

```
#include <Arduino.h>
#include <TM1637Display.h> // Inclure la bibliothèque TM1637

const int poussoir = 12; //La broche 12 est le poussoir
const int relais = 10; //La broche 10 est le relais
const int ledch = 9; //La broche 9 est la led "charge"
const int ledef = 7; //La broche 7 est la led "défaut"
const int GATE = 5; //La broche 5 est la GATE du MOSFET
const int V = A0; //La broche A0 est l'entrée analogique V
const int CLK = 3; //La broche 3 est CLK
const int DIO = 2; //La broche 2 est DIO
TM1637Display display(CLK, DIO); //Broches utilisées

int Van; //Valeur analogique
int Tension; //Valeur analogique convertie en tension
bool Mes = true; //Mesure pile
bool Char = false; //Charge pile
bool Def = false; //Défaut pile
int T1H = 0; //Temporisation 1 heure
```

```
const uint8_t noPL[] = {
    SEG_C | SEG_E | SEG_G,           // n
    SEG_C | SEG_D | SEG_E | SEG_G,  // o
    SEG_A | SEG_B | SEG_E | SEG_F | SEG_G, // P
    SEG_D | SEG_E | SEG_F           // L
};
```

```
const uint8_t dEft[] = {
    SEG_B | SEG_C | SEG_D | SEG_E | SEG_G, // d
    SEG_A | SEG_D | SEG_E | SEG_F | SEG_G, // E
    SEG_A | SEG_E | SEG_F | SEG_G,        // F
    SEG_D | SEG_E | SEG_F | SEG_G        // t
};
```

```
void setup()
{
    display.setBrightness(7);
    pinMode(relais, OUTPUT);
    pinMode(GATE, OUTPUT);
    pinMode(ledf, OUTPUT);
}
```

```
pinMode(ledch, OUTPUT);
pinMode (poussoir, INPUT_PULLUP); //Résistance pull up interne
Serial.begin(57600);           //Initialisation moniteur série
digitalWrite(leddef, LOW);     //Extinction LED défaut
digitalWrite(ledch, LOW);      //Extinction LED charge
digitalWrite(relais, LOW);     //Ouverture relais
digitalWrite(GATE, HIGH);     //Blocage MOSFET
}

void loop()
{
  Van = analogRead(V);        //Fausse lecture

debut:
  //Poussoir "charge"
  if (digitalRead (poussoir) == LOW and Tension > 500)
  {
    Mes = false;
    Char = true;
    digitalWrite(relais, HIGH); //Fermeture relais
```

```

    digitalWrite(GATE, LOW);          //Conduction MOSFET
}

delay(1000);                          //Tempo 1 sec
Van = analogRead(V);                  //Lecture valeur
//la borne Aref reçoit 2,5V par le TL431
Tension = int(5.7*Van*2.5/1023*1000); //Conversion en tension
Serial.print(Tension);                 //Affichage de la tension
Serial.println(" mV");                 //en mV

if (Tension > 1930)                    // 11V -> 11:5,7=1,93V
{
    Serial.print("Erreur Mesure");
    digitalWrite(relais, LOW);         //Ouverture relais
    digitalWrite(GATE, HIGH);         //Blocage MOSFET
    goto debut;
}

if (Tension < 500)                     //Pile non présente
{

```

```
Mes = true;
Char = false;
Def = false;
T1H = 0;
Serial.println("PAS DE PILE");
display.setSegments(noPL);           //Affiche noPL
digitalWrite(relais, LOW);           //Ouverture relais
digitalWrite(GATE, HIGH);            //Blocage MOSFET
digitalWrite(leddef, LOW);           //Extinction LED défaut
digitalWrite(ledch, LOW);            //Extinction LED charge
goto debut;
}

display.showNumberDec(Tension, false); //Digits significatifs

if (T1H != 0)                         //Fin tempo 1 heure
{
  T1H = T1H-1;
  Mes = true;
  digitalWrite(GATE, HIGH);           //Blocage MOSFET
```

```

Serial.print("MESURE de la PILE: ");
goto debut;
}

//Tension pile < 7,5V //7,5:5,7=1,31
if (Tension < 1310 and Tension > 500 and Def==0)
{
Serial.print("DEFAULT: ");
display.setSegments(dEFt); //Affiche dEFt
Serial.print(Tension); //Affichage de la tension
Serial.println(" mV"); //en mV
digitalWrite(ledéf, HIGH); //Allumage LED défaut
Mes = true;
Char = false;
Def= true;
delay(5000);
goto debut;
}

if (Char == true and Mes == false) //Charge pile

```

```

{

if (Tension > 1790) //Tension pile > 10,2V 10,2:5,7=1,79V
{
  Serial.println("ARRET DE LA CHARGE");
  digitalWrite(GATE, HIGH); //Blocage MOSFET
  digitalWrite(ledch, LOW); //Extinction LED charge
  Mes = true;
  T1H =3600;
}
else
{
  Serial.print("CHARGE de la PILE: ");
  digitalWrite(GATE, LOW); //Conduction MOSFET
  digitalWrite(ledch, HIGH); //Allumage LED charge
}
goto debut;
}

else //Mesure pile

```

```
{
  Serial.print("MESURE de la PILE: ");
  digitalWrite(GATE, HIGH);          //Blocage MOSFET
  if (Char==true and Tension < 1580) //Tension pile < 9,3V
  {
    Mes = false;
    digitalWrite(GATE, LOW);        //Conduction MOSFET
    digitalWrite(ledch, HIGH);     //Allumage LED charge
  }
}
}
```