TEMCO CONTROLS.COM

Bacnet and Modbus Modules

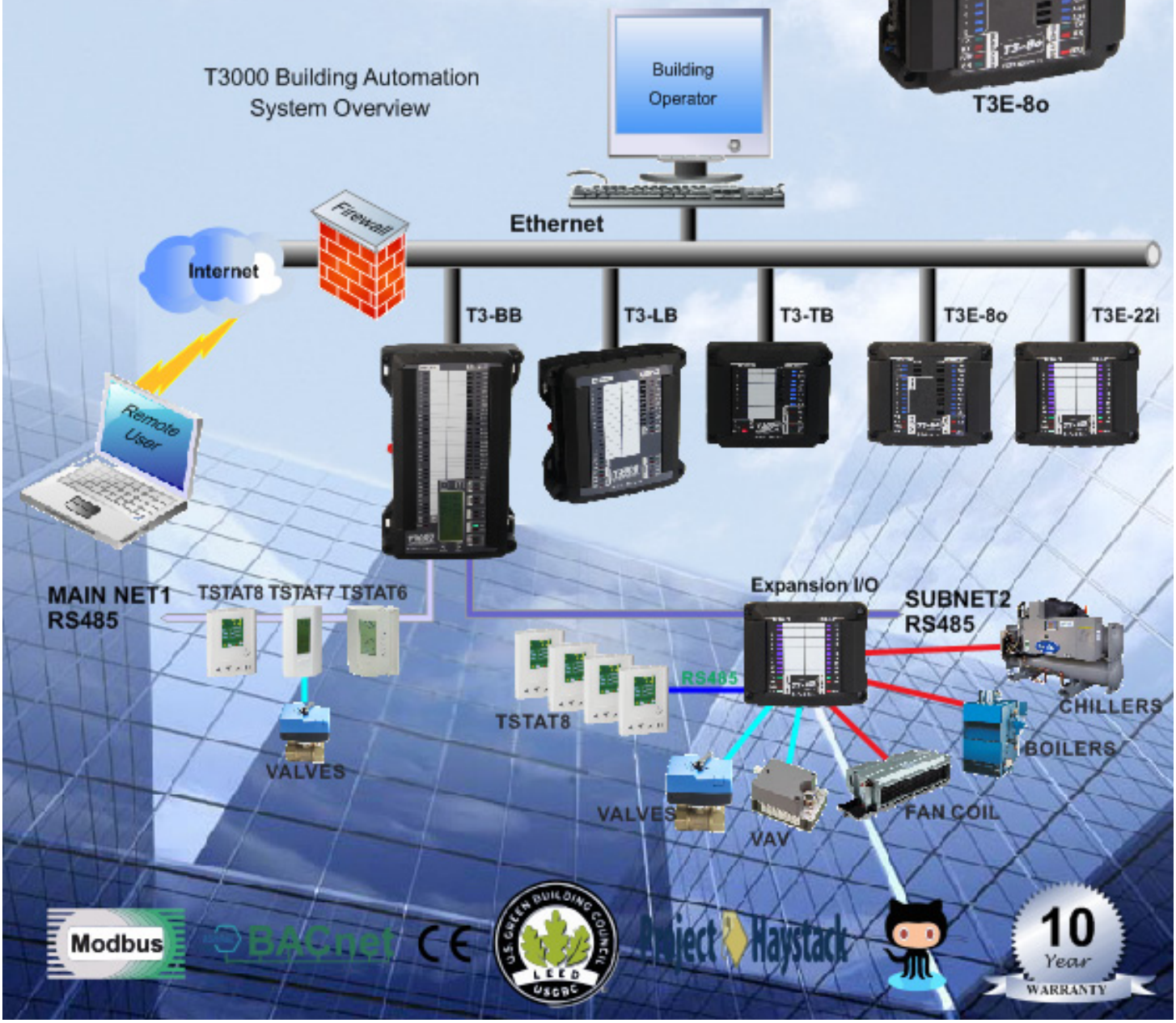
The T3 general purpose modules add input/output expansion space for building automation systems. Integrators regularly tell us they are winning more projects becuase of the excellent price point and features of these devices. Works well with Seimens, Reliable, Delta, KMD, Tridium, etc.

T3E-22i and T3E-8O support both Bacnet and Modbus over both RS485 and the ethernet ports. All settings are available as Bacnet objects and Modbus registers.

T3E-22i

T3E-8o

T3000 Building Automation System Overview



Modbus BACnet CE LEED Project Haystack 10 Year WARRANTY

Features

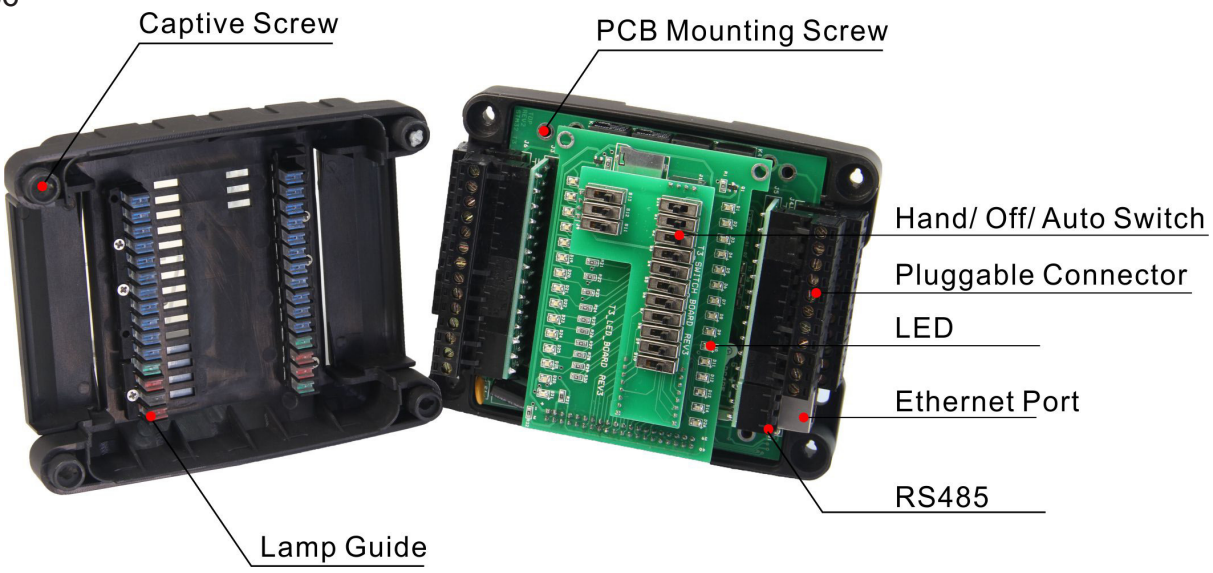
- Surge-protected Universal Inputs with 10-bit resolution.
- UL listed ABS enclosure with rubberized texture creates a high end feel.
- The RS485 port has separate upstream and a downstream connectors to make troubleshooting easier.
- Software configure the I/O ranges with the free T3000 software or by writing to the registers with your own software.
- Each input as well as the RS485 connections have a separate screw terminal, there's no need to gang two wires under one terminal for any of the terminations.
- Each output has a hand-off-auto switch for easy troubleshooting and overrides.
- Baudrates: 9600, 19200, 38400, 57600,76800 and 115200bps.
- The T3 modules support Bacnet over MSTP and TCP/IP as well as Modbus.
- In this first 10 seconds period, heartbeat LED on the T3E-886 will be flashing, as the rhythm of 2 fast 1 slow, to show the device is in ISP mode now.
- Source code for the modules is available with your first purchase.
- T3000 front end is free and open source: http://tinyurl.com//n7kkqp6
- Compiled version of the front end is here: http://tinyurl.com/y7uyu9n3

Specifications

•T3E-22i analog input: 22 AI@0-5V, 0-10V, 4-20mA, 10K Type2 NTC
•T3E-32i analog input: 32 AI@0-5V, 0-10V, 4-20mA, 10K Type2 NTC
•T3E-886analog input: 8 AI@ 0-5V, 0-10V, 4-20mA,10K Type2 NTC.
•T3E-22i, T3E-8o T3E-32i digital input: DI@ pulse counter
•T3E-886 analog output: 8 outputs@0-10V Accuracy: 0.01V
•T3E-886relay output: 6 relay dry-contact outputs DC12V, 3A@125VDC
•Baudrate: 9600, 19200, 38400, 57600, 76800, 115200
•Operating temperature: -30~70°C (-22~158°F)
•Supply voltage: 15~24VAC/DC ±10%, 50-60Hz
•Power consumption: 100mA at 15~24VAC/DC
•Storage temperature: -40~85°C
•Operating ambient humidity: 0-80 %Rh
•Communications: RS485, Ethernet
•Enclosure color: Black

Highlights

T3E-886



Part Number Scheme

T3E - 22i

Code	Description
T3E	T3 Bacnet ModbusExpansion Module

Code	Option
22i	22 Universal Inputs
886	8 Universal Inputs, 8 Analog Outputs, 6 Relays

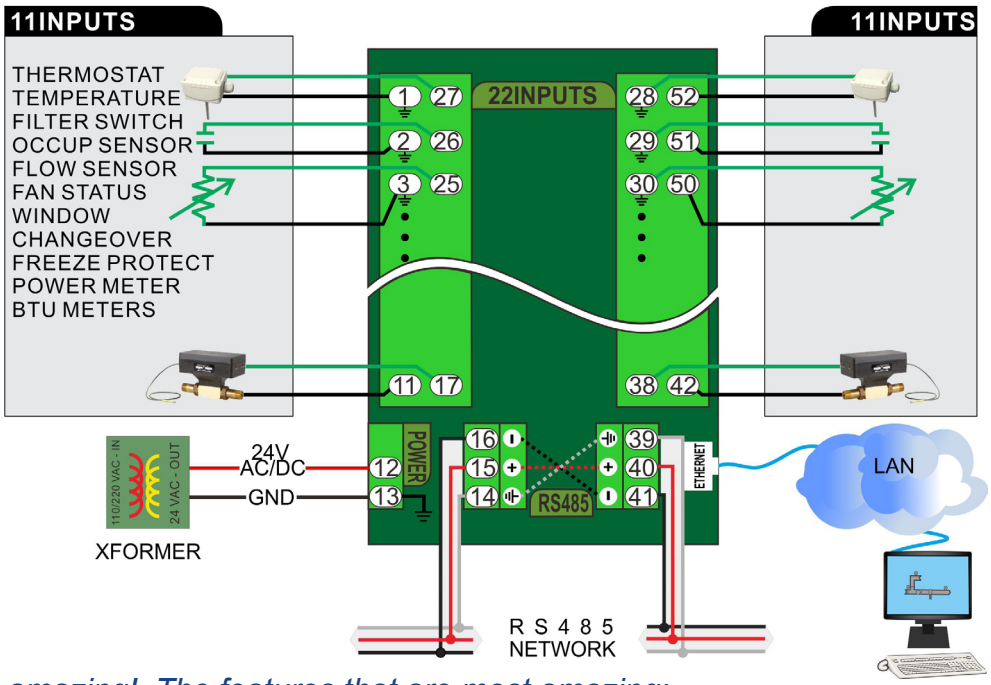
Approvals

Plastic Enclosure	PA66
PCB	FR-4 Epoxy Glass Cloth UL file NO. E360179
Terminal Block	PA66 UL file NO. E365137
Relay	UL file NO. E332982

Wiring Diagram

The T3E-22i has 22 inputs, 2 RS485 terminals that share the same serial port, and 1 Ethernet port.

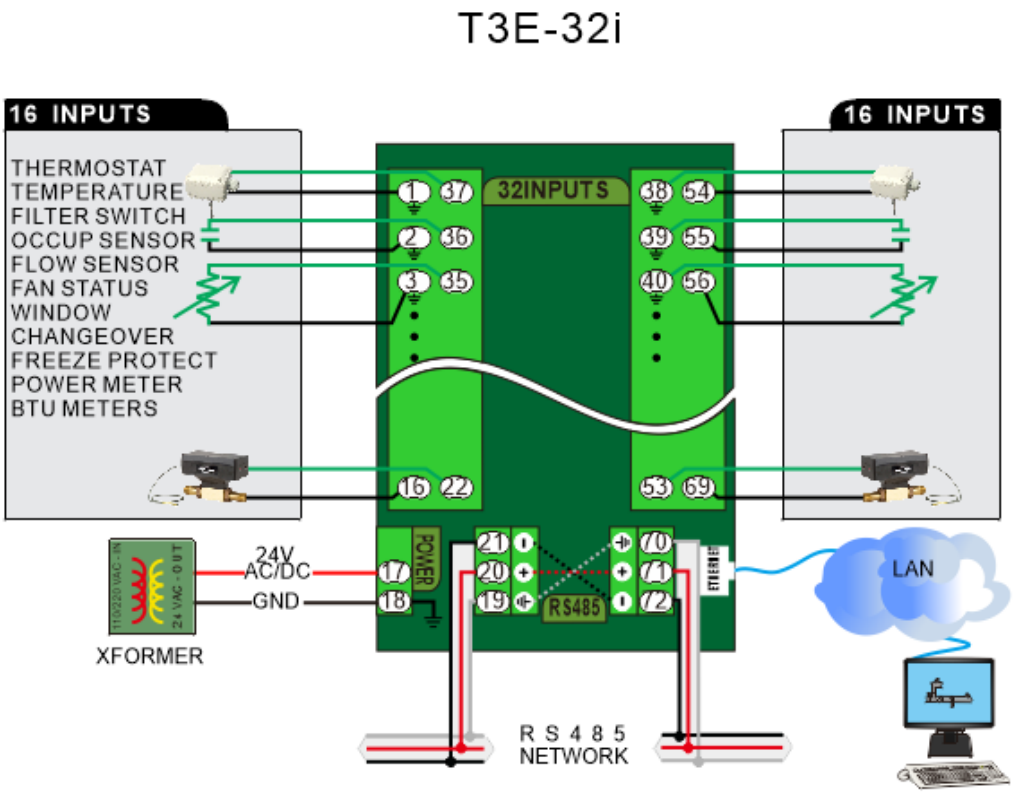
T3-22i
WIRING DIAGRAM



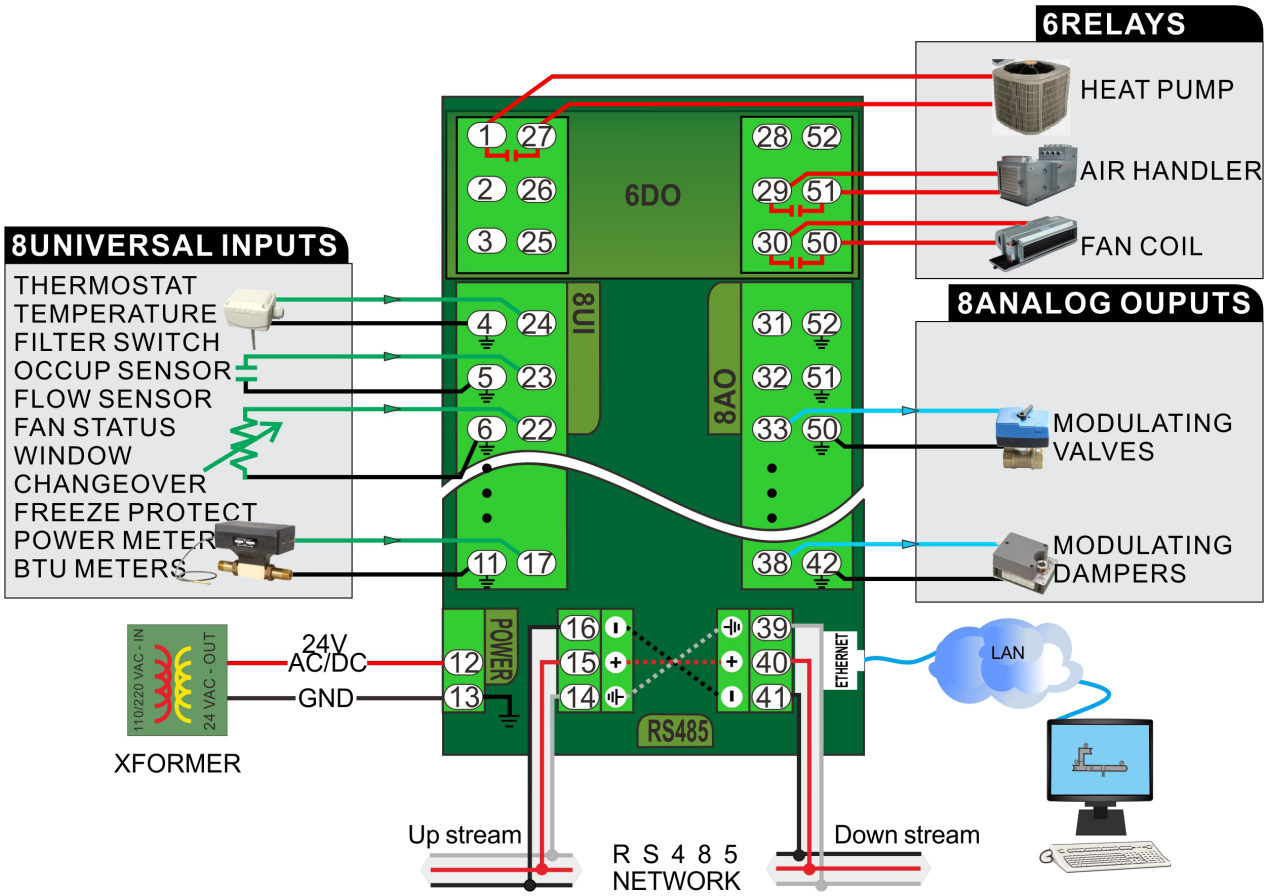
The T3E-22i are amazing! The features that are most amazing:

- *Software Configurable I/O*
- *Ground Screw terminals for all 22 inputs.*
- *Feed through to aide in daisy chaining RS485 connection*
- *22 Pulse counters*
- *Higher Baud Rates*
- *BACNet support*
- *Supports Modbus TCP*
- *Cad is available, 3D and 2D acad/corel draw vector art.*

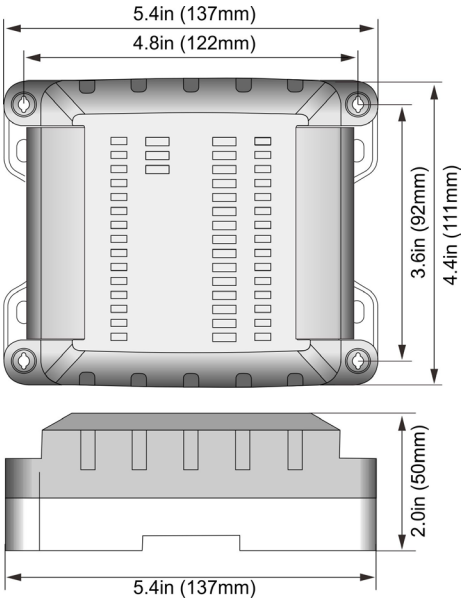
The T3E-32i has 32 inputs, 2 RS485 terminals that share the same serial port, and 1 Ethernet port.



The T3E-886 has 8 inputs, 8 outputs, 6 relays, 2 RS485 terminals that share the same serial port, and 1 Ethernet port.



Dimensions



Standard Operation

Inputs

Each input of a T3 Module can be configured in 1 of 5 ways:

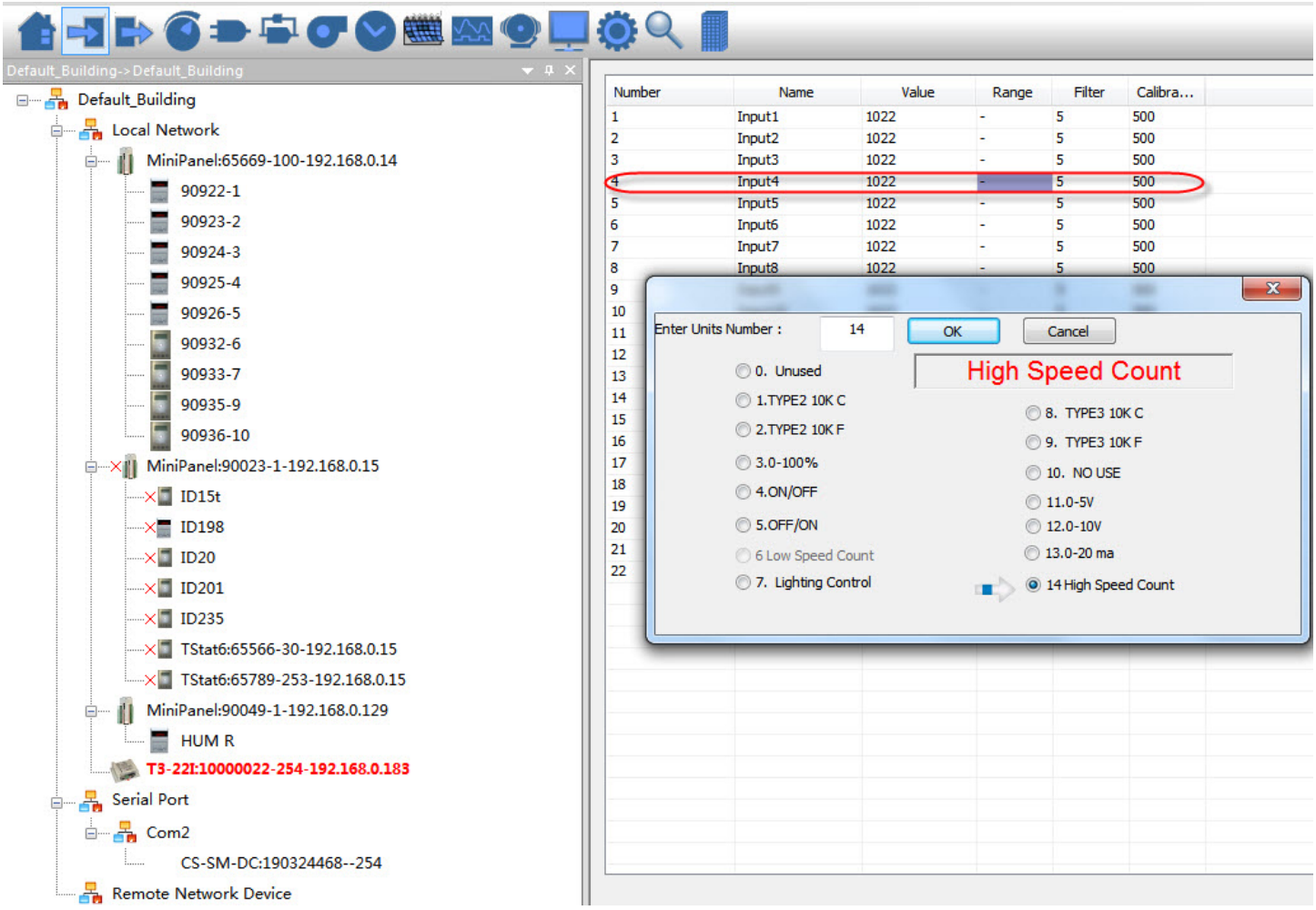
0-5V
0-10V
4-20mA
10K type2 NTC
pulse counter

The value of each input is stored as a 10-bit number in the respective modbus register.
The maximum values for the 5V, 10V, 20mA is 1023, and pulse counter configurations would produce a reading of 65536*65536=4294967296. Each input has a corresponding LED which will light up if the value of the input is greater than 512.

Here following one table showing the info of pulse input.

Model	Number of inputs		Register address	Pulse
T3E-22i	22	1-11	100-121	High Speed: Support up to 1KHz pulse input
		12-22	122-143	Low Speed: Support up to 10Hz pulse input
T3E-886	8		116-131	Low Speed: Support up to 10Hz pulse input

T3E-22i high and low speed counters configured in T3000 software



Outputs

The state of each output is determined by its corresponding switch position for the T3E-886. The switches have 3 states: hand /off /auto.

	Analog	**Digital**
Hand	10V	Disconnected
Off	0V	Connected
Auto	Register Value	Non-zero value = activate

The registers addresses are as follows:

Model	Number of analog outputs	Register addresses
T3E-886	8	100-107

Model	Number of digital outputs	Register addresses
T3E-886	6	108-113

When the switch is set to the ‘hand’ position, the corresponding output will be switched to 10V for analog, the contact will be disconnected the relay, or 0V for sinking outputs. When it is on the ‘off’ position, the output will be set to 0V for analog, contact open for relay, or open circuit for sinking outputs. When it is on the ‘auto’ position the analog output will be set to the level stored in the corresponding MODBUS output registers. For digital or sinking outputs, a register value of 0 is to deactivate and a register value of 1000 is to activate.

These registers can be changed using the RS485 serial interface when in auto mode. For analog outputs, 0 corresponds to 0V, 1000 corresponds to 10V. For relay or sinking outputs, the output will be activated by any number greater than 0. The output registers are stored in RAM, thus the contents of each register will be lost upon power-off. Each output has a corresponding LED which will light up if the value of the output is greater than 0. For more information, please see the Standard Register lists starting on the next page.

Baudrate

T3E-22i and T3E-886 have adjustable baudrates that are set by register 15. The options include:
value 0 will set the baudrate to 9600bps
value 1 will set the baudrate to 19200bps
value 2 will set the baudrate to 38400bps
value 3 will set the baudrate to 57600bps
value 4 will set the baudrate to 115200bps
value 5 will set the baudrate to 76800bps

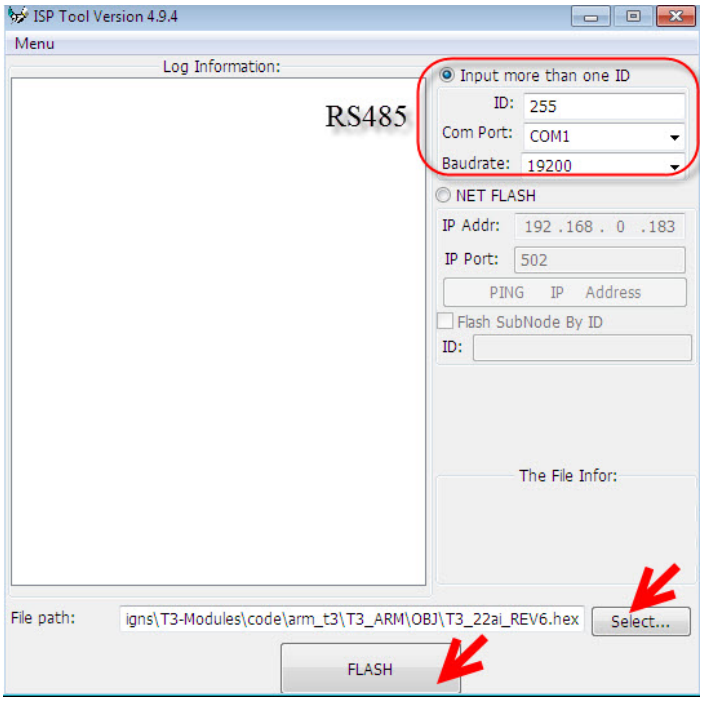
How to Update Firmware

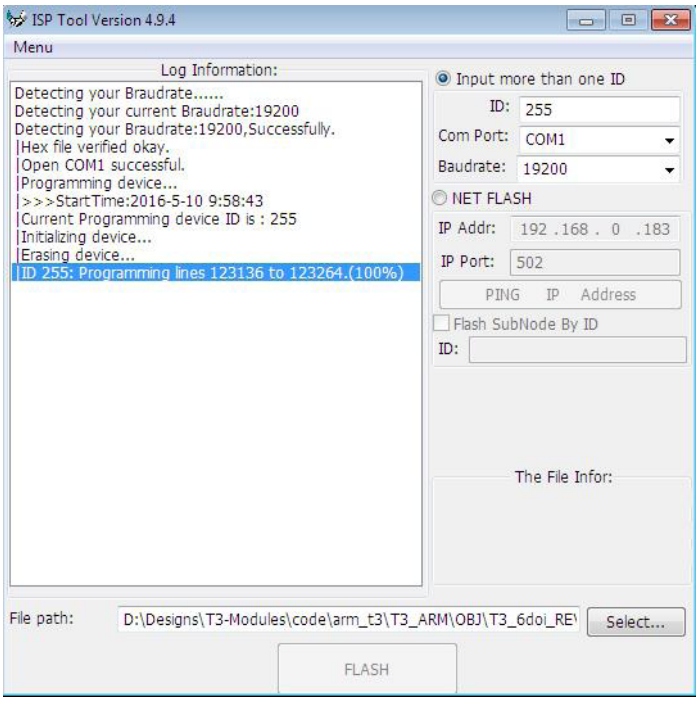
There are two ways to update the firmware, T3000 and ISPTool. For ISPTool, it also contains RS485 network and Ethernet.
Download T3000 software http://tinyurl.com/y7uyu9n3 and install it.
Then you will see two icons on your desktop, T3000 and ISPTool.

1. Use ISPTool RS485 to Update

In this section, we will first explain how to use ISPTool RS485 to update the firmware. Here take an example of T3E-886, connect T3E-8o to your computer via RS485 connectors. Connect the T3E-886 to 24V AC/DC power.

1) Start ISPTool software, as below photo shows, you will see RS485 setting, click and choose it.
2) Set broadcast ID 255 or module Modbus ID.
3) Choose the com port what you used and click select to choose the file you prepare to program.
4) Turn on the power of the T3E-8o, within the first 10 seconds of powerd on, click flash.

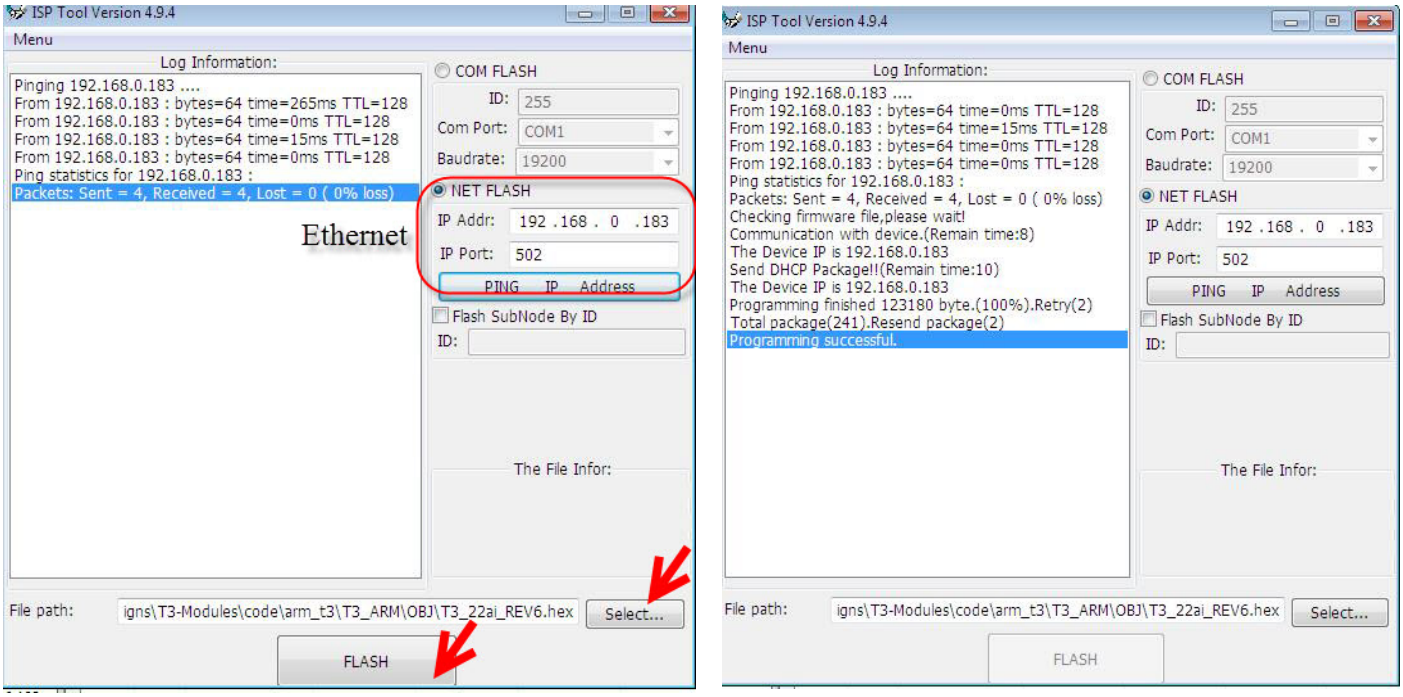




2. Use ISPTool Ethernet to Update

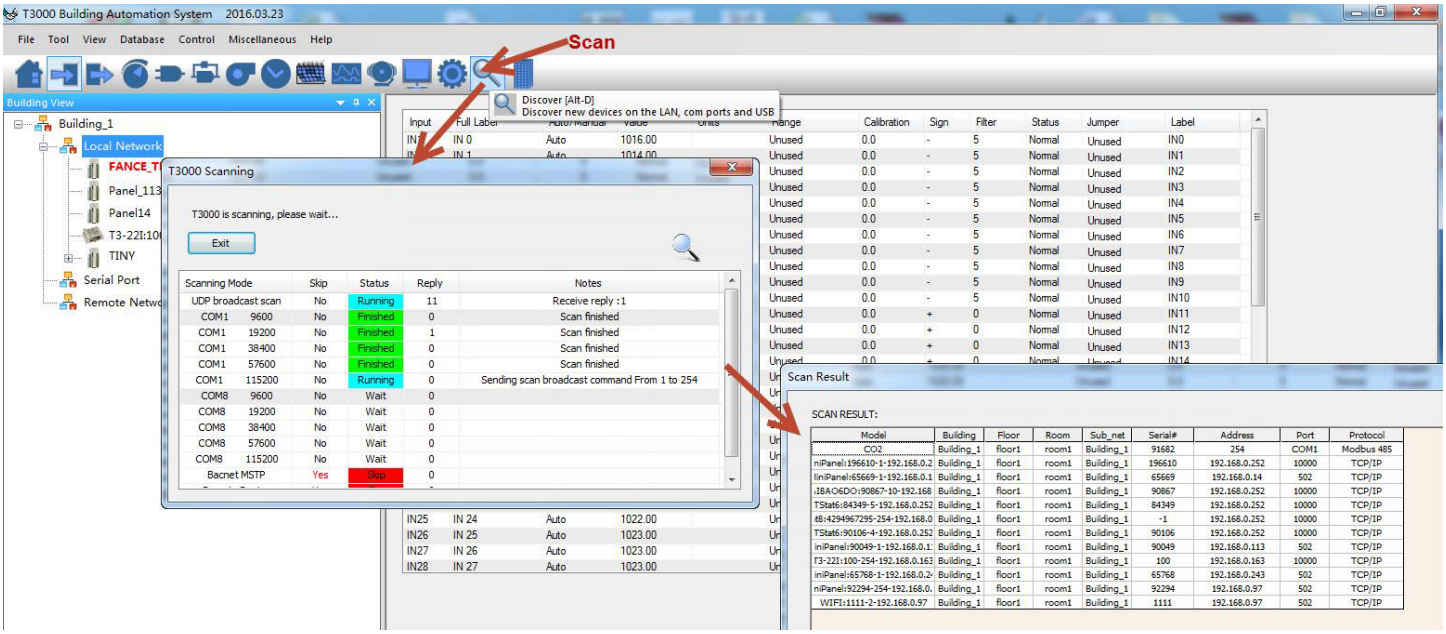
In this section, we will display how to use ISPTool Ethernet to update the firmware. Connect T3E-886, for example, to your computer by Ethernet and turn on the power of 24VAC/DC of the unit.

1) Start ISPTool software, as below photo shows, you will see Ethernet setting.
2) Set IP address, ensure that the IP address of the module and the IP address of the computer must in the same subnet.
3) Set IP port to 502.
4) Click “PING IP Address” to check whether the communication is good. If not, then check the wire and setting. If it’s good as below the screen shot, after you choose the file, click FLASH to program.

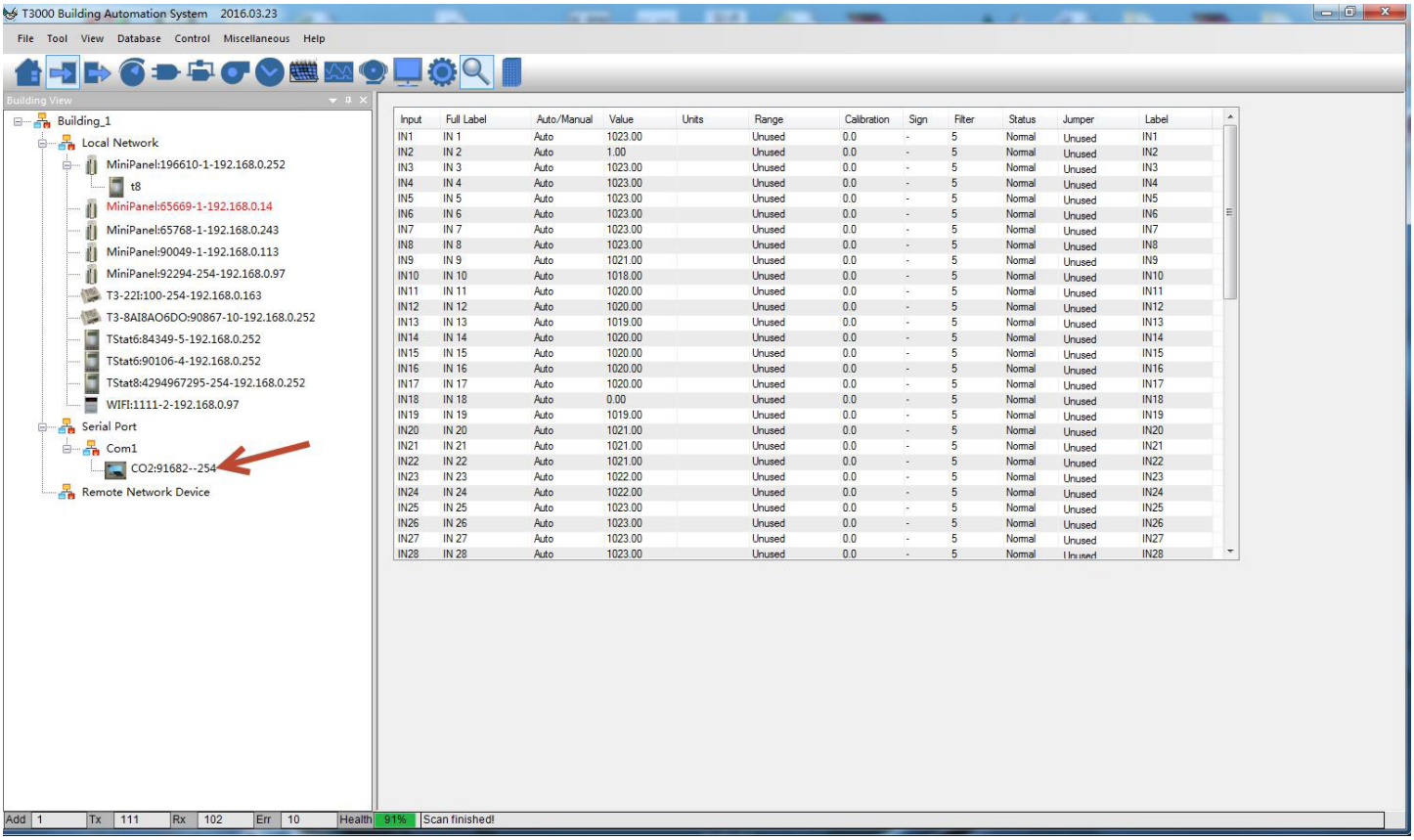


3. Use T3000 to Update

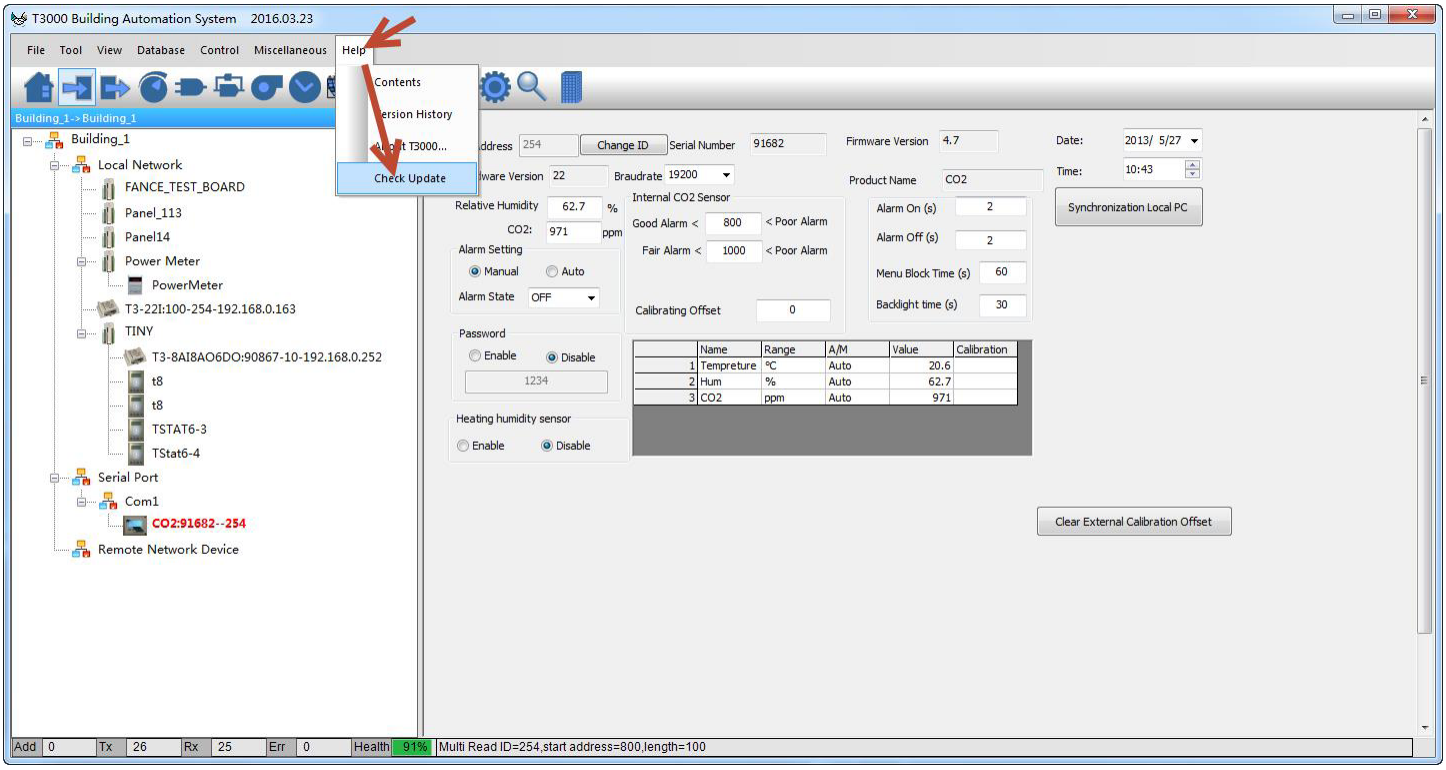
1). Connect your device to PC via RS485 or Ethernet cable, then start T3000 software and click the 'Scan'.

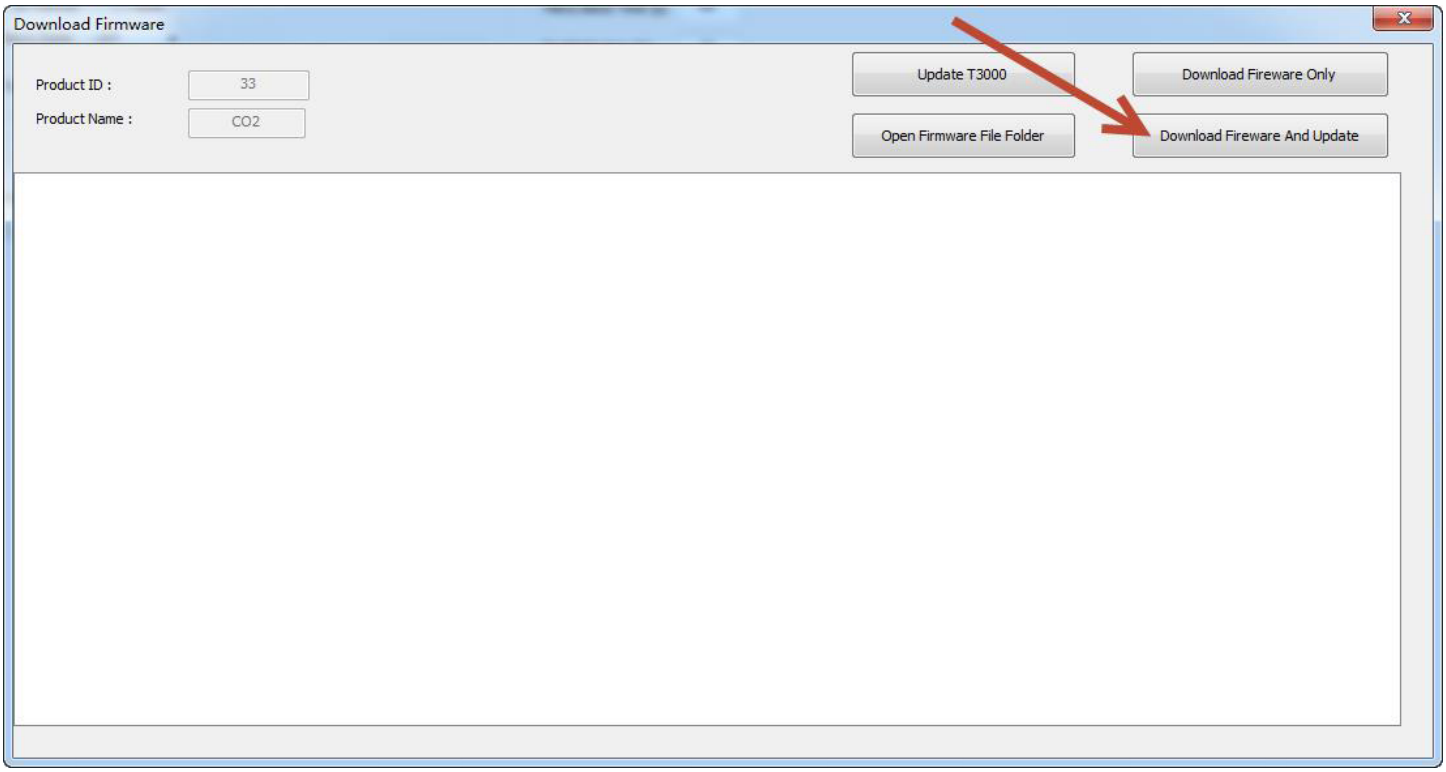


2). You will get the devices on the left device tree.

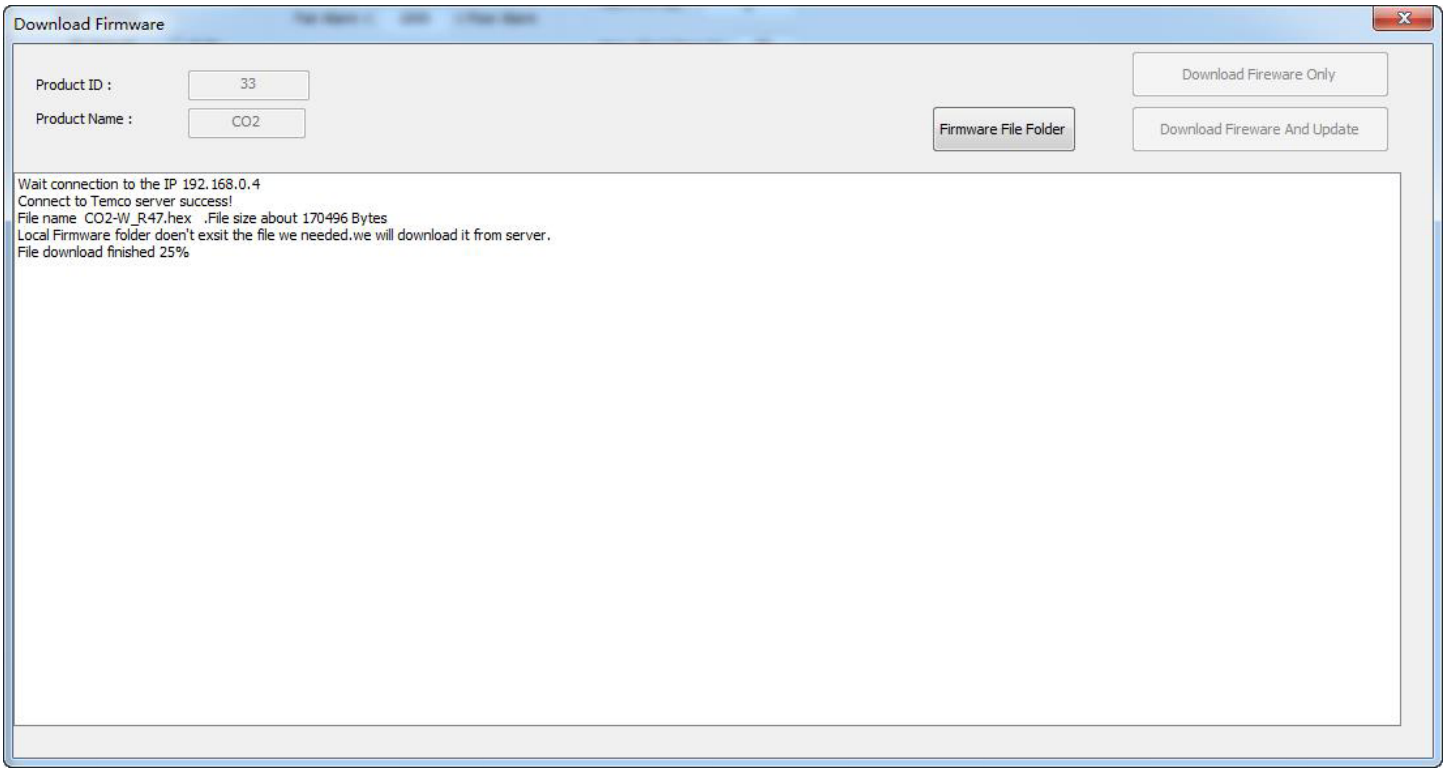


3). Update the firmware online.

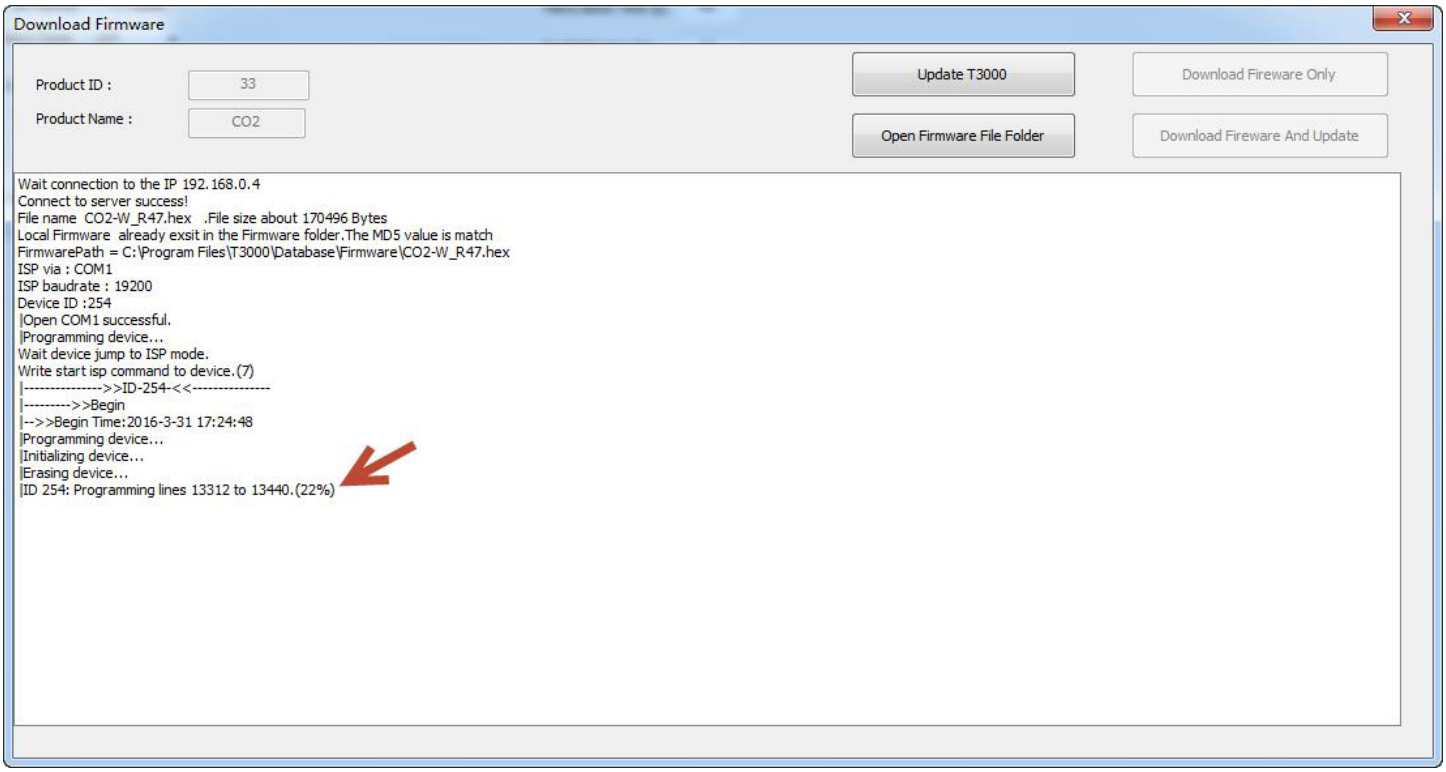




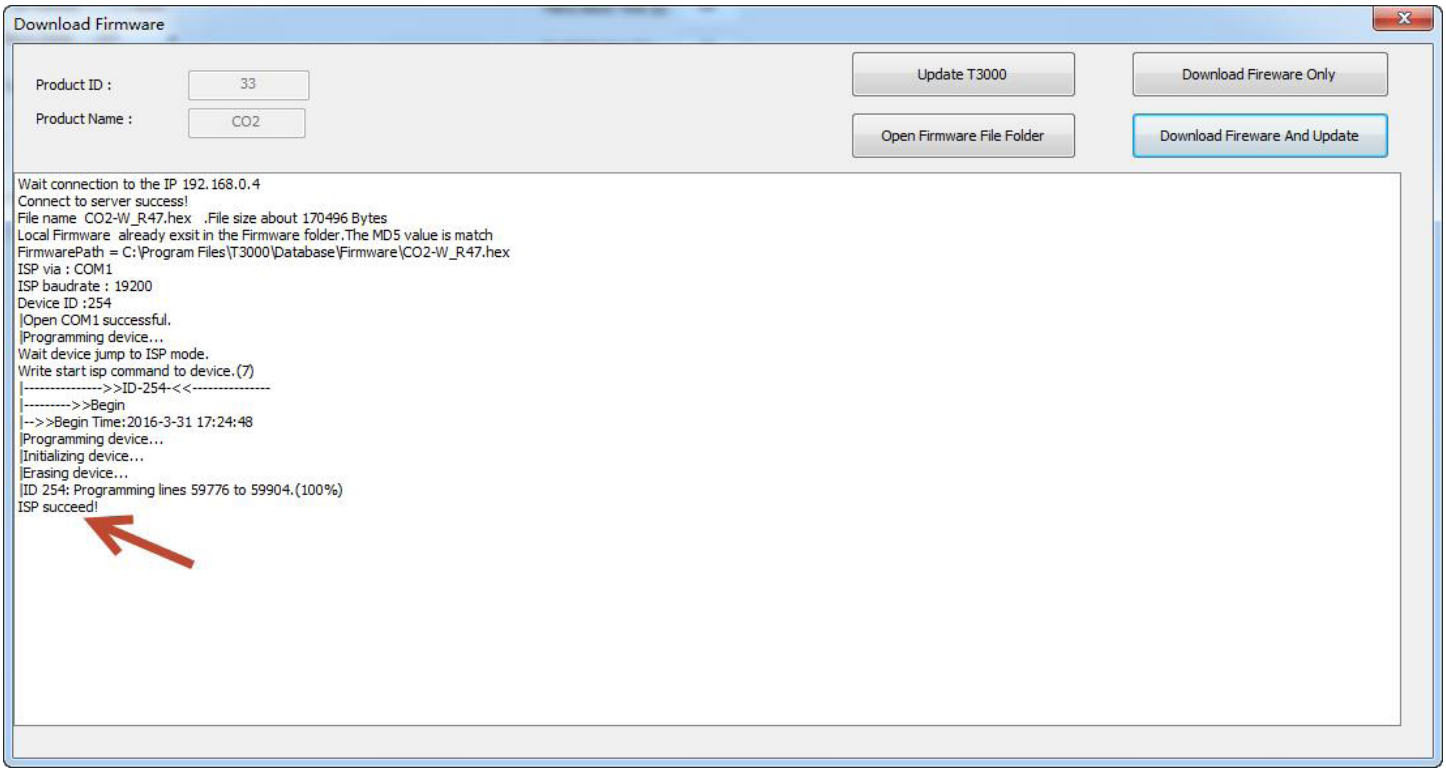
Downloading the firmware:



Updating the firmware:

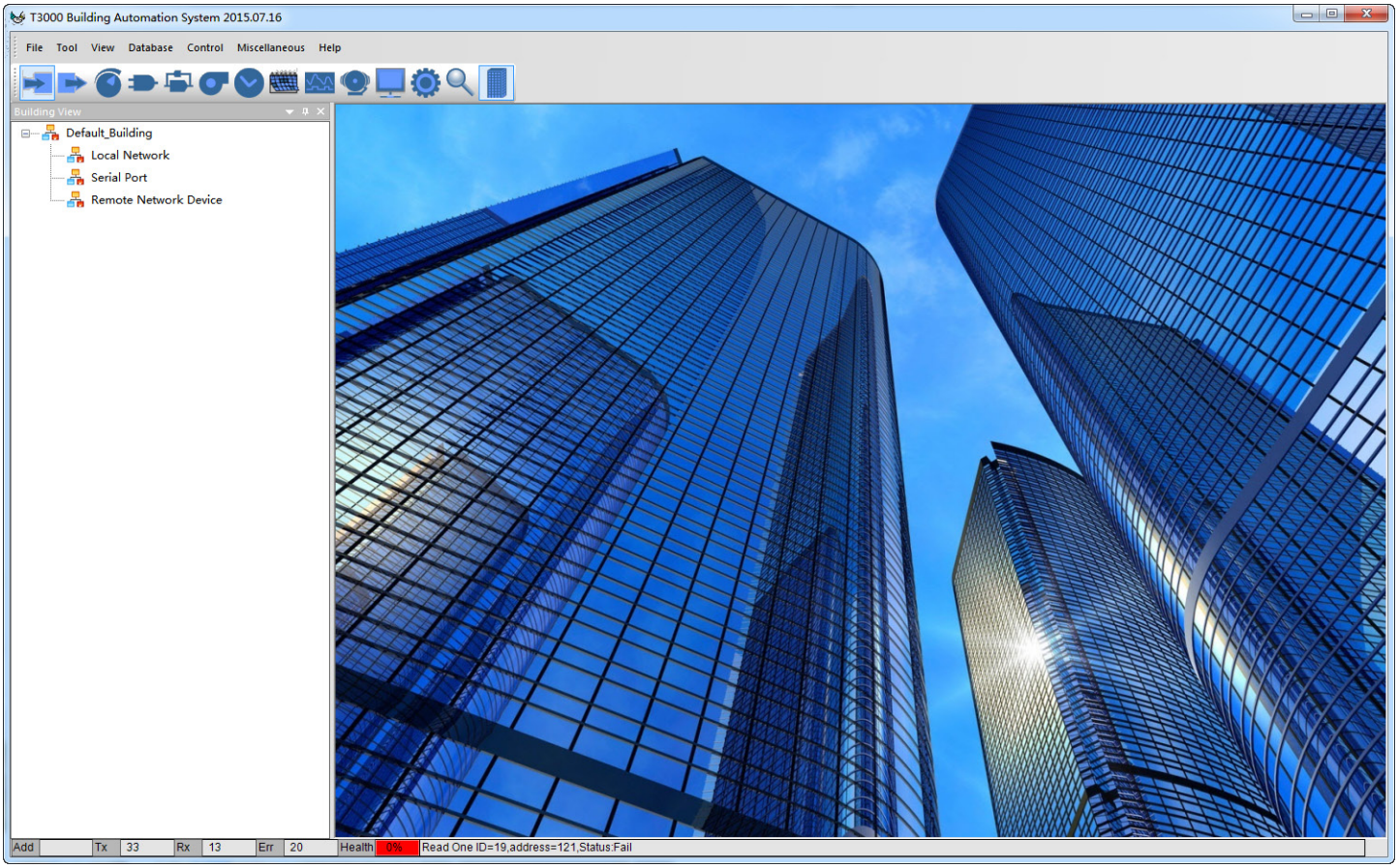


Update done.

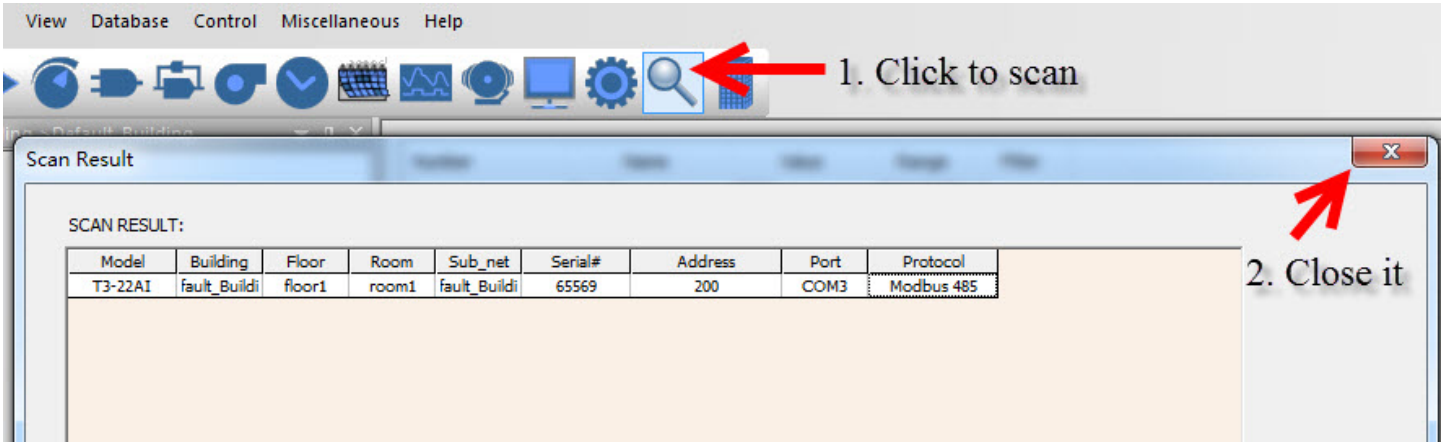


T3000 Software Introductions

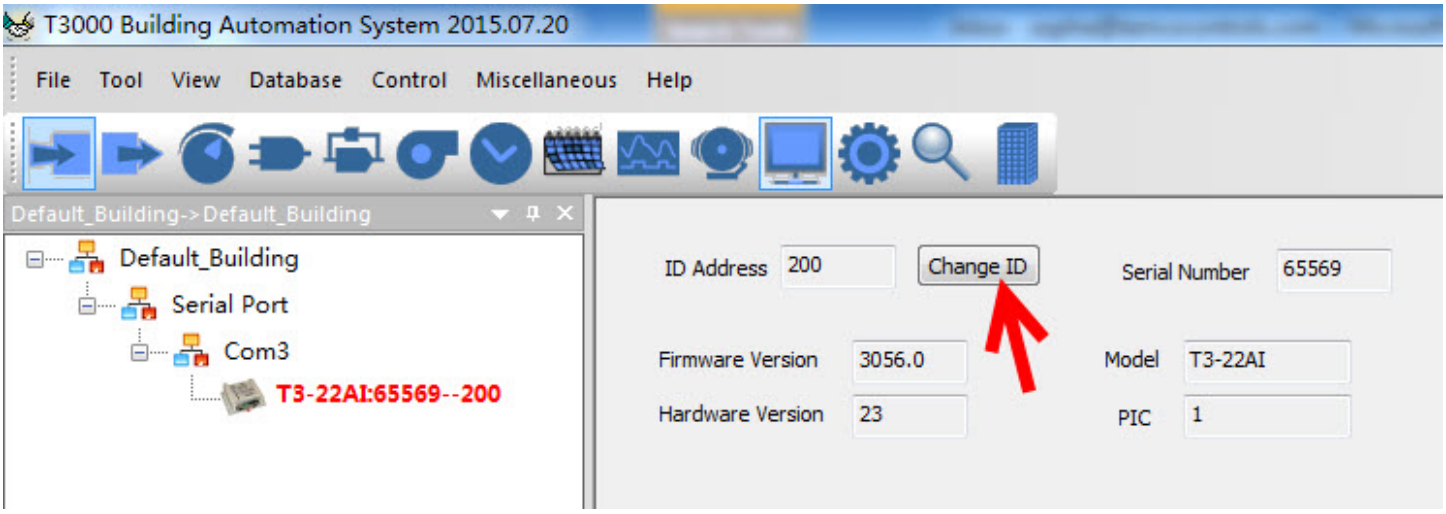
1. Visit https://temcocontrols.com/ftp/software/09T3000Software.zip, download T3000 software and install it;
2. Connect T3E-22i to PC via RS485 at pin 14, 15 and 16 or Ethernet. Open the software T3000, it



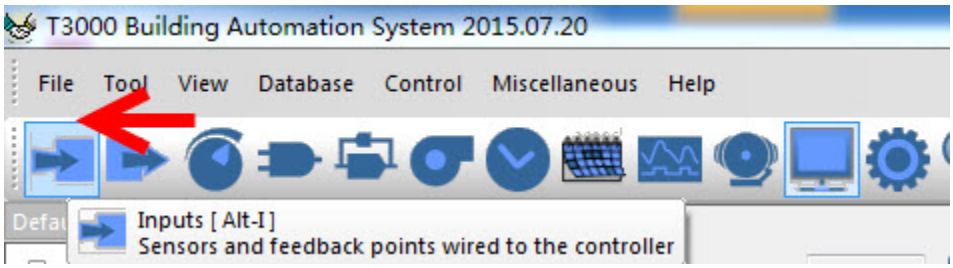
3. Click scan, it will open below the window view, then close it.

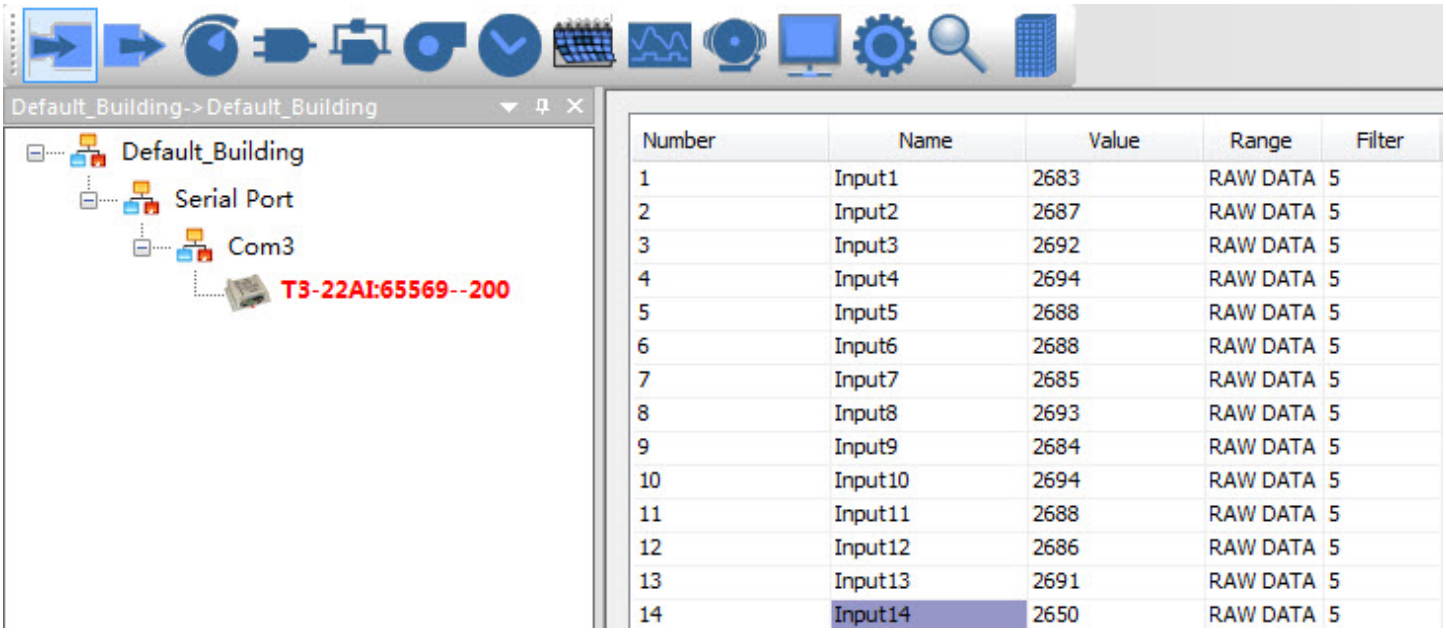


4. Click T3E-22i log, it will show all the information of it.

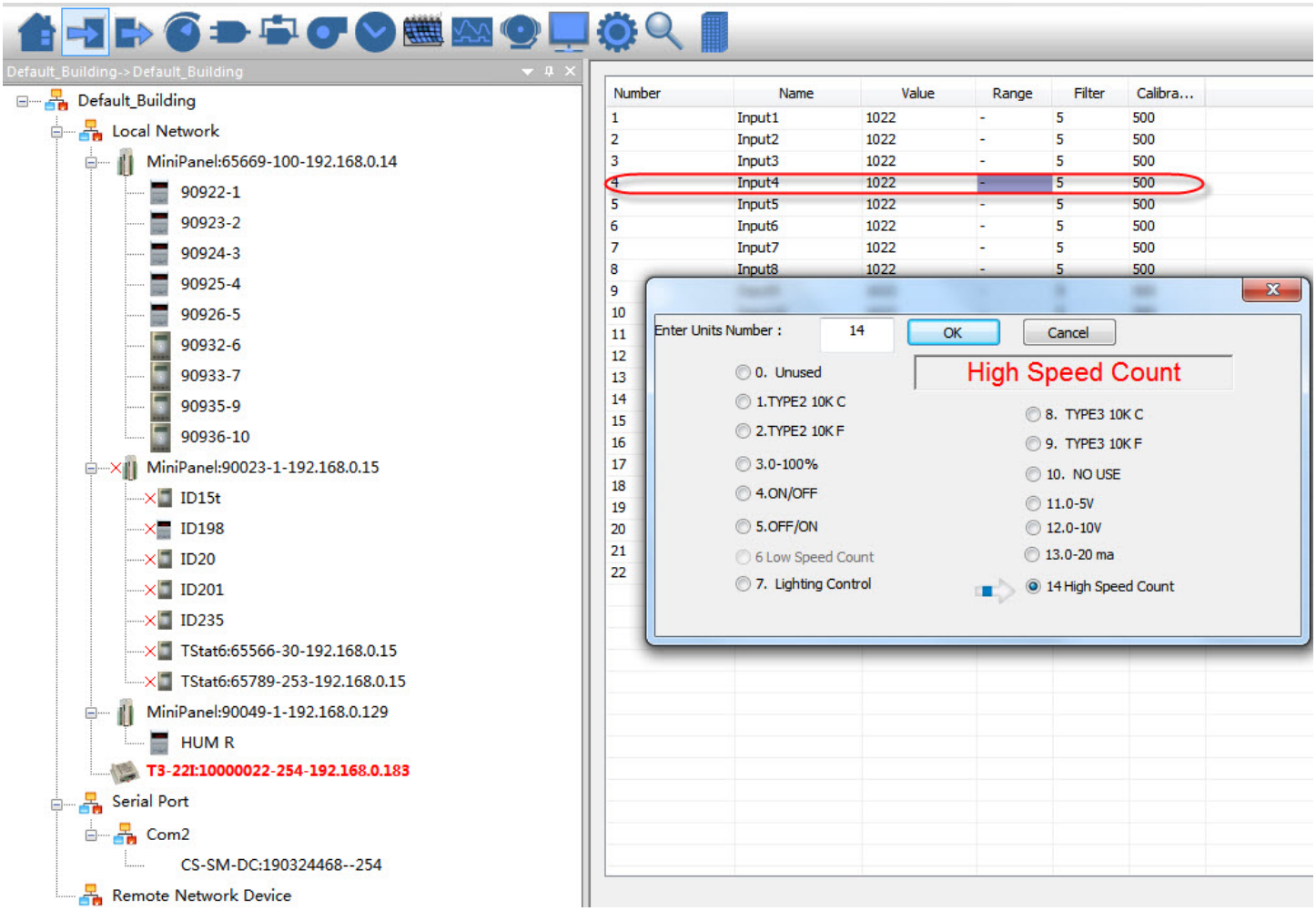


5. Click input, it will show the view of all inputs. For T3E-22i, from input channel 1-11, it's high speed pulse counters. From input channel 12-22, it's low speed pulse counters.

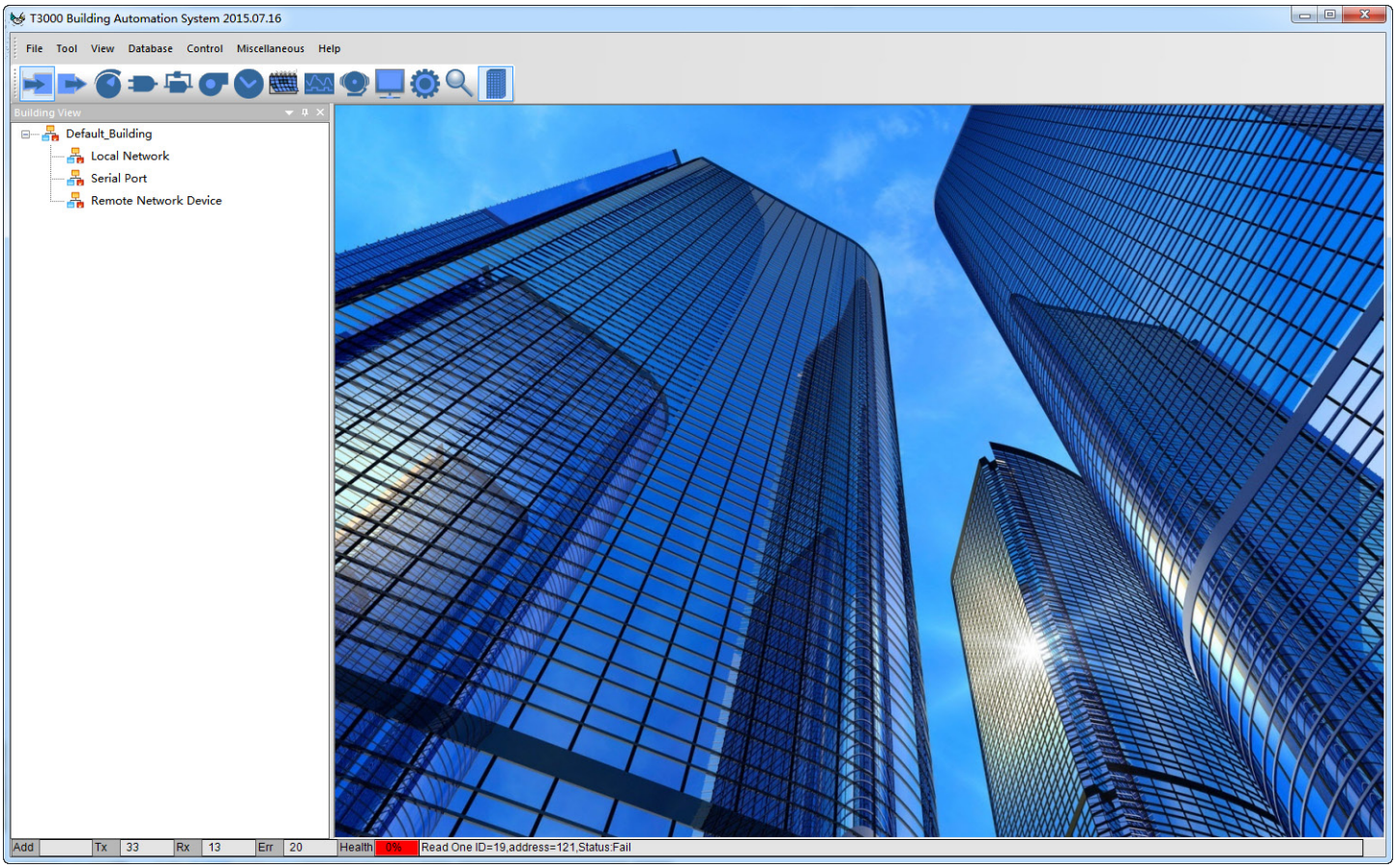




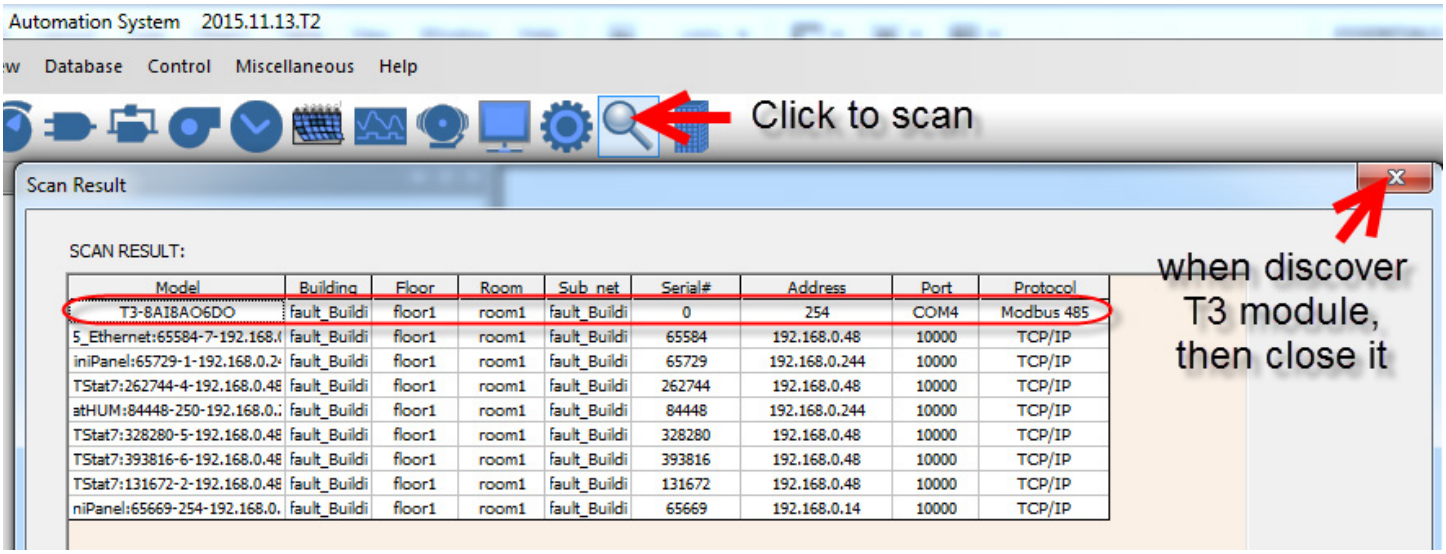
Bacnet and Modbus Modules



1. Download T3000 software https://temcocontrols.com/ftp/software/09T3000Software.zip and install it.
2. Connect T3E-886to PC via RS485 at pin 14, 15 and 16 or Ethernet. Start the software T3000, it will

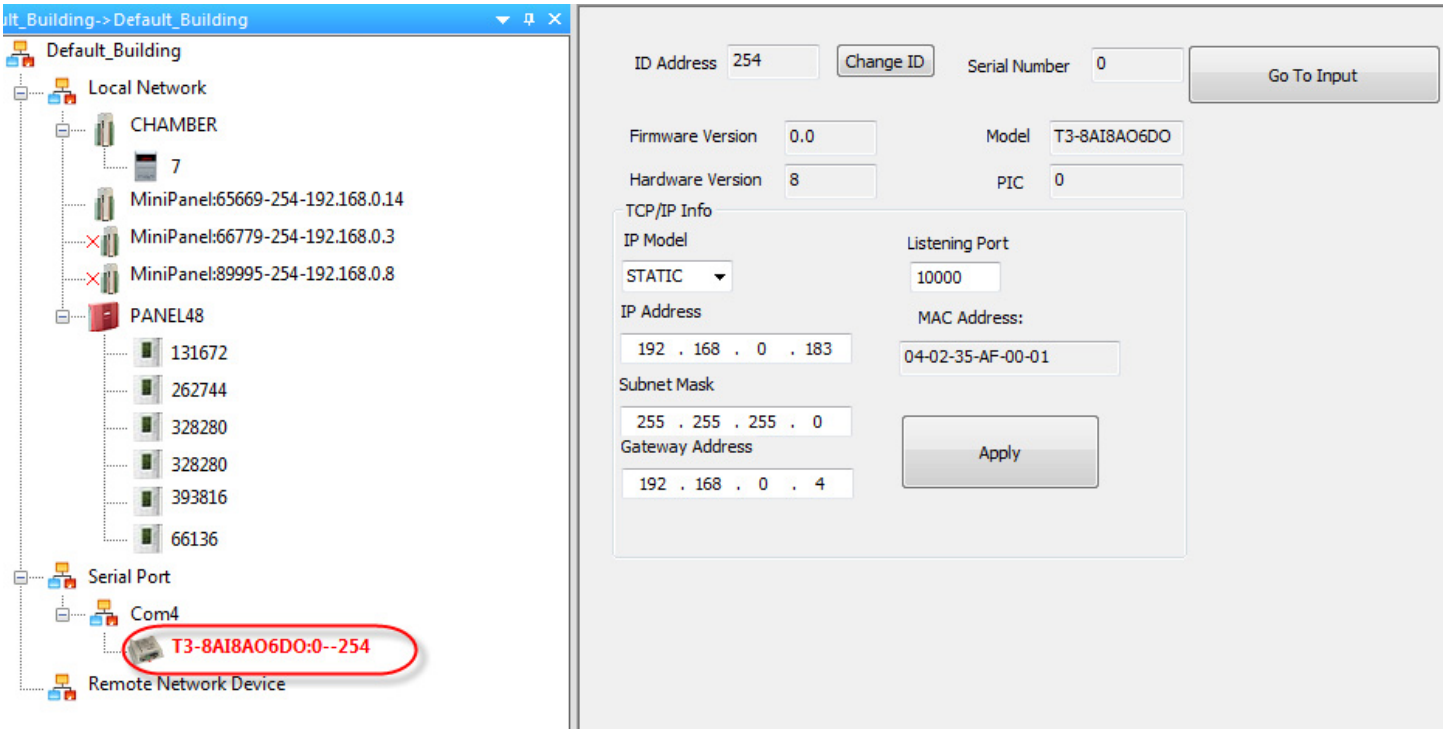


3. Click scan, it will appear one pop up window.

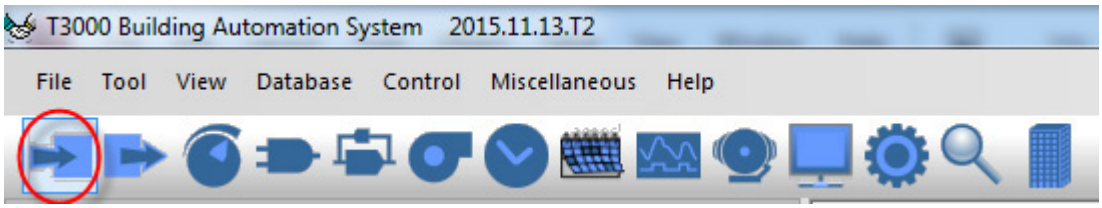


Model	Building	Floor	Room	Sub_net	Serial#	Address	Port	Protocol
T3-8AI8AO6DO	fault_Buildi	floor1	room1	fault_Buildi	0	254	COM4	Modbus 485
5_Ethernet:65584-7-192.168.(	fault_Buildi	floor1	room1	fault_Buildi	65584	192.168.0.48	10000	TCP/IP
iniPanel:65729-1-192.168.0.2	fault_Buildi	floor1	room1	fault_Buildi	65729	192.168.0.244	10000	TCP/IP
TStat7:262744-4-192.168.0.48	fault_Buildi	floor1	room1	fault_Buildi	262744	192.168.0.48	10000	TCP/IP
atHUM:84448-250-192.168.0..	fault_Buildi	floor1	room1	fault_Buildi	84448	192.168.0.244	10000	TCP/IP
TStat7:328280-5-192.168.0.48	fault_Buildi	floor1	room1	fault_Buildi	328280	192.168.0.48	10000	TCP/IP
TStat7:393816-6-192.168.0.48	fault_Buildi	floor1	room1	fault_Buildi	393816	192.168.0.48	10000	TCP/IP
TStat7:131672-2-192.168.0.48	fault_Buildi	floor1	room1	fault_Buildi	131672	192.168.0.48	10000	TCP/IP
niPanel:65669-254-192.168.0.	fault_Buildi	floor1	room1	fault_Buildi	65669	192.168.0.14	10000	TCP/IP

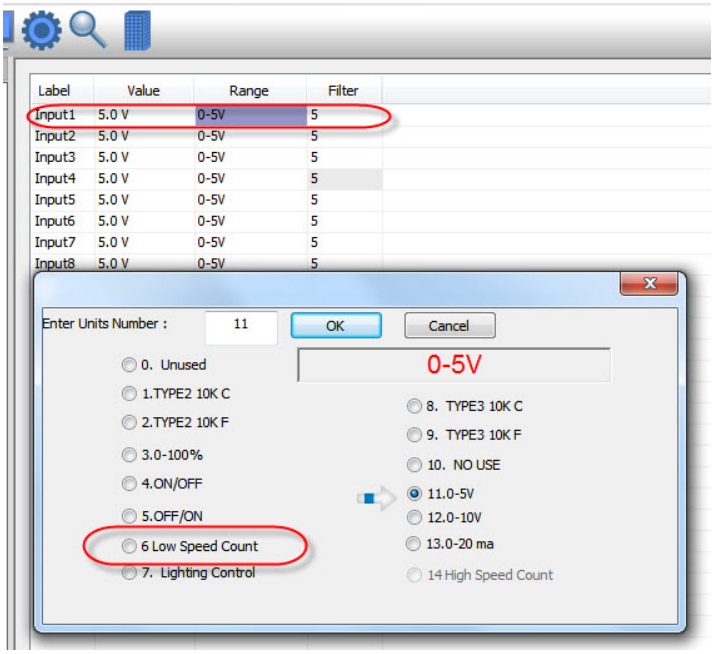
4. Click T3E-886 log, it will show all the information of it.



5. Click input, it will show the view of all inputs.



Click input1 range, it will appear one pop up window, you can choose “pulse input”, then click ok.



Register List

T3E-22i Register List

Address	Num	Length	Description	Bacnet
0~3	1	4	Serial number	AV0
4	1	1	Firmware version number	AV1
5	1	1	software version number	AV2
6	1	1	modbus service address	AV3
7	1	1	product model	AV4
8	1	1	hardware version number	AV5
9~13	1	5	spare	
15	1	1	baudrate	AV6
16~39	0		spare	
40~45	1	6	Mac address. Read only	
46	1	1	DHCP setting. 0 = static 1=dynamic Read only	
47~50	1	4	Ip address Read only	
51~54	1	4	sub mask address Read only	
55~58	1	4	gateway address Read only	
59	1	1	tcp server Read only	
60	2	1	listen port Read only	
61	1	1	gost ip mode Read/Write	
62~65	1	4	gost Ip address Read/Write	
66~69	1	4	gost sub mask address Read/Write	
70~73	1	4	gost gateway address Read/Write	
74	1	1	gost tcp server Read/Write	
75	2	1	gost listen port Read/Write	
76	1	1	gost write gost value to sytem and refresh the the real parameter Read/Write	
77~99	0		spare	
100	2	1	Input1 high word	AI1
101	2	1	Input1 low word Input1: 2 registers, Value = Reg100 * 65535 + Reg 101 The A/D converer is 12 bits so for most ranges you can read reg101 only. For pulse counting use reg 100 and 101.	
102	2	1	Input2 . see input1 description for details	AI2
103	2	1		
104	2	1	Input3 . see input1 description for details	AI3
105	2	1		
106	2	1	Input4 . see input1 description for details	AI4
107	2	1		

T3E-22i Register List

Address	Num	Length	Description	Bacnet
108	2	1	Input5 . see input1 description for details	AI5
109	2	1		
110	2	1	Input6 . see input1 description for details	AI6
111	2	1		
112	2	1	Input7 . see input1 description for details	AI7
113	2	1		
114	2	1	Input8 . see input1 description for details	AI8
115	2	1		
116	2	1	Input9 . see input1 description for details	AI9
117	2	1		
118	2	1	Input10 . see input1 description for details	AI10
119	2	1		
120	2	1	Input11 . see input1 description for details	AI11
121	2	1		
122	2	1	Input12 . see input1 description for details	AI12
123	2	1		
124	2	1	Input13 . see input1 description for details	AI13
125	2	1		
126	2	1	Input14 . see input1 description for details	AI14
127	2	1		
128	2	1	Input15 . see input1 description for details	AI15
129	2	1		
130	2	1	Input16 . see input1 description for details	AI16
131	2	1		
132	2	1	Input17 . see input1 description for details	AI17
133	2	1		
134	2	1	Input18 . see input1 description for details	AI18
135	2	1		
136	2	1	Input19 . see input1 description for details	AI19
137	2	1		
138	2	1	Input20 . see input1 description for details	AI20
139	2	1		
140	2	1	Input21 . see input1 description for details	AI21
141	2	1		
142	2	1	Input22 . see input1 description for details	AI22
143	2	1		
144~199	0	1	spare	AV32
200~221	2	22	filter for input1~22	AV7~28

T3E-22i Register List

Address	Num	Length	Description	Bacnet
222~224	0		spare	
225~246	1	22	range for input1~22	AV29~50
247~249	0	spare		
250~271	2	22	offset for input1~22	AV51~72

T3E-886 Register List

Address	Num	Length	Description	Bacnet
0~3	1	4	Serial number	AV0
4	1	1	Firmware version number	AV1
5	1	1	software version number	AV2
6	1	1	modbus service address	AV3
7	1	1	product model	AV4
8	1	1	hardware version number	AV5
9~13	1	4	spare	
15	1	1	baudrate	AV6
16~39	0		spare	
40~45	1	6	Mac address. Read only	
46	1		Ip mode. 0 = static 1=dynamic Read only	
47~50	1	4	Ip address Read only	
51~54	1	4	sub mask address Read only	
55~58	1	4	gateway address Read only	
59	1	1	tcp server Read only	
60	2	1	listen port Read only	
61	1	1	gost ip mode Read/Write	
62~65	1	4	gost Ip address Read/Write	
66~69	1	4	gost sub mask address Read/Write	
70~73	1	4	gost gateway address Read/Write	
74	1	1	gost tcp server Read/Write	
75	2	1	gost listen port Read/Write	
76	1	1	gost write gost value to sytem and refresh the the real parameter Read/Write	
77 to 99	0		spare	
100~107	2	8	analog output1~8	AO0~7
108~113	2		digit output1~6	BO1~6
114~115	2	2	switch bank1~2	AV7~8
116	2	2	analog input1	AI0
117				
118	2	2	analog input2	AI1
119				
120	2	2	analog input3	AI2
121				
122	2	2	analog input4	AI3
123				
124	2	2	analog input5	AI4
125				

T3E-886 Register List

Address	Num	Length	Description	Bacnet
126	2		analog input6	AI5
127				
128	2		analog input7	AI6
129				
130	2		analog input8	AI7
131				
200~207	2	8	analog input1~8 filter	AV9~16
225~232	2	8	range for input1~8	AV17~24
250~257	2	8	offset for input1~8	AV25~32

T3E-32i Register List

Address	Num	Length	Description
0	1	4	Serial number
4	1	2	firmware Version
6	1	1	Modbus device address
7	1	1	Prodouct model
8	1	1	hardware version number
100	1	2	analog input 0 high byte
101	1	2	analog input 0 low byte
102	1	2	analog input 1 high byte
103	1	2	analog input 1 low byte
104	1	2	analog input 2 high byte
105	1	2	analog input 2 low byte
106	1	2	analog input 3 high byte
107	1	2	analog input 3 low byte
108	1	2	analog input 4 high byte
109	1	2	analog input 4 low byte
110	1	2	analog input 5 high byte
111	1	2	analog input 5 low byte
112	1	2	analog input 6 high byte
113	1	2	analog input 6 low byte
114	1	2	analog input 7 high byte
115	1	2	analog input 7 low byte
116	1	2	analog input 8 high byte
117	1	2	analog input 8 low byte
118	1	2	analog input 9 high byte
119	1	2	analog input 9 low byte
120	1	2	analog input 10 high byte
121	1	2	analog input 10 low byte
122	1	2	analog input 11 high byte
123	1	2	analog input 11 low byte
124	1	2	analog input 12 high byte
125	1	2	analog input 12 low byte
126	1	2	analog input 13 high byte
127	1	2	analog input 13 low byte
128	1	2	analog input 14 high byte
129	1	2	analog input 14 low byte
130	1	2	analog input 15 high byte
131	1	2	analog input 15 low byte
132	1	2	analog input 16 high byte
133	1	2	analog input 16 low byte

Address	Num	Length	Description
134	1	2	analog input 17 high byte
135	1	2	analog input 17 low byte
136	1	2	analog input 18 high byte
137	1	2	analog input 18 low byte
138	1	2	analog input 19 high byte
139	1	2	analog input 19 low byte
140	1	2	analog input 20 high byte
141	1	2	analog input 20 low byte
142	1	2	analog input 21 high byte
143	1	2	analog input 21 low byte
144	1	2	analog input 22 high byte
145	1	2	analog input 22 low byte
146	1	2	analog input 23 high byte
147	1	2	analog input 23 low byte
148	1	2	analog input 24 high byte
149	1	2	analog input 24 low byte
150	1	2	analog input 25 high byte
151	1	2	analog input 25 low byte
152	1	2	analog input 26 high byte
153	1	2	analog input 26 low byte
154	1	2	analog input 27 high byte
155	1	2	analog input 27 low byte
156	1	2	analog input 28 high byte
157	1	2	analog input 28 low byte
158	1	2	analog input 29 high byte
159	1	2	analog input 29 low byte
160	1	2	analog input 30 high byte
161	1	2	analog input 30 low byte
162	1	2	analog input 31 high byte
163	1	2	analog input 31 low byte
164	1	1	analog input 0 filter
165	1	1	analog input 1 filter
166	1	1	analog input 2 filter
167	1	1	analog input 3 filter
168	1	1	analog input 4 filter
169	1	1	analog input 5 filter
170	1	1	analog input 6 filter
171	1	1	analog input 7 filter
172	1	1	analog input 8 filter

Address	Num	Length	Description
197	1	1	analog input 1 range
198	1	1	analog input 2 range
199	1	1	analog input 3 range
200	1	1	analog input 4 range
201	1	1	analog input 5 range
202	1	1	analog input 6 range
203	1	1	analog input 7 range
204	1	1	analog input 8 range
205	1	1	analog input 9 range
206	1	1	analog input 10 range
207	1	1	analog input 11 range
208	1	1	analog input 12 range
209	1	1	analog input 13 range
210	1	1	analog input 14 range
211	1	1	analog input 15 range
212	1	1	analog input 16 range
213	1	1	analog input 17 range

*The register list is very long ,it can be downloaded as an excel spreadsheet(03ModbusBacnetRegisterList.xls T3-32A_ARM) https://temcocontrols.com/ftp/software/

Set Up WIFI via T3000

Take an example of T3E-22i-W here,connect WIFI via T3000

1.Visit https://temcocontrols.com/ftp/software/09T3000Software.zip, download T3000 software and install it;

2.Start T3000 software,click  to scan