



## 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

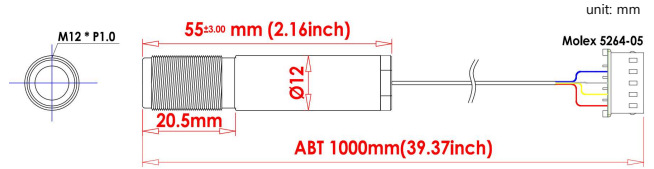
If not otherwise noted, 25°C ambient temperature, 5V supply voltage were applied.

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

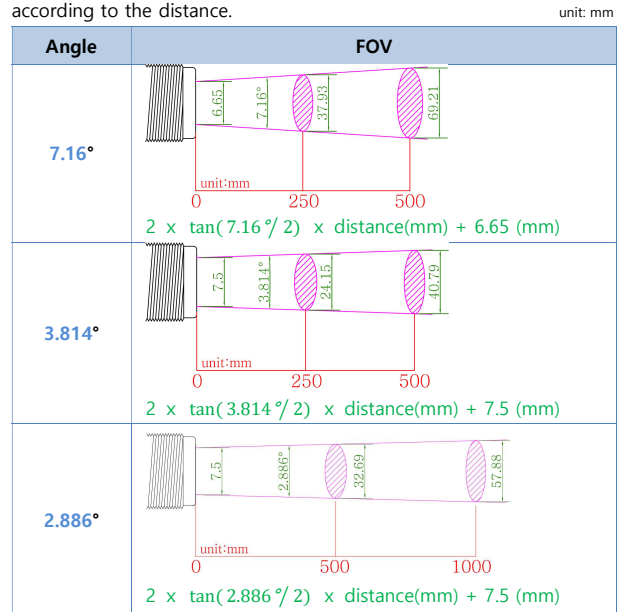


The shield wire is connected to the GND wire.

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

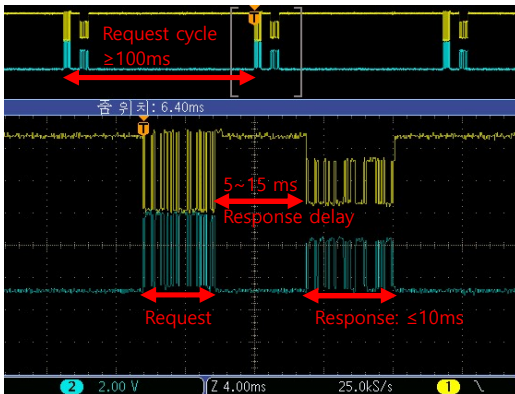
0xFF11(read data) → 0x000F(two's complement)=15 → means -1.5°C

※ 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];

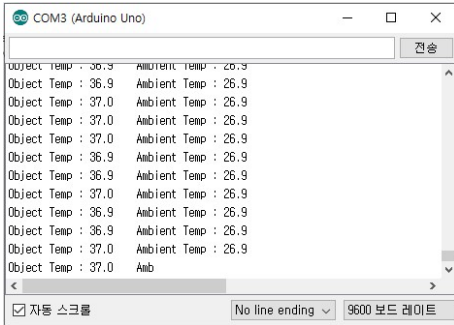
      Serial.print("Object Temp: ");
      Serial.print(float(Object)/10, 1); // celsius
      Serial.print(" Ambient Temp: ");
      Serial.println(float(Ambient)/10, 1);
    }
    else if(master.getLastError() == NO_REPLY) { // Time-out
      Serial.println("No reply.");
    }
    Data_Print = DISABLE;
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

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.



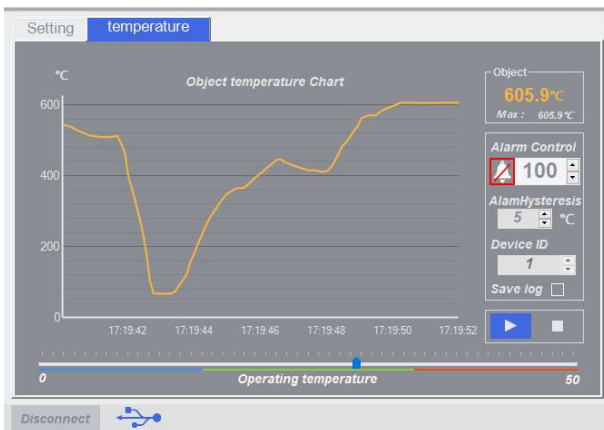
### PC Software

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](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.