TC01 Non-contact 16x4 Pixel Infrared Temperature Sensor

SKU:SEN0254

Introduction

The main function of this TC01 non-contact 16x4 pixel infrared temperature sensor is to realize remote temperature detection via non-contact 16x4 pixel infrared. It can detect the environment temperature, and its 16x4 pixels support producing temperature figure of 64 pixels. The sensor adopts metal crust, which is waterproof, dustproof and ensures high anti-interference even in varieties of complex scenarios. The standard Modbus-RTU industrial protocol RS485 interface is adopted. So that it is compatible with a variety of industrial personal computer. It can be widely applied to applications like high-precision contactless temperature testing, temperature scanners, intrusion/motion detection, status detection/human positioning and so on.

Specification

Operating Voltage: Operating Voltage: 9-24V DC

Rated Power: 0.1W

Operating Temperature: -40℃-85℃

Temperature Detection Range: -20℃-300℃

Precision: ±1℃~±5.5℃

Infrared Array: 16x4

FOV: 60°x 16°

Protection Level: IP65

Communication Interface: RS485

Communication Protocol: Modbus-RTU

Probe Diameter: 0.606inch / 15.4mm

Probe Length: 3.110inch / 79mm

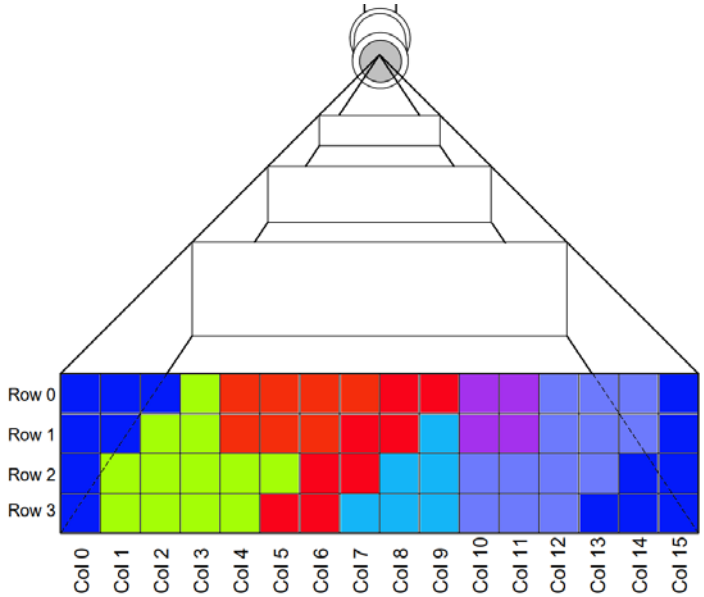
Cable Length: 1.5m

Cable Interface: stripped tin-plating wire interface

Overview

Num	Wire Color	Description
1	White	VCC(+)
2	Black	GND(-)
3	Orange	RS485-A
4	Brown	RS485-B

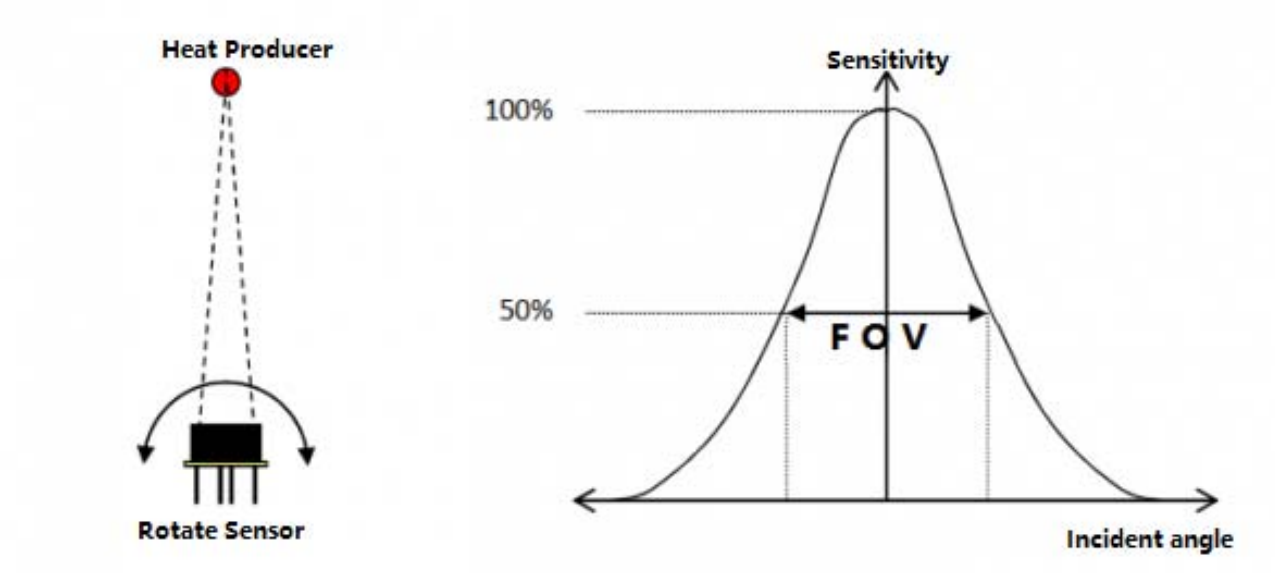
Pixel Arrangement Schematic



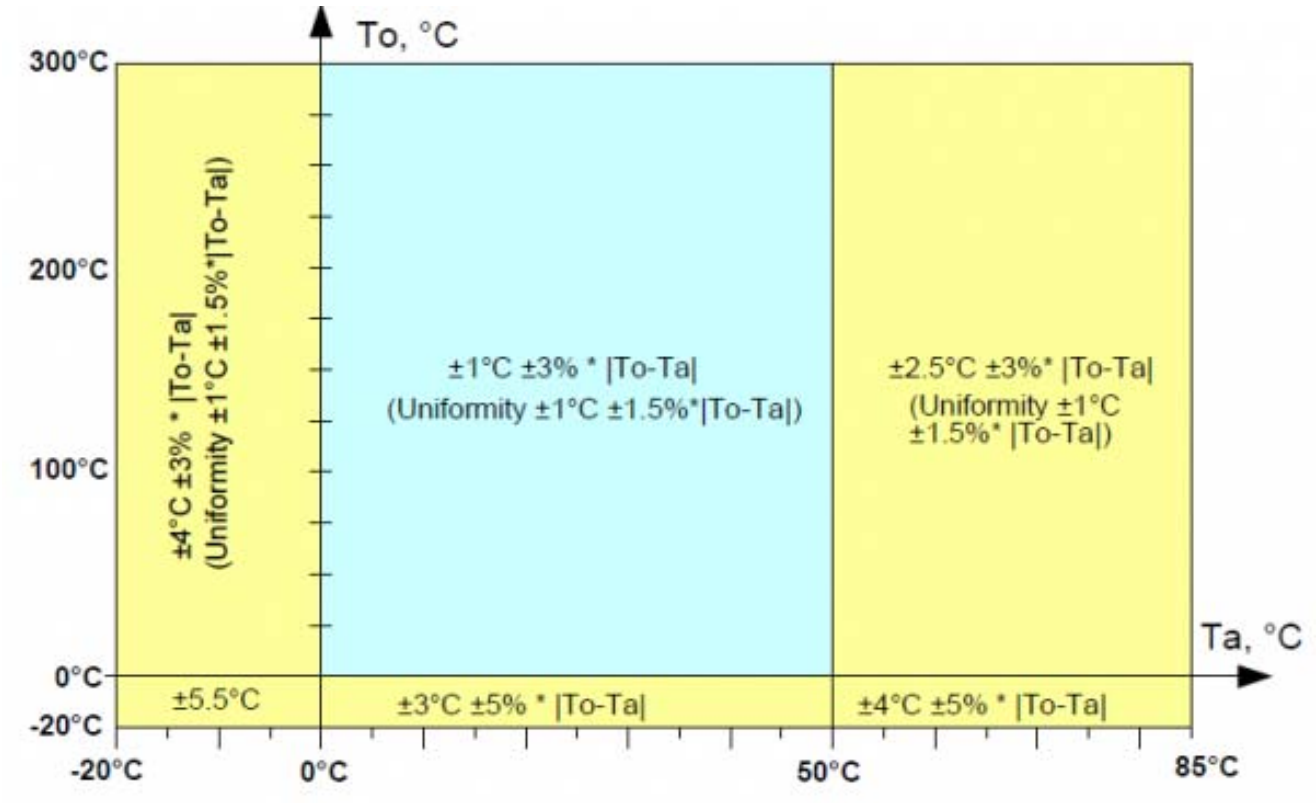
NOTE: The infrared array has 16x4 pixels in all.

Description about FOV and Distance

The field-of-view angle of the sensor is 60°x 16°. The maximum distance between the target under test and the measuring head is depended on the size of the target being measured and the optical characteristics of the infrared thermometer.



Measurement Accuracy Change



Annotation: To-Measure temperature Ta-ambient temperature

NOTE:

All precision specifications are only applicable to stable temperature conditions.

Accuracy is only effective if the object is fully covered by the sensor's field-of-view angle.

The precision parameters shown in the figure are the accuracy of the four center pixels of the product, and the accuracy of the remaining pixels depends on the uniformity declaration.

Due to long-term (year) drift, the temperature of the measured object near room temperature may have an additional measurement deviation of ±3°C.

Modbus -RTU Register Table

Description: support Modbus function codes: 0x03, 0x06, 0x10

TC01 ModBus-RTU Register Map							
Address	DEC	Number	Name	Operation	Data Range	Default	Comment
0x0000	0	1	Product ID (PID)	R	0x0000-0xFFFF	0x00DF	This bit is used for product calibration
0x0001	1	1	Version ID (VID)	R	0x0000-0xFFFF	0x0010	[0x0010 indicates V0.0.1.0]
0x0002	2	1	Address	R/W	0x0001-0x00F7	0x000A	[When the address of the sensor is unknown, the register write operation can be done by the broadcast address 0x00, and the sensor will not output data]
0x0003	3	1	BaudRate	R/W	0x0000-0xFFFF	0x0005	BaudRate(bps) 0x0001---2400 0x0002---4800 0x0003---9600 0x0004---14400 0x0005---19200 0x0006---38400 0x0007---57600 0x0008---115200 Other----115200 [0x0005 indicates the BaudRate is 19200bps]
0x0004	4	1	Parity&StopBits	R/W	0x0000-0xFFFF	0x0001	Parity(H) Stop Bits(L) 0x00--None 00--0.5Byte 0x01--Even 01--1Byte 0x02--Odd 02--1.5Byte oyher-None 04--2Byte Other--1Byte [0x0001 indicates Parity(H)=None StopBits=1Byte]
0x0005 ~ 0x0044	5	64	Matrix temperature	R	0x0000-0xFFFF	0x0000	int16, 1LSB=0.1℃
0x0045	69	1	Ambient Temperature	R	0x0000-0xFFFF	0x0000	int16, 1LSB=0.1℃

Tutorial

Requirements

Hardware

Leonardo with Xbee Socket (Arduino Compatible) x 1

RS485 Shield for Arduino x 1

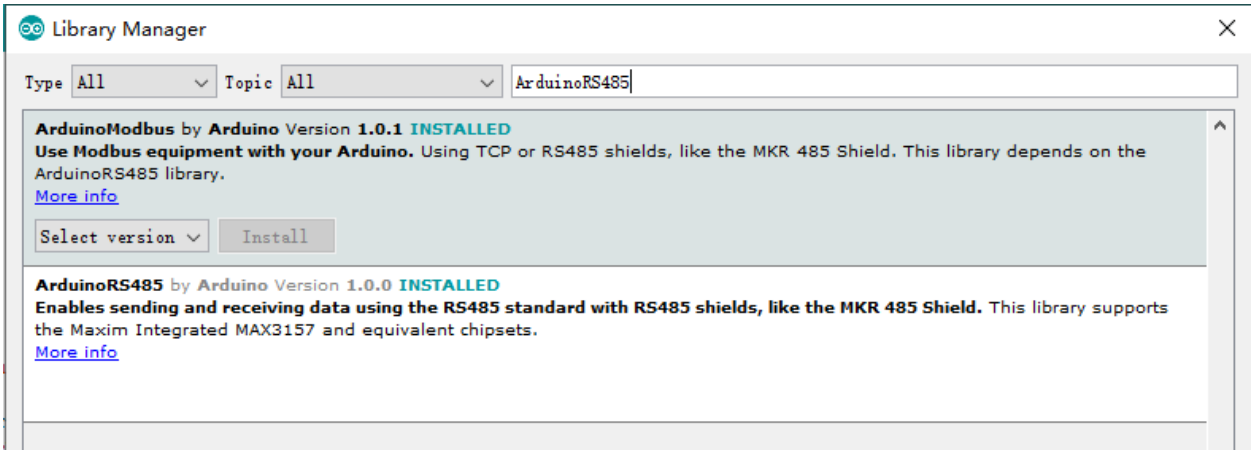
9v- 24v External Power Supply x1

TC01 Non_contact 16x4 Pixel Infrared Temperature Sensor x1

Software

Arduino IDE

Download and install the [ArduinoModbus] and [ArduinoRS485] in Library Manager(Ctrl+Shift+I). (About how to install the library?)



Connection Diagram

Sample Code

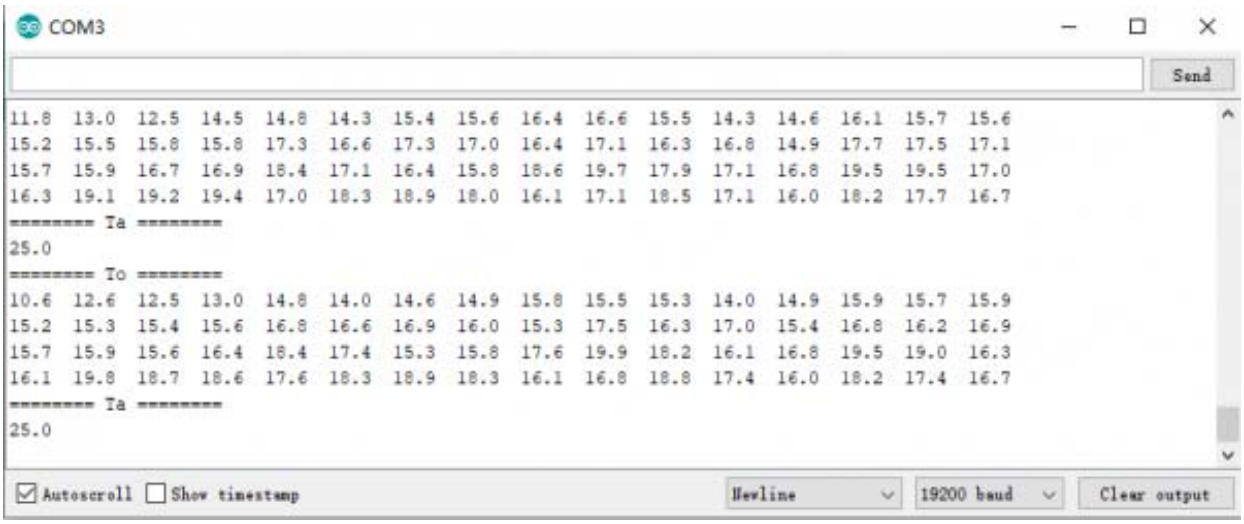
```
#include <ArduinoModbus.h>

#include <ArduinoRS485.h>


#define baudRate 19200

#define addr 0x0A
```

```
float To[64]= {0.0};
float Ta= 0.0;

void getTa()
{
   if (!ModbusRTUClient.requestFrom(addr, HOLDING_REGISTERS, 0x45,1))
   {
      Serial.println("error: ");
      Serial.println(ModbusRTUClient.lastError());
   }
   else
   {
      Ta= ModbusRTUClient.read()/10.0;
   }
   delay(100);
}

void getTo()
{
 for(uint8_t row=0;row<4;row++)
 {
   if (!ModbusRTUClient.requestFrom(addr, HOLDING_REGISTERS, 0x05+(row*0x10),0x10))
   {
      Serial.print("error: ");
```

```
      Serial.println(row);
      Serial.println(ModbusRTUClient.lastError());
    }
    else
    {
      for(uint8_t i=0; i<16; i++)
      {
        To[row*16+i]=ModbusRTUClient.read()/10.0;
      }
    }
    delay(100);
  }
}

void setup() {
  Serial.begin(baudRate);
  ModbusRTUClient.begin(baudRate);
}

void loop() {

  /**********Ta*****************/
  getTa();
  Serial.println("======== Ta ========");
  Serial.println(Ta,1);
```

```
  /**********TO**********************/
  getTo();
  Serial.println("======== To ========");
  for(uint8_t i=0; i<64; i++)
  {
     Serial.print(To[i],1);
     Serial.print("  ");
     if((i+1)%16==0)Serial.println();
  }
  delay(100);
}
```

Expected Results



Visual Testing Software

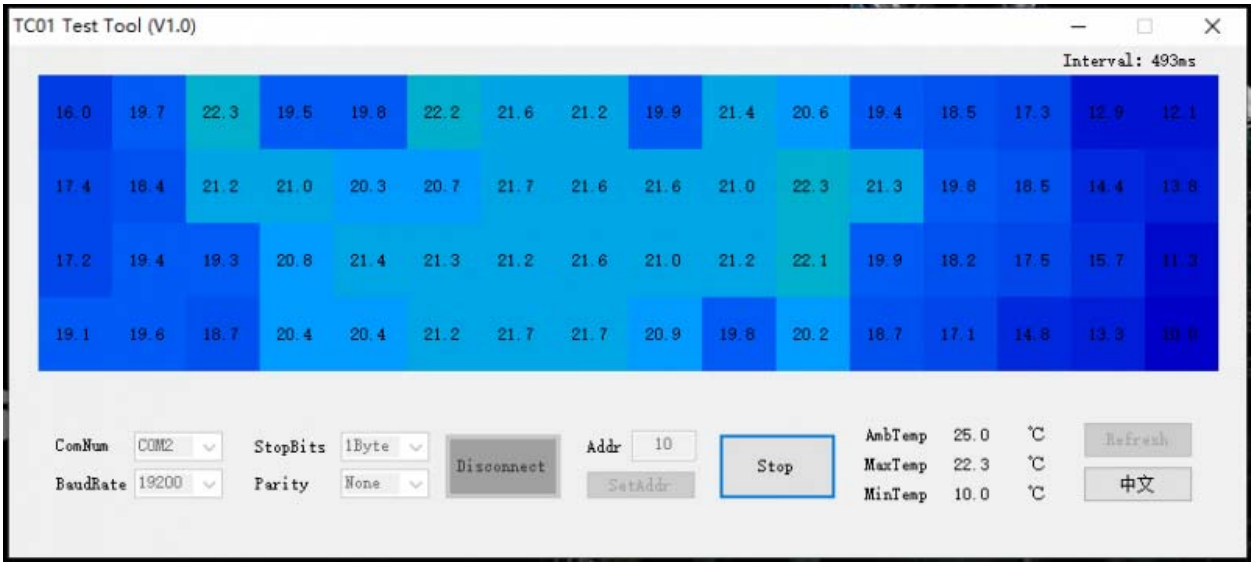
Connection Diagram

Please refer to the hardware connection above(but there is no need to install library).

```
*
This code realizes the function to transform Leonardo USB to 485. And you can also test it with other DF USB to 485 tools.
*/
void setup() {
 Serial.begin(19200); //Initializing Serial (i.e. USB serial)
 Serial1.begin(19200);//Initializing Serial
}
void loop() {
 while (Serial1.available()) {
  Serial.write(Serial1.read());//If Serial1 receives data, then Serial will output it.
 }
 while (Serial.available()) {
  Serial1.write(Serial.read());//If Serial receives data, then Serial1 will output it.
 }
 delay(1);//Short delay to avoid USB-COM instability
 }
```

Host Computer Software

Click to download TC01 measurement tool.



FAQ

For any questions, advice or cool ideas to share, please visit the DFRobot Forum