Module Type 4 Channels Temperature Controller

Features:
⊙ 4 loops TC input and SSR control output.
⊙ Communicate with host computer or HMI through RS485.
⊙ Diffferent types of PID arithmetic and with auto-tuning function.
⊙ Used for industrial machinery, machine tools,measuring instruments.
⊙ Economical and easy operation.

The instruction explain instrument settings, connections,name and etc, please read carefully before you use the temperature controller. Please keep it properly for necessary reference.

KKGTA2E01-A/0-20171212

I. Safe Caution

⚠ Warning

1) When the failure or abnormal of products lead to a system of major accidents, please set the proper protection circuit in the external.
2) Please don`t plug in before completing all the wire.Otherwise it may lead to electric shock, fire, fault.
3) Not allow to use outside the scope of product specification,otherwise it may lead to fire,fault.
4) Not allow to use in the place where is inflammable and explosive gas.
5) Do not touch power terminal and other high voltage part when the power on, otherwise you may get an electric-shock.
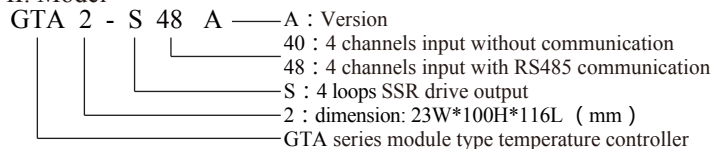6) Do not remove,repair and modify this product,otherwise it may lead to electric shock, fire, fault.

⚠ Caution

1) The product should not be used in a nuclear facility and human life associated medical equipment.
2) The product may occur radio interference when it used at home.You should take adequate countermeasures.
3) The product get an electric shock protection through reinforced Insulation. when the product is embedded in the devices and wiring,please subject to the specification of embedded devices.
4) In order to prevent surge occurs,when using this product in the place of over 30m indoor wiring and wiring in outdoor, you need to set the proper surge suppression circuitry.
5) The product is produced based on mounting on the disk.In order to avoid to touch the wire connectors,please take the necessary measures on the product.
6) Be sure to observe the precautions in this manual, otherwise there is a risk of a major injury or accident.
7) When wiring, please observe the local regulation.
8) To prevent to damage the machine and prevent to machine failure, the product is connected with power lines or large capacity input and output lines and other methods please install proper capacity fuse or other methods of protection circuit.
9) Please don't put metal and wire clastic mixed with this product,otherwise it may lead to electric shock, fire, fault.
10) Please tighten screw torque according to the rules.If not,it may lead to electric shock and fire.
11) In order not to interfere with this products to dissipate heat, please don't plug casing around the cooling vent hole and equipment.
12) Please don' t connect any unused terminal.
13) Please do the cleaning after power off, and use the dry cleaning cloth to wipe away the dirt. Please don' t use desiccant, otherwise, it may casue the deformation or discoloration of the product.
14) Please don`t knock or rub the panel with rigid thing.
15) The readers of this manual should have basic knowledge of electrical,control, computer and communications.

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16) The illustration, example of data and screen in this manual is convenient to understand,instead of guaranteeing the result of the operation.
17)In order to use this product with safety for long-term,regular maintenance is necessary. The life of some parts of the equipments are by some restrictions, but the performance of some will change for using many years.
18) Without prior notice, the contents of this manual will be change. We hope these is no any loopholes, if you have questions or objections, please contact us.

⚠ Caution of Install & Connection

1. Installation
1) This product is used in the following environmental standards.
   （IEC61010-1）[Overvoltage category Ⅱ、 class of pollution 2]
2) This product is used in the following scope:surrounding environment, temperature, humidity and environmental conditions. Temperature：0 ～ 50℃; Humidity：45 ～ 85%RH; Environment condition: Indoor warranty，The altitude is less than 2000m.
3) Please avoid using in the following places：
The place will be dew for changing temperature;with corrosive gases and flammable gas;with vibration and impact;with water, oil, chemicals, smoke and steam facilities with Dust, salt, metal powder;and with clutter interference, static electric and magnetic fields, noise;where has air conditioning or heating of air blowing directly to the site; where will be illuminated directly by sunlight; where accumulation of heat will happen caused by radiation.
4) On the occasion of the installation, please consider the following before installation.
In order to protect heat saturated, please ensure adequate ventilation space.
Please consider connections and environment,and ensure that the products below for more than 50mm space.
Please avoid to installed over the machine of the calorific value(Such as heaters, transformer, semiconductor operations, the bulk resistance).
When the surrounding is more than 50 , please using the force fan or cooling fans.But don`t let cold air blowing directly to the product.
In order to improve the anti - interference performance and security, please try to stay away from high pressure machines, power machines to install.
Don`t install on the same plate with high pressure machine and the product.
The distance should be more than 200mm between the product and power line.
2. Cable caution：
1) Please use specified compensation wire in the place of TC input;Please use insulated TC if the measured device is heated metal.
2) Please use the cable of lesser resistance in the place of RTD input,and the cable(3 wire) must be no resistance difference,but the total length is within 5m.
3) In order to avoid the effect of noise,please put the input dignal away from meter cable,power cable,load cable to wiring.
4) In order to reduce the power cables and the load power cables on the effect of this product,please use noise filter in the place where easy to effect.
   You must install it on the grounding of the disk if you use the noise filter,and make the wiring to be shortest between noise filter output side and power connectors.

Don`t install fuse and switch on the wiring of noice filter output side,otherwise it will reduce the effect of noise filter.
5) It takes 5s from input power to output.If there is a place with interlocking actions circuit signal,please use timer relay.
6) Please use twisted pair with a shield for analog output line, can also connect the common-mode coil to the front-end of the signal receiving device to suppress line interference if necessary, to ensure the reliabilty of signal.
7) Please use twisted pair with a shield for remote RS485 communication cable,and deal with the shield on the host side earth, to ensure the reliabilty of signal.
8) This product don' t have the fuse; please set according to rated voltage 250V,rated current 1A if you need; fuse type:relay fuse.
9) Please use suitable slotted screwdriver and wire.
   Terminal distance: 5.0mm
   Screwdriver size: 0.6X3.5, length of slotted screwdriver >130mm
   Recommended tightening torque: 0.5N.m
   Proper cables: 0.25 ～ 1.65mm single cable/multiple core cable
10) Please don`t put the Crimp terminal or bare wire part contact with adjacent connector.

II. Model

GTA 2 - S 48 A —— A : Version
40 : 4 channels input without communication
48 : 4 channels input with RS485 communication
S : 4 loops SSR drive output
2 : dimension: 23W*100H*116L （mm）
GTA series module type temperature controller

III. Ordering Information

Model	Input/output function	RS485
GTA2-S40	4 loops TC input/ 4 loops SSR output	No
GTA2-S48	4 loops TC input/ 4 loops SSR output	Yes

IV. Specifications

1、 Electrical parameters:

Input signal	TC(K、J、E、T、N、B、R、S) 4 loops non isolated input.
Accuracy	Standard accuracy ±0.5%F.S ±3digits @（20±5）℃
Resolution	The reference value of K type sensor is 1 degree;The lowest error rate of 12 digits AD conversion accuracy is 1.5 LSB.
Power supply	100 ～ 240V AC/DC （85-265V）
Consumption	<5VA
Working environment	Temperature:0 ～ 50℃, no condensation, Humidity:＜85%RH
Storage environment	-10 ～ 60℃, no condensation.
SSR drive output	MAX 24V DC pulse level, 20mA for each loop, 4 loops outputs are non isolated.

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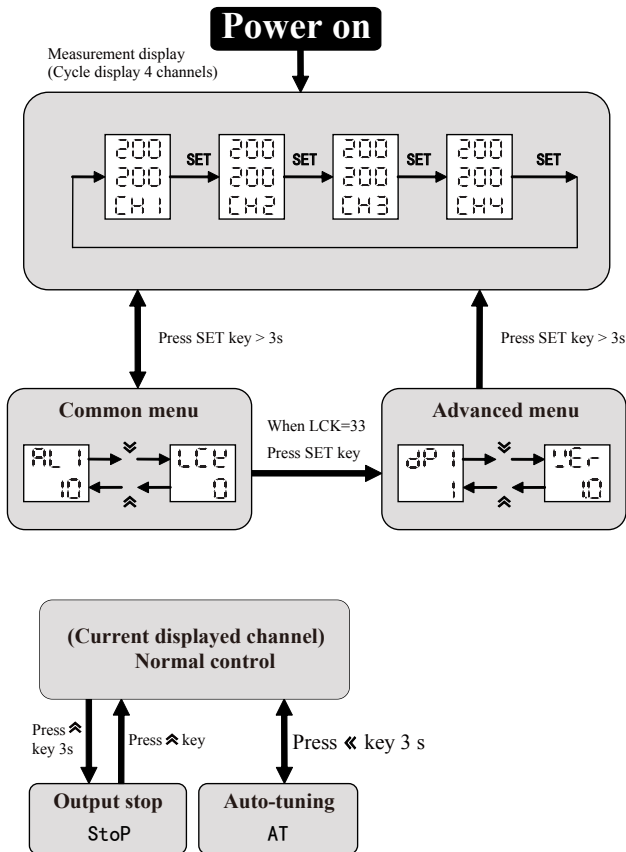| Communication port	RS485 Modbus-RTU procotol,interface and output common ground
Insolation impedance	Input, output, power cabinet > 20MΩ
ESD	IEC/EN61000-4-2 Contact ±4KV /Air ±8KV perf.Criteria B
Pulse traip anti-interference	IEC/EN61000-4-4 ±2KV perf.Criteria B
Surge immunity	IEC/EN61000-4-5 ±2KV perf.Criteria B
Voltage drop & short interruption immunity	IEC/EN61000-4-29 0%～70% perf.Criteria B
Dielectric strength	Signal input & output & power 1500VAC 1min, below 60V low voltage circuit between DC500V, 1min
Total weight	About 300g
Shell material	PA66-FR(Flame Class UL94V-0)
Panel material	PVC film and PEM silicone key
Power failure memory	10 years , times of writing: 1 million times
Safety Standard	IEC61010-1 Overvoltage category Ⅱ, pollution level 2, level Ⅱ (Enhanced insulation)

2. Measured signal specifications

Input type	Symbol	Measuring range	Resolution	Accuracy	Input impedance	Communication parameter code
K	Ľ	-50~1200	1℃	0.5%FS±3digits	>500kΩ	0
J	┘	0~1200	1℃	0.5%FS±3digits	>500kΩ	1
E	Ē	0~850	1℃	0.5%FS±3digits	>500kΩ	2
T	Ł	-50~400	1℃	0.5%FS±2℃	>500kΩ	3
B	┗	250~1800	1℃	1%FS±2℃	>500kΩ	4
R	┌	-10~1700	1℃	1%FS±2℃	>500kΩ	5
S	�Ş	-10~1600	1℃	1%FS±2℃	>500kΩ	6
N	∩	-50~1200	1℃	0.5%FS±3digits	>500kΩ	7

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V. Name of universal panel
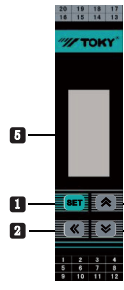
| No.	Symbol	Name	Function
1	SET	Function key	Menu key/confirm key, long press for 3s to enter or back to manu, short press to save modified parameters.
2	≪	Shift key	Short press to shift the modified digit; under measuring status, short press to enter SV setting menu.
3	≫	Increase key	Short press to increase the parameters, long press to switch the menu forward.
4	⟱	Decrease key	Short press to reduce the parameters, long press to switch the menu backward.
5	LCD	Display window	Display the measured value/ set value/ status/ menu, etc.

VI. Dimension and installation size
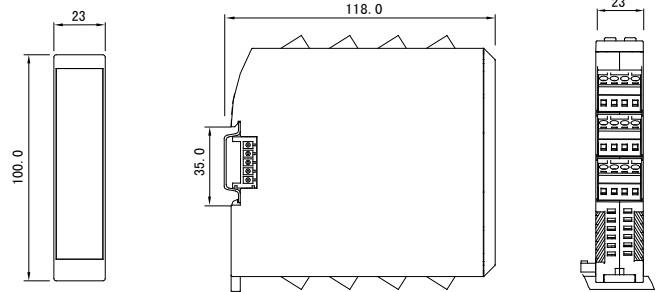
VII. Connection
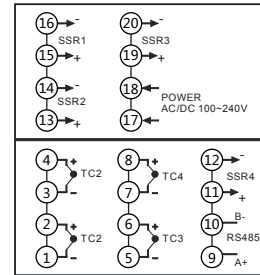
Note: If there is any change, please subject to the drawing on the meter

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VIII. Operation & menu

1) Operation process

2)Common menu (Only the model with RS485 has the menu in gray color)

No.	Symbol	Name	Description	Set range	Factory set
1	Add	ADD	Communication address	1~247	1
2	bAd	BAD	Communication baud rate	4.8K/9.6K	9.6K
3	dtC	DTC	Sequenced transport of communication data and setting 00 of response delay; 1st is byte sequenced exchange, 2nd is response delay, it can set 0~9 to 10~100ms.	Refer to commu-nication protocol Note ②	0
4	ot	OT1~OT4	Control mode for each channel 0：ON/OFF heating；1：PID heating；2：ON/OFF cooling；3：Reserve；4：Reserve；5：PID cooling；	0~5	1
5	P	P1~P4	Proportional band for each channel, when P=0, no PID control.	0~9999	30
6	I	I1~I4	Integral time for each channel, when I=0, no integral action	0~9999	120
7	d	D1~D4	Differential time for each channel, when D=0, no differential function.	0~9999	30
8	CP	CP1~CP4	Control cycle for each channel, 1:SSR control output. Unit:second	1~200	1
9	db	DB1~DB4	On-off control hysteresis for each channel.	0~1000	1
10	dn	DN	The number of channels, it means the actual used measuring channel numbers.	1~4	4
11	dnS	DNS	The No. of the starting channel; for the application of several meters, it is used to indicate the display number of Channel 1. E.g., when DNS=5, CH5~CH8 indicate Channel 1~4 respectively.	1~E	1
12	dnt	DNT	Channel cycle display time, 0 means no auto cycle display.	0~99	4

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13	InP	INP1~INP4	Input signal for each channel	Refer to input signal table	K
14	PS	PS1~PS4	Amend value of the input of each channel, display value = actual measured value + amend value.	-1999~9999	0
15	LCK	LCK	Lock function; 001: SV value can not be modified, 010: menu setting value only can be checked, cannot be modified; 033: can enter to advanced menu; 123: menus reset to factory setting.	0~9999	0

3) Advanced menu

No.	Symbol	Name	Description	Set range	Factory set
16	dP	DP1~DP4	Decimal point setting for each channel, TC iput only can set 1 decimal point	0~1	0
17	dtr	DTR	PV fuzzy tracking value; it can get a stable control display value in some status, if it is set properly. This value and actual meassured value are irrelavant. Setting 0 to close the function.	0.0~2.0	1.0
18	Ft	FT1~FT4	Filter coefficient for each channel, the higher of value, the stronger of filter function	0~255	10
19	FL	FL1~FL4	Measure range low limit for each channel,the setting value must be smaller than measure range high limit.	Refer to input signal table	-50
20	FH	FH1~FH4	Measure range high limit for each channel, the setting value must be larger than measure range low limit.	Refer to input signal table	1200
21	PdC	PDC	Optional PID type : 0(FUZ): Advanced fuzzy PID arithmetic; 1(STD): normal PID arithmetic	FUZ、STD	FUZ
22	VEr	VER	Software version	----	----

IX. Key function operation

1. PID parameter auto-tuning operation (Take channel 1 as example)

1）Cut off the power supply of the load, or disconnect the control output and the load.
2）Try to keep the PV value near the room temperature.
3）Set the SV value under measuring status.
4）Long press "《" key for 3s, it will display "AT" symbol, which means it enters the auto-tuning mode.
5）Connect the load to the power supply, or connect the control output and the load.

6）Please don`t modify parameters or power-off during auto-tuning, to avoid any influence on the auto-tuning result.
7）When "AT" symbol is gone , it means the auto-tuning procedure is over. Channel 1 will enter the running mode automatically.
8）Experienced users can set a proper PID parameter according to their experience.

2. Stop mode (Take channel 1 as example)

1）Under the measure mode, press "《" for 3s, it will display "Stop" , which means it enters the stop mode.
2）At this time, all outputs of channel 1 are closed.
3）Press "《" key to exit stop mode.

X. Methods of simple fault

Display	Methods
LLLL/HHHH	Checks whether the input disconnection and whether normal of FH value, FL value, working environment temperature and whether input signal is selected correctly.

XI. Communication procotol

Meter use Modbus RTU to do RS485 half-duplex communication.Reading function code 0x03，writing function code 0x10 / 0x06. The meter use 16digits CRC to check and will not feedback any information of checked error.

Data frame format:

Start bit	Data bit	Stop bit	Check bit
1	8	1	No

Handling of abnormal communication:

If there is abnormal response, put 1 on the highest bit of function code. For example: Host request function code is 0x03, and the response function code from guest should be 0x83. Error code:
0x01--- Illegal function: the function code sent from host is not support by meter.
0x02--- Illegal address: the register address designated by host beyond the address range of meter.
0x03--- Illegal data: the writing data sent from host beyond the writing range of meter.

Communication cycle:

Communication cycle is the time from host request to client back to data: communication cycle=time of request + time of guest response + time of relay.
Take 9600 baud rate as example: The communication cycle of single measure data is not less than 250ms.

1. Read register

For example:Host reads integer SV1 (set value 200)
The ADD code of SV1 is 0x200C, because SV is integer(2 dyte),seizes 1 data register.
The memory code of decimal integer 200 is 0x00C8.
Note:It should read DP value or ensure DP value in first to ensure the decimal point when reading data,and need to transform the reading data to get the actual value.

Host request (Read multi-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte Length high bit	Data byte Length low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x20	0x0C	0x00	0x01	0x4F	0xC9

Guest normal answer(Read multi-register)						
1	2	3	4	5	6	7
Meter ADD	Function code	Data byte number	Data high bit	Data low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x02	0x00	0xC8	0xB9	0xD2

Function code abnormal answer: (For example: host request ADD is 0x2020)

Guest abnormal answer(Read multi-register)				
1	2	3	4	5
Meter ADD	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x83	0x02	0xC0	0xF1

2. Write multi-register

For example: Host write SV1 with 0x10 function (setting value 150)
ADD code of SV1 is 0x200C, because SV1 is integer(2 dyte),seizes 1 data register.
The hexadecimal memory code of decimal integer 150 is 0x0096.

Host request (write multi-register)										
1	2	3	4	5	6	7	8	9	10	11
Meter ADD	Function code	Start ADD high bit	Start ADD low bit	Data byte length high bit	Data byte length low bit	Data byte length	Data high bit	Data low bit	CRC code low bit	CRC code high bit
0x01	0x10	0x20	0x0C	0x00	0x01	0x02	0x00	0x96	0x07	0x30

Host request (write multi-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte Length high bit	Data byte Length low bit	CRC code low bit	CRC code high bit
0x01	0x10	0x20	0x0C	0x00	0x01	0xCA	0x0A

Data location error response: (For example:Host request the ADD index is 0x2020)

Guest abnormal answer (write multi-register)				
1	2	3	4	5
Meter ADD	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x90	0x02	0xCD	0xC1

Host write SV1 with 0x06 function (setting value 150)

Host request (write single-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function code	ADD High bit	ADD Low bit	Data high bit	Data low bit	CRC code low bit	CRC code high bit
0x01	0x06	0x20	0x0C	0x00	0x96	0xC2	0x67

Guest normal answer (write single-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function code	ADD High bit	ADD Low bit	Data high bit	Data low bit	CRC code low bit	CRC code high bit
0x01	0x06	0x20	0x0C	0x00	0x96	0xC2	0x67

Data location error response: (For example:Host request the ADD index is 0x2020)

Guest abnormal answer (write single-register)				
1	2	3	4	5
Meter ADD	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x86	0x02	0xC3	0xA1

Address Mapping Table of Meter Parameters

No.	ADD mapping	Parameter name	Illustration	Read/write	Remark
1	0x2000~0x2003	PV1~PV4	Measured value of each channel	R	Please read the value according to the position of decimal point
2	0x2004~0x2007	STA1~STA4	Status of each channel	R	Refer to communication protocol Note①
3	0x2008~0x200B	MV1~MV4	Output of each channel	R	0~1000
4	0x200C~0x200F	SV1~SV4	Set value of each channel	R/W	
5	0x2010~0x2013	RSA1~RSA4	Operating switch of each channel	R/W	0:run 1:stop 2: auto-tuning

			Reserve		
6	0x2100~0x2103	INP1~INP4	Input type of each channel	R/W	Refer to measured signal table
7	0x2104~0x2107	FL1~FL4	Measure range low limit of each channel	R/W	
8	0x2108~0x210B	FH1~FH4	Measure range high limit of each channel	R/W	
9	0x210C~0x210F	DP1~DP2	Decimal point setting of each channel	R/W	
10	0x2110~0x2113	PS1~PS4	Amend value of each channel	R/W	
11	0x2114~0x2117	FT1~FT4	Filter coefficient of each channel	R/W	
12	0x2118	DTR	Tracking value of each channel	R/W	If communication read value is 10, then the actual value is 1.0
13	0x2119	DN	Display channel number	R/W	
14	0x211A	DNS	Display starting channel number	R/W	
15	0x211B	DNT	Cycle display time of each cahnnel	R/W	
			Reserve		
16	0x2200~0x2203	AL1~AL4	Alarm value of each channel	R/W	Factory default:10
17	0x2204~0x2207	AD1~AD4	Alarm mode of each channel (refer to alarm logic diagram on page 15)	R/W	Factory default: 3 1: High limit absolute value alarm 2: Low limit absolute value alarm 3: High limit deviation value alarm 4: Low limit deviation value alarm 5: High/low limit deviation value alarm 6: High/low limit interval value alarm
18	0x2208~0x220B	HY1~HY4	Alarm hysteresis of each cahnnel	R/W	Factory default: 1

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			Reserve		
19	0x2300~0x2303	OT1~OT4	Control type of each channel	R/W	
20	0x2304~0x2307	P1~P4	Proportional coefficient of each channel	R/W	
21	0x2308~0x230B	I1~I4	Integral time of each channel	R/W	
22	0x230C~0x230F	D1~D4	Differential time of each channel	R/W	
23	0x2310~0x2313	CP1~CP4	Control cycle of each channel	R/W	
24	0x2314~0x2317	DB1~DB4	On-off control hysteresis of each channel	R/W	
25	0x2318	PDC	PID arithmetic type	R/W	0(FUZ)、1(STD)
			Reserve		
26	0x2500	ADD	Meter address	R/W	
27	0x2501	BAD	Communication baud rate	R	0：4.8K，1：9.6K
28	0x2502	DTC	Communication delay setting	R	Refer to communication protocol Note②
29	0x2503	LCK	Lock	R	
30	0x2504	VER	Version code	R	If the read value is 10, it means V1.0

R：Read ； R/W：Read/write

Note ①：Channel status indication,it means operation when the data position is 1, it means no opertion when it is 0.

D7	D6	D5	D4	D3	D2	D1	D0
----	HHHH	LLLL	----	----	----	AL	OUT

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Note ②：Sequenced transport and respon relay of DTC communication data

DTC : □ □ □ —— Respon delay: 0~9 means 10~100ms
—— Sequenced transport of byte：
0 means from the tallest to the shortest,
1 means from the shortest to the tallest.
—— Reserve

※16 digits CRC check code get C program
unsigned int Get_CRC(uchar *pBuf, uchar num)

```c
{
    unsigned i,j;
    unsigned int wCrc = 0xFFFF;
    for(i=0; i<num; i++)
    {
        wCrc ^= (unsigned int)(pBuf[i]);
        for(j=0; j<8; j++)
        {
            if(wCrc & 1){wCrc >>=    1; wCrc ^= 0xA001; }
            else
                wCrc >>= 1;
        }
    }
    return wCrc;
}
```

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Alarm logic diagram (Alarm output status is read by communication)：
Symbol description: "☆" means HY , " ▲" means ,"△"means SV value.

No.	Type	Image: the hatched section means the alarm action
1	High limit absolute value alarm	△ AL
2	Low limit absolute value alarm	AL
3	※High limit deviation value alarm	SV+AL SV
4	※Low limit deviation value alarm	SV-AL SV
5	※High/low limit deviation value alarm	SV-AL SV SV+AL
6	※High/low limit interval value alarm	SV-AL SV SV+AL

※When the alarm value with deviation alarm is set as a negative number, it will be dealed as an absolute value.

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