LAMPIRAN

1. Perhitungan Nilai *Test Point*

Hasil Perhitungan Pada T1 dan T2 Suhu 36º C dan 37º C

a. T1 Suhu *Setting* 36º C

Nilai Rata-rata *Test Point* 1:

$$\text{Xn} = \frac{0.360 + 0.359 + 0.361 + 0.361 + 0.359 + 0.361 + 0.360 + 0.363 + 0.360 + 0.360}{10}$$

Xn (*Test Point* 1) = 0.360

Nilai Rata-rata *Test Point* 2:

$$\text{Xn} = \frac{2.321 + 2.330 + 2.229 + 2.229 + 2.331 + 2.337 + 2.330 + 2.346 + 2.336 + 2.336}{10}$$

Xn (*Test Point* 2) = 2.313

Nilai Rata-rata Pada *Display* Modul TA:

$$\text{Xn} = \frac{36.02 + 36.46 + 36.35 + 36.35 + 36.46 + 36.57 + 36.46 + 36.57 + 36.51 + 36.51}{10}$$

Xn (Modul TA) = 36.426

b. T2 Suhu *Setting* 37º C

Nilai Rata-rata *Test Point* 1:

$$\text{Xn} = \frac{0.370 + 0.370 + 0.371 + 0.371 + 0.372 + 0.380 + 0.380 + 0.380 + 0.381 + 0.381}{10}$$

Xn (*Test Point* 1) = 0.376

Nilai Rata-rata *Test Point* 2:

$$\text{Xn} = \frac{2.411 + 2.412 + 2.413 + 2.414 + 2.415 + 2.500 + 2.500 + 2.501 + 2.501 + 2.502}{10}$$

Xn (*Test Point* 2) = 2.457

Nilai Rata-rata Pada *Display* Modul TA:

$$\text{Xn} = \frac{36.93 + 36.98 + 37.04 + 37.09 + 37.15 + 37.31 + 37.31 + 37.31 + 37.26 + 37.26}{10}$$

Xn (Modul TA) = 37.16

2. Perhitungan Nilai Terhadap Kalibrator

Hasil Perhitungan Pada T1 dan T2 Suhu 32º C dan 33º C

a. T1 Suhu *Setting* 32º C

Nilai Rata-rata Pada *Display* Modul TA:

$$\text{Xn} = \frac{31.99 + 32.05 + 32.05 + 32.16 + 32.05 + 32.16 + 32.21 + 32.27 + 32.38 + 32.38}{10}$$

Xn (Modul TA) = 32.17

Nilai Rata-rata Pada Alat Pembanding:

$$\text{Xn} = \frac{32.0 + 32.2 + 32.2 + 32.3 + 32.2 + 32.4 + 32.4 + 32.5 + 32.5 + 32.5}{10}$$

Xn (Pembanding) = 32.3

Simpangan:

Simpangan = 32.17 – 32.3 = – 0.1

***Error* (%):**

$$\% = \frac{32.17 - 32.3}{32.17} \text{ x } 100\% = -0.464108911\ \%$$

Standar Deviasi

$$\text{SD} \sqrt{\frac{(31.99 - 32.17)^2 + (32.05 - 32.17)^2 + (32.05 - 32.17)^2 + (32.16 - 32.17)^2 + (32.05 - 32.17)^2}{10 - 1}}$$

$$\sqrt{\frac{(32.16 - 32.17)^2 + (32.21 - 32.17)^2 + (32.27 - 32.17)^2 + (32.38 - 32.17)^2 + (32.38 - 32.17)^2}{10 - 1}}$$

SD = 0.139682179

Ketidakpastian (UA):

$$\text{UA} = \frac{0.139682179}{\sqrt{10 - 1}} = 0.046560726$$

b. T2 Suhu *Setting* 33º C

Nilai Rata-rata Pada *Display* Modul TA:

$$\text{Xn} = \frac{33.51 + 33.56 + 33.62 + 33.62 + 33.62 + 33.56 + 33.56 + 33.56 + 33.62 + 33.62}{10}$$

Xn (Modul TA) = 33.59

Nilai Rata-rata Pada Alat Pembanding:

$$\text{Xn} = \frac{33.8 + 33.8 + 33.8 + 33.6 + 33.6 + 33.7 + 33.8 + 33.8 + 33.8 + 33.8}{10}$$

Xn (Pembanding) = 33.8

Simpangan:

Simpangan = 33.59 – 33.8 = – 0.2

***Error* (%):**

$$\% = \frac{33.59 - 33.8}{33.59} \text{ x } 100\% = -0.488888889\ \%$$

Standar Deviasi

$$\text{SD} \sqrt{\frac{(33.51 - 33.59)^2 + (33.56 - 33.59)^2 + (33.62 - 33.59)^2 + (33.62 - 33.59)^2 + (33.62 - 33.59)^2}{10 - 1}}$$

$$\sqrt{\frac{(33.56 - 33.59)^2 + (33.56 - 33.59)^2 + (33.56 - 33.59)^2 + (33.62 - 33.59)^2 + (33.62 - 33.59)^2}{10 - 1}}$$

SD = 0.039791121

Ketidakpastian (UA):

$$\text{UA} = \frac{0.039791121}{\sqrt{10 - 1}} = 0.013263707$$

3. Perhitungan Nilai Kalibrasi

Hasil Perhitungan Pada T3 dan T4 Suhu 34º C dan 35º C

a. T3 Suhu *Setting* 34º C

Nilai Rata-rata Pada *Display* Modul TA:

$$\text{Xn} = \frac{34.83 + 34.83 + 34.83 + 34.83 + 34.83 + 34.83 + 34.83 + 34.83 + 34.83 + 34.83}{10}$$

Xn (Modul TA) = 34.83

Nilai Rata-rata Pada *Display* Inkubator Bayi:

$$\text{Xn} = \frac{34.2 + 34.2 + 34.2 + 34.4 + 34.7 + 34.2 + 34.7 + 34.2 + 34.4 + 34.2}{10}$$

Xn (Inkubator Bayi) = 34.34

Simpangan:

Simpangan = 34.83 – 34.34= 0.49

Error (%):

$$\% = \frac{34.83 - 34.34}{34.83} \text{x } 100\% = 1.426907397\ \%$$

Standar Deviasi

$$\text{SD} \sqrt{\frac{(34.83 - 34.83)^2 + (34.83 - 34.83)^2 + (34.83 - 34.83)^2 + (34.83 - 34.83)^2 + (34.83 - 34.83)^2}{10 - 1}}$$

$$\sqrt{\frac{(34.83 - 34.83)^2 + (34.83 - 34.83)^2 + (34.83 - 34.83)^2 + (34.83 - 34.83)^2 + (34.83 - 34.83)^2}{10 - 1}}$$

SD = 7.48978E-15

Ketidakpastian (UA):

$$\text{UA} = \frac{7.48978\text{E} - 15}{\sqrt{10 - 1}} = 2.49659\text{E} - 15$$

b. T4 Suhu *Setting* 35º C

Nilai Rata-rata Pada *Display* Modul TA:

$$\text{Xn} = \frac{34.68 + 34.68 + 34.68 + 34.68 + 34.68 + 34.74 + 34.68 + 34.74 + 34.74 + 34.74}{10}$$

Xn (Modul TA) = 34.70

Nilai Rata-rata Pada *Display* Inkubator Bayi:

$$\text{Xn} = \frac{35.1 + 35.2 + 35.1 + 35.1 + 35.4 + 35.1 + 35.2 + 35.4 + 35.3 + 35.2}{10}$$

Xn (Inkubator Bayi) = 35.21

Simpangan:

Simpangan = 34.70 – 35.21= – 0.506

***Error* (%):**

$$\% = \frac{34.70 - 35.21}{34.70} \text{x } 100\% = -1.43709174\ \%$$

Standar Deviasi

$$\text{SD} \sqrt{\frac{(34.68 - 34.70)^2 + (34.68 - 34.70)^2 + (34.68 - 34.70)^2 + (34.68 - 34.70)^2 + (34.68 - 34.70)^2}{10 - 1}}$$

$$\sqrt{\frac{(34.74 - 34.70)^2 + (34.68 - 34.70)^2 + (34.74 - 34.70)^2 + (34.74 - 34.70)^2 + (34.74 - 34.70)^2}{10 - 1}}$$

SD = 0.030983867

Ketidakpastian (UA):

$$\text{UA} = \frac{0.030983867}{\sqrt{10 - 1}} = 0.010327956$$

4. Program Arduino

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(0, 1, 2, 3, 4, 5);

//SUHU

float T1;

float T2;

float T3;

float T4;

float suhu1;

float suhu2;

float suhu3;

float suhu4;

float referenceVoltage;

unsigned int adc1;

unsigned int adc2;

unsigned int adc3;

unsigned int adc4;

int temp1=A0;

int temp2=A1;

int temp3=A2;

int temp4=A3;

//Kelembaban Dan Kebisingan

float Kelembaban=4;
```

```
float Kebisingan=5;
float Humidity;
float dBmeter;
unsigned int ValueHumidity;
unsigned int ValuedBmeter;
void setup()
{
  analogReference(EXTERNAL);
  referenceVoltage=3.3;
  lcd.begin(20, 4);
  lcd.setCursor(1,1);
  lcd.print("Incubator Analyzer ");
  delay(1000);
  lcd.setCursor(2,2);
  lcd.print("ELEKTROMEDIK UMY");
  delay(4000);
  lcd.clear();
}
void loop()
{
//SUHU
  adc1=0;
  adc2=0;
```

```
  adc3=0;
  adc4=0;
//Kelembaban
  ValueHumidity = 0;
  ValuedBmeter = 0;
  for(int i=0; i<30; i++)
  {
    adc1 +=analogRead(temp1);
    adc2 +=analogRead(temp2);
    adc3 +=analogRead(temp3);
    adc4 +=analogRead(temp4);
  }
//Kelembaban dan Kebisingan
  for(int i = 0; i < 50; i++)
  {
    ValueHumidity +=  analogRead(Kelembaban);
  }
  for(int i = 0; i < 50; i++)
  {
    ValuedBmeter  +=  analogRead(Kebisingan);
  }
//Rumus SUHU
  T1=(adc1/30);
```

```
  T2=(adc2/30);
  T3=(adc3/30);
  T4=(adc4/30);
  suhu1=(T1*11)/199.525424-3.32;
  suhu2=(T2*11)/199.525424-4.3;
  suhu3=(T3*11)/199.525424-3.32;
  suhu4=(T4*11)/199.525424-4.9;
//Rumus Kelembaban dan Kebisingan
  Humidity =(ValueHumidity/50)*3.3/1023;
  float hasilHumidity = (31.847*Humidity)-3.5;
  dBmeter=(ValuedBmeter/50)*3.3/1023;
  float  hasildBmeter= (dBmeter*50)+3.5 ;
//Tampil SUHU
  if (hasildBmeter > 99);
  {
    lcd.clear();
  }
  lcd.setCursor(0,0);
  lcd.print("T1:");
  lcd.print(suhu1);
  lcd.print("C");
  lcd.setCursor(0,1);
  lcd.print("T2:");
```

```
  lcd.print(suhu2);
  lcd.print("C");
  lcd.setCursor(0,2);
  lcd.print("T3:");
  lcd.print(suhu3);
  lcd.print("C");
  lcd.setCursor(0,3);
  lcd.print("T4:");
  lcd.print(suhu4);
  lcd.print("C");
//Tampil Kelembaban dan kebisingan
  lcd.setCursor(11,0);
  lcd.print("Humidity");
  lcd.setCursor(11,1);
  lcd.print(":");
  lcd.print(hasilHumidity);
  lcd.print("%");
  lcd.setCursor(11,2);
  lcd.print("dB Meter");
  lcd.setCursor(11,3);
  lcd.print(":");
  lcd.print(hasildBmeter);
  lcd.print("dB");
```

```
  lcd.setCursor(10,0);
  lcd.print("|");
  lcd.setCursor(10,1);
  lcd.print("|");
  lcd.setCursor(10,2);
  lcd.print("|");
  lcd.setCursor(10,3);
  lcd.print("|");
  delay(1000);
}
```