,

ioSCADA Series

User's Manual

Modbus RS485 Network I/O Modules

The hardware and software of ioSCADA are not special designed for human monitoring and processing, unavailable to be used for any rescue device.

Version 1.0 , Sept 2007

Warranty and ServicePolicy

Product Warranty

Sunix Group warrants all the products mentioned in this manual well-qualified from manufacture to the delivery.
The warranty can take effect only when the products down by normal working. Don't include of improper used (the work environment is out of the specication definition) and recomposed. The warranty time limit would be 2-year after delivery or 1-year after scene installation, judging by the earlier one. Sunix promises to change or repaire the
broken products.

Sunix Group will keep the right of replace or modify the specification of the products in case of not affect the products performance.

With RMA, the deal of the new products can be canceled within 30-days after consignment from factory, and it must be returned within 30-days after obtaining the RMA.. The ones with integrity packing should be deducted the process fee with at most 20% of the order price (for re-storage and testing), all the delivery and process expense will be paid by the customer. The ones which are special order form, packing broken and exceeded 30-days after consignment can't be returns.

Warranty doesn't include goods losing or damage during the delivery, or caused by improper installation and maintenance, misuses and the negligence normal commercial and industrial application etc. Limited warranty is much more powerful than any other nuncupation; rules in written or concealment, the responsibility paid by Sunix shouldn't exceed the sole product value. No matter under what situation, Sunix Group would not be responsible for any material or immaterial loss, such as equipment or income loss.

This manual would be reedited before prior notice. Sunix Group doesn't warrant any serviceability for any special application. Maybe the content of this manual has mistakes, don't guarantee immediately updating or providing the latest data.

Service Policy

Repairation, testing and adjustment of the products won't be charged during the warranty time. But the product carriage and the materials expenses should be paid by the customer own. If it's surpasses the warrant time, all the expenses would be taken from the customer .According to different cases and customer requirement, customer will be noticed before reparation if the reparation fee exceeds the 50% of the product price. Generally the repair, test, adjustment cost would be around 25% of the product price. Bidirectional carriage will be paid by the customer.

Please make sure the product needed reparation provides the following data:

1. Returned goods authorization code RMA, clearly marks outside the wrapping.

2. The company bill and delivery address
3. Detail description for the problem
4. Contact telephone number
5. Purchase order number needed enclosed for the returned goods out of the warranty time

The returned goods needed to be wrapped by the original material or the similar firm package during the delivery

Content

Chapter 1 Introduction

Products overview

ioSCADA series module , includes the following

Module	Explaination
SM_DI_116p	16 channels DC24V digital input（ Sourcing ）
SM_DO_108	8 channels Relay output
SM_DO_116	16 channels Relay output
SM_DIO_116p	16 channels DC24V digital input/output（ Sourcing）
SM_AI_108i	8 channels current/votage analog input
SM_RTD_108i	8 channels RTD input
SM_TH_108i	8 channels Thermister input
SM_UI_108i	8 channels Universal analog input
SM_AO_102i	2 channels current/votage analog output
SM_CNT_102	2 channels counter/frequency input

Description

SUNIX ioSCADA product is a series of industrial SCADA IO module, supporting Modbus RTU/ASCII communication protocol, using the RS485 network to connect mutually, the module is the sub-station under the Modbus network, and it can exist with other module in the same network. The host station may be the SCADA computer, PLC, PAC, DCS or the other logical controller. Inside the module, there is a microcontroller, containing EEPROM which can save datas, that may help to store module's function parameter and singal revises parameter.Using ioCFG.exe software under Windows XP system, together with RS485 and the simple graph setting interface, all kinds of the paremeter of the module can be set easily.

SUNIX ioSCADA series module has various module types due to the different IO interface, mainly dividing into 5 kinds: digital input, digital output, analog input, analog output, high-speed counter module etc. Each kind has the independence industrial plastic shell protection, two group of DIP switch, one of which sets the baud rate and communication protocol, the other sets the module address and default setting. The module has RS485 network terminal resistance internal, used when is located at the end of the network.
Different module has different LED signal display, besides the digital module IO channel LED signal, each kind of module has 5 LED signals, they are Power source (PWR), IO Access(IO_ACC), data receive (RX), data communication deliver (TX), terminal resistance ON(Rt). The main statuses of the module are all displayed by the LED signal, letting ioSCADA module easier to use and maintain.

SUNIX ioSCADA module is different to IO module used in the general laboratory and commercial environment , it is especially designed for the hard industrial environment which is high interferential , including high-grade RFI, EMI, ESD, EFT and Surge protection , the temperature drifts compensation, extending operating environment, 3-way isolation (RS485 isolation, IO and PU isolation, IO channel to channels isolation). With the DIN Rail installation mode, it can be installed both horizontally and vertically (to save space), the lamp design let the status be seen clearly no matter it is installed horizontally or vertically.
The terminal block uses the pull-out block. IO, power source and communication block designed independently, making it easy to connect and maintain, also can use different size cable.

The ioSCADA is designed with willowy function block, the timer function block may delay the output alarm and do the sequential control, the i2o function block may do the alarm interlock control and the TPC output function block may control the heater, suiting the SCADA application system so much, When the SCADA is shut-down or under repairation, it does not affect its control function.

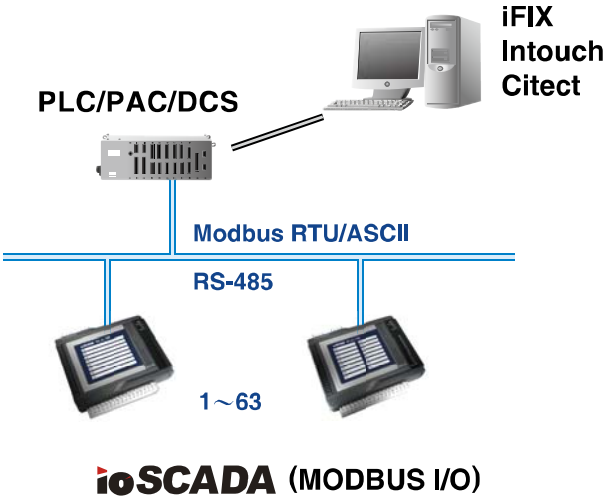
APPLICATION FRAMEWORK

Connect to SCADA (SCADA IO)

ioSCADA has a wide application area , a typical application framework is to connect several ioSCADA together through one RS485 bus, then connected with the SCADA/HMI, thus forms the PC-based computer monitor system. If the range of the control network is too large or too many the I/O connected, it can be solved by increase the number of serial port on PC, the application framework is as following.

Worked with PLC/PAC/DCS or other host system (PLC/PAC/DCS remote IO)

When the control application requests much higher level of reliable and stable, ioSCADA can worked with other company's PLC or other company's PAC/DCS, being used as the remote distributional IO of the primary control system.



ioSCADA's Innovation Design:

1. The DIN Rail installation can choose horizontal or vertical style, considered different installation way, the LED signal designed to be seen both clearly. The IO mark panel is designed to be pull-out. While installed vertically, it can be pull-out to check and write.
2. The module attaches the RS-485 network terminal resistance, which can be set by the switch. Also there is some LED to display the terminal resistance's working status (On/Off), the lift-up design for the panel makes it easy to adjust baud rate and module address as well

as change the fuse.

3. The terminal block of the module IO may has 24 PIN at most; it can isolate the 8 channels completely by using RTD module which is for channels isolation. The gerenal IO block only support 18PIN, and can just isolate 6 channels completely.
4. The External cold-junction compensation (reference point) of the thermocouple's input signal keeps the precision and stability of the detection.
5. The special electric circuit technology achieves the isolation between the IO channels, which makes the ioSCADA have 3 level isolation abilities.
6. The unique MODBUS 4-in-1 method of seeking address keeps the compatibility of the products, letting it can integrate with any other MODBUS Master or SCADA.
7. The delay timer which is owned by PLC is also designed in ioSCADA, letting it be one intelligent data-collecting device. The counting ability of the DI reaches the 300HZ
8. Having the control function of I to O that means the alarm signal on scene can connect to the output end of the module to do the lock control. That's why module can process the alarm control function independently when the communication of the module is totally shut down.
9. The DO module has the TPC control function internal, may match SCADA to carry out the PID temperature control.
   The AO module has SLOP output control function internal, may match SCADA to realize the Ramp/Soak control.

ioSCADA's Application Area

ioSCADA suits all kinds of industrial control domains, especially the high noise environment. From the complex control system to the simple data collecting and monitoring, each industrial application domain has its successful application stories. We list up some application domains which can use ioSCADA as following:

- ✧ SCADA remote data collecting control system
- ✧ Electricity factory DCS romote IO
- ✧ Steel factory pudding , steel-making,steel roliing, transfer device,environment device and public service
- ✧ Industrial product line automation
- ✧ Landification factory process monitoring
- ✧ Energy sources manage and match system
- ✧ Security system application
- ✧ Air and water pollution monitoring
- ✧ Building automation
- ✧ Lab information manage
- ✧ Computer and communication room environment monitoring
- ✧ Intelligence control system
- ✧ Other distributing type monitoring application

General Features:

⊙ **Dual watch-dog:**

The CPU watch-dog and communication watch-dog. If the module stops working, the CPU watch-doy will automatically touch off. Letting CPU reset. The communication watch-dog，the module will detect the communication on line status, if there is no data transfering and receving activity of all the online module, it regards it as off-line. Then module will set the output option to default safe status.

Dual communication protocol:

Support Modbus RTU and Modbus ASCI communication protocol

High noise immunity level

IEC61000-4-4 EFT Level III

Panel and Din rail install:

Panel or DIN rail install. By using DIN rali installation, besides horizontal installation, it can be installed vertically with some vertical installation fittings in order to save room of the control box.

RS485 termainal resister:

With RS485 termainal resister internal, setting by DIP switch and displayed bye LED.

Convenience DIP switch setting:

ID address and parameters can be set by the DIP switch. Without softwares, making it easy to install and maintain.

⊙ **Built-in 3-way isolation protection:**

RS485 isolation、IO and CPU isolation、IO channels isolation can offer high nose immunity and protect module

Extend operation temperature:

With industrial level accessory，well fit industrial environment operation，extending the temperature to -30 ~75

Easy to install and maintain：

Pull-out style terminal block, independent communication, power, IO terminal block

User friendly LED display:

LED power display, CPU operation, communication receiving and sending, I/O and terminal resister status

Mark and instruction of the module：

Easy lift design cover，letting user write channel tag and display connection images of the module.

Reset to factory setting：

Reset to default factory settings via DIP switch with proper steps，easy to use and maintain

Software simulation mode:

Can be set to be operation simulation mode, the input value of the module can be written into by master, but the output value doesn’t change by the master order. When it switches to the normal mode, the restored signal will update automatically.

SM_DI_116p Module Features:

⊙ **Input Debounce:**

Setting the fastest change time of the signal, that can filtrate unnecessary nose signal

Input Invert:

When the actual singal is “True” ,the module displays “False”. Vice versa, it can be adjusted any time by the device connecter.

Input On delay:

When the actual input signal changes from Off (False) to On (True), the module can display On(True) after some certain time, that can be used as alarm delay function.

Input Off delay:

When the actual input signal changes from On(True) to Off(False), the module can display Off(False) after some certain time, that can be used as alarm delay function.

Input Toggled:

When the actual input signal changes from Off（ False）to On（ True）, the module only changes the instant status once, that can be used as revert switch.

Create Pulsed:

When the actual input signal changes from Off（ False）to On（ True）, the module can create some pulse for some time, that can be used as ration output.

Bypass Signal Disposal:

The signal dealing process can be switched during the operation, ignore data process, easy to doing system testing and maintain.

Input Counter:

When the status of the module changes from Off(False) to On(True), the count plus one, that can be used as a counter

On/Off Latch:

When the input signal changes from Off（ False）to On（ True）, On Latch will be set, when input signal changes from On（ True）to Off（ Flase）,Off Latch will be set. The moment input status changes can be save to avoid missing any status change.

SM_DO_108/SM_DO_116 Module Features:

Fuse Protection:

The module has fuse protection, when the current exceeded the burthen, the fuse will be broken to protect the module

Fail Safe:

When communication is lost, the module enters safe mode, outputting the default value（ If the module detects there is other on-line module active, it is not judgeed off line.）

Output Debounce:

Only after a certain time that module order is changed, the actual output activity will happen. Avoiding the device damage casued by the frequently switch.

Output Invert:

When the module output status is On（True），actual output is Off（False），module status and actual output are reverse, that makes it can work with the device under control.

Sequential ON:

Each channel's ON delay time can be set, send the order at the same time, but it starts sequentially. Time setting is 1~65535 second

Sequential Off:

Each channel's OFF delay time can be set, send the order at the same time, but it starts sequentially. Time setting is 1~65535 second.

Toggled:

When the module output status changes from Off to On, tha actual ouput changes one moment status.

Pulsed Output:

When the module output changes from Off to On, the actual ouput will create a section pulse. The pulse time is set 1~65535 second.

Time Propotion Control:

Let 0~100 % analog signal change to digital output automatically according to the set action cycle. The TPC cycle is set 100ms~300s

Manual Mode:

In the manual mode, the ouput is controlled by the master directly, the module don't control automaticly. When it changes to automation mode from the manual mode, the status will be reset.

Power on output:

The output status of the module cold start.

SM_DIO_116p Module Features:

- **Input to Output:**

  Input signal can do AND/OR control by connecting to ouput point by point. In the i2o mode, the master can't control output. That can be used as Alarm interlock control to protect device. Any DO output can be decided by any 8 DI status (AND/OR).

- **Input Debounce:**

  Setting the fastest change time of the signal, that can filtrate unnecessary nose signal

- **Input Invert:**

  When the actual singal is "True" ,the module displays "False". Vice versa, it can be adjusted any time by the device connecter.

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Input Off delay:

When the actual input signal changes from On(True) to Off(False), the module can display Off(False) after some certain time, that can be used as alarm delay function.

Input Toggled:

When the actual input signal changes from Off（False）to On（True）, the module only changes the instant status once, that can be used as revert switch.

Create Pulsed:

When the actual input signal changes from Off（False）to On（True）, the module can create some pulse for some time, that can be used as ration output

Bypass Signal Disposal:

The signal dealing process can be switched during the operation, ignore data process, easy to doing system testing and maintain

Input Counter:

When the status of the module changes from Off(False) to On(True), the count plus one, that can be used as a counter

On/Off Latch:

When the input signal changes from Off（False）to On（True）, On Latch will be set, when input signal changes from On（True）to Off（Flase）,Off Latch will be set. The moment input status changes can be saved to avoid missing any status change.

Fail Safe:

When communication is lost, the module enters safe mode, outputting the default value（If the module detects there is other on-line module active, it is not judgeed off line.）

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Let 0~100 % analog signal change to digital output automatically according to the set action cycle. The TPC cycle is set 100ms~300s

Manual Mode:

In the manual mode, the ouput is controlled by the master directly， the module don't control automaticly. When it changes to automation mode from the manual mode， the status will be reset.

Power on output:

The output status of the module cold start.

Fuse Protection:

The module has fuse protection, when the current exceeded the burthen, the fuse will be broken to protect the module

SM_AI_108i Module Features:

⊙ **Channel to channel isolation:**

Input signal channel to channel isolation, avoiding channels disturbance

Voltage/Current switch by software:

Input signal V or mA swtich，set by the software without hardware setting.

7 kinds alarm for input signal range:

Input signal over range has 7 kinds alarm: Over flow, over range, high alarm, low alarm, under range, under flow, Break

Channel signal kinds select:

Every channel's input signal kind can be set separately, not dividing into groups.

A/D Converter:

16 bit A/D converter, resolution ±32000

0.05% High Accuracy:

Accurary ±0.05%,

Automatic Self-Calibration:

Built-in automatic self-calibration circuit decreases the temperature effect of the circuit，that pledges the accuracy under different environment temperature.

Signal Smoothing:

Each channel can set smooth value to filtrate surge, making the input signal smooth.

Minimum/ Maximum Record:

Recording the MAX/MIN value automatically, without missing any abnormal data.

Offset:

Each channel can input instrument signal, setting offset value，that can make the on scene value keep the same

Open Loop Detection Feature:

If the input signal range is 4~20 mA，the one below 4 mA will be displayed as negative and below 3.84mA can be regarded as open loop.

SM_RTD_108i Module Features:

⊙ **Channel to channel isolation:**

Input signal channel to channel isolation, avoiding channels disturbance

⊙ **7 kinds alarm for input signal range:**

Input signal over range has 7 kinds alarm: Over flow, over range, high alarm, low alarm, under range, under flow, Break

⊙ **A/D Converter:**

16 bit A/D converter, resolution 0.1

⊙ **Automatic Self-Calibration:**

Built-in automatic self-calibration circuit decreases the temperature effect of the circuit，that pledges the accuracy under different environment temperature.

⊙ **Signal Smoothing:**

Each channel can set smooth value to filtrate surge, making the input signal smooth.

⊙ **Minimum/ Maximum Record:**

Recording the MAX/MIN value automatically, without missing any abnormal data.

⊙ **Offset:**

Each channel can input instrument signal, setting offset value，that can make the on scene value keep the same.

⊙ **Open Loop Detection Feature:**

If the input signal is open loop, it will display break alarm to make sure the validity of the collecting data .

⊙ **High density isolation channel:**

8 absolutely isolation RTD channels（3 wire connection，24 terminal blocks）, that can cut the sing channel cost.

RTD linearization:

Supporting PT100、PT200、PT500、PT1000、NI120、Cu100、Cu50 all kinds of resistance temperature sensor，built-in RTD temperature converter can translate the resistence value which measured automatically to temperature value.

RTD temperature unit display:

RTD can directly display the temperature value，－2000~8500 means -200.0 ~850.0 ℃，resolution 0.1

SM_TH_108i Module Features:

⊙ **Channel to channel isolation**：

Input signal channel to channel isolation, avoiding channels disturbance

⊙ **7 kinds alarm for input signal range:**

Input signal over range has 7 kinds alarm: Over flow, over range, high alarm, low alarm, under range, under flow, Break.

⊙ **A/D Converter:**

16 bit A/D converter, resolution 0.1

⊙ **Automatic Self-Calibration:**

Built-in automatic self-calibration circuit decreases the temperature effect of the circuit, that pledges the accuracy under different environment temperature.

⊙ **Signal Smoothing:**

Each channel can set smooth value to filtrate surge, making the input signal smooth.

⊙ **Minimum/ Maximum Record:**

Recording the MAX/MIN value automatically, without missing any abnormal data.

⊙ **Offset:**

Each channel can input instrument signal, setting offset value, that can make the on scene value keep the same.

⊙ **Open Loop Detection Feature:**

If the input signal is open loop, it will display break alarm to make sure the validity of the collecting data.

Thermister linearization:

Built-in Thermister temperature converter can translate the resistence value which measured automatically to temperature value.

Thermister temperature unit display:

Thermister can directly display the temperature value, resolution 0.1

SM_UI_108i Module Features:

⊙ **T/C Cold Junction sensor:**

T/C's cold junction sensor is connected external in order to enhance T/C's accuracy，it will not effected by the inequality temperature inside the module.

Channel to channel isolation:

Input signal channel to channel isolation, avoiding channels disturbance.

Voltage/Current switch by software:

Input signal V or mA swtich，set by the software without hardware setting.

7 kinds alarm for input signal range:

Input signal over range has 7 kinds alarm: Over flow, over range, high alarm, low alarm, under range, under flow, Break.

Channel signal kinds select:

Every channel's input signal kind can be set separately, not dividing into groups.

A/D Converter:

16 bit A/D converter, resolution ±32000 or 0.1

0.05% High Accuracy:

Accuracy ±0.05%

Automatic Self-Calibration:

Built-in automatic self-calibration circuit decreases the temperature effect of the circuit，that pledges the accuracy under different environment temperature.

Signal Smoothing:

Each channel can set smooth value to filtrate surge, making the input signal smooth.

Minimum/ Maximum Record:

Recording the MAX/MIN value automatically, without missing any abnormal data.

Offset:

Each channel can input instrument signal, setting offset value，that can make the on scene value keep the same.

Open Loop Detection Feature:

If the input signal range is 4~20 mA，the one below 4 mA will be displayed as negative and below 3.84mA can be regarded as open loop.

SM_AO_102i Module Features:

⊙ **Fail Safe:**

When communication is lost, the module enters safe mode, outputting the default value（If the module detects there is other on-line module active, it is not judgeed off line.）

⊙ **Channel to channel isolation:**

Input signal channel to channel isolation, avoiding channels disturbance.

⊙ **Voltage/Current switch by software:**

Input signal V or mA swtich, set by the software without hardware setting.

⊙ **Output clamp:**

It can set low and high range of the output to limit the output in order to protect device and process.

Slop output:

It can be set to output linearly, how soon will the it take to go from moment value to target value (Ramp control).

Power on output:

When cold start, set the default output value. That can protect the process safe when power shut-down.

SM_CNT_102 Module Features:

High/low alarm relay:

4 Relay junction alarm output

Count Max value set:

Reaches the max, the count will go back from 0.

Initial count value set:

The count can start from any number, not only 0.

Falling/rising edge trig:

Set to start count when it changes from high to low or from low to high.

Frequency display:

Available to set the display frequency mode.

Chapter 2 Installation

Unpacking and inspection

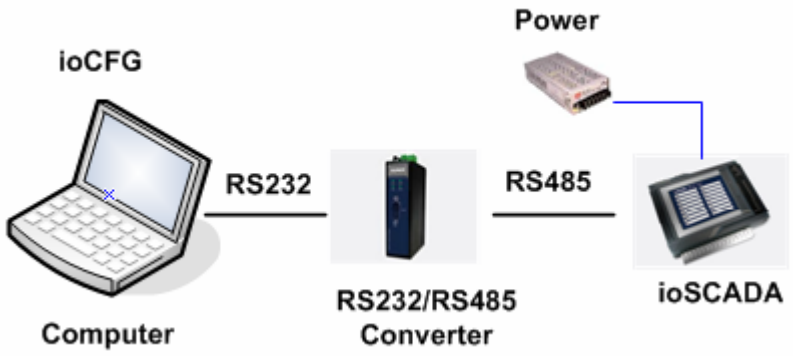
Please check the package situation when receive the product to see whether it was broken during the delivery. If the wrapping has the serious damage or has soaked in water, just ask the carrier to open the package on scene. If the carrier is not on scene when you open the package and the goods inside is damaged, you should keep the packing material for future reference. The damaged product caused by the delivery, the reparation should according to the warranty rules. Keeping the packing material is suggested for the future delivery use. Although the products have packing material outside during the delivery and static-against bag protection inside, Figuration rechecking is still needed when ready to connect to power.

Packing inclued:

- ioSCADA module X 1
- Panels install accessory X 1
- Install CD X 1
- Quick install instruction X 1
- T/C Cold-Junction compensation wiring X 1 (SM_UI_108i Only)

Prepare Work

Before setting the ioSCADA's parameters , the following devices are needed: PC（ Windows XP）、Power supply (10~30V DC)、RS232/RS485 converter、ioCFG Configuration software.



Host computer

The PC should install the Windows XP system and it should has an available RS-232 or RS-485 to output character string for installing ioCFG. If the PC only has RS-232, one isolation RS-232/RS-485 converter is needed to change RS-232 to RS-485. The converter can also protect the PC by isolation as well.

Power supply

In order to easy to use ioSCADA in the industrial environment, the power supply is designed to be industrial standard (+24V DC power supply). When the power is between +10V and +30V DC, it can be kept working normally. (The fluctuant of the power peak value should be under 5V). The range of power supply takes the module terminal as a gauge point, when the module is remote power supply, the voltage drop caused by the distance must be considered. Caution: when select the industrial standard power supply, it must conform IEC-61000-4-4 2KV specification.

Communication Wiring

ioSCADA uses 3-wring isolation RS-85 connection style, containing three junction T+, T-, COM.

ioSCADA's network uses the shielded twisted-pair to reduce the environment nose, it's needed to obey EIA RS-485 standard,

using two groups twisted-pair, one is used to transfer data ,the other is used as COMMON. Caution: The COMMON end cannot connect to PE.

ioCFG Configuration Software

ioCFG is ioSCADA's configuration software, working under Windows XP system. It's the product's accessory, free to customers.

ioSCADA RS-485 baud rate and Modbus ID address is set by hardware switch, Default:

Baud rate＝115.2K，No Parity，8 Data Bits，1 STOP Bit

Module ID address ＝1

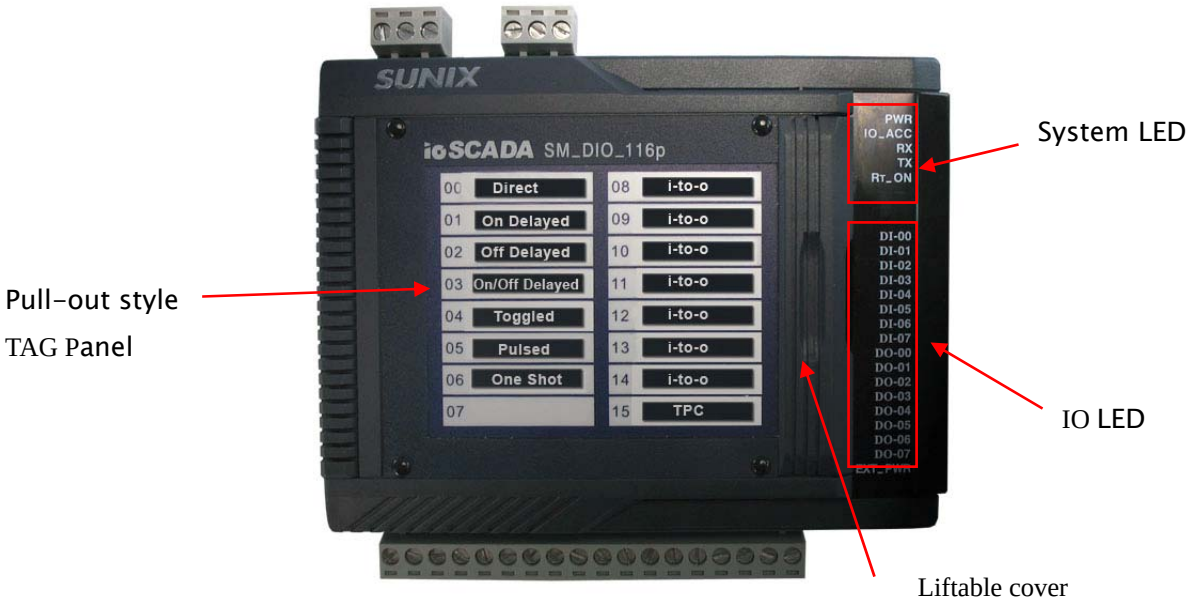
RS-232/RS-485 Isolation converter (Option)

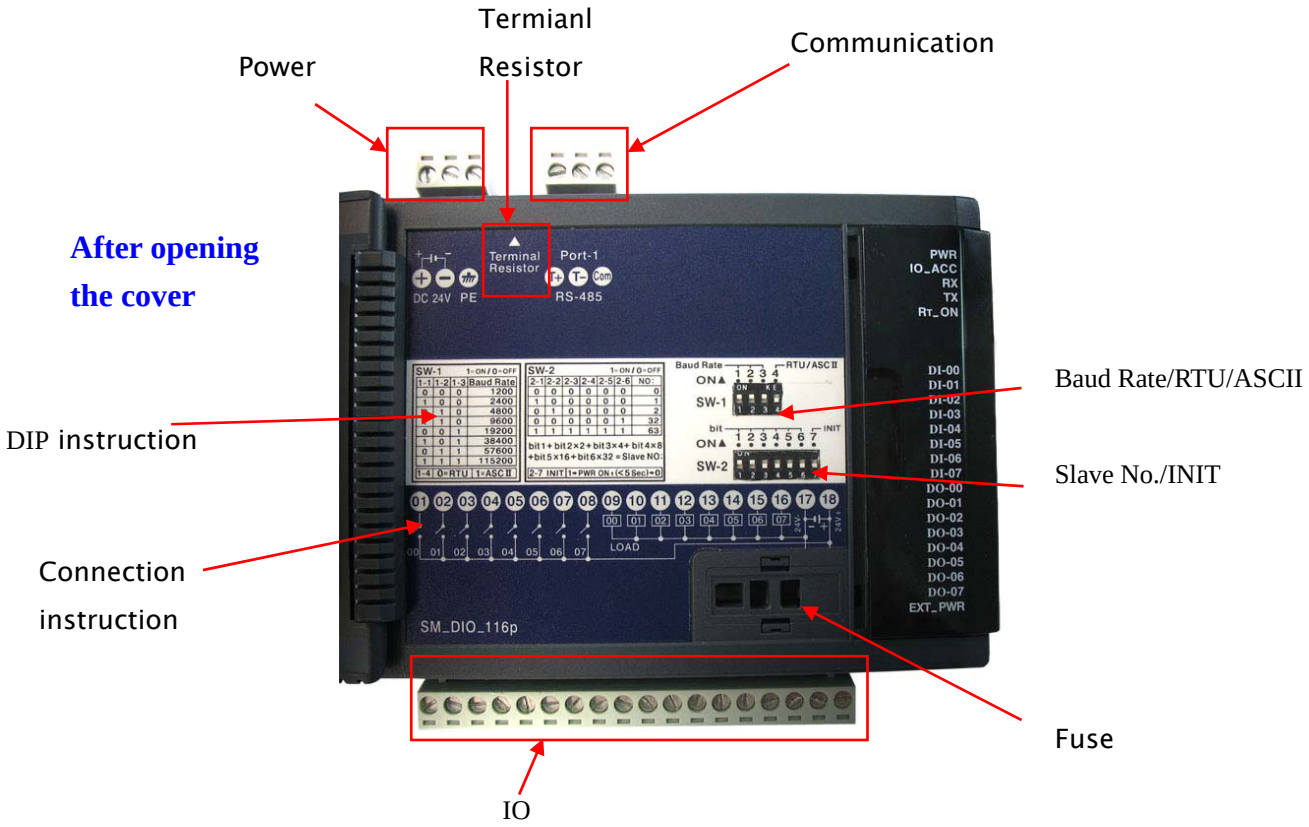
If the host computer doesn't has RS-485 port, RS232/RS485 converter would be a must.

RS-485 Repeater (Option)

If the ioSCADA network's max length exceeds 1200 meter, the RS485 Repeater would be a must，it can support at most 8 repeaters.

Setting and Connection





Setting Baud Rate

ioSCADA module has 4-PIN (SW-1's 1~3, the fourth PIN is RTU/ASCII) ,through DIP switch can set other baud rate. Range : 1200~11500 bps. Just like the images below, the value is set to baud rate 115200.

1	2	3	Baud Rate
0	0	0	1200
1	0	0	2400
0	1	0	4800
1	1	0	9600
0	0	1	19200
1	0	1	38400
0	1	1	57600
1	1	1	115200

The default factory baud rate is: 115200 bps

Setting Slave No

Before networking, checking the Slave No and baud rate's DIP setting. The Slave No can't be the same on one network. Each ioSCADA module has 7-PIN(SW-2's1~6, the seventh PIN is INIT). Through DIP switch can set other Modbus Slave number,

range: 1~63. Just like the images below, the value is set to NO.1。

Slave NO calculation formula：NO = DIP1+DIP2*2+DIP3*4+DIP4*8+DIP5*16+DIP6*32

1	2	3	4	5	6	NO
1	0	0	0	0	0	1
0	1	0	0	0	0	2
1	1	0	0	0	0	3
0	0	1	0	0	0	4
1	0	1	0	0	0	5
0	1	1	0	0	0	6
1	1	1	1	1	1	63

Please every ioSCADA module on one RS-485 bus，make sure that there is no same NO set to them. If that happened, please adjust to avoid communication crash and data transfer failure caused by the modules.

Protocol selection (RTU/ASCII)

SW-1's PIN4 can set to select Modbus RTU(OFF) or Modbus ASCII(ON)

Reset Default Factiory Setting (INIT)

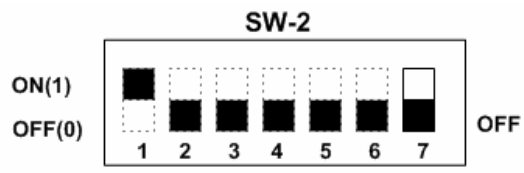
The module function parameter can be reset to default factory setting by SW-2's DIP7 switch，easy to maintain and inspection.

Operaton order：1. Cut-down the power supply

2. Set DIP7 to ON

3. Power supply on

4. Set DIP back to OFF within 5 s（If failed to set DIP7 back to OFF within 5 s，do the whole process again）



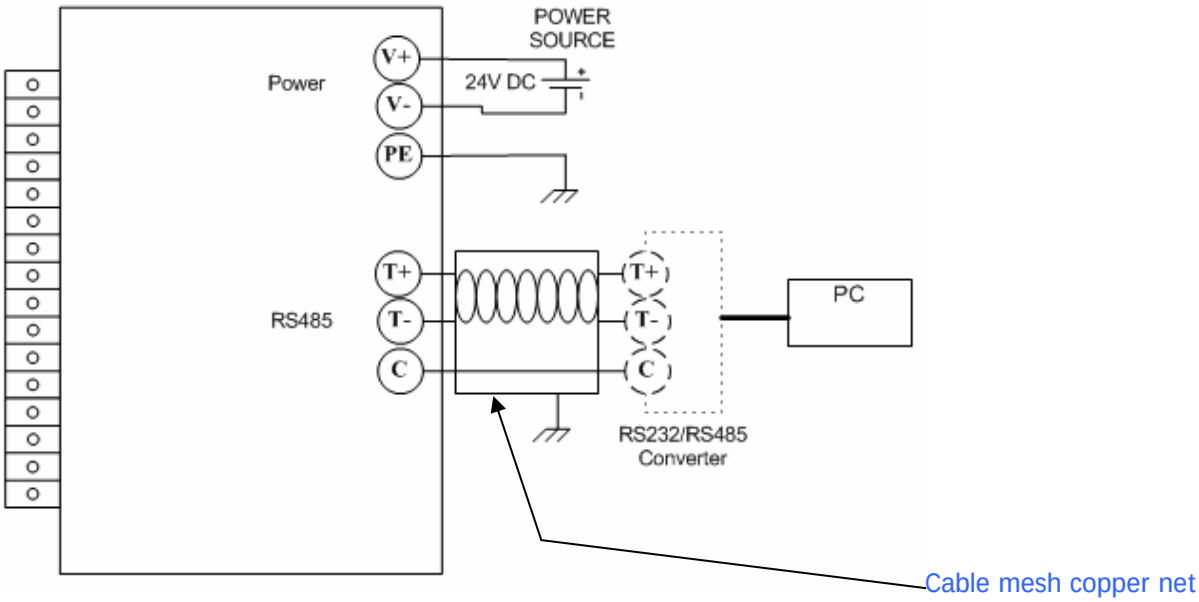
Normal start LED display: After connect to Power supply : PWR bright、RX/TX flashes once，one second later，IO_ACC starts to flash after RX/TX flashs again

INIT on start LED display: After connect to Power supply: PWR 亮、RX/TX flashes once，one second later， IO_ACC keeps bright after RX/TX flashes once again

INIT off LED display: IO_ACC wink, 5 second later，IO_ACC starts to flash，system works normally

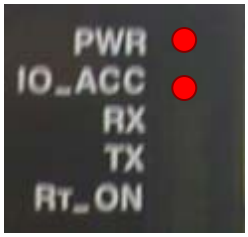
Power Supply 、Communication Connection

Basic install connection diagram:



Normal Start System LED Display

After connect to Power supply : PWR bright、RX/TX flashes once, one second later, IO_ACC starts to flash after RX/TX flashes once again. When EEPROM value changed or failure, IO_ACC will slow down its flash speed.



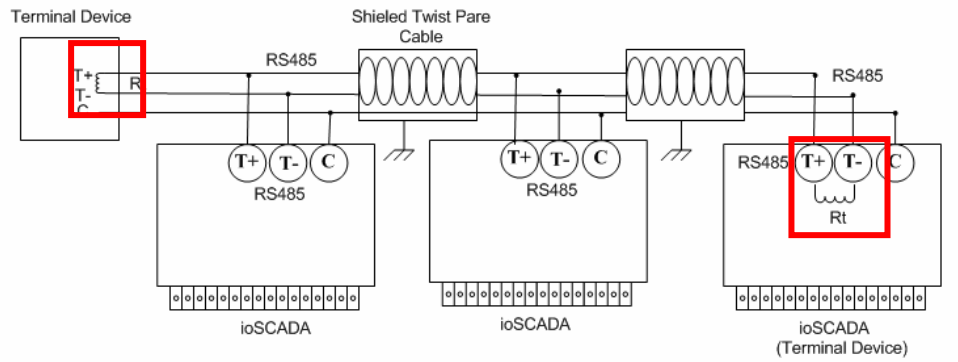
If RS485 terminal resistance has setting，Rt_ON will be bright.

If RS485 is connected to the hose computer：RX is bright to display that the module has received the data, when TX is bright; it means the module has sent the data.

When connected to the host computer，if RX flashes，TX doesn't flash，the module ID address or baud rate maybe has a wrong setting.

Terminal Resistance（Rt）

If ioSCADA is the terminal device of the RS-485 net, the Rt switch on the ioSCADA needs to be set ON



PE

PE is the most important in the ioSCADA system; PE offers the same reference point to the circuit, different device all needs to has its own PE stick. Such as computer system, power supply system, communication system, etc. RS-485's COMMON point doesn't need to PE and the cable isolation net needs to PE with singl point.

Install Configure Software ioCFG

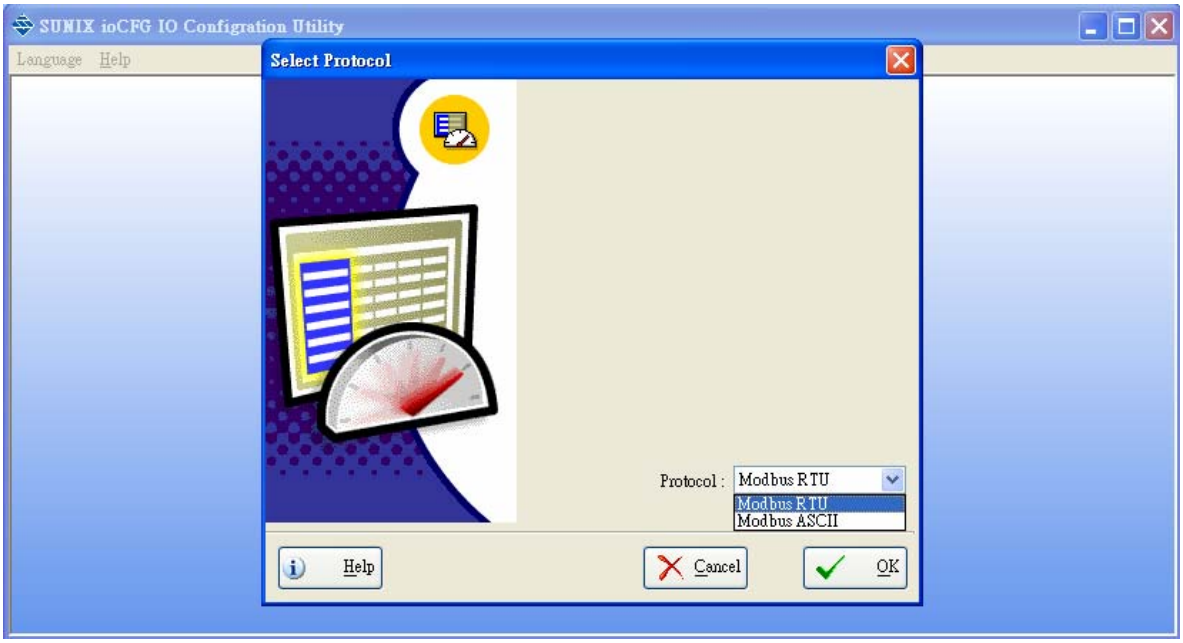
ioCFG is the configure software which used to set different parameter of ioSCADA module, testing communication status and each channel connection situation. It's free for users.

Execute CD floder \ioCFG\Setup.exe to achieve installation.

Caution：ioCFG.exe needs to work under Microsoft Windows .NET Framework 2.0 system or above, the install program will be recognized automatically and install itself.

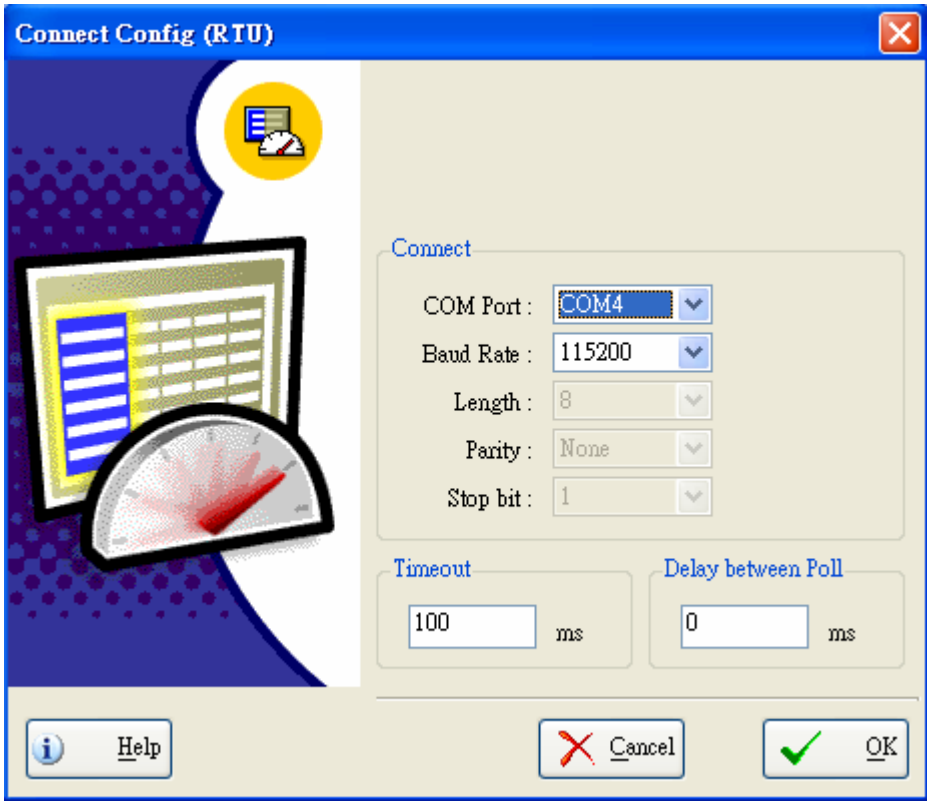
Execute ioCFG

Execute ioCFG.exe application progame, after executing there will be two windows coming out as following.



Select RTU/ASCII： To make a choice of the communication protocol from the protocol hint window, you can choosed either Modbus RTU or Modbus ASCII，Modbus TCP is now out of support. The module communication protocol can be set by DIP switch. The module won't finish the connecton unless the protocol is chosen the same with the software.

COM and Baud Rate Selection:



COM Port:: Select the COM of PC and ioSCADA

Baud Rate: By the module DIP switch setting ,115200、57600、38400、19200、9600、4800、2400、1200 are available to be selected, or select the AUTO option to let software scan for you

Lengh: The character length is 8 bit, choice disable

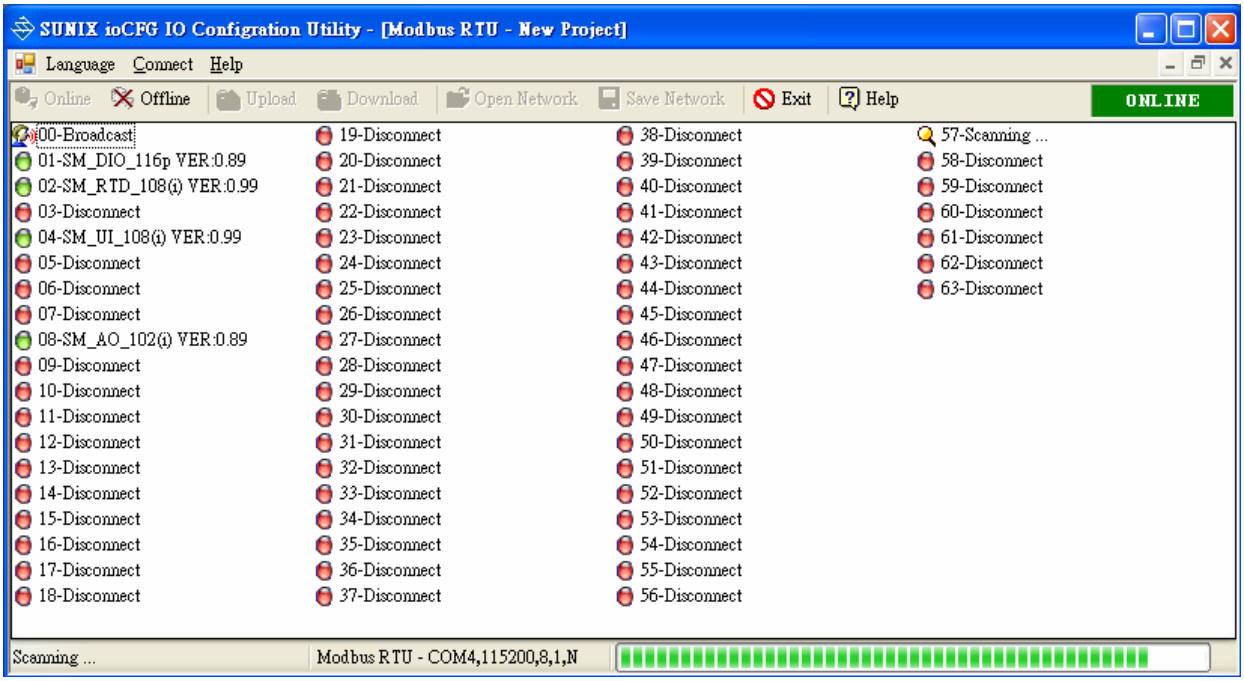
Parity: None, choice disable

Stop bit: 1, choice disable

Timeout: The response from module to software is timeout, normal value is 100 ms, the longer time of timeout the longer time needed for scanning the 63 module.

Delay between Poll: Set the delay time between two orders of the software, normal time would be 0 ms.

Autoscan screen: Communication parameter setting done, enter auto scan screen



The autoscan can list the discovered module, such as 01-SM_DIO_116p VER:0.89, 01 is the module address, SM_DIO_116p is the module model, VER:0.89 is the firmware edition. If the module EEPROM is damaged, it will display the ERR code.

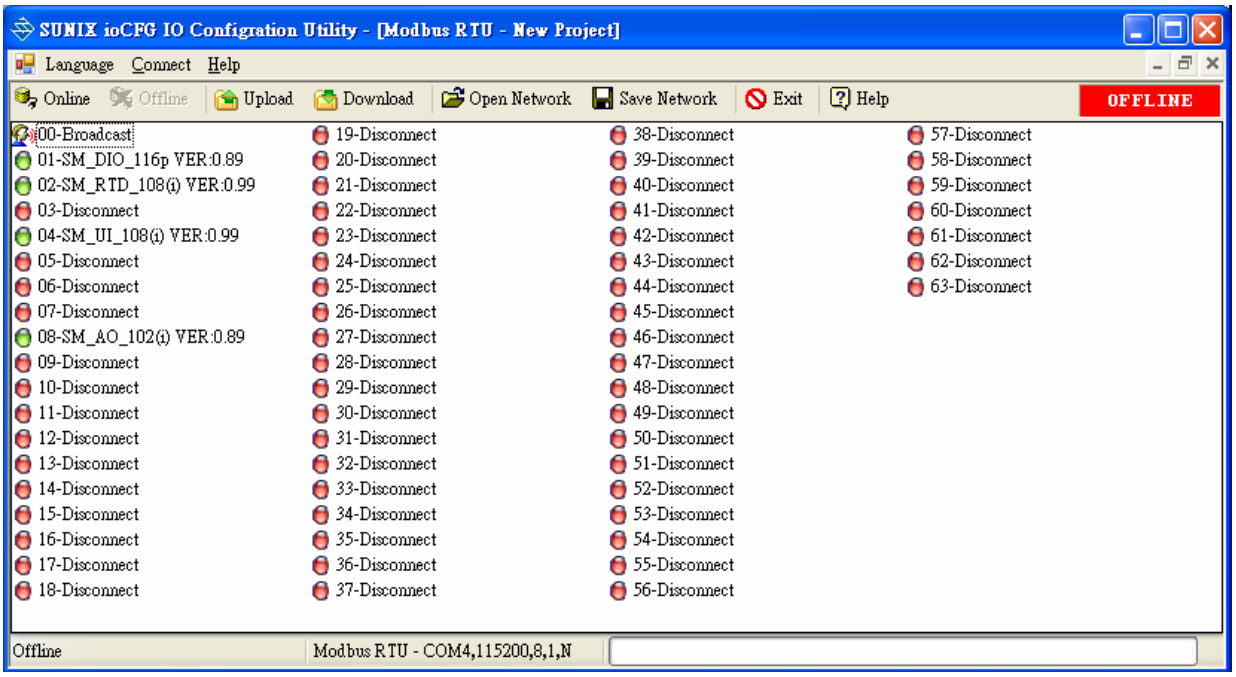
Like the diagram 57-Scanning, it means that it has scanned 57 addresses at present, each station scaned once, it will start to scan the next station when timeout. The waiting time is like the timeout setting.

It will wait for 3s before starting to scan from NODE 01.

It will wait for 5s before starting to scan from NODE 01, if the screen changes back to scan diagram from the monitoring diagram. .

Online/Offline Switch:

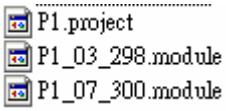
Online can switch to Offline easily, it can do the offline edit during the Offline period, opening network or saving network, downloading and uploading datas.



Open Network: Reading module configure data, all the setting parameter of the network will be read

Save Network: Saving the module parameter read online to files. One in network, on in every module.

File name as: xxx.propect, xxx_ADDR_ID.module



xxx: User save name

XXX: User assigned Project file name

ADDR: Module Slave NO

ID: Module ID

Module	ID
SM_DI_116p	297
SM_DIO_116p	298
SM_DO_108	299
SM_DO_116	300
SM_CNT_102	312
SM_AI_108(i)	317
SM_RTD_108(i)	317
SM_TH_108(i)	317
SM_UI_108(i)	317
SM_AO_102(i)	327

Attached file name.project saves the network configuration

Attached file name.module saves the module configuration, each module has one, that be opened independently during module setting.

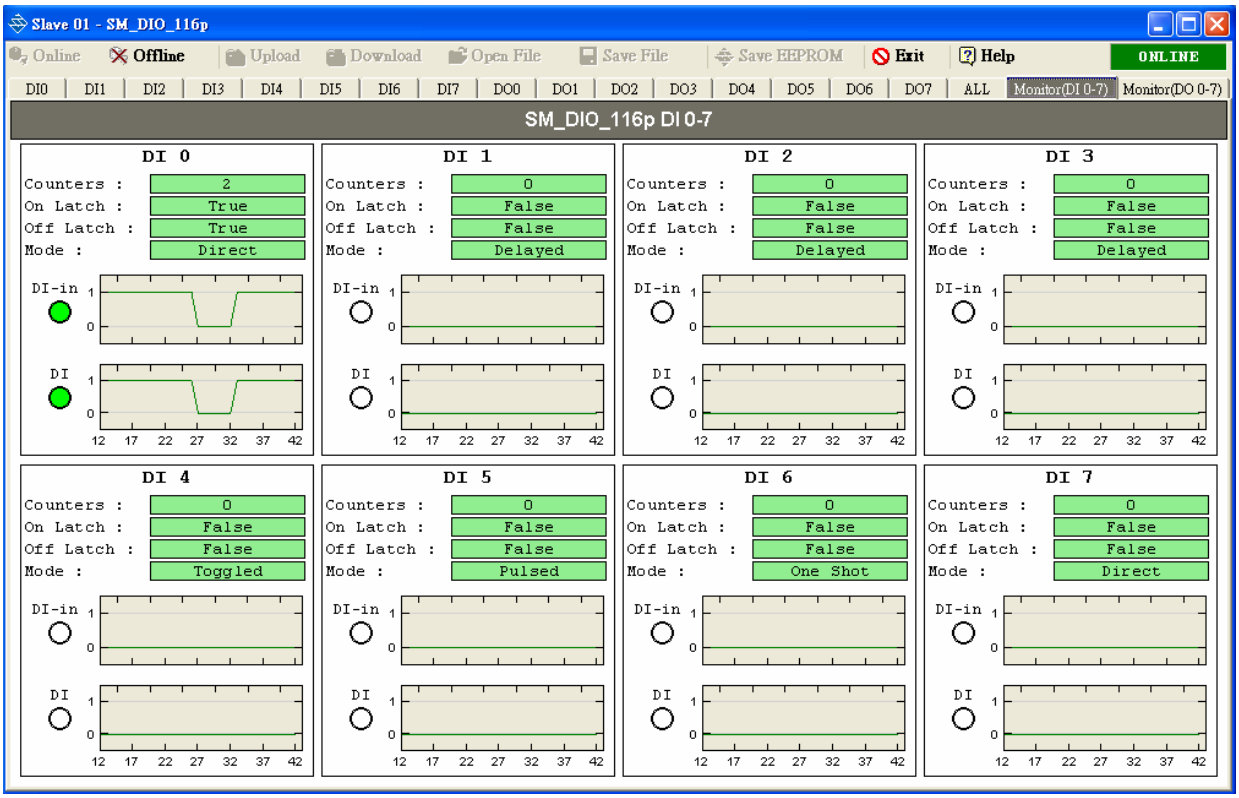
Upload: Reading parameter data from module

Download: Download all the network module data to module

If switch to Online, all the offline data will lost.（Needing to remember to save the modified data）

Data Monitoring Overview Diagram

Click the left-key of the mouse twice on the module scanned to enter the module setting diagram

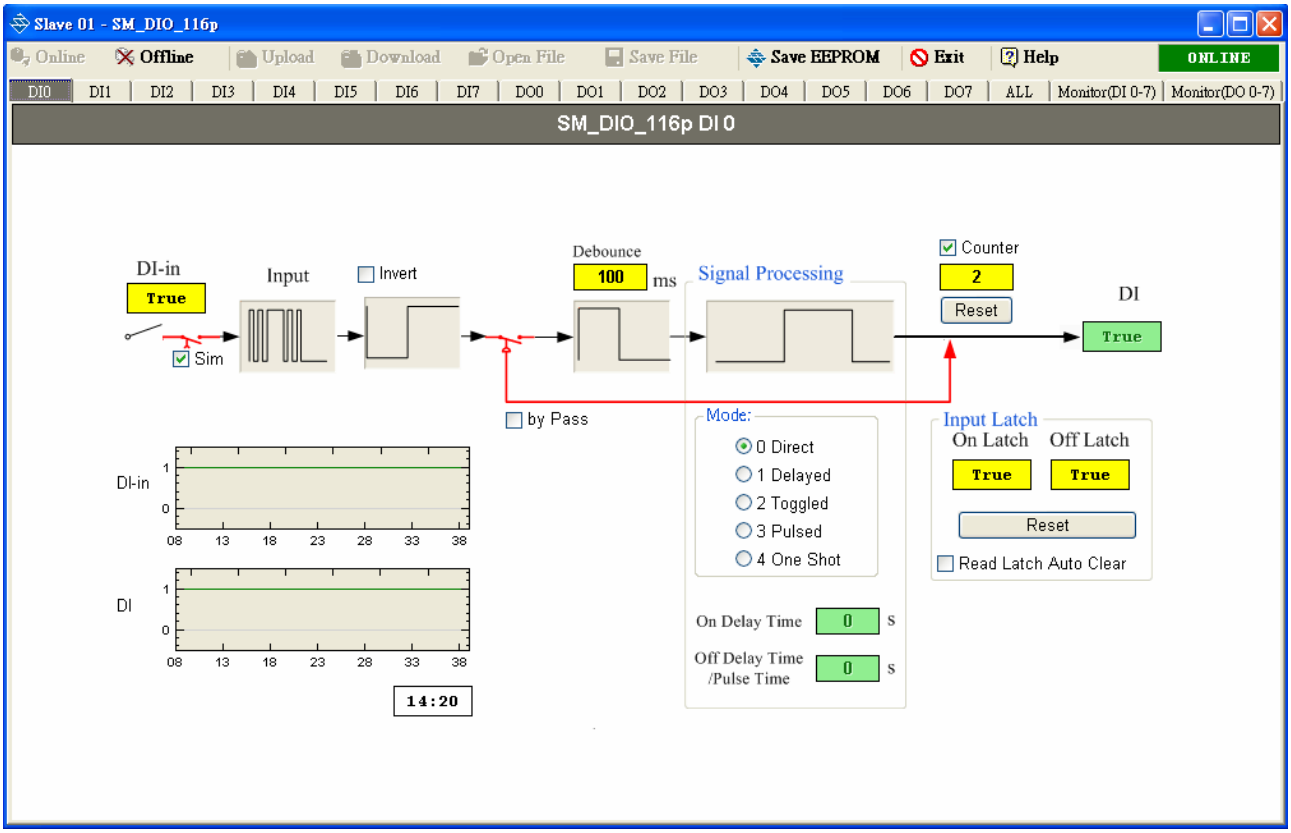


The screen will update by seconds, the real time curve section is 30s, the new data is on the right side.

Whe choose Offline, the screen will stop update.

DI Channel Parameter Setting

Click DI0~DI7 to enter the DI channel setting diagram



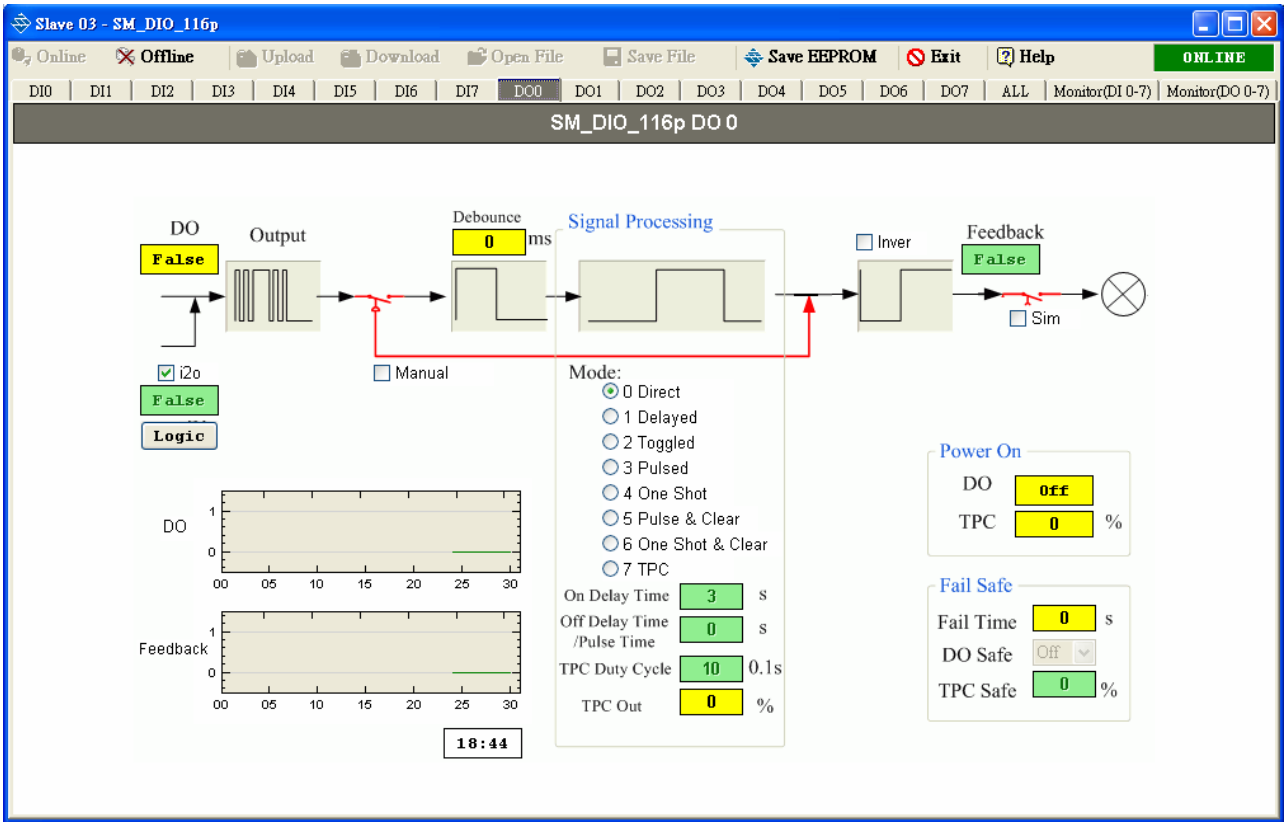
The yellow field data can be modified and the green one can't. The two colour can be exchanged under different mode.

选The data selected to be modified will write into ioSCADA module directly,but it won't save in EEPROM. It will come to defealt after power off. If you want it to change permanently, please click Save EEPROM.

The number field instructions please take reference to Chapter 3 configuration setting.

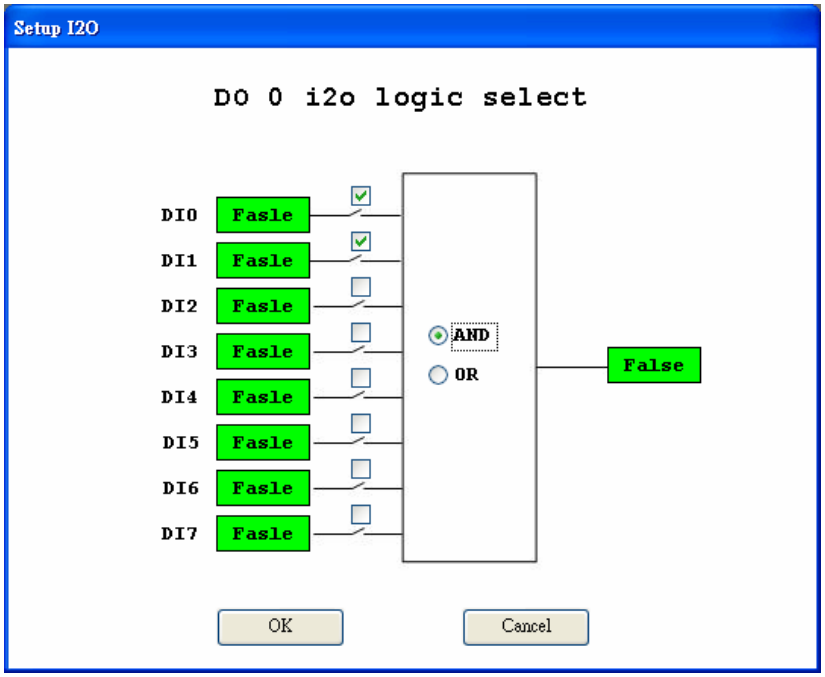
DO Channel Parameter Setting

Click DO0~DO7 to enter into DO channel setting diagram



Power On-TPC and Fail Safe-TPC Safe is the same value. Click Logic to set i2o's logical control, Select at least one DI input.

The number field instructions please take reference to Chapter 3 configuration setting



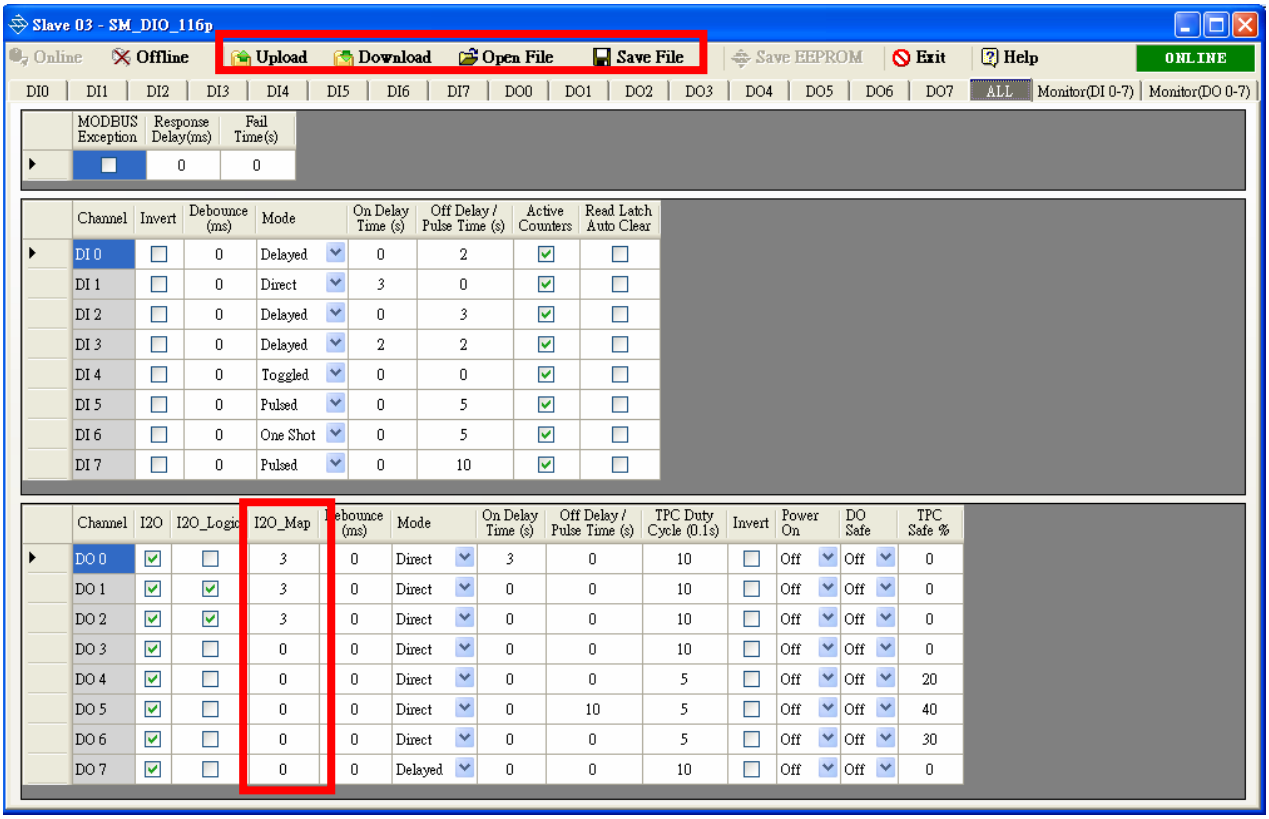
All Parameter Setting

Click All to enter all channel parameter setting diagram

Any modified data doesn't write into the module directly, it needs to be click "Download" to save the changes into module. It

will execute Save EEPROM after download automatically.

Attention to the left "Pencil" symbol , it expresses "Failed to modifiy", the "Arrow" symbol means "Already Finish"



I2O_Map value is between 0 ~ 255 ,that means 8 DI channels, 3 = CH0 and CH1 are selected

Save File can save the present parameter，Open File can read old files, Upload can upload data from the module（ When entering All screen，it will upload once automatically， Execute upload after download to make sure whether the download is successful）.

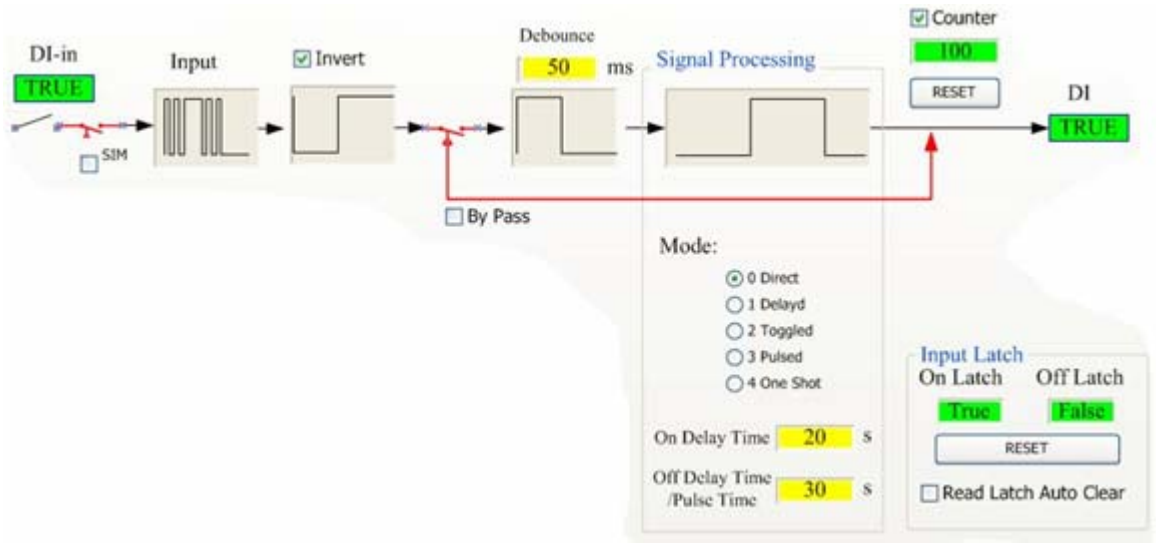
File name is XXX.module.

XXX is assigned file name by user.

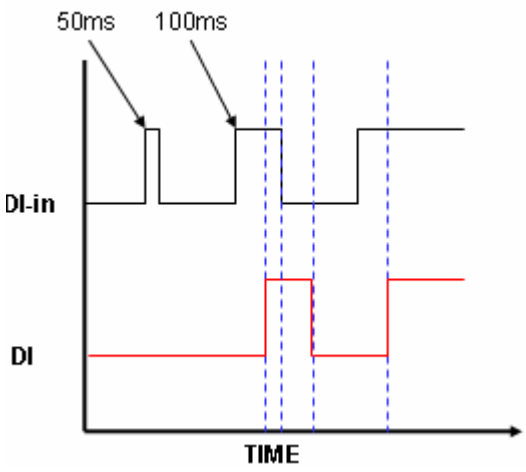
When execute Download，the modified data will be downloaded to the ioSCADA module, and save into EEPROM, it needs to wait 5 s to continue to do later operation.

Function block Timing Diagram

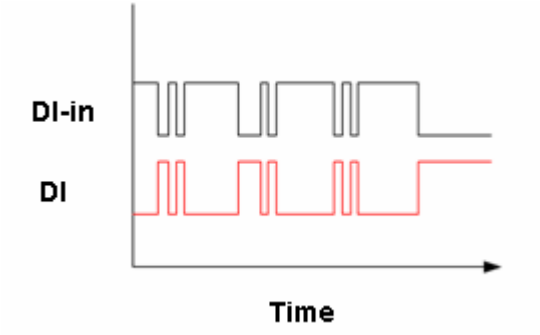
SM_DI_116p、SM_DIO_116p



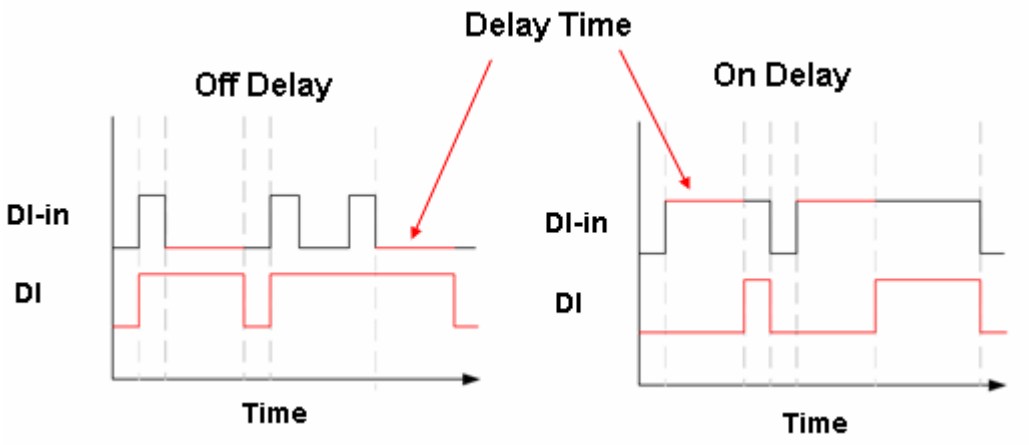
Debounce : Filter nose, Only the on scene signal should keep the Debounce in the shortest time, the changed status can be confirmed. DI-in is the signal detected on scene; DI is the cognizance value of the module. If Debounce is set to be 100ms and one pulse is 50ms, this pulse won't be reveived. The pulse which is over 100ms can be received. The status read out is later than the actual by the Debounce time.



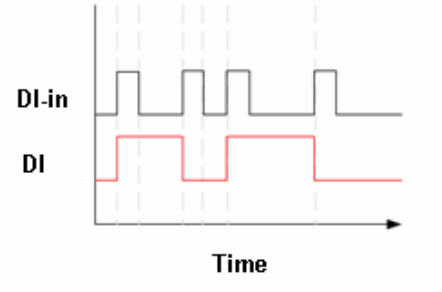
Invert : Invert, to take the on scene signal as opposite, if the present singal is TRUE, the module will think it is FALSE, whereas, if the present signal is FALSE, the module will think it is TRUE. This is used for the normal open or normal close device junction adjustment.



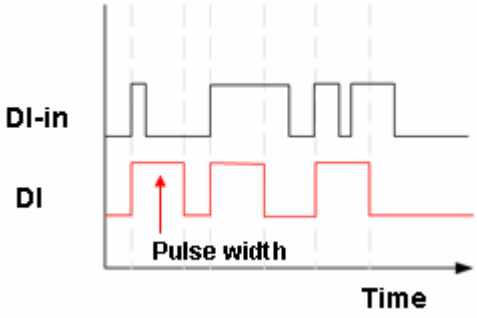
On Delay / Off Delay: ON delay and OFF delay，you can choose one or both simultaneously of them. The status recognized by the module will be later about a period set time than the realy present signal. The red line is the delay time set before, its unit is second.



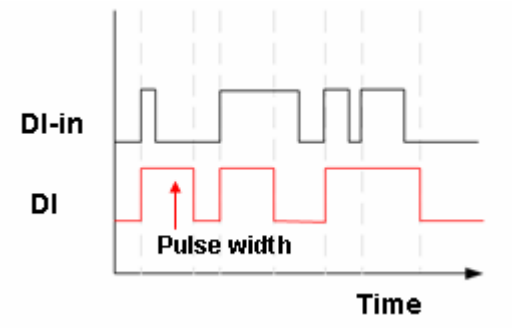
Toggle: Touched off by the detection upper, when the present signal changes from 0 to 1, the module status changes once, if it is OFF, it changeds to 1(ON)，if it is ON, it changes to 0 (OFF).



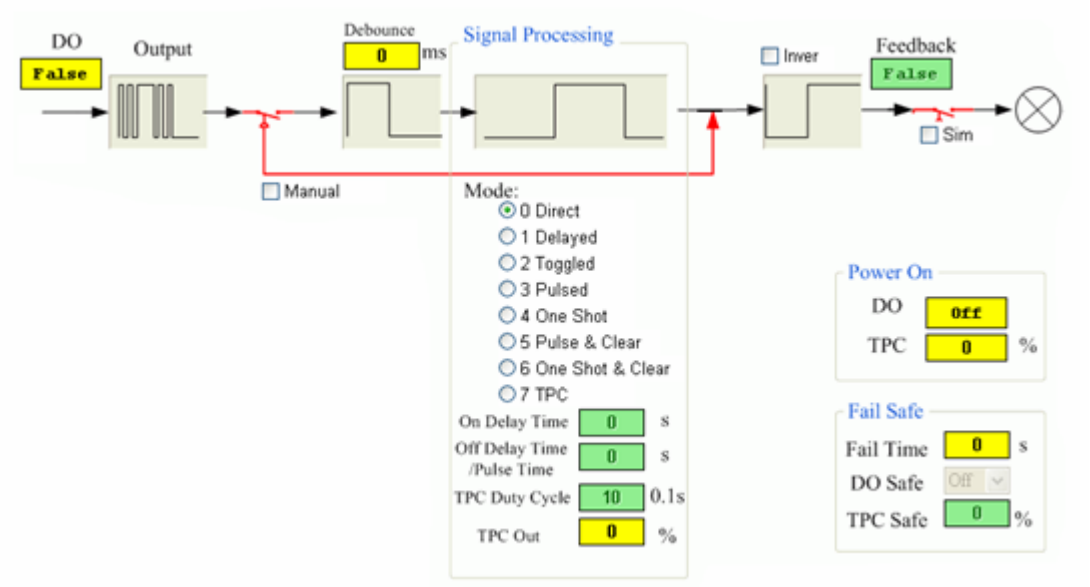
Pulse: Creating pulse signal, when the present signal changes from 0(OFF) to 1(ON)，the module creats one fix baud pulse. If the present signal is always keeping 1(ON) status, it will change to 0(OFF) after.



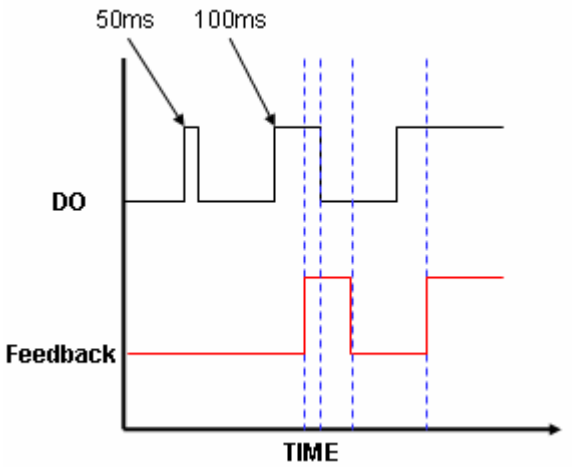
One Shot: Same as Pulse to produce pulse, but if the last springed pulse isn't finish, the present signal springs again, the pulse time will count again, continuing to extend the pulse baud.



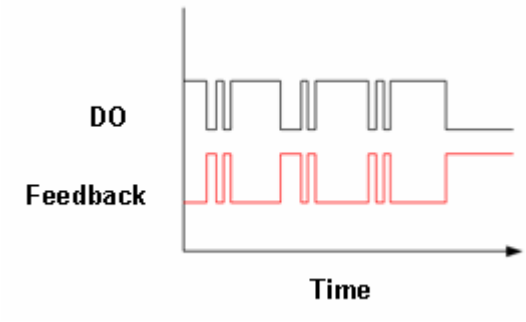
SM_DO_108、SM_DO_116、SM_DIO_116p



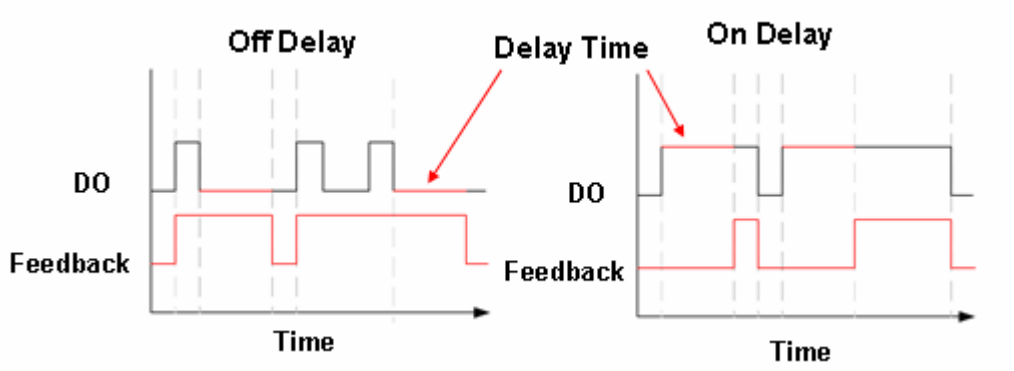
Debounce: Filter nose, Only the on scene signal should keep the Debounce in the shortest time, the changed status can be confirmed. DO is the output order, Feedback is the module actual output status. If Debounce is set to be 100ms, DO order which wants to be confirmed needs to exceed 100ms.



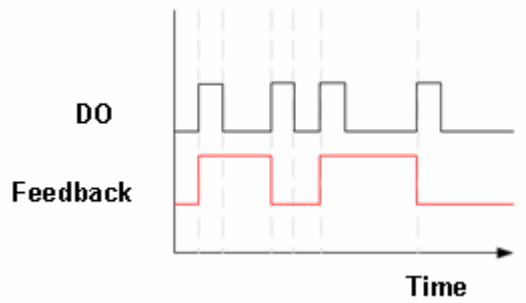
Invert : Invert, to take the on scene signal as opposite, if the present singal is TRUE, the module will think it is FALSE, whereas, if the present signal is FALSE, the module will think it is TRUE.



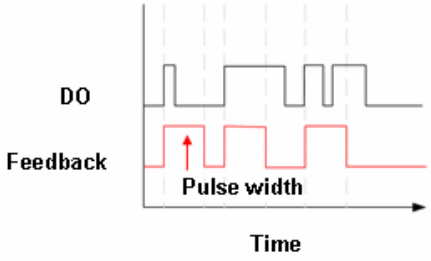
Delay: ON delay and OFF delay, you can choose one or both simultaneously of them. The status recognized by the module will be later about a period set time than the realy present signal. The red line is the delay time set before, its unit is second.



Toggle: Touched off by the detection upper, when the present signal changes from 0 to 1, the module status changes once, if it is OFF, it changeds to 1(ON), if it is ON, it changes to 0 (OFF).

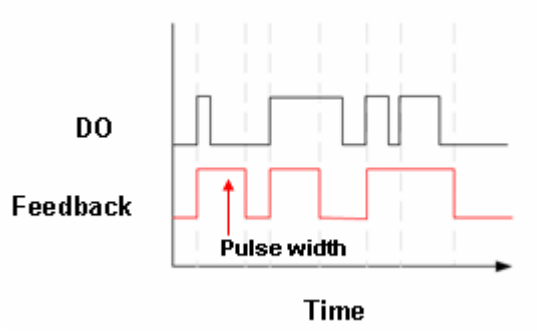


Pulse: Creating pulse signal, when the present signal changes from 0(OFF) to 1(ON), the module creats one fix baud pulse. If the present signal is always keeping 1(ON) status, it will change to 0(OFF) after.

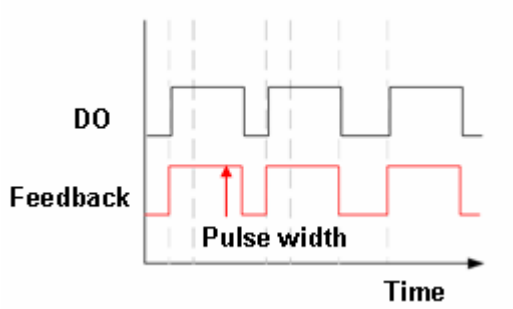


One Shot: Same as Pulse to produce pulse, but if the last springed pulse isn't finish, the present signal springs again, the pulse

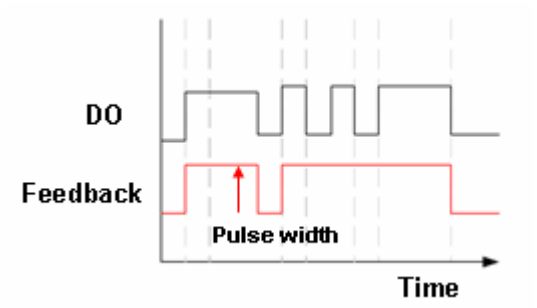
time will count again, continuing to extend the pulse baud.



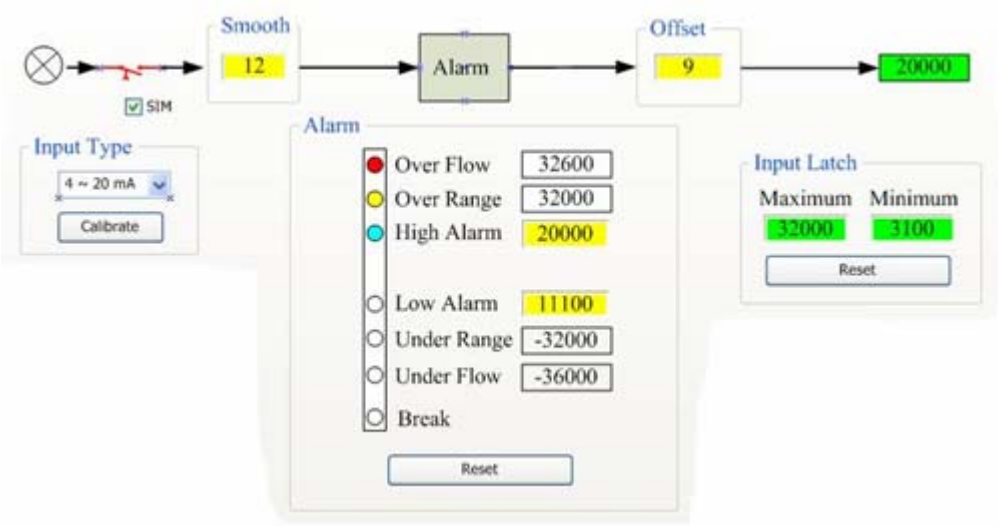
Pulse & Clear: Just like Pulse, but when actual pulse turns to be 0(OFF) after finishing output, it will clear the order (DO) to 0 (OFF) itself.



One Shot & Clear: Same as One Shot, but when the actual pulse turns to be 0(OFF) after finishing output, it will clear the order (DO) to 0(OFF) itself.



SM_AI_108i、SM_UI_108i、SM_RTD_108i、SM_TH_108i



Smooth:

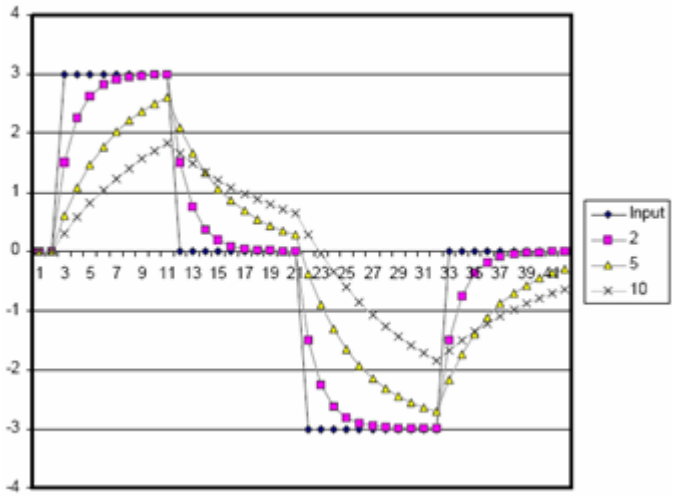
Formula: Y0 = (Y-X)/S + X

Y0 : Present adjust value

Y : Present value

X : Previous value

S : Smooth set value, when S=1, Smooth is ineffective.



Overflow alarm set value:

SM_RTD_108i

Name	Over Flow	Over Range	Under Range	Under Flow
Pt100(385)	870	850	-200	-220
Pt100(3902)	870	850	-200	-220
Pt100(3916)	870	850	-200	-220
Pt100(392)	870	850	-200	-220
Pt100(3926)	870	850	-200	-220
Pt200(385)	870	850	-200	-220
Pt500(385)	870	850	-200	-220
Pt 1000 (375)	870	850	-200	-220
Pt 1000 (385)	870	850	-200	-220
Ni120(672)	280	260	-80	-100
Cu50(427)	280	260	-100	-120
Cu100(427)	280	260	-100	-120

SM_UI_108i

Name	Over Flow	Over Range	Under Range	Under Flow
+-100mV	32600	32000	-32000	-36000
+-500mV	32600	32000	-32000	-36000
+-5V	32600	32000	-32000	-36000
+-10V	32600	32000	-32000	-36000
1~5V	32600	32000		
+-20mA	32600	32000	-32000	-36000
4~20mA	32600	32000		
B	1840	1820	-260	240
E	1020	1000	-200	-220
J	1220	1200	-210	-230
K	1392	1372	-200	-220
N	1300	1320	-230	-250
R	1788	1768	-50	-70
S	1788	1768	-50	-70
T	420	400	-260	-280

SM_TH_108i

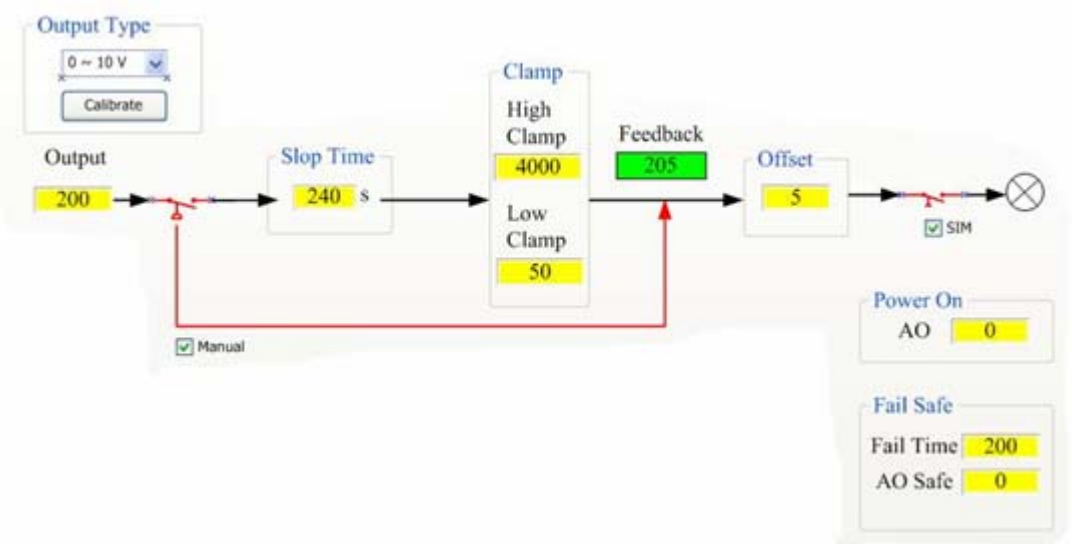
Name	Over Flow	Over Range	Under Range	Under Flow

10K(TypeII/Z)	150	140	-45	-55
10K(TypeIII/S)	150	140	-45	-55

SM_AI_108i

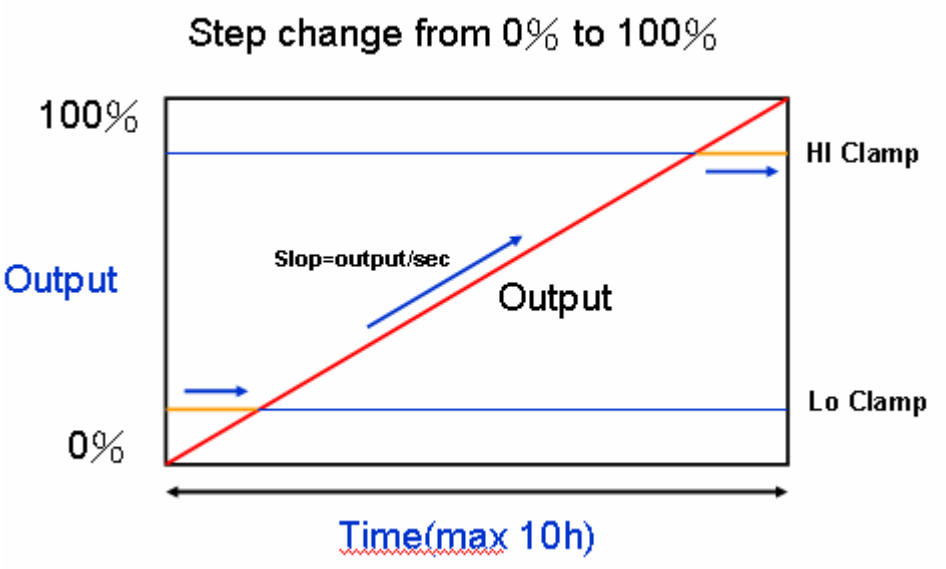
Name	Over Flow	Over Range	Under Range	Under Flow
+-5V	32600	32000	-32000	-36000
+-10V	32600	32000	-32000	-36000
1～5V	32600	32000	-32000	-36000
+-20mA	32600	32000	-32000	-36000
4～20mA	32600	32000		

SM_AO_102i

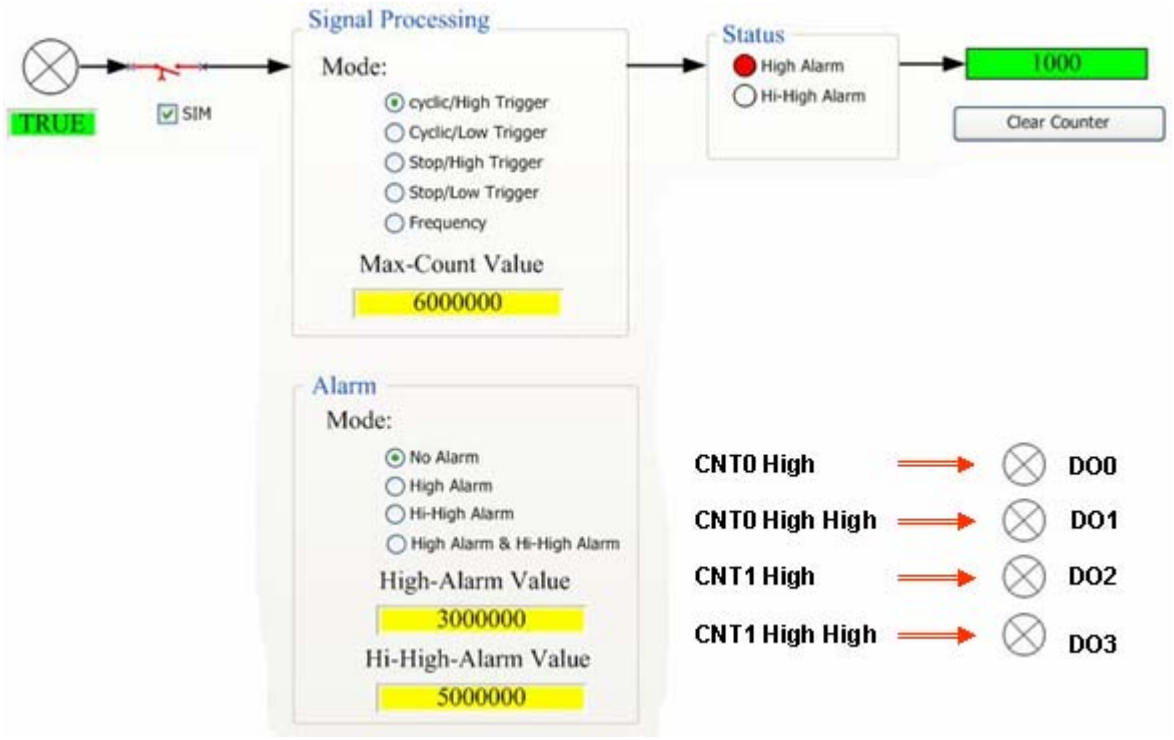


Clamp: Set AO high clamp and low clamp can limit output value within the special range.

Slop Time: Slop Time is to define the request time to reach the target value, such as setting Slop Time to 100s, when the output changes from 0 to 4000, it will increase 40 per second. Slop Time will be ineffective when it is 0. Any target value（output） changes will be count again according to the formula, the origin point will take the present output point. Just as last example when the output changes to 1000, the target value will change to 3000 again, and then the output increase amount will be 30 per second. The renew output time will change once per 0.01s.



SM_CNT_102



Cyclic/High Trigger: It will start to count when input changes to true from false, when it reaches Max-Count Value, the cyclic will count from 1.

Cyclic/Low Trigger: It will start to count when input changes to false from true, when it reaches Max-Count Value, the cyclic will count from 1.

Stop/High Trigger: It will start to count when input changes to true from false, when it reaches Max-Count Value, it stops count.

Stop/Low Trigger: It will start to count when input changes to false from true, when it reaches Max-Count Value, it stops count.

Alarm: When setting the Alarm Mode, the Alarm will output by the relatively DO.

Chatper 3 Configuration

ioSCADA ‘s the parameter setting needs according to the application requirement. Besides the ioCFG.exe supported by SUNIX，any software which supports Modbsu RTU or Modbus ASCII communication protocol can set the module paremeter according to the Modbus address of the ioSCADA.

Modbus Register Map

Modbus’s internal data is divided into four kinds (0x、1x、3x、4x), the address is consist of two part, the first code can be 0、1、3、4, which is representative different internal block，the second part x can be 1~65535 according to different RAM size of different device,usually using three-code 01~999、four-code 001~9999 or five-code 001~99999 to display. ioSCADA can use four or five code address format.（It will be 5 or 6 code including the first code.）

Address	Instructions
0x	Write and read digital output Coil，bit data. Any 0x’s address can be both read and written, usually it is digital output or internal parameter
1x	Read only digital input state，bit data. Any 1x’s address can’t be written. Error code usually is digital state point.
3x	Read only analog input register, integer data. Any 3x’s address can’t be written，Error code usually is analog value point.
4x	Read and write hold register, integer data. Any 4x’s address can be both write and read, usually it is analog output or internal value parameter.

Cautions:

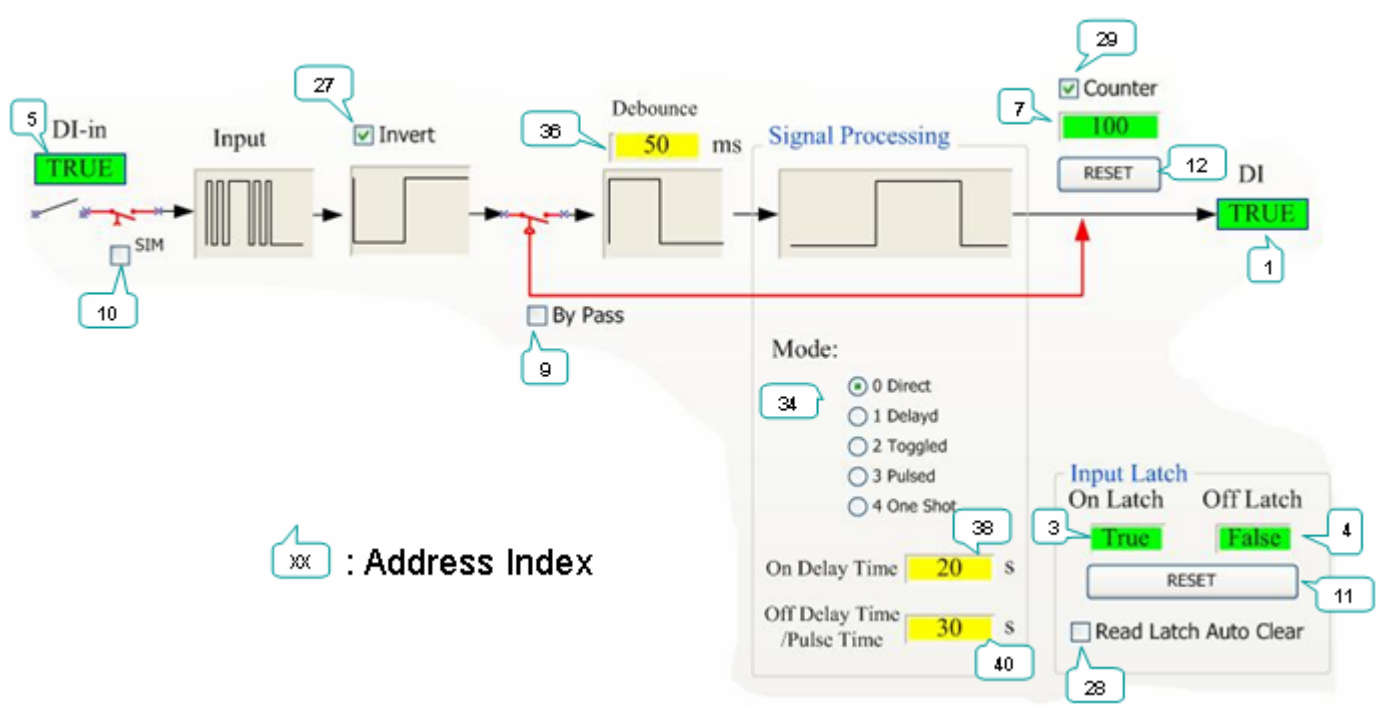
1. "x" expresses 1~65536，base-16 0~FFFF（在传送命令时address 40001 will be divided into function code3 and address 0）. The first code of the Modbus protocol is hidden order function code, the last five is the actual address of different RAM. If the first code is 0 or 1, it means Bit region，its state is either 0 or 1、16 Bit address form one word. If the first code is 3 or 4, it means WORD region. ioSCADA is used 4-in-1 register map design，0、1、3、4 four kinds of RAM region are actual homologous to one place. That means no matter what the first code is, it will be read out the same data if only the last four or five code assigned address is the same (the last five code of 0、1 divding 16 will come out the 3、4 Word address). Such as 00001~00016(Bit) = 10001~10016(Bit) = 30001(Word) = 40001(Word)

ioSCADA Modbus address:

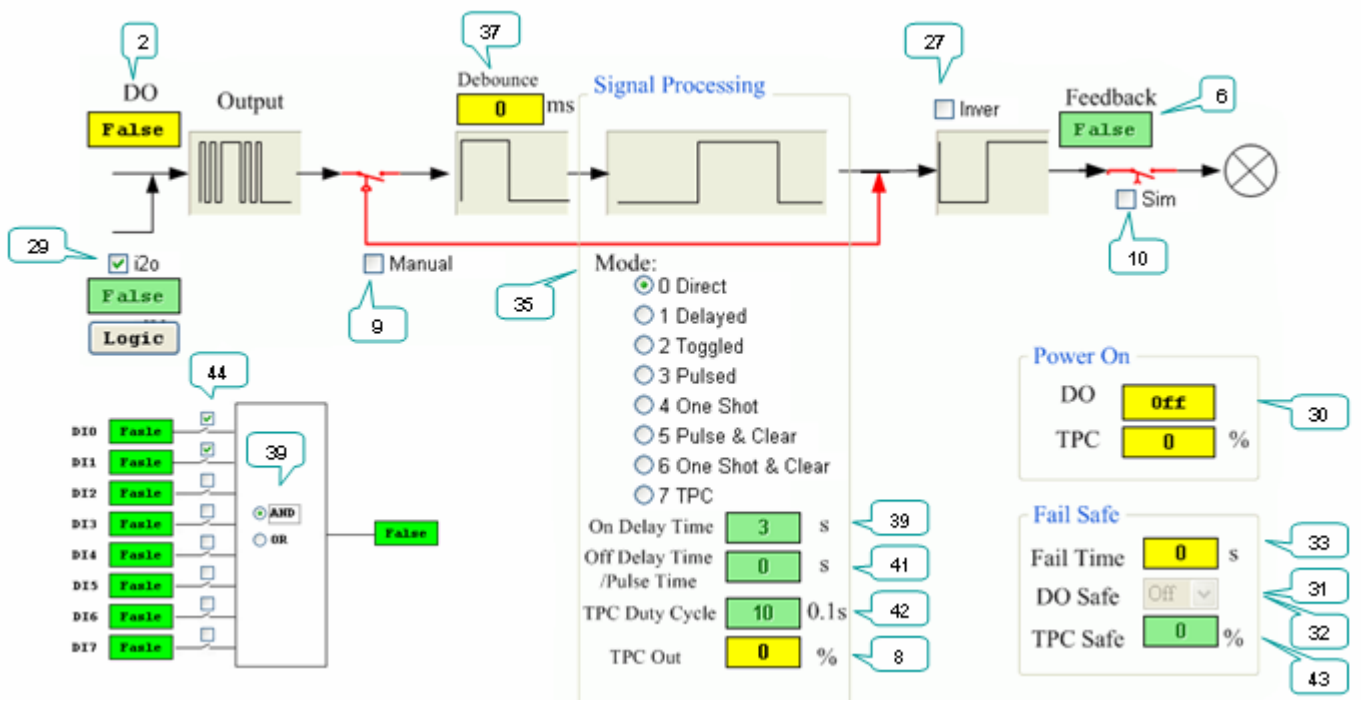
ioSACAD address is divided into two kinds, one is present data address which starts from1 (40001)，the other is module parameter which stars from 9001(49001). The present data is created by the operation, it will loss when power off. The module parameter will be read from EEPROM when it starts operation. It can be read or modified during operation, also it can be set to read only, the modified parameter can be saved back to EEPROM according to the special steps, it will be saved into EEPROM

when power off.

SM_DIO_116p - DI Data Process Diagram



SM_DIO_116p - DO Data Process Diagram



Address Index Following the Form Number

SM_DIO_116p Present Data

NO.	Address	Instruction	Data Format	Unit

1	00001~00008 (RO) 10001~10008 (RO) 30001 (RO) 40001 (RO)	**DI0 ~ DI7 Status**	Digital input, occupying 8 bit of the16 bit Word(Low Byte), 1 is True (ON), 0 is False (OFF)。 10009 ~ 10016 meaningless, value=0 The status is the value dealt with by the signal process function block. Just like the data process diagram display.	**Bit**
2	0017~0024 (RW) 10017~10024 (RO) 30002 (RO) 40002 (RW)	**DO0 ~ DO7 Output**	Digital output, occupying 8 bit of the 16 bit Word(Low Byte), 1 isTrue (ON), 0 is False (OFF)。 00025 ~ 00032 meaningless, value=0 forvever	**Bit**
3	00033~00040 (RO) 10033~10040 (RO) 30003 (RO) 40003 (RO)	**DI0 ~ DI7 On Latch Status**	When DI Status changes to 1 from 0, DI On Latch Status is set to 1, Reset to clear to 0.	**Bit**
4	00049~00056 (RO) 10049~10056 (RO) 30004 (RO) 40004 (RO)	**DI0 ~ DI7 Off Latch Status**	When DI Status changes to 0 from 1,DI Off Latch Status is set to1, Reset to clear to 0.	**Bit**
5	00065~00072 (RO) 10065~10072 (RO) 30005 (RO) 40005 (RO)	**DI0 ~ DI7 DI-in**	DI Status's original data, coming directly from the hardware, hasn't been processed by the function block.	**Bit**
6	00081~00088 (RO) 10081~10088 (RO) 30006 (RO) 40006 (RO)	**DO0 ~ DO7 Output Feedback Status**	DO actual output status feedback	**Bit** **0/1**
7	30009 ~ 30016 (RO) 40009 ~ 40016 (RO)	**DI0 ~ DI7 Count Value**	DI Status's count value, when DI Status changes to 1 from 0, the present value adds 1. It has the count function,only when the Counter Active's parameter is 1(Enable) When in the Simulatiopn Mode, the value can be wiritten in by the master.	**WORD** **0~65535**
8	30017 ~ 30024 (RW) 40017 ~ 40024 (RW)	**DO0 ~ DO7 TCP Output**	Used when the mode isTPC, together with Duty Cycle can be changed to DO junction output by 0~100%.	**%** **0 ~ 100**
9	00385 ~ 00040 (RW) 10385 ~ 10040 (RO) 30025 (RO) 40025 (RW)	**DI0 ~ DI7 Bypass** **DO0 ~ DO7 Manual**	40025 low byte 00385 ~ 00392 为DI0 ~ DI7 Set Bypass 1 = Bypass , 0 = Normal 40025 high byte 00393 ~ 00040 为 DO0~DO7 Set Manual 1 = Manual , 0 = Manual	**Bit**
10	00401 ~ 00416 (RW) 10401 ~ 10416 (RO) 30026 (RO) 40026 (RW)	**DI0 ~ DI7 Simulation** **DO0 ~ DO7 Simulation**	40026 low byte 00401 ~ 00408 为DI0 ~ DI7 Simulation 40026 high byte 00409 ~ 00416 为DO0 ~ DO7 Simulation 1 = Simulation, 0 = Normal	**Bit**

11	00417 ~ 00424 (RW) 10417 ~ 10424 (RO) 30027 (RO) 40027 (RW)	**DI0 ~ DI7 Latch Clear**	Let DI On Latch/Off Latch Status reset to 0 1 = Clear, reset to 0(5s later)	**Bit**
12	00433 ~ 00440 (RW) 10433 ~ 10440 (RO) 30028 (RO) 40028 (RW)	**DI0 ~ DI7 Count Clear**	Let DI Count value reset to 0, when the Flag changes to 1 from 0, it's active, and reset to 0 after 5s .	**Bit**

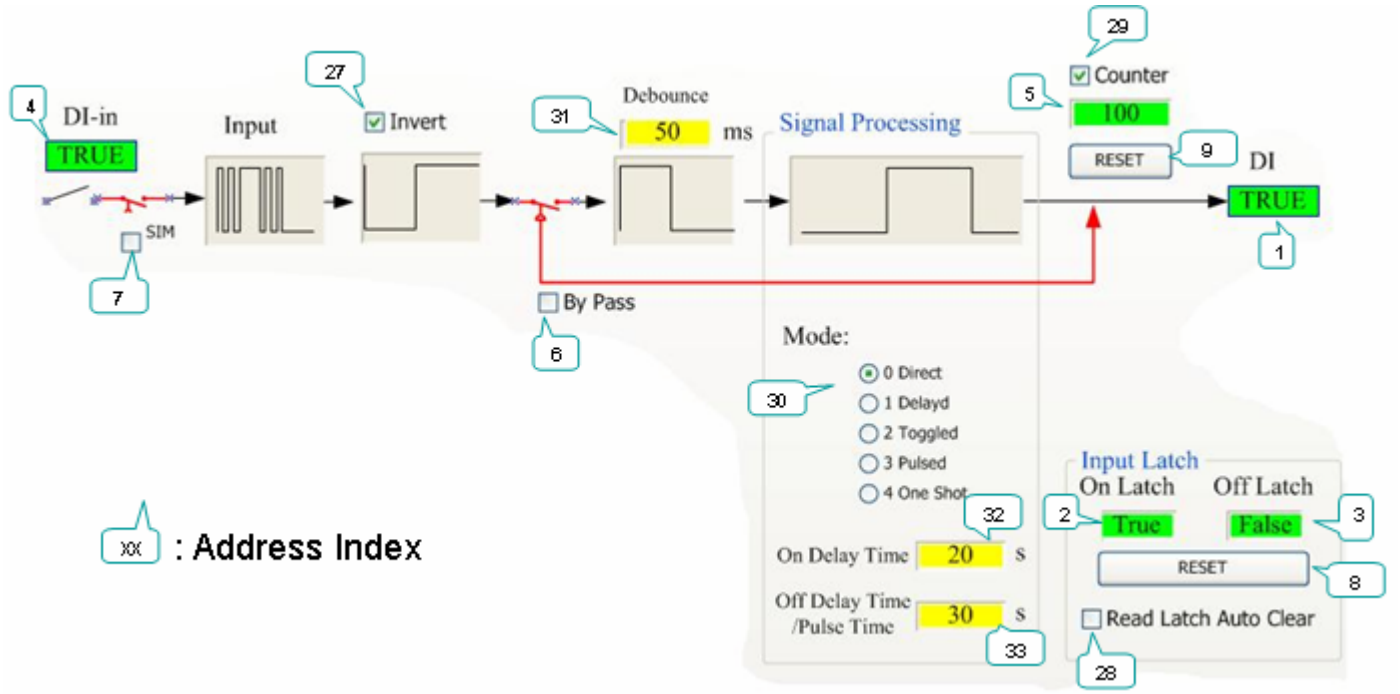
SM_DIO_116p Module Parameter

NO.	Address	Instruction	Data Fomat	Unit
21	39001 (RO) 49001 (RO)	**Product ID**	<table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table>	**WORD**
22	39002 (RO) 49002 (RO)	**Product Version**	100 = 1.00, the dual ending number is the formal version, the single ending number is the test version	**WORD**
23	39003 (RO) 49003 (RO)	**System error**	0 = OK 1 = Flash Read Error (If error stil after reboot, needing repairation) 2 = Flash checksum Error（ expresses the set value or the calibration is broken, needing to reset） Cation: The Flash may fail to be writen into but can be read, the system can't judge this kind of error.	**WORD**
24	39005 (RO) 49005 (RW)	**Configuration Setup**	Set to 0, disable to modify any setting parameter.Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM, the module will recover to work after 5s. During this time all function is disable. Reboot to go back to get default value 1	**WROD**
25	39006 (RO) 49006 (RW)	**Modbus Exception**	0 = Command Exception Disable 1 = Command Exception Enable	**WORD**
26	39007 (RO) 49007 (RW)	**Response Delay Time**	Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.	**ms** **0~65535**
27	39009 (RO) 49009 (RW)	**DI0 ~ DI7 Invert** **DO0 ~ DO7 Invert**	Let actual DI input status input reversely or let DO order output reversely. Low Byte = DI0 ~ DI7 Invert High Byte = DO0 ~ DO7 Invert 1=Invert, 0=Normal	**Bit**
28	39010 (RO) 49010 (RW)	**DI0 ~ DI7 Read Latch Clear**	After master read DI On/Off Status, it reset to 0, avoid reading the repetitive alarm data . Low Byte = DI0 ~ DI7 Read Latch Clear High Byte = Always 0 1 = Clear, 0 = Normal	**Bit**

29	39011 (RO) 49011 (RW)	**DI0 ~ DI7 Counter Enable** **DO0~DO7 i2o**	Set to 1 to enable the count function Low Byte = DI0 ~ DI7 Counter Enable High Byte = DO0~DO7 input to output 1 = i2o, 0 = Normal	**Bit**
30	39012 (RO) 49012 (RW)	**DO0 ~ DO7 Power On** **& i2o logic**	On power, DO's output value, ineffective in TPC mode. Low Byte = DO0 ~ DO7 Power On 1 = On, 0 = Off High Byte = DO0~DO7 i2o (AND/OR) logic 0 = AND, 1=OR	**Bit**
31	39013 (RO) 49013 (RW)	**DO0 ~ DO7 Fail Latch**	When communication watchdog is active, sing poion is ineffective, that means it will keep the original state when communication failure. Low Byte = DO0 ~ DO7 Fail Latch High Byte = Always 0 1 = Latch, 0 = Fail Safe	**Bit**
32	39014 (RO) 49014 (RW)	**DO0 ~ DO7 Fail Safe**	When watch dog detects communication broken, it is enforced to output ON or Off 1 = On, 0 = Off Low Byte = DO0 ~ DO7 Fail Safe High Byte = Always 0	**Bit**
33	39016 (RO) 49016 (RW)	**Fail Time**	The time of watch dog, 0 is Fail Safe Disable. All DO share one set value.	**ms** **0~65535**
34	39017~39024(RO) 49017~49024(RW)	**DI0~DI7 Signal Processing Mode**	0 = Direct 1 = Delayed 2 = Toggled 3 = Pulsed 4 = One Shot	**WORD** **0~4**
35	39025~39032(RO) 49025~49032(RW)	**DO0~DO7 Signal Processing Mode**	0 = Direct 1 = Delayed 2 = Toggled 3 = Pulsed 4 = One Shot 5 = Pulsed&Clear 6 = One Shot&Clear 7 = TPC	**WORD** **0~7**
36	39033~39040(RO) 49033~49040(RW)	**DI0~DI7 Debounce**	Confirm the input status changed after input signal keeps a certain time.	**5ms** **0~65535**
37	39041~39048(RO) 49041~49048(RW)	**DO0~DO7 Debounce**	Confirm the output status changed after output signal keeps a certain time.	**5ms** **0~65535**

38	39049~39056(RO) 49049~49056(RW)	**DI0~DI7 On Delay Time**	DI status changes to on from off, delay time	**s** **0~65535**
39	39057~39064(RO) 49057~49064(RW)	**DO0~DO7 On Delay Time**	DO order changes to on from off, delay time	**s** **0~65535**
40	39065~39072(RO) 49065~49072(RW)	**DI0~DI7 Off Delay Time/Pulse Time**	DI status changes to off from on, delay time or Pulse Mode's Pulse baud	**s** **0~65535**
41	39073~39080(RO) 49073~49080(RW)	**DO0~DO7 Off Delay Time/Pulse Time**	DO order changes to off from on, delay time or Pulse Mode's Pulse baud	**s** **0~65535**
42	39081~39088(RO) 49081~49088(RW)	**DO0~DO7 TPC Duty Cycle Time**	Do in TPC Mode, TPC duty cycle time.	**0.1 s** **0~3000**
43	39097~390104(RO) 49097~490104(RW)	**DO0~DO7 TPC Fail Safe/Power On Output**	Do in TPC Mode, TPC output percent or the safe value of the communication error. If not set Fail Time, output will be 0% by power on.	**%** **0~100**
44	39113~39120(RO) 49113~49120(RW)	**DO0~DO7 i2o logic pattern select**	Using Low Byte 8 bit to express DI0~DI7 0 = not selected; 1 = selected	**bit**

SM_DI_116p Data Process Diagram



Address Index Following the Form Number

SM_DI_116p Present Data

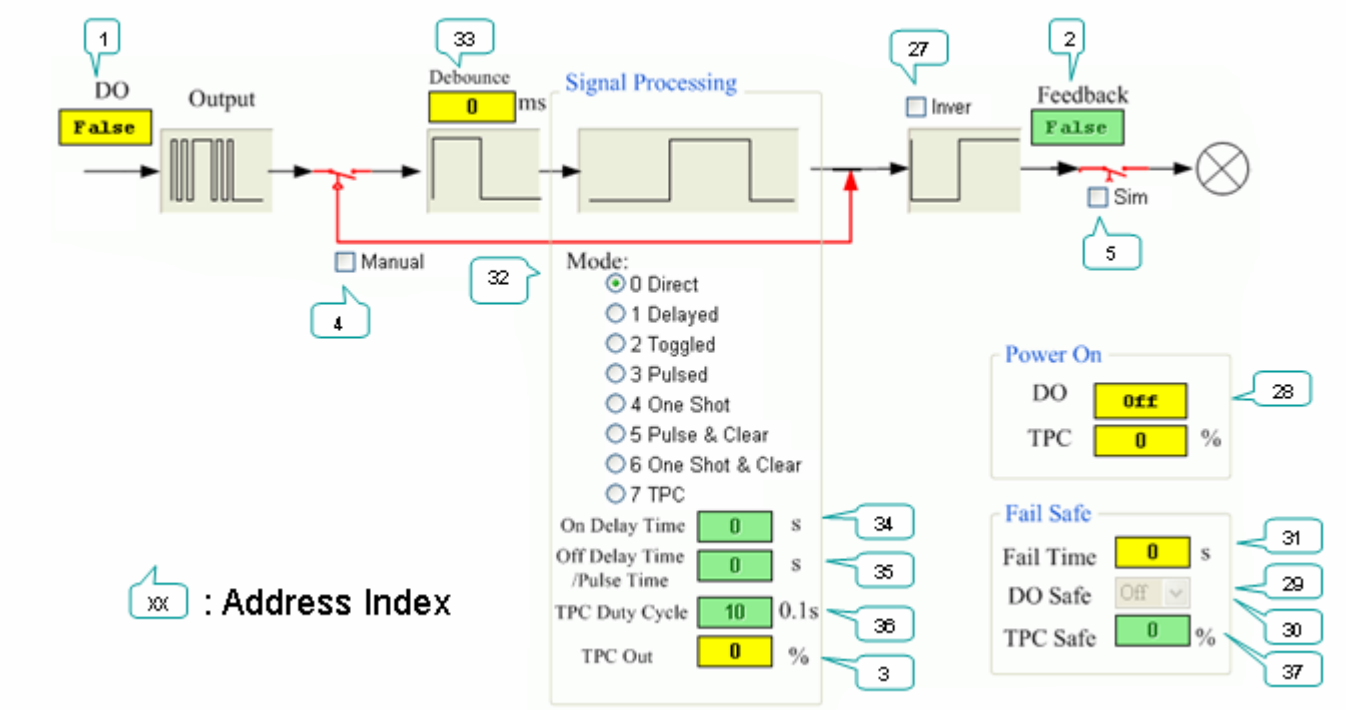
NO.	Address	Instruction	Data Fomat	Unit
1	00001~00016 (RO) 10001~10016 (RO) 30001 (RO) 40001 (RO)	**DI0 ~ DI15 Status**	Digtal input, occupying 8 bit of the 16 bit Word(Low Byte), 1 is True (ON), 0 isFalse (OFF)。 The status is the value dealt with by the signal process function block. Just like the data process diagram display.	**Bit**
2	00017~00032 (RW) 10017~10032 (RO) 30002 (RO) 40002 (RO)	**DI0 ~ DI15 On Latch Status**	When DI Status changes to 1 from 0, DI On Latch Status will be set to 1, Reset to clear to 0.	**Bit**
3	00033~00048 (RO) 10033~10048 (RO) 30003 (RO) 40003 (RO)	**DI0 ~ DI15 Off Latch Status**	When DI Status changes to 0 from 1, DI Off Latch Status will be set to 1, Reset to clear to 0.	**Bit**
4	00049~00064 (RO) 10049~10064 (RO) 30004 (RO) 40004 (RO)	**DI0 ~ DI15 DI - in**	DI Status's original data, directly value which comes from the hardware, hasn't been dealt with by the function block.	**Bit**
5	30009 ~30024 (RO) 40009 ~ 400024 (RO)	**DI0 ~ DI15Count Value**	DI Status's count value, when DI Status changes to 1 from 0, the present value adds 1. When Counter Active's parameter is 1 , the count function is enable. In Simulatiopn Mode, this value can be input by the Master.	**WORD** **0~65535**
6	00385 ~ 00040 (RW) 10385 ~ 10040 (RO) 30025 (RO) 40025 (RW)	**DI0 ~ DI15 Bypass**	00385 ~ 0040 为DI0 ~ DI15 Bypass 1 = Bypass, 0 = Normal	**Bit**
7	00401 ~ 00416 (RW) 10401 ~ 10416 (RO) 30026 (RO) 40026 (RW)	**DI0 ~ DI15 Simulation**	00401 ~ 00416 为DI0 ~ DI15 Simulation 1 = Simulation, 0 = Normal	**Bit**
8	00417 ~ 00432 (RW) 10417 ~ 10432 (RO) 30027 (RO) 40027 (RW)	**DI0 ~ DI15 Latch Clear**	Let DI On Latch/Off Latch Status reset to 0 1 = Reset, reset to 0 after 5s itself.	**Bit**
9	00433 ~ 00448 (RW) 10433 ~ 10448 (RO) 30028 (RO) 40028 (RW)	**DI0 ~ DI15 Count Clear**	Let DI Count value reset to 0. It will be active when Flag changes to 1 from 0, and it will reset to 0 after 5s itself.	**Bit**

SM_DI_116p Module Parameter

<table>
<tr><th>NO.</th><th>Address</th><th>Instruction</th><th>Data Fomat</th><th>Unit</th></tr>
<tr><td>21</td><td>39001 (RO)
49001 (RO)</td><td>Product ID</td><td><table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table></td><td>WORD</td></tr>
<tr><td>22</td><td>39002 (RO)
49002 (RO)</td><td>Product Version</td><td>100 = 1.00, the dual ending number is the formal version, the single ending number is the test version</td><td>WORD</td></tr>
<tr><td>23</td><td>39003 (RO)
49003 (RO)</td><td>System error</td><td>0 = OK
1 = Flash Read Error (If error still after reboot, needing repairation)
2 = Flash checksum Error（ expresses the set value or the calibration is broken, needing to reset）
Cation: The Flash may fail to be writen into but can be read, the system can’t judge this kind of error.</td><td>WORD</td></tr>
<tr><td>24</td><td>39005 (RO)
49005 (RW)</td><td>Configuration Setup</td><td>Set to 0, disable to modify any setting parameter . Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM, the module will recover to work after 5s. During this time all function is disable.
Reboot to go back to get default value 1</td><td>WROD</td></tr>
<tr><td>25</td><td>39006 (RO)
49006 (RW)</td><td>Modbus Exception</td><td>0 = Command Exception Disable
1 = Command Exception Enable</td><td>WORD</td></tr>
<tr><td>26</td><td>39007 (RO)
49007 (RW)</td><td>Response Delay Time</td><td>Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.</td><td>ms
0~65535</td></tr>
<tr><td>27</td><td>39009 (RO)
49009 (RW)</td><td>DI0 ~ DI15 Invert</td><td>Let actual DI input status input reversely， Low Byte = DI0 ~ DI7 Invert, High Byte = DI8 ~ DI15 Invert</td><td>Bit</td></tr>
<tr><td>28</td><td>39010 (RO)
49010 (RW)</td><td>DI0 ~ DI15 Read Latch Clear</td><td>After master read DI On/Off Status, it reset to 0, avoid reading the repetitive alarm data.
1 = Read Clear, 0 = Normal</td><td>Bit</td></tr>
</table>

29	39011 (RO) 49011 (RW)	**DI0 ~ DI15 Counter Enable**	设定为1 时才对有计数功能	**Bit**
30	39017~39032(RO) 49017~49032(RW)	**DI0~DI15 Signal Processing Mode**	0 = Direct 1 = Delayed 2 = Toggled 3 = Pulsed 4 = One Shot	**WORD** **0~4**
31	39033~39048(RO) 49033~49048(RW)	**DI0~DI15 Debounce**	Confirm the input status changed after input signal keeps a certain time.	**5ms** **0~65535**
32	39049~39064(RO) 49049~49064(RW)	**DI0~DI15** **On Delay Time**	DI status changes to on from off, delay time	**s** **0~65535**
33	39065~39080(RO) 49065~49080(RW)	**DI0~DI15 Off Delay Time/Pulse Time**	DI status changes to off from on, delay time or Pulse Mode's Pulse baud	**s** **0~65535**

SM_DO_116、SM_DO_108 Data Process Diagram



Address Index Following the Form Number

SM_DO_116 Present Data

NO.	Address	Instruction	Data Fomat	Unit
1	00001~00016 (RW) 10001~10016 (RO) 30001 (RO) 40001 (RW)	**DO0 ~ DO15 Output**	Digital output, occupying 16 bit Word, 1 is True (ON), 0 is False (OFF)。	**Bit**
2	00017~00032 (RO) 10017~10032 (RO) 30002 (RO) 40002 (RO)	**DO0 ~ DO15 Output Feedback Status**	DO actual output status feedback	**Bit**
3	30009 ~ 30024 (RW) 40009 ~ 40024 (RW)	**DO0 ~ DO15 TCP Output**	Used when the Mode isTPC, together with Duty Cycle can be changed to DO junction output by 0~100%.	**%** **0 ~ 100**
4	00385 ~ 00400 (RW) 10385 ~ 10400 (RO) 30025 (RO) 40025 (RW)	**DO0 ~ DO15 Manual**	DO0 ~ DO15 Manual 1 = Manual, 0 = Normal	**Bit**
5	00401 ~ 00416 (RW) 10401 ~ 10416 (RO) 30026 (RO) 40026 (RW)	**DO0 ~ DO15 Simulation**	DO0 ~ DO15 Simulation 1 = Simulation, 0 = Normal	**Bit**

SM_DO_116 Module Parameter

NO.	Address	Instruction	Data Fomat	Unit
21	39001 (RO) 49001 (RO)	**Product ID**	<table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table>	**WORD**
22	39002 (RO) 49002 (RO)	**Product Version**	100 = 1.00，the dual ending number is the formal version, the single ending number is the test version	**WORD**
23	39003 (RO) 49003 (RO)	**System error**	0 = OK 1 = Flash Read Error (If error still after reboot，needing repairation) 2 = Flash checksum Error（expresses the set value or the calibration is broken, needing to reset） Cation：The Flash may fail to be writen into but can be read, the system can't judge this kind of error.	**WORD**
24	39005 (RO) 49005 (RW)	**Configuration Setup**	Set to 0，disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM，the module will recover to work after 5s. During this time all function is disable. Reboot to go back to get default value 1	**WROD**
25	39006 (RO) 49006 (RW)	**Modbus Exception**	0 = Command Exception Disable 1 = Command Exception Enable	**WORD**
26	39007 (RO) 49007 (RW)	**Response Delay Time**	Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.	**ms** **0~65535**
27	39009 (RO) 49009 (RW)	**DO0 ~ DO15 Invert**	Let DO order output reversely Low Byte = DO0 ~ DO7 Invert High Byte = DO8 ~ DO15 Invert 1 = Invert，0 = Normal	**Bit**
28	39012 (RO) 49012 (RW)	**DO0 ~ DO15 Power On**	On power，DO's output value, ineffective in TPC mode. 1 = On，0 = Off Low Byte = DO0 ~ DO7 Power On High Byte = DO8 ~ DO15 Power On	**Bit**

29	39013 (RO) 49013 (RW)	**DO0 ~ DO15 Fail Latch**	When communication watchdog is active, sing poion is ineffective, that means it will keep the original state when communication failure. Low Byte = DO0 ~ DO7 Fail Latch High Byte = DO8 ~ DO15 Fail Latch 1 = Latch, 0 = Fail Safe	**Bit**
30	39014 (RO) 49014 (RW)	**DO0 ~ DO15 Fail Safe**	When watch dog detects communication broken, it is enforced to output ON or Off Low Byte = DO0 ~ DO7 Fail Safe High Byte = DO8 ~ DO15 Fail Safe 1 = On, 0 = Off	**Bit**
31	39016 (RO) 49016 (RW)	**Fail Time**	通讯Watch Dog 的时间 0 表示Fail Safe Disable。全部DO 共享一个设定值。	**s** **0~65535**
32	39017~39032(RO) 49017~49032(RW)	**DO0~DO15 Signal Processing Mode**	0 = Direct 1 = Delayed 2 = Toggled 3 = Pulsed 4 = One Shot 5 = Pulsed&Clear 6 = One Shot&Clear 7 = TPC 49017 = DO0 Mode 依次 49018=DO1 Mode	**WORD** **0~7**
33	39033~39048(RO) 49033~49040(RW)	**DO0~DO15 Debounce**	Confirm the output status changed after output signal keeps a certain time 49033 = DO0 Debounce 49034=DO1 Debounce	**5ms** **0~65535**
34	39049~39064(RO) 49049~49064(RW)	**DO0~DO15 On Delay Time**	DO order changes to on from off, delay time. 49049 = DO0 On Delay Time	**s** **0~65535**
35	39065~39080(RO) 49065~49080(RW)	**DO0~DO15 Off Delay Time/Pulse Time**	DO order changes to off from on, delay time or Pulse Mode's Pulse baud 49065 = DO0 Off Delay Time	**s** **0~65535**
36	39081~39096(RO) 49081~49096(RW)	**DO0~DO15 TPC Duty Cycle Time**	Do in TPC Mode, TPC duty cycle time. 49081 = DO0 Duty Cycle Time	**0.1 s** **1~3000**
37	39097~390112(RO) 49097~490112(RW)	**DO0~DO16 TPC Fail Safe/Power On Output**	Do in TPC Mode, TPC outputs percent or the safe value of the communication error. If not set Fail Time, output will be 0% by power on. Fail Safe and Power On share the same parameter 49097 = DO0 Fail Safe/Power On Output	**%** **0~100**

SM_DO_108 Present Data

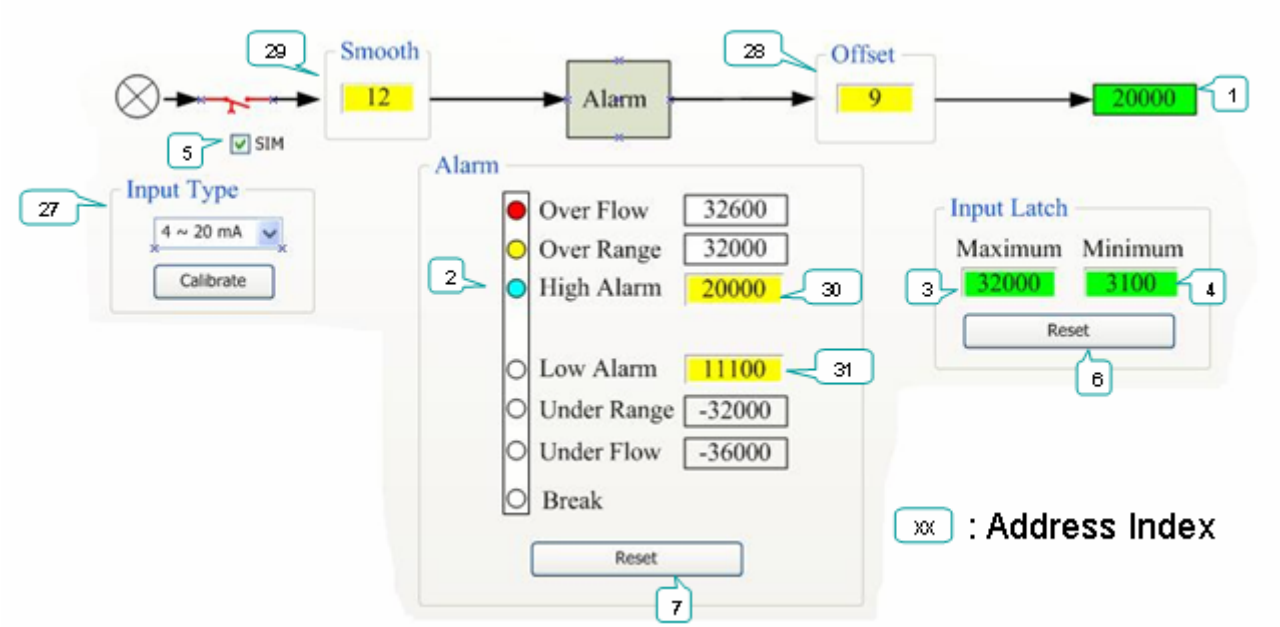
NO.	Address	Instruction	Data Fomat	Unit
1	00001~00008 (RW) 10001~10008 (RO) 30001 (RO) 40001 (RW)	**DO0 ~ DO7 Output**	Digital output，occupying 8 bit of the 16 bit Word 中的8 位（Low Byte)， 1 is True (ON)，0 is False (OFF)。	**Bit**
2	00017~00024 (RO) 10017~10024 (RO) 30002 (RO) 40002 (RO)	**DO0 ~ DO7 Output Feedback Status**	DO actual output status feedback	**Bit**
3	30009 ~ 30016 (RW) 40009 ~ 40016 (RW)	**DO0 ~ DO7 TCP Output**	Used when the mode isTPC, together with Duty Cycle can be changed to DO junction output by 0~100%.	**%** **0 ~ 100**
4	00385 ~ 00392 (RW) 10385 ~ 10392 (RO) 30025 (RO) 40025 (RW)	**DO0 ~ DO7 Manual**	DO0 ~ DO7 Manual 1 = Manual，0 = Normal	**Bit**
5	00401 ~ 00408 (RW) 10401 ~ 10408 (RO) 30026 (RO) 40026 (RW)	**DO0 ~ DO7 Simulation**	DO0 ~ DO7 Simulation 1 = Simulation，0 = Normal	**Bit**

SM_DO_108 Module Parameter

<table>
<tr><th>NO.</th><th>Address</th><th>Instruction</th><th>Data Fomat</th><th>Unit</th></tr>
<tr><td>21</td><td>39001 (RO)
49001 (RO)</td><td>Product ID</td><td><table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table></td><td>WORD</td></tr>
<tr><td>22</td><td>39002 (RO)
49002 (RO)</td><td>Product Version</td><td>100 = 1.00，the dual ending number is the formal version, the single ending number is the test version</td><td>WORD</td></tr>
<tr><td>23</td><td>39003 (RO)
49003 (RO)</td><td>System error</td><td>0 = OK
1 = Flash Read Error (If error still after reboot，needing repairation)
2 = Flash checksum Error（expresses the set value or the calibration is broken, needing to reset）
Cation：The Flash may fail to be writen into but can be read, the system can’t judge this kind of error.</td><td>WORD</td></tr>
<tr><td>24</td><td>39005 (RO)
49005 (RW)</td><td>Configuration Setup</td><td>Set to 0, disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM，the module will recover to work after 5s. During this time all function is disable.
Reboot to go back to get default value 1</td><td>WROD</td></tr>
<tr><td>25</td><td>39006 (RO)
49006 (RW)</td><td>Modbus Exception</td><td>0 = Command Exception Disable
1 = Command Exception Enable</td><td>WORD</td></tr>
<tr><td>26</td><td>39007 (RO)
49007 (RW)</td><td>Response Delay Time</td><td>Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.</td><td>ms
0~65535</td></tr>
<tr><td>27</td><td>39009 (RO)
49009 (RW)</td><td>DO0 ~ DO7 Invert</td><td>Let DO order output reversely
Low Byte = DO0 ~ DO7 Invert
High Byte = 0
1 = Invert，0 = Normal</td><td>Bit</td></tr>
<tr><td>28</td><td>39012 (RO)
49012 (RW)</td><td>DO0 ~ DO7 Power On</td><td>On power，DO’s output value, ineffective in TPC mode.
1 = On，0 = Off
Low Byte = DO0 ~ DO7 Power On
High Byte = 0</td><td>Bit</td></tr>
</table>

29	39013 (RO) 49013 (RW)	**DO0 ~ DO7 Fail Latch**	When communication watchdog is active, sing poion is ineffective, that means it will keep the original state when communication failure. Low Byte = DO0 ~ DO7 Fail Latch High Byte = 0 1 = Latch, 0 = Fail Safe	**Bit**
30	39014 (RO) 49014 (RW)	**DO0 ~ DO7 Fail Safe**	When watch dog detects communication broken, it is enforced to output ON or Off 1 = On, 0 = Off Low Byte = DO0 ~ DO7 Fail Safe High Byte = 0	**Bit**
31	39016 (RO) 49016 (RW)	**Fail Time**	The time of watch dog, 0 is Fail Safe Disable. All DO share one set value.	**s** **0~65535**
32	39017~39024(RO) 49017~49024(RW)	**DO0~DO7 Signal Processing Mode**	0 = Direct 1 = Delayed 2 = Toggled 3 = Pulsed 4 = One Shot 5 = Pulsed&Clear 6 = One Shot&Clear 7 = TPC 49017 = DO0 Mode, 49018=DO1 Mode	**WORD** **0~7**
33	39033~39040(RO) 49033~49040(RW)	**DO0~DO7 Debounce**	Confirm the output status changed after output signal keeps a certain time. 49033 = DO0 Debounce, 49034=DO1 Debounce	**5ms** **0~65535**
34	39049~39056(RO) 49049~49056(RW)	**DO0~DO7 On Delay Time**	DO order changes to on from off, delay time 49049 = DO0 On Delay Time	**s** **0~65535**
35	39065~39072(RO) 49065~49072(RW)	**DO0~DO7 Off Delay Time/Pulse Time**	DO order changes to off from on, delay time or Pulse Mode's Pulse baud 49065 = DO0 Off Delay Time	**s** **0~65535**
36	39081~39088(RO) 49081~49088(RW)	**DO0~DO7 TPC Duty Cycle Time**	Do in TPC Mode, TPC duty cycle time. 49081 = DO0 Duty Cycle Time	**0.1 s** **1~3000**
37	39097~390104(RO) 49097~490104(RW)	**DO0~DO7 TPC Fail Safe/Power On Output**	Do in TPC Mode, TPC outputs percent or the safe value of the communication error. If not set Fail Time, output will be 0% by power on. Fail Safe and Power On share on parameter. 49097 = DO0 Fail Safe/Power On Output	**%** **0~100**

SM_AI_108i Data Process Diagram



Address Index Following the Form Number

SM_AI_108i Present Data

NO.	Address	Instruction	Data Fomat	Unit
1	30001~ 30008(RO) 40001~ 40008 (RO)	**AI0 ~ AI7 Value**	Normal Range is -3200 ~ 3200, the exceeded ones is Over Range, the one lower than -32768 or higher than 32767 is Over Flow	**WORD** **±32768**
2	00129 ~ 00256(RO) 10129 ~ 10256(RO) 30009 ~ 300016(RO) 40009 ~ 40016(RO)	**AI0 ~ AI7 Status**	AI0 ~ AI7 Alarm status, each AI point take one WORD, it has 7 kinds of status: 0 is OK, only takes BIT0 ~ BIT6, the other bit is 0 After alarm, the manual operation is needed to clear the alarm status BIT0 = High Alarm BIT1 = Low Alarm BIT2 = Over Range (> 3200) BIT3 = Under Range (< 3200) BIT4 = Over Flow (> 3260) BIT5 = Under Flow (< 3260) BIT6 = Break 1~5V and 4~20 mA has no Under Range and Under Flow alarm.	**Bit**
3	30017 ~ 30024 (RW) 40017 ~ 40024 (RW)	**AI0 ~ AI7 Max Value**	AI0 ~ AI7 moment Max value	**WORD**
4	30025 ~ 30032 (RW) 40025 ~ 40032 (RW)	**AI0 ~ AI7 Min Value**	AI0 ~ AI7 moment Min value	**WORD**

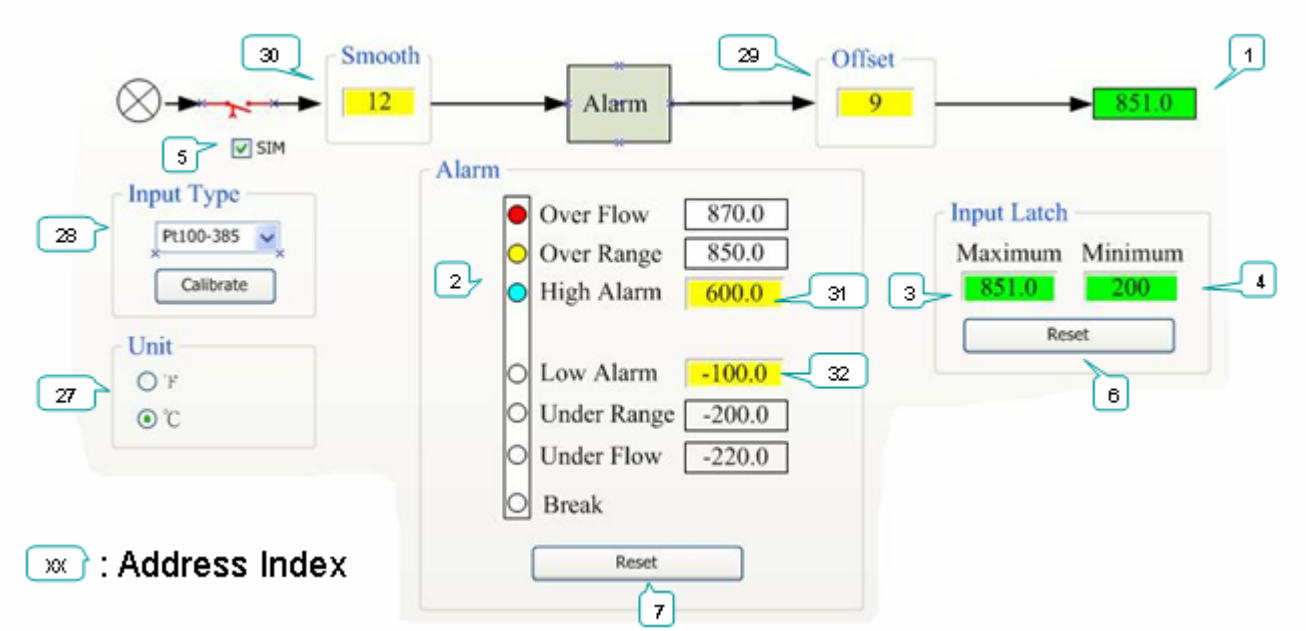
5	00513 ~ 00520 (RW) 10513 ~ 10520 (RO) 30033 (RO) 40033 (RW)	**AI0 ~ AI7 Simulation**	AI0 ~ AI7 Simulation, the actual input will not update in the Simulation mode, the value can be set by the Host 40033 的High Byte 为0	**Bit**
6	00529 ~ 00536 (RW) 10529 ~ 10536 (RO) 30034 (RO) 40034 (RW)	**AI0 ~ AI7 Max/Min Reset**	Let AI0 ~ AI7 Max/Min value reset and count again. 40034's High Byte 为0	**Bit**
7	00545 ~ 00552 (RW) 10545 ~ 10552 (RO) 30026 (RO) 40026 (RW)	**AI0 ~ AI7 Alarm Reset**	Let AI0 ~ AI7's alarm status be cleared 40035's High Byte 为0	**Bit**

SM_AI_108i Module Parameter

NO.	Address	Instruction	Data Fomat	Unit
21	39001 (RO) 49001 (RO)	**Product ID**	<table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table>	**WORD**
22	39002 (RO) 49002 (RO)	**Product Version**	100 = 1.00, the dual ending number is the formal version, the single ending number is the test version.	**WORD**

<table>
<tr><td>23</td><td>39003 (RO)
49003 (RO)</td><td>System error</td><td>0 = OK
1 = Flash Read Error (If error still after reboot, needing repairation)
2 = Flash checksum Error（ expresses the set value or the calibration is broken, needing to reset）
Cation: The Flash may fail to be writen into but can be read, the system can’t judge this kind of error.</td><td>WORD</td></tr>
<tr><td>24</td><td>39005 (RO)
49005 (RW)</td><td>Configuration Setup</td><td>Set to 0, disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM, the module will recover to work after 5s. During this time all function is disable.
Reboot to go back to get default value 1</td><td>WROD</td></tr>
<tr><td>25</td><td>39006 (RO)
49006 (RW)</td><td>Modbus Exception</td><td>0 = Command Exception Disable
1 = Command Exception Enable</td><td>WORD</td></tr>
<tr><td>26</td><td>39007 (RO)
49007 (RW)</td><td>Response Delay Time</td><td>Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.</td><td>ms
0~65535</td></tr>
<tr><td>27</td><td>39017~39024(RO)
49017~49024(RW)</td><td>AI0~AI7 Signal Type</td><td><table><tr><th>Type</th><th>Name</th></tr><tr><td>7</td><td>+-5V</td></tr><tr><td>8</td><td>+-10V</td></tr><tr><td>9</td><td>1～5V</td></tr><tr><td>20</td><td>+-20mA</td></tr><tr><td>22</td><td>4～20mA</td></tr></table></td><td>WORD
0~7</td></tr>
<tr><td>28</td><td>39025~39032(RO)
49025~49032(RW)</td><td>AI0~AI7 Offset</td><td>Measure accroding to the instrument offset value, offset range is -128 ~ 127</td><td>WORD</td></tr>
<tr><td>29</td><td>39033~39040(RO)
49033~49040(RW)</td><td>AI0~AI7 Smooth</td><td>Formula: O=X+(Y-X)/S
O=Smooth value after calculation
Y=present input value
X=previous calculated value
S=Smooth value, S=1 (ineffective)</td><td>WORD
1~255</td></tr>
<tr><td>90</td><td>39041~39048(RO)
49041~49048(RW)</td><td>AI0~AI7 High Alarm</td><td>High alarm setting</td><td>WORD
±3200</td></tr>
<tr><td>31</td><td>39049~39056(RO)
49049~49056(RW)</td><td>AI0~AI7 LOW Alarm</td><td>Low alarm setting</td><td>WORD
±3200</td></tr>
</table>

SM_RTD_108i Data Process Diagram



Address Index Following the Form Number

SM_RTD_108i Present Data

NO.	Address	Instruction	Data Fomat	Unit
1	309001 ~30008(RO) 40001~ 40008 (RO)	**RTD0 ~ RTD7 Value**	量测值为温度单位(0.1 or 0.1)	**0.1** **±32768**
2	00129 ~ 00256(RO) 10129 ~ 102556(RO) 30009 ~ 30016(RO) 40009 ~ 40016(RO)	**RTD0 ~ RTD7 Status**	RTD0 ~ RTD7 警报状态，每一RTD 点占用一个WORD，有七种状态: 0 表示OK，只用到BIT0 ~ BIT6，其他位为0 警报消失后，必须手动复归才可清除警报状态 BIT0 = High Alarm BIT1 = Low Alarm BIT2 = Over Range BIT3 = Under Range BIT4 = Over Flow BIT5 = Under Flow BIT6 = Break	**Bit**
3	30017 ~ 30024 (RW) 40017 ~ 40024 (RW)	**RTD0 ~ RTD7 Max Value**	RTD0 ~ RTD7 瞬间最大值	**WORD**
4	30025 ~ 30032 (RW) 40025 ~ 40032 (RW)	**RTD0 ~ RTD7 Min Value**	RTD0 ~ RTD7 瞬间最小值	**WORD**

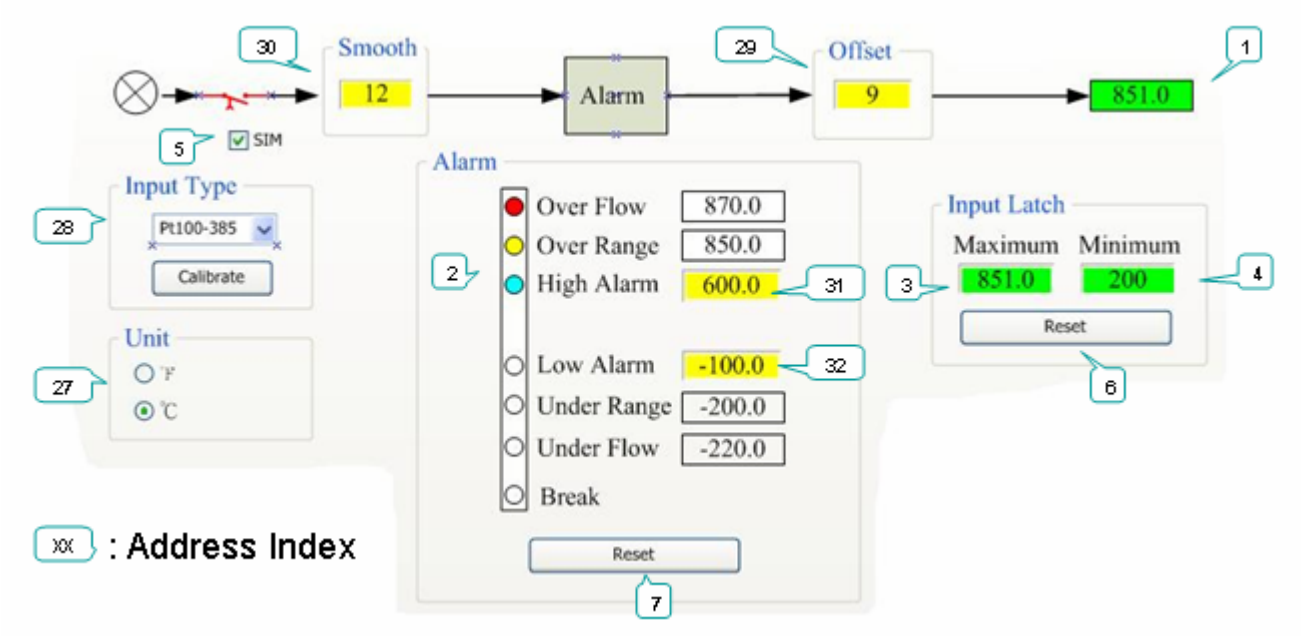
5	00513 ~ 00520 (RW) 10513 ~ 10520 (RO) 30033 (RO) 40033 (RW)	**RTD0 ~ RTD7 Simulation**	RTD0 ~ RTD7 Simulation，Simulation mode 时实际输入不再更新，数值可以由Host 设定 40033 的High Byte 为0	**Bit**
6	00529 ~ 00536 (RW) 10529 ~ 10536 (RO) 30034 (RO) 40034 (RW)	**RTD0 ~ RTD7 Max/Min Reset**	将RTD0 ~ RTD7 Max/Min 数值复归重新计算 40034 的High Byte 为0	**Bit**
7	00545 ~ 00552 (RW) 10545 ~ 10552 (RO) 30026 (RO) 40026 (RW)	**RTD0 ~ RTD7 Alarm Reset**	将RTD0 ~ RTD7 的Alarm 状态清除 40035 的High Byte 为0	**Bit**

SM_RTD_108i Module Parameter

<table>
<tr><th>NO.</th><th>Address</th><th>Instruction</th><th>Data Fomat</th><th>Unit</th></tr>
<tr><td>21</td><td>39001 (RO)
49001 (RO)</td><td>Product ID</td><td><table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table></td><td>WORD</td></tr>
<tr><td>22</td><td>39002 (RO)
49002 (RO)</td><td>Product Version</td><td>100 = 1.00，the dual ending number is the formal version, the single ending number is the test version.</td><td>WORD</td></tr>
<tr><td>23</td><td>39003 (RO)
49003 (RO)</td><td>System error</td><td>0 = OK
1 = Flash Read Error (If error still after reboot，needing repairation)
2 = Flash checksum Error（expresses the set value or the calibration is broken, needing to reset）
Cation：The Flash may fail to be writen into but can be read, the system can’t judge this kind of error.</td><td>WORD</td></tr>
<tr><td>24</td><td>39005 (RO)
49005 (RW)</td><td>Configuration Setup</td><td>Set to 0，disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM，the module will recover to work after 5s. During this time all function is disable.
Reboot to go back to get default value 1</td><td>WROD</td></tr>
<tr><td>25</td><td>39006 (RO)
49006 (RW)</td><td>Modbus Exception</td><td>0 = Command Exception Disable
1 = Command Exception Enable</td><td>WORD</td></tr>
<tr><td>26</td><td>39007 (RO)
49007 (RW)</td><td>Response Delay Time</td><td>Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.</td><td>ms
0~65535</td></tr>
<tr><td>27</td><td>90010 (RO)
49010 (RW)</td><td>Temperature Unit</td><td>使用的温度単位
0 =
1 =</td><td></td></tr>
</table>

<table>
<tr>
<td>28</td>
<td>39017~39024(RO)
49017~49024(RW)</td>
<td>RTD0~RTD7 Signal Type</td>
<td>
<table>
<tr><th>Type</th><th>Name</th></tr>
<tr><td>61</td><td>Pt100(385)</td></tr>
<tr><td>62</td><td>Pt100(3902)</td></tr>
<tr><td>63</td><td>Pt100(3916)</td></tr>
<tr><td>64</td><td>Pt100(392)</td></tr>
<tr><td>65</td><td>Pt100(3926)</td></tr>
<tr><td>71</td><td>Pt200(385)</td></tr>
<tr><td>81</td><td>Pt500(385)</td></tr>
<tr><td>90</td><td>Pt 1000 (375)</td></tr>
<tr><td>91</td><td>Pt 1000 (385)</td></tr>
<tr><td>101</td><td>Ni120(672)</td></tr>
<tr><td>105</td><td>Cu50(427)</td></tr>
<tr><td>110</td><td>Cu100(427)</td></tr>
</table>
</td>
<td>WORD</td>
</tr>
<tr>
<td>29</td>
<td>39025~39032(RO)
49025~49032(RW)</td>
<td>RTD0~RTD7 Offset</td>
<td>Measure accroding to the instrument offset value，offset range is -128 ~ 127</td>
<td>WORD</td>
</tr>
<tr>
<td>30</td>
<td>39033~39040(RO)
49033~49040(RW)</td>
<td>RTD0~RTD7 Smooth</td>
<td>Formula: O=X+(Y-X)/S
O=Smooth value after calculation
Y=present input value
X=previous calculated value
S=Smooth value，S=1 (ineffective)</td>
<td>WORD
1~255</td>
</tr>
<tr>
<td>31</td>
<td>39041~39048(RO)
49041~49048(RW)</td>
<td>RTD0~RTD7 High Alarm</td>
<td>High alarm setting</td>
<td>WORD
±3200</td>
</tr>
<tr>
<td>32</td>
<td>39049~39056(RO)
49049~49056(RW)</td>
<td>RTD0~RTD7 LOW Alarm</td>
<td>Low alarm setting</td>
<td>WORD
±3200</td>
</tr>
</table>

SM_TH_108i Data Process Diagram



Address Index Following the Form Number

SM_TH_108i Present Data

NO.	Address	Instruction	Data Fomat	Unit
1	30001 ~30008(RO) 40001~ 40008 (RO)	**TH0 ~ TH7 Value**	The measure value is the temperature unit（0.1 or 0.1 ）	**0.1** **±32768**
2	00129 ~ 00256(RO) 10129 ~ 10256(RO) 30009 ~ 30016(RO) 40009 ~ 40016(RO)	**TH0 ~ TH7 Status**	TH0 ~ TH7 alarm status, each TH point takes a WORD. it has 7 kinds of status: 0 is OK，only takes BIT0 ~ BIT6，the other bit is 0 After alarm, the manual operation is needed to clear the alarm status BIT0 = High Alarm BIT1 = Low Alarm BIT2 = Over Range BIT3 = Under Range BIT4 = Over Flow BIT5 = Under Flow BIT6 = Break	**Bit**
3	30017 ~ 30024 (RW) 30017 ~ 30024 (RW)	**TH0 ~ TH7 Max Value**	TH0 ~ TH7 moment Max value	**WORD**
4	30025 ~ 30032 (RW) 40025 ~ 40032 (RW)	**TH0 ~ TH7 Min Value**	TH0 ~ TH7 moment Min value	**WORD**
5	00513 ~ 00520 (RW) 10513 ~ 10520 (RO) 30033 (RO) 40033 (RW)	**TH0 ~ TH7 Simulation**	TH0 ~ TH7 Simulation，the actual input will not update in the Simulation mode, the value can be set by the Host. 40033 的High Byte 为0	**Bit**
6	00529 ~ 00536 (RW) 10529 ~ 10536 (RO) 30034 (RO) 40034 (RW)	**TH0 ~ TH7 Max/Min Reset**	Let TH0 ~ TH7 Max/Min value reset and count again. 40034 的High Byte 为0	**Bit**
7	00545 ~ 00552 (RW) 10545 ~ 10552 (RO) 30026 (RO) 40026 (RW)	**TH0 ~ TH7 Alarm Reset**	Let TH0 ~ TH7's alarm status be cleared 40035 的High Byte 为0	**Bit**

SM_TH_108i Module Parameter

NO.	Address	Instruction	Data Fomat	Unit

<table>
<tr><td>21</td><td>39001 (RO)
49001 (RO)</td><td>Product ID</td><td><table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table></td><td>WORD</td></tr>
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49002 (RO)</td><td>Product Version</td><td>100 = 1.00, the dual ending number is the formal version, the single ending number is the test version.</td><td>WORD</td></tr>
<tr><td>23</td><td>39003 (RO)
49003 (RO)</td><td>System error</td><td>0 = OK
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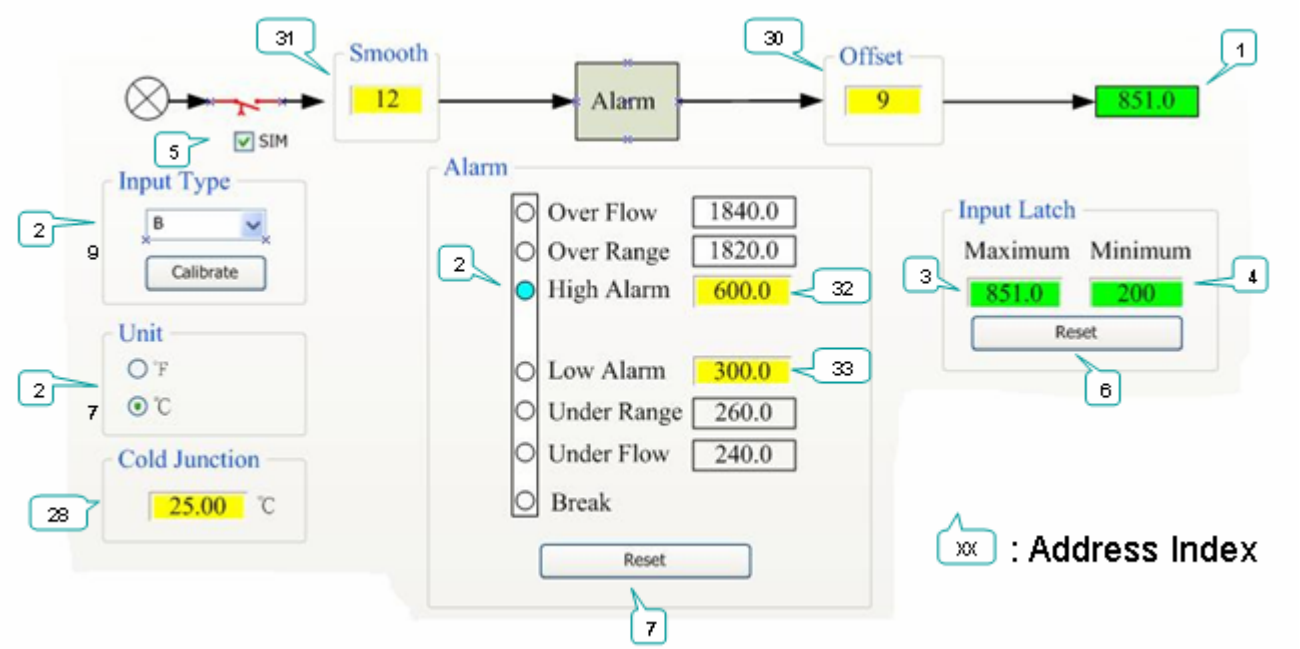
2 = Flash checksum Error（ expresses the set value or the calibration is broken, needing to reset）
Cation： The Flash may fail to be writen into but can be read, the system can’t judge this kind of error.</td><td>WORD</td></tr>
<tr><td>24</td><td>39005 (RO)
49005 (RW)</td><td>Configuration Setup</td><td>Set to 0, disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM, the module will recover to work after 5s. During this time all function is disable.
Reboot to go back to get default value 1</td><td>WROD</td></tr>
<tr><td>25</td><td>39006 (RO)
49006 (RW)</td><td>Modbus Exception</td><td>0 = Command Exception Disable
1 = Command Exception Enable</td><td>WORD</td></tr>
<tr><td>26</td><td>39007 (RO)
49007 (RW)</td><td>Response Delay Time</td><td>Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.</td><td>ms
0~65535</td></tr>
<tr><td>27</td><td>90010 (RO)
49010 (RW)</td><td>Temperature Unit</td><td>Used temperature unit
0 =
1 =</td><td></td></tr>
<tr><td>28</td><td>39017~39024(RO)
49017~49024(RW)</td><td>TH0~TH7 Signal Type</td><td><table><tr><th>Type</th><th>Name</th></tr><tr><td>50</td><td>10K (TypeII/Z)</td></tr><tr><td>51</td><td>10K (TypeIII/Z)</td></tr></table></td><td>WORD</td></tr>
<tr><td>29</td><td>39025~39032(RO)
49025~49032(RW)</td><td>TH0~TH7 Offset</td><td>Measure accroding to the instrument offset value, offset range is -128 ~ 127</td><td>WORD</td></tr>
</table>

30	39033~39040(RO) 49033~49040(RW)	**TH0~TH7 Smooth**	Formula : O=X+(Y-X)/S O=Smooth value after calculation Y= present input value X= previous calculated value S=Smooth value, S=1 (ineffective)	**WORD** **1~255**
31	39041~39048(RO) 49041~49048(RW)	**TH0~TH7 High Alarm**	High alarm setting	**WORD** **±3200**
32	39049~39056(RO) 49049~49056(RW)	**TH0~TH7 LOW Alarm**	Low alarm setting	**WORD** **±3200**

SM_UI_108i Data Process Diagram



Address Index Following the Form Number

SM_UI_108i Present Data

NO.	Address	Instruction	Data Fomat	Unit
1	30001 ~30008(RO) 40001~ 40008 (RO)	**UI0 ~ UI7 Value**	mV、mA、V normal range is -3200 ~ 3200, the exceeded ones is Over Range, the one lower than -32768 or higher than 32767 is Over Flow T/C 's measure value is temperature unit(0.1 or 0.1)	**0.1** **±32768**
2	00129 ~ 00256(RO) 10129 ~ 10256(RO) 30009 ~ 30016(RO) 40009 ~ 40016(RO)	**UI0 ~ UI7 Status**	UI0 ~ UI7 alarm status, each UI ake one WORD, it has 7 kinds of status: 0 is OK, only takes BIT0 ~ BIT6, the other bit is 0 After alarm, the manual operation is needed to clear the alarm status BIT0 = High Alarm BIT1 = Low Alarm BIT2 = Over Range BIT3 = Under Range BIT4 = Over Flow BIT5 = Under Flow BIT6 = Break	**Bit**
3	30017 ~ 30024 (RW) 40017 ~ 40024 (RW)	**UI0 ~ UI7 Max Value**	UI0 ~ UI7 moment Max value	**WORD**

4	30025 ~ 30032 (RW) 40025 ~ 40032 (RW)	**UI0 ~ UI7 Min Value**	UI0 ~ UI7 moment Min value	**WORD**
5	00513 ~ 00520 (RW) 10513 ~ 10520 (RO) 30033 (RO) 40033 (RW)	**UI0 ~ UI7 Simulation**	UI0 ~ UI7 Simulation，the actual input will not update in the Simulation mode, the value can be set by the Host 40033 的High Byte 为0	**Bit**
6	00529 ~ 00536 (RW) 10529 ~ 10536 (RO) 30034 (RO) 40034 (RW)	**UI0 ~ UI7 Max/Min Reset**	Let UI0 ~ UI7 Max/Min value reset and count again. 40034 的High Byte 为0	**Bit**
7	00545 ~ 00552 (RW) 10545 ~ 10552 (RO) 30026 (RO) 40026 (RW)	**UI0 ~ UI7 Alarm Reset**	Let UI0 ~ UI7 ‘s alarm status to be cleared 40035 的High Byte 为0	**Bit**

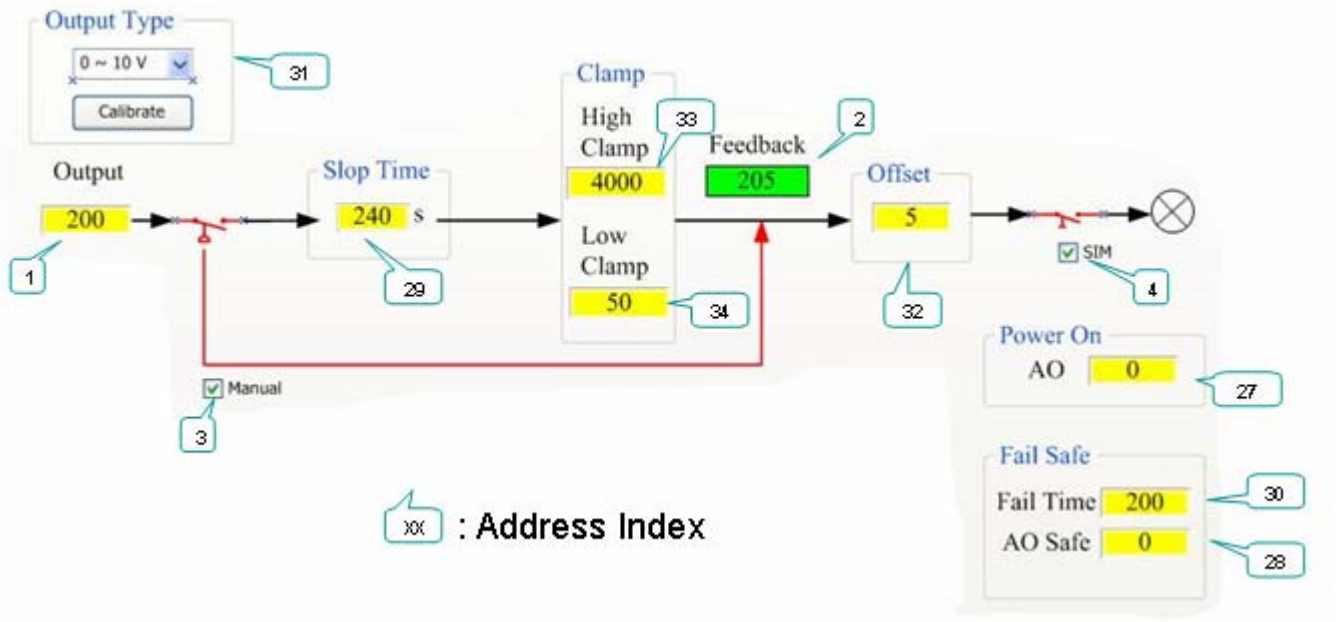
SM_UI_108i Module Parameter

NO.	Address	Instruction	Data Fomat	Unit
21	39001 (RO) 49001 (RO)	**Product ID**	<table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table>	**WORD**
22	39002 (RO) 49002 (RO)	**Product Version**	100 = 1.00，the dual ending number is the formal version, the single ending number is the test version.	**WORD**
23	39003 (RO) 49003 (RO)	**System error**	0 = OK 1 = Flash Read Error (If error still after reboot，needing repairation) 2 = Flash checksum Error（expresses the set value or the calibration is broken, needing to reset） Cation：The Flash may fail to be writen into but can be read, the system can’t judge this kind of error.	**WORD**

<table>
<tr><td>24</td><td>39005 (RO)
49005 (RW)</td><td>Configuration Setup</td><td>Set to 0，disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM，the module will recover to work after 5s. During this time all function is disable.
Reboot to go back to get default value 1</td><td>WROD</td></tr>
<tr><td>25</td><td>39006 (RO)
49006 (RW)</td><td>Modbus Exception</td><td>0 = Command Exception Disable
1 = Command Exception Enable</td><td>WORD</td></tr>
<tr><td>26</td><td>39007 (RO)
49007 (RW)</td><td>Response Delay Time</td><td>Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.</td><td>ms
0~65535</td></tr>
<tr><td>27</td><td>90010 (RO)
49010 (RW)</td><td>Temperature Unit</td><td>Used temperature unit
0 =
1 =</td><td></td></tr>
<tr><td>28</td><td>90010 (RO)
49010 (RW)</td><td>Cold Junction</td><td>Cold junction temperature (或), it’s the cold end temperature of the thermocouple, it is the temperature of the thermocouple compensation wiring and normal wiring terminal.</td><td>0.01
WORD</td></tr>
<tr><td>29</td><td>39017~39024(RO)
49017~49024(RW)</td><td>UI0~UI7 Signal Type</td><td><table><tr><th>Type</th><th>Name</th></tr><tr><td>3</td><td>+-100mV</td></tr><tr><td>4</td><td>+-500mV</td></tr><tr><td>7</td><td>+-5V</td></tr><tr><td>8</td><td>+-10V</td></tr><tr><td>9</td><td>1～5V</td></tr><tr><td>20</td><td>+-20mA</td></tr><tr><td>22</td><td>4～20mA</td></tr><tr><td>30</td><td>B</td></tr><tr><td>31</td><td>E</td></tr><tr><td>32</td><td>J</td></tr><tr><td>33</td><td>K</td></tr><tr><td>34</td><td>N</td></tr><tr><td>35</td><td>R</td></tr><tr><td>36</td><td>S</td></tr><tr><td>37</td><td>T</td></tr></table></td><td>WORD</td></tr>
<tr><td>30</td><td>39025~39032(RO)
49025~49032(RW)</td><td>UI0~UI7 Offset</td><td>Measure accroding to the instrument offset value，offset range is -128 ~ 127</td><td>WORD</td></tr>
<tr><td>31</td><td>39033~39040(RO)
49033~49040(RW)</td><td>UI0~UI7 Smooth</td><td>Formula : O=X+(Y-X)/S
O=Smooth value after calculation
Y= present input value
X= previous calculated value
S=Smooth value，S=1 (ineffective)</td><td>WORD
1~255</td></tr>
</table>

32	39041~39048(RO) 49041~49048(RW)	**UI0~UI7 High Alarm**	High alarm setting	**WORD ±3200**
33	39049~39056(RO) 49049~49056(RW)	**UI0~UI7 LOW Alarm**	Low alarm setting	**WORD ±3200**

SM_AO_102i Data Process Diagram



Address Index Following the Form Number

SM_AO_102i Present Data

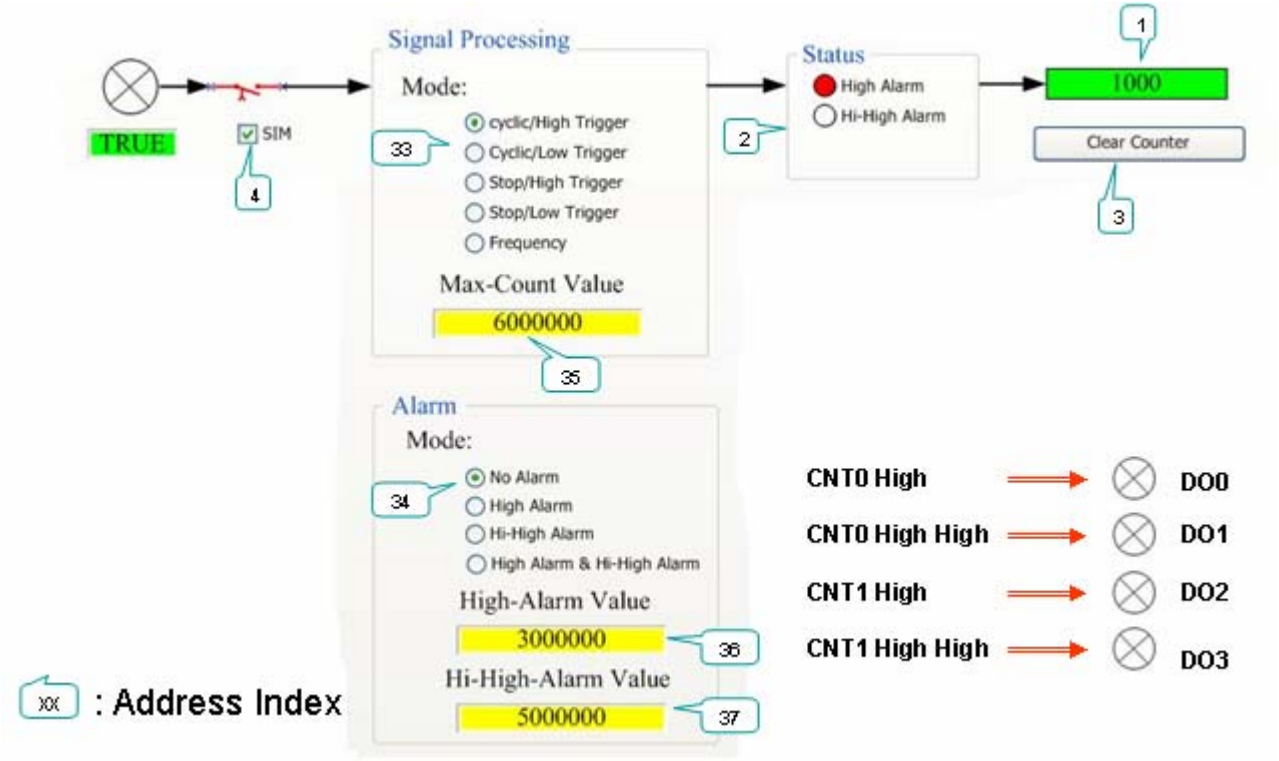
NO.	Address	Instruction	Data Fomat	Unit
1	30001 ~30002(RO) 40001~ 40002 (RO)	**AO0 ~ AO1 Value**	mV、mA、V measure range, the range is 0 ~ 4095, MAX 4195	**WORD**
2	30003 ~ 30004(RO) 40003 ~ 40004(RO)	**AO0 ~ AO1 Feedback**	AO0 ~ AO1 output value feedback	**WORD**
3	00065 ~ 00066 (RW) 10065 ~ 10066 (RO) 30005 (RW) 40005 (RW)	**AO0 ~ AO1 Manual**	AO0 ~ AO1 jump RAMP to output itself	**Bit**
4	00081 ~ 00082 (RW) 10081 ~ 10082 (RO) 30006 (RO) 40006 (RW)	**AO0 ~ AO7 Simulation**	AO0 ~ AO1 Simulation，it will not output signal when in Simulation mode. 4006 的High Byte 为0	**Bit**

SM_AO_102i Module Parameter

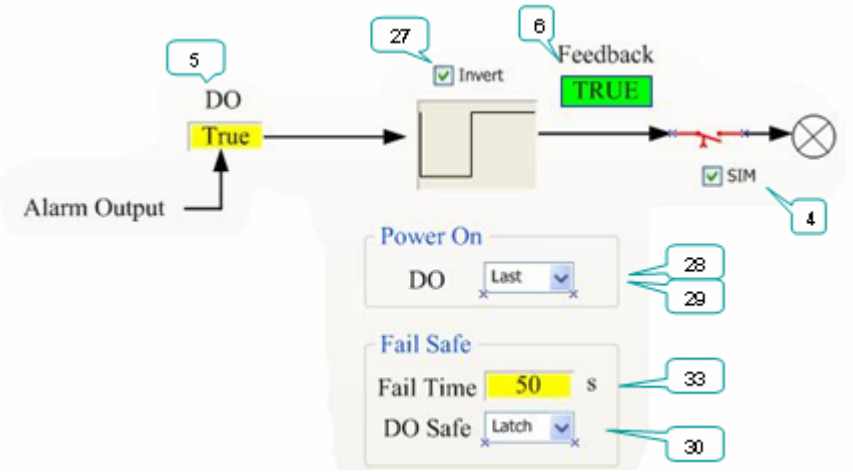
NO.	Address	Instruction	Data Fomat	Unit
21	39001 (RO) 49001 (RO)	**Product ID**	<table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table>	**WORD**
22	39002 (RO) 49002 (RO)	**Product Version**	100 = 1.00，the dual ending number is the formal version, the single ending number is the test version.	**WORD**
23	39003 (RO) 49003 (RO)	**System error**	0 = OK 1 = Flash Read Error (If error still after reboot，needing repairation) 2 = Flash checksum Error（expresses the set value or the calibration is broken, needing to reset） Cation：The Flash may fail to be writen into but can be read, the system can't judge this kind of error.	**WORD**
24	39005 (RO) 49005 (RW)	**Configuration Setup**	Set to 0，disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM，the module will recover to work after 5s. During this time all function is disable. Reboot to go back to get default value 1	**WROD**
25	39006 (RO) 49006 (RW)	**Modbus Exception**	0 = Command Exception Disable 1 = Command Exception Enable	**WORD**
26	39007 (RO) 49007 (RW)	**Response Delay Time**	Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.	**ms** **0~65535**
27	39009~39010 (RO) 49009~49010 (RW)	**AO0~AO1 Power On Value**	Power on value	**WORD** **0~4095**
28	39011~39012 (RO) 49011~49012 (RW)	**AO0~AO1 Fail Safe Value**	Safe output value when communication loss	**WORD** **0~4095**
29	39013~39014 (RO) 49013~49014 (RW)	**AO0~AO1 Slop Time**	Slop time	**s** **65535**
30	39016 (RO) 49016 (RW)	**Fail Time**	Communication Watch dog time	**s** **65535**

<table>
<tr><td>31</td><td>39017~39018(RO)
49017~490184(RW)</td><td>AO0~AO1 Signal Type</td><td><table><tr><th colspan="2">dO_AO_2i/dO_AO-2</th></tr><tr><th>Type</th><th>Name</th></tr><tr><td>10</td><td>0-10V</td></tr><tr><td>21</td><td>0-20mA</td></tr><tr><td>22</td><td>4-20mA</td></tr></table></td><td>WORD</td></tr>
<tr><td>32</td><td>39019~39020(RO)
49019~49020(RW)</td><td>AO0~AO1 Offset</td><td>Measure accroding to the instrument offset value，offset range is -128 ~ 127</td><td>WORD</td></tr>
<tr><td>33</td><td>39021~39022(RO)
49021~49022(RW)</td><td>AO0~AO1 High Clamp</td><td>High output setting</td><td>WORD
0~4095</td></tr>
<tr><td>34</td><td>39023~39024(RO)
49023~49024(RW)</td><td>AO0~AO1 LOW Clamp</td><td>Low output setting</td><td>WORD
0~4095</td></tr>
</table>

SM_CNT_102 - CI Data Process Diagram



SM_CNT_102 - DO Data Process Diagram



Address Index Following the Form Number

SM_CNT_102 Present Data

NO.	Address	Instruction	Data Fomat	Unit
1	30001 ~30004(RO) 40001~ 40004 (RO)	**CNT0 ~ CNT1 Value**	9001 = CNT0 Low word 9002 = CNT0 High word 9003 = CNT1 Low word 9004 = CNT1 High word Max is 4294967295	**DW**
2	30005 ~30006(RO) 40005~ 40006 (RO)	**CNT0 ~ CNT1 Alarm Status**	0 = OK 1 = High Alarm 2 = HI-HI Alarm 3 = High Alarm & HI-HI Alarm High Alarm and HI-HI Alarm singl drive matches the DO output	**Bit**
3	00097 ~ 00098 (RW) 10097 ~ 10098 (RO) 30007(RW) 40007 (RW)	**CNT0 ~ CNT1 Clear count**	CNT0 ~ CNT1 clear to 0	**Bit**
4	00113 ~ 00114 (RW) 10113 ~ 10114 (RO) 30008 (RO) 40008 (RW)	**CNT0 ~ CNT1 Simulation**	CNT0 ~ CNT1 Simulation, the actual input CI will not update in Simulation mode, it can be set by the host	**Bit**
5	00129 ~ 00132 (RW) 10129 ~ 10132 (RO) 30009 (RO) 40009(RW)	**CNT0 ~ CNT1 DO Output**	When CNTdoesn't set alarm output, the DO can be controlled by the host independently. When alarm occurs , it can only do the trig control to the DO, the host can control the DO at the same time	
6	00145 ~ 00146 (RW) 10145 ~ 10146 (RO) 30010 (RO) 40010 (RW)	**CNT0 ~ CNT1 DO Feedback**	DO0 ~ DO3 's output status feedback signal	

SM_CNT_102 Module Parameter

NO.	Address	Instruction	Data Fomat	Unit
21	39001 (RO) 49001 (RO)	**Product ID**	<table><tr><th>Module</th><th>ID</th></tr><tr><td>SM_DI_116p</td><td>297</td></tr><tr><td>SM_DIO_116p</td><td>298</td></tr><tr><td>SM_DO_108</td><td>299</td></tr><tr><td>SM_DO_116</td><td>300</td></tr><tr><td>SM_CNT_102</td><td>312</td></tr><tr><td>SM_AI_108(i)</td><td>317</td></tr><tr><td>SM_RTD_108(i)</td><td>318</td></tr><tr><td>SM_TH_108(i)</td><td>319</td></tr><tr><td>SM_UI_108(i)</td><td>320</td></tr><tr><td>SM_AO_102(i)</td><td>327</td></tr></table>	**WORD**
22	39002 (RO) 49002 (RO)	**Product Version**	100= 1.00，the dual ending number is the formal version, the single ending number is the test version.	**WORD**
23	39003 (RO) 49003 (RO)	**System error**	0 = OK 1 = Flash Read Error (If error still after reboot，needing repairation) 2 = Flash checksum Error（expresses the set value or the calibration is broken, needing to reset） Cation：The Flash may fail to be writen into but can be read, the system can't judge this kind of error.	**WORD**
24	39005 (RO) 49005 (RW)	**Configuration Setup**	Set to 0, disable to modify any setting parameter. Set to 1. Able t be modified by Master, Set to 7 from 1, the data will be saved into EEPROM. When saving into EEPROM，the module will recover to work after 5s. During this time all function is disable. Reboot to go back to get default value 1	**WROD**
25	39006 (RO) 49006 (RW)	**Modbus Exception**	0 = Command Exception Disable 1 = Command Exception Enable	**WORD**
26	39007 (RO) 49007 (RW)	**Response Delay Time**	Sometime Master needs the slave delay a certain time to reply after get the order. The immediate respond will cause the the cmmunication errors.	**ms** **0~65535**
27	39009 (RO) 49009 (RW)	**DO0 ~ DO3 Invert**	Output the reverse setting	**Bit** **0~3**
28	39010 (RO) 49010 (RW)	**DO0~DO3 Last Value**	Keep last output value when power on	**Bit** **0~3**
29	39011 (RO) 49011 (RW)	**DO0~DO3 Power On Value**	Power on value setting	**Bit** **0~3**

30	39012 (RO) 49012 (RW)	**DO0~DO3 Fail Latch**	When communication loses, the output status doesn't change.	**Bit** **0~3**
31	39013 (RO) 49013 (RW)	**CNT0~CNT1 Fail Safe Value**	Safe output value when communication lose	**Bit** **0~3**
32	39016 (RO) 49016 (RW)	**CNT0~CNT1 Fail Time**	The watch dog time when communication lose	**S** **0~65535**
33	39017~39018 (RO) 49017~49018 (RW)	**CNT0~CNT1 mode**	Counter/frequence mode 0 = Cycle (High trig), circle count 1 = Cycle (Low trig) , circle count 2 = Stop (High trig), stop till count max 3 = Stop (Low trig) , stop till count max 4 = Frequence	**WORD**
34	39019~39020 (RO) 49019~49020 (RW)	**CNT0~CNT1 alarm mode**	0 = NO Alarm 1 = High Alarm 2 = HI-HI Alarm 3 = High Alarm & HI-HI Alarm The DO will be controled by the alarm status after the alarm mode is set. AWhen alarm occurs , it can only do the trig control to the DO, the host can control the DO at the same time	**WORD**
35	39021~39024(RO) 49021~49024(RW)	**CNT0~CNT1 high limit**	Counter max value, when reached, the next count would start from 1	**DW**
36	39025~39028(RO) 49025~49028(RW)	**CNT0~CNT1 High Alarm**	Counter's high alarm	**DW**
37	39029~39032(RO) 49029~49032(RW)	**CNT0~CNT1 HI-HI Alarm**	Counter's high-high alarm	**DW**

Chapter 4 Modbus RTU protocol

Modbus is the industrial standard communication protocol, it uses principal and subordinate structure, only one host station can send orders, the sub-station just receives the order and replies to it or follows the order. ioSCADA is acted as sub-station, the host station is usually be the PC SCADA control software or PLC/PAC/DCS. The host station can send order to every sub-station and can send to order to all the sub-station by broadcast. Some sub-station will reply to the host query order, but the broadcast won't reply any message.

The order information sent by the host includes sub-station address (or broadcast), function code (define the orders the sub-station needs to execute), any related data and error code (CRC). If the received information has mistakes or orders can't be executed by the sub-station, it will report the exceptions to the host station.

The limit length of the ioSACDA's order to Modbus, read or write data is 48 WORDS，it will be exception errors when exceeded that. The exception error code reply function can ben set to enable when errors occur（default is disable）. Take the configure form as reference

Modbus data frame format:

Station address	Function code	Data 0	……	Data (n-1)	CRC low inspection	CRC high inspection

Data content and length will be different according to the order information and reply information

Station address:

The sub-station address is expressed by 8 bit, ioSCADA's effective address is 1-63，the address 0 is the broadcast address, all the module on the network can accept the order. But the sub-station doesn't reply the broadcast order. Not all the function code supports the broadcast order.

Function code:

Function	Instruction	Reference address
01 (01H)	Read Coil (Output) Status	0xxxxx
02 (02H)	Read Input Status	1xxxxx
03 (03H)	Read Holding Registers	4xxxxx
04 (04H)	Read Input Registers	3xxxxx
05 (05H)	Force Single Coil (Output)	0xxxxx
06 (06H)	Preset Single Register	4xxxxx
08 (08H)	Loop back	

15 (0FH)	Force Multiple Coils (Outputs)	0xxxxx
16 (10H)	Preset Multiple Registers	4xxxxx
17 (11H)	Report Slave ID	

Data (0, …,n-1) : data content, n X 8 bit, then length depends on the function code.

CRC 检测: CRC-16 (circle redundancy inspection)

Function code instruction

Function code 01(01H) : To read a group Coil status code

For example : module address 01H, IO bit's starting address is 0001H (000002) , reading 4 serial number status information.

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	1 (01)	Function code	1 (01)
High start address	0 (00)	Byte number	1 (01)
Low start address	1 (01)	Information (Coils 3-0)	10 (0A)
High Coil data length	0 (00)	CRC low	
Low Coil data length	4 (04)	CRC high	
CRC low	--		
CRC high			

The data address of the MODBUS's information starts from 0, different data region using is different function code. (such as: 0x, 1x, 3x, or 4x reference address) 000002 is 0001H's data address

Function code 02(02H): To read a group input status code

For example: module address 01H, IO bit's starting address is 0001H(100002), reading 16 serial number status information.

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	2 (02)	Function code	2 (02)
High start address	0 (00)	Byte number	2 (02)
Low start address	1 (01)	Information (Coils 7-0)	10 (0A)
High Coil data length	0 (00)	Information (Coils 15-8)	0 (00)
Low Coil data length	16 (10)	CRC low	
CRC low	--	CRC high	
CRC high			

To Function code 03(03H) : read serial internal holding register data

This order can read 4x reference address's data from the holding registers, it needs read the data start address and word data length in the order, the address starts from 0, such as: 400001~400016's data address is 0~15.

The following example is read holding registers: 400006~400008

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	3 (03)	Function code	3 (03)
High start address	0 (00)	Byte number	6 (06)
Low start address	5 (05)	High information (Register 40006)	(3A)
High data length(Register)	0 (00)	Low information(Register 40006)	75%=15000 (98)
Low data length(Register)	3 (03)	High information (Register 40007)	-13
CRC low	--	Low information (Register 40007)	25%=5000 (88)
CRC high		Low information (Register 40008)	0
		Low information (Register 40008)	1%=200 (C8)

		CRC low	--
		CRC high	

ioSCADA ‘s data length limit is 48 register.

Function code 04(04H) : To read the serial data of the Input Register

The order can read the 3x reference address data of the input registers, it needs read the data start address and word data length in the order, the address starts from 0, sunc as: 300001~300016’s data address is 0~15.

The following example is holding registers: 300003~300004

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	4 (04)	Function code	4 (04)
High start address	0 (00)	Byte number	4 (04)
Low start address	2 (02)	High information (Register 30003)	(3E)
High data length(Register)	0 (00)	High information (Register 30003)	80%=16000 (80)
Low data length(Register)	2 (02)	High information (Register 30004)	0
CRC low	--	High information (Register 30004)	136 (88)
CRC high		CRC low	--
		CRC high	

ioSCADA ‘s data length limit is 48 register

Function code 05(05H) : To write out ON / OFF status to Coil (Coil / Output)

The order will set one Coil/Output to On or Off. The set value FF00H will set Coil/Output to ON, the set value 0000H will set Coil/Output to OFF. Such as: the module address 01H, starting IO address 0005H(000006) , writing in ON

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	5 (05)	Function code	5 (05)
High start address	0 (00)	High start address	0 (00)

Low start address	5 (05)	Low start address	5 (05)
High information (Register)	255 (FF)	High information (Register)	255 (FF)
High information (Register)	0 (0)	High information (Register)	0 (0)
CRC low	--	CRC low	
CRC high		CRC high	

Function code 06(06H): To write on word into register

The order is to set single register value（reference address 4x）

Such as: the module address 01, starting IO address 0002H (400003) , writing 1 into register

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	6 (06)	Function code	6 (06)
High start address	0 (00)	High start address	0 (00)
Low start address	2 (02)	Low start address	2 (02)
High information (Register)	0 (00)	High information (Register)	0 (00)
High information (Register)	1 (01)	High information (Register)	1 (01)
CRC low	--	CRC low	
CRC high		CRC high	

Function code 08(08H) : Loop back

Master sends any information; the Slave would send the origin data back to master when received.

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	8 (06)	Function code	8 (06)
High sub function code	0 (00)	High sub function code	0 (00)
Low sub function code	0 (00)	Low sub function code	0 (00)
Information 0	x (00)	Information 0	0 (00)
Information 1	1 (01)	Information 1	1 (01)
…	--	…	
Information n		Information n	

CRC low		CRC low	
CRC high		CRC high	

Function code 15(0FH) : Write ON / OFF status to several coil

The order will set a serial coil to ON or OFF (reference address 0x)

The coil start address, the number written in Coil and information need to be assigned in the order. Data Bit express: 1 is ON，0 is OFF. Other useless place is set to 0.

Such as : module address(01H)，starting IO address 02H(reference address 000003) , writing 1,0, 1,0 to 4 Coil

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	15 (0F)	Function code	15 (0F)
High start address	0 (00)	High start address	0 (00)
Low start address	2 (02)	Low start address	2 (02)
High data length(Coil)	0 (00)	High data length(Coil)	0 (00)
Low data length(Coil)	4 (01)	Low data length(Coil)	4 (01)
Information Byte number	1(01)	CRC low	
Information 0	5(05)	CRC high	
CRC low	--		
CRC high			

ioSCADA ‘s data length limit is 768 Coils

Function code 16(10H) : To write several word to Register

The order will set serial Register value（ reference address 4x）. The data start address, word length and written data need to be assigned in the order.

Such as: module address 01H，starting address 02H(reference address 400003) 3 register, let 1，2，3 write into

Sending / Receiving data format as below: :

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	Low data length(Coil)
Function code	16 (10)	Function code	16 (10)
High start address	0 (00)	High start address	0 (00)
Low start address	2 (02)	Low start address	2 (02)
High data length(Register)	0 (00)	High data length (Register)	0 (00)
Low data length (Register)	3 (03)	Low data length (Register)	3 (03)
High information（ 0）	0(00)	CRC low	
Low information（ 0）	1(01)	CRC high	
High information（ 1）	0(00)		

Low information（1）	2(02)		
High information（2）	0(00)		
Low information（2）	3(03)		
CRC low	--		
CRC high			

ioSCADA ‘s data length limit is 48 register

Function code 17(11H) : Output module I D

According to this order, the sub-station will reply module ID number and software/hardware version number.

This order don’t need assigned data address.

Such as: Inquiry module address 01H’s ID and version.

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	17 (11)	Function code	17 (11)
CRC low	--	Data length(Byte)	2 (02)
CRC high		Module ID	2 (02)
		Module version	0 (00)
		CRC low	
		CRC high	

Modbus Error code（Exceptions）

When sub-station can’t execute master’s order, it reply the error code, For example the following is the address error, replying:

Exception code 2。

Sending / Receiving data format as below:

Sending inquiry data		Receive feedback data	
Field explanation	Sample value (hexadecimal)	Field explanation	Sample value (hexadecimal)
Station address	1 (01)	Station address	1 (01)
Function code	6 (06)	Function code	129 (81)
High start address	255 (FF)	**Exception code**	2 (02)
Low start address	255 (FF)		
High informaiton(Register)	0 (00)		
Low information(Register)	1 (01)		
CRC low	--		
CRC high			

CRC-16 Inspection Code Program Examples (C Language)

```
unsigned char* data   /* order cursor */
unsigned char length   /* order length */
/* sub-program crc_chk */
unsigned char crc_chk(unsigned char* data, unsigned char length)
{
      int j ;
```

Modbus Exception Codes		
Code	Exception	Description
1	Illegal Function	The function code received in the query is not allowed or invalid.
2	Illegal Data Address	The data address received in the query is not an allowable address for the slave or is invalid.
3	Illegal Data Value	A value contained in the query data field is not an allowable value for the slave or is invalid.

```
unsigned int reg_crc = 0xffff ;
      while(length--) {
            reg_crc ^= *data++ ;
            for (j=0; j<8 ;j++) {
                  if (reg_crc & 0x01) {/* LSB(b0) = 1   */
                        reg_crc = (reg_crc >> 1) ^ 0xa001 ;
                  } else {
                        reg_crc = reg_crc >> 1 ;
                  }
            } /* end of for loop */
      } /* end of while loop   */
      return reg_crc ;   //   return value to the CRC register
```

⊙ Appendix 1. ioSCADA Specification Form

General Specificaton:

Communication Interface	
Protocol	Modbus-RTU/ASCII protocol, RS485 (3-Wire)
Baud Rate:	1200,2400, 4800, 9600, 19.2k, 38.4k, 57.6k, or 115.2k baud.
Module Addressing:	1 to 63, selectable. Default address 1
Network Distance	4000 feet without network repeater
MAX Nodes	Nodes Supports up to 63 modules without the use of a network repeater
FLAME	Data Bits 8 Parity none, Stop Bits 1
Watchdog	Communication Failure
Network Isolation Votage	3000 Vrms
Over Votage Protection:	70 Vdc/Vp-p
Supported Modbus Commands	
Function Code	**Description**
1	Read Coil (Output) Status (0x)
2	Read Input Status (1x)
4	Read Input Registers (3x)
3	Read Holding Registers (4x)
5	Force Single Coil (Output) (0x)
6	Preset Single Register (4x)
8	Loopback Command
15	Force Multiple Coils (Outputs) (0x)
16	Preset Multiple Registers (4x)
17	Report Slave ID
	Command Exception support
	Broadcast Command support

Isolation Voltage	
RS485 Isolation:	3000 Vrms
Field Side to Logic Side isolation voltage :	3000/ 5000 Vrms (Analog/Digital)
Channel-to-channel Isolation:	Yes
Environment	
Operating temperature:	-30 to 75 °C
Storage temperature:	-45 to 85 °C
Relative humidity:	5 to 90%, noncondensing
Electromagnetic Compatibility	
Electrical Fast Transient Immunity (EFT)	IEC61000-4-4 Level 3(power, signal lines)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2 Level 3/2 (8KV/4KV air/direct discharge)
Surge Immunity	IEC61000-4-5 (0.5KV COMM.).

Module Specification:

SM_DI_116p (16 channels 24V digital input module)

Channels:	16 sourcing input
Input Resistance:	4.7K ohms, typical
Input Signal Voltage Range:	0 to 35 V DC, maximum
Input Current:	5.1 mA, typical at 24V DC.
Digital logic levels	
OFF state:	< 4 VDC
ON state:	>10 VDC Input
Input Response Time:	1 ms max
Maximum reverse voltage:	35 VDC
Maximum Input current:	10 mA
Fast Mode count feature:	300 Hz
Isolation(Field Side to Logic Side):	5K Vrms
Common ground:	1 for 16 Channels
Watch Dog:	Hardware
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24
Digital Input Function Block	
On Delay timer:	0 to 65535 s , 1s resolution
Off Delay timer:	0 to 65535 s , 1s resolution
Input Debounce:	0 to 65535 ms, 5ms resolution
Input Invert:	YES
Pulse Generator :	**duration- 0 to 65535 s , 1s resolution**
Pulse Counter:	300Hz
ON/OFF Latch:	Yes
Simulation:	Yes
Input Toggle:	Yes
Timer Accuarcy:	1%

SM_DIO_116p (16 channels 24V digital input/output module)

Input Channels:	8 sourcing input
Output Channels:	8 sourcing outputs
Input Resistance:	4.7K ohms, typical
Input Signal Voltage Range:	0 to 35 V DC, maximum
Input Current:	5.1 mA, typical at 24V DC.
Digital logic levels	
OFF state:	< 4 VDC
ON state:	>10 VDC Input
Input Response Time:	1 ms max
Maximum reverse voltage:	35 VDC
Maximum Input current:	10 mA
Fast Mode count feature:	300 Hz
Isolation(Field Side to Logic Side):	5K Vrms
Input Common ground:	1 for 8 Channels
Output On Resistance:	0.28 ohms maximum
Continuous output current:	500 mA max
Supply voltage Range:	10 to 35V DC, maximum
Output Response Time:	
Force Coil:	Output updates within 10 ms (max) of receipt of a command.
Output protection:	Fuse (4A)
Output Common Ground:	1 for 8 Channels
Maximum lamp load:	5W @24Vdc
Maximum inductive load:	0.2 H (3 Amp load at 24 VDC)
Max. OFF state leakage current:	100 nA
Typical ON voltage (@ 1 Amp):	1V
Output Protection against inductive loads:	Yes
Otput Principle of Operation:	Non-latching
Watch Dog:	Hardware & Communication
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG

Digital Input Function Block	
On Delay timer:	0 to 65535 s , 1s resolution
Off Delay timer:	0 to 65535 s , 1s resolution
Input Debounce:	0 to 65535 ms, 5ms resolution
Input Invert:	YES
Pulse Generator :	duration- 0 to 65535 s , 1s resolution
Pulse Counter:	300Hz
ON/OFF Latch:	Yes
Simulation:	Yes
Input Toggle:	Yes
Timer Accuarcy:	1%
Digital Output Function Block	
Output Sequence ON timer:	0 to 65535 s , 1s resolution
Output Sequence Off timer:	0 to 65535 s ,1s resolution
Output Invert:	YES
Pulse Output:	0 to 65535 s ,1 s resolution
TPC Output:	0 to 100 (%),
Duty cycle:	1 to 3000 (0.1 to 300s)
Atuo/Man bumpless :	Yes
Fail Safe (Comm. Watch Dog):	0 to 65535 s
Power on output:	Yes
I to O	Yes
Timer Accuarcy:	1%

SM_DO_116 (16 channels relay output module)

Output Channels:	16
Relay Type:	Form A,Normal Open
Contact Rating:	5A @250VAC 5A @30VDC
Max. output current per channel:	2A
Max. output current (entire module):	8A
Common Ground:	1 for 16 Channels
Minimum OFF resistance:	1000 Meg Ohm @500 Vdc
Minimum On resistance:	30m Ohm @6 Vdc 1A
Output Response Time:	10ms , MAX, measured from receipt of force coil command to gate transition of the output mosfet.
Min. Life:	1A 1*10^5 ops.
Line Voltage:	Max 30Vdc, Max 250Vac
Life Mechanical:	2*10^7 ops
Watch Dog:	Hardware & Communication
Power Requirements:	10 to 30 Vdc
Digital Output Function Block	
Output Sequence ON timer:	0 to 65535 s , 1s resolution
Output Sequence Off timer:	0 to 65535 s ,1s resolution
Output Invert:	YES
Pulse Output:	0 to 65535 s ,1 s resolution
TPC Output:	0 to 100 (%),
Duty cycle:	1 to 3000 (0.1 to 300s)
Atuo/Man bumpless :	Yes
Fail Safe (Comm. Watch Dog):	0 to 65535 s
Power on output:	Yes
I to O	No
Timer Accuarcy:	1%

SM_DO_108 (8 channels relay output module)

Output Channels:	8
Relay Type:	Form A,Normal Open
Contact Rating:	5A @250VAC 5A @30VDC
Max. output current per channel:	2A
Minimum OFF resistance:	1000 Meg Ohm @500 Vdc
Minimum On resistance:	30m Ohm @6 Vdc 1A
Output Response Time:	10ms , MAX, measured from receipt of force coil command to gate transition of the output mosfet.
Min. Life:	1A 1*10^5 ops.
Line Voltage:	Max 30Vdc, Max 250Vac
Life Mechanical:	2*10^7 ops
Watch Dog:	Hardware & Communication
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG
Digital Output Function Block	
Output Sequence ON timer:	0 to 65535 s , 1s resolution
Output Sequence Off timer:	0 to 65535 s ,1s resolution
Output Invert:	YES
Pulse Output:	0 to 65535 s ,1 s resolution
TPC Output:	0 to 100 (%),
Duty cycle:	1 to 3000 (0.1 to 300s)
Atuo/Man bumpless :	Yes
Fail Safe (Comm. Watch Dog):	0 to 65535 s
Power on output:	Yes
I to O:	No
Timer Accuarcy:	1%

SM_AI_108i (8 channels voltage/current isolation input module)

Input Channel:	8 differential
Input Range:	±20mA, 4 to 20mA, ±10V, ±5V, 1 to 5V
Resolution:	16 bit (1 part in 32,000.)
Input accuracy:	(@25° C) ±0.05% of input range.
Ambient Temperature Effect:	Better than ±0.005% of input span per °C, or ±1.0uV/°C, whichever is greater
Noise Filter:	50/ 60Hz Auto
Noise Rejection	
Normal mode:	60dB @ 60Hz, typical.
Common mode:	88dB @ 60Hz, typical.
Input Filter Bandwidth:	-3dB at 1.5Hz, typical.
Input Conversion Rate:	140 ms (per channel)
Current Input Resistance:	250 ohm
Votage Input Impedance:	380K ohm
Over voltage protection (voltage inputs only):	60 V AC
Over current protection (current inputs only):	300 mA
Watch Dog:	Hardware
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG
Analog Input Function Block	
Offset adjust:	-128 to 127
Input Somoothing:	1 to 255
Latch Max. Value:	YES
Latch Min. Value:	YES
High/Low Alam:	YES
Over/Under Range Alam:	YES
Over/Under Flow Alam:	YES
Break Alam:	YES

SM_UI_108i (8 channels general isolation analog input module)

Input Channel:	8 differential
Input Range:	±20mA, 4 to 20mA, ±10V, ±5V, 1 to 5V , ±100mV, +/-500mV, Thermocouple types (J, K, T, R, S, E, B, N)
Input accuracy:	(@25° C) ±0.05% of input range. (a/v/mA)
Resolution:	Thermocouple input: 0.1°C (0.18°F) ,others 16 bit (1 part in 32,000.)
Ambient Temperature Effect:	Better than ±0.005% of input span per °C, or ±1.0uV/°C, whichever is greater.
Noise Filter:	50/ 60Hz Auto
Noise Rejection	
Normal mode:	60dB (A/V/mV)@ 60Hz, typical.
Common mode:	88dB (A/V/mV)@ 60Hz, typical.
Input Filter Bandwidth:	-3dB at 1.5Hz, typical.
Input Conversion Rate:	140ms (per channel)
Current Input Resistance:	250 ohm
mV and Votage Input Impedance:	100K ohm
Overvoltage protection (voltage inputs only):	60 V AC
Overcurrent protection (current inputs only):	300 mA
External cold-junction compensation:	Yes
Thermocouple Break Detection:	Yes
TC Input impedance:	20 M ohm
TC Input bias current (break):	200 uA typical
TC Overvoltage protection:	±15 V
Reference-junction accuracy:	0.15 °C @0~70 °C, 0.5 °C @-20~0 °C
Watch Dog:	Hardware
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG

Analog Input Function Block	
Offset adjust:	-128 to 127
Input Somoothing:	1 to 255
Latch Max. Value:	YES
Latch Min. Value:	YES
High/Low Alam:	YES
Over/Under Range Alam:	YES
Over/Under Flow Alam:	YES
Break Alam:	YES

Input Range & Accuracy		
TC	**°C Range (°F Range)**	**Accuracy**
J	-210 to 1200 °C (-346 to 1712 °F)	±0.5°C
K	-200 to 1372 °C (-328 to 2502 °F)	±0.5°C
T	-260 to 400 °C (-436 to 752°F)	±0.5°C
R	-50 to 1768 °C (-58 to 3214°F)	±1.0°C
S	-50 to 1768°C (-58 to 3214°F)	±1.0°C
E	-200 to 1000°C (-328 to 1832°F)	±0.5°C
B	260 to 1820°C (500 to 3308°F)	±1.0°C
N	-230 to 1300°C (-382 to 2372°F)	±1.0°C

SM_RTD_108i (8 channels RTD isolation input)

Input Channel:	8 differential
Input Type:	PT100,PT1000,Cu50, Cu100,Ni120
Ambient Temperature Effect:	Better than ±0.005% of input span per °C, or ±1.0uV/°C, whichever is greater
Noise Filter:	50/ 60Hz Auto
Noise Rejection	
Normal mode:	60dB @ 60Hz, typical.
Common mode:	90dB @ 60Hz, typical.
Input Filter Bandwidth:	-3dB at 1.5Hz, typical.
Input Conversion Rate:	140 ms (per channel)
RTD Break Detection:	YES
Excitation Current:	200 uA DC typical, all types.
Lead-Wire Compensation:	Inherent for 3-wire RTD.
Maximum lead resistance	25 ohms per lead (Pt), 10 ohms per lead (Cu). 20 ohms per lead (Ni),
Watch Dog:	Hardware
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG
Analog Input Function Block	
Offset adjust:	-128 to 127
Input Somoothing:	1 to 255
Latch Max. Value:	YES
Latch Min. Value:	YES
High/Low Alam:	YES
Over/Under Range Alam:	YES
Over/Under Flow Alam:	YES
Break Alam:	YES

Input Range				
Input Type	**Alpha**	**Input Range**	**Resolution**	**Accuracy**
Pt 100 ohm	.00385	-200 to 850°C	0.1°C	±0.1°C
Pt 100 ohm	.003902	-200 to 850°C	0.1°C	±0.1°C
Pt 100 ohm	.003916	-200 to 850°C	0.1°C	±0.1°C
Pt 100 ohm	.00392	-200 to 850°C	0.1°C	±0.1°C
Pt 100 ohm	.003926	-200 to 850°C	0.1°C	±0.1°C
Pt 200 ohm	.00385	-200 to 850°C	0.1°C	±0.1°C
Pt 500 ohm	.00385	-200 to 850°C	0.1°C	±0.1°C
Pt 1000 ohm	.00375	-200 to 850°C	0.1°C	±0.1°C
Pt 1000 ohm	.00385	-200 to 850°C	0.1°C	±0.1°C
Ni 120 ohm	.00672	-80 to 260°C	0.1°C	±0.25°C
Cu 100 ohm	.00427	-100 to 260°C	0.1°C	±1.00°C
Cu 50 ohm	.00427	-100 to 260°C	0.1°C	±1.00°C

SM_TH_108i (8 channels Thermister isolation input module)

Input Channel:	8 differential
Input Type:	10K Type II,10K Type III
Input Range:	-45 °C to 140 °C
Resolution:	0.1°C (0.18°F)
Accuracy:	± 0.5°C (0.18°F)
Ambient Temperature Effect:	Better than ±0.005% of input span per °C, or ±1.0uV/°C, whichever is greater
Noise Filter:	50/ 60Hz Auto
Noise Rejection	
Normal mode:	60dB @ 60Hz, typical.
Common mode:	90dB @ 60Hz, typical.
Input Filter Bandwidth:	-3dB at 1.5Hz, typical.
Input Conversion Rate:	140ms (per channel)
Break Detection:	YES
Excitation Current:	200 uA DC typical, all types.
Lead-Wire:	2-wire.
Watch Dog:	Hardware
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG
Analog Input Function Block	
Offset adjust:	-128 to 127
Input Somoothing:	1 to 255
Latch Max. Value:	YES
Latch Min. Value:	YES
High/Low Alam:	YES
Over/Under Range Alam:	YES
Over/Under Flow Alam:	YES
Break Alam:	YES

SM_AO_102i (2 channels voltage /current isolation output module)

Output Channel:	2 differential
Output Range:	0 to 20mA,4 to 20mA, 0 to 10V
Resolution:	12 bit (1 part in 4095)
Output accuracy:	(@25° C) ±0.1% of output range.

Ambient Temperature Effect:	Better than ±0.005% of input span per °C, or ±1.0uV/°C, whichever is greater
Response Time:	10 ms typical into 500 ohms, for measurement to reach 98% of the final.
Maximum Output Current:	20.5 mA DC typical.
Current Output Compliance:	10.5 V typical.
Current Output Load Resistance Range:	0 to 500 ohms typical.
Maximum Output Voltage:	10. 5V DC typical.
Votage Output Current(Votage mode):	0 to 10.5 mA DC maximum.
Votage Output Impedance:	1K ohm.
Output Short Circuit Protection:	Included
Watch Dog:	Hardware & Communication
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG
Analog Output Function Block	
Offset Ajust:	-128 to 127
Slop Output:	Slop time (0 to 65535 s)
High/Low Clamp:	Yes
Auto/Man bumpless:	Yes
Fail Safe (Comm. Watch Dog):	0 to 65535 s
Power on output:	Yes

SM_CNT_102 (2 channels counter /frequency input module)

Counter Input channel:	2
Relay Output Channels:	4
Input Ranges:	0 to 10,000Hz
Resolution:	0 to 10,000Hz input range: 1Hz
Pulse counter:	1 pulse
Minimum Input Pulse Width:	50μS
Counting Rate:	10KHz maximum counting rate (50uS ON and 50uS OFF for 100 uS period or 10KHz).
Input Impedance:	4.7K ohms, typical.
Digital logic levels	
OFF state:	< 4 VDC
ON state:	>10 VDC
Output Relay Type:	Form A,Normal Open
Contact Rating:	5A @250VAC 5A @30VDC
Max. output current per channel:	2A
Max. output current (entire module):	8A
Minimum OFF resistance:	1000 Meg Ohm @500 Vdc
Minimum On resistance:	30M Ohm @6 Vdc 1A
Output Response Time:	10ms , MAX, measured from receipt of force coil command to gate transition of the output mosfet.
Min. Life:	1A 1*10^5 ops.
Line Voltage:	Max 30Vdc, Max 250Vac
Life Mechanical:	2*10^7 ops
Watch Dog:	Hardware & Communication
Power Requirements:	10 to 30 Vdc
Wiring:	I/O Cable 16 to 24 AWG

Digital Input Function Block	
On Delay timer:	No
Off Delay timer:	No
Input Debounce:	No
Input Invert:	YES

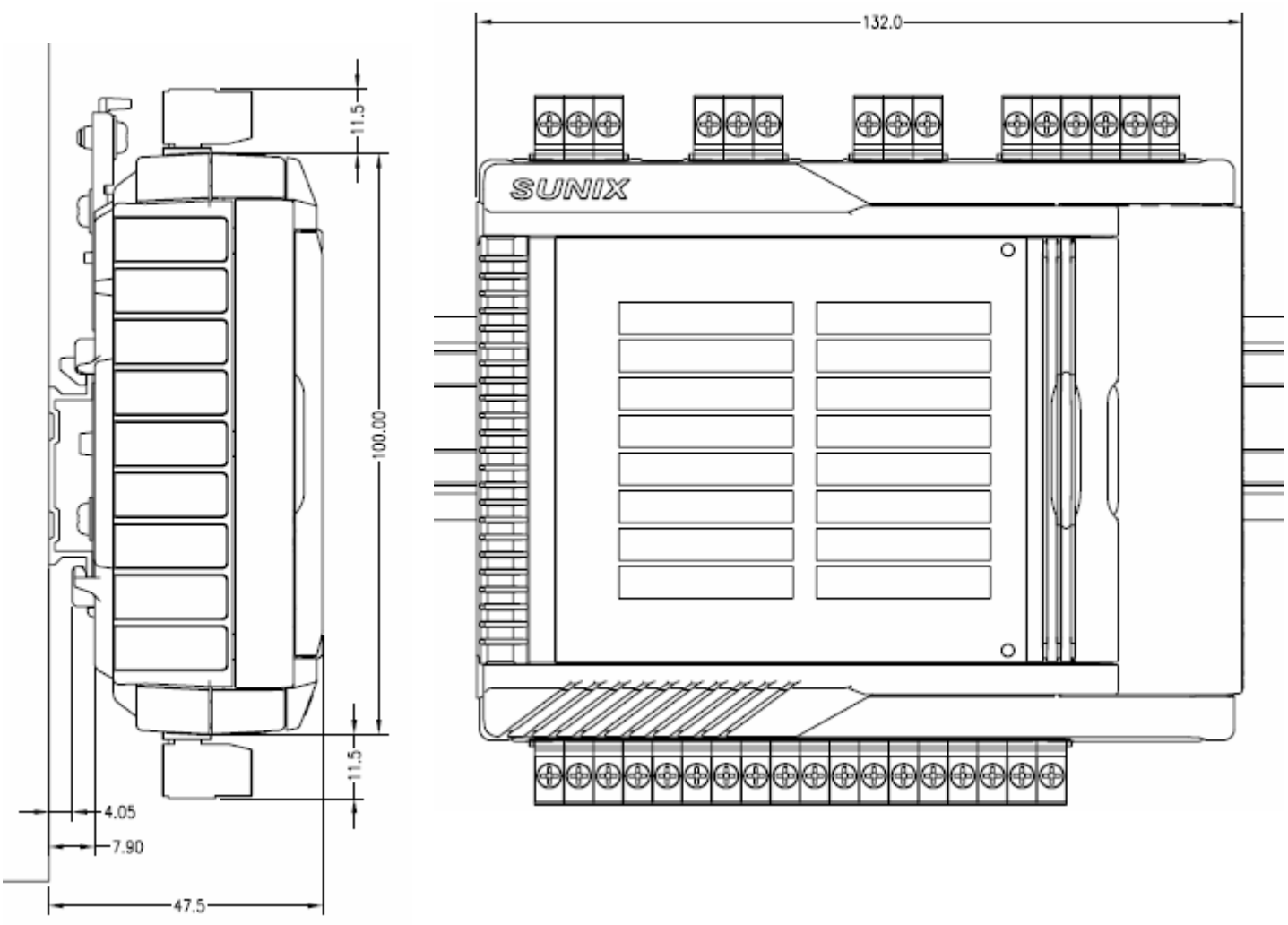
Pulse Generator :	No
Pulse Counter:	10K HZ
ON/OFF Latch:	No
Simulation:	Yes
Input Toggle:	No
Timer Accuarcy:	No
Digital Output Function Block	
Output Sequence ON timer:	No
Output Sequence Off timer:	No
Output Invert:	YES
Pulse Output:	No
TPC Output:	No
Duty cycle:	No
Atuo/Man bumpless :	No
Fail Safe (Comm. Watch Dog):	0 to 65535 s
Power on output:	Yes
Alarm Output	Yes
Timer Accuarcy:	No

ioSCADA Module Power Consumption

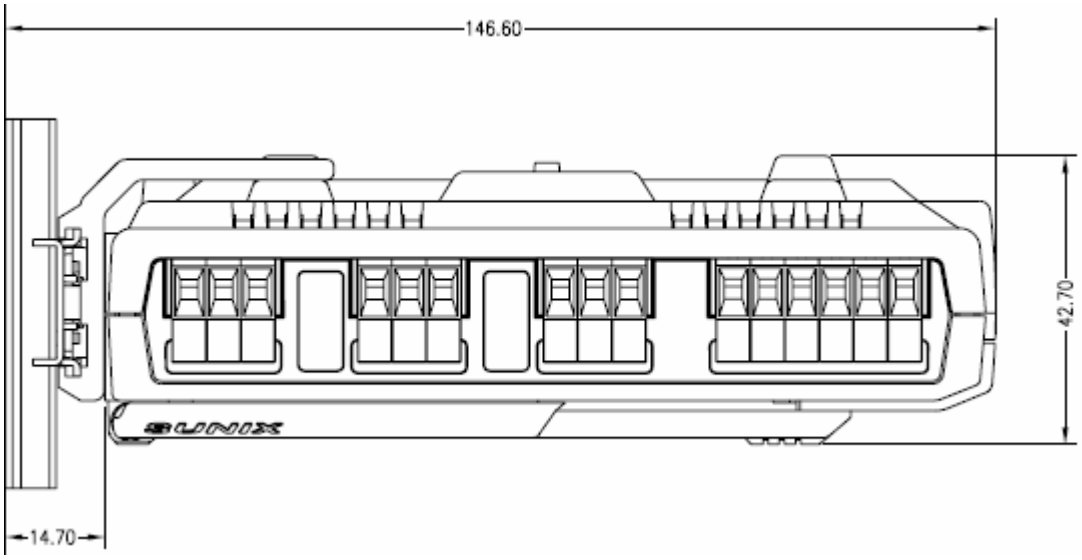
	TYP	MIN	MAX
ioSCADA	**DC 24V**	**DC 10V**	**DC 30V**
SM_DI_116p	0.0617A	0.1244A	0.0474A
SM_DO_108	0.1094A	0.2687A	0.0868A
SM_DO_116	0.1789A	0.4349A	0.1469A
SM_DIO_116p	0.0547A	0.1435A	0.0461A
SM_CNT_102	0.0943A	0.2278A	0.0689A
SM_AO_102i	0.1361A	0.3585A	0.1086A
SM_AI_108i	0.1094A	0.2149A	0.0902A
SM_UI_108i	0.1227A	0.2276A	0.1038A
SM_RTD_108i	0.1266A	0.1721A	0.0733A
SM_TH_108i	0.1146A	0.1601A	0.0662A

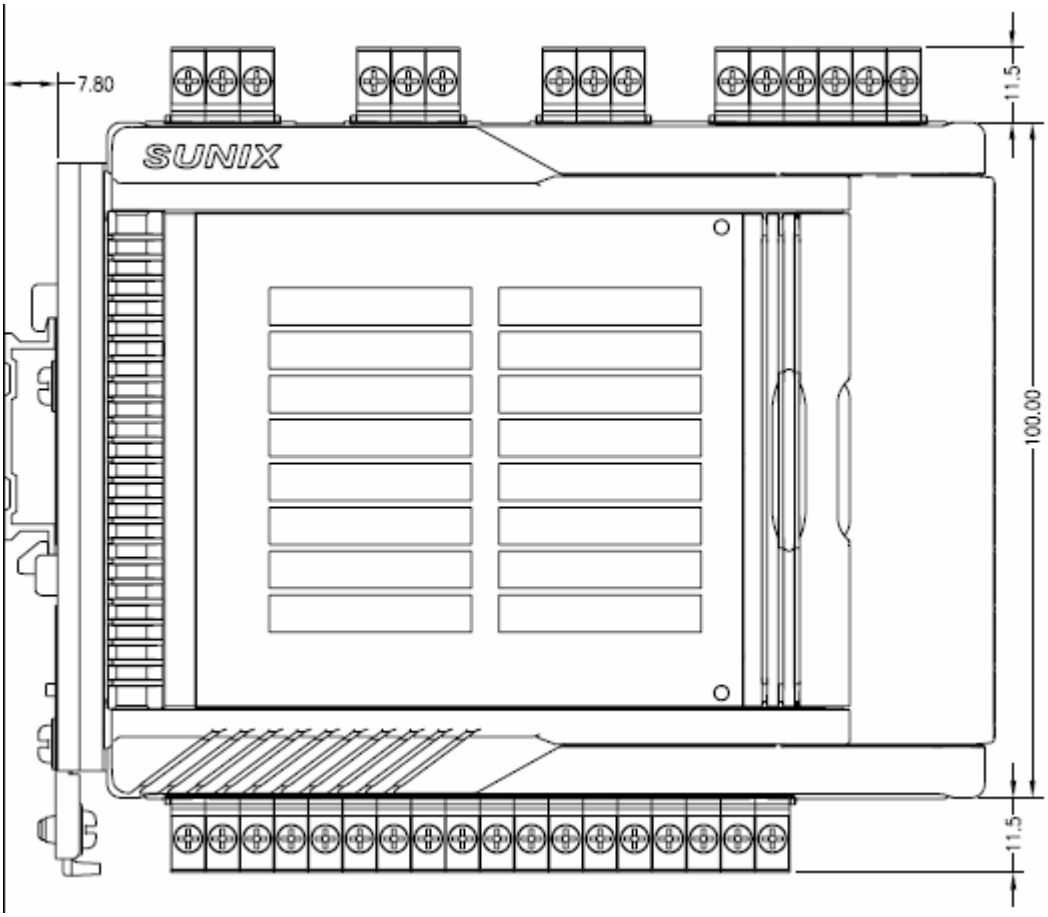
⊙ Appendix 2. Module Site plan and Diagram

HORIZONTAL INSTALLATION DIAGRAM:

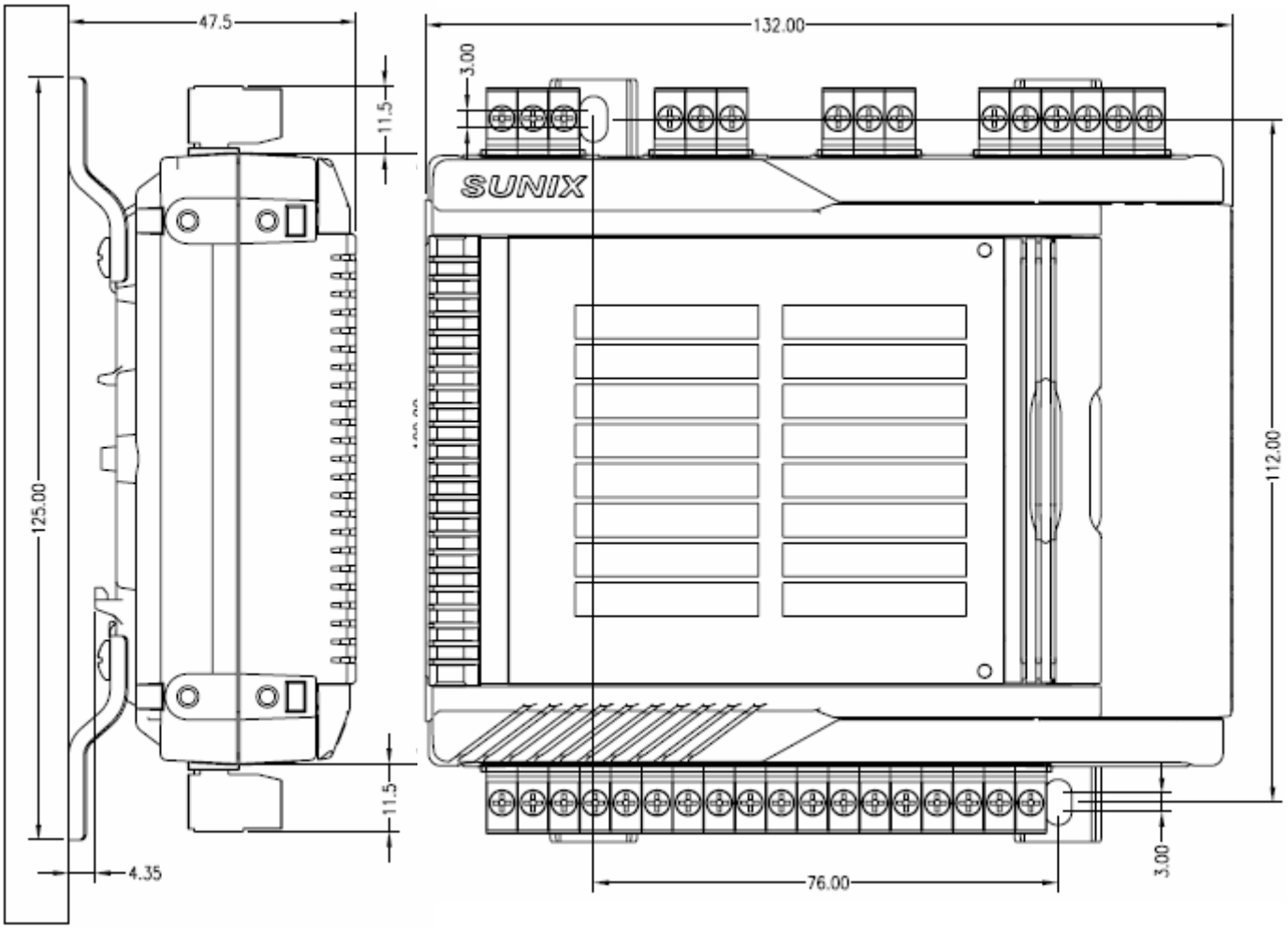


VERTICAL INSTALLATION DIAGRAM:

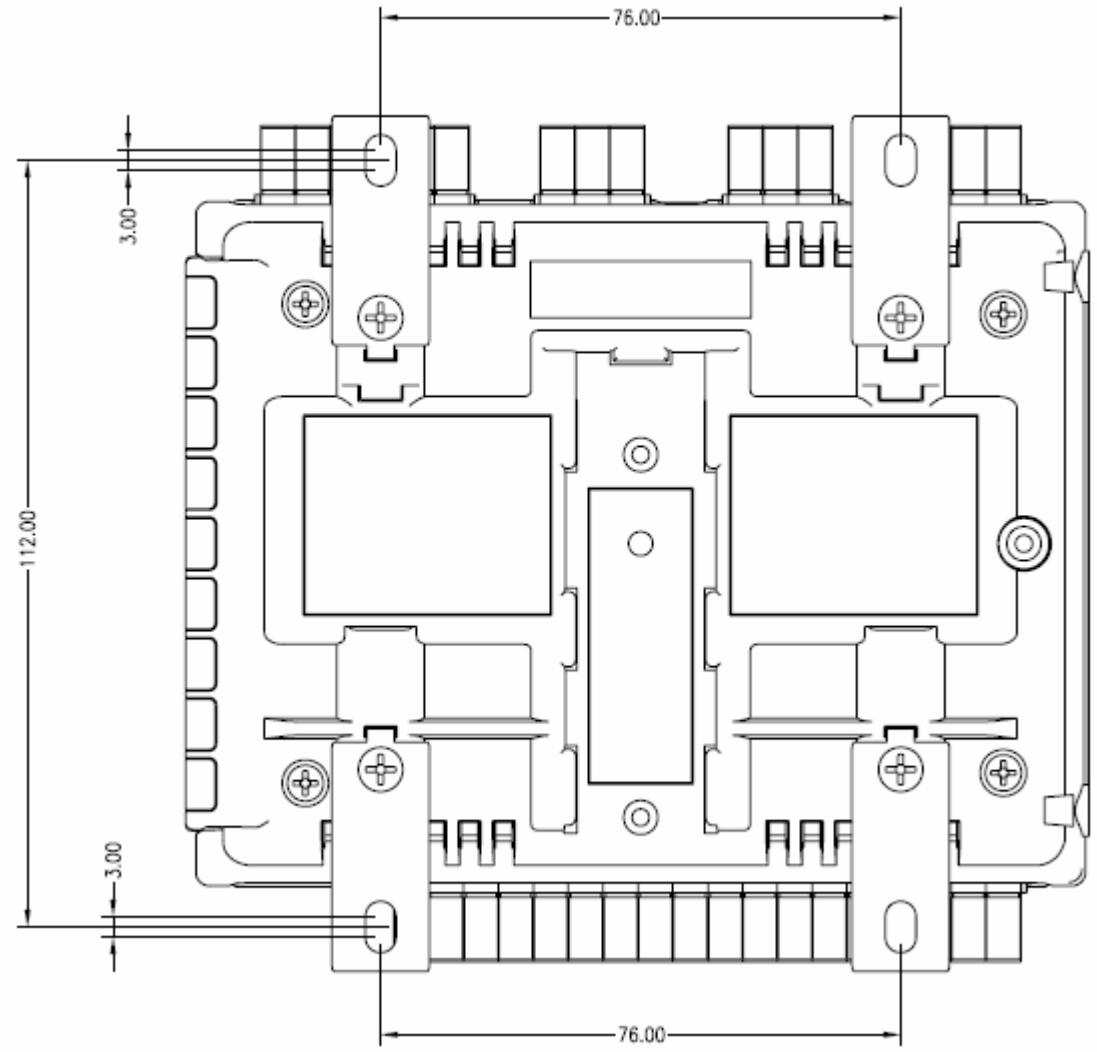



7.80
SUNIX
11.5
100.00
11.5

PANEL INSTALLATION DIAGRAM (Front):

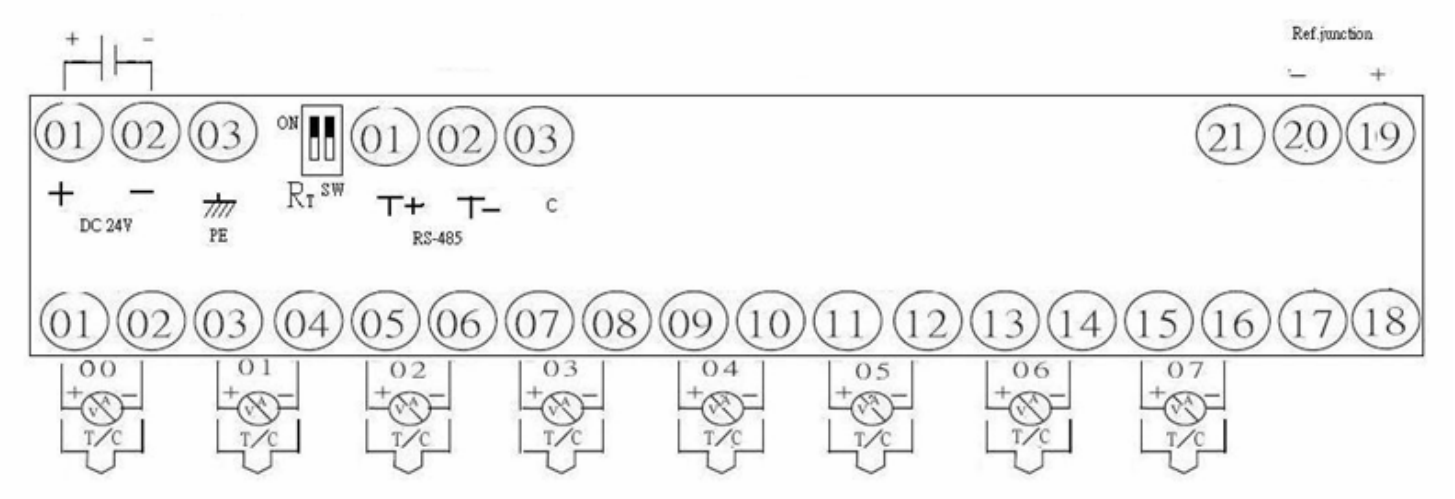


PANEL INSTALLATION DIAGRAM (BACK):



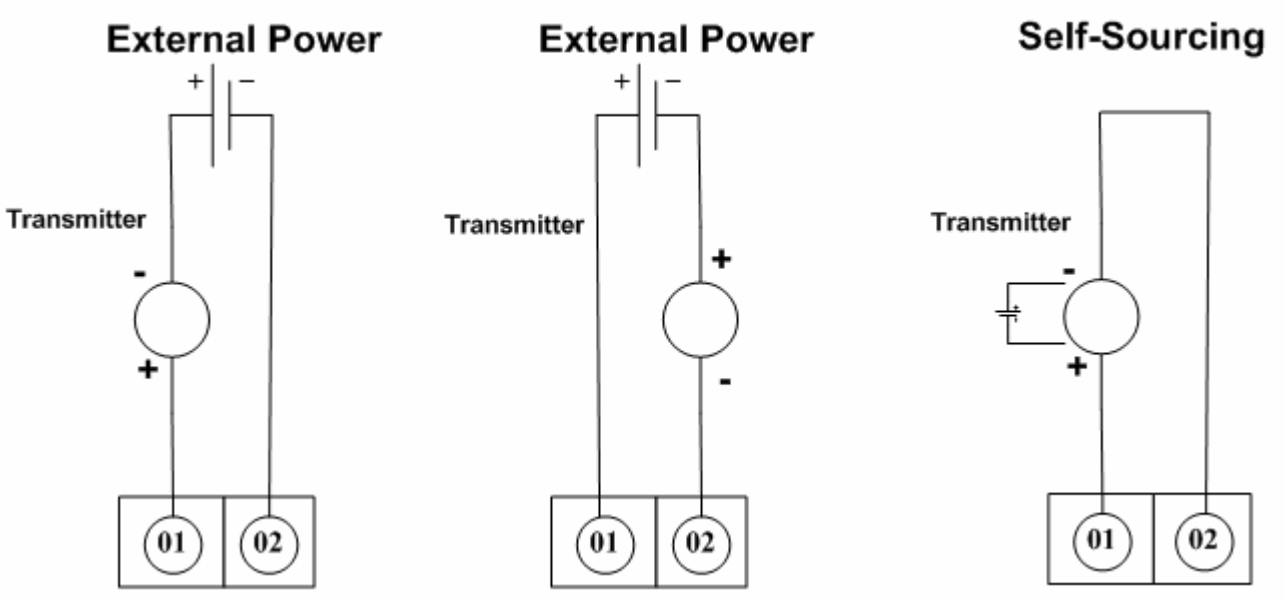
⊙ Appendix 3. Circuit and wiring diagram

SM_UI_108 (i) External wiring diagram



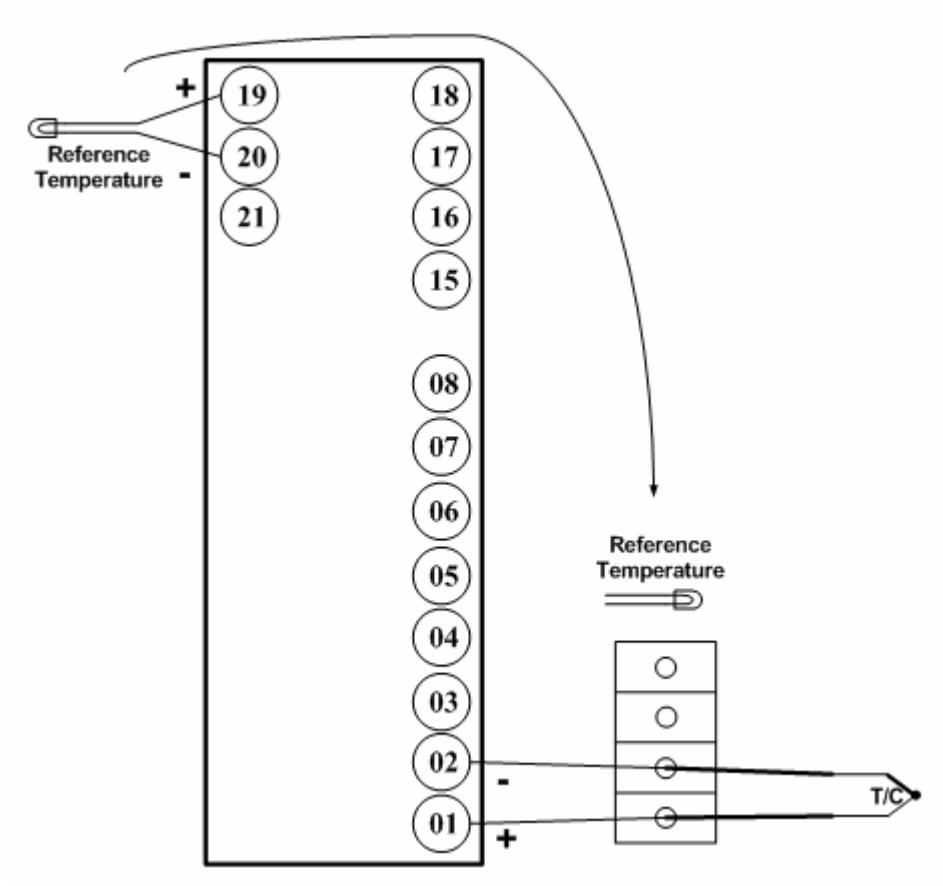
Current signal（ mA）wiring

Current（ mA） two -wiring type sensor（ extenal power supply） Four-wiring type sensor（ Self-sourcing）

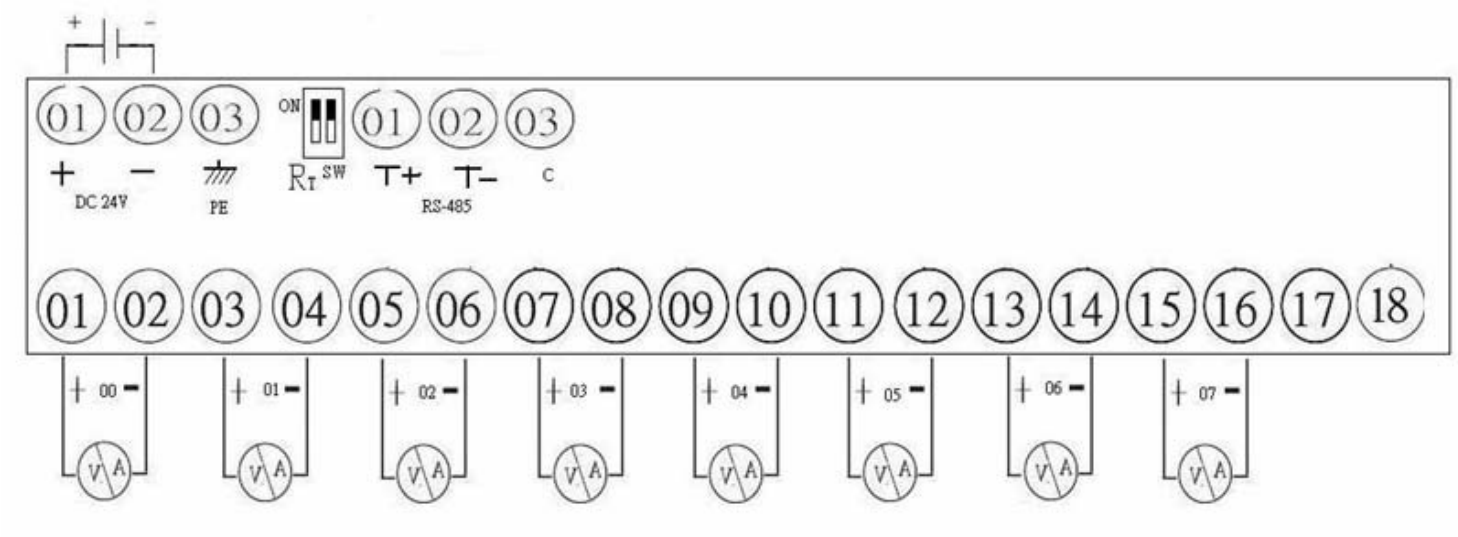


Thermocouple（ T/ C） wiring

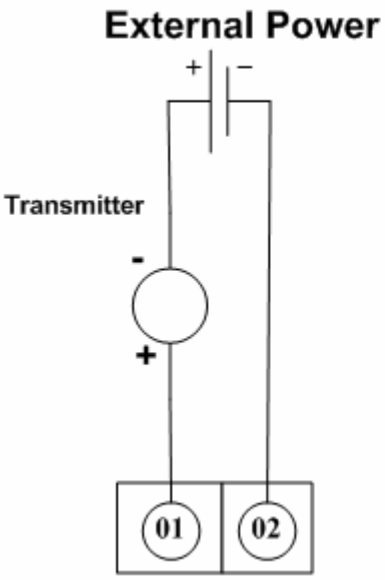
The temperature of the cold junction affects thermocouple measure so much, cause every terminal of the module block's temperature doesn't keep the same, hardly would be the same stable compensation, so to connect extend wiring to the converter block first, then connect to the module block from the converter block, and let the reference temperature sensor put close to the converter block to measure the compensation temperature.



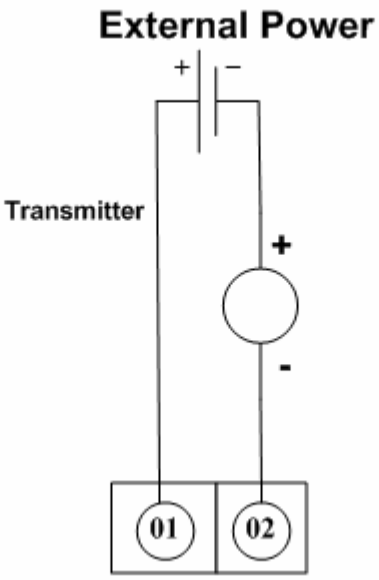
SM_AI_108i External wiring diagram

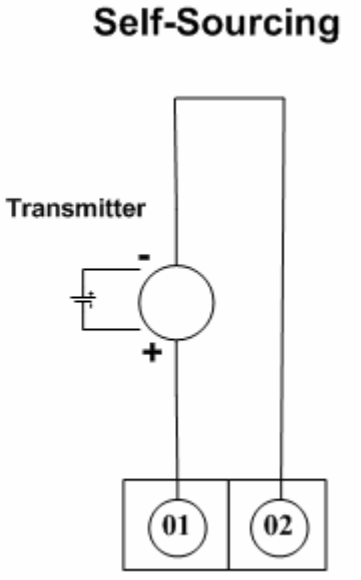


Current（ mA） two -wiring type sensor（ extenal power supply）

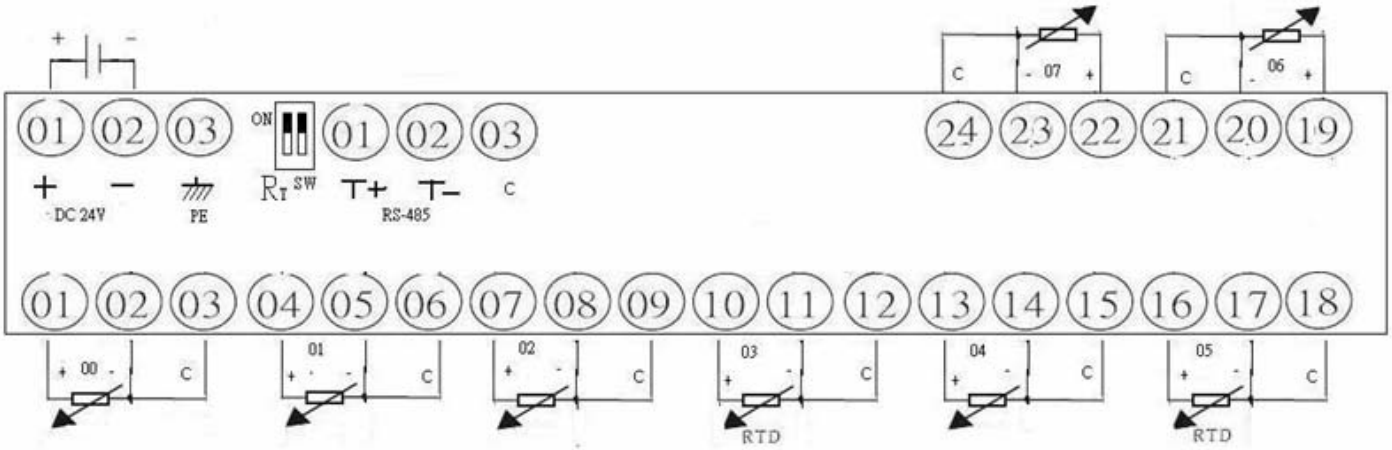


Four-wiring type sensor（ Self-sourcing）

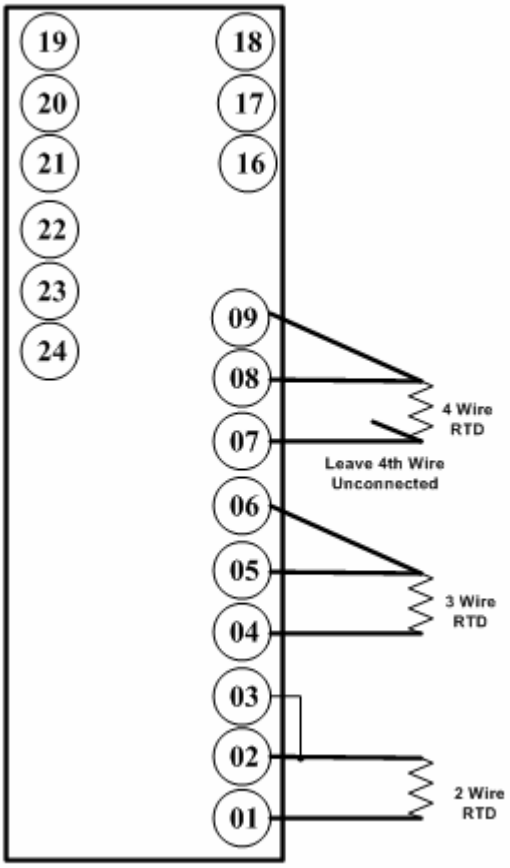




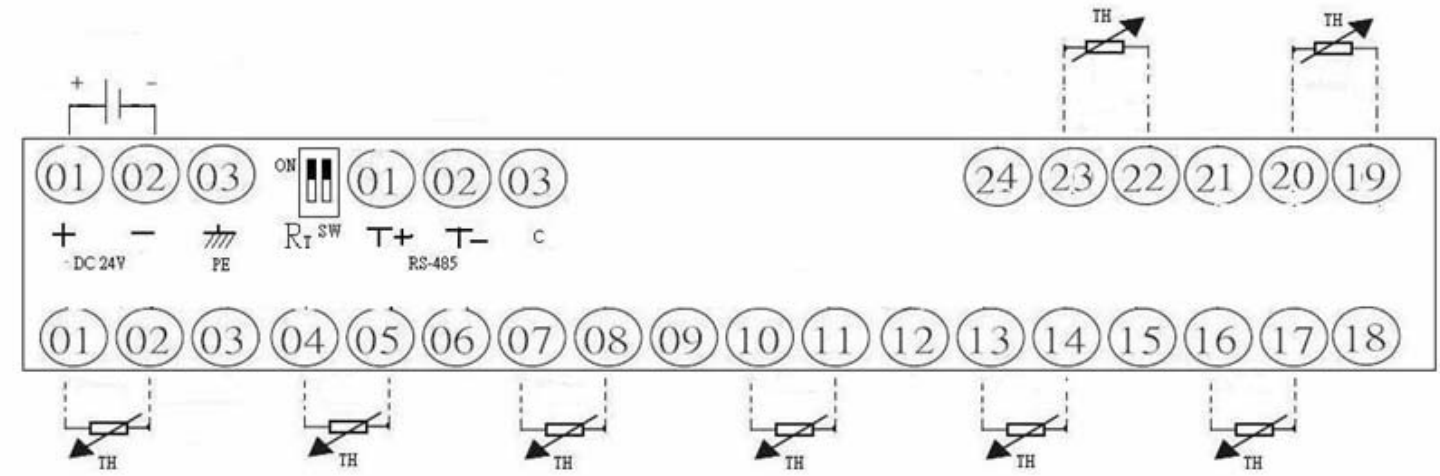
SM_RTD_108i External wiring diagram



RTD's wiring is usually the three-wiring type, mainly to standoff the resistance offset of the wiring. If using two-wiring type wiring(2,3 short loop) , the measure offset will happen cause the RTD' wiring length(resistance). If using four-wiring type, one of the wiring doesn't need to be connected.

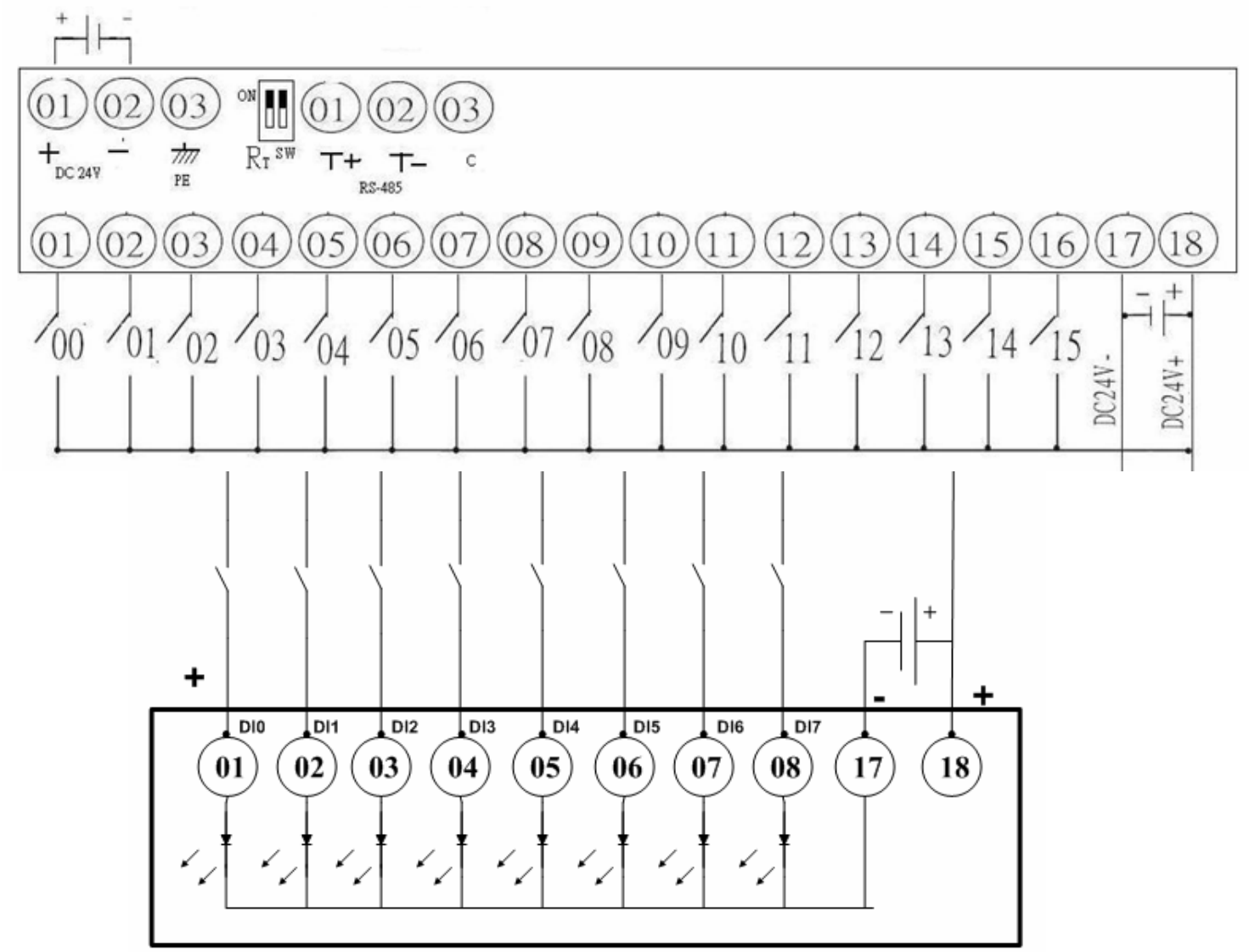


SM_TH_108i External wiring diagram

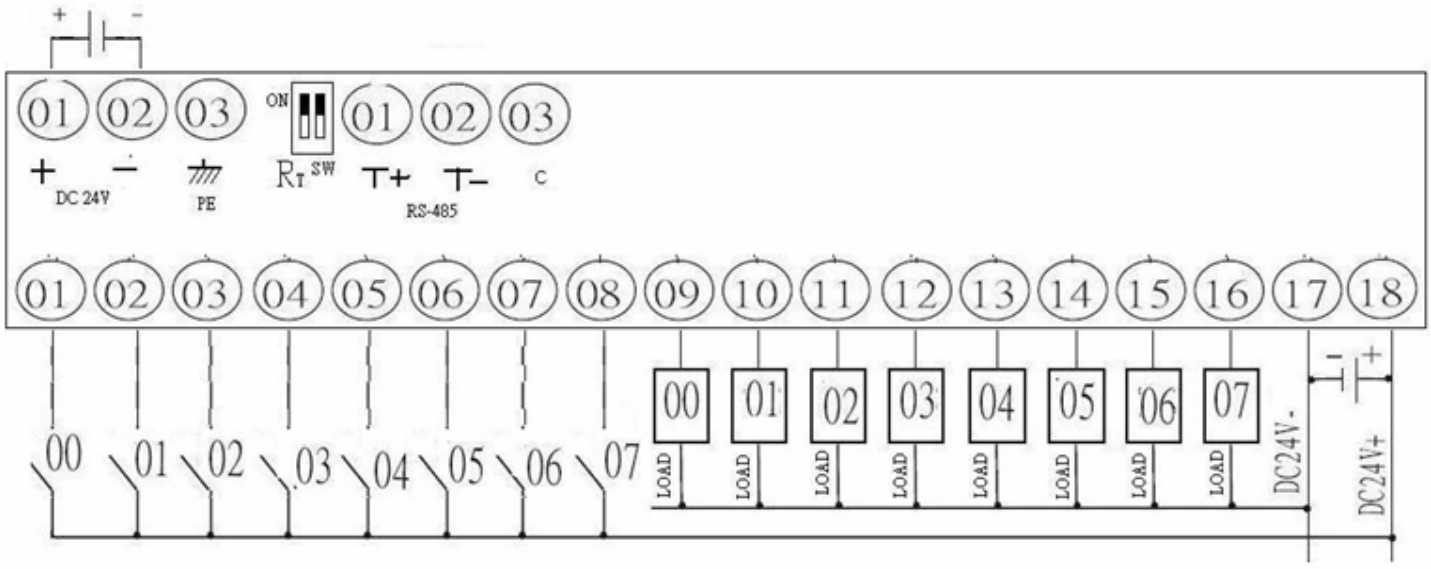


Thermister ‘s junction is like RTD，but the third point doesn’t need to be short loop

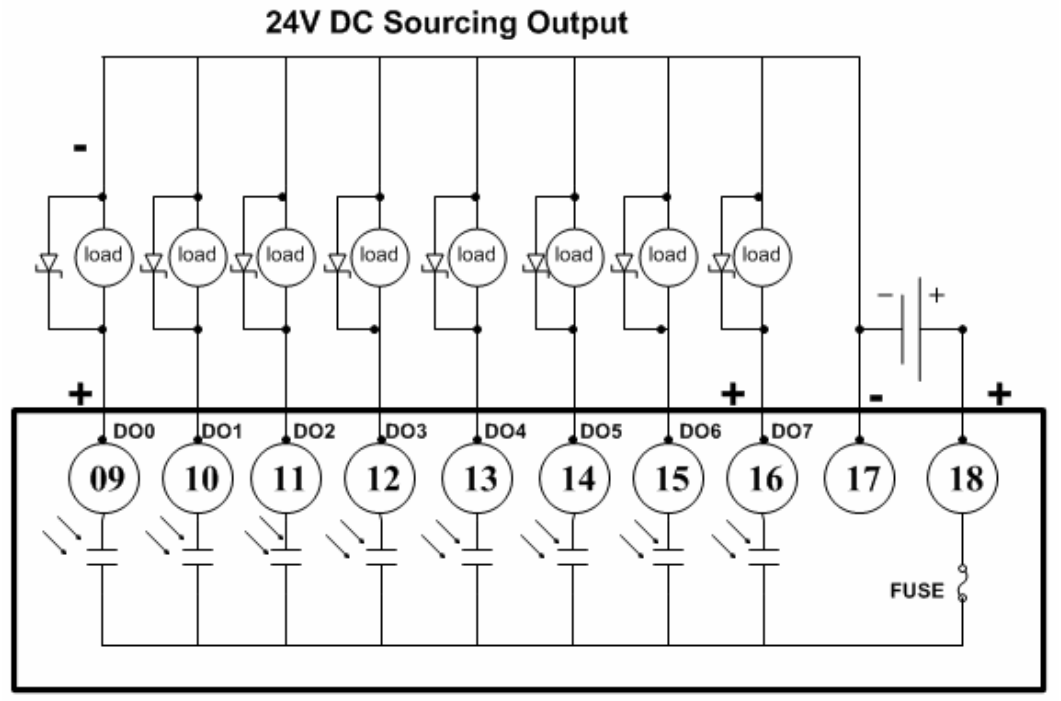
SM_AO_102i External wiring diagram

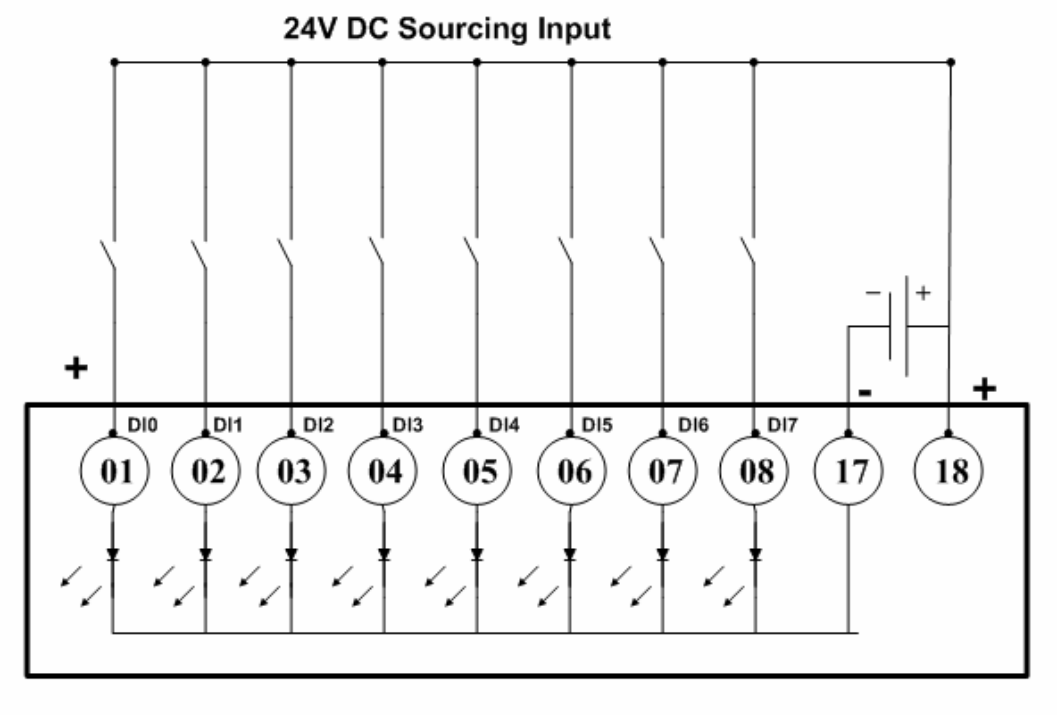


SM_DIO_116p External wiring diagram

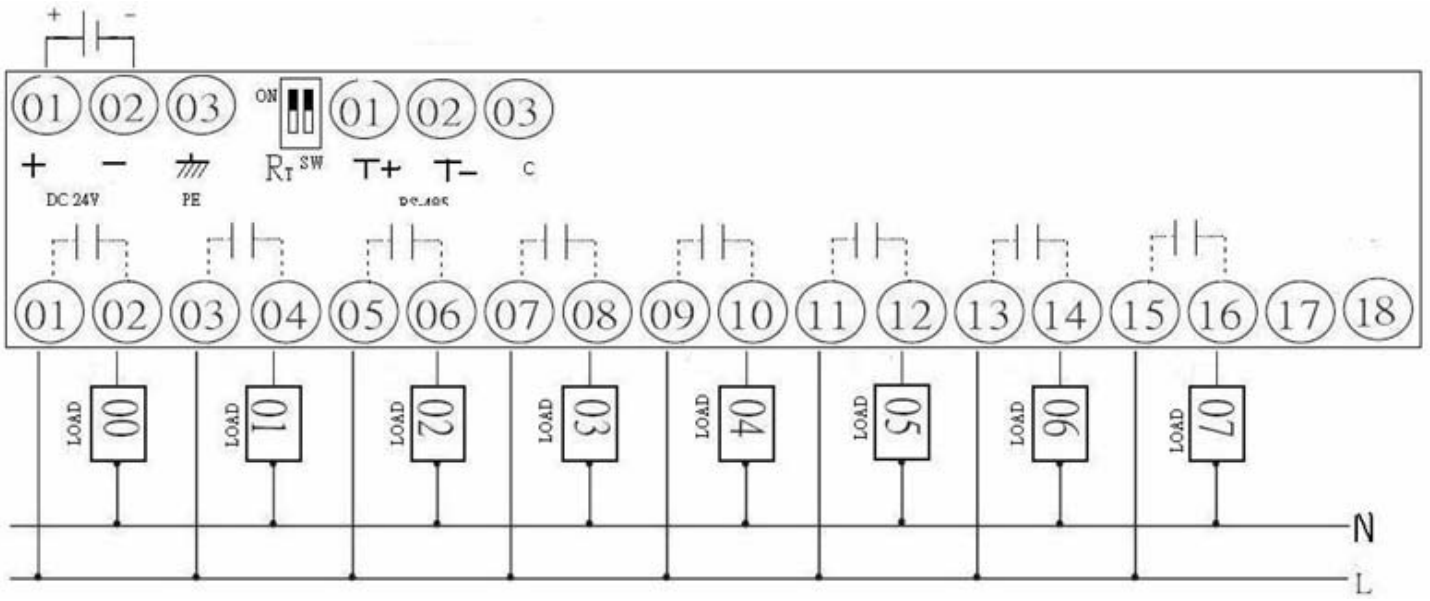


Circuit diagram

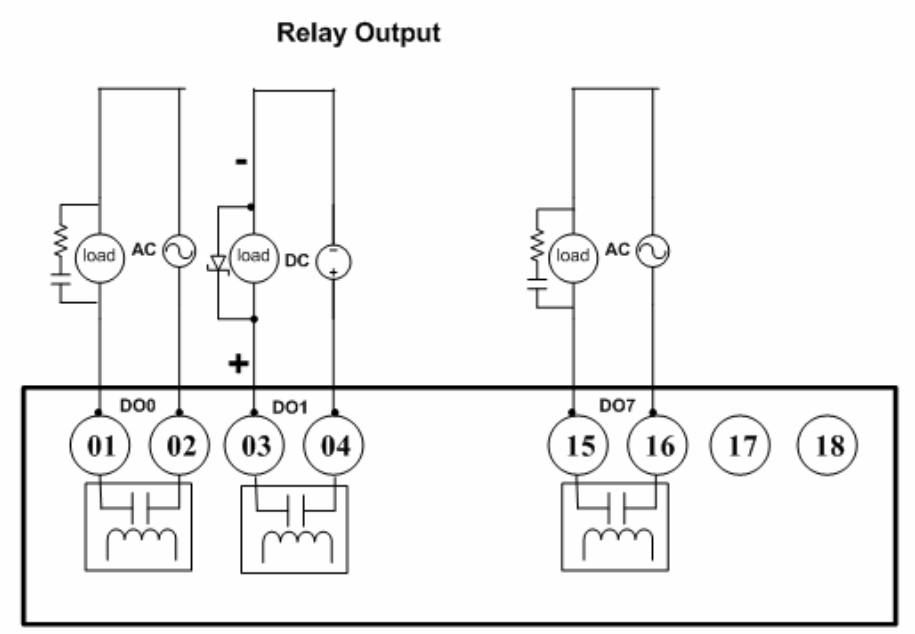



24V DC Sourcing Input
+
DI0
DI1
DI2
DI3
DI4
DI5
DI6
DI7
01
02
03
04
05
06
07
08
17
18
-
+

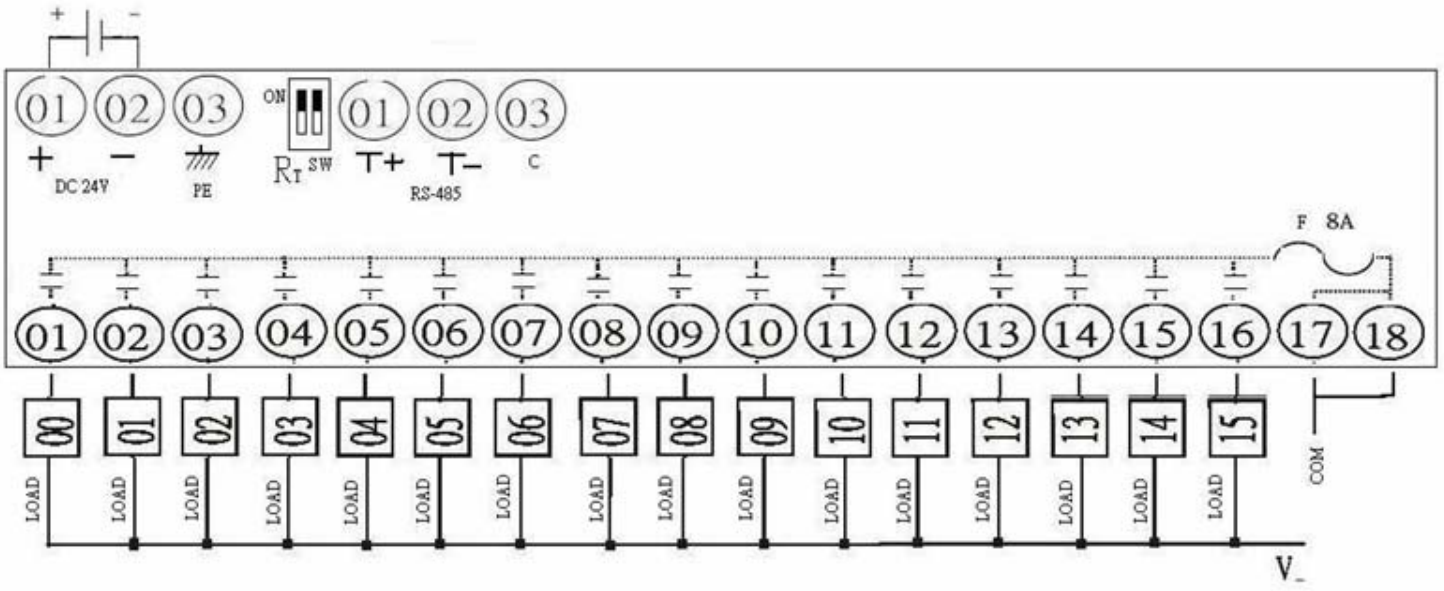
SM_DO_108 External wiring diagram



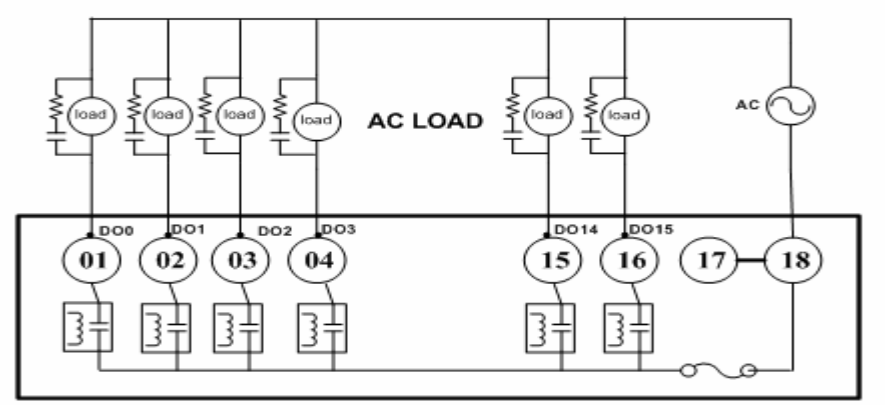
Circuit diagram

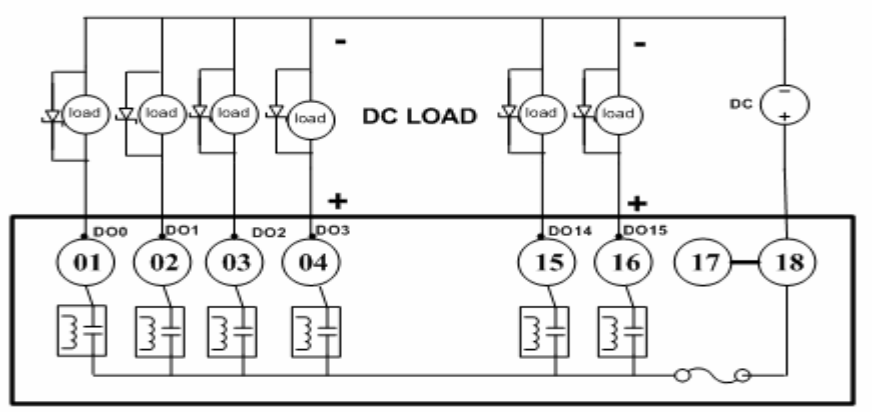


SM_DO_116 External wiring diagram

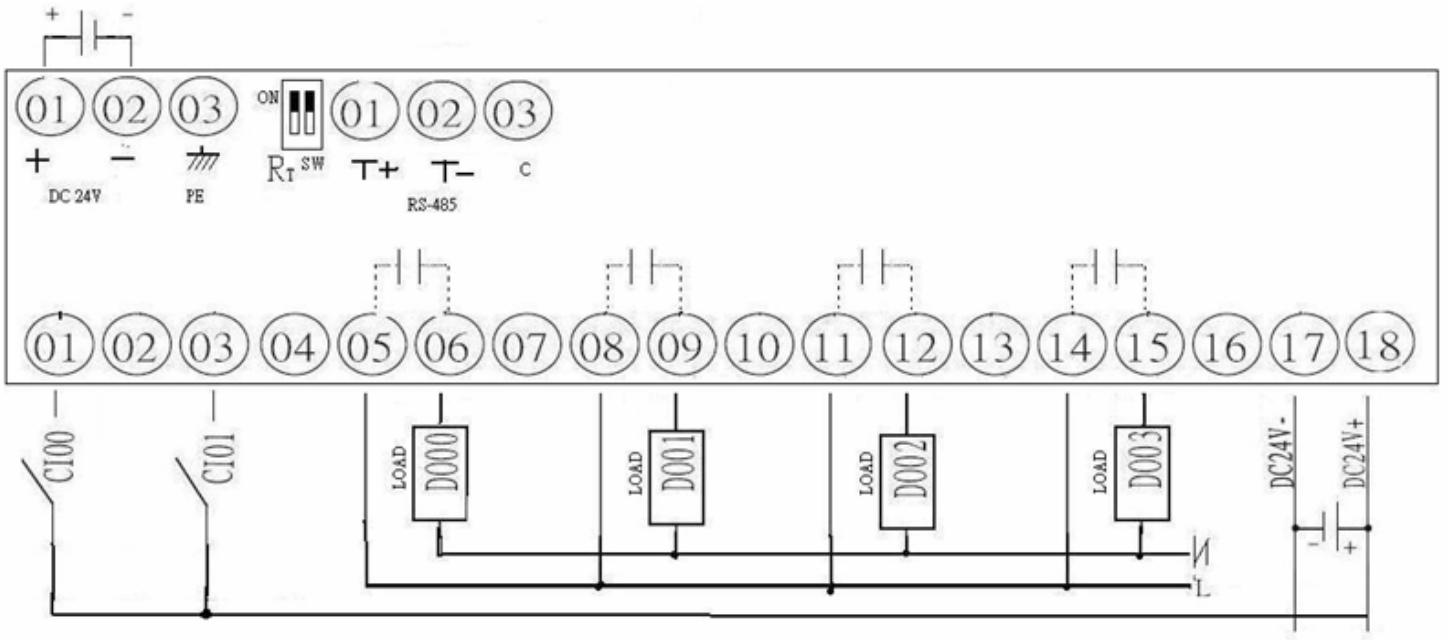


Circuit diagram





SM_CNT_102 External wiring diagram



⊙ Appendix 4. ioSCADA Modbus Address Form

1. The module address is divided to two parts: the one above 40001and below 49001 is the present data zone, the data in this zoon will update time by time, it will not be saved when power off. The capacity of the RAM is different according to the different module. When saving and reading the order over the address range , the exception errors will occur, the one above and include 49001 is the function block reference, it can be modified or set to read only, the modified reference can be saved into EEPROM only by special orders, if it is not saved into EEPROM, it will reset to previous value when power off.

2. The data in the present zoon(below 49001) supports the Modbus function code 1、2、3、4、15、16，at the same time . It can be used bit to read and write, using the address 0xxxx or 1xxxx, and also can be used the integer to read or write, using the address 3xxxx or 4xxxx. But the data in the function reference data zoon(above 49001) only supports Modbus function code 3、4、16，only can be used integer to read or write, using the address 3xxxx or 4xxxx.

3. Using Modbus to read data, the limit length of the single order data is 48 WORDS, when exceeds, the exception errors will occur. Within 48 WORD，if the module data is not exist, it will reply 0 to the master.

SM_DIO_116p Present Data (40001- 40028)

												DI	AI	DO	AO	
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	
40001		40002		40003		40004		40005		40006		40007		40008		
DI 7-0	0x00	DO 7-0	0x00	DI 7-0 On Latch Value	0x00	DI 7-0 Off Latch Value	0x00	DI 7-0 DI-in Value	0x00	DO 7-0 Feedback	0x00					
129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249	
40009		40010		40011		40012		40013		40014		40015		40016		
DI 0 Count Value		DI 1 Count Value		DI 2 Count Value		DI 3 Count Value		DI 4 Count Value		DI 5 Count Value		DI 6 Count Value		DI 7 Count Value		
257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377	
40017		40018		40019		40020		40021		40022		40023		40024		
DO 0 TPC OUT		DO 1 TPC OUT		DO 2TPC OUT		DO 3 TPC OUT		DO 4 TPC OUT		DO 5 TPC OUT		DO 6 TPC OUT		DO 7 TPC OUT		
385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505	
40025		40026		40027		40028		40029		40030		40031		40032		
DI 7-0 Bypass	DO 7-0 Manual	DI 7-0 Sim	DO 7-0 Sim	DI 7-0 On/Off Latch Clear	0x00	DI 7-0 Clear Counters	0x00									

SM_DIO_116p Module Reference (49001-49064)

											DI	AI	DO	AO	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49001		49002		49003		49004		49005		49006		49007		49008	
Product-ID		Product-Version		System Error				System Setup		Protocol Config		Response Delay			
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49009		49010		49011		49012		49013		49014		49015		49016	
DI 7-0 Invert	DO 7-0 Invert	DI 7-0 read latch auto clear	0x00	DI 7-0 Active Counters	I2O DI 7-0 to DO 7-0	DO 7-0 Pwr-on Value	ADD/OR	DO 7-0 Fail Latch	0x00	DO 7-0 Fail Safe Value	0x00			Fail Time	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49017		49018		49019		49020		49021		49022		49023		49024	
DI 0 Process mode		DI 1 Process mode		DI 2 Process mode		DI 3 Process mode		DI 4 Process mode		DI 5 Process mode		DI 6 Process mode		DI 7 Process mode	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49025		49026		49027		49028		49029		49030		49031		49032	
DO 0 Process mode		DO 1 Process mode		DO 2 Process mode		DO 3 Process mode		DO 4 Process mode		DO 5 Process mode		DO 6 Process mode		DO 7 Process mode	

7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49033		49034		49035		49036		49037		49038		49039		49040	
DI 0 Debounce		DI 1 Debounce		DI 2 Debounce		DI 3 Debounce		DI 4 Debounce		DI 5 Debounce		DI 6 Debounce		DI 7 Debounce	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49041		49042		49043		49044		49045		49046		49047		49048	
DO 0 Debounce		DO 1 Debounce		DO 2 Debounce		DO 3 Debounce		DO 4 Debounce		DO 5 Debounce		DO 6 Debounce		DO 7 Debounce	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49049		49050		49051		49052		49053		49054		49055		49056	
DI 0 On Delay Time		DI 1 On Delay Time		DI 2 On Delay Time		DI 3 On Delay Time		DI 4 On Delay Time		DI 5 On Delay Time		DI 6 On Delay Time		DI 7 On Delay Time	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49057		49058		49059		49060		49061		49062		49063		49064	
DO 0 On Delay Time		DO 1 On Delay Time		DO 2 On Delay Time		DO 3 On Delay Time		DO 4 On Delay Time		DO 5 On Delay Time		DO 6 On Delay Time		DO 7 On Delay Time	

SM_DIO_116p Module Reference (49065-49120)

												DI	AI	DO	AO
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49065		49066		49067		49068		49069		49070		49071		49072	
DI 0 Off Delay Time /Pulse Time		DI 1 Off Delay Time /Pulse Time		DI 2 Off Delay Time /Pulse Time		DI 3 Off Delay Time /Pulse Time		DI 4 Off Delay Time /Pulse Time		DI 5 Off Delay Time /Pulse Time		DI 6 Off Delay Time /Pulse Time		DI 7 Off Delay Time /Pulse Time	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49073		49074		49075		49076		49077		49078		49079		49080	
DO 0 Off Delay Time /Pulse Time		DO 1 Off Delay Time /Pulse Time		DO 2 Off Delay Time /Pulse Time		DO 3 Off Delay Time /Pulse Time		DO 4 Off Delay Time /Pulse Time		DO 5 Off Delay Time /Pulse Time		DO 6 Off Delay Time /Pulse Time		DO 7 Off Delay Time /Pulse Time	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49081		49082		49083		49084		49085		49086		49087		49088	
DO 0 TPC Cycle Time		DO 1 TPC Cycle Time		DO 2 TPC Cycle Time		DO 3 TPC Cycle Time		DO 4 TPC Cycle Time		DO 5 TPC Cycle Time		DO 6 TPC Cycle Time		DO 7 TPC Cycle Time	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49089		49090		49091		49092		49093		49094		49095		49096	

7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49097		49098		49099		49100		49101		49102		49103		49104	
DO 0 TPC Fail Out		DO 1 TPC Fail Out		DO 2 TPC Fail Out		DO 3 TPC Fail Out		DO 4 TPC Fail Out		DO 5 TPC Fail Out		DO 6 TPC Fail Out		DO 7 TPC Fail Out	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49105		49106		49107		49108		49109		49110		49111		49112	
7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
49113		49114		49115		49116		49117		49118		49119		49120	
I2O DO0 Logic		I2O DO1 Logic		I2O DO2 Logic		I2O DO3 Logic		I2O DO4 Logic		I2O DO5 Logic		I2O DO6 Logic		I2O DO7 Logic	

SM_DI_116p Present Data (40001- 40028)

												DI	AI	DO	AO	
modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008	
	DI 7-0	DI 15-8	DI 7-0 On Latch Value	DI 15-8 On Latch Value	DI 7-0 Off Latch Value	DI 15-8 Off Latch Value	DI 7-0 DI-in Value	DI 15-8 DI-in Value								
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249
modbus WORD	40009		40010		40011		40012		40013		40014		40015		40016	
	DI 0 Count Value		DI 1 Count Value		DI 2 Count Value		DI 3 Count Value		DI 4 Count Value		DI 5 Count Value		DI 6 Count Value		DI 7 Count Value	
modbus BIT	257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377
modbus WORD	40017		40018		40019		40020		40021		40022		40023		40024	
	DI 8 Count Value		DI 9 Count Value		DI 10 Count Value		DI 11 Count Value		DI 12 Count Value		DI 13 Count Value		DI 14 Count Value		DI 15 Count Value	
modbus BIT	385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505
modbus WORD	40025		40026		40027		40028		40029		40030		40031		40032	
	DI 7-0 Bypass	DI 15-8 Bypass	DI 7-0 Sim	DI 15-8 Sim	DI 7-0 On/Off Latch Clear	DI 15-8 On/Off Latch Clear	DI 7-0 Clear Counters	DI 15-8 Clear Counters								

SM_DI_116p Module Reference (49001- 49064)

													DI		AI		DO		AO	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49001		49002		49003		49004		49005		49006			49007				49008	
	Product-ID		Product-Version		System Error				System Setup		Protocol Config			Response Delay					
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49009		49010		49011		49012		49013		49014			49015				49016	
	DI 7-0 Invert	DI 15-8 Invert	DI 7-0 read latch auto clear	DI 15-8 read latch auto clear	DI 7-0 Active Counters	DI 15-8 Active Counters													
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49017		49018		49019		49020		49021		49022			49023				49024	
	DI 0 Process mode		DI 1 Process mode		DI 2 Process mode		DI 3 Process mode		DI 4 Process mode		DI 5 Process mode			DI 6 Process mode				DI 7 Process mode	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49025		49026		49027		49028		49029		49030			49031				49032	
	DI 8 Process mode		DI 9 Process mode		DI 10 Process mode		DI 11 Process mode		DI 12 Process mode		DI 13 Process mode			DI 14 Process mode				DI 15 Process mode	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8	7..0	15..8

modbus WORD	49033		49034		49035		49036		49037		49038		49039		49040	
	DI 0 Debounce		DI 1 Debounce		DI 2 Debounce		DI 3 Debounce		DI 4 Debounce		DI 5 Debounce		DI 6 Debounce		DI 7 Debounce	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49041		49042		49043		49044		49045		49046		49047		49048	
	DI 8 Debounce		DI 9 Debounce		DI 10 Debounce		DI 11 Debounce		DI 12 Debounce		DI 13 Debounce		DI 14 Debounce		DI 15 Debounce	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49049		49050		49051		49052		49053		49054		49055		49056	
	DI 0 On Delay Time		DI 1 On Delay Time		DI 2 On Delay Time		DI 3 On Delay Time		DI 4 On Delay Time		DI 5 On Delay Time		DI 6 On Delay Time		DI 7 On Delay Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49057		49058		49059		49060		49061		49062		49063		49064	
	DI 8 On Delay Time		DI 9 On Delay Time		DI 10 On Delay Time		DI 11 On Delay Time		DI 12 On Delay Time		DI 13 On Delay Time		DI 14 On Delay Time		DI 15 On Delay Time	

SM_DI_116p Module Reference (49065-49080)

	DI	AI	DO	AO

WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49065		49066		49067		49068		49069		49070		49071		49072	
	DI 0 Off Delay Time /Pulse Time		DI 1 Off Delay Time /Pulse Time		DI 2 Off Delay Time /Pulse Time		DI 3 Off Delay Time /Pulse Time		DI 4 Off Delay Time /Pulse Time		DI 5 Off Delay Time /Pulse Time		DI 6 Off Delay Time /Pulse Time		DI 7 Off Delay Time /Pulse Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49073		49074		49075		49076		49077		49078		49079		49080	
	DI 8 Off Delay Time /Pulse Time		DI 9 Off Delay Time /Pulse Time		DI 10 Off Delay Time /Pulse Time		DI 11 Off Delay Time /Pulse Time		DI 12 Off Delay Time /Pulse Time		DI 13 Off Delay Time /Pulse Time		DI 14 Off Delay Time /Pulse Time		DI 15 Off Delay Time /Pulse Time	

	SM_DO_108 Present Data (40001-40026)											DI	AI	DO	AO	
modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008	
	DO 7-0	0x00	DO 7-0 Feedback	0x00												
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249
modbus WORD	40009		40010		40011		40012		40013		40014		40015		40016	
	DO 0 TPC OUT		DO 1 TPC OUT		DO 2TPC OUT		DO 3 TPC OUT		DO 4 TPC OUT		DO 5 TPC OUT		DO 6 TPC OUT		DO 7 TPC OUT	
modbus BIT	257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377
modbus WORD	40017		40018		40019		40020		40021		40022		40023		40024	
modbus BIT	385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505
modbus WORD	40025		40026		40027		40028		40029		40030		40031		40032	
	DO 7-0 Manual	0x00	DO 7-0 Sim	0x00												

SM_DO_108 Module Reference (49001-49056)

													DI		AI	DO	AO	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49001		49002		49003		49004		49005		49006		49007				49008	
	Product-ID		Product-Version		System Error				System Setup		Protocol Config		Response Delay					
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49009		49010		49011		49012		49013		49014		49015				49016	
	DO 7-0 Invert	0x00					DO 7-0 Pwr-on Value	0x00	DO 7-0 Fail Latch	0x00	DO 7-0 Fail Safe Value	0x00					Fail Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49017		49018		49019		49020		49021		49022		49023				49024	
	DO 0 Process mode		DO 1 Process mode		DO 2 Process mode		DO 3 Process mode		DO 4 Process mode		DO 5 Process mode		DO 6 Process mode				DO 7 Process mode	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49025		49026		49027		49028		49029		49030		49031				49032	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49033		49034		49035		49036		49037		49038		49039				49040	
	DO 0 Debounce		DO 1 Debounce		DO 2 Debounce		DO 3 Debounce		DO 4 Debounce		DO 5 Debounce		DO 6 Debounce				DO 7 Debounce	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49041		49042		49043		49044		49045		49046		49047				49048	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49049		49050		49051		49052		49053		49054		49055				49056	
	DO 0 On Delay Time		DO 1 On Delay Time		DO 2 On Delay Time		DO 3 On Delay Time		DO 4 On Delay Time		DO 5 On Delay Time		DO 6 On Delay Time				DO 7 On Delay Time	

	SM_DO_108 Module Reference (49065- 49104)												DI		AI		DO		AO	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8			7..0	15..8			7..0	15..8
modbus WORD	49065		49066		49067		49068		49069		49070				49071				49072	
	DO 0 Off Delay Time /Pulse Time		DO 1 Off Delay Time /Pulse Time		DO 2 Off Delay Time /Pulse Time		DO 3 Off Delay Time /Pulse Time		DO 4 Off Delay Time /Pulse Time		DO 5 Off Delay Time /Pulse Time				DO 6 Off Delay Time /Pulse Time				DO 7 Off Delay Time /Pulse Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8			7..0	15..8			7..0	15..8
modbus WORD	49073		49074		49075		49076		49077		49078				49079				49080	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8			7..0	15..8			7..0	15..8
modbus WORD	49081		49082		49083		49084		49085		49086				49087				49088	
	DO 0 TPC Cycle Time		DO 1 TPC Cycle Time		DO 2 TPC Cycle Time		DO 3 TPC Cycle Time		DO 4 TPC Cycle Time		DO 5 TPC Cycle Time				DO 6 TPC Cycle Time				DO 7 TPC Cycle Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8			7..0	15..8			7..0	15..8
modbus WORD	49089		49090		49091		49092		49093		49094				49095				49096	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8			7..0	15..8			7..0	15..8
modbus WORD	49097		49098		49099		49100		49101		49102				49103				49104	
	DO 0 TPC Fail Out		DO 1 TPC Fail Out		DO 2 TPC Fail Out		DO 3 TPC Fail Out		DO 4 TPC Fail Out		DO 5 TPC Fail Out				DO 6 TPC Fail Out				DO 7 TPC Fail Out	

	SM_DO_116 Present Data (40001-40026)	DI	AI	DO	AO	

modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008	
	DO 7-0	DO 15-8	DO 7-0 Feedback	DO 15-8 Feedback												
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249
modbus WORD	40009		40010		40011		40012		40013		40014		40015		40016	
	DO 0 TPC OUT		DO 1 TPC OUT		DO 2TPC OUT		DO 3 TPC OUT		DO 4 TPC OUT		DO 5 TPC OUT		DO 6 TPC OUT		DO 7 TPC OUT	
modbus BIT	257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377
modbus WORD	40017		40018		40019		40020		40021		40022		40023		40024	
	DO 8 TPC OUT		DO 9 TPC OUT		DO 10 TPC OUT		DO 11 TPC OUT		DO 12 TPC OUT		DO 13 TPC OUT		DO 14 TPC OUT		DO 15 TPC OUT	
modbus BIT	385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505
modbus WORD	40025		40026		40027		40028		40029		40030		40031		40032	
	DO 7-0 Manual	DO 15-8 Manual	DO 7-0 Sim	DO 15-8 Sim												

SM_DO_116 Module Reference (49001-49064)

	DI	AI	DO	AO

WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49001		49002		49003		49004		49005		49006		49007		49008	
	Product-ID		Product-Version		System Error				System Setup		Protocol Config		Response Delay			
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49009		49010		49011		49012		49013		49014		49015		49016	
	DO 7-0 Invert	DO 15-8 Invert					DO 7-0 Pwr-on Value	DO 15-8 Pwr-on Value	DO 7-0 Fail Latch	DO 15-8 Fail Latch	DO 7-0 Fail Safe Value	DO 15-8 Fail Safe Value			Fail Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49017		49018		49019		49020		49021		49022		49023		49024	
	DO 0 Process mode		DO 1 Process mode		DO 2 Process mode		DO 3 Process mode		DO 4 Process mode		DO 5 Process mode		DO 6 Process mode		DO 7 Process mode	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49025		49026		49027		49028		49029		49030		49031		49032	
	DO 8 Process mode		DO 9 Process mode		DO 10 Process mode		DO 11 Process mode		DO 12 Process mode		DO 13 Process mode		DO 14 Process mode		DO 15 Process mode	

WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49033		49034		49035		49036		49037		49038		49039		49040	
	DO 0 Debounce		DO 1 Debounce		DO 2 Debounce		DO 3 Debounce		DO 4 Debounce		DO 5 Debounce		DO 6 Debounce		DO 7 Debounce	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49041		49042		49043		49044		49045		49046		49047		49048	
	DO 8 Debounce		DO 9 Debounce		DO 10 Debounce		DO 11 Debounce		DO 12 Debounce		DO 13 Debounce		DO 14 Debounce		DO 15 Debounce	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49049		49050		49051		49052		49053		49054		49055		49056	
	DO 0 On Delay Time		DO 1 On Delay Time		DO 2 On Delay Time		DO 3 On Delay Time		DO 4 On Delay Time		DO 5 On Delay Time		DO 6 On Delay Time		DO 7 On Delay Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49057		49058		49059		49060		49061		49062		49063		49064	
	DO 8 On Delay Time		DO 9 On Delay Time		DO 10 On Delay Time		DO 11 On Delay Time		DO 12 On Delay Time		DO 13 On Delay Time		DO 14 On Delay Time		DO 15 On Delay Time	

SM_DO_116 Module Reference (49065-49112)

DI | AI | DO | AO

WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49065		49066		49067		49068		49069		49070		49071		49072	
	DO 0 Off Delay Time /Pulse Time		DO 1 Off Delay Time /Pulse Time		DO 2 Off Delay Time /Pulse Time		DO 3 Off Delay Time /Pulse Time		DO 4 Off Delay Time /Pulse Time		DO 5 Off Delay Time /Pulse Time		DO 6 Off Delay Time /Pulse Time		DO 7 Off Delay Time /Pulse Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49073		49074		49075		49076		49077		49078		49079		49080	
	DO 8 Off Delay Time /Pulse Time		DO 9 Off Delay Time /Pulse Time		DO 10 Off Delay Time /Pulse Time		DO 11 Off Delay Time /Pulse Time		DO 12 Off Delay Time /Pulse Time		DO 13 Off Delay Time /Pulse Time		DO 14 Off Delay Time /Pulse Time		DO 15 Off Delay Time /Pulse Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49081		49082		49083		49084		49085		49086		49087		49088	
	DO 0 TPC Cycle Time		DO 1 TPC Cycle Time		DO 2 TPC Cycle Time		DO 3 TPC Cycle Time		DO 4 TPC Cycle Time		DO 5 TPC Cycle Time		DO 6 TPC Cycle Time		DO 7 TPC Cycle Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49089		49090		49091		49092		49093		49094		49095		49096	
	DO 8 TPC Cycle Time		DO 9 TPC Cycle Time		DO 10 TPC Cycle Time		DO 11 TPC Cycle Time		DO 12 TPC Cycle Time		DO 13 TPC Cycle Time		DO 14 TPC Cycle Time		DO 15 TPC Cycle Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49097		49098		49099		49100		49101		49102		49103		49104	
	DO 0 TPC Fail Out		DO 1 TPC Fail Out		DO 2 TPC Fail Out		DO 3 TPC Fail Out		DO 4 TPC Fail Out		DO 5 TPC Fail Out		DO 6 TPC Fail Out		DO 7 TPC Fail Out	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49105		49106		49107		49108		49109		49110		49111		49112	
	DO 8 TPC Fail Out		DO 9 TPC Fail Out		DO 10 TPC Fail Out		DO 11 TPC Fail Out		DO 12 TPC Fail Out		DO 13 TPC Fail Out		DO 14 TPC Fail Out		DO 15 TPC Fail Out	

	SM_RTD_108i/SM_RTD_108 Present Data (40001-40035)											DI	RTD	DO	AO	
modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008	
	RTD 0		RTD 1		RTD 2		RTD 3		RTD 4		RTD 5		RTD 6		RTD 7	
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249
modbus WORD	40009		40010		40011		40012		40013		40014		40015		40016	
	RTD 0 Status		RTD 1 Status		RTD 2 Status		RTD 3 Status		RTD 4 Status		RTD 5 Status		RTD 6 Status		RTD 7 Status	
modbus BIT	257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377
modbus WORD	40017		40018		40019		40020		40021		40022		40023		40024	
	Max RTD 0		Max RTD 1		Max RTD 2		Max RTD 3		Max RTD 4		Max RTD 5		Max RTD 6		Max RTD 7	
modbus BIT	385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505
modbus WORD	40025		40026		40027		40028		40029		40030		40031		40032	
	Min RTD 0		Min RTD 1		Min RTD 2		Min RTD 3		Min RTD 4		Min RTD 5		Min RTD 6		Min RTD 7	
modbus BIT	513	521	529	537	545	553	561	569	577	585	593	601	609	617	625	633
modbus WORD	40033		40034		40035		40036		40037		40038		40039		40040	
	RTD 7-0 Sim	0x00	RTD7-0 Max/Min Reset	0x00	RTD7-0 H/L-Alarm Reset	0x00										

	SM_RTD_108i/SM_RTD_108 Module Reference (49001-49056)												DI		RTD		DO		AO	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49001		49002		49003		49004		49005		49006		49007		49008					
	Product-ID		Product-Version		System Error				System Setup		Protocol Config		Response Delay							
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49009		49010		49011		49012		49013		49014		49015		49016					
			Temperature Unit																	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49017		49018		49019		49020		49021		49022		49023		49024					
	RTD 0 Type		RTD 1 Type		RTD 2 Type		RTD 3 Type		RTD 4 Type		RTD 5 Type		RTD 6 Type		RTD 7 Type					
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49025		49026		49027		49028		49029		49030		49031		49032					
	RTD 0 Offset		RTD 1 Offset		RTD 2 Offset		RTD 3 Offset		RTD 4 Offset		RTD 5 Offset		RTD 6 Offset		RTD 7 Offset					
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49033		49034		49035		49036		49037		49038		49039		49040					
	RTD 0 Smooth		RTD 1 Smooth		RTD 2 Smooth		RTD 3 Smooth		RTD 4 Smooth		RTD 5 Smooth		RTD 6 Smooth		RTD 7 Smooth					
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49041		49042		49043		49044		49045		49046		49047		49048					
	RTD 0 MAX Linit		RTD 1 MAX Linit		RTD 2 MAX Linit		RTD 3 MAX Linit		RTD 4 MAX Linit		RTD 5 MAX Linit		RTD 6 MAX Linit		RTD 7 MAX Linit					
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49049		49050		49051		49052		49053		49054		49055		49056					
	RTD 0 MIN Limit		RTD 1 MIN Limit		RTD 2 MIN Limit		RTD 3 MIN Limit		RTD 4 MIN Limit		RTD 5 MIN Limit		RTD 6 MIN Limit		RTD 7 MIN Limit					

SM_UI_108i/SM_UI_108 Present Data (40001-40035)

												DI	UI	DO	AO		
modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008		
	UI 0		UI 1		UI 2		UI 3		UI 4		UI 5		UI 6		UI 7		
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249	
modbus WORD	40009		40010		40011		40012		40013		40014		40015		40016		
	UI 0 Status		UI 1 Status		UI 2 Status		UI 3 Status		UI 4 Status		UI 5 Status		UI 6 Status		UI 7 Status		
modbus BIT	257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377	
modbus WORD	40017		40018		40019		40020		40021		40022		40023		40024		
	Max UI 0		Max UI 1		Max UI 2		Max UI 3		Max UI 4		Max UI 5		Max UI 6		Max UI 7		
modbus BIT	385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505	
modbus WORD	40025		40026		40027		40028		40029		40030		40031		40032		
	Min UI 0		Min UI 1		Min UI 2		Min UI 3		Min UI 4		Min UI 5		Min UI 6		Min UI 7		
modbus BIT	513	521	529	537	545	553	561	569	577	585	593	601	609	617	625	633	
modbus WORD	40033		40034		40035		40036		40037		40038		40039		40040		
	UI 7-0 Sim	0x00	UI7-0 Max/Min Reset	0x00	UI7-0 H/L-Alarm Reset	0x00											

	SM_UI_108i/SM_UI_108 Module Reference (49001-49056)											DI	UI	DO	AO	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49001		49002		49003		49004		49005		49006		49007		49008	
	Product-ID		Product-Version		System Error				System Setup		Protocol Config		Response Delay			
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49009		49010		49011		49012		49013		49014		49015		49016	
			Temperature Unit		Cold Junction											
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49017		49018		49019		49020		49021		49022		49023		49024	
	UI 0 Type		UI 1 Type		UI 2 Type		UI 3 Type		UI 4 Type		UI 5 Type		UI 6 Type		UI 7 Type	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49025		49026		49027		49028		49029		49030		49031		49032	
	UI 0 Offset		UI 1 Offset		UI 2 Offset		UI 3 Offset		UI 4 Offset		UI 5 Offset		UI 6 Offset		UI 7 Offset	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49033		49034		49035		49036		49037		49038		49039		49040	
	UI 0 Smooth		UI 1 Smooth		UI 2 Smooth		UI 3 Smooth		UI 4 Smooth		UI 5 Smooth		UI 6 Smooth		UI 7 Smooth	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49041		49042		49043		49044		49045		49046		49047		49048	
	UI 0 MAX Linit		UI 1 MAX Linit		UI 2 MAX Linit		UI 3 MAX Linit		UI 4 MAX Linit		UI 5 MAX Linit		UI 6 MAX Linit		UI 7 MAX Linit	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49049		49050		49051		49052		49053		49054		49055		49056	
	UI 0 MIN Limit		UI 1 MIN Limit		UI 2 MIN Limit		UI 3 MIN Limit		UI 4 MIN Limit		UI 5 MIN Limit		UI 6 MIN Limit		UI 7 MIN Limit	

SM_TH_108i/SM_TH_108 Present Data (40001-40035)

DI | TH | DO | AO

modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008	
	TH 0		TH 1		TH 2		TH 3		TH 4		TH 5		TH 6		TH 7	
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249
modbus WORD	40009		40010		40011		40012		40013		40014		40015		40016	
	TH 0 Status		TH 1 Status		TH 2 Status		TH 3 Status		TH 4 Status		TH 5 Status		TH 6 Status		TH 7 Status	
modbus BIT	257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377
modbus WORD	40017		40018		40019		40020		40021		40022		40023		40024	
	Max TH 0		Max TH 1		Max TH 2		Max TH 3		Max TH 4		Max TH 5		Max TH 6		Max TH 7	
modbus BIT	385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505
modbus WORD	40025		40026		40027		40028		40029		40030		40031		40032	
	Min TH 0		Min TH 1		Min TH 2		Min TH 3		Min TH 4		Min TH 5		Min TH 6		Min TH 7	
modbus BIT	513	521	529	537	545	553	561	569	577	585	593	601	609	617	625	633
modbus WORD	40033		40034		40035		40036		40037		40038		40039		40040	
	TH 7-0 Sim	0x00	TH7-0 Max/Min Reset	0x00	TH7-0 H/L-Alarm Reset	0x00										

SM_TH_108i/SM_TH_108 Module Reference (49001-49056)

DI | TH | DO | AO

WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49001		49002		49003		49004		49005		49006		49007		49008		
	Product-ID		Product-Version		System Error				System Setup		Protocol Config		Response Delay				
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49009		49010		49011		49012		49013		49014		49015		49016		
			Temperature Unit														
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49017		49018		49019		49020		49021		49022		49023		49024		
	TH 0 Type		TH 1 Type		TH 2 Type		TH 3 Type		TH 4 Type		TH 5 Type		TH 6 Type		TH 7 Type		
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49025		49026		49027		49028		49029		49030		49031		49032		
	TH 0 Offset		TH 1 Offset		TH 2 Offset		TH 3 Offset		TH 4 Offset		TH 5 Offset		TH 6 Offset		TH 7 Offset		
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49033		49034		49035		49036		49037		49038		49039		49040		
	TH 0 Smooth		TH 1 Smooth		TH 2 Smooth		TH 3 Smooth		TH 4 Smooth		TH 5 Smooth		TH 6 Smooth		TH 7 Smooth		
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49041		49042		49043		49044		49045		49046		49047		49048		
	TH 0 MAX Linit		TH 1 MAX Linit		TH 2 MAX Linit		TH 3 MAX Linit		TH 4 MAX Linit		TH 5 MAX Linit		TH 6 MAX Linit		TH 7 MAX Linit		
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49049		49050		49051		49052		49053		49054		49055		49056		
	TH 0 MIN Limit		TH 1 MIN Limit		TH 2 MIN Limit		TH 3 MIN Limit		TH 4 MIN Limit		TH 5 MIN Limit		TH 6 MIN Limit		TH 7 MIN Limit		

SM_AI_108i/SM_AI_108 Present Data (40001-40035)

	DI	AI	DO	AO

modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008		
	AI 0		AI 1		AI 2		AI 3		AI 4		AI 5		AI 6		AI 7		
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217	225	233	241	249	
modbus WORD	40009		40010		40011		40012		40013		40014		40015		40016		
	AI 0 Status		AI 1 Status		AI 2 Status		AI 3 Status		AI 4 Status		AI 5 Status		AI 6 Status		AI 7 Status		
modbus BIT	257	265	273	281	289	297	305	313	321	329	337	345	353	361	369	377	
modbus WORD	40017		40018		40019		40020		40021		40022		40023		40024		
	Max AI 0		Max AI 1		Max AI 2		Max AI 3		Max AI 4		Max AI 5		Max AI 6		Max AI 7		
modbus BIT	385	393	401	409	417	425	433	441	449	457	465	473	481	489	497	505	
modbus WORD	40025		40026		40027		40028		40029		40030		40031		40032		
	Min AI 0		Min AI 1		Min AI 2		Min AI 3		Min AI 4		Min AI 5		Min AI 6		Min AI 7		
modbus BIT	513	521	529	537	545	553	561	569	577	585	593	601	609	617	625	633	
modbus WORD	40033		40034		40035		40036		40037		40038		40039		40040		
	AI 7-0 Sim	0x00	AI7-0 Max/Min Reset	0x00	AI7-0 H/L-Alarm Reset	0x00											

SM_AI_108i/SM_AI_108 Module Reference (49001-49056)

													DI		AI		DO	AO
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49001		49002		49003		49004		49005		49006				49007		49008	
	Product-ID		Product-Version		System Error				System Setup		Protocol Config				Response Delay			
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49009		49010		49011		49012		49013		49014				49015		49016	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49017		49018		49019		49020		49021		49022				49023		49024	
	AI 0 Type		AI 1 Type		AI 2 Type		AI 3 Type		AI 4 Type		AI 5 Type				AI 6 Type		AI 7 Type	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49025		49026		49027		49028		49029		49030				49031		49032	
	AI 0 Offset		AI 1 Offset		AI 2 Offset		AI 3 Offset		AI 4 Offset		AI 5 Offset				AI 6 Offset		AI 7 Offset	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49033		49034		49035		49036		49037		49038				49039		49040	
	AI 0 Smooth		AI 1 Smooth		AI 2 Smooth		AI 3 Smooth		AI 4 Smooth		AI 5 Smooth				AI 6 Smooth		AI 7 Smooth	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49041		49042		49043		49044		49045		49046				49047		49048	
	AI 0 MAX Linit		AI 1 MAX Linit		AI 2 MAX Linit		AI 3 MAX Linit		AI 4 MAX Linit		AI 5 MAX Linit				AI 6 MAX Linit		AI 7 MAX Linit	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8
modbus WORD	49049		49050		49051		49052		49053		49054				49055		49056	
	AI 0 MIN Limit		AI 1 MIN Limit		AI 2 MIN Limit		AI 3 MIN Limit		AI 4 MIN Limit		AI 5 MIN Limit				AI 6 MIN Limit		AI 7 MIN Limit	

SM_AO_102i/SM_AO_102 Present Data (40001- 40006)

												DI	AI	DO	AO		
WORD. BIT	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	
modbus WORD	40001		40002		40003		40004		40005		40006		40007		40008		
	AO 0		AO 1		AO0 Feedback		AO1 Feedback		AO 1-0 Raw mode	0x00	AO 1-0 Sim	0x00					

SM_AO_102i/SM_AO_102 Module Reference (49001- 49024)

												DI	AI	DO	AO		
WORD.BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49001		49002		49003		49004		49005		49006		49007		49008		
	Product-ID		Product-Version		System Error				System Setup		Protocol Config		Response Delay				
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49009		49010		49011		49012		49013		49014		49015		49016		
	AO 0 Pwr-on Value		AO 1 Pwr-on Value		AO 0 Fail Safe Value		AO 1 Fail Safe Value		AO 0 Slop Time		AO 1 Slop Time				Fail Time		
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	
modbus WORD	49017		49018		49019		49020		49021		49022		49023		49024		
	AO 0 Type		AO 1 Type		AO 0 Offset		AO 1 Offset		AO 0 Hi-Clamp		AO 1 Hi-Clamp		AO 0 Low-Clamp		AO 1 Low-Clamp		

SM_CNT_102 Present Data (40001-40011)

													DI	AI	DO	AO	
modbus BIT	1	9	17	25	33	41	49	57	65	73	81	89		97	105	113	121
modbus WORD	40001		40002		40003		40004		40005		40006			40007		40008	
	CI 0 Low-Word Value		CI 0 High-Word Value		CI 1 Low-Word Value		CI 1 High-Word Value		CI 0 Status		CI 1 Status			CI 1-0 Clear Counter	0x00	CI 1-0 Sim	DO 3-0 Sim
modbus BIT	129	137	145	153	161	169	177	185	193	201	209	217		225	233	241	249
modbus WORD	40009		40010		40011		40012		40013		40014			40015		40016	
	DO 3-0	0x00	DO 3-0 Feedback	0x00	CI 1-0 DI	0x00											

SM_CNT_102 Module Reference (49001-49032)

													DI	AI	DO	AO	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8
modbus WORD	49001		49002		49003		49004		49005		49006			49007		49008	
	Product-ID		Product-Version		System Error				System Setup		Protocol Config			Response Delay			
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8
modbus WORD	49009		49010		49011		49012		49013		49014			49015		49016	
	DO 3-0 Invert	0x00	DO 3-0 Pwr-on Last-Value	0x00	DO 3-0 Pwr-on Value	0x00	DO 3-0 Fail Latch	0x00	DO 3-0 Fail Safe Value	0x00						Fail Time	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8
modbus WORD	49017		49018		49019		49020		49021		49022			49023		49024	
	CI 0 mode		CI 1 mode		CI 0 Alarm Mode		CI 1 Alarm Mode		CI 0 Max-Limit Low-Word Value		CI 0 Max-Limit High-Word Value			CI 1 Max-Limit Low-Word Value		CI 1 Max-Limit High-Word Value	
WORD. BIT	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8	7..0	15..8		7..0	15..8	7..0	15..8
modbus WORD	49025		49026		49027		49028		49029		49030			49031		49032	
	CI 0 High-Alarm Low-Word Value		CI 0 High-Alarm High-Word Value		CI 1 High-Alarm Low-Word Value		CI 1 High-Alarm High-Word Value		CI 0 Hi-High Alarm Low-Word Value		CI 0 Hi-High Alarm High-Word Value			CI 1 Hi-High Alarm Low-Word Value		CI 1 Hi-High Alarm High-Word Value	

⊙ Appendix 5. Configuration Example

SM_DIO_116p Self-testing, (TPC) configuration example

No need the up host, DI0~DI7 and DO0~DO7 will flash in sequence automatically when power on

	Channel	Invert	Debounce (ms)	Mode	On Delay Time (s)	Off Delay / Pulse Time (s)	Active Counters	Read Latch Auto Clear
▶	DI 0	☐	0	Delayed	1	0	☐	☐
	DI 1	☐	0	Delayed	2	0	☐	☐
	DI 2	☐	0	Delayed	3	0	☐	☐
	DI 3	☐	0	Delayed	4	0	☐	☐
	DI 4	☐	0	Direct	0	0	☐	☐
	DI 5	☐	0	Direct	0	0	☐	☐
	DI 6	☐	0	Direct	0	0	☐	☐
	DI 7	☐	0	Direct	0	0	☐	☐

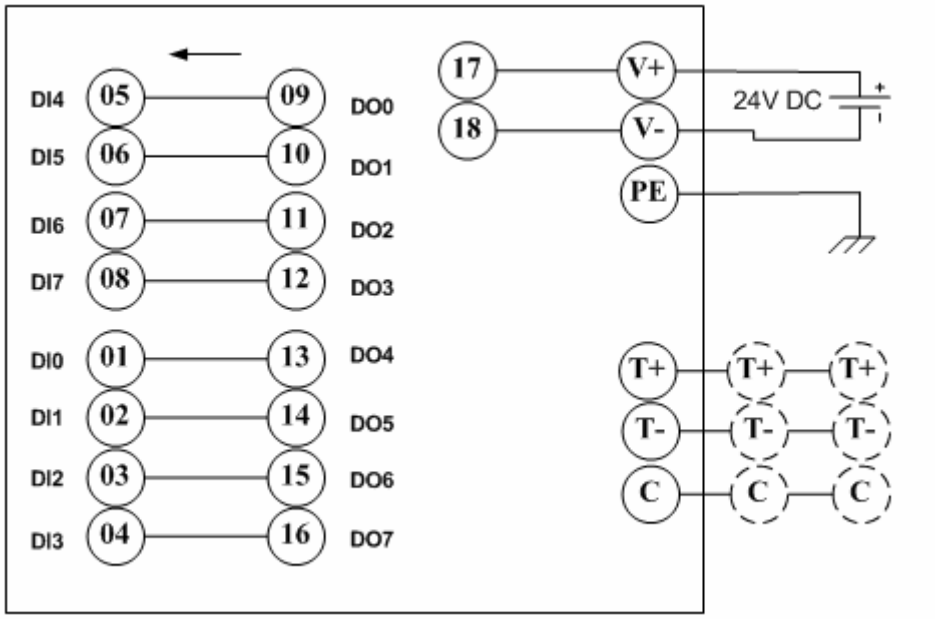
	Channel	I2O	I2O_Logic	I2O_Map	Debounce (ms)	Mode	On Delay Time (s)	Off Delay / Pulse Time (s)	TPC Duty Cycle (0.1s)	Invert	Power On	DO Safe	TPC Safe %
▶	DO 0	☑	AND	1	0	Direct	0	0	10	☐	Off	Off	0
	DO 1	☑	AND	2	0	Direct	0	0	10	☐	Off	Off	0
	DO 2	☑	AND	4	0	Direct	0	0	10	☐	Off	Off	0
	DO 3	☑	AND	8	0	Direct	0	0	10	☐	Off	Off	0
	DO 4	☐	AND	0	0	TPC	0	0	100	☐	Off	Off	60
	DO 5	☐	AND	0	0	TPC	0	0	100	☐	Off	Off	70
	DO 6	☐	AND	0	0	TPC	0	0	100	☐	Off	Off	80
	DO 7	☐	AND	0	0	TPC	0	0	100	☐	Off	Off	90

1. Set DO4~DO7 to TPC Mode, TPC Safe is set to 60、70、80、90 separately, DO4~DO7 will flash automatically when power on, Duty Cycle is set to 10s, cause the ON/OFF time of DO4~DO7 is not the same, it will has the light bright in sequence effect.
2. Let DO4~DO7's signal connect to DI0~DI3, cause theDO0~DO3 is set to i2o mode, so DI0~DI3's signal will be connect to DO0~DO3.
3. Let the external wiring of DO0~DO3 connect to the DI4~DI7 separately, sending the signal toDI4~DI7.
4. Normal light number: DI0~DI3 bright、DO4~DO7 bright, DI4-DO0 bright, DI5-DO1 bright, DI6-DO2 bright, DI7-DO3 bright, DI0-DI4-DO0-DO4 dark, DI1-DI5-DO1-DO5 dark, DI2-DI6-DO2-DO6 dark, DI3-DI7-DO3-DO7 dark.

Module Wiring:

DO4~DO7（13~16） connect to DI0~DI3(01~04) separately

DO0~DO3（09~12） connect to DI4~DI7(05~08) separately



SM_DIO_116p Self-testing， (Invert) configuration setting

No need the up host, DI0~DI7 and DO0~DO7 will be bright in sequence when power on.

	Channel	Invert	Debounce (ms)	Mode	On Delay Time (s)	Off Delay / Pulse Time (s)	Active Counters	Read Latch Auto Clear
▶	DI 0	☑	0	Delayed	1	0	☐	☐
	DI 1	☐	0	Delayed	1	0	☐	☐
	DI 2	☐	0	Delayed	1	0	☐	☐
	DI 3	☐	0	Delayed	1	0	☐	☐
	DI 4	☐	0	Delayed	1	0	☐	☐
	DI 5	☐	0	Delayed	1	0	☐	☐
	DI 6	☐	0	Delayed	1	0	☐	☐
	DI 7	☐	0	Delayed	1	0	☐	☐

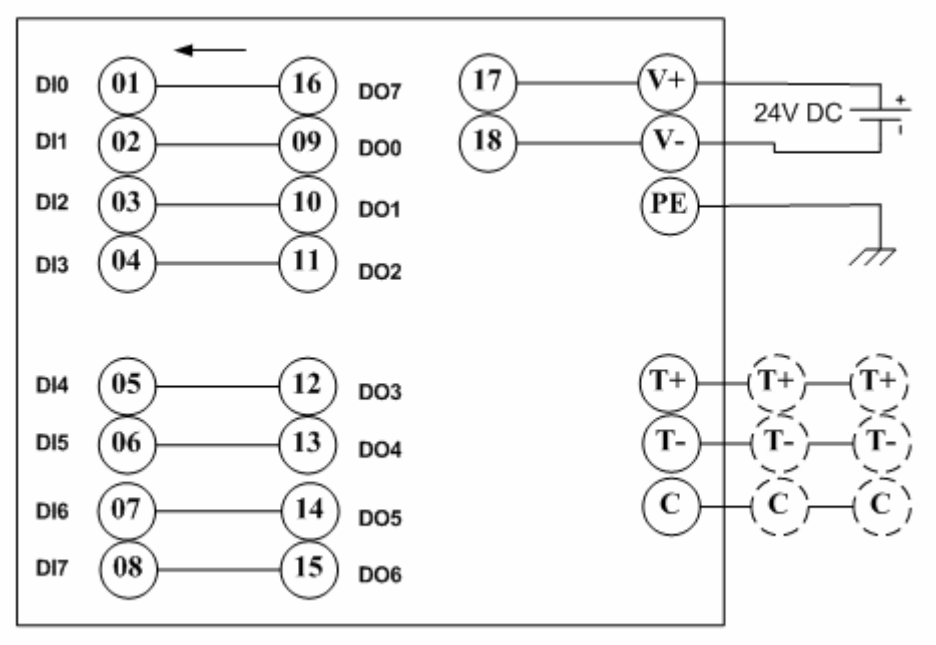
	Channel	I2O	I2O_Logic	I2O_Map	Debounce (ms)	Mode	On Delay Time (s)	Off Delay / Pulse Time (s)	TPC Duty Cycle (0.1s)	Invert	Power On	DO Safe	TPC Safe %
▶	DO 0	☑	AND	1	0	Direct	0	0	10	☐	Off	Off	0
	DO 1	☑	AND	2	0	Direct	0	0	10	☐	Off	Off	0
	DO 2	☑	AND	4	0	Direct	0	0	10	☐	Off	Off	0
	DO 3	☑	AND	8	0	Direct	0	0	10	☐	Off	Off	0
	DO 4	☑	AND	16	0	Direct	0	0	10	☐	Off	Off	0
	DO 5	☑	AND	32	0	Direct	0	0	10	☐	Off	Off	0
	DO 6	☑	AND	64	0	Direct	0	0	10	☐	Off	Off	0
	DO 7	☑	AND	128	0	Direct	0	0	10	☐	Off	Off	0

1. Set DI0 to Invert，letting DI0~DI7 set to on delay time 1s
2. Set DO0~DO7 to i2o mode
3. Cause the DI0's setting is Invert, so the status value is ON when power on. It will send to DO0 (i2o) by 1s delay.
4. DO0 will send the signal to DI1，DI1 through external wiring , and will send it to DO1 through i2o by 1s delay. To conclude like this.
5. DO7 connect the signal to DI0 by external wiring, at the same time DI0 will read Off, it will send the signal to DO0 by 1s delay，circle lasts forever.
6. Normal light number：DO0-DI1 bright，1s later，DO1-DI2 bright，1s later，DO2-DI3 bright，1s later，…till the DO7-DI0 bright, DI0 dark，DO0-DI1bright , the circle lasts forever.

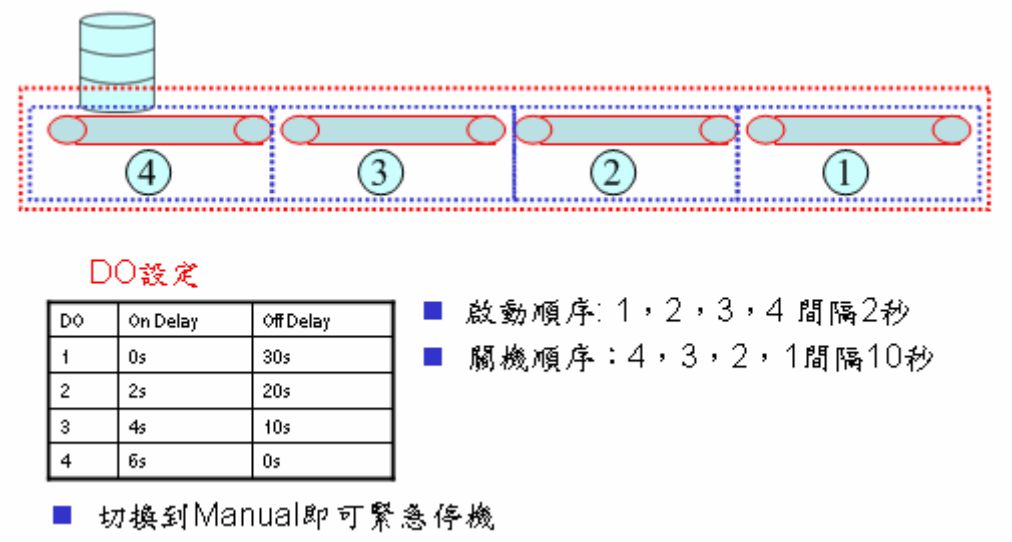
Module Wiring:

Let DO0(09) connect to DI1(02), DO1(10) to DI2(03), DO2(11) to DI3(04), DO3(12) to DI4(05)

Let DO4(13) connect to DI5(06), DO5(14) to DI6(07), DO6(15) to DI7(08), DO7(16) to DI0(01)



DO TRANSFER BELT ORDER CONTROL



Usually the transfer of the raw and processed materials is consisted of several transfer machines, when the transfer belt started; it goes in sequence to avoid the large sudden start current. And when it is stoped, it will also be asked to stop in sequence to avoid the goods stored up on the belt. These kinds of function can be achieved by using“ ioSCADA On Delay Timer and Off DelayTimer”. The host can send the ON/OFF order to 4 transfer belts at the same time（ using write multiple coil order）, the other will be taken care of by the ioSCADA. If the emergency operation is needed during the operation, the module can switch to manual mode easily.（ Timer is disable at this time） Then the operator can control it manually.

⊙ Appendix 6. MODBUS Reference Data

http://www.modbus.org/ MODBUS international standard institution web

http://members.tripod.com/~mbserver/index.htm Free Modbus Master Program code web

http://www.modbusdriver.com/ Charged Modbus Drivers & Libraries

http://www.automatedsolutions.com/products/asmbsuite.asp Charged Modbus Drivers & Libraries

http://www.sapia-inc.com/software.htm Charged Modbus Drivers & Libraries

http://www.geocities.com/pbmcrae42/frame1.html Modbus C Source Program