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LAMPIRAN

A. Lampiran Data Hasil Pengukuran

1. Lampiran Data Hasil Pengukuran Pada Volume Tangki 25 Liter

1.1 Data Tanggal 10 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,33 | 7,64 | 25,7 |
| 9.30 | 900 | 16,35 | 7,67 | 26,2 |
| 10.00 | 900 | 16,33 | 7,65 | 26,8 |
| 10.30 | 900 | 16,37 | 7,65 | 27,3 |
| 11.00 | 900 | 16,41 | 7,65 | 27,8 |
| 11.30 | 900 | 16,41 | 7,66 | 28,3 |
| 12.00 | 900 | 16,42 | 7,66 | 28,8 |
| 12.30 | 900 | 16,42 | 7,66 | 29,3 |
| 13.00 | 900 | 16,42 | 7,66 | 29,9 |
| 13.30 | 900 | 16,44 | 7,66 | 30,4 |
| 14.00 | 900 | 16,42 | 7,63 | 31 |
| 14.30 | 900 | 16,43 | 7,63 | 31,5 |
| 15.00 | 900 | 16,43 | 7,63 | 32 |
| 15.30 | 900 | 16,42 | 7,63 | 32,5 |
| 16.00 | 900 | 16,42 | 7,63 | 32,9 |

1.2 Data Tanggal 11 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,35 | 7,62 | 25,3 |
| 9.30 | 900 | 16,36 | 7,65 | 25,8 |
| 10.00 | 900 | 16,35 | 7,63 | 26,3 |
| 10.30 | 900 | 16,37 | 7,63 | 26,9 |
| 11.00 | 900 | 16,39 | 7,63 | 27,5 |
| 11.30 | 900 | 16,37 | 7,64 | 28 |
| 12.00 | 900 | 16,35 | 7,63 | 28,5 |
| 12.30 | 900 | 16,41 | 7,63 | 29 |
| 13.00 | 900 | 16,41 | 7,63 | 29,6 |
| 13.30 | 900 | 16,42 | 7,62 | 30,1 |
| 14.00 | 900 | 16,41 | 7,62 | 30,7 |
| 14.30 | 900 | 16,4 | 7,62 | 31,2 |
| 15.00 | 900 | 16,41 | 7,62 | 31,7 |
| 15.30 | 900 | 16,4 | 7,63 | 32,1 |
| 16.00 | 900 | 16,4 | 7,61 | 32,5 |

1.3 Data Tanggal 17 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,25 | 7,56 | 25,3 |
| 9.30 | 900 | 16,26 | 7,57 | 25,8 |
| 10.00 | 900 | 16,27 | 7,54 | 26,2 |
| 10.30 | 900 | 16,24 | 7,55 | 26,8 |
| 11.00 | 900 | 16,26 | 7,56 | 27,3 |
| 11.30 | 900 | 16,26 | 7,57 | 27,7 |
| 12.00 | 900 | 16,25 | 7,57 | 28,1 |
| 12.30 | 900 | 16,25 | 7,56 | 28,6 |
| 13.00 | 900 | 16,24 | 7,58 | 29,2 |
| 13.30 | 900 | 16,27 | 7,6 | 29,7 |
| 14.00 | 900 | 16,26 | 7,6 | 30,3 |
| 14.30 | 900 | 16,25 | 7,61 | 30,8 |
| 15.00 | 900 | 16,25 | 7,59 | 31,3 |
| 15.30 | 900 | 16,24 | 7,58 | 31,7 |
| 16.00 | 900 | 16,27 | 7,59 | 32,1 |

2. Lampiran Data Hasil Pengukuran Pada Volume Tangki 35 Liter

2.1 Data Tanggal 9 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,37 | 7,59 | 27,7 |
| 9.30 | 900 | 16,35 | 7,6 | 28 |
| 10.00 | 900 | 16,36 | 7,61 | 28,4 |
| 10.30 | 900 | 16,37 | 7,62 | 28,8 |
| 11.00 | 900 | 16,39 | 7,63 | 29,2 |
| 11.30 | 900 | 16,4 | 7,62 | 29,6 |
| 12.00 | 900 | 16,37 | 7,62 | 30 |
| 12.30 | 900 | 16,39 | 7,62 | 30,4 |
| 13.00 | 900 | 16,37 | 7,62 | 30,8 |
| 13.30 | 900 | 16,35 | 7,6 | 31,1 |
| 14.00 | 900 | 16,36 | 7,58 | 31,5 |
| 14.30 | 900 | 16,36 | 7,58 | 31,8 |
| 15.00 | 900 | 16,36 | 7,59 | 32,2 |
| 15.30 | 900 | 16,36 | 7,6 | 32,5 |
| 16.00 | 900 | 16,35 | 7,58 | 32,8 |

2.2 Data Tanggal 12 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,35 | 7,62 | 27,5 |
| 9.30 | 900 | 16,36 | 7,6 | 27,8 |
| 10.00 | 900 | 16,36 | 7,59 | 28,2 |
| 10.30 | 900 | 16,38 | 7,61 | 28,6 |
| 11.00 | 900 | 16,36 | 7,63 | 29 |
| 11.30 | 900 | 16,38 | 7,62 | 29,4 |
| 12.00 | 900 | 16,37 | 7,63 | 29,8 |
| 12.30 | 900 | 16,38 | 7,62 | 30,2 |
| 13.00 | 900 | 16,38 | 7,61 | 30,6 |
| 13.30 | 900 | 16,35 | 7,6 | 31 |
| 14.00 | 900 | 16,37 | 7,59 | 31,3 |
| 14.30 | 900 | 16,38 | 7,57 | 31,7 |
| 15.00 | 900 | 16,37 | 7,59 | 32 |
| 15.30 | 900 | 16,38 | 7,6 | 32,3 |
| 16.00 | 900 | 16,36 | 7,6 | 32,6 |

2.3 Data Tanggal 15 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,29 | 7,6 | 27,5 |
| 9.30 | 900 | 16,26 | 7,61 | 27,8 |
| 10.00 | 900 | 16,27 | 7,58 | 28,1 |
| 10.30 | 900 | 16,28 | 7,61 | 28,4 |
| 11.00 | 900 | 16,3 | 7,58 | 28,8 |
| 11.30 | 900 | 16,3 | 7,59 | 29,1 |
| 12.00 | 900 | 16,32 | 7,63 | 29,5 |
| 12.30 | 900 | 16,31 | 7,6 | 29,9 |
| 13.00 | 900 | 16,34 | 7,61 | 30,3 |
| 13.30 | 900 | 16,35 | 7,6 | 30,7 |
| 14.00 | 900 | 16,32 | 7,59 | 31 |
| 14.30 | 900 | 16,35 | 7,57 | 31,4 |
| 15.00 | 900 | 16,31 | 7,59 | 31,7 |
| 15.30 | 900 | 16,32 | 7,6 | 32 |
| 16.00 | 900 | 16,31 | 7,6 | 32,3 |

3. Lampiran Data Hasil Pengukuran Pada Volume Tangki 50 Liter

3.1 Data Tanggal 7 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,37 | 7,62 | 27,3 |
| 9.30 | 900 | 16,38 | 7,61 | 27,5 |
| 10.00 | 900 | 16,39 | 7,6 | 27,8 |
| 10.30 | 900 | 16,4 | 7,61 | 28 |
| 11.00 | 900 | 16,4 | 7,64 | 28,3 |
| 11.30 | 900 | 16,38 | 7,63 | 28,6 |
| 12.00 | 900 | 16,37 | 7,63 | 28,9 |
| 12.30 | 900 | 16,36 | 7,64 | 29,2 |
| 13.00 | 900 | 16,37 | 7,62 | 29,4 |
| 13.30 | 900 | 16,36 | 7,61 | 29,6 |
| 14.00 | 900 | 16,35 | 7,6 | 29,8 |
| 14.30 | 900 | 16,37 | 7,63 | 30 |
| 15.00 | 900 | 16,39 | 7,64 | 30,2 |
| 15.30 | 900 | 16,37 | 7,63 | 30,4 |
| 16.00 | 900 | 16,39 | 7,62 | 30,6 |

3.2 Data Tanggal 13 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,4 | 7,6 | 27,5 |
| 9.30 | 900 | 16,37 | 7,61 | 27,7 |
| 10.00 | 900 | 16,39 | 7,6 | 28 |
| 10.30 | 900 | 16,4 | 7,63 | 28,2 |
| 11.00 | 900 | 16,41 | 7,63 | 28,5 |
| 11.30 | 900 | 16,39 | 7,63 | 28,8 |
| 12.00 | 900 | 16,37 | 7,65 | 29,1 |
| 12.30 | 900 | 16,38 | 7,64 | 29,4 |
| 13.00 | 900 | 16,37 | 7,65 | 29,6 |
| 13.30 | 900 | 16,36 | 7,61 | 29,8 |
| 14.00 | 900 | 16,39 | 7,6 | 30 |
| 14.30 | 900 | 16,37 | 7,63 | 30,2 |
| 15.00 | 900 | 16,36 | 7,64 | 30,4 |
| 15.30 | 900 | 16,37 | 7,63 | 30,6 |
| 16.00 | 900 | 16,36 | 7,64 | 30,8 |

3.3 Data Tanggal 16 Februari 2022

| Waktu | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | Temperatur |
|-------|--------------------------|--------------|----------|------------|
| 9.00 | 900 | 16,25 | 7,5 | 27,5 |
| 9.30 | 900 | 16,24 | 7,51 | 27,6 |
| 10.00 | 900 | 16,23 | 7,52 | 27,8 |
| 10.30 | 900 | 16,24 | 7,54 | 28,1 |
| 11.00 | 900 | 16,25 | 7,56 | 28,4 |
| 11.30 | 900 | 16,26 | 7,57 | 28,7 |
| 12.00 | 900 | 16,27 | 7,59 | 28,9 |
| 12.30 | 900 | 16,25 | 7,6 | 29,1 |
| 13.00 | 900 | 16,23 | 7,61 | 29,3 |
| 13.30 | 900 | 16,25 | 7,61 | 29,5 |
| 14.00 | 900 | 16,26 | 7,6 | 29,7 |
| 14.30 | 900 | 16,27 | 7,59 | 29,9 |
| 15.00 | 900 | 16,26 | 7,58 | 30,1 |
| 15.30 | 900 | 16,28 | 7,59 | 30,3 |
| 16.00 | 900 | 16,25 | 7,59 | 30,5 |

B. Lampiran Data Hasil Perhitungan

1. Lampiran Data Hasil Perhitungan Pada Volume Tangki 25 Liter

1.1 Data Hasil Perhitungan Tanggal 10 Februari

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,33 | 7,64 | 1,071 | 0,76 | 94,819 | 963,9 | 9,837 | 25,4 | 25,7 | 31,5 | 0,018 | 120 | 14,583 | 1,435 | 1,816 |
| 9.30 | 900 | 16,35 | 7,67 | 1,071 | 0,76 | 95,307 | 963,9 | 9,888 | 25,4 | 26,2 | 84 | 0,023 | 120 | 19,444 | 1,923 | 2,421 |
| 10.00 | 900 | 16,33 | 7,65 | 1,071 | 0,76 | 94,943 | 963,9 | 9,850 | 25,4 | 26,8 | 147 | 0,027 | 120 | 22,685 | 2,234 | 2,824 |
| 10.30 | 900 | 16,37 | 7,65 | 1,071 | 0,76 | 95,175 | 963,9 | 9,874 | 25,4 | 27,3 | 199,5 | 0,028 | 120 | 23,090 | 2,280 | 2,875 |
| 11.00 | 900 | 16,41 | 7,65 | 1,071 | 0,76 | 95,408 | 963,9 | 9,898 | 25,4 | 27,8 | 252 | 0,028 | 120 | 23,333 | 2,310 | 2,905 |
| 11.30 | 900 | 16,41 | 7,66 | 1,071 | 0,76 | 95,532 | 963,9 | 9,911 | 25,4 | 28,3 | 304,5 | 0,028 | 120 | 23,495 | 2,329 | 2,925 |
| 12.00 | 900 | 16,42 | 7,66 | 1,071 | 0,76 | 95,591 | 963,9 | 9,917 | 25,4 | 28,8 | 357 | 0,028 | 120 | 23,611 | 2,342 | 2,939 |
| 12.30 | 900 | 16,42 | 7,66 | 1,071 | 0,76 | 95,591 | 963,9 | 9,917 | 25,4 | 29,3 | 409,5 | 0,028 | 120 | 23,698 | 2,350 | 2,950 |
| 13.00 | 900 | 16,42 | 7,66 | 1,071 | 0,76 | 95,591 | 963,9 | 9,917 | 25,4 | 29,9 | 472,5 | 0,029 | 120 | 24,306 | 2,410 | 3,026 |
| 13.30 | 900 | 16,44 | 7,66 | 1,071 | 0,76 | 95,707 | 963,9 | 9,929 | 25,4 | 30,4 | 525 | 0,029 | 120 | 24,306 | 2,413 | 3,026 |
| 14.00 | 900 | 16,42 | 7,63 | 1,071 | 0,76 | 95,216 | 963,9 | 9,878 | 25,4 | 31 | 588 | 0,030 | 120 | 24,747 | 2,445 | 3,081 |
| 14.30 | 900 | 16,43 | 7,63 | 1,071 | 0,76 | 95,274 | 963,9 | 9,884 | 25,4 | 31,5 | 640,5 | 0,030 | 120 | 24,711 | 2,442 | 3,076 |
| 15.00 | 900 | 16,43 | 7,63 | 1,071 | 0,76 | 95,274 | 963,9 | 9,884 | 25,4 | 32 | 693 | 0,030 | 120 | 24,679 | 2,439 | 3,072 |
| 15.30 | 900 | 16,42 | 7,63 | 1,071 | 0,76 | 95,216 | 963,9 | 9,878 | 25,4 | 32,5 | 745,5 | 0,030 | 120 | 24,653 | 2,435 | 3,069 |
| 16.00 | 900 | 16,42 | 7,63 | 1,071 | 0,76 | 95,216 | 963,9 | 9,878 | 25,4 | 32,9 | 787,5 | 0,029 | 120 | 24,306 | 2,401 | 3,026 |

1.2 Data Hasil Perhitungan Tanggal 11 Februari

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,35 | 7,62 | 1,071 | 0,76 | 94,686 | 963,9 | 9,823 | 25 | 25,3 | 31,5 | 0,018 | 120 | 14,583 | 1,433 | 1,816 |
| 9.30 | 900 | 16,36 | 7,65 | 1,071 | 0,76 | 95,117 | 963,9 | 9,868 | 25 | 25,8 | 84 | 0,023 | 120 | 19,444 | 1,919 | 2,421 |
| 10.00 | 900 | 16,35 | 7,63 | 1,071 | 0,76 | 94,810 | 963,9 | 9,836 | 25 | 26,3 | 147 | 0,025 | 120 | 21,065 | 2,072 | 2,622 |
| 10.30 | 900 | 16,37 | 7,63 | 1,071 | 0,76 | 94,926 | 963,9 | 9,848 | 25 | 26,9 | 199,5 | 0,028 | 120 | 23,090 | 2,274 | 2,875 |
| 11.00 | 900 | 16,39 | 7,63 | 1,071 | 0,76 | 95,042 | 963,9 | 9,860 | 25 | 27,5 | 252 | 0,029 | 120 | 24,306 | 2,397 | 3,026 |
| 11.30 | 900 | 16,37 | 7,64 | 1,071 | 0,76 | 95,051 | 963,9 | 9,861 | 25 | 28 | 304,5 | 0,029 | 120 | 24,306 | 2,397 | 3,026 |
| 12.00 | 900 | 16,35 | 7,63 | 1,071 | 0,76 | 94,810 | 963,9 | 9,836 | 25 | 28,5 | 357 | 0,029 | 120 | 24,306 | 2,391 | 3,026 |
| 12.30 | 900 | 16,41 | 7,63 | 1,071 | 0,76 | 95,158 | 963,9 | 9,872 | 25 | 29 | 409,5 | 0,029 | 120 | 24,306 | 2,399 | 3,026 |
| 13.00 | 900 | 16,41 | 7,63 | 1,071 | 0,76 | 95,158 | 963,9 | 9,872 | 25 | 29,6 | 472,5 | 0,030 | 120 | 24,846 | 2,453 | 3,093 |
| 13.30 | 900 | 16,42 | 7,62 | 1,071 | 0,76 | 95,092 | 963,9 | 9,865 | 25 | 30,1 | 525 | 0,030 | 120 | 24,792 | 2,446 | 3,086 |
| 14.00 | 900 | 16,41 | 7,62 | 1,071 | 0,76 | 95,034 | 963,9 | 9,859 | 25 | 30,7 | 588 | 0,030 | 120 | 25,189 | 2,483 | 3,136 |
| 14.30 | 900 | 16,4 | 7,62 | 1,071 | 0,76 | 94,976 | 963,9 | 9,853 | 25 | 31,2 | 640,5 | 0,030 | 120 | 25,116 | 2,475 | 3,127 |
| 15.00 | 900 | 16,41 | 7,62 | 1,071 | 0,76 | 95,034 | 963,9 | 9,859 | 25 | 31,7 | 693 | 0,030 | 120 | 25,053 | 2,470 | 3,119 |
| 15.30 | 900 | 16,4 | 7,63 | 1,071 | 0,76 | 95,100 | 963,9 | 9,866 | 25 | 32,1 | 745,5 | 0,030 | 120 | 24,653 | 2,432 | 3,069 |
| 16.00 | 900 | 16,4 | 7,61 | 1,071 | 0,76 | 94,851 | 963,9 | 9,840 | 25 | 32,5 | 787,5 | 0,029 | 120 | 24,306 | 2,392 | 3,026 |

1.3 Data Hasil Perhitungan Tanggal 17 Februari

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,25 | 7,56 | 1,071 | 0,76 | 93,366 | 963,9 | 9,686 | 25 | 25,3 | 31,5 | 0,018 | 120 | 14,583 | 1,413 | 1,816 |
| 9.30 | 900 | 16,26 | 7,57 | 1,071 | 0,76 | 93,547 | 963,9 | 9,705 | 25 | 25,8 | 84 | 0,023 | 120 | 19,444 | 1,887 | 2,421 |
| 10.00 | 900 | 16,27 | 7,54 | 1,071 | 0,76 | 93,234 | 963,9 | 9,673 | 25 | 26,2 | 126 | 0,023 | 120 | 19,444 | 1,881 | 2,421 |
| 10.30 | 900 | 16,24 | 7,55 | 1,071 | 0,76 | 93,185 | 963,9 | 9,668 | 25 | 26,8 | 189 | 0,026 | 120 | 21,875 | 2,115 | 2,723 |
| 11.00 | 900 | 16,26 | 7,56 | 1,071 | 0,76 | 93,423 | 963,9 | 9,692 | 25 | 27,3 | 241,5 | 0,027 | 120 | 22,361 | 2,167 | 2,784 |
| 11.30 | 900 | 16,26 | 7,57 | 1,071 | 0,76 | 93,547 | 963,9 | 9,705 | 25 | 27,7 | 283,5 | 0,026 | 120 | 21,875 | 2,123 | 2,723 |
| 12.00 | 900 | 16,25 | 7,57 | 1,071 | 0,76 | 93,490 | 963,9 | 9,699 | 25 | 28,1 | 325,5 | 0,026 | 120 | 21,528 | 2,088 | 2,680 |
| 12.30 | 900 | 16,25 | 7,56 | 1,071 | 0,76 | 93,366 | 963,9 | 9,686 | 25 | 28,6 | 378 | 0,026 | 120 | 21,875 | 2,119 | 2,723 |
| 13.00 | 900 | 16,24 | 7,58 | 1,071 | 0,76 | 93,555 | 963,9 | 9,706 | 25 | 29,2 | 441 | 0,027 | 120 | 22,685 | 2,202 | 2,824 |
| 13.30 | 900 | 16,27 | 7,6 | 1,071 | 0,76 | 93,976 | 963,9 | 9,750 | 25 | 29,7 | 493,5 | 0,027 | 120 | 22,847 | 2,227 | 2,844 |
| 14.00 | 900 | 16,26 | 7,6 | 1,071 | 0,76 | 93,918 | 963,9 | 9,744 | 25 | 30,3 | 556,5 | 0,028 | 120 | 23,422 | 2,282 | 2,916 |
| 14.30 | 900 | 16,25 | 7,61 | 1,071 | 0,76 | 93,984 | 963,9 | 9,750 | 25 | 30,8 | 609 | 0,028 | 120 | 23,495 | 2,291 | 2,925 |
| 15.00 | 900 | 16,25 | 7,59 | 1,071 | 0,76 | 93,737 | 963,9 | 9,725 | 25 | 31,3 | 661,5 | 0,028 | 120 | 23,558 | 2,291 | 2,933 |
| 15.30 | 900 | 16,24 | 7,58 | 1,071 | 0,76 | 93,555 | 963,9 | 9,706 | 25 | 31,7 | 703,5 | 0,028 | 120 | 23,264 | 2,258 | 2,896 |
| 16.00 | 900 | 16,27 | 7,59 | 1,071 | 0,76 | 93,852 | 963,9 | 9,737 | 25 | 32,1 | 745,5 | 0,028 | 120 | 23,009 | 2,240 | 2,865 |

2. Lampiran Data Hasil Perhitungan Pada Volume Tangki 35 Liter

2.1 Data Hasil Perhitungan Tanggal 9 Februari 2022

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,37 | 7,59 | 1,071 | 0,76 | 94,429 | 963,9 | 9,797 | 27,5 | 27,7 | 29,4 | 0,016 | 120 | 13,611 | 1,333 | 1,694 |
| 9.30 | 900 | 16,35 | 7,6 | 1,071 | 0,76 | 94,438 | 963,9 | 9,797 | 27,5 | 28 | 73,5 | 0,020 | 120 | 17,014 | 1,667 | 2,118 |
| 10.00 | 900 | 16,36 | 7,61 | 1,071 | 0,76 | 94,620 | 963,9 | 9,816 | 27,5 | 28,4 | 132,3 | 0,025 | 120 | 20,417 | 2,004 | 2,542 |
| 10.30 | 900 | 16,37 | 7,62 | 1,071 | 0,76 | 94,802 | 963,9 | 9,835 | 27,5 | 28,8 | 191,1 | 0,027 | 120 | 22,118 | 2,175 | 2,754 |
| 11.00 | 900 | 16,39 | 7,63 | 1,071 | 0,76 | 95,042 | 963,9 | 9,860 | 27,5 | 29,2 | 249,9 | 0,028 | 120 | 23,139 | 2,282 | 2,881 |
| 11.30 | 900 | 16,4 | 7,62 | 1,071 | 0,76 | 94,976 | 963,9 | 9,853 | 27,5 | 29,6 | 308,7 | 0,029 | 120 | 23,819 | 2,347 | 2,965 |
| 12.00 | 900 | 16,37 | 7,62 | 1,071 | 0,76 | 94,802 | 963,9 | 9,835 | 27,5 | 30 | 367,5 | 0,029 | 120 | 24,306 | 2,391 | 3,026 |
| 12.30 | 900 | 16,39 | 7,62 | 1,071 | 0,76 | 94,918 | 963,9 | 9,847 | 27,5 | 30,4 | 426,3 | 0,030 | 120 | 24,670 | 2,429 | 3,071 |
| 13.00 | 900 | 16,37 | 7,62 | 1,071 | 0,76 | 94,802 | 963,9 | 9,835 | 27,5 | 30,8 | 485,1 | 0,030 | 120 | 24,954 | 2,454 | 3,107 |
| 13.30 | 900 | 16,35 | 7,6 | 1,071 | 0,76 | 94,438 | 963,9 | 9,797 | 27,5 | 31,1 | 529,2 | 0,029 | 120 | 24,500 | 2,400 | 3,050 |
| 14.00 | 900 | 16,36 | 7,58 | 1,071 | 0,76 | 94,247 | 963,9 | 9,778 | 27,5 | 31,5 | 588 | 0,030 | 120 | 24,747 | 2,420 | 3,081 |
| 14.30 | 900 | 16,36 | 7,58 | 1,071 | 0,76 | 94,247 | 963,9 | 9,778 | 27,5 | 31,8 | 632,1 | 0,029 | 120 | 24,387 | 2,384 | 3,036 |
| 15.00 | 900 | 16,36 | 7,59 | 1,071 | 0,76 | 94,371 | 963,9 | 9,791 | 27,5 | 32,2 | 690,9 | 0,030 | 120 | 24,605 | 2,409 | 3,063 |
| 15.30 | 900 | 16,36 | 7,6 | 1,071 | 0,76 | 94,495 | 963,9 | 9,803 | 27,5 | 32,5 | 735 | 0,029 | 120 | 24,306 | 2,383 | 3,026 |
| 16.00 | 900 | 16,35 | 7,58 | 1,071 | 0,76 | 94,189 | 963,9 | 9,772 | 27,5 | 32,8 | 779,1 | 0,029 | 120 | 24,046 | 2,350 | 2,994 |

2.2 Data Hasil Perhitungan Tanggal 12 Februari 2022

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,35 | 7,62 | 1,071 | 0,76 | 94,686 | 963,9 | 9,823 | 27,3 | 27,5 | 29,4 | 0,016 | 120 | 13,611 | 1,337 | 1,694 |
| 9.30 | 900 | 16,36 | 7,6 | 1,071 | 0,76 | 94,495 | 963,9 | 9,803 | 27,3 | 27,8 | 73,5 | 0,020 | 120 | 17,014 | 1,668 | 2,118 |
| 10.00 | 900 | 16,36 | 7,59 | 1,071 | 0,76 | 94,371 | 963,9 | 9,791 | 27,3 | 28,2 | 132,3 | 0,025 | 120 | 20,417 | 1,999 | 2,542 |
| 10.30 | 900 | 16,38 | 7,61 | 1,071 | 0,76 | 94,735 | 963,9 | 9,828 | 27,3 | 28,6 | 191,1 | 0,027 | 120 | 22,118 | 2,174 | 2,754 |
| 11.00 | 900 | 16,36 | 7,63 | 1,071 | 0,76 | 94,868 | 963,9 | 9,842 | 27,3 | 29 | 249,9 | 0,028 | 120 | 23,139 | 2,277 | 2,881 |
| 11.30 | 900 | 16,38 | 7,62 | 1,071 | 0,76 | 94,860 | 963,9 | 9,841 | 27,3 | 29,4 | 308,7 | 0,029 | 120 | 23,819 | 2,344 | 2,965 |
| 12.00 | 900 | 16,37 | 7,63 | 1,071 | 0,76 | 94,926 | 963,9 | 9,848 | 27,3 | 29,8 | 367,5 | 0,029 | 120 | 24,306 | 2,394 | 3,026 |
| 12.30 | 900 | 16,38 | 7,62 | 1,071 | 0,76 | 94,860 | 963,9 | 9,841 | 27,3 | 30,2 | 426,3 | 0,030 | 120 | 24,670 | 2,428 | 3,071 |
| 13.00 | 900 | 16,38 | 7,61 | 1,071 | 0,76 | 94,735 | 963,9 | 9,828 | 27,3 | 30,6 | 485,1 | 0,030 | 120 | 24,954 | 2,453 | 3,107 |
| 13.30 | 900 | 16,35 | 7,6 | 1,071 | 0,76 | 94,438 | 963,9 | 9,797 | 27,3 | 31 | 543,9 | 0,030 | 120 | 25,181 | 2,467 | 3,135 |
| 14.00 | 900 | 16,37 | 7,59 | 1,071 | 0,76 | 94,429 | 963,9 | 9,797 | 27,3 | 31,3 | 588 | 0,030 | 120 | 24,747 | 2,424 | 3,081 |
| 14.30 | 900 | 16,38 | 7,57 | 1,071 | 0,76 | 94,237 | 963,9 | 9,777 | 27,3 | 31,7 | 646,8 | 0,030 | 120 | 24,954 | 2,440 | 3,107 |
| 15.00 | 900 | 16,37 | 7,59 | 1,071 | 0,76 | 94,429 | 963,9 | 9,797 | 27,3 | 32 | 690,9 | 0,030 | 120 | 24,605 | 2,410 | 3,063 |
| 15.30 | 900 | 16,38 | 7,6 | 1,071 | 0,76 | 94,611 | 963,9 | 9,815 | 27,3 | 32,3 | 735 | 0,029 | 120 | 24,306 | 2,386 | 3,026 |
| 16.00 | 900 | 16,36 | 7,6 | 1,071 | 0,76 | 94,495 | 963,9 | 9,803 | 27,3 | 32,6 | 779,1 | 0,029 | 120 | 24,046 | 2,357 | 2,994 |

2.3 Data Hasil Perhitungan Tanggal 15 Februari 2022

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,29 | 7,6 | 1,071 | 0,76 | 94,091 | 963,9 | 9,761 | 27,3 | 27,5 | 29,4 | 0,016 | 120 | 13,611 | 1,329 | 1,694 |
| 9.30 | 900 | 16,26 | 7,61 | 1,071 | 0,76 | 94,041 | 963,9 | 9,756 | 27,3 | 27,8 | 73,5 | 0,020 | 120 | 17,014 | 1,660 | 2,118 |
| 10.00 | 900 | 16,27 | 7,58 | 1,071 | 0,76 | 93,728 | 963,9 | 9,724 | 27,3 | 28,1 | 117,6 | 0,022 | 120 | 18,148 | 1,765 | 2,259 |
| 10.30 | 900 | 16,28 | 7,61 | 1,071 | 0,76 | 94,157 | 963,9 | 9,768 | 27,3 | 28,4 | 161,7 | 0,022 | 120 | 18,715 | 1,828 | 2,330 |
| 11.00 | 900 | 16,3 | 7,58 | 1,071 | 0,76 | 93,901 | 963,9 | 9,742 | 27,3 | 28,8 | 220,5 | 0,025 | 120 | 20,417 | 1,989 | 2,542 |
| 11.30 | 900 | 16,3 | 7,59 | 1,071 | 0,76 | 94,025 | 963,9 | 9,755 | 27,3 | 29,1 | 264,6 | 0,025 | 120 | 20,417 | 1,992 | 2,542 |
| 12.00 | 900 | 16,32 | 7,63 | 1,071 | 0,76 | 94,636 | 963,9 | 9,818 | 27,3 | 29,5 | 323,4 | 0,026 | 120 | 21,389 | 2,100 | 2,663 |
| 12.30 | 900 | 16,31 | 7,6 | 1,071 | 0,76 | 94,207 | 963,9 | 9,773 | 27,3 | 29,9 | 382,2 | 0,027 | 120 | 22,118 | 2,162 | 2,754 |
| 13.00 | 900 | 16,34 | 7,61 | 1,071 | 0,76 | 94,504 | 963,9 | 9,804 | 27,3 | 30,3 | 441 | 0,027 | 120 | 22,685 | 2,224 | 2,824 |
| 13.30 | 900 | 16,35 | 7,6 | 1,071 | 0,76 | 94,438 | 963,9 | 9,797 | 27,3 | 30,7 | 499,8 | 0,028 | 120 | 23,139 | 2,267 | 2,881 |
| 14.00 | 900 | 16,32 | 7,59 | 1,071 | 0,76 | 94,140 | 963,9 | 9,767 | 27,3 | 31 | 543,9 | 0,027 | 120 | 22,891 | 2,236 | 2,850 |
| 14.30 | 900 | 16,35 | 7,57 | 1,071 | 0,76 | 94,065 | 963,9 | 9,759 | 27,3 | 31,4 | 602,7 | 0,028 | 120 | 23,252 | 2,269 | 2,895 |
| 15.00 | 900 | 16,31 | 7,59 | 1,071 | 0,76 | 94,083 | 963,9 | 9,761 | 27,3 | 31,7 | 646,8 | 0,028 | 120 | 23,034 | 2,248 | 2,868 |
| 15.30 | 900 | 16,32 | 7,6 | 1,071 | 0,76 | 94,264 | 963,9 | 9,779 | 27,3 | 32 | 690,9 | 0,027 | 120 | 22,847 | 2,234 | 2,844 |
| 16.00 | 900 | 16,31 | 7,6 | 1,071 | 0,76 | 94,207 | 963,9 | 9,773 | 27,3 | 32,3 | 735 | 0,027 | 120 | 22,685 | 2,217 | 2,824 |

3. Lampiran Data Hasil Perhitungan Pada Volume Tangki 50 Liter

3.1 Data Hasil Perhitungan Tanggal 7 Februari 2022

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,37 | 7,62 | 1,071 | 0,76 | 94,802 | 963,9 | 9,835 | 27,2 | 27,3 | 21 | 0,012 | 120 | 9,722 | 0,956 | 1,210 |
| 9.30 | 900 | 16,38 | 7,61 | 1,071 | 0,76 | 94,735 | 963,9 | 9,828 | 27,2 | 27,5 | 63 | 0,018 | 120 | 14,583 | 1,433 | 1,816 |
| 10.00 | 900 | 16,39 | 7,6 | 1,071 | 0,76 | 94,669 | 963,9 | 9,821 | 27,2 | 27,8 | 126 | 0,023 | 120 | 19,444 | 1,910 | 2,421 |
| 10.30 | 900 | 16,4 | 7,61 | 1,071 | 0,76 | 94,851 | 963,9 | 9,840 | 27,2 | 28 | 168 | 0,023 | 120 | 19,444 | 1,913 | 2,421 |
| 11.00 | 900 | 16,4 | 7,64 | 1,071 | 0,76 | 95,225 | 963,9 | 9,879 | 27,2 | 28,3 | 231 | 0,026 | 120 | 21,389 | 2,113 | 2,663 |
| 11.30 | 900 | 16,38 | 7,63 | 1,071 | 0,76 | 94,984 | 963,9 | 9,854 | 27,2 | 28,6 | 294 | 0,027 | 120 | 22,685 | 2,235 | 2,824 |
| 12.00 | 900 | 16,37 | 7,63 | 1,071 | 0,76 | 94,926 | 963,9 | 9,848 | 27,2 | 28,9 | 357 | 0,028 | 120 | 23,611 | 2,325 | 2,939 |
| 12.30 | 900 | 16,36 | 7,64 | 1,071 | 0,76 | 94,993 | 963,9 | 9,855 | 27,2 | 29,2 | 420 | 0,029 | 120 | 24,306 | 2,395 | 3,026 |
| 13.00 | 900 | 16,37 | 7,62 | 1,071 | 0,76 | 94,802 | 963,9 | 9,835 | 27,2 | 29,4 | 462 | 0,029 | 120 | 23,765 | 2,337 | 2,959 |
| 13.30 | 900 | 16,36 | 7,61 | 1,071 | 0,76 | 94,620 | 963,9 | 9,816 | 27,2 | 29,6 | 504 | 0,028 | 120 | 23,333 | 2,290 | 2,905 |
| 14.00 | 900 | 16,35 | 7,6 | 1,071 | 0,76 | 94,438 | 963,9 | 9,797 | 27,2 | 29,8 | 546 | 0,028 | 120 | 22,980 | 2,251 | 2,861 |
| 14.30 | 900 | 16,37 | 7,63 | 1,071 | 0,76 | 94,926 | 963,9 | 9,848 | 27,2 | 30 | 588 | 0,027 | 120 | 22,685 | 2,234 | 2,824 |
| 15.00 | 900 | 16,39 | 7,64 | 1,071 | 0,76 | 95,167 | 963,9 | 9,873 | 27,2 | 30,2 | 630 | 0,027 | 120 | 22,436 | 2,215 | 2,793 |
| 15.30 | 900 | 16,37 | 7,63 | 1,071 | 0,76 | 94,926 | 963,9 | 9,848 | 27,2 | 30,4 | 672 | 0,027 | 120 | 22,222 | 2,188 | 2,767 |
| 16.00 | 900 | 16,39 | 7,62 | 1,071 | 0,76 | 94,918 | 963,9 | 9,847 | 27,2 | 30,6 | 714 | 0,026 | 120 | 22,037 | 2,170 | 2,743 |

3.2 Data Hasil Perhitungan Tanggal 13 Februari 2022

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,4 | 7,6 | 1,071 | 0,76 | 94,726 | 963,9 | 9,827 | 27,4 | 27,5 | 21 | 0,012 | 120 | 9,722 | 0,955 | 1,210 |
| 9.30 | 900 | 16,37 | 7,61 | 1,071 | 0,76 | 94,678 | 963,9 | 9,822 | 27,4 | 27,7 | 63 | 0,018 | 120 | 14,583 | 1,432 | 1,816 |
| 10.00 | 900 | 16,39 | 7,6 | 1,071 | 0,76 | 94,669 | 963,9 | 9,821 | 27,4 | 28 | 126 | 0,023 | 120 | 19,444 | 1,910 | 2,421 |
| 10.30 | 900 | 16,4 | 7,63 | 1,071 | 0,76 | 95,100 | 963,9 | 9,866 | 27,4 | 28,2 | 168 | 0,023 | 120 | 19,444 | 1,918 | 2,421 |
| 11.00 | 900 | 16,41 | 7,63 | 1,071 | 0,76 | 95,158 | 963,9 | 9,872 | 27,4 | 28,5 | 231 | 0,026 | 120 | 21,389 | 2,112 | 2,663 |
| 11.30 | 900 | 16,39 | 7,63 | 1,071 | 0,76 | 95,042 | 963,9 | 9,860 | 27,4 | 28,8 | 294 | 0,027 | 120 | 22,685 | 2,237 | 2,824 |
| 12.00 | 900 | 16,37 | 7,65 | 1,071 | 0,76 | 95,175 | 963,9 | 9,874 | 27,4 | 29,1 | 357 | 0,028 | 120 | 23,611 | 2,331 | 2,939 |
| 12.30 | 900 | 16,38 | 7,64 | 1,071 | 0,76 | 95,109 | 963,9 | 9,867 | 27,4 | 29,4 | 420 | 0,029 | 120 | 24,306 | 2,398 | 3,026 |
| 13.00 | 900 | 16,37 | 7,65 | 1,071 | 0,76 | 95,175 | 963,9 | 9,874 | 27,4 | 29,6 | 462 | 0,029 | 120 | 23,765 | 2,347 | 2,959 |
| 13.30 | 900 | 16,36 | 7,61 | 1,071 | 0,76 | 94,620 | 963,9 | 9,816 | 27,4 | 29,8 | 504 | 0,028 | 120 | 23,333 | 2,290 | 2,905 |
| 14.00 | 900 | 16,39 | 7,6 | 1,071 | 0,76 | 94,669 | 963,9 | 9,821 | 27,4 | 30 | 546 | 0,028 | 120 | 22,980 | 2,257 | 2,861 |
| 14.30 | 900 | 16,37 | 7,63 | 1,071 | 0,76 | 94,926 | 963,9 | 9,848 | 27,4 | 30,2 | 588 | 0,027 | 120 | 22,685 | 2,234 | 2,824 |
| 15.00 | 900 | 16,36 | 7,64 | 1,071 | 0,76 | 94,993 | 963,9 | 9,855 | 27,4 | 30,4 | 630 | 0,027 | 120 | 22,436 | 2,211 | 2,793 |
| 15.30 | 900 | 16,37 | 7,63 | 1,071 | 0,76 | 94,926 | 963,9 | 9,848 | 27,4 | 30,6 | 672 | 0,027 | 120 | 22,222 | 2,188 | 2,767 |
| 16.00 | 900 | 16,36 | 7,64 | 1,071 | 0,76 | 94,993 | 963,9 | 9,855 | 27,4 | 30,8 | 714 | 0,026 | 120 | 22,037 | 2,172 | 2,743 |

3.3 Data Hasil Perhitungan Tanggal 16 Februari 2022

| Waktu (Menit) | Radiasi Matahari (W.m-2) | Tegangan (V) | Arus (A) | A | FF | Pout (Watt) | Pin (Watt) | Efisiensi PV | T awal | T akhir | Kalor Air (Joule) | Q air | Q heater | Efisiensi Heater | Efisiensi Total | Efisiensi Aktual |
|---------------|--------------------------|--------------|----------|-------|------|-------------|------------|--------------|--------|---------|-------------------|-------|----------|------------------|-----------------|------------------|
| 9.00 | 900 | 16,25 | 7,5 | 1,071 | 0,76 | 92,625 | 963,9 | 9,609 | 27,4 | 27,5 | 21 | 0,012 | 120 | 9,722 | 0,934 | 1,210 |
| 9.30 | 900 | 16,24 | 7,51 | 1,071 | 0,76 | 92,691 | 963,9 | 9,616 | 27,4 | 27,6 | 42 | 0,012 | 120 | 9,722 | 0,935 | 1,210 |
| 10.00 | 900 | 16,23 | 7,52 | 1,071 | 0,76 | 92,758 | 963,9 | 9,623 | 27,4 | 27,8 | 84 | 0,016 | 120 | 12,963 | 1,247 | 1,614 |
| 10.30 | 900 | 16,24 | 7,54 | 1,071 | 0,76 | 93,062 | 963,9 | 9,655 | 27,4 | 28,1 | 147 | 0,020 | 120 | 17,014 | 1,643 | 2,118 |
| 11.00 | 900 | 16,25 | 7,56 | 1,071 | 0,76 | 93,366 | 963,9 | 9,686 | 27,4 | 28,4 | 210 | 0,023 | 120 | 19,444 | 1,883 | 2,421 |
| 11.30 | 900 | 16,26 | 7,57 | 1,071 | 0,76 | 93,547 | 963,9 | 9,705 | 27,4 | 28,7 | 273 | 0,025 | 120 | 21,065 | 2,044 | 2,622 |
| 12.00 | 900 | 16,27 | 7,59 | 1,071 | 0,76 | 93,852 | 963,9 | 9,737 | 27,4 | 28,9 | 315 | 0,025 | 120 | 20,833 | 2,028 | 2,594 |
| 12.30 | 900 | 16,25 | 7,6 | 1,071 | 0,76 | 93,860 | 963,9 | 9,738 | 27,4 | 29,1 | 357 | 0,025 | 120 | 20,660 | 2,012 | 2,572 |
| 13.00 | 900 | 16,23 | 7,61 | 1,071 | 0,76 | 93,868 | 963,9 | 9,738 | 27,4 | 29,3 | 399 | 0,025 | 120 | 20,525 | 1,999 | 2,555 |
| 13.30 | 900 | 16,25 | 7,61 | 1,071 | 0,76 | 93,984 | 963,9 | 9,750 | 27,4 | 29,5 | 441 | 0,025 | 120 | 20,417 | 1,991 | 2,542 |
| 14.00 | 900 | 16,26 | 7,6 | 1,071 | 0,76 | 93,918 | 963,9 | 9,744 | 27,4 | 29,7 | 483 | 0,024 | 120 | 20,328 | 1,981 | 2,531 |
| 14.30 | 900 | 16,27 | 7,59 | 1,071 | 0,76 | 93,852 | 963,9 | 9,737 | 27,4 | 29,9 | 525 | 0,024 | 120 | 20,255 | 1,972 | 2,522 |
| 15.00 | 900 | 16,26 | 7,58 | 1,071 | 0,76 | 93,671 | 963,9 | 9,718 | 27,4 | 30,1 | 567 | 0,024 | 120 | 20,192 | 1,962 | 2,514 |
| 15.30 | 900 | 16,28 | 7,59 | 1,071 | 0,76 | 93,910 | 963,9 | 9,743 | 27,4 | 30,3 | 609 | 0,024 | 120 | 20,139 | 1,962 | 2,507 |
| 16.00 | 900 | 16,25 | 7,59 | 1,071 | 0,76 | 93,737 | 963,9 | 9,725 | 27,4 | 30,5 | 651 | 0,024 | 120 | 20,093 | 1,954 | 2,501 |

DOKUMENTASI



Proses Pembuatan Rangka Alat



Proses Pembuatan Tangki



Proses Pengambilan Data Pada Komputer dan Data Logger



Proses Pengambilan Data Arus dengan Multimeter Digital



Proses Pengambilan Data Tegangan