

## Lampiran A Perhitungan Catu Daya Rumah

$$\tau = \frac{P}{\omega}$$

dimana :  $\tau$  = torsi (N.m),  $P$  = daya (Watt), dan  $\omega$  = kecepatan sudut (rad/s)

### 1. Keadaan Forward

$$\tau = \frac{1,44}{4,38} = 0,32$$

$$\tau = \frac{1,8}{4,67} = 0,38$$

$$\tau = \frac{2}{5,57} = 0,35$$

$$\tau = \frac{2,3}{6,02} = 0,39$$

$$\tau = \frac{2,6}{6,42} = 0,4$$

$$\tau = \frac{2,84}{6,61} = 0,43$$

$$\tau = \frac{2,95}{6,85} = 0,43$$

$$\tau = \frac{2,95}{7,05} = 0,41$$

$$\tau = \frac{3,07}{6,99} = 0,43$$

$$\tau = \frac{3,07}{7,02} = 0,43$$

## 2. Keadaan Backward

$$\tau = \frac{1,52}{4,3} = 0,35$$

$$\tau = \frac{1,84}{4,59} = 0,4$$

$$\tau = \frac{2,05}{5,4} = 0,37$$

$$\tau = \frac{2,4}{5,99} = 0,4$$

$$\tau = \frac{2,73}{6,54} = 0,41$$

$$\tau = \frac{2,83}{6,85} = 0,41$$

$$\tau = \frac{2,95}{6,99} = 0,42$$

$$\tau = \frac{2,95}{7} = 0,42$$

$$\tau = \frac{3,07}{7,02} = 0,43$$

$$\tau = \frac{3,19}{7,07} = 0,45$$

## Lampiran B Perhitungan Daya Cadangan

$$\tau = \frac{P}{\omega}$$

dimana :  $\tau$  = torsi (N.m),  $P$  = daya (Watt), dan  $\omega$  = kecepatan sudut (rad/s)

### 1. Keadaan Forward

$$\tau = \frac{2,77}{6,56} = 0,42$$

$$\tau = \frac{2,65}{6,54} = 0,4$$

$$\tau = \frac{2,61}{6,46} = 0,4$$

$$\tau = \frac{2,61}{6,45} = 0,4$$

$$\tau = \frac{2,52}{6,43} = 0,39$$

$$\tau = \frac{2,49}{6,4} = 0,38$$

$$\tau = \frac{2,49}{6,4} = 0,38$$

$$\tau = \frac{2,4}{6,32} = 0,37$$

$$\tau = \frac{2,4}{6,29} = 0,37$$

$$\tau = \frac{2,3}{6,28} = 0,36$$

## 2. Keadaan Backward

$$\tau = \frac{2,67}{6,57} = 0,4$$

$$\tau = \frac{2,67}{6,54} = 0,4$$

$$\tau = \frac{2,64}{6,47} = 0,4$$

$$\tau = \frac{2,52}{6,45} = 0,39$$

$$\tau = \frac{2,52}{6,41} = 0,39$$

$$\tau = \frac{2,49}{6,38} = 0,39$$

$$\tau = \frac{2,4}{6,37} = 0,37$$

$$\tau = \frac{2,4}{6,37} = 0,37$$

$$\tau = \frac{2,4}{6,33} = 0,37$$

$$\tau = \frac{2,3}{6,29} = 0,36$$

### Lampiran C Perhitungan Beban Maksimum

$$\tau = \frac{12}{6,19} = 1,93$$

$$\tau = \frac{12}{5,51} = 2,17$$

$$\tau = \frac{12}{4,95} = 2,42$$

$$\tau = \frac{12}{4,44} = 2,69$$

$$\tau = \frac{12}{0} = 0$$

### Lampiran D Perhitungan Kebutuhan Panel Surya

$$\text{Daya} = V \times I \quad (3.3)$$

$$\text{Panel Surya yang dibutuhkan (Wp)} = \frac{\text{Kebutuhan daya (Wh)}}{E \times H} \quad (3.4)$$

Daya yang dipakai motor DC, diketahui dari data didapat pada tegangan 12 V dan arus sebesar 0,28 A oleh karena itu

$$\begin{aligned} \text{Daya} &= 12 \times 0,28 \\ &= 3,36 \text{ Watt} \end{aligned}$$

Perkiraan penggunaan motor DC selama ketika terjadi pemadaman 10 jam

$$\begin{aligned} &3,36 \times 10 \text{ jam} \\ &= 33,6 \text{ Watt hour} \end{aligned}$$

Dan dapat dicari kebutuhan panel surya yaitu dengan rumus di atas

$$\begin{aligned} \text{Panel Surya yang dibutuhkan (Wp)} &= \frac{33,6}{4} \\ &= 8,4 \text{ Wp} \end{aligned}$$

Dikarenakan yang ada dipasaran panel surya hanya 10 Wp. Maka, kebutuhan panel surya akan dijadikan 10 Wp

## Lampiran E *Listing* Program Arduino IDE

```
#include <ezButton.h>

int in_3 = 2; //mendeklarasikan pin in_3 terhubung ke pin 2
Arduino
int in_4 = 3; //mendeklarasikan pin in_4 terhubung ke pin 3
Arduino
char val;

ezButton limitSwitch1(4);
ezButton limitSwitch2(5);

void setup() {
  Serial.begin(9600);
  // Mendeklarasikan bahwa pin-pin tersebut bekerja sebagai
  OUTPUT
  pinMode(in_3,OUTPUT);
  pinMode(in_4,OUTPUT);
}

void loop() {

  limitSwitch1.loop(); // MUST call the loop() function
  first
  limitSwitch2.loop(); // MUST call the loop() function
  first

  if (Serial.available()) {
    val = Serial.read();
    Serial.println();
  }

  int state1 = limitSwitch1.getState();
  int state2 = limitSwitch2.getState();
```

```

    if(state1 == HIGH){
        Serial.println("limit switch1: UNTOUCHED");
    }else{
        Serial.println("limit switch1: TOUCHED");
        delay(1000);
    }
}
if(limitSwitch1.isPressed()){
    berhenti(); //memanggil fungsi berhenti
    delay(1000);
}
if (val == '0'){
    berhenti(); //memanggil fungsi berhenti
    delay(1000);
}

if(state2 == HIGH){
    Serial.println("limit switch2: UNTOUCHED");
}else{
    Serial.println("limit switch2: TOUCHED");
    delay(1000);
}
if(limitSwitch2.isPressed()){
    berhenti(); //memanggil fungsi berhenti
    delay(1000);
}
if (val == '1'){
    berhenti(); //memanggil fungsi berhenti
    delay(1000);
}

if (val == '2'){

    gerak_1(); //memanggil fungsi gerak maju (membuka
pagar)
    delay(2000);
}

```



```

if (val == '3'){

    gerak_2();    //memanggil fungsi gerak mundur(menutup
pagar)
    delay(2000);
}
}

//membuat fungsi gerak pada driver BTS7960
void gerak_1(){
    digitalWrite(in_3,HIGH);
    digitalWrite(in_4,LOW);
}

void gerak_2(){
    digitalWrite(in_3,LOW);
    digitalWrite(in_4,HIGH);
}

//membuat fungsi berhenti
void berhenti(){
    digitalWrite(in_3,LOW);
    digitalWrite(in_4,LOW);
}

```

## Lampiran F Beban ditambahkan



Gambar F.1



Gambar F.2



Gambar F.1



Gambar F.4



Gambar F.5