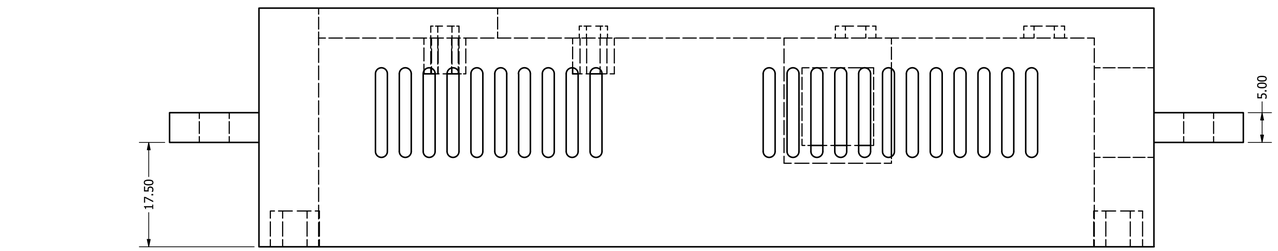
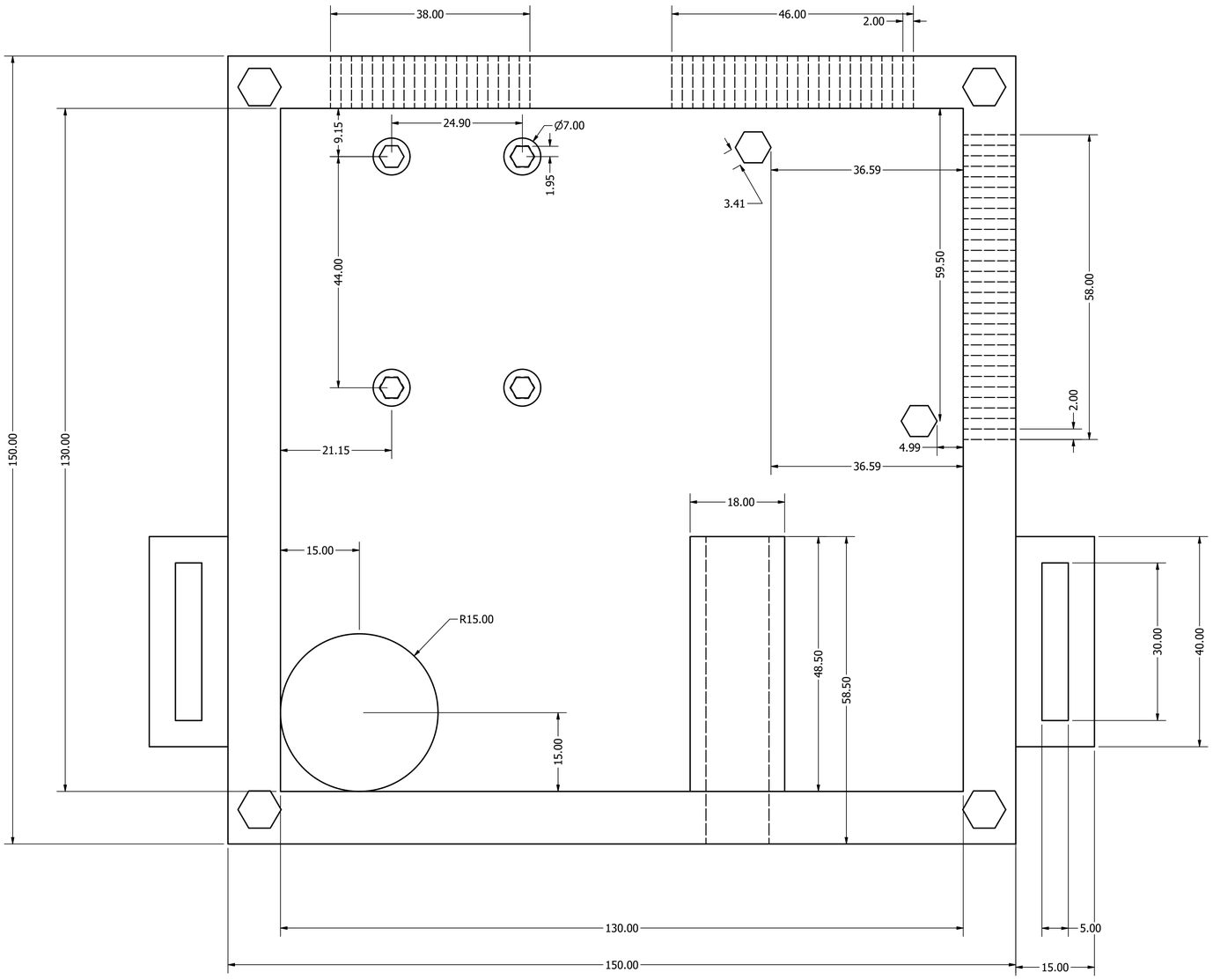
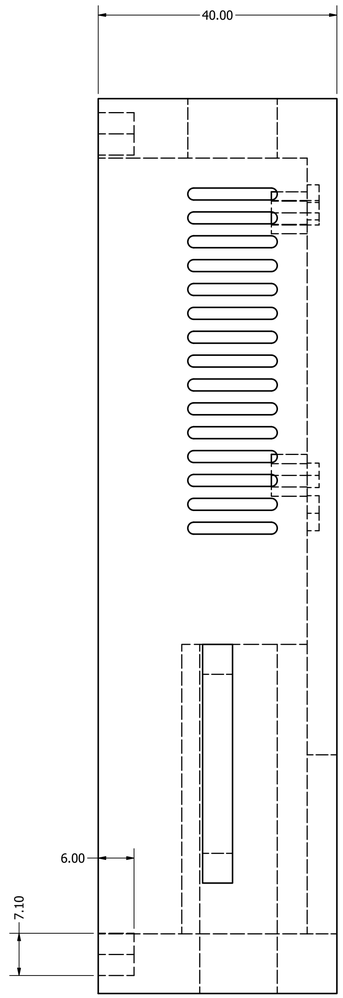
ANEXOS

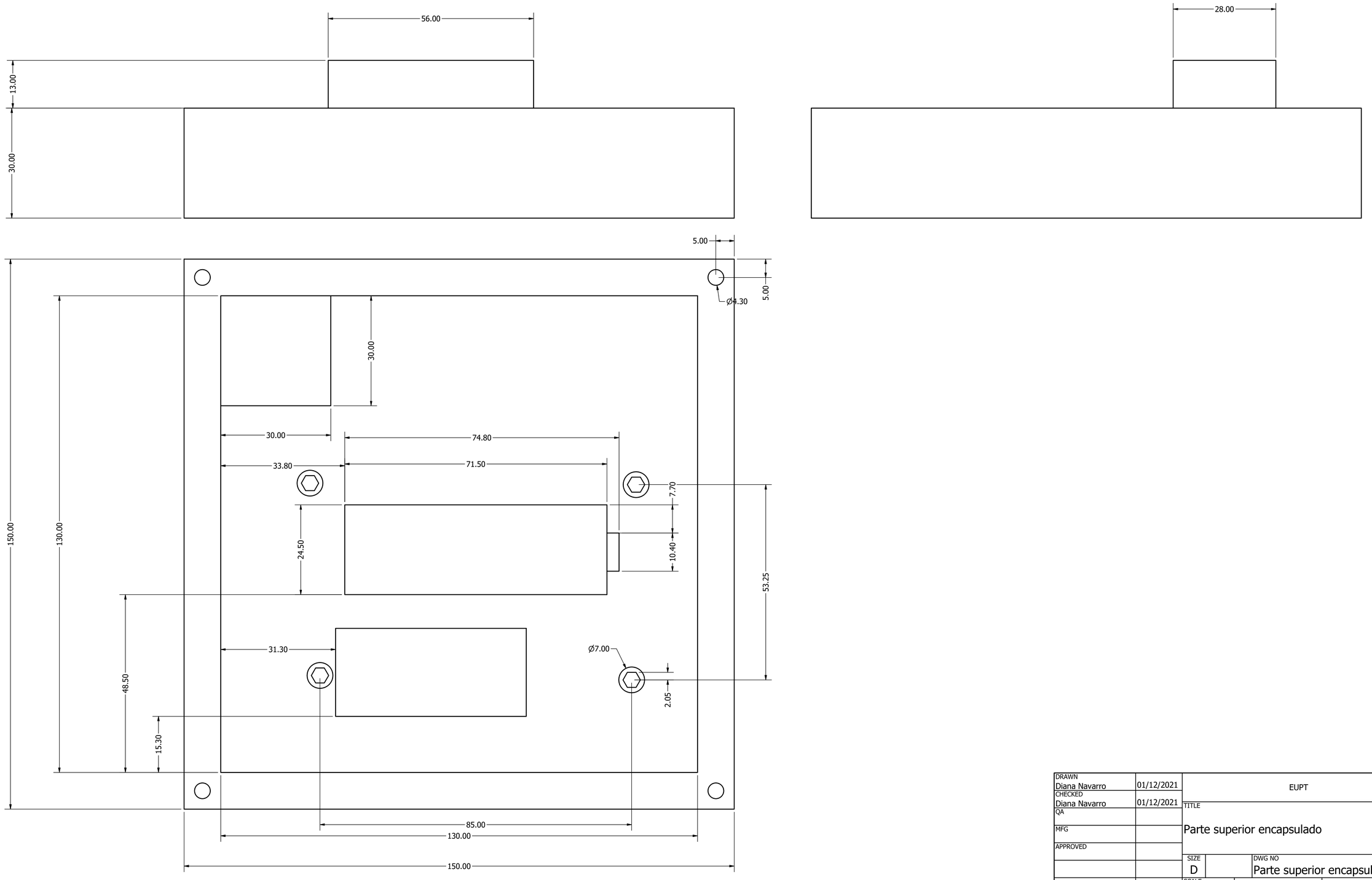
ANEXO 1: PLANOS DEL ENCAPSULADO



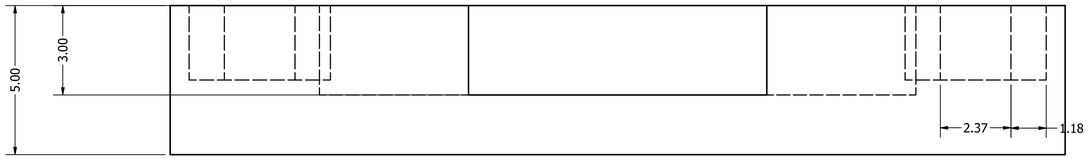


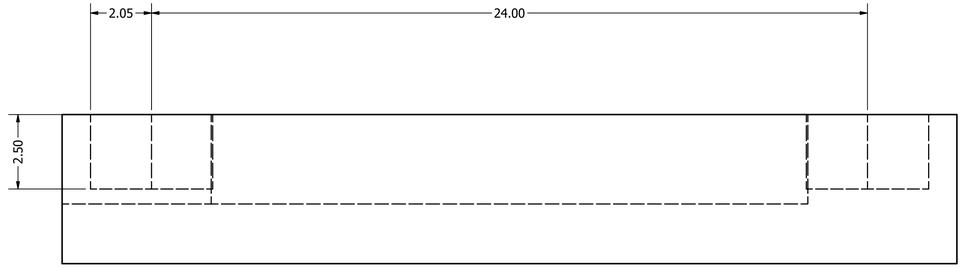


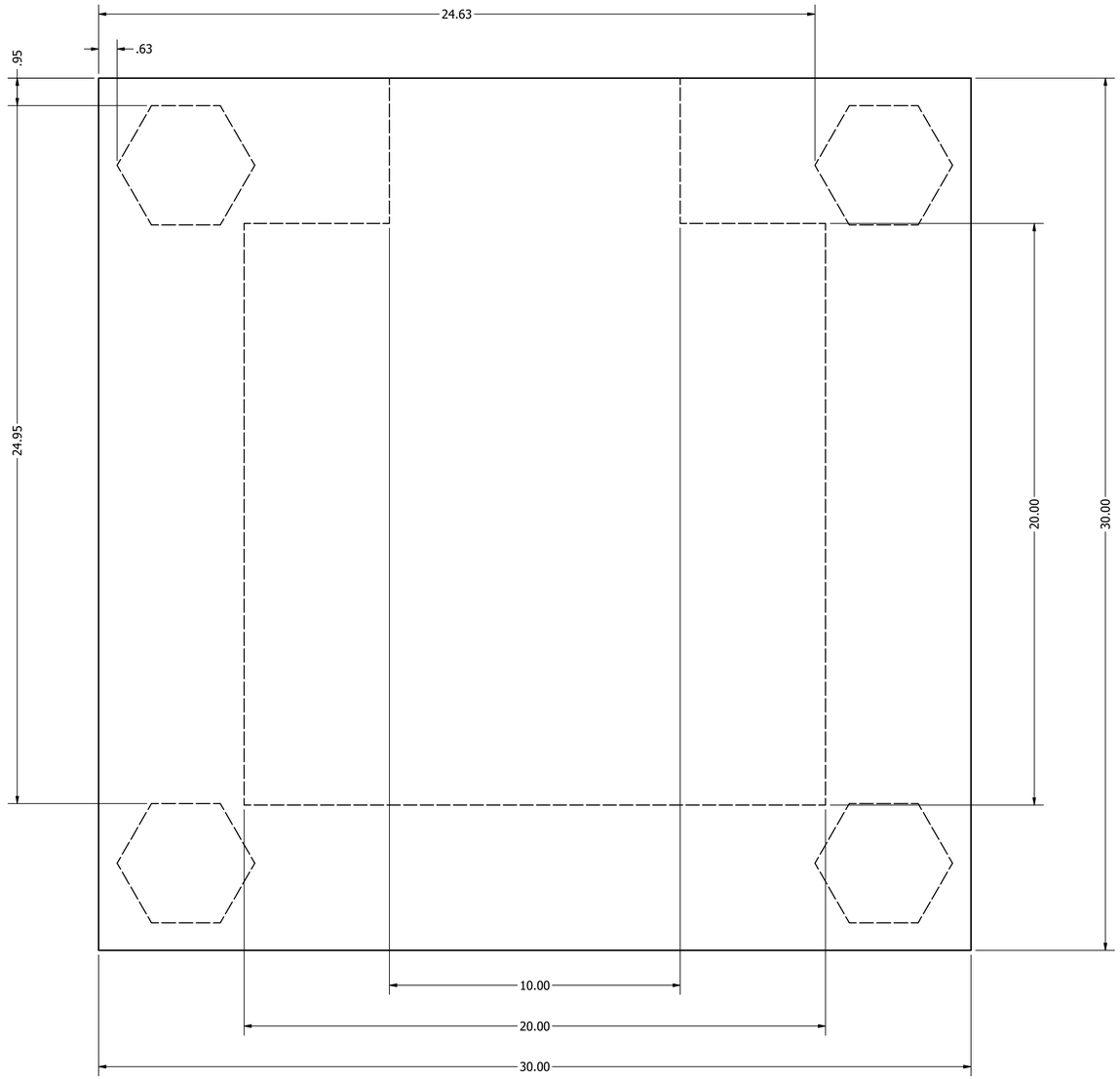
DRAWN Diana Navarro	01/12/2021	EUPT
CHECKED Diana Navarro	01/12/2021	TITLE: Parte inferior del encapsulado
QA		
MFG		
APPROVED		
SIZE D	DWG NO Parte inferior del encapsulado	REV
SCALE 2 : 1	SHEET 1 OF 1	



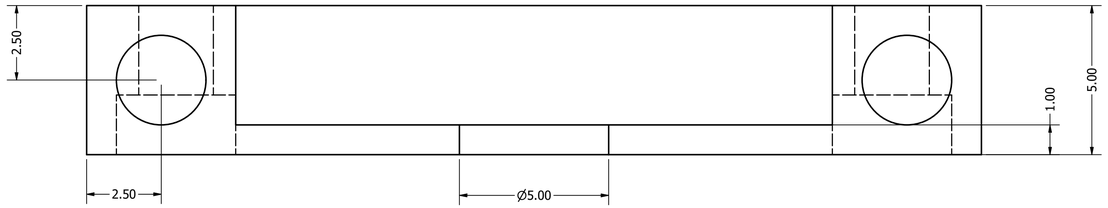
DRAWN Diana Navarro	01/12/2021	EUPT	
CHECKED Diana Navarro	01/12/2021	TITLE	
QA		Parte superior encapsulado	
MFG			
APPROVED		SIZE D	DWG NO Parte superior encapsulado REV
		SCALE 2 : 1	SHEET 1 OF 1

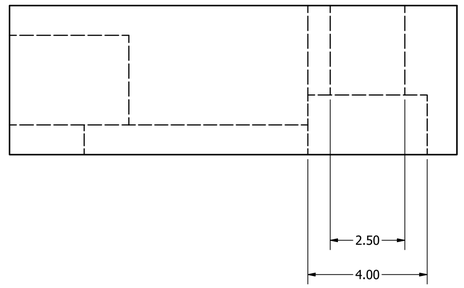


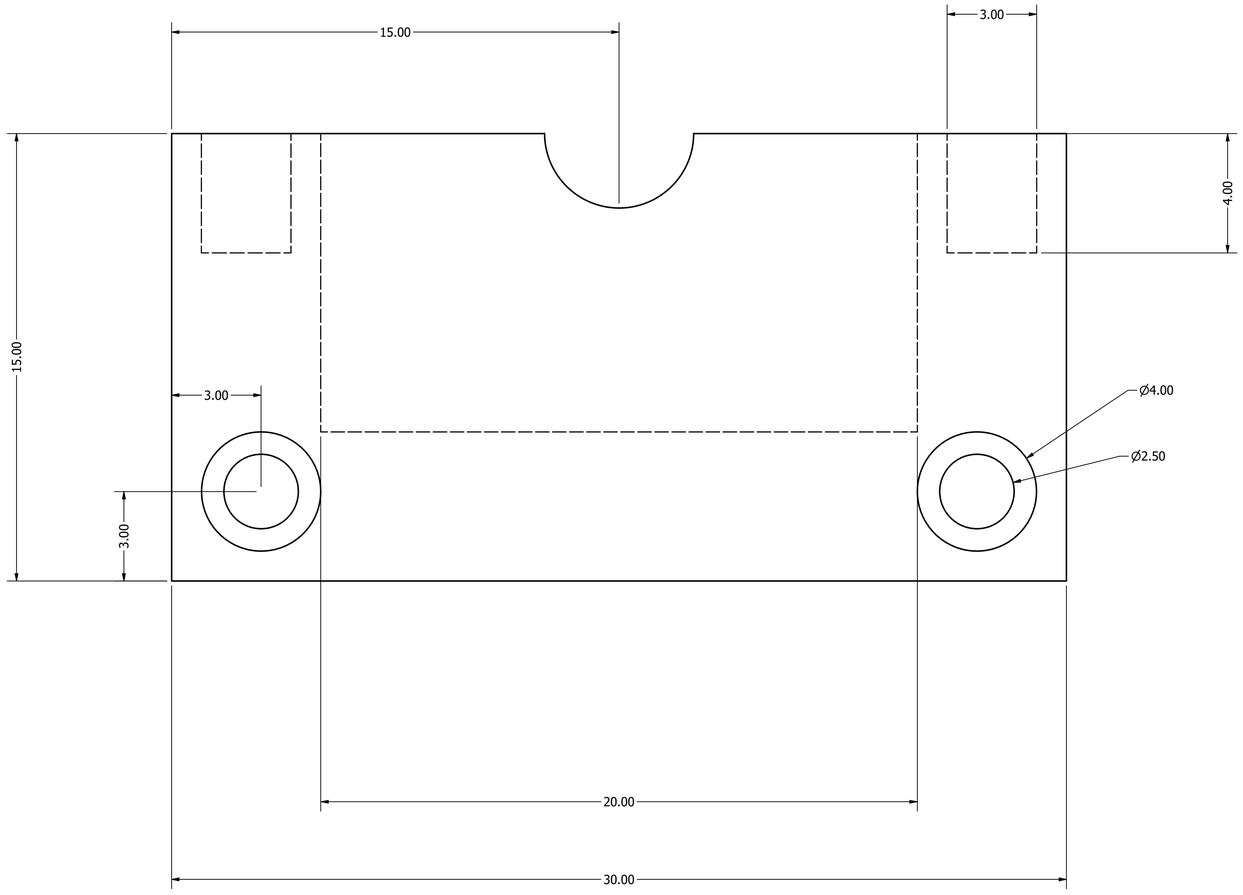




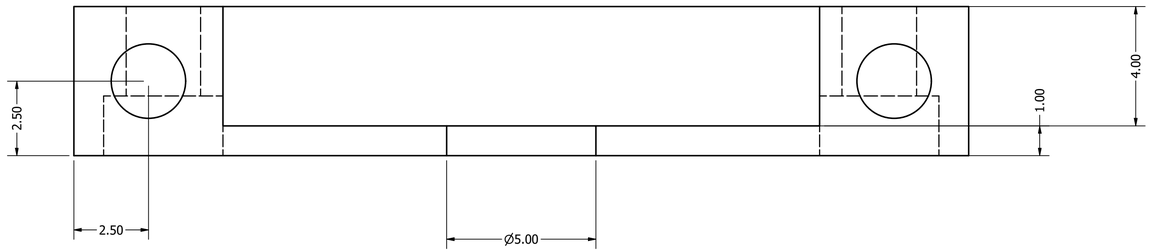
DRAWN Diana Navarro	01/12/2021	EUPT	
CHECKED Diana Navarro	01/12/2021	TITLE Caja sensor 1	
QA			
MFG			
APPROVED		SIZE D	DWG NO Caja sensor 1 REV
		SCALE 10 : 1	SHEET 1 OF 1

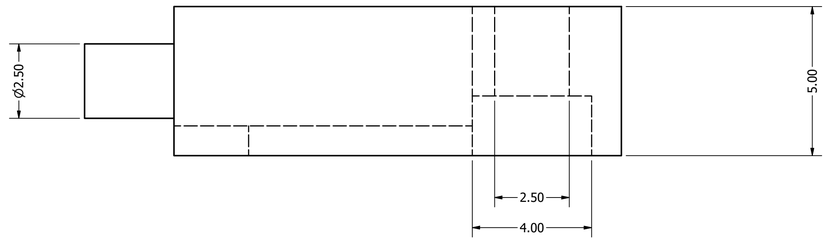


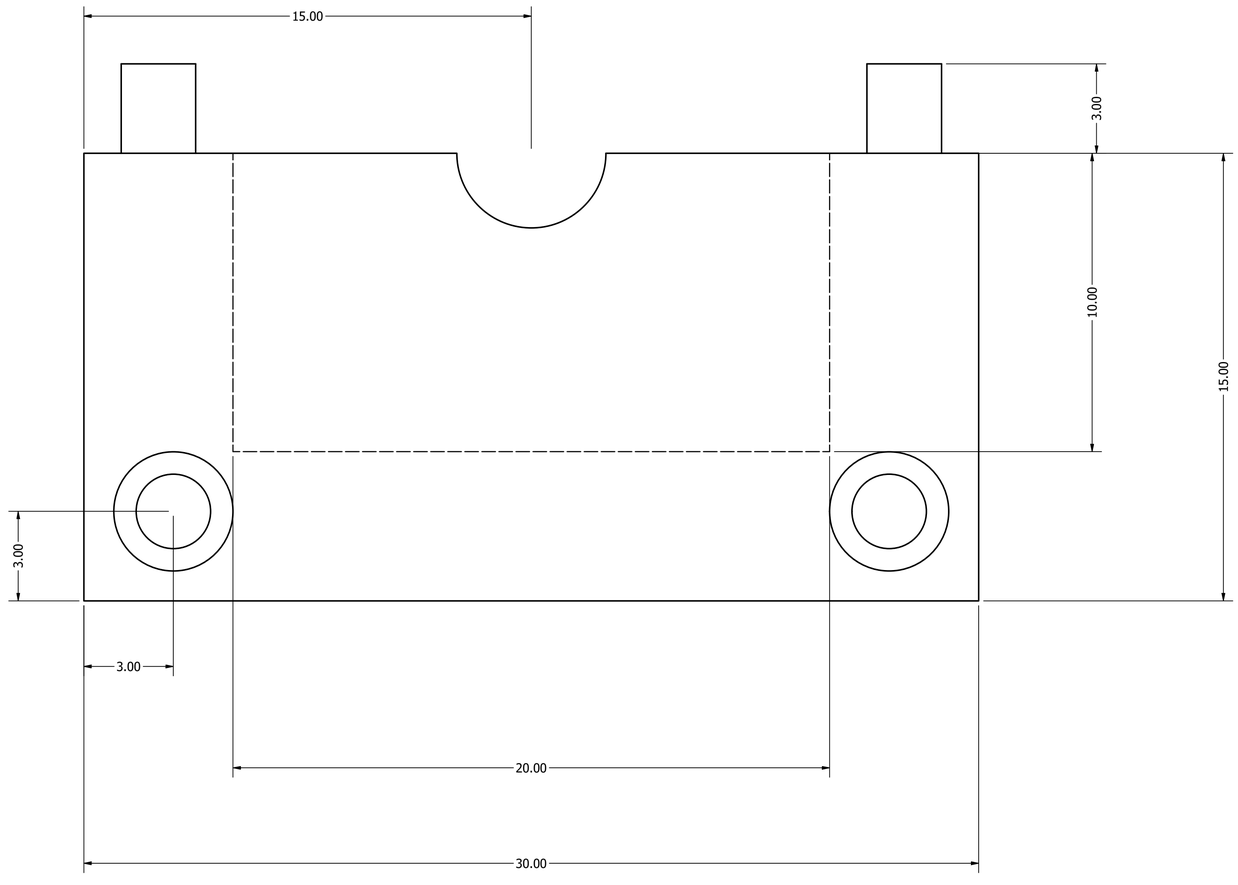




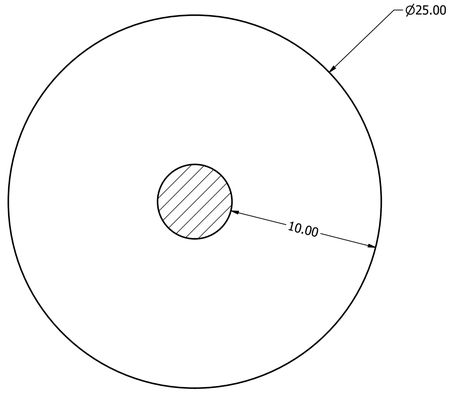
DRAWN Diana Navarro	01/12/2021	EUPT	
CHECKED Diana Navarro	01/12/2021	TITLE Caja sensor 2	
QA			
MFG			
APPROVED		SIZE D	DWG NO Caja sensor 2 REV
		SCALE 10 : 1	SHEET 1 OF 1



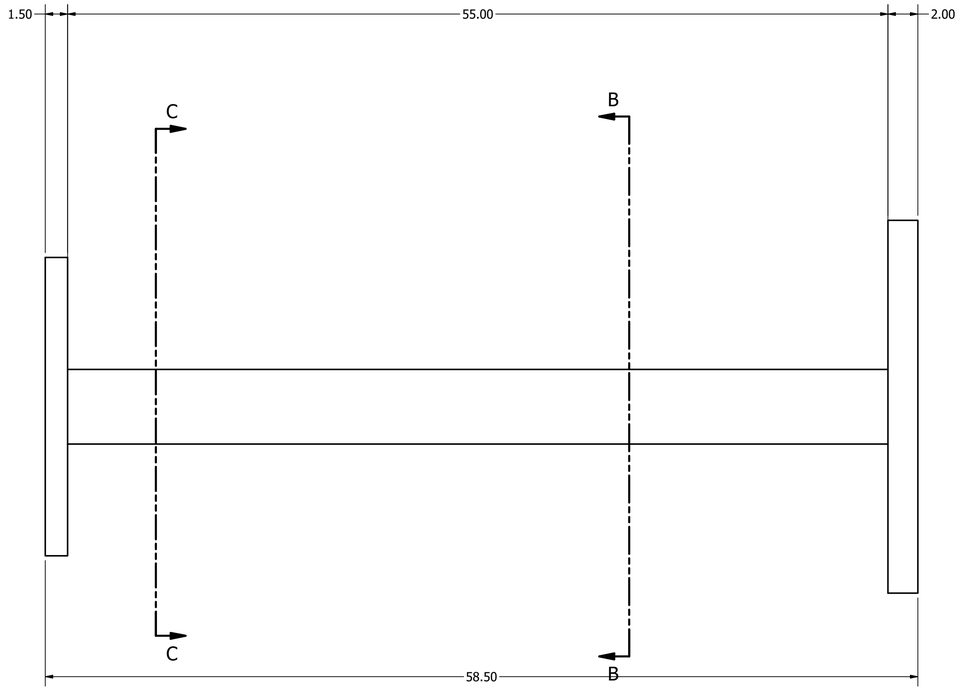


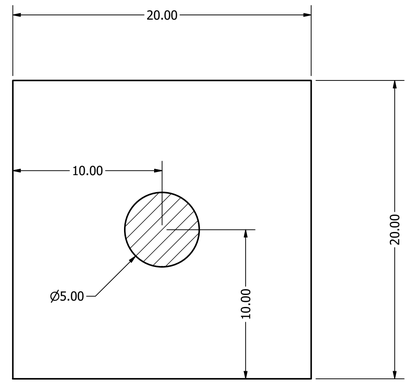


DRAWN Diana Navarro	01/12/2021	EUPT	
CHECKED Diana Navarro	01/12/2021	TITLE Caja sensor 3	
QA			
MFG			
APPROVED		SIZE D	DWG NO Caja sensor 3 REV
		SCALE 10 : 1	SHEET 1 OF 1



SECTION C-C
SCALE 5 : 1





SECTION B-B
SCALE 5 : 1

DRAWN Diana Navarro	01/12/2021	EUPT	
CHECKED Diana Navarro	01/12/2021	TITLE Vastago	
QA			
MFG			
APPROVED			
		SIZE D	DWG NO plano bastago / REV
		SCALE 5 : 1	SHEET 1 OF 1

ANEXO 2: CÓDIGO ARDUINO

```
/// Sensor capacitivo para la medicion de la frecuencia respiratoria ///
/// Autor:Diana Navarro Sánchez ///
////////////////////////////////////////////////////////////////////////////////////////
//////////////////////////////////////////////////////////////////////////
/// LIBRARIES ///
//////////////////////////////////////////////////////////////////////////
#include <LiquidCrystal.h>
//////////////////////////////////////////////////////////////////////////
/// VARIABLES ///
//////////////////////////////////////////////////////////////////////////
/*---------------------------(Variables for capacity measure)----------------------------------*/
float Ra = 10000; //Circuit resistance 1
float Rb = 100000; //Circuit resistance 2
float Cx = 0; //Varaiable that save capacity measure.
float Cx_nF=0; //Variable that saves the capacity measure in nF
float F_555 = 0; //Output frecuency of the frecuency modulator (LM555)
int entrada = 2; //Pin that detects de pulse
unsigned long  t0_lcd; //variable que pone la LCD a 0
unsigned long  t1 = 0; //Variable that saves the rising edge
unsigned long t2 = 0; //Variable that saves the falling edge
unsigned long T_High = 0; //Variable that saves the High time of the pulse
unsigned long T_High_Sg = 0; //Variable that saves the high timen in seconds
float n = 0;
float N = 0;

/*----------------------------------(Inicializacion LCD)-------------------------------------------*/
LiquidCrystal lcd(8, 7, 6, 5, 4, 3);

#define COLS 16 // Columnas del LCD
#define ROWS 2 // Filas del LCD
#define VELOCIDAD 300 // Velocidad para mover el texto
```

```
void setup() {
// Configuramos las filas y las columnas del LCD en este caso 16 columnas y 2 filas (Depende del hardware de cada uno)
  Serial.begin(9600);
  lcd.begin(COLS, ROWS);
  pinMode(entrada,INPUT);
  //Serial.begin(9600);
  t0_lcd = millis(); //value in milliseconds
}

void loop(){
 while (digitalRead(entrada) == 0);
  t1 = micros(); //First measure
 while (digitalRead(entrada)== 1);
  t2= micros(); //Second measure


 T_High= t2-t1; //High time of the output in usg
 //T_High_Sg = T_High/10^6; //High time of the output in sg
 //Cx = ((T_High_Sg)/(0.693*(Ra+Rb))); //Calculate the unknown capacity (in Farads)
 //F_555 = 1.44/((Ra+2*Rb )*Cx); //Calculate the frecuency of the circuit
 // F_555=(F_555*100000)/2 ; //Calculates the frecuency of the circuit in Hz

 if (T_High > 60000){
  n++;

  Serial.println(n); // para mostrar el valor de la pantalla monitor serie
  lcd.setCursor(0,0);
  lcd.print("Respir.: ");
  lcd.setCursor(9,0);
  lcd.print(String(n));
```

```
  lcd.setCursor(0,1);
  lcd.print("Freq.resp.: ");
  lcd.setCursor(12,1);
  lcd.print(String(N)) ;

}

 //Calculo de la frecuencia respiratoria cuando ha pasado 1 minuto
  if( (millis()-t0_lcd) > 60000 ) {
   N=n; // Frecuencia respiratoria
   lcd.setCursor(0,0);
   lcd.print("Respir.: ");
   lcd.setCursor(9,0);
   lcd.print(String(n));
   lcd.setCursor(0,1);
   lcd.print("Freq.resp.: ");
   lcd.setCursor(12,1);
   lcd.print(String(N)) ;

  n=0;
  t0_lcd = millis();
 }
}

//Loop End//
////////////////////////////
//End of the program //
```