



Temperature Range, Field-of-View

CT - □N - 485

| Temp. code | Measurement range | FOV (field of view) |
|------------|-------------------|---------------------|
| 200 | -20 ... 400°C | 7.16° |
| 300 | -20 ... 500°C | 3.814° |
| 1000 | -20 ... 1000°C | 2.886° |

e.g. Model CT-200N-485 has a 7.16° field of view and provides object temperatures of -20...400°C.

Product Specifications

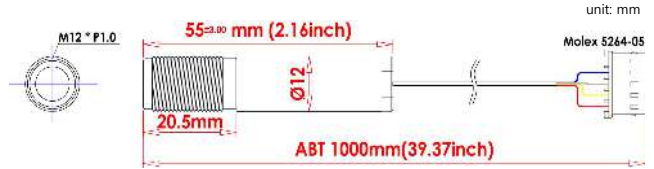
If not otherwise noted, 25°C ambient temperature, 5V supply voltage were applied.

| Parameter | min | Typ | Max | Unit |
|--------------------------------------|-------------------------|------|-----|------|
| Supply voltage | 4.75 | 5 | 12 | V |
| Supply current | | 15 | | mA |
| Spectral range | 8 | - | 14 | μm |
| Operating temperature | -20 | | 70 | °C |
| IR refresh rate | | 10 | 10 | Hz |
| Accuracy(*) | | ±2 | | % |
| Resolution digital | | 0.1 | | °C |
| Emission coefficient | 0.1 | 0.97 | 1.0 | ε |
| Standard start-up time | | 1 | 2 | sec |
| Stabilization time | 1 | | | min |
| Dimensions | Ø12 x 55mm(long) | | | |
| Thread mounting | M12 x 1mm pitch | | | |
| Cable length | about 1m (39.37 inch) | | | |
| Weight with cable | 36g | | | |
| Cable interface | molex 5264-05 | | | |
| Communication interface/ protocol | RS-485/ Modbus-RTU | | | |
| Relative humidity | 95% Max. non-condensing | | | |

*: ±2% of reading or ±2°C whichever is greater.

Accuracy is only effective if the object is fully covered by the sensor's FOV and applicable to stable temperature conditions.

Dimensions / Pins and Wiring colors

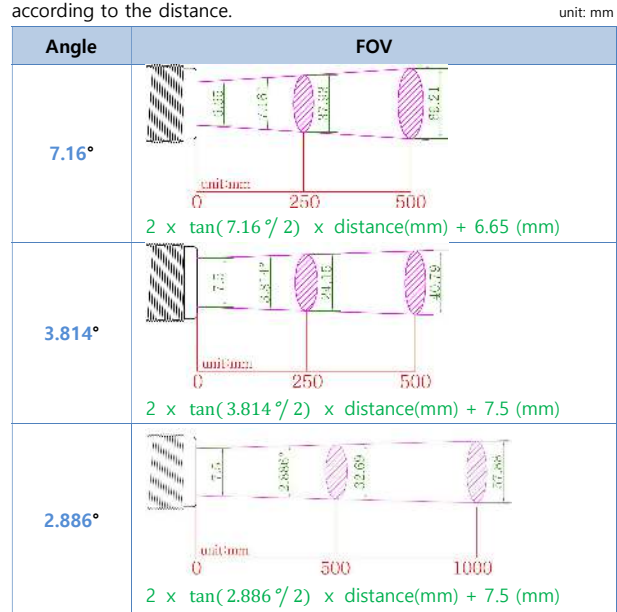


The shield wire is connected to the GND wire.

| No. | Wire Color | Description |
|-----|-----------------|-------------|
| 1 | Red | VDD (5V) |
| 2 | Yellow or Black | Ground |
| 3 | White | RS485 D- |
| 4 | Blue or Green | RS485 D+ |
| 5 | None | None |

Calculate Field of View

The FOV determines the size of the infrared measurement area according to the distance.



Accessories

| | | |
|--|---------------------------------------|------|
| | nut (assembled to the body.) | 2pcs |
| | Protective cap (Remove when using) | 1pc |
| | Molex 5267-05A-X | 1pc |

Modbus-RTU Register Table

- BaudRate: 19,200 bps(fixed), data bit: 8, stop bit: 1, parity: none, flow control: none.

- R = Read - W = Write (single write)

| Address | | Length (short) | Description | R/W |
|---------|--------|----------------|--|-----|
| Dec | Hex | | | |
| 40,000 | 0x9C40 | 1 | Device ID (1 ~ 200), Modbus broadcast not supported. | R/W |
| 40,001 | 0x9C41 | 1 | Emissivity (10~100. default : 97) (*) | R/W |
| 40,002 | 0x9C42 | 1 | Object temperature | R |
| 40,003 | 0x9C43 | 1 | Ambient temperature | R |
| 40,004 | 0x9C44 | 1 | Average Filter (1~10, default : 10) (**) | R/W |

*: "97" means emissivity "0.97". To adjust the emissivity to 0.95, write 95 not 0.95.

** : number of average filter array elements. Affected by noise reduction of Object temperature and peak temperature measurement time.
Time to peak temperature: up to 1 sec (default: 10)

Support Modbus function codes

- Read Holding Registers 03 (0x03)
- Write Single Register: 06 (0x06)

Object Temperature: To, Ambient Temperature: Ta

To is the object temperature derived from thermopile and ambient sensor outputs.
Ta stands for ambient temperature.

0x016D(read data) = 365(dec) → means 36.5°C

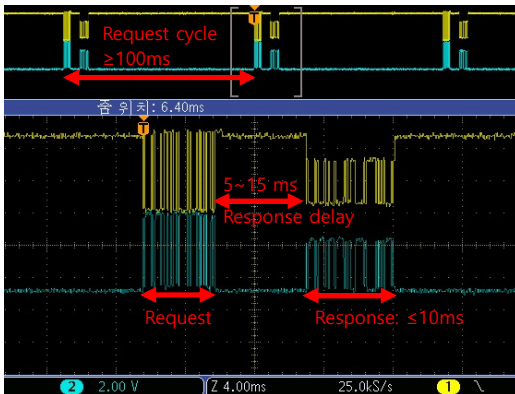
0xFFFF1(read data) → 0x000F(two's complement)=15 → means -1.5°C

※ Output Data Limit

| Model | Temperature range |
|--------------|-------------------|
| CT-200N-485 | -20 ... 450°C |
| CT-300N-485 | -20 ... 550°C |
| CT-1000N-485 | -20 ... 1100°C |

Request & Response timing

- Request cycle: ≥100ms
- First data request time after Power-on: ≥ 1 sec
- Timeout: ≥ 25ms



Note. If there is an error in the request sequence (including crc), there is no response data.

Products handling precaution

- ※ When it comes to dust removal by air, the best method is to use a blower, and to avoid using compressed air.
- ※ Do not press the lens with your hands or any other object.
- ※ Do not scratch the lens surface with sharp objects.
- ※ Voluntary disassembly and modification of the product is prohibited.
- ※ Avoid direct sunlight, chemical substance, heat or fire.
- ※ Water resistance is not guaranteed.

- Sample Code

```

#include <MsTimer2.h> // Timer library.
#include <ModbusRtu.h> // Modbus library.
#include "SoftwareSerial.h" // SoftwareSerial library
#define DISABLE 0
#define ENABLE 1
#define DE_RE 2
#define USING_SOFTWARESERIAL 4
#define ID 1

int8_t Timer_Flag = 0, Data_Print = DISABLE;
uint16_t au16data[2];
int16_t Object, Ambient;

SoftwareSerial mySerial(3, 5); // RX 3, TX 5
Modbus master(0,USING_SOFTWARESERIAL,DE_RE); // Modbus Master, 4:Using SoftwareSerial , DE/RE 2
modbus_t telegram; // Master query structure

void setup() {
  Serial.begin(9600); // for Serial Monitor (Ctrl + Shift + M )

  master.begin(&mySerial, 19200); // begin the ModBus object.
  master.setTimeout( 25 ); // Modbus timeout : 25 ms

  Serial.println("Waiting for sensor initialization time");
  delay(1000); // Wait for sensor initialization time

  MsTimer2::set(500, timerISR); // Timer interval : 500ms.
  MsTimer2::start(); // Timer Start
}

void loop() {
  if(Timer_Flag) { // Check timer interrupt
    Timer_Flag = 0;
    Transfer_Data(ID); // Request data transmission : Timer cycle
  }
  if(master.getState() == COM_WAITING) { // Get modbus master state : waiting for answer
    master.poll();
    Data_Print = ENABLE;
  }
  if ((master.getState() == COM_IDLE) && (Data_Print == ENABLE)) { // Get modbus master state : idle
    if(master.getLastError() == 0) { // Get the last error in the protocol processor (0: No error)
      Object = au16data[0];
      Ambient = au16data[1];

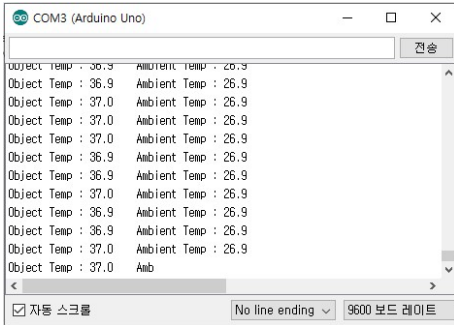
      Serial.print("Object Temp: ");
      Serial.print(float(Object)/10, 1); // celsius
      Serial.print(" Ambient Temp: ");
      Serial.println(float(Ambient)/10, 1);
    }
    else if(master.getLastError() == NO_REPLY) { // Time-out
      Serial.println("No reply.");
    }
    Data_Print = DISABLE;
  }
}

void timerISR() { Timer_Flag = 1; } // Timer Interrupt Service Routine

void Transfer_Data(uint8_t uid) {
  if( (uid == 0) &&(uid>200) ) { // ID : 1~200
    uid = 1; // Do not change the parameter values below.
  }
  telegram.u8id = uid; // slave ID
  telegram.u8fct = 3; // function code = 03 (Read Holding Registers)
  telegram.u16RegAdd = 40002; // start address in slave
  telegram.u16CoilsNo = 2; // number of elements to read
  telegram.au16reg = au16data; // pointer to a memory array in the Arduino
  master.query( telegram ); // send query
}

```

- Expected Results.



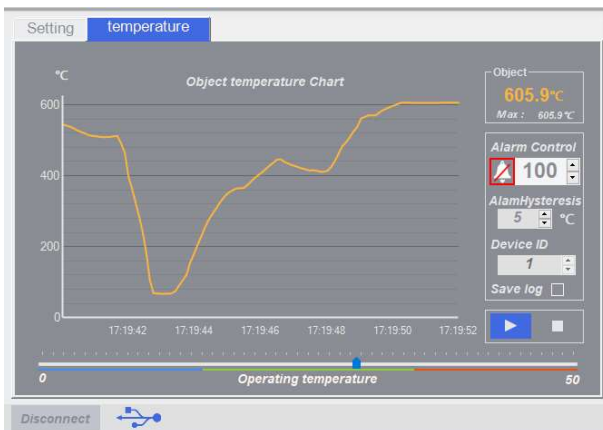
PC Software

The program runs in the Windows 10 environment.

It is not guaranteed to be used on other OS.

For more information, refer to the Test Board manual.

https://www.diwellshop.com/web/en/CT-N/CT-N_Testboard_en.pdf



Additional information

Manufacturer: DIWELL Electronics Co., Ltd. (South Korea)

Technical support: <mailto:expoeb2@diwell.com>, <mailto:dsjeong@diwell.com>

Revision history

| Version | Date(Y,M,D) | Description |
|---------|--------------|-------------------------------------|
| 1.0.0 | 2022. 5. 9. | First version is released |
| 1.0.1 | 2022. 7. 14. | Added Modbus library download link. |
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