iSN-81x Series User Manual

Version 1.0

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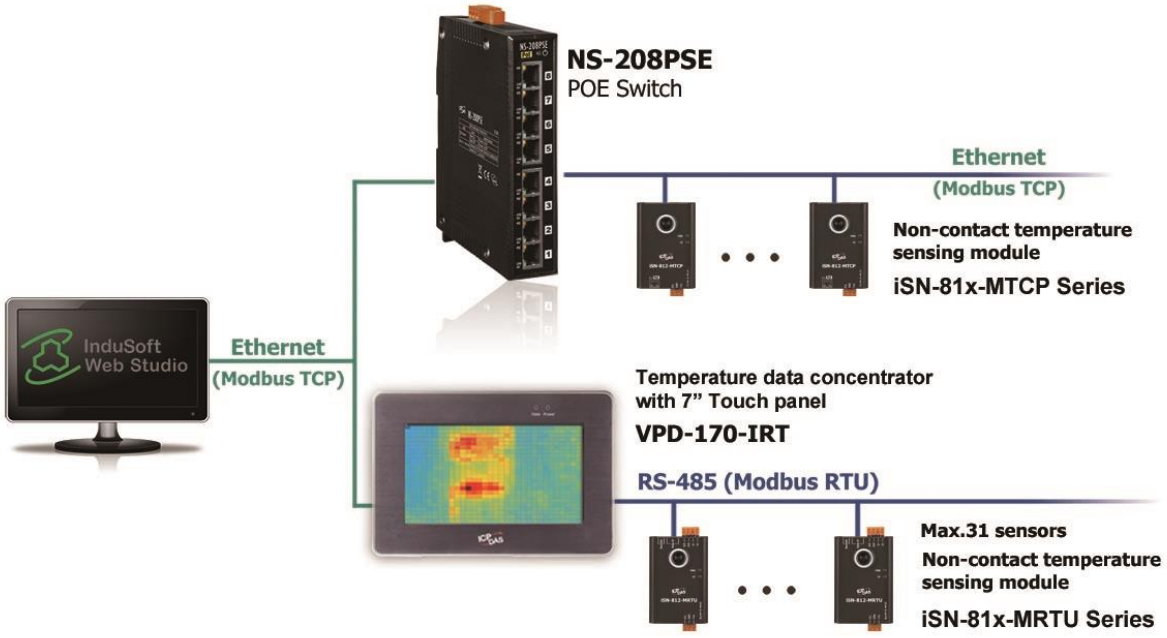
Written by Adam Tsai

Table of Contents

1 Introduction

1.1 Product Information

iSN-81x series is an Infrared temperature sensing module that is designed specifically for non-contact temperature measurement. The module provides a variety of temperature pixels and temperature threshold detection functions to meet various temperature measurement needs. It also provides Modbus RTU and Modbus TCP two protocols that users can put it into SCADA system very easily.



- iSN-81x series

Model	Pixel
iSN-812-MRTU	32*24=768
iSN-812-MTCP	32*24=768

1.2 Features

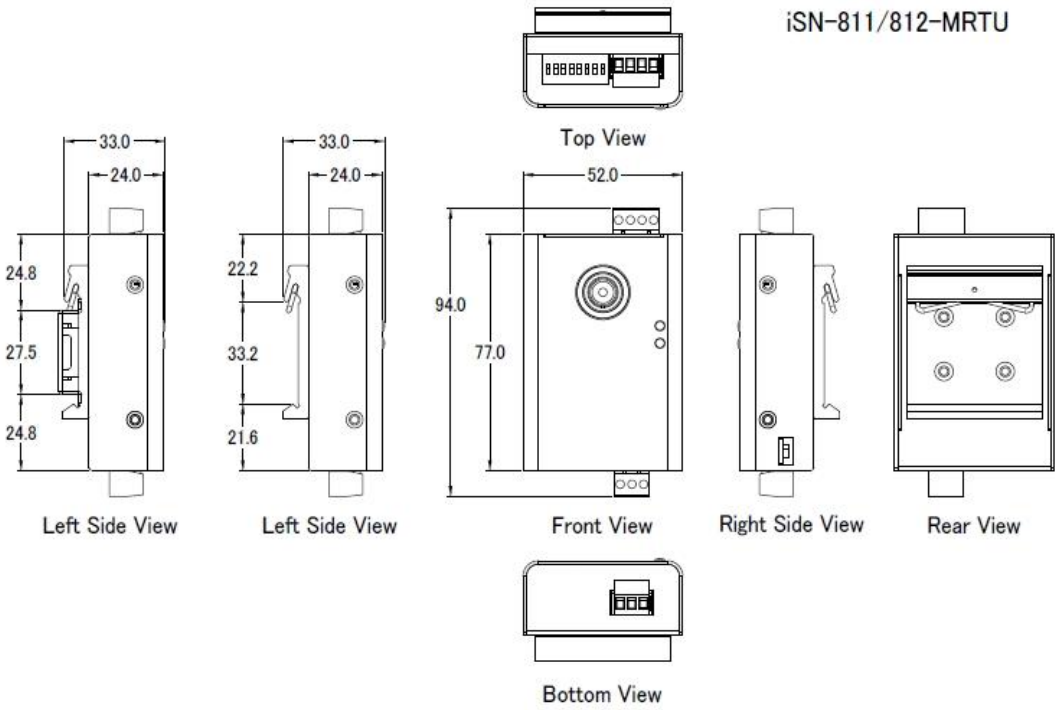
- Non-Contact Temperature measurement
- Support Modbus RTU、Modbus TCP protocols
- Temperature threshold detection function
- Offers Wall-mount, magnetic and universal joint for installation

1.3 Specifications

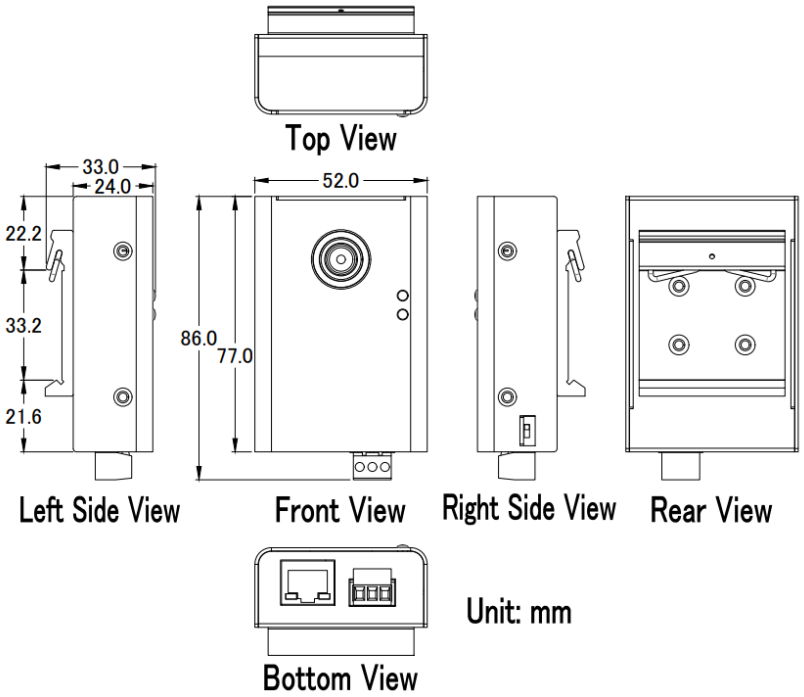
型號	iSN-812-MTCP	iSN-812-MRTU
COM Ports		
Baudrate		115200 bps Max.
Data format		None Parity, 8 Data bit, 1 Stop bit
Ports		1 x RS-485
Protocol		Modbus RTU
Ethernet		
Ports	1 x RJ-45, 10/100Base-T(X)	
PoE	Yes	
Protocol	Modbus TCP	Modbus RTU
Temperature Measurement		
Range	-40°C~300°C	
Accuracy	±5°C Max	
Resolution	0.1°C	
Effective Distance	1m	
Pixel	768(32X24)	
FOV	110°x75°	
Power		
Input Range	+10~+30VDC、 PoE IEEE 802.3af, Class1	+10~+30VDC
Consumption	1.8W	1.5W
Mechanical		
Installation	Wall-mounting or magnetic mounting, gimbal mounting	
Dimensions (mm)	52x95x27	52x94x33
Environment		
Operating Temperature	-10°C ~+70℃	
Storage Temperature	-20°C ~+80℃	
Humidity	10~95% RH, Non-condensing	

1.4 Dimensions

1.iSN-812-MRTU

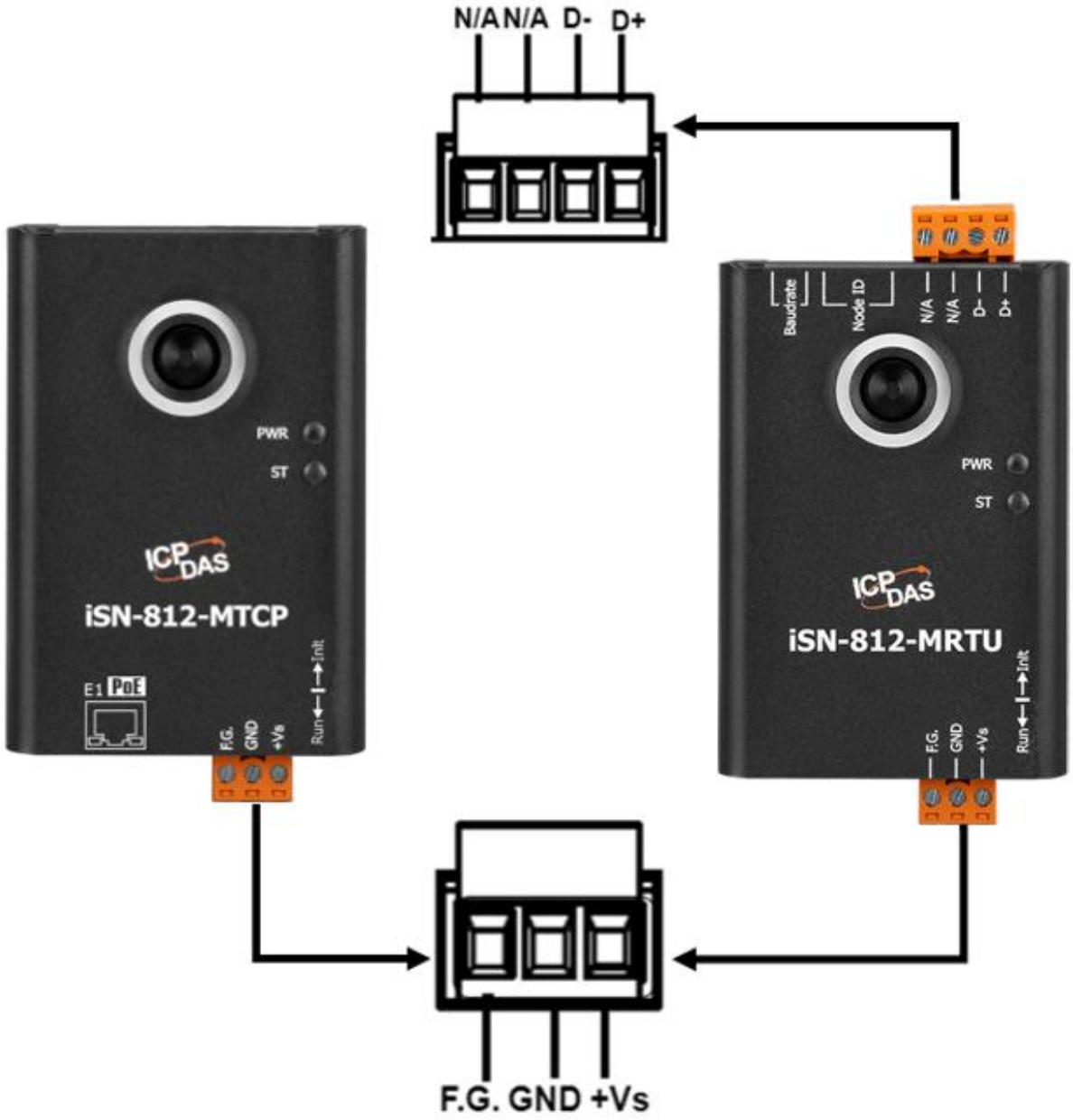


2.iSN-812-MTCP



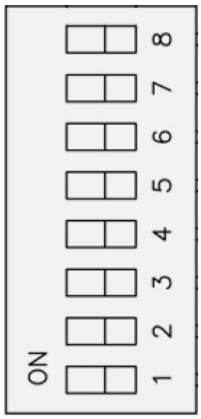
2 Configured by Hardware

2.1 Pin assignments



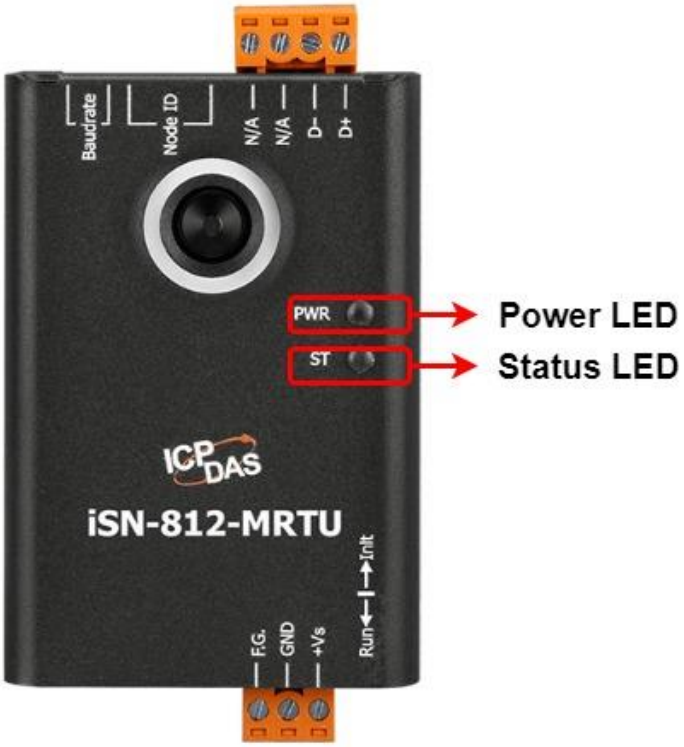
- +Vs: +10~+30VDC

2.2 Dip Switch

<table>
<tr><th>Switch</th><th>Pin Number</th><th>Function</th><th>Example</th></tr>
<tr><td rowspan="2"> 
</td><td>1~5</td><td>Modbus ID (ID range: 1~31)</td><td>
<table>
<tr><th>Modbus ID</th><th colspan="5">Switch</th></tr>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>10</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>30</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>
Note: 1=>ON, 0=>OFF
</td></tr>
<tr><td>6~8</td><td>Baudrate</td><td>
<table>
<tr><th>Baudrate (bps)</th><th colspan="3">Switch</th></tr>
<tr><td></td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>9600</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>19200</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>38400</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>57600</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>115200</td><td>0</td><td>0</td><td>1</td></tr>
</table>
Note: 1=>ON, 0=>OFF
</td></tr>
<tr><td rowspan="2"> 
</td><td colspan="2">Init</td><td>Device works in waiting to be upload Firmware mode</td></tr>
<tr><td colspan="2">Run</td><td>Device works in normal mode</td></tr>
</table>

- The Data format of COM Port: None Parity, 8 Data bit, 1 Stop bit. (N,8,1)

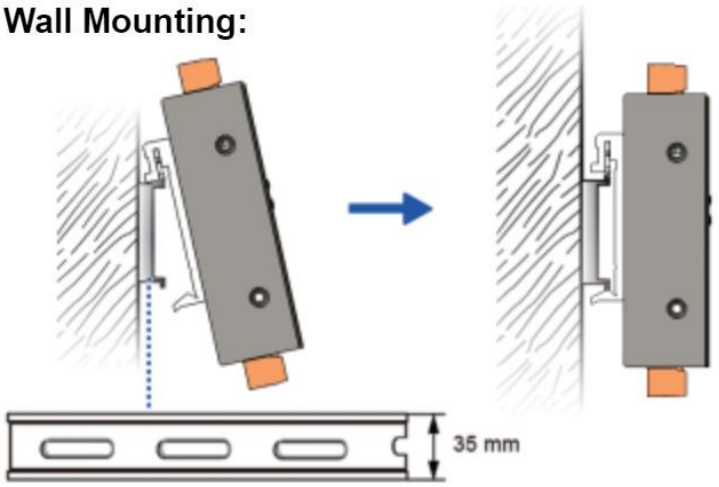
2.3 LED Indicators



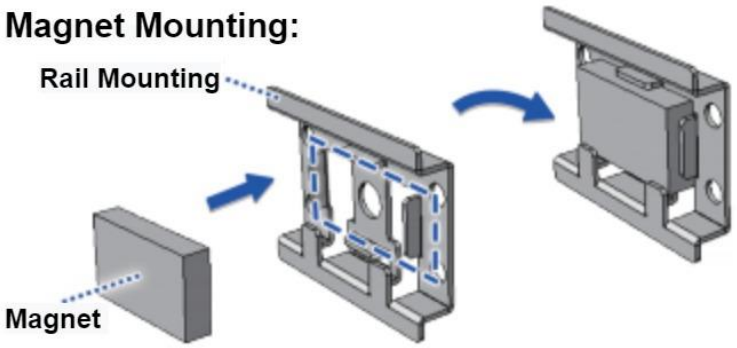
LED	LED Status	LED Description
Power	On	Power supply is OK
	Off	Power supply has failed
Status	On	Start Modbus communication
	Flash	Diagnostic message
	Off	Reserved

2.4 Installation

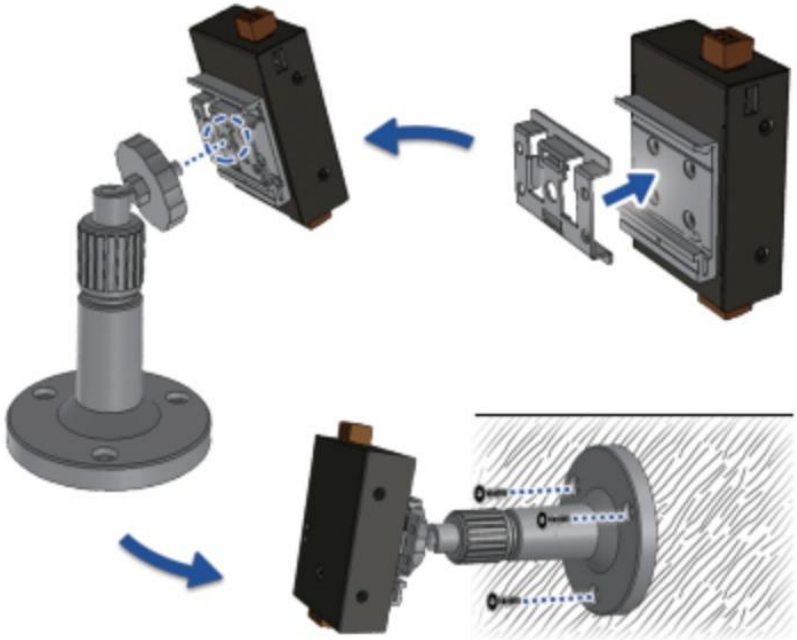
Wall Mounting:



Magnet Mounting:



Gimbal Mounting:

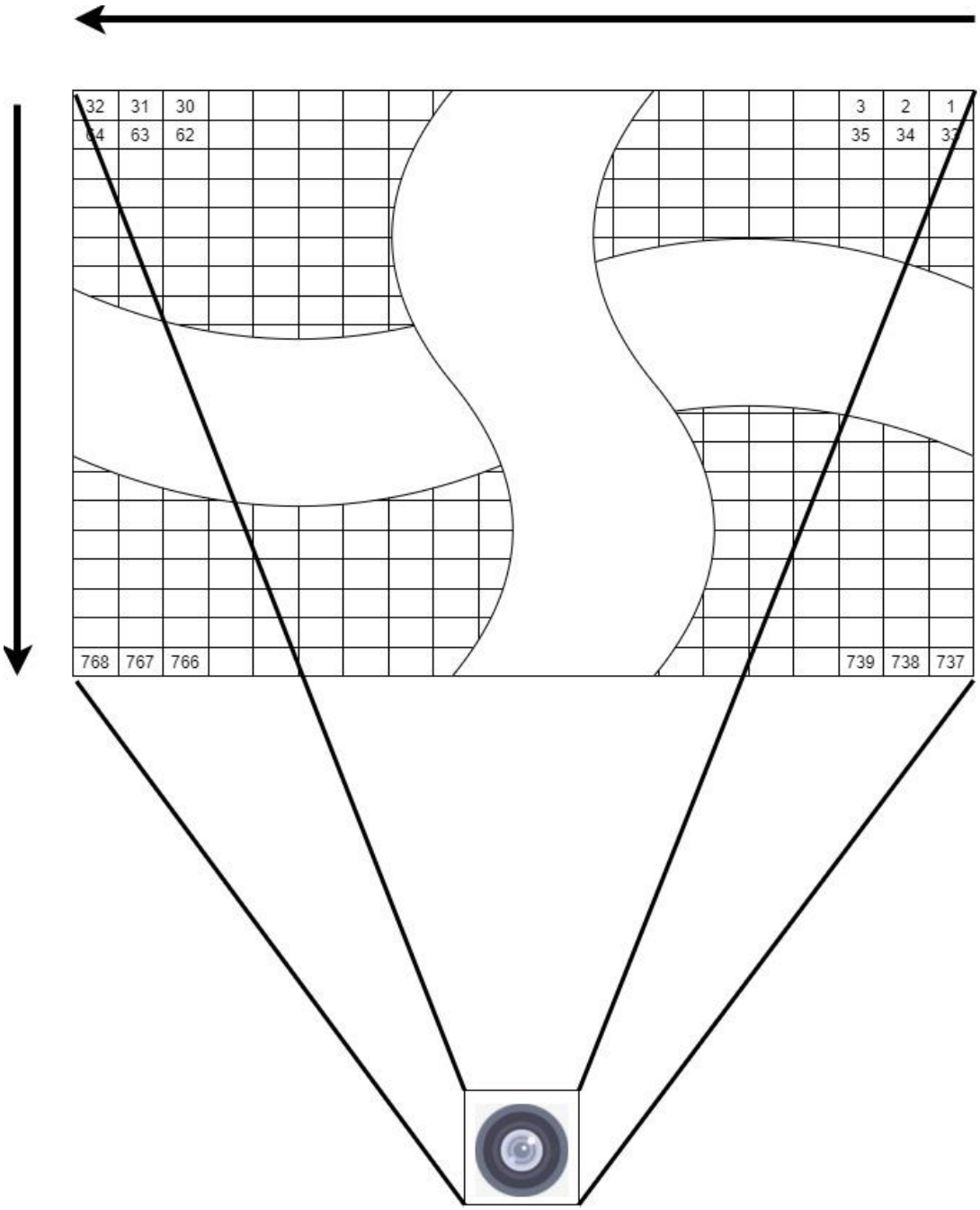


3 Temperature and other function

3.1 Temperature point and its coordinate

Each model has its own coordinate of the temperature point, please refer to the following content.

- iSN-812 series



3.2 Segmentation of Measurement FOV

According the image resolution of iSN-81x series, we segment the measurement FOV to serval area. Each area has its own item, like the highest temperature, the lowest temperature, threshold value, etc.

1. The item of each area:

- The highest temperature
- The lowest temperature
- Average temperature
- Warning threshold value
- Danger threshold value
- Threshold type
- Threshold switch

2. Area distribution

- iSN-812 series

4	3	2	1
8	7	6	5
12	11	10	9

3.3 Temperature threshold value

iSN-81x series provides two kinds of threshold value, the Warning threshold value and the danger threshold value. When the temperature is higher(lower) than threshold value, iSN-81x series will show the diagnostic message and status LED will be flashing.

1. The parameter of iSN-81x series threshold value, each area has its own threshold parameter.

- Threshold switch
- Warning threshold value
- Danger threshold value
- Threshold type

2. Threshold switch

- When the threshold switch of one of the area open, that area will start to check if the temperature is over than threshold value.
- Modbus address: 0
- Each area uses 1 bit.
- Modbus value: 0: close, 1: open
- example:

Modbus address	0															
Value	0xFA15															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	1	1	1	1	1	0	1	0	0	0	0	1	0	1	0	1
Area	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Switch	ON	ON	ON	ON	ON	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	ON

3. Warning threshold value

- Unit: 0.1°C
- Modbus address: 17~32 (from area 1 to area 16)
- Each area uses 1 word
- example:

Modbus address	18
Value (Hex)	0x9E5
Value (Dex)	2533
Area Number	2
Warning threshold temperature	253.3°C

4. Danger threshold value

- Unit: 0.1°C
- Modbus address: 33~48 (from area 1 to area 16)
- Each area uses 1 word
- example:

Modbus address	40
Value (Hex)	0xA97
Value (Dex)	2711
Area number	8
Danger threshold temperature	271.1°C

5. Threshold type

- Type:

Type	Alarm condition	The requirement of the threshold setting
The upper temperature threshold	When temperature>= threshold value. iSN-81x series will give the alarm.	Danger threshold value>=Warning threshold value
The lower temperature threshold	When temperature<= threshold value. iSN-81x series will give the alarm.	Danger threshold value<=Warning threshold value

- When temperature matches the alarm condition, iSN-81x series will occur “threshold value diagnostic message”.
- When the threshold value of one of the area mismatches the requirement of the threshold setting, iSN-81x series will close the threshold switch of that area, and occur “system diagnostic message” (Threshold value setting error).
- Modbus address: 1~16 (from area 1 to area 16)
- Each area uses 1 word
- Modbus value: 0: the upper temperature threshold, 1: the lower temperature threshold
- example:

Modbus address	12
Value (Dex)	0
Area number	12
Threshold type	The upper temperature threshold

3.4 Diagnostic message

When iSN-81x series occurs error, or the temperature is over than threshold value, iSN-81x series will show the diagnostic messages and Status LED will be blinking.

Type	Message
System diagnostic message	Sensor error
	Threshold value setting error
Threshold value diagnostic message	Temperature is over than Warning threshold value
	Temperature is over than danger threshold value

1. Sensor error:

- Modbus address:106
- Modbus value: 0xFF00
- Explanation: iSN-81x series can't read the temperature data from sensor.

2. Threshold value setting error:

- Modbus address:106
- Bit15~Bit8: area number
- Bit7~Bit0: error type
  - Value 1: The upper temperature threshold setting is error
  - Value 2: The lower temperature threshold setting is error
- Explanation: If the threshold setting is error, please check the warning threshold value and the danger threshold value match the requirement of the threshold setting.
- example:

Modbus address	106	
Value(Hex)	0x0302	
Bit	8~15	0~7
Bit Value	0x03	0x02
Area number	3	
Error type	The upper temperature threshold setting is error	

3. Threshold value diagnostic message:

- Modbus address:117~118
- Each area uses 2 bits
- Modbus value:
  - 0: normal
  - 1: Temperature is over than warning threshold value
  - 2: Temperature is over than danger threshold value
- Example:

Modbus address	117															
Value	0x9845															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	1	0	0	1	1	0	0	0	0	1	0	0	0	1	0	1
Area	8		7		6		5		4		3		2		1	
Status	Over than danger threshold value		Over than Warning threshold value		Over than danger threshold value		Normal		Over than Warning threshold value		Normal		Over than Warning threshold value		Over than Warning threshold value	

Modbus Address	118															
Value	0x6412															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	0	1	1	0	0	1	0	0	0	0	0	1	0	0	1	0
Area	16		15		14		13		12		11		10		9	
Status	Over than Warning threshold value		Over than danger threshold value		Over than Warning threshold value		Normal		Normal		Over than Warning threshold value		Normal		Over than danger threshold value	

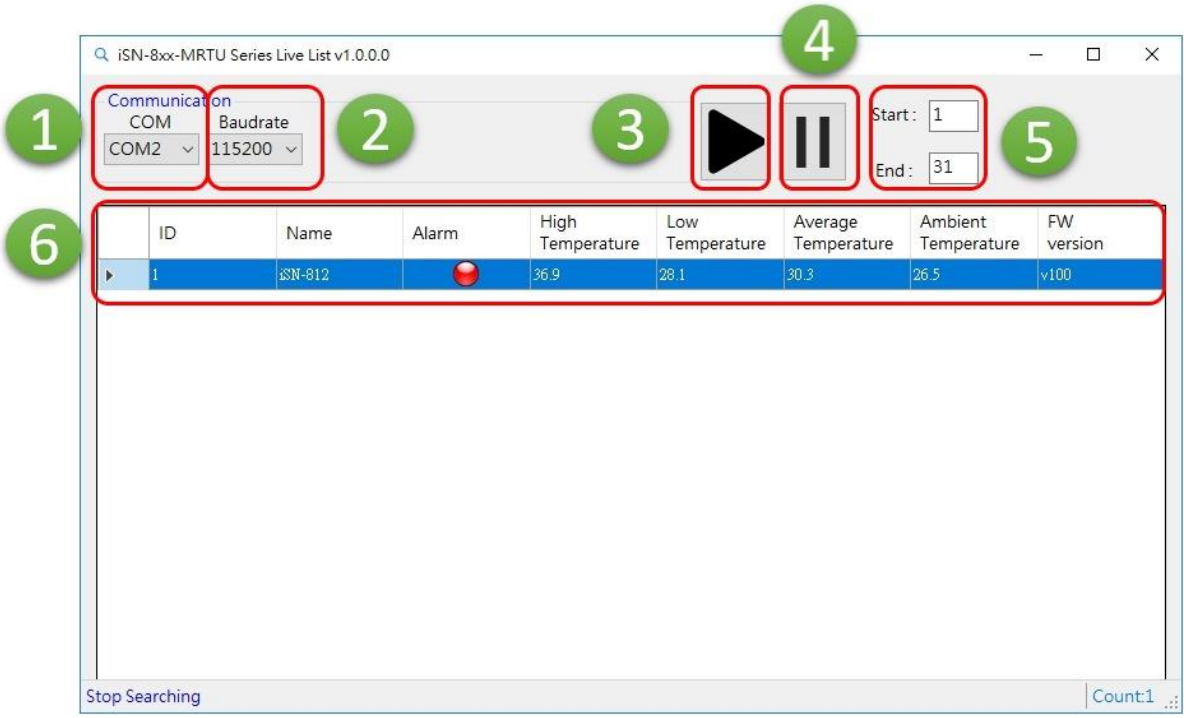
4. If you don't want iSN-81x series to shows any diagnostic messages, Set the value of Modbus address 61 to 1, and then iSN-81x series will close all diagnostic message.

4 iSN-8xx_Tool Utility

iSN-8xx_Tool Utility is used for iSN-81x series. LiveList Utility can quickly search iSN-81x-MRTU,and IR_Configurtaion Utility can read iSN-81x series temperature data and display it by thermography, and record the temperature data for a while, etc.

4.1 LiveList.exe :

- Function: Search iSN-81x-MRTU



1. Set COM Port
2. Set Baudrate
3.  Start search
4.  Stop search
5. Start: start address of device ID, End: End address of device ID
6. iSN-81x-MRTU's status:

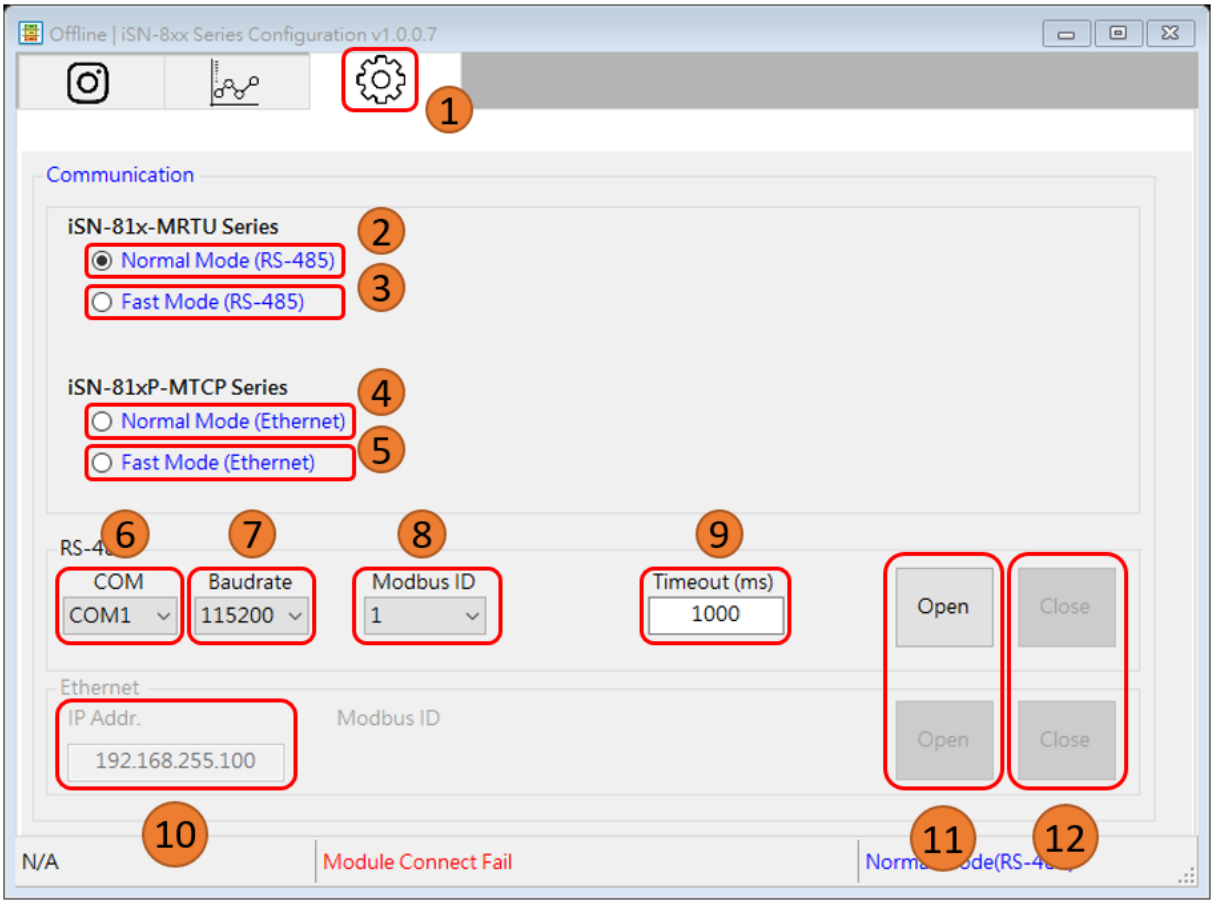
- ID : iSN-81x-MRTU's Modbus ID
- Name: iSN-81x-MRTU's model

- Alarm:  No diagnostic message,  iSN-81x-MRTU has diagnostic message
- High Temperature: iSN-81x-MRTU’s the highest temperature
- Low Temperature: iSN-81x-MRTU’s the lowest temperature
- Average Temperature: iSN-81x-MRTU’s average temperature
- Ambient Temperature: Sensor temperature
- FW version: Firmware version

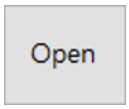
4.2 IR_Configurtaion.exe : Communication Setting

- Function: Communication setting between iSN-81x series and PC
- iSN-81x-MTCP default IP address:

IP	Mask	Gate way
192.168.255.100	255.255.0.0	192.168.0.1



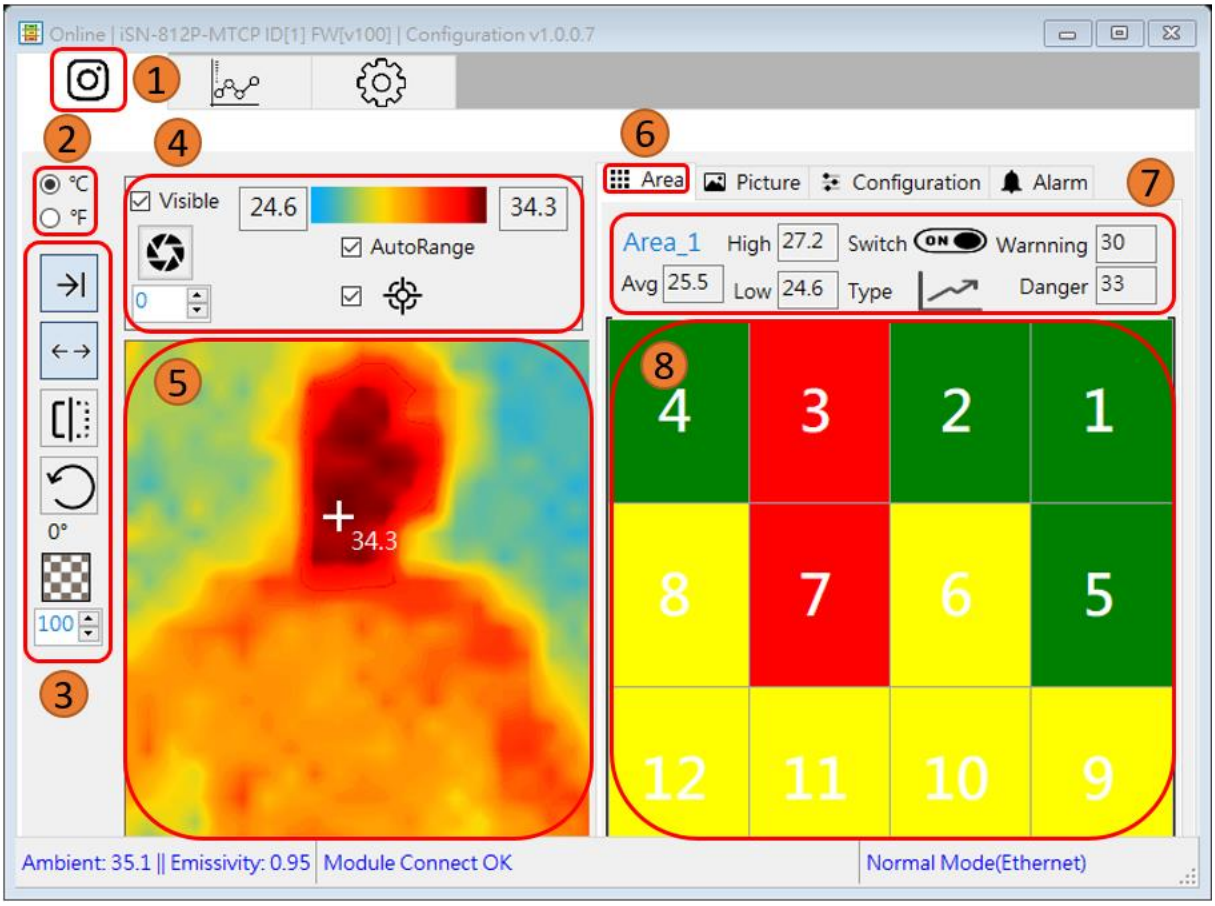
1. Setting icon 
2. Use Modbus communication protocol and transmit with RS-485
3. Use specialized protocol and transmit with RS-485
4. Use Modbus communication protocol and transmit with Ethernet
5. Use specialized protocol and transmit with Ethernet
6. Set Com Port
7. Set Baudrate
8. Set iSN-81x-MRTU's Modbus ID
9. Set Timeout

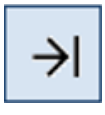
10. Set iSN-81x-MTCP's IP address
11. Start communication 

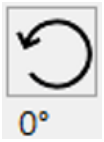
12. Stop communication 

4.3 IR_Configurtaion.exe : thermography and area status

- Function: shows the temperature of each area and the thermography.



1. Thermography and area status icon 
2. Set temperature unit: °F degrees Fahrenheit, °C degrees Celsius
3. Image control toolbar:
   - Folding 
   - Unfolding 

- Mirroring 
- Rotation 

- Transparency 

4. Thermography setting:
   - Image update 

   - Save Image 
   - Interval ofauto save Image 

   - Thermal imaging color scale range 

   - Color scale autorange
   - Set Highest temperature mark 
5. Show thermography
6. Area status page
7. Show the data of the selected area:
   - High: The highest temperature of the selected area
   - Low: The lowest temperature of the selected area
   - Avg: Average temperature of the selected area
   - Switch: Open 

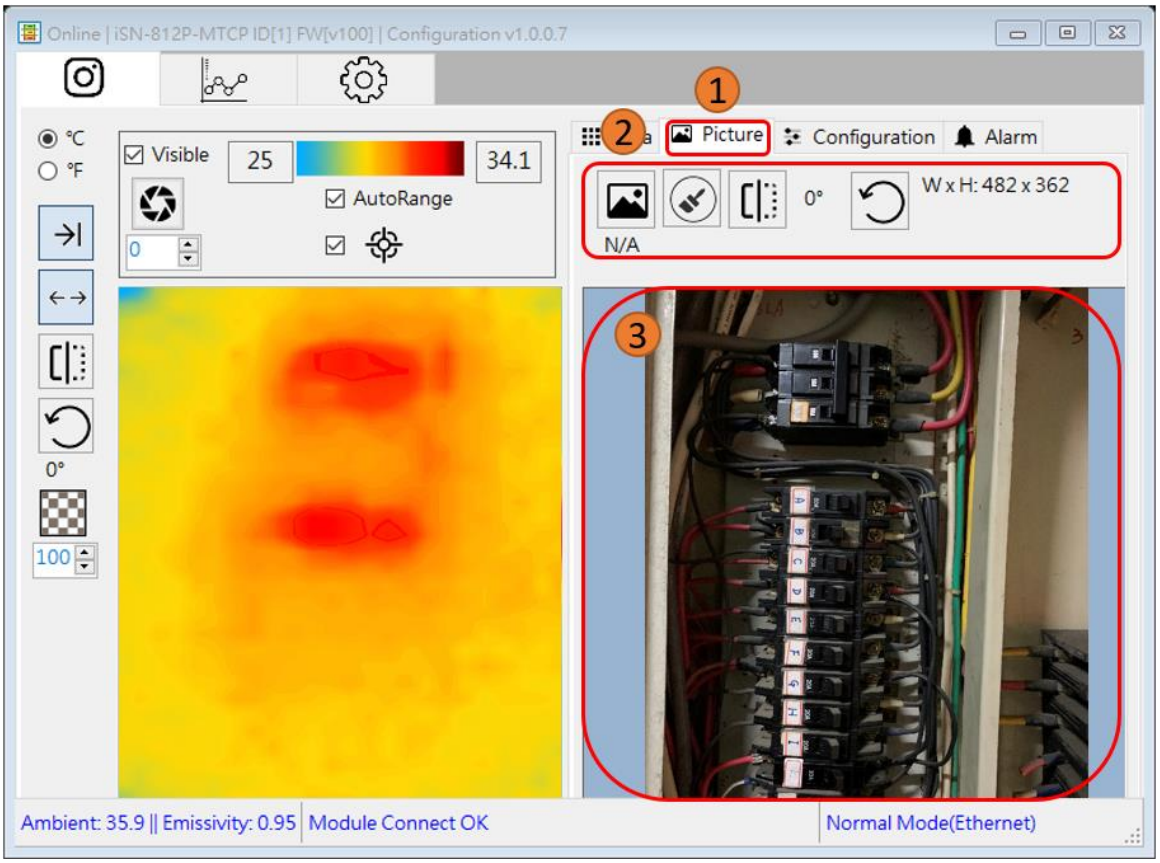
, Close 

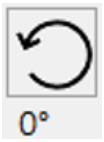
- Type: The upper temperature threshold  , The lower temperature threshold 
- Warning: Warning threshold value
- Danger: Danger threshold value

8. Show each area status:
   - Gray: The threshold switch of this area is close.
   - Red: The temperature of this area is over than warning threshold value.
   - Yellow: The temperature of this area is over than warning threshold value.
   - Green: The temperature of this area is normal.

4.4 IR_Configurtaion.exe : Import Image

- Function: More realize the temperature distribution by actual picture



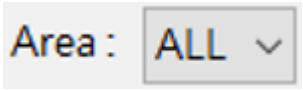
1. Background image page
2. Background image toolbar:
   - Import 
   - Clear 
   - Mirroring 
   - Rotation 

3. Imported background image

4.5 IR_Configurtaion.exe : Parameter setting

- Function: Modify and read iSN-81x-MRTU's parameters

1. Setting parameter page
2. Threshold value setting:

- Select area 

- Threshold switch 

- Threshold type 

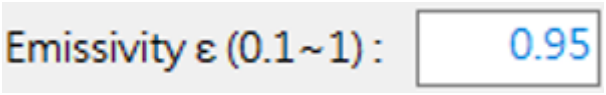
- Warning threshold value 

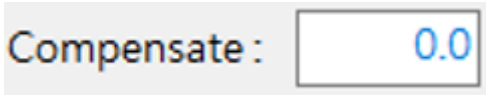
- Danger threshold value 

- Save threshold settings to iSN-81x series 

- Load threshold setting from iSN-81x series 

3. Measuring parameter setting:

- Emissivity setting 

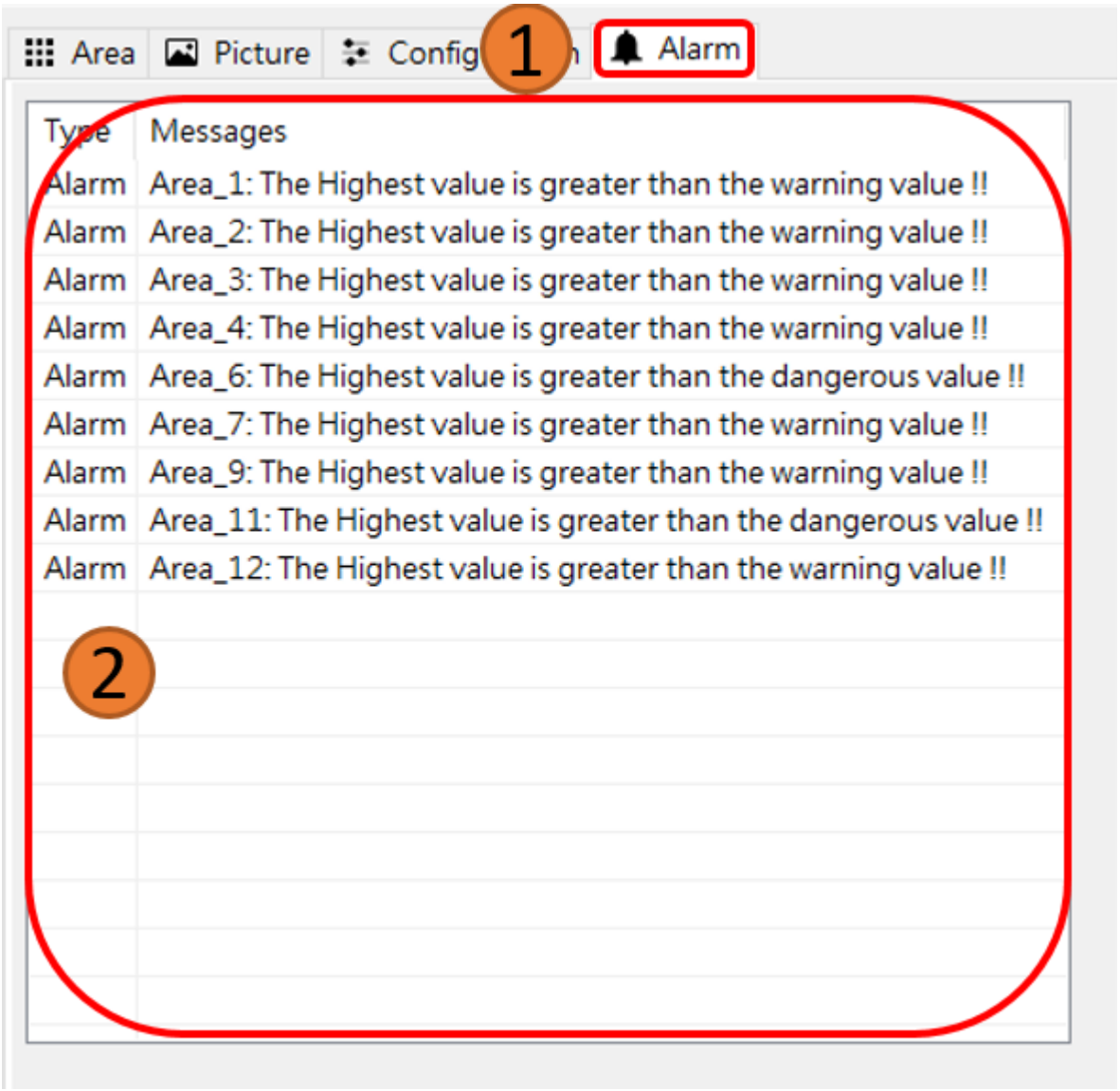
- Compensation value setting 

- Save iSN-81x- series parameters 

- Load iSN-81x- series parameters 

4.6 IR_Configurtaion.exe : Diagnostic message

- Function: Show the diagnostic message



1. Diagnostic message page
2. Show iSN-81x series diagnostic message

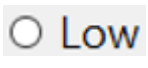
4.7 IR_Configurtaion.exe : Temperature data logger

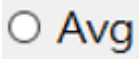
- Function: Save and record the temperature data

1. Temperature data logger icon 
2. Chart Operation Toolbar:
   - Tracking resume 
   - Tracking pause 
   - Axes scroll 
   - Axes zoom 

- Zoom-out 
- Zoom-in 
- Select 
- Zoom-box 
- Data-cursor 
- Copy 
- Save 
- Print 
- Preview 

3. Show the temperature data of the selected area
4. Set the chart visible
5. Interval of auto save csv file
6. Select the area
7. Select the temperature type:
   - The highest temperature in area 

   - The lowest temperature in area 

   - Average temperature in area 

8. After selecting this item, utility will save the temperature data to csv file:

- File path: the place which deposit iSN-8xx_Tool Utility\iSN-8xx_Tool\ThermalData
- Save file:
  - Year/Month/Day_Area.csv : Temperature and threshold setting and diagnostic message of each area.
  - Year/Month/Day _Raw.csv : All temperature data of all temperature point.

5 Modbus Command

5.1 Function code

Modbus master can use the following function code to read or write data to iSN-81x series. FC 3 and FC4 can read data from registers. FC6 and FC16 can write data to the register.

Function Code	Description
3	Read multiple registers
4	Read multiple registers
6	Write Single register
16	Write multiple registers

5.2 Modbus Register Table

Modbus address (Decimal)	Function	R/W	Data length	Explanation
Modbus Holding Registers (4xxxx, 0 based)				
0	Threshold switch of each area	R/W	1 word	0: Close, 1: Open Each area uses 1 bit
1~16	Threshold type of each area	R/W	16 words	0: The upper temperature threshold value 1: The lower temperature threshold value Each area uses 1 word This item can be set when its threshold switch is close.
17~32	Warning threshold value of each area	R/W	16 words	Each area uses 1 word Unit: 0.1°C e.g. Value: 515->51.5°C This item can be set when its threshold switch is close.
33~48	Danger threshold value of each area	R/W	16 words	Each area uses 1 word Unit: 0.1°C e.g. Value: 515->51.5°C This item can be set when its threshold switch is close.
49	X	X	X	Reserve
50	Compensation value	R/W	1 word	Measuring temperature+ Compensation value= actual temperature Unit: 0.1°C

				e.g. 173->17.3°C
51	Emissivity	R/W	1 word	Value range:10~100 (Emissivity: 0.1~1.0) When the value is over than value range, emissivity is 0.95. e.g. Value: 15 ->emissivity: 0.15 iSN-813-MRTU is unable to set this item.
52~53	X	X	X	Reserve
54~55	IP Address	R/W	2 words	Only TCP devices have these setting, RTU devices reserve.
56~57	Mask	R/W	2 words	
58~59	Gateway	R/W	2 words	
60	Device reset	R/W	1 word	0: no Reset, 1: Reset
61	The switch of diagnostic message	R/W	1 word	0: Open, 1: Close
62~99	X	X	X	Reserve
100~102	MAC Address	R	3 words	Only TCP devices have these setting, RTU devices reserve.
103	NetID	R	1 word	Value:1~31 Only RTU devices have these setting, TCP devices reserve.
104	Baudrate (bps)	R	1 word	960: 9600 bps 1920: 19200 bps 3840: 38400 bps 5760: 57600 bps 11520: 115200 bps Only RTU devices have these setting, TCP devices reserve.
105	Firmware version	R	1 word	Value: 235 -> Ver. 23.5

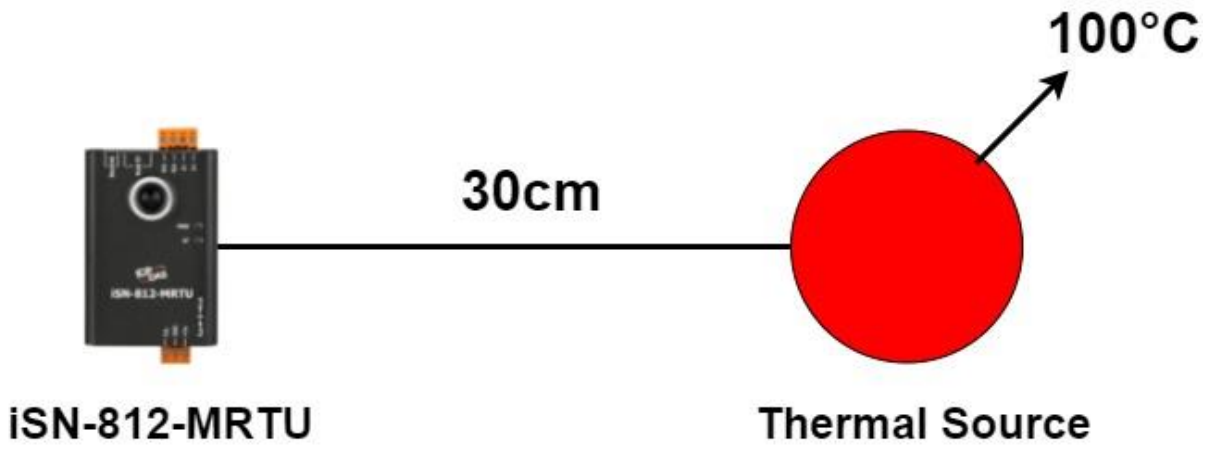
106	System diagnostic message	R	1 word	Sensor error or Threshold setting error high 8 bits Value:1~16 -> Threshold setting error (Value=area) Value: 0xFF ->Sensor error low 8 bits 1. Threshold setting error ● Value: 1, The upper temperature threshold setting is error. ● Value: 2, The upper temperature threshold setting is error. 2. Sensor error ● Value: 0
107~116	X	X	X	Reserve
117~118	Threshold diagnostic message	R	2 words	Each area uses 2 bits Value: ● 0: normal ● 1: over warning value ● 2: over danger value
119	Pixel	R	1 word	64/768/1024
120	Device model	R	1 word	811/812/813/814
121	Sensor temperature (TA)	R	1 word	Unit: 0.1°C e.g. Value: 515->51.5°C
122	Central temperature	R	1 word	Unit: 0.1°C e.g. Value: 515->51.5°C
123	Average temperature	R	1 word	Unit: 0.1°C e.g. Value: 515->51.5°C
124	The highest temperature	R	1 word	Unit: 0.1°C ex: Value: 515->51.5°C
125	The highest temperature point	R	1 word	
126	The lowest temperature	R	1 word	Unit: 0.1°C e.g. Value: 515->51.5°C

127	The lowest temperature Point	R	1 word	
128~143	The highest temperature of each area	R	16 words	Each area uses 1 word Unit: 0.1°C e.g. Value: 515->51.5°C
144~159	The lowest temperature of each area	R	16 words	Each area uses 1 word Unit: 0.1°C e.g. Value: 515->51.5°C
160~175	Average temperature of each area	R	16 words	Each area uses 1 word Unit: 0.1°C e.g. Value: 515->51.5°C
176~1199	All temperature (TO)	R	Max 1024 Words	Each temperature point uses 1 word Unit: 0.1°C e.g. Value: 515->51.5°C

6 Example

6.1 Situation

1. Device: iSN-812-MRTU
2. The distance between iSN-812-MRTU and the thermal source: 30cm
3. iSN-812-MRTU Modbus ID: 1
4. The temperature of the thermal source: 100°C
5. The surface material of the thermal source: Black electrical tape. (Emissivity 0.95)
6. Threshold type: The upper temperature threshold.
7. Warning Threshold value: 125°C
8. Danger Threshold value: 155°C



6.2 iSN-81x series configuration

1. Emissivity setting:

- Emissivity: 0.95 → Modbus value: 95
- Modbus address: 67
- Modbus command: 01 06 00 43 00 5F 38 26

Modbus Command	01	06	00	43	00	5F	38	26
Function	Modbus ID	Function Code	Address 0x43 = 67(Dec)		Value 0x5F = 95 (Dec)		CRC checksum	

2. Distance setting:

- The distance between iSN-81x series and the thermal source: 30cm.
- Distance: 30cm → Modbus value: 30
- Modbus address: 49
- Modbus command: 01 06 00 31 00 1E 58 0D

Modbus Command	01	06	00	31	00	1E	58	0D
Function	Modbus ID	Function Code	Address 0x31 = 49 (Dec)		Value 0x1E = 30 (Dec)		CRC checksum	

3. Compensation value:

- The measuring temperature of iSN-81x series: 98.3°C
- The actual temperature of the thermal source: 100°C
- Compensation value: 100-98.3=1.7 → Modbus value: 17
- Modbus address: 50
- Modbus command: 01 06 00 32 00 11 E8 09

Modbus Command	01	06	00	32	00	11	E8	09
Function	Modbus ID	Function Code	Address 0x32 = 50 (Dec)		Value 0x11 = 17 (Dec)		CRC checksum	

4. Threshold value setting:

(1) Read the temperature of each area-> choose the area which need to be set threshold value.

- Modbus address: 128~175
- Read item: the highest temperature, the lowest temperature and the average temperature in each area.
- Modbus command: 01 03 00 80 00 30 44 36

Modbus Command	01	03	00	80	00	30	44	36
Function	Modbus ID	Function Code	Start Address: 0x80 = 128 (Dec)		Count: 0x30=48 words		CRC checksum	

- iSN-81x series responses Modbus command: 01 03 60 00 EB 00 E2 00 D0 00 FD 03 E8 00 F7 00 D7 00 F3 00 ED 00 E1 00 C7 00 C1 00 00 00 00 00 00 00 00 00 A0 00 9D 00 86 00 C0 00 F5 00 C3 00 9A 00 B8 00 AC 00 A5 00 A6 00 B3 00 00 00 00 00 00 00 00 00 B6 00 BF 00 A6 00 DF 03 2C 00 D8 00 B7 00 C9 00 D7 00 CC 00 BB 00 B6 00 00 00 00 00 00 00 00 72 77

Modbus Command	01	03	60	00 EB ~00 00	72	77
Function	Modbus ID	Function Code	Byte Count: 0x60=96(Dec) Bytes	Modbus value	CRC checksum	

- Each area temperature (°C):

Area Number	1	2	3	4
The highest temperature	23.5	22.6	20.8	25.3
The lowest temperature	16.0	15.7	13.4	19.2
The average temperature	18.2	19.1	16.6	22.3
Area Number	5	6	7	8
The highest temperature	100	24.7	21.5	24.3
The lowest temperature	24.5	19.5	15.4	18.4
The average temperature	81.2	21.6	18.3	20.1
Area Number	9	10	11	12
The highest temperature	23.7	22.5	19.9	19.3
The lowest temperature	17.2	16.5	16.6	17.9
The average temperature	21.5	20.4	18.7	18.2

- The thermal source is in area 5, so we choose area 5 to monitor.

(2) Close all the threshold switch

- Modbus address: 0
- Modbus value: 0 (Close all the threshold switch)
- Modbus Command: 01 06 00 00 00 00 89 CA

Modbus Command	01	06	00	00	00	00	89	CA
Function	Modbus ID	Function Code	Address: 0		Value: 0		CRC checksum	

(3) Set the warning threshold value

- Warning threshold temperature 125°C → Modbus value: 125
- Modbus address: 21 (the warning threshold value of area 5)
- Modbus command: 01 06 00 15 00 7D 58 2F

Modbus Command	01	06	00	15	00	7D	58	2F
Function	Modbus ID	Function Code	Address 0x15 = 21 (Dec)		Value 0x7D = 125 (Dec)		CRC checksum	

(4) Set the danger threshold value

- Danger threshold temperature 155°C → Modbus value: 155
- Modbus address: 37 (the danger threshold value of area 5)
- Modbus command: 01 06 00 25 00 9B D9 AA

Modbus Command	01	06	00	25	00	9B	D9	AA
Function	Modbus ID	Function Code	Address 0x25 = 37 (Dec)		Value 0x9B = 155 (Dec)		CRC checksum	

(5) Set the threshold type

- The upper temperature threshold → Modbus value: 0
- Modbus address: 5 (The threshold type of area 5)
- Modbus command: 01 06 00 05 00 00 99 CB

Modbus Command	01	06	00	05	00	00	99	CB
Function	Modbus ID	Function Code	Address: 5		Value: 0		CRC checksum	

(6) Open the threshold switch

- Modbus address: 0
- Modbus value: 0x0010 (Set the switch of area 5 to on)

Modbus Address	0															
Value	0x0010															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Segment	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Switch	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF

- Modbus Command: 01 06 00 00 00 10 88 06

Modbus Command	01	06	00	00	00	10	88	06
Function	Modbus ID	Function Code	Start Address: 0x80 = 128 (Dec)		Count: 0x10 = 16 words		CRC checksum	

6.3 Temperature alarm and Diagnostic message

1. When the diagnostic message occurs, Status LED is flashing.
2. When the temperature of area 5 is up to 130°C

- Read the threshold value diagnostic message.
- Modbus address: 117~118
- Modbus Command:01 03 00 75 00 02 D5 D1

Modbus Command	01	03	00	75	00	02	D5	D1
Function	Modbus ID	Function Code	Start Address: 0x75 = 117 (Dec)		Count: 2 words		CRC checksum	

- iSN-812-MRTU responses Modbus command: 01 03 04 01 00 00 00 FB CF

Modbus Command	01	03	04	01	00	00	00	FB	CF
Function	Modbus ID	Function Code	Count: 4 Bytes	The value of Modbus address 117		The value of Modbus address 118		CRC checksum	

- Modbus value analysis

Modbus Address	117															
Value	0x0100															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Segment	8		7		6		5		4		3		2		1	
Status	Normal		Normal		Normal		Over than warning threshold value		Normal		Normal		Normal		Normal	

Modbus Address	118															
Value	0x0000															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Segment	16		15		14		13		12		11		10		9	
Status	Normal		Normal		Normal		Normal		Normal		Normal		Normal		Normal	

3. When the temperature of area 5 is up to 160°C

- Read the threshold value diagnostic message.
- Modbus address: 117~118
- Modbus Command: 01 03 00 75 00 02 D5 D1

Modbus Command	01	03	00	75	00	02	D5	D1
Function	Modbus ID	Function Code	Start Address: 0x75 = 117 (Dec)		Count: 2 words		CRC checksum	

- iSN-812-MRTU responses Modbus command: 01 03 04 02 00 00 00 FB 8B

Modbus Command	01	03	04	02	00	00	00	FB	8B
Function	Modbus ID	Function Code	Count: 4 Bytes	The value of Modbus address 117		The value of Modbus address 118		CRC checksum	

- Modbus value analysis

Modbus Address	117															
Value	0x0200															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Segment	8		7		6		5		4		3		2		1	
Status	Normal		Normal		Normal		Over than danger threshold value		Normal		Normal		Normal		Normal	

Modbus Address	118															
Value	0x0000															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit Value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Segment	16		15		14		13		12		11		10		9	
Status	Normal		Normal		Normal		Normal		Normal		Normal		Normal		Normal	