01650	0.00110	0.00247	10.53982	2.24027	23.61205	34.15187
85	0.64828	4184.8	0	0	0.00021	0.01650	0.00110	0.00247	10.53982	2.24027	23.61205	34.15187
90	0.64828	4184.8	0	0	0.00021	0.01652	0.00110	0.00247	10.51405	2.12975	22.39231	32.90636
95	0.64832	4185.6	1	9.0454	0.00021	0.01652	0.00110	0.00247	10.51405	2.12975	22.39231	32.90636
100	0.64836	4186.4	0	0	0.00021	0.01652	0.00110	0.00247	10.51405	2.12975	22.39231	32.90636
105	0.64836	4186.4	0	0	0.00021	0.01652	0.00110	0.00247	10.51405	2.12975	22.39231	32.90636
110	0.64836	4186.4	0	0	0.00021	0.01654	0.00110	0.00247	10.4883	2.01849	21.17056	31.65886
115	0.64840	4187.2	1	9.04995	0.00021	0.01654	0.00110	0.00247	10.4883	2.01849	21.17056	31.65886
120	0.64844	4188	0	0	0.00021	0.01654	0.00110	0.00247	10.4883	2.01849	21.17056	31.65886
125	0.64844	4188	0	0	0.00021	0.01654	0.00110	0.00247	10.4883	2.01849	21.17056	31.65886
130	0.64844	4188	0	0	0.00021	0.01654	0.00110	0.00247	10.4883	2.01849	21.17056	31.65886
135	0.64848	4188.8	1	9.0545	0.00021	0.01655	0.00109	0.00247	10.46258	1.90649	19.94676	30.40934
140	0.64852	4189.6	0	0	0.00021	0.01655	0.00109	0.00247	10.46258	1.90649	19.94676	30.40934
145	0.64852	4189.6	0	0	0.00021	0.01655	0.00109	0.00247	10.46258	1.90649	19.94676	30.40934
150	0.64852	4189.6	0	0	0.00021	0.01655	0.00109	0.00247	10.46258	1.90649	19.94676	30.40934
155	0.64852	4189.6	0	0	0.00021	0.01655	0.00109	0.00247	10.46258	1.90649	19.94676	30.40934
160	0.64856	4190.4	1	9.05904	0.00021	0.01655	0.00109	0.00247	10.46258	1.90649	19.94676	30.40934
165	0.64860	4191.2	0	0	0.00021	0.01655	0.00109	0.00247	10.46258	1.90649	19.94676	30.40934
170	0.64860	4191.2	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
175	0.64860	4191.2	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
180	0.64860	4191.2	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776

Lampiran 4b

Tabel Hasil Perhitungan Termoelektrik Ganda-Seri pada Tegangan 8 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ωcm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
185	0.64864	4192	1	9.06359	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
190	0.64867	4192.8	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
195	0.64867	4192.8	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
200	0.64867	4192.8	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
205	0.64867	4192.8	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
210	0.64867	4192.8	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
215	0.64867	4192.8	0	0	0.00021	0.01657	0.00109	0.00247	10.43689	1.79372	18.72087	29.15776
220	0.64867	4192.8	0	0	0.00021	0.01658	0.00109	0.00247	10.41123	1.68019	17.49285	27.90408
225	0.64871	4193.6	1	9.06814	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
230	0.64875	4194.4	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
235	0.64875	4194.4	0	0	0.00021	0.01658	0.00109	0.00247	10.41123	1.68019	17.49285	27.90408
240	0.64875	4194.4	0	0	0.00021	0.01658	0.00109	0.00247	10.41123	1.68019	17.49285	27.90408
245	0.64875	4194.4	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
250	0.64875	4194.4	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
255	0.64879	4195.2	1	9.07269	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
260	0.64883	4196	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
265	0.64883	4196	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
270	0.64883	4196	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
275	0.64883	4196	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
280	0.64883	4196	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
285	0.64883	4196	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
290	0.64883	4196	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
295	0.64883	4196	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
300	0.64887	4196.8	1	9.07724	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
305	0.64891	4197.6	0	0	0.00021	0.01660	0.00108	0.00247	10.38561	1.77796	18.46517	28.85078
310	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
315	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
320	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
325	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
330	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
335	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
340	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
345	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.36001	1.66358	17.2347	27.59471
350	0.64891	4197.6	0	0	0.00021	0.01662	0.00108	0.00247	10.49768	1.66417	17.46988	27.96757
355	0.64895	4198.4	1	9.0818	0.00021	0.01663	0.00108	0.00247	10.47178	1.55046	16.23605	26.70783
360	0.64899	4199.2	0	0	0.00021	0.01663	0.00108	0.00247	10.47178	1.55046	16.23605	26.70783

Lampiran 5a

Tabel Data Termoelektrik Ganda-Seri pada Tegangan 10 V

Waktu [menit]	T_c [°C]	T_h [°C]	ΔT [K]	$T_{\text{air dingin}}$ [°C]	T_{air} [°C]	T_{ambient} [°C]	I [A]	V [V]
0	27	28	1	27	29	29	0	0
5	20	37	17	26	29	29	1.88	10
10	19	37	18	26	28	29	1.87	10
15	19	37	18	26	28	29	1.87	10
20	18	37	19	25	29	29	1.87	10
25	18	37	19	25	29	29	1.87	10
30	18	37	19	24	29	29	1.87	10
35	17	37	20	24	29	29	1.87	10
40	17	37	20	24	29	29	1.87	10
45	17	37	20	23	29	29	1.87	10
50	17	37	20	23	29	29	1.87	10
55	16	37	21	22	29	30	1.87	10
60	16	37	21	22	29	30	1.87	10
65	16	37	21	22	29	30	1.87	10
70	15	37	22	21	29	30	1.87	10
75	15	37	22	21	29	30	1.87	10
80	15	37	22	21	29	30	1.87	10
85	14	37	23	20	30	30	1.87	10
90	14	37	23	20	30	30	1.87	10
95	14	37	23	20	30	30	1.87	10
100	14	37	23	19	30	30	1.87	10
105	14	37	23	19	30	30	1.87	10
110	14	37	23	19	30	30	1.87	10
115	13	37	24	19	30	30	1.87	10
120	13	37	24	18	30	30	1.87	10
125	13	37	24	18	30	30	1.87	10
130	13	37	24	18	30	30	1.87	10
135	13	37	24	18	30	30	1.87	10
140	13	37	24	17	30	30	1.87	10
145	12	37	25	17	30	30	1.87	10
150	12	37	25	17	30	30	1.87	10
155	12	37	25	17	30	30	1.87	10
160	12	37	25	17	30	30	1.87	10
165	12	37	25	16	30	30	1.87	10
170	12	37	25	16	30	30	1.87	10
175	12	37	25	16	30	30	1.87	10
180	11	37	26	16	30	30	1.87	10

Lampiran 5a

Tabel Data Termoelektrik Ganda-Seri pada Tegangan 10 V

Waktu [menit]	T_c [°C]	T_h [°C]	ΔT [K]	$T_{\text{air dingin}}$ [°C]	T_{air} [°C]	T_{ambient} [°C]	I [A]	V [V]
185	11	37	26	16	30	30	1.87	10
190	11	37	26	16	30	30	1.87	10
195	11	37	26	15	30	30	1.87	10
200	11	37	26	15	30	30	1.87	10
205	11	37	26	15	30	30	1.87	10
210	11	37	26	15	30	30	1.87	10
215	11	37	26	15	30	30	1.87	10
220	11	37	26	15	30	30	1.87	10
225	10	37	27	15	30	30	1.87	10
230	10	37	27	15	30	30	1.87	10
235	10	37	27	15	30	30	1.87	10
240	10	36	26	14	30	30	1.87	10
245	10	36	26	14	30	30	1.87	10
250	10	36	26	14	30	30	1.86	10
255	10	36	26	14	30	30	1.86	10
260	10	36	26	14	30	30	1.86	10
265	10	36	26	14	30	30	1.86	10
270	10	36	26	14	30	30	1.86	10
275	9	37	28	13	30	30	1.86	10
280	9	37	28	13	30	30	1.85	10
285	9	37	28	13	30	30	1.85	10
290	9	37	28	13	30	30	1.85	10
295	9	37	28	13	30	30	1.85	10
300	9	37	28	13	30	30	1.85	10
305	9	37	28	13	30	30	1.85	10
310	9	37	28	13	30	30	1.85	10
315	9	37	28	13	30	30	1.85	10
320	9	37	28	13	30	30	1.85	10
325	9	37	28	13	30	30	1.85	10
330	9	37	28	13	30	30	1.85	10
335	9	37	28	13	30	30	1.85	10
340	9	37	28	13	30	30	1.85	10
345	9	37	28	12	30	30	1.85	10
350	9	37	28	12	30	30	1.85	10
355	9	37	28	12	30	30	1.85	10
360	9	37	28	12	30	30	1.85	10

Lampiran 5b

Tabel Hasil Perhitungan Termoelektrik Ganda-Seri pada Tegangan 10 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64895	4198.4	0	0	0.00021	0.01646	0.00111	0.00247	0	0	0	0
5	0.64793	4177.6	1	9.02268	0.00021	0.01643	0.00111	0.00247	16.53835	2.06177	34.0983	50.63664
10	0.64797	4178.4	0	0	0.00021	0.01644	0.00111	0.00247	16.32311	1.99808	32.61495	48.93806
15	0.64797	4178.4	0	0	0.00021	0.01644	0.00111	0.00247	16.32311	1.99808	32.61495	48.93806
20	0.64801	4179.2	1	9.02723	0.00021	0.01646	0.00111	0.00247	16.28339	1.92581	31.3587	47.64209
25	0.64805	4180	0	0	0.00021	0.01646	0.00111	0.00247	16.28339	1.92581	31.3587	47.64209
30	0.64809	4180.8	1	9.03177	0.00021	0.01646	0.00111	0.00247	16.28339	1.92581	31.3587	47.64209
35	0.64813	4181.6	0	0	0.00021	0.01647	0.00111	0.00247	16.24372	1.85306	30.10056	46.34428
40	0.64813	4181.6	0	0	0.00021	0.01647	0.00111	0.00247	16.24372	1.85306	30.10056	46.34428
45	0.64817	4182.4	1	9.03631	0.00021	0.01647	0.00111	0.00247	16.24372	1.85306	30.10056	46.34428
50	0.64821	4183.2	0	0	0.00021	0.01647	0.00111	0.00247	16.24372	1.85306	30.10056	46.34428
55	0.64825	4184	1	9.04085	0.00021	0.01649	0.00110	0.00247	16.20409	1.77983	28.84048	45.04458
60	0.64828	4184.8	0	0	0.00021	0.01649	0.00110	0.00247	16.20409	1.77983	28.84048	45.04458
65	0.64828	4184.8	0	0	0.00021	0.01649	0.00110	0.00247	16.20409	1.77983	28.84048	45.04458
70	0.64832	4185.6	1	9.04540	0.00021	0.01650	0.00110	0.00247	16.16451	1.70611	27.57845	43.74296
75	0.64836	4185.4	0	0	0.00021	0.01650	0.00110	0.00247	16.16451	1.70611	27.57845	43.74296
80	0.64836	4185.4	0	0	0.00021	0.01650	0.00110	0.00247	16.16451	1.70611	27.57845	43.74296
85	0.64840	4187.2	1	9.04995	0.00021	0.01652	0.00110	0.00247	16.12498	1.63190	25.31441	42.43939
90	0.64844	4188	0	0	0.00021	0.01652	0.00110	0.00247	16.12498	1.63190	25.31441	42.43939
95	0.64844	4188	0	0	0.00021	0.01652	0.00110	0.00247	16.12498	1.63190	25.31441	42.43939
100	0.64848	4188.8	1	9.05450	0.00021	0.01652	0.00110	0.00247	16.12498	1.63190	25.31441	42.43939
105	0.64852	4189.6	0	0	0.00021	0.01652	0.00110	0.00247	16.12498	1.63190	25.31441	42.43939
110	0.64852	4189.6	0	0	0.00021	0.01652	0.00110	0.00247	16.12498	1.63190	25.31441	42.43939
115	0.64852	4189.6	0	0	0.00021	0.01654	0.00110	0.00247	16.08549	1.55720	25.04833	41.13382
120	0.64856	4190.4	1	9.05904	0.00021	0.01654	0.00110	0.00247	16.08549	1.55720	25.04833	41.13382
125	0.64860	4191.2	0	0	0.00021	0.01654	0.00110	0.00247	16.08549	1.55720	25.04833	41.13382
130	0.64860	4191.2	0	0	0.00021	0.01654	0.00110	0.00247	16.08549	1.55720	25.04833	41.13382
135	0.64860	4191.2	0	0	0.00021	0.01654	0.00110	0.00247	16.08549	1.55720	25.04833	41.13382
140	0.64864	4192	1	9.06359	0.00021	0.01654	0.00110	0.00247	16.08549	1.55720	25.04833	41.13382
145	0.64867	4192.8	0	0	0.00021	0.01655	0.00109	0.00247	16.04605	1.48200	23.78018	39.82623
150	0.64867	4192.8	0	0	0.00021	0.01655	0.00109	0.00247	16.04605	1.48200	23.78018	39.82623
155	0.64867	4192.8	0	0	0.00021	0.01655	0.00109	0.00247	16.04605	1.48200	23.78018	39.82623
160	0.64867	4192.8	0	0	0.00021	0.01655	0.00109	0.00247	16.04605	1.48200	23.78018	39.82623
165	0.64871	4193.6	1	9.06814	0.00021	0.01655	0.00109	0.00247	16.04605	1.48200	23.78018	39.82623
170	0.64875	4194.4	0	0	0.00021	0.01655	0.00109	0.00247	16.04605	1.48200	23.78018	39.82623
175	0.64875	4194.4	0	0	0.00021	0.01655	0.00109	0.00247	16.04605	1.48200	23.78018	39.82623
180	0.64875	4194.4	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51557

Lampiran 5b

Tabel Hasil Perhitungan Termoelektrik Ganda-Seri pada Tegangan 10 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_u [W]	α_m [V/K]	K_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
185	0.64875	4194.4	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
190	0.64875	4194.4	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
195	0.64879	4195.2	1	9.07269	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
200	0.64883	4196	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
205	0.64883	4196	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
210	0.64883	4196	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
215	0.64883	4196	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
220	0.64883	4196	0	0	0.00021	0.01657	0.00109	0.00247	16.00665	1.40629	22.50992	38.51657
225	0.64883	4196	0	0	0.00021	0.01658	0.00109	0.00247	15.9673	1.33006	21.23751	37.20481
230	0.64883	4196	0	0	0.00021	0.01658	0.00109	0.00247	15.9673	1.33006	21.23751	37.20481
235	0.64883	4196	0	0	0.00021	0.01658	0.00109	0.00247	15.9673	1.33006	21.23751	37.20481
240	0.64887	4196.8	1	9.07724	0.00021	0.01660	0.00108	0.00247	15.928	1.39402	22.20399	38.13199
245	0.64891	4197.6	0	0	0.00021	0.01660	0.00108	0.00247	15.928	1.39402	22.20399	38.13199
250	0.64891	4197.6	0	0	0.00021	0.01660	0.00108	0.00247	15.7581	1.39520	21.98574	37.74384
255	0.64891	4197.6	0	0	0.00021	0.01660	0.00108	0.00247	15.75810	1.39520	21.98574	37.74384
260	0.64891	4197.6	0	0	0.00021	0.01660	0.00108	0.00247	15.7581	1.39520	21.98574	37.74384
265	0.64891	4197.6	0	0	0.00021	0.01660	0.00108	0.00247	15.7581	1.39520	21.98574	37.74384
270	0.64891	4197.6	0	0	0.00021	0.01660	0.00108	0.00247	15.7581	1.39520	21.98574	37.74384
275	0.64895	4198.4	1	9.08180	0.00021	0.01660	0.00108	0.00247	15.7581	1.25305	19.74573	35.50384
280	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
285	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
290	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
295	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
300	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
305	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
310	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
315	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
320	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
325	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
330	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
335	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
340	0.64899	4199.2	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
345	0.64903	4200	1	9.08635	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
350	0.64906	4200.8	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
355	0.64906	4200.8	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722
360	0.64906	4200.8	0	0	0.00021	0.01660	0.00108	0.00247	15.58912	1.25268	19.52810	35.11722

Lampiran 6a

Tabel Data Termoelektrik Ganda-Seri pada Tegangan 12 V

Waktu [menit]	T_c [°C]	T_h [°C]	ΔT [K]	$T_{\text{air dingin}}$ [°C]	T_{air} [°C]	T_{ambient} [°C]	I [A]	V [V]
0	29	29	0	27	31	30	0	0
5	22	40	18	27	31	30	2.22	12
10	21	40	19	27	31	30	2.22	12
15	21	40	19	26	31	30	2.22	12
20	20	40	20	25	30	30	2.21	12
25	20	40	20	25	30	30	2.22	12
30	19	40	21	24	30	30	2.22	12
35	19	40	21	24	30	30	2.21	12
40	19	40	21	24	30	30	2.21	12
45	18	40	22	24	30	30	2.21	12
50	18	40	22	23	30	30	2.21	12
55	17	40	23	23	30	30	2.21	12
60	17	40	23	22	30	30	2.21	12
65	16	40	24	21	30	30	2.21	12
70	16	40	24	21	30	30	2.21	12
75	16	40	24	21	30	30	2.21	12
80	16	40	24	21	30	30	2.22	12
85	15	39	24	20	30	30	2.22	12
90	15	39	24	20	30	30	2.22	12
95	15	39	24	19	30	30	2.22	12
100	15	39	24	19	30	30	2.22	12
105	15	39	24	19	30	30	2.22	12
110	15	39	24	19	30	30	2.22	12
115	14	39	25	18	30	30	2.22	12
120	14	39	25	18	30	30	2.22	12
125	14	39	25	18	30	30	2.22	12
130	13	39	26	17	30	30	2.22	12
135	13	39	26	17	30	30	2.22	12
140	13	39	26	17	30	30	2.22	12
145	13	39	26	17	30	30	2.22	12
150	13	39	26	16	30	30	2.22	12
155	13	39	26	16	30	30	2.22	12
160	13	39	26	16	30	30	2.22	12
165	12	39	27	16	30	30	2.22	12
170	12	39	27	16	30	30	2.22	12
175	12	39	27	16	30	30	2.22	12
180	12	39	27	16	30	30	2.22	12

Tabel Data Termoelektrik Ganda-Seri pada Tegangan 12 V

Waktu [menit]	T_c [$^{\circ}\text{C}$]	T_h [$^{\circ}\text{C}$]	ΔT [K]	$T_{\text{air dingin}}$ [$^{\circ}\text{C}$]	T_{air} [$^{\circ}\text{C}$]	T_{ambient} [$^{\circ}\text{C}$]	I [A]	V [V]
185	12	39	27	16	30	30	2.22	12
190	12	39	27	15	30	30	2.22	12
195	11	39	28	15	30	30	2.22	12
200	11	39	28	15	30	30	2.22	12
205	11	39	28	15	30	30	2.22	12
210	11	39	28	15	30	30	2.22	12
215	11	39	28	14	30	30	2.22	12
220	11	39	28	14	30	30	2.22	12
225	11	39	28	14	30	30	2.22	12
230	11	39	28	14	30	30	2.22	12
235	11	39	28	14	30	30	2.22	12
240	11	39	28	14	30	30	2.22	12
245	11	39	28	14	30	30	2.22	12
250	11	39	28	14	30	30	2.22	12
255	11	39	28	14	30	30	2.22	12
260	10	39	29	13	30	30	2.22	12
265	10	39	29	13	30	30	2.22	12
270	10	39	29	13	30	30	2.21	12
275	10	40	30	13	30	30	2.2	12
280	10	40	30	13	30	30	2.2	12
285	10	40	30	13	30	30	2.2	12
290	10	40	30	13	30	30	2.2	12
295	10	40	30	13	30	30	2.2	12
300	10	40	30	13	30	30	2.2	12
305	10	40	30	13	31	30	2.2	12
310	10	40	30	13	31	30	2.2	12
315	10	40	30	13	31	29	2.2	12
320	10	40	30	13	31	29	2.2	12
325	10	40	30	13	31	29	2.2	12
330	10	40	30	13	31	29	2.2	12
335	10	40	30	12	31	29	2.2	12
340	10	40	30	12	31	29	2.19	12
345	10	40	30	12	31	29	2.19	12
350	10	41	31	12	30	29	2.18	12
355	10	41	31	12	30	29	2.18	12
360	10	41	31	12	30	29	2.18	12

Lampiran 6b

Tabel Hasil Perhitungan Termoelektrik Ganda-Seri pada Tegangan 12 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64895	4198.4	0	0	0.00021	0.01642	0.00112	0.00247	0	0	0	0
5	0.64789	4176.8	0	0	0.00021	0.01636	0.00113	0.00247	23.34241	1.76866	41.28485	64.62727
10	0.64789	4176.8	0	0	0.00021	0.01637	0.00113	0.00247	23.28605	1.71761	39.99633	63.28238
15	0.64793	4177.6	1	9.02268	0.00021	0.01637	0.00113	0.00247	23.28605	1.71761	39.99633	63.28238
20	0.64801	4179.2	1	9.02723	0.00021	0.01639	0.00112	0.00247	23.02094	1.67209	38.49306	61.514
25	0.64805	4180	0	0	0.00021	0.01639	0.00112	0.00247	23.22974	1.66623	38.70608	61.93583
30	0.64809	4180.8	1	9.03177	0.00021	0.01640	0.00112	0.00247	23.17351	1.61452	37.41408	60.58759
35	0.64813	4181.6	0	0	0.00021	0.01640	0.00112	0.00247	22.96521	1.61993	37.20214	60.16734
40	0.64813	4181.6	0	0	0.00021	0.01640	0.00112	0.00247	22.96521	1.61993	37.20214	60.16734
45	0.64813	4181.6	0	0	0.00021	0.01642	0.00112	0.00247	22.90954	1.56744	35.90941	58.81895
50	0.64817	4182.4	1	9.03631	0.00021	0.01642	0.00112	0.00247	22.90954	1.56744	35.90941	58.81895
55	0.64821	4183.2	0	0	0.00021	0.01643	0.00111	0.00247	22.85393	1.51461	34.61485	57.46879
60	0.64825	4184	1	9.04086	0.00021	0.01643	0.00111	0.00247	22.85393	1.51461	34.61485	57.46879
65	0.64832	4185.6	1	9.04540	0.00021	0.01644	0.00111	0.00247	22.7984	1.46144	33.31843	56.11682
70	0.64836	4186.4	0	0	0.00021	0.01644	0.00111	0.00247	22.7984	1.46144	33.31843	56.11682
75	0.64836	4186.4	0	0	0.00021	0.01644	0.00111	0.00247	22.7984	1.46144	33.31843	56.11682
80	0.64836	4186.4	0	0	0.00021	0.01644	0.00111	0.00247	23.00518	1.45737	33.52715	56.53233
85	0.64840	4187.2	1	9.04995	0.00021	0.01647	0.00111	0.00247	22.89329	1.44981	33.19102	56.08431
90	0.64844	4188	0	0	0.00021	0.01647	0.00111	0.00247	22.89329	1.44981	33.19102	56.08431
95	0.64848	4188.8	1	9.05450	0.00021	0.01647	0.00111	0.00247	22.89329	1.44981	33.19102	56.08431
100	0.64852	4189.6	0	0	0.00021	0.01647	0.00111	0.00247	22.89329	1.44981	33.19102	56.08431
105	0.64852	4189.6	0	0	0.00021	0.01647	0.00111	0.00247	22.89329	1.44981	33.19102	56.08431
110	0.64852	4189.6	0	0	0.00021	0.01647	0.00111	0.00247	22.89329	1.44981	33.19102	56.08431
115	0.64856	4190.4	1	9.05904	0.00021	0.01649	0.00110	0.00247	22.83744	1.39636	31.88935	54.72679
120	0.64860	4191.2	0	0	0.00021	0.01649	0.00110	0.00247	22.83744	1.39636	31.88935	54.72679
125	0.64860	4191.2	0	0	0.00021	0.01649	0.00110	0.00247	22.83744	1.39636	31.88935	54.72679
130	0.64864	4192	1	9.06359	0.00021	0.01650	0.00110	0.00247	22.78166	1.34256	30.58569	53.36735
135	0.64867	4192.8	0	0	0.00021	0.01650	0.00110	0.00247	22.78166	1.34256	30.58569	53.36735
140	0.64867	4192.8	0	0	0.00021	0.01650	0.00110	0.00247	22.78166	1.34256	30.58569	53.36735
145	0.64867	4192.8	0	0	0.00021	0.01650	0.00110	0.00247	22.78166	1.34256	30.58569	53.36735
150	0.64871	4193.6	1	9.06814	0.00021	0.01650	0.00110	0.00247	22.78166	1.34256	30.58569	53.36735
155	0.64875	4194.4	0	0	0.00021	0.01650	0.00110	0.00247	22.78166	1.34256	30.58569	53.36735
160	0.64875	4194.4	0	0	0.00021	0.01650	0.00110	0.00247	22.78166	1.34256	30.58569	53.36735
165	0.64875	4194.4	0	0	0.00021	0.01652	0.00110	0.00247	22.72594	1.28840	29.28001	52.00595
170	0.64875	4194.4	0	0	0.00021	0.01652	0.00110	0.00247	22.72594	1.28840	29.28001	52.00595
175	0.64875	4194.4	0	0	0.00021	0.01652	0.00110	0.00247	22.72594	1.28840	29.28001	52.00595
180	0.64875	4194.4	0	0	0.00021	0.01652	0.00110	0.00247	22.72594	1.28840	29.28001	52.00595

Lampiran 6b

Tabel Hasil Perhitungan Termoelektrik Ganda-Seri pada Tegangan 12 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_u [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
185	0.64875	4194.4	0	0	0.00021	0.01652	0.00110	0.00247	22.72594	1.28840	29.28001	52.00595
190	0.64879	4195.2	1	9.07269	0.00021	0.01652	0.00110	0.00247	22.72594	1.28840	29.28001	52.00595
195	0.64883	4196	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
200	0.64883	4196	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
205	0.64883	4196	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
210	0.64883	4196	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
215	0.64887	4196.8	1	9.07724	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
220	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
225	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
230	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
235	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
240	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
245	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
250	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
255	0.64891	4197.6	0	0	0.00021	0.01654	0.00110	0.00247	22.67029	1.23387	27.97226	50.64255
260	0.64895	4198.4	1	9.08180	0.00021	0.01655	0.00109	0.00247	22.6147	1.17899	26.66242	49.27712
265	0.64899	4199.2	0	0	0.00021	0.01655	0.00109	0.00247	22.6147	1.17899	26.66242	49.27712
270	0.64899	4199.2	0	0	0.00021	0.01655	0.00109	0.00247	22.41142	1.18065	26.46012	48.87155
275	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
280	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
285	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
290	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
295	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
300	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
305	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
310	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
315	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
320	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
325	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
330	0.64899	4199.2	0	0	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
335	0.64903	4200	1	9.08635	0.00021	0.01654	0.00110	0.00247	22.26366	1.13619	25.29582	47.55948
340	0.64906	4200.8	0	0	0.00021	0.01654	0.00110	0.00247	22.06172	1.13738	25.09261	47.15433
345	0.64906	4200.8	0	0	0.00021	0.01654	0.00110	0.00247	22.06172	1.13738	25.09261	47.15433
350	0.64906	4200.8	0	0	0.00021	0.01652	0.00110	0.00247	21.91437	1.09192	23.92876	45.84313
355	0.64906	4200.8	0	0	0.00021	0.01652	0.00110	0.00247	21.91437	1.09192	23.92876	45.84313
360	0.64906	4200.8	0	0	0.00021	0.01652	0.00110	0.00247	21.91437	1.09192	23.92876	45.84313

Lampiran 7a

Tabel Data Termoelektrik Ganda-Paralel pada Tegangan 8 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
0	29	29	0	28	29	29	0	0
5	24	44	20	28	29	29	5.23	8
10	24	44	20	28	29	29	5.23	8
15	23	45	22	28	29	30	5.24	8
20	23	45	22	27	29	30	5.24	8
25	23	45	22	27	29	30	5.24	8
30	22	44	22	26	29	30	5.25	8
35	22	45	23	26	29	30	5.25	8
40	22	45	23	25	29	30	5.25	8
45	21	45	24	25	29	30	5.26	8
50	21	45	24	24	29	30	5.26	8
55	21	45	24	24	29	30	5.26	8
60	21	45	24	24	29	30	5.26	8
65	21	45	24	24	29	30	5.26	8
70	20	45	25	23	29	30	5.27	8
75	20	45	25	23	29	30	5.27	8
80	20	45	25	23	29	30	5.27	8
85	19	45	26	22	29	30	5.27	8
90	19	44	25	22	29	30	5.27	8
95	19	44	25	22	29	30	5.27	8
100	19	44	25	21	29	30	5.27	8
105	19	44	25	21	29	30	5.27	8
110	18	44	26	21	29	30	5.27	8
115	18	44	26	21	29	30	5.27	8
120	18	44	26	21	29	30	5.27	8
125	18	44	26	20	29	30	5.27	8
130	18	44	26	20	29	30	5.27	8
135	18	44	26	20	29	30	5.27	8
140	18	44	26	20	29	30	5.27	8
145	17	44	27	20	29	30	5.28	8
150	17	44	27	19	29	30	5.28	8
155	17	44	27	19	29	30	5.28	8
160	17	44	27	19	29	30	5.28	8
165	17	44	27	19	29	30	5.28	8
170	17	44	27	19	29	30	5.28	8
175	17	44	27	19	29	31	5.28	8
180	17	44	27	19	29	31	5.28	8

Lampiran 7a

Tabel Data Termoelektrik Ganda-Paralel pada Tegangan 8 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
185	17	44	27	18	29	31	5.28	8
190	17	44	27	18	29	31	5.27	8
195	16	44	28	18	29	30	5.27	8
200	16	44	28	18	29	30	5.27	8
205	16	44	28	18	29	30	5.27	8
210	16	44	28	18	29	30	5.27	8
215	16	44	28	18	29	30	5.27	8
220	16	44	28	18	29	30	5.27	8
225	16	44	28	18	29	30	5.27	8
230	16	44	28	18	29	30	5.27	8
235	16	44	28	18	29	30	5.27	8
240	16	44	28	18	29	30	5.27	8
245	16	44	28	17	29	30	5.27	8
250	16	44	28	17	29	30	5.27	8
255	16	44	28	17	29	30	5.27	8
260	16	44	28	17	29	31	5.27	8
265	16	44	28	17	29	31	5.27	8
270	16	44	28	17	29	31	5.27	8
275	15	44	29	17	29	31	5.27	8
280	15	44	29	17	29	30	5.27	8
285	15	44	29	17	29	30	5.27	8
290	15	44	29	17	29	30	5.27	8
295	15	44	29	17	29	30	5.27	8
300	15	44	29	17	29	30	5.27	8
305	15	44	29	17	29	30	5.27	8
310	15	44	29	17	29	30	5.27	8
315	15	44	29	17	29	30	5.27	8
320	15	44	29	17	29	30	5.27	8
325	15	44	29	17	29	30	5.27	8
330	15	44	29	17	29	30	5.27	8
335	15	44	29	17	29	30	5.27	8
340	15	44	29	17	29	30	5.27	8
345	15	44	29	17	29	31	5.27	8
350	15	44	29	17	29	31	5.27	8
355	15	44	29	17	29	31	5.27	8
360	15	44	29	17	29	31	5.27	8

Lampiran 7b

Tabel Hasil Perhitungan Termoelektrik Ganda-Paralel pada Tegangan 8 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64891	4197.6	0	0	0.00021	0.01642	0.00112	0.00247	0	0	0	0
5	0.64782	4175.2	0	0	0.00021	0.01629	0.00114	0.00247	32.85909	0.63582	20.89254	53.75163
10	0.64782	4175.2	0	0	0.00021	0.01629	0.00114	0.00247	32.85909	0.63582	20.89254	53.75163
15	0.64782	4175.2	0	0	0.00021	0.01629	0.00114	0.00247	32.98487	0.61444	20.26728	53.25215
20	0.64786	4176	1	9.01814	0.00021	0.01629	0.00114	0.00247	32.98487	0.61444	20.26728	53.25215
25	0.64789	4176.8	0	0	0.00021	0.01629	0.00114	0.00247	32.98487	0.61444	20.26728	53.25215
30	0.64793	4177.6	1	9.02268	0.00021	0.01631	0.00114	0.00247	32.95226	0.61147	20.1493	53.10156
35	0.64797	4178.4	0	0	0.00021	0.01630	0.00114	0.00247	33.03153	0.60231	19.89525	52.92678
40	0.64801	4179.2	1	9.02723	0.00021	0.01630	0.00114	0.00247	33.03153	0.60231	19.89525	52.92678
45	0.64805	4180	0	0	0.00021	0.01631	0.00114	0.00247	33.07792	0.59019	19.52235	52.60027
50	0.64809	4180.8	1	9.03177	0.00021	0.01631	0.00114	0.00247	33.07792	0.59019	19.52235	52.60027
55	0.64813	4181.6	0	0	0.00021	0.01631	0.00114	0.00247	33.07792	0.59019	19.52235	52.60027
60	0.64813	4181.6	0	0	0.00021	0.01631	0.00114	0.00247	33.07792	0.59019	19.52235	52.60027
65	0.64813	4181.6	0	0	0.00021	0.01631	0.00114	0.00247	33.07792	0.59019	19.52235	52.60027
70	0.64817	4182.4	1	9.03631	0.00021	0.01632	0.00114	0.00247	33.12403	0.57809	19.14859	52.27262
75	0.64821	4183.2	0	0	0.00021	0.01632	0.00114	0.00247	33.12403	0.57809	19.14859	52.27262
80	0.64821	4183.2	0	0	0.00021	0.01632	0.00114	0.00247	33.12403	0.57809	19.14859	52.27262
85	0.64825	4184	1	9.04086	0.00021	0.01634	0.00113	0.00247	33.04434	0.56764	18.75739	51.80173
90	0.64828	4184.8	0	0	0.00021	0.01635	0.00113	0.00247	32.96475	0.57672	19.01128	51.97603
95	0.64828	4184.8	0	0	0.00021	0.01635	0.00113	0.00247	32.96475	0.57672	19.01128	51.97603
100	0.64832	4185.6	1	9.0454	0.00021	0.01635	0.00113	0.00247	32.96475	0.57672	19.01128	51.97603
105	0.64836	4186.4	0	0	0.00021	0.01635	0.00113	0.00247	32.96475	0.57672	19.01128	51.97603
110	0.64836	4186.4	0	0	0.00021	0.01636	0.00113	0.00247	32.88524	0.56620	18.61956	51.50481
115	0.64836	4186.4	0	0	0.00021	0.01636	0.00113	0.00247	32.88524	0.56620	18.61956	51.50481
120	0.64836	4186.4	0	0	0.00021	0.01636	0.00113	0.00247	32.88524	0.56620	18.61956	51.50481
125	0.64840	4187.2	1	9.04995	0.00021	0.01636	0.00113	0.00247	32.88524	0.56620	18.61956	51.50481
130	0.64844	4188	0	0	0.00021	0.01636	0.00113	0.00247	32.88524	0.56620	18.61956	51.50481
135	0.64844	4188	0	0	0.00021	0.01636	0.00113	0.00247	32.88524	0.56620	18.61956	51.50481
140	0.64844	4188	0	0	0.00021	0.01636	0.00113	0.00247	32.88524	0.56620	18.61956	51.50481
145	0.64844	4188	0	0	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
150	0.64848	4188.8	1	9.0545	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
155	0.64852	4189.6	0	0	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
160	0.64852	4189.6	0	0	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
165	0.64852	4189.6	0	0	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
170	0.64852	4189.6	0	0	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
175	0.64852	4189.6	0	0	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
180	0.64852	4189.6	0	0	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417

Lampiran 7b

Tabel Hasil Perhitungan Termoelektrik Ganda-Paralel pada Tegangan 8 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
185	0.64856	4190.4	1	9.05904	0.00021	0.01637	0.00113	0.00247	32.93045	0.55401	18.24372	51.17417
190	0.64860	4191.2	0	0	0.00021	0.01637	0.00113	0.00247	32.80583	0.55562	18.22743	51.03326
195	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
200	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
205	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
210	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
215	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
220	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
225	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
230	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
235	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
240	0.64860	4191.2	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
245	0.64864	4192	1	9.06359	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
250	0.64867	4192.8	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
255	0.64867	4192.8	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
260	0.64867	4192.8	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
265	0.64867	4192.8	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
270	0.64867	4192.8	0	0	0.00021	0.01639	0.00112	0.00247	32.72651	0.54497	17.83487	50.56139
275	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
280	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
285	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
290	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
295	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
300	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
305	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
310	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
315	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
320	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
325	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
330	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
335	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
340	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
345	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
350	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
355	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917
360	0.64867	4192.8	0	0	0.00021	0.01640	0.00112	0.00247	32.64728	0.53425	17.44189	50.08917

Tabel Data Termoelektrik Ganda-Paralel pada Tegangan 10 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
0	30	31	1	29	29	31	0	0
5	26	51	25	28	29	30	6.17	10
10	26	51	25	28	29	30	6.17	10
15	25	51	26	28	29	30	6.17	10
20	25	51	26	28	29	30	6.17	10
25	25	51	26	28	29	30	6.17	10
30	25	51	26	27	29	30	6.17	10
35	24	50	26	27	29	30	6.17	10
40	24	50	26	27	29	30	6.2	10
45	24	50	26	26	29	31	6.2	10
50	24	50	26	26	29	31	6.21	10
55	24	50	26	26	29	31	6.21	10
60	24	50	26	26	29	30	6.21	10
65	24	50	26	25	29	30	6.21	10
70	23	50	27	25	29	30	6.21	10
75	23	50	27	25	29	30	6.21	10
80	23	50	27	25	29	30	6.21	10
85	23	50	27	25	29	30	6.21	10
90	23	50	27	25	29	30	6.21	10
95	23	50	27	25	29	30	6.21	10
100	23	50	27	24	29	30	6.21	10
105	23	50	27	24	29	30	6.21	10
110	23	50	27	24	29	30	6.21	10
115	23	50	27	24	29	30	6.21	10
120	23	50	27	24	29	30	6.21	10
125	22	50	28	24	29	30	6.21	10
130	22	50	28	24	29	31	6.21	10
135	22	50	28	24	29	31	6.21	10
140	22	50	28	24	29	31	6.21	10
145	22	50	28	24	29	31	6.21	10
150	22	50	28	24	29	31	6.21	10
155	22	50	28	24	29	31	6.21	10
160	22	50	28	24	29	31	6.21	10
165	22	50	28	24	29	31	6.21	10
170	22	50	28	24	29	31	6.21	10
175	22	50	28	23	29	31	6.21	10
180	22	50	28	23	29	31	6.21	10

Lampiran 8a

Tabel Data Termoelektrik Ganda-Paralel pada Tegangan 10 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
185	22	50	28	23	29	31	6.21	10
190	22	50	28	23	29	31	6.21	10
195	21	50	29	23	29	31	6.21	10
200	21	50	29	23	29	31	6.21	10
205	21	50	29	23	29	31	6.21	10
210	21	50	29	23	29	31	6.21	10
215	21	50	29	22	29	31	6.21	10
220	21	50	29	22	29	31	6.21	10
225	21	50	29	22	29	31	6.21	10
230	21	50	29	22	29	31	6.21	10
235	21	50	29	22	29	31	6.21	10
240	21	50	29	22	29	31	6.2	10
245	21	50	29	22	29	31	6.2	10
250	21	50	29	22	29	31	6.2	10
255	21	50	29	22	29	31	6.2	10
260	21	50	29	22	29	31	6.2	10
265	21	50	29	22	29	31	6.2	10
270	21	50	29	22	29	31	6.2	10
275	21	50	29	22	29	31	6.2	10
280	21	50	29	22	29	31	6.2	10
285	21	50	29	22	29	31	6.2	10
290	21	50	29	22	29	31	6.2	10
295	21	50	29	22	29	31	6.2	10
300	21	50	29	22	29	31	6.19	10
305	21	50	29	22	29	31	6.18	10
310	21	51	30	22	29	31	6.18	10
315	21	51	30	22	29	31	6.18	10
320	21	51	30	22	29	31	6.18	10
325	21	51	30	22	29	31	6.18	10
330	21	51	30	22	29	31	6.18	10
335	21	51	30	22	29	31	6.18	10
340	21	51	30	22	29	31	6.18	10
345	21	51	30	22	29	31	6.18	10
350	21	51	30	22	29	31	6.18	10
355	21	51	30	22	29	31	6.18	10
360	21	51	30	22	29	31	6.18	10

Lampiran 8b

Tabel Hasil Perhitungan Termoelektrik Ganda-Paralel pada Tegangan 10 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64887	4196.8	0	0	0.00021	0.01637	0.00113	0.00247	0	0	0	0
5	0.64778	4174.4	1	9.01360	0.00022	0.01619	0.00117	0.00246	46.72433	0.45000	21.0261	67.75042
10	0.64782	4175.2	0	0	0.00022	0.01619	0.00117	0.00246	46.72433	0.45000	21.0261	67.75042
15	0.64782	4175.2	0	0	0.00022	0.01620	0.00117	0.00247	46.61359	0.44242	20.62272	67.23631
20	0.64782	4175.2	0	0	0.00022	0.01620	0.00117	0.00247	46.61359	0.44242	20.62272	67.23631
25	0.64782	4175.2	0	0	0.00022	0.01620	0.00117	0.00247	46.61359	0.44242	20.62272	67.23631
30	0.64786	4176	1	9.01814	0.00022	0.01620	0.00117	0.00247	46.61359	0.44242	20.62272	67.23631
35	0.64789	4176.8	0	0	0.00022	0.01622	0.00116	0.00247	46.3925	0.44150	20.48226	66.87476
40	0.64789	4176.8	0	0	0.00022	0.01622	0.00116	0.00247	46.84474	0.43762	20.50002	67.34476
45	0.64793	4177.6	1	9.02268	0.00022	0.01622	0.00116	0.00247	46.84474	0.43762	20.50002	67.34476
50	0.64797	4178.4	0	0	0.00022	0.01622	0.00116	0.00247	46.99598	0.43633	20.50569	67.50167
55	0.64797	4178.4	0	0	0.00022	0.01622	0.00116	0.00247	46.99598	0.43633	20.50569	67.50167
60	0.64797	4178.4	0	0	0.00022	0.01622	0.00116	0.00247	46.99598	0.43633	20.50569	67.50167
65	0.64801	4179.2	1	9.02723	0.00022	0.01622	0.00116	0.00247	46.99598	0.43633	20.50569	67.50167
70	0.64805	4180	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
75	0.64805	4180	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
80	0.64805	4180	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
85	0.64805	4180	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
90	0.64805	4180	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
95	0.64805	4180	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
100	0.64809	4180.8	1	9.03177	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
105	0.64813	4181.6	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
110	0.64813	4181.6	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
115	0.64813	4181.6	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
120	0.64813	4181.6	0	0	0.00022	0.01623	0.00116	0.00247	46.88418	0.42873	20.10089	66.98507
125	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
130	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
135	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
140	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
145	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
150	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
155	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
160	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
165	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
170	0.64813	4181.6	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
175	0.64817	4182.4	1	9.03631	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825
180	0.64821	4183.2	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.69573	66.46825

Lampiran 8b

Tabel Hasil Perhitungan Termoelektrik Ganda Paralel pada Tegangan 10 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K ⁻¹]	P [W]	COP	q_c [W]	q_h [W]
185	0.64821	4183.2	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.59573	66.46825
190	0.64821	4183.2	0	0	0.00022	0.01624	0.00116	0.00247	46.77252	0.42110	19.59573	66.46825
195	0.64821	4183.2	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
200	0.64821	4183.2	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
205	0.64821	4183.2	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
210	0.64821	4183.2	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
215	0.64825	4184	1	9.04086	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
220	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
225	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
230	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
235	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.66098	0.41341	19.29021	65.95119
240	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
245	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
250	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
255	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
260	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
265	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
270	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
275	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
280	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
285	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
290	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.51082	0.41463	19.285	65.79582
295	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.45083	0.41512	19.28288	65.73371
300	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.36091	0.41586	19.27966	65.64057
305	0.64828	4184.8	0	0	0.00022	0.01625	0.00115	0.00247	46.21124	0.41709	19.2742	65.48544
310	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
315	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
320	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
325	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
330	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
335	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
340	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
345	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
350	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
355	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297
360	0.64828	4184.8	0	0	0.00022	0.01624	0.00116	0.00247	46.3217	0.41042	19.01127	65.33297

Lampiran 9a

Tabel Data Termoelektrik Ganda-Paralel pada Tegangan 12 V

Waktu [menit]	T_c [°C]	T_h [°C]	ΔT [K]	$T_{\text{air dingin}}$ [°C]	T_{air} [°C]	T_{ambient} [°C]	I [A]	V [V]
0	29	29	0	29	29	29	0	0
5	29	55	27	29	29	29	6.99	12
10	29	55	27	29	29	29	6.98	12
15	29	55	27	29	29	29	6.98	12
20	29	55	27	29	29	29	6.99	12
25	29	55	27	29	29	29	7	12
30	29	55	27	29	29	29	7	12
35	29	55	27	29	29	30	6.99	12
40	29	55	27	29	29	30	6.99	12
45	29	55	27	29	29	30	6.99	12
50	29	55	26	29	29	30	6.99	12
55	29	55	26	29	29	30	6.99	12
60	29	55	26	29	29	29	7	12
65	29	55	26	29	29	29	7	12
70	28	55	26	29	29	29	7	12
75	28	55	26	29	29	29	7	12
80	28	55	26	28	29	29	7	12
85	28	55	26	28	29	30	6.99	12
90	28	55	26	28	29	30	6.99	12
95	28	55	26	28	29	30	6.99	12
100	28	55	26	28	29	30	6.99	12
105	28	55	26	28	29	30	6.99	12
110	28	55	26	28	29	30	6.99	12
115	28	55	26	28	29	30	6.99	12
120	28	55	26	28	29	30	6.99	12
125	28	55	26	28	29	30	6.99	12
130	28	55	26	28	29	30	6.99	12
135	28	55	26	28	29	30	6.99	12
140	28	55	26	28	29	30	6.99	12
145	28	55	26	28	29	30	6.99	12
150	28	55	26	28	29	30	6.99	12
155	28	55	26	28	29	30	6.99	12
160	28	55	26	28	29	30	6.99	12
165	28	55	26	28	29	30	6.99	12
170	28	55	26	28	29	30	6.99	12
175	28	56	27	28	29	30	6.99	12
180	28	56	27	28	29	30	6.99	12

Tabel Data Termoelektrik Ganda-Paralel pada Tegangan 12 V

Waktu [menit]	T _c [°C]	T _h [°C]	ΔT [K]	T _{air dingin} [°C]	T _{air} [°C]	T _{ambient} [°C]	I [A]	V [V]
185	28	56	27	28	29	30	6.99	12
190	28	56	27	28	29	30	6.99	12
195	28	56	27	28	29	30	6.99	12
200	28	55	26	28	29	30	6.99	12
205	28	55	26	28	29	30	6.99	12
210	28	55	26	28	29	30	6.99	12
215	28	56	27	28	29	30	6.99	12
220	28	56	27	28	29	30	6.99	12
225	28	56	27	28	29	30	6.99	12
230	28	56	27	28	29	30	6.99	12
235	28	56	27	28	29	30	6.99	12
240	28	56	27	28	29	30	6.99	12
245	28	56	27	28	29	30	6.99	12
250	28	56	27	28	29	30	6.99	12
255	28	56	27	28	29	30	6.99	12
260	28	56	27	28	29	30	6.99	12
265	28	56	27	28	29	30	6.99	12
270	28	56	27	28	29	30	6.99	12
275	28	56	27	28	29	30	6.99	12
280	28	56	27	28	29	30	6.99	12
285	28	56	27	28	29	30	6.99	12
290	28	56	27	28	29	30	6.99	12
295	28	56	27	28	29	30	6.99	12
300	28	56	27	28	29	30	6.99	12
305	28	56	27	28	29	30	6.99	12
310	28	56	27	28	29	30	6.99	12
315	28	56	27	28	29	30	6.99	12
320	28	56	27	28	29	30	6.99	12
325	28	56	27	28	29	30	6.99	12
330	28	56	27	28	29	30	6.99	12
335	28	56	27	28	29	30	6.99	12
340	28	56	27	28	29	30	6.99	12
345	28	56	27	28	29	30	6.99	12
350	28	56	27	28	29	30	6.99	12
355	28	56	27	28	29	30	6.99	12
360	28	56	27	28	29	30	6.99	12

Lampiran 9b

Tabel Hasil Perhitungan Termoelektrik Ganda-Paralel pada Tegangan 12 V

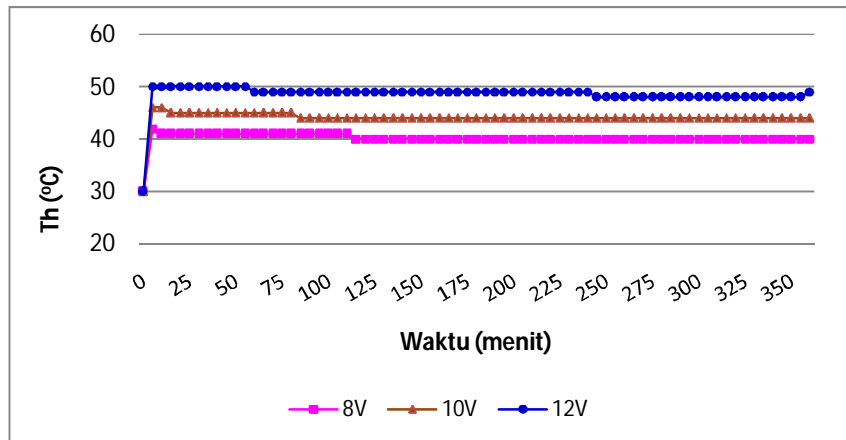
Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ωcm)	z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
0	0.64887	4196.8	0	0	0.00021	0.01642	0.00112	0.00247	0	0	0	0
5	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	60.9684	0.34893	21.27356	82.24196
10	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	60.79408	0.34999	21.27746	82.07154
15	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	60.79408	0.34999	21.27746	82.07154
20	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	60.9684	0.34893	21.27356	82.24196
25	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	61.14297	0.34787	21.26953	82.4125
30	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	61.14297	0.34787	21.26953	82.4125
35	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	60.9684	0.34893	21.27356	82.24196
40	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	60.9684	0.34893	21.27356	82.24196
45	0.64774	4173.6	0	0	0.00022	0.01613	0.00119	0.00246	60.9684	0.34893	21.27356	82.24196
50	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.9684	0.34893	21.27356	82.24196
55	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.9684	0.34893	21.27356	82.24196
60	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	61.14297	0.34787	21.26953	82.4125
65	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	61.14297	0.34787	21.26953	82.4125
70	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.99931	0.34190	20.85593	81.85524
75	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.99931	0.34190	20.85593	81.85524
80	0.64774	4173.6	1	9.01360	0.00022	0.01612	0.00119	0.00246	60.99931	0.34190	20.85593	81.85524
85	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
90	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
95	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
100	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
105	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
110	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
115	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
120	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
125	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
130	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
135	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
140	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
145	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
150	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
155	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
160	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
165	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
170	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
175	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
180	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384

Lampiran 9b

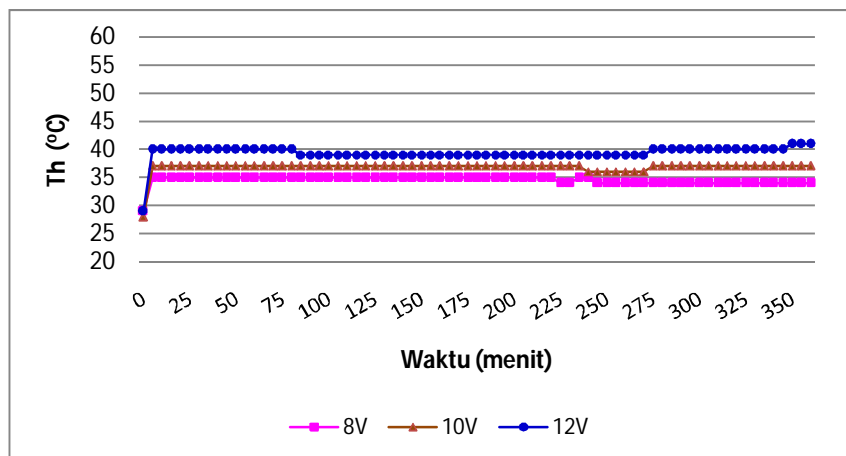
Tabel Hasil Perhitungan Termoelektrik Ganda-Paralel pada Tegangan 12 V

Waktu [menit]	m_{air} [kg]	C_p [J/kgK]	ΔT_{air} [K]	q_w [W]	α_m (V/K)	κ_m (W/cmK)	ρ (Ω cm)	Z [K^{-1}]	P [W]	COP	q_c [W]	q_h [W]
185	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
190	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
195	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
200	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
205	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
210	0.64774	4173.6	0	0	0.00022	0.01612	0.00119	0.00246	60.82515	0.34295	20.86008	81.68523
215	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
220	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
225	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
230	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
235	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
240	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
245	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
250	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
255	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
260	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
265	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
270	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
275	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
280	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
285	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
290	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
295	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
300	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
305	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
310	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
315	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
320	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
325	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
330	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
335	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
340	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
345	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
350	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
355	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384
360	0.64774	4173.6	0	0	0.00022	0.01611	0.00119	0.00246	60.9684	0.33764	20.58544	81.55384

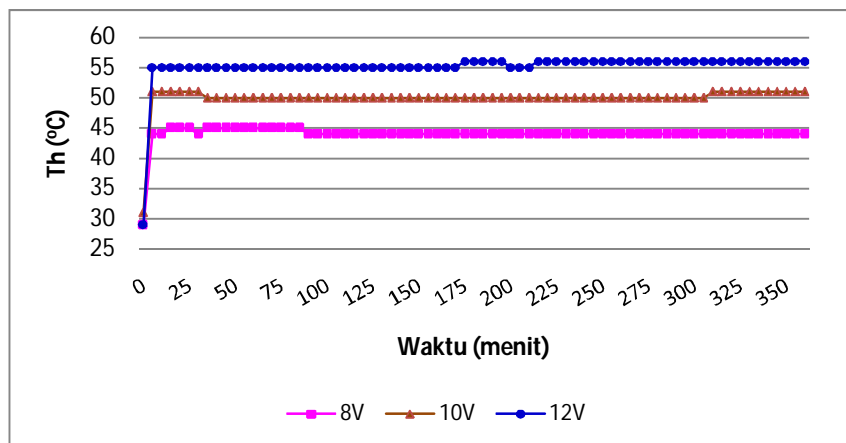
Lampiran 10. Grafik temperatur sisi panas



Grafik 1. Temperatur sisi panas untuk modul termoelektrik tunggal

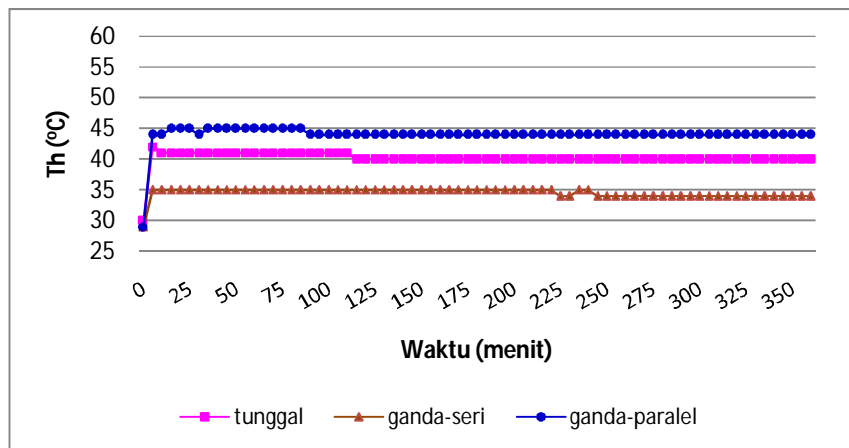


Grafik 2. Temperatur sisi panas untuk modul termoelektrik ganda-seri

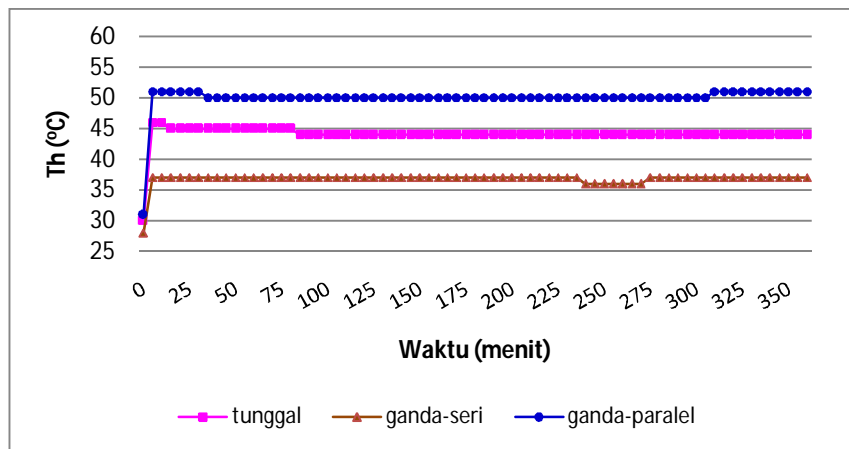


Grafik 3. Temperatur sisi panas untuk modul termoelektrik ganda-paralel

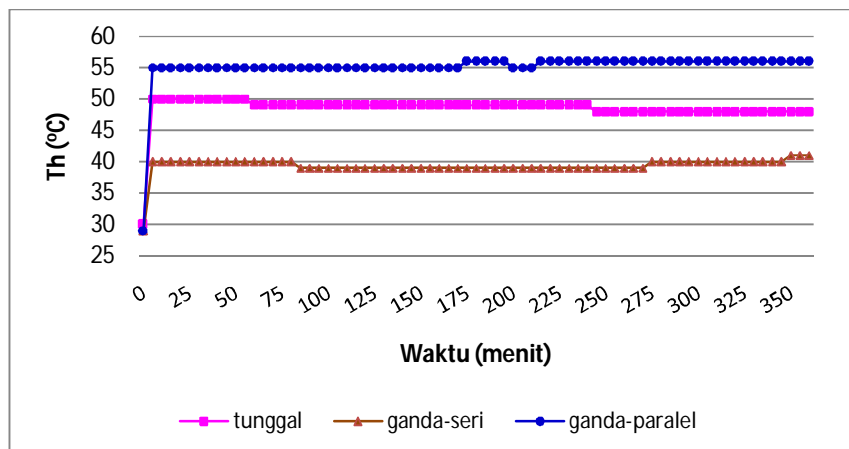
Lampiran 10. Grafik temperatur sisi panas



Grafik 4. Temperatur sisi panas dengan tegangan 8V

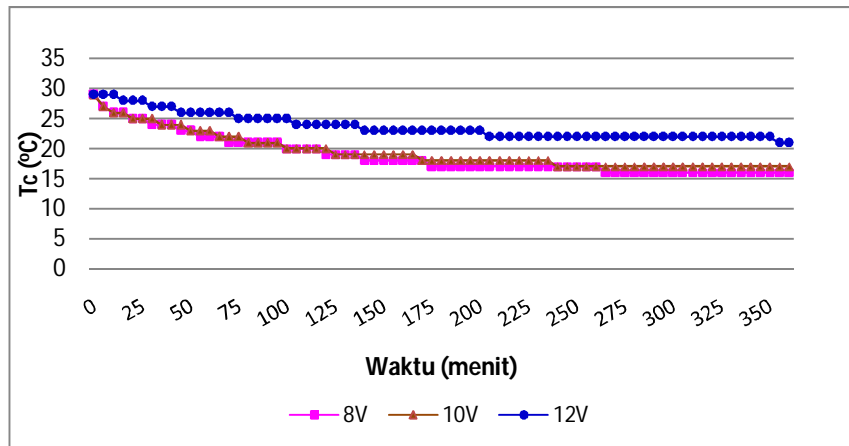


Grafik 5. Temperatur sisi panas dengan tegangan 10V

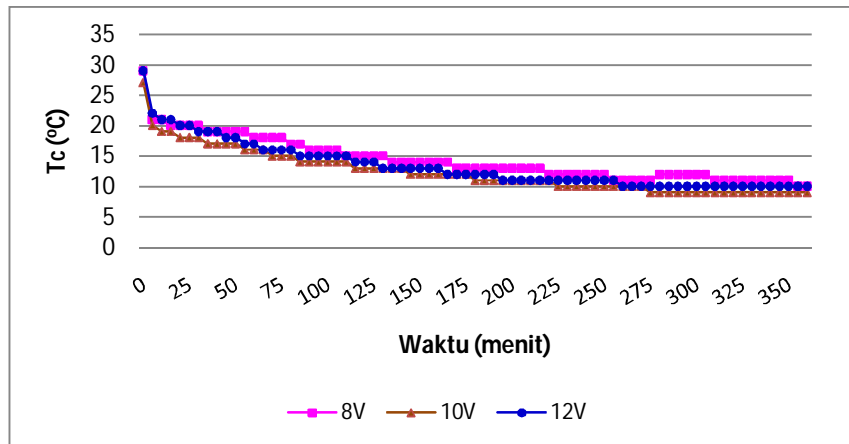


Grafik 6. Temperatur sisi panas dengan tegangan 12V

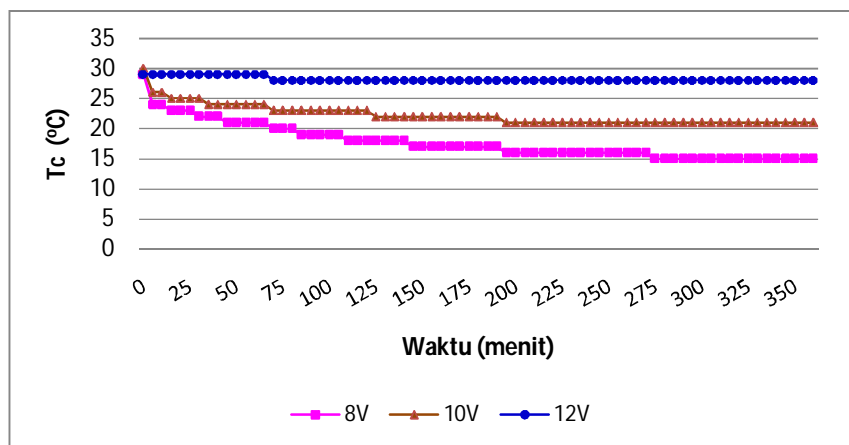
Lampiran 11. Grafik temperatur sisi dingin



Grafik 1. Temperatur sisi dingin untuk modul termoelektrik tunggal

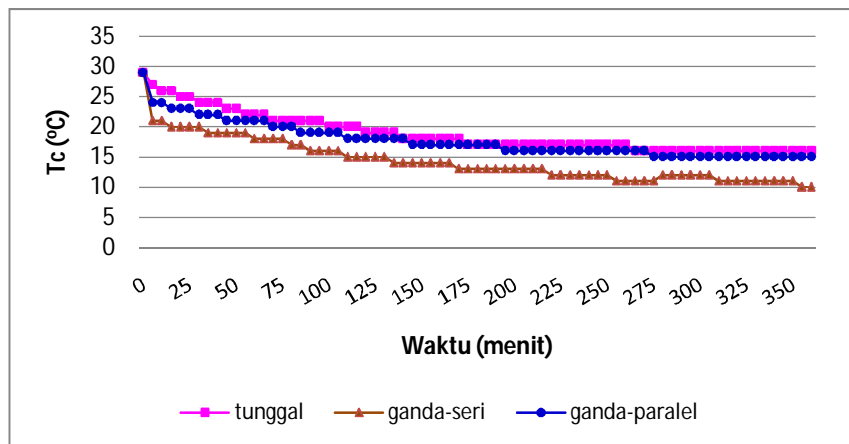


Grafik 2. Temperatur sisi dingin untuk modul termoelektrik ganda-seri

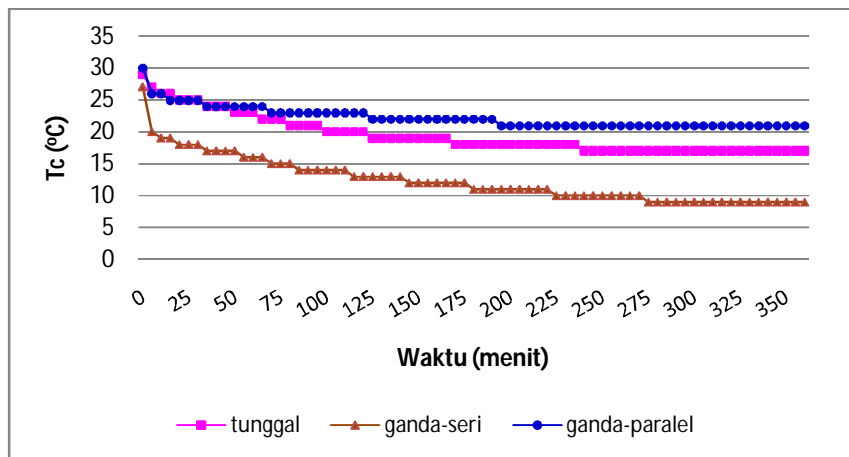


Grafik 3. Temperatur sisi dingin untuk modul termoelektrik ganda-paralel

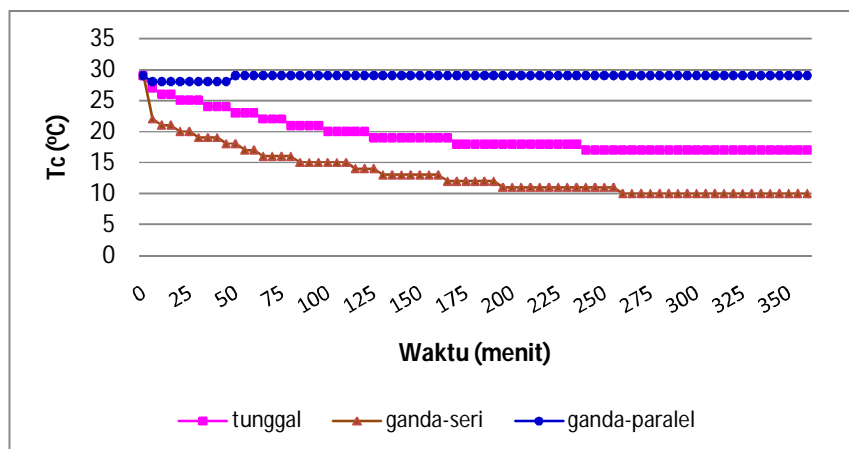
Lampiran 11. Grafik temperatur sisi dingin



Grafik 4. Temperatur sisi dingin dengan tegangan 8V

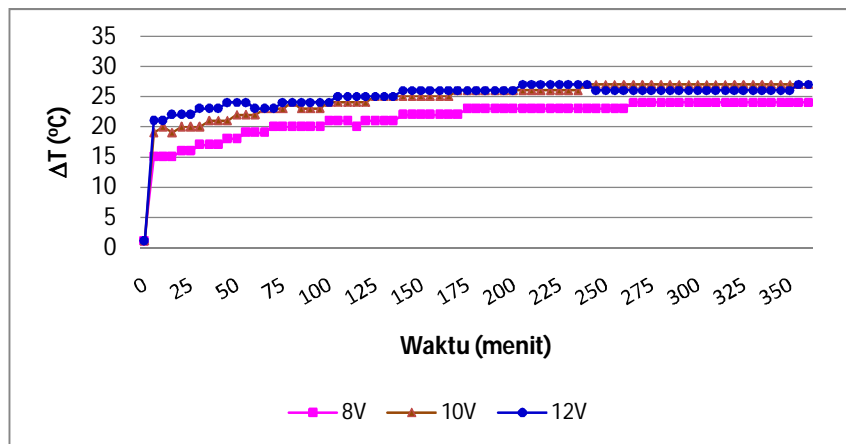


Grafik 5. Temperatur sisi dingin dengan tegangan 10V

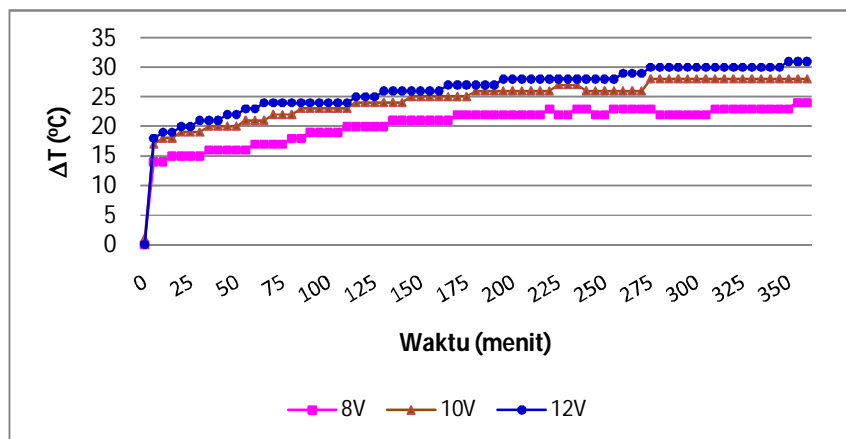


Grafik 6. Temperatur sisi dingin dengan tegangan 12V

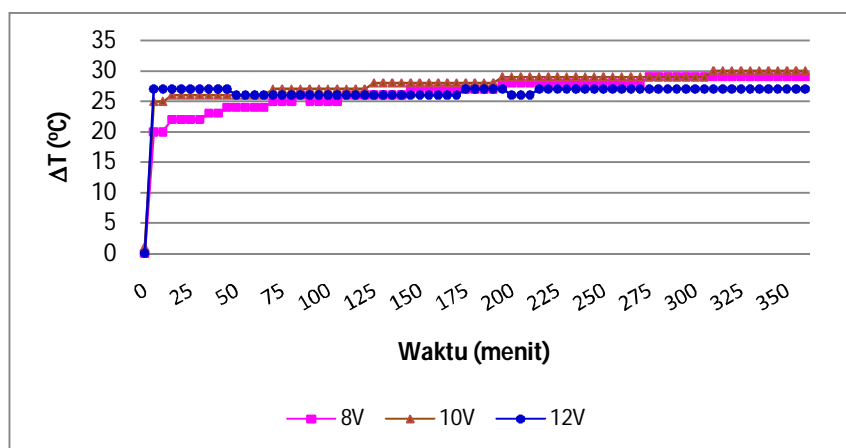
Lampiran 12. Grafik beda temperatur



Grafik 1. Beda temperatur untuk modul termoelektrik tunggal

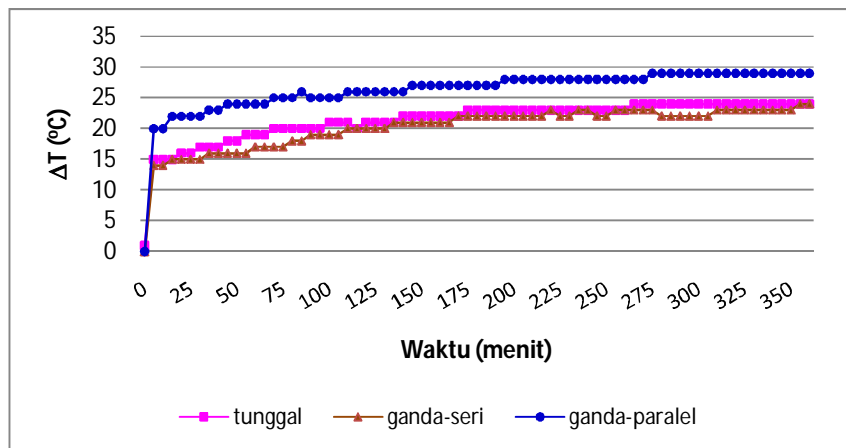


Grafik 2. Beda temperatur untuk modul termoelektrik ganda-seri

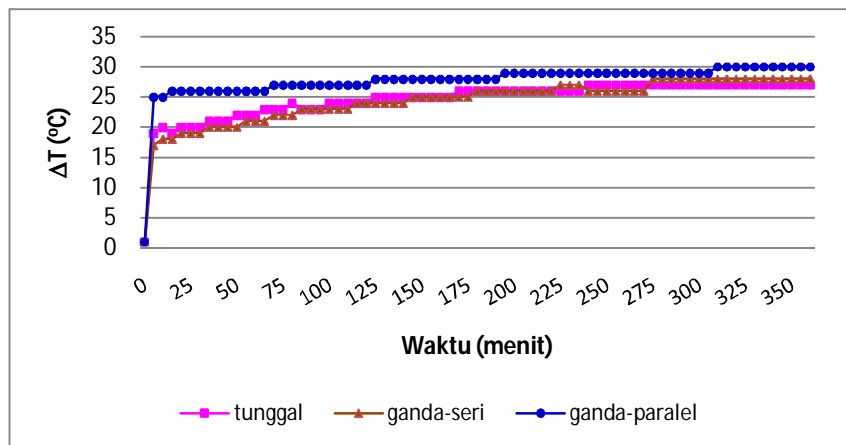


Grafik 3. Beda temperatur untuk modul termoelektrik ganda-paralel

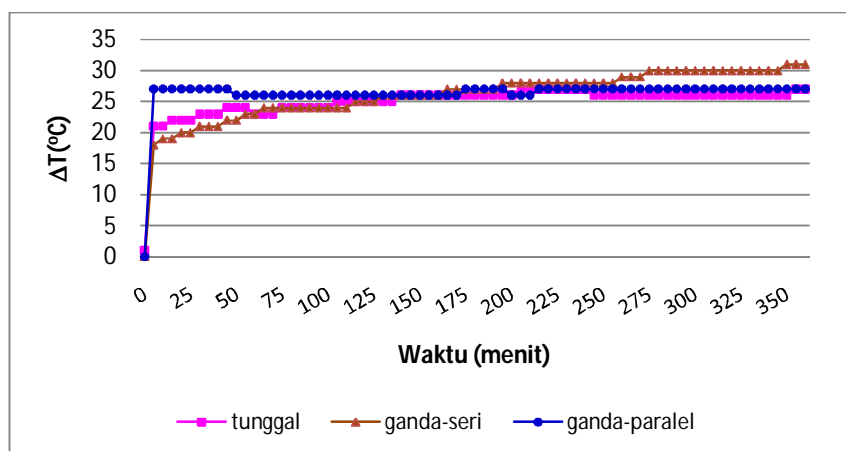
Lampiran 12. Grafik beda temperatur



.Grafik 4. Benda temperatur dengan tegangan 8 V

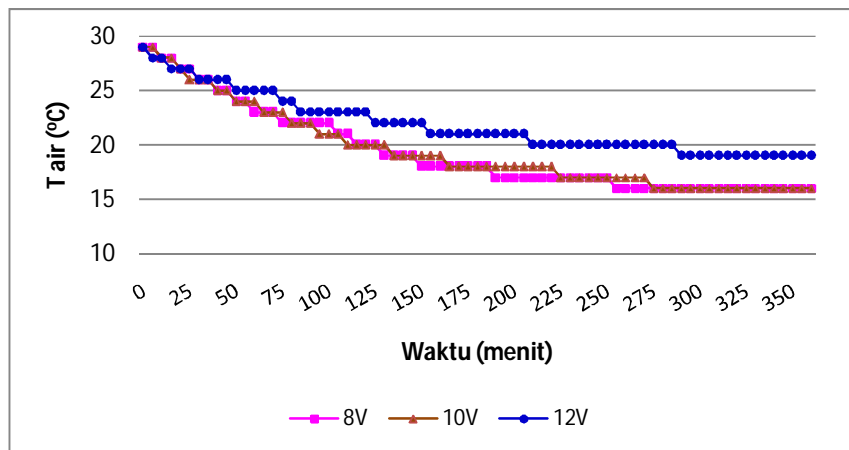


Grafik 5. Benda temperatur dengan tegangan 10 V

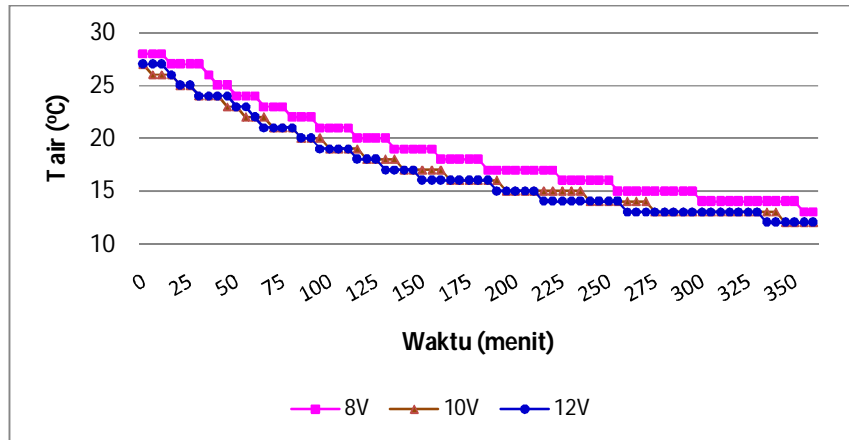


Grafik 6. Benda temperatur dengan tegangan 12 V

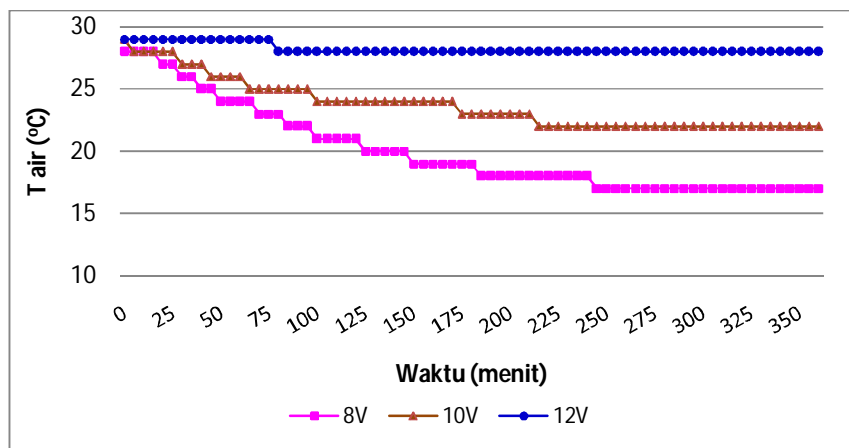
Lampiran 13. Grafik temperatur air yang didinginkan



Grafik 1. Temperatur air untuk termoelektrik tunggal

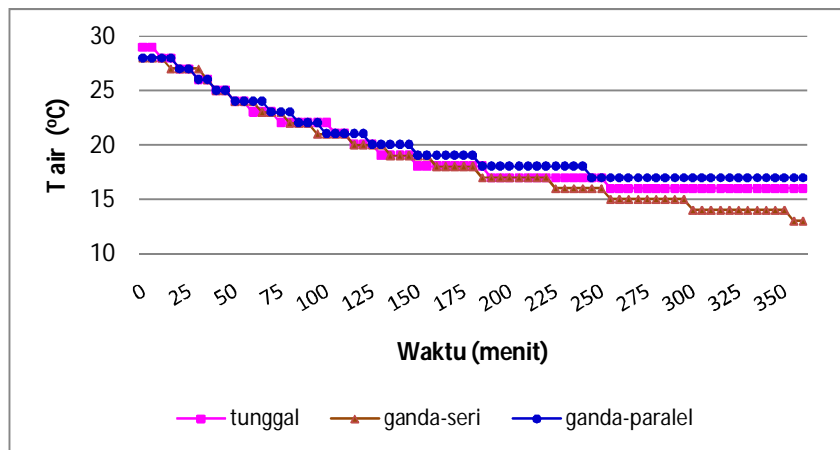


Grafik 2. Temperatur air untuk termoelektrik ganda-seri

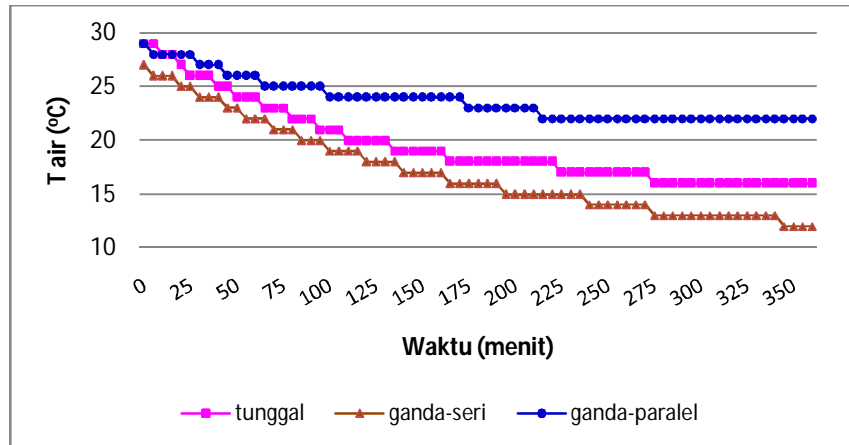


Grafik 3. Temperatur air untuk modul termoelektrik ganda-paralel

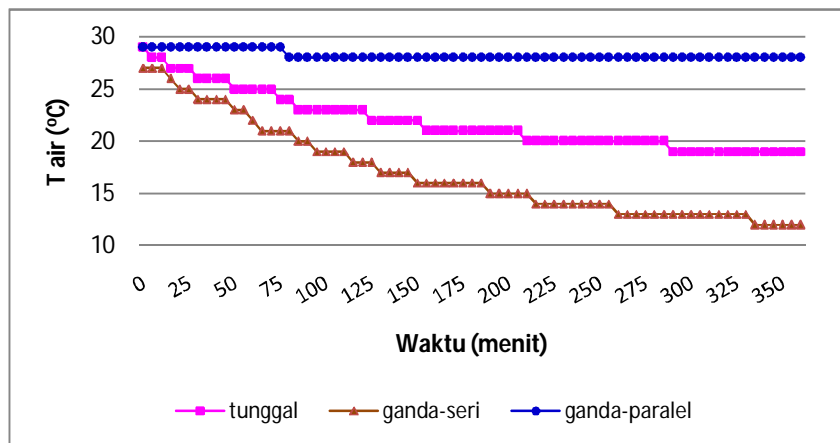
Lampiran 13. Grafik temperatur air yang didinginkan



Grafik 4. Temperatur air dengan tegangan 8 V



Grafik 5. Temperatur air dengan tegangan 10 V



Grafik 6. Temperatur air dengan tegangan 12 V

Lampiran 14. Data teknis modul termoelektrik TEC1-12706

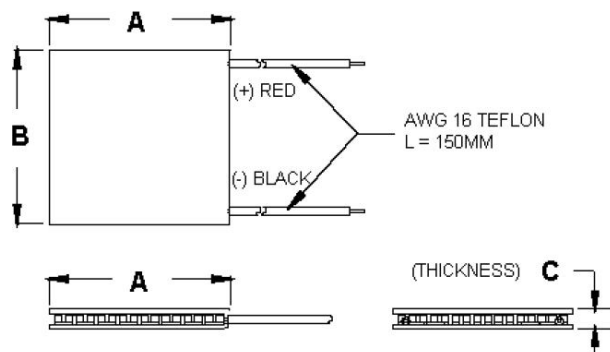


**Thermoelectric
Cooler**

TEC1-12706

Performance Specifications

Hot Side Temperature (°C)	25° C	50° C
Qmax (Watts)	50	57
Delta Tmax (°C)	66	75
I _{max} (Amps)	6.4	6.4
V _{max} (Volts)	14.4	16.4
Module Resistance (Ohms)	1.98	2.30



Ceramic Material: Alumina (Al₂O₃)
Solder Construction: 138°C, Bismuth Tin (BiSn)

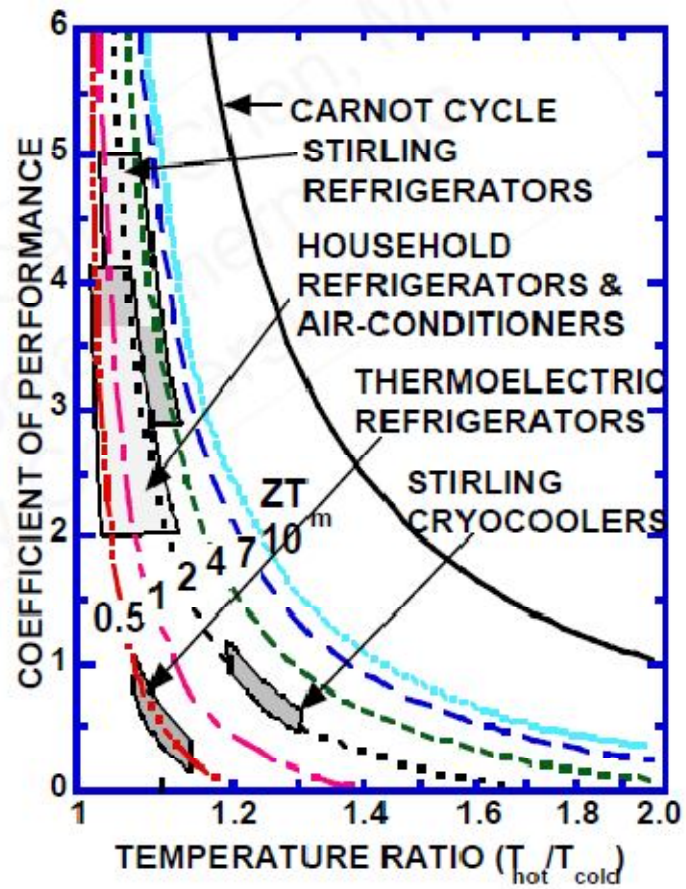
Size table:

A	B	C				
40	40	3.8				

Operating Tips

- Max. Operating Temperature: 138°C
- Do not exceed I_{max} or V_{max} when operating module.
- Life expectancy: 200,000 hours
-
- Please consult HB for moisture protection options (sealing).
- Failure rate based on long time testings: 0.2%.

Lampiran 15. Grafik COP untuk mesin pendingin (Rohsenow,2013).



Lampiran 16. Tabel sifat-sifat zat cair (Çengel and Boles, 2006).

TABLE A-3

Properties of common liquids, solids, and foods

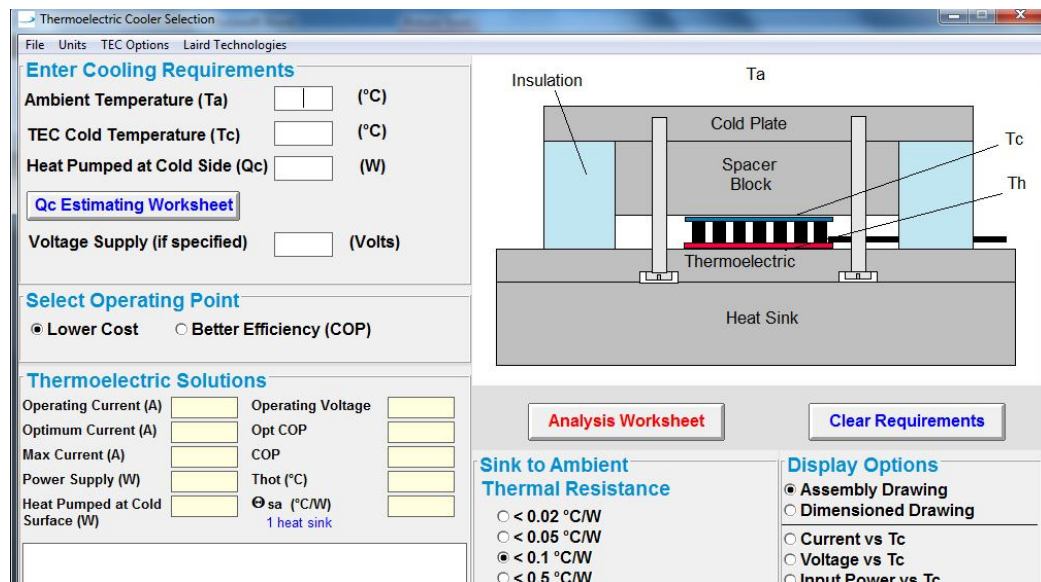
(a) Liquids

Substance	Boiling data at 1 atm		Freezing data		Liquid properties		
	Normal boiling point, °C	Latent heat of vaporization h_{fg} , kJ/kg	Freezing point, °C	Latent heat of fusion h_{if} , kJ/kg	Temperature, °C	Density ρ , kg/m ³	Specific heat c_p , kJ/kg · K
Ammonia	-33.3	1357	-77.7	322.4	-33.3	682	4.43
					-20	665	4.52
					0	639	4.60
					25	602	4.80
Argon	-185.9	161.6	-189.3	28	-185.6	1394	1.14
Benzene	80.2	394	5.5	126	20	879	1.72
Brine (20% sodium chloride by mass)	103.9	—	-17.4	—	20	1150	3.11
<i>n</i> -Butane	-0.5	385.2	-138.5	80.3	-0.5	601	2.31
Carbon dioxide	-78.4*	230.5 (at 0°C)	-56.6	—	0	298	0.59
Ethanol	78.2	838.3	-114.2	109	25	783	2.46
Ethyl alcohol	78.6	855	-156	108	20	789	2.84
Ethylene glycol	198.1	800.1	-10.8	181.1	20	1109	2.84
Glycerine	179.9	974	18.9	200.6	20	1261	2.32
Helium	-268.9	22.8	—	—	-268.9	146.2	22.8
Hydrogen	-252.8	445.7	-259.2	59.5	-252.8	70.7	10.0
Isobutane	-11.7	367.1	-160	105.7	-11.7	593.8	2.28
Kerosene	204–293	251	-24.9	—	20	820	2.00
Mercury	356.7	294.7	-38.9	11.4	25	13,560	0.139
Methane	-161.5	510.4	-182.2	58.4	-161.5	423	3.49
					-100	301	5.79
Methanol	64.5	1100	-97.7	99.2	25	787	2.55
Nitrogen	-195.8	198.6	-210	25.3	-195.8	809	2.06
					-160	596	2.97
Octane	124.8	306.3	-57.5	180.7	20	703	2.10
Oil (light)	—	—	—	—	25	910	1.80
Oxygen	-183	212.7	-218.8	13.7	-183	1141	1.71
Petroleum	—	230–384	—	—	20	640	2.0
					25	640	2.0
Propane	-42.1	427.8	-187.7	80.0	-42.1	581	2.25
					0	529	2.53
					50	449	3.13
					-50	1443	1.23
Refrigerant-134a	-26.1	217.0	-96.6	—	-26.1	1374	1.27
					0	1295	1.34
					25	1207	1.43
					0	1000	4.22
Water	100	2257	0.0	333.7	25	997	4.18
					50	988	4.18
					75	975	4.19
					100	958	4.22

* Sublimation temperature. (At pressures below the triple-point pressure of 518 kPa, carbon dioxide exists as a solid or gas. Also, the freezing point temperature of carbon dioxide is the triple-point temperature of -56.5°C.)

Lampiran 17. Tampilan AZTEC software version 3.1

(Laird Technologies. 2010).



Gambar proses pengambilan data dan rangkaian alat penelitian

