

ZTF SERIES

# Intellegient Temperature Controller User Manual



## Features:

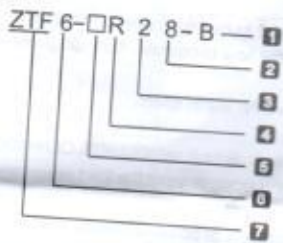
- Optional input signal types and models
- With functions of measured display, control output, alarm output, analog output, RS485 communication, etc.
- Different types of PID arithmetic and with auto-tuning function.
- Used for industrial machinery, machine tools, measuring instruments.
- Economical and easy operation.

KKTFME01T-A0-20150611

**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 signal 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 noise 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, to ensure the reliability of signal, if necessary.
- 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 reliability 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 the suitable screw force and crimp terminal.  
The screw terminal size : M3X8 ( with 7.0X7.0 square base )  
Recommended tightening torque : 0.4N.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.

**Model**



- 1 B : Version
- 2 10: without communication 18: with RS485
- 3 1 : 1 alarm output 2: 2 alarms 0: No alarm
- 4 R : Relay output Q: SSR output C : DC 4-20mA ( can be set to analog output through ACT menu) M: SSR & Relay output K: SCR output ( can be ordered) I: 4 ~ 20m A analog output ( can be set to control output through ACT menu) Blank: No 4 ~ 20mA analog output
- 5 3: 72W\*36H\*70.5L 4: 48W\*48H\*100L 6 : 48W\*96H\*100L 7 : 72W\*72H\*100L 8 : 96W\*48H\*100L 9 : 96W\*96H\*100L 80 : 160W\*80H\*96L (mm)
- 7 ZTF series temperature controller

Please note the input signal type when you choose the model. 1st type: TC/RTD/mV/Rt ; 2nd type: mA/V.

ZTF series is only one 4-20mA output function.

**Ordering Information**

Model	Control output	Alarm	Analog 4 ~ 20mA	RS485
ZTF□-IR28	Relay / 4 ~ 20mA			
ZTF□-IQ28	SSR / 4 ~ 20mA	2	Yes	Yes
ZTF□-C28	4 ~ 20mA	2	Yes	Yes
ZTF□-M1	Relay and SSR	2	Multi-use of main control	Yes
ZTF□-Q1	SSR	1	No	No
		1	No	No

**Specifications**

1. Electrical parameters:

Sample rate	2 times/per second
Relay capacity	AC 250V /3A Life of rated load > 100,000 times
Power supply	AC/DC 100 ~ 240V ( 85-265V )
Power consumption	< 6VA
Environment	Temperature of indoor : 0 ~ 50°C no condensation ; Humidity : < 85%RH , altitude < 2000m
Storage environment	-10 ~ 60°C, no condensation

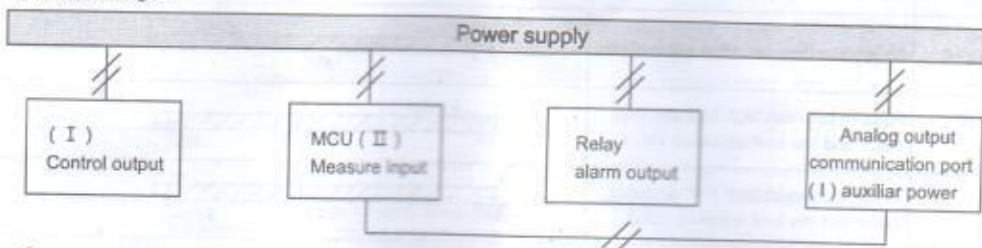
SSR output	DC 24V pulse voltage , load<30mA
Current output	DC 4 ~ 20mA load<500Ω
Communication port	RS485 port Modbus-RTU protocol, max input 30units
Insulation impedance	Input, output, power VS meter cover > 20MΩ
ESD	IEC/EN61000-4-2 Contact ±4KV /Air ±8KV perf.Criteria B
Pulse tripp anti-interference	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 , between lower than 60V circuits, DC500V,1min
Total weight	About 400g
Shell material	The shell and panel frame PC/ABS (Flame Class UL94V-0)
Panel material	PET(F150/F200)
Power failure memory	10 years , times of writing: 1 million times
Panel Protection level	IP65(IEC60529)
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/ auxiliary current	Communication parameter code
K	$\epsilon$	-50 ~ 1200	1°C	0.5%F.S±3digits	> 500kΩ	0
J	$\mathcal{J}$	0 ~ 1200	1°C	0.5%F.S±3digits	> 500kΩ	1
E	$\mathcal{E}$	0 ~ 850	1°C	0.5%F.S±3digits	> 500kΩ	2
T	$\mathcal{t}$	-50 ~ 400	1°C	0.5%F.S±2°C	> 500kΩ	3
PT100	$\mathcal{Pt}$	-200 ~ 600	0.2°C	0.5%F.S±3digits	0.2mA	4
CU50	$\mathcal{CU50}$	-50 ~ 150	0.2°C	0.5%F.S±3°C	0.2mA	5
CU100	$\mathcal{CU00}$	-50 ~ 150	0.2°C	0.5%F.S±1°C	0.2mA	6
0 ~ 50mV	$\mathcal{mV}$	-1999 ~ 9999	12bit	0.5%F.S±3digits	> 500kΩ	7
0 ~ 400Ω	$\mathcal{r\Omega}$	-1999 ~ 9999	12bit	0.5%F.S±3digits	0.2mA	8
* 4 ~ 20mA	$\mathcal{mA}$	-1999 ~ 9999	12bit	0.5%F.S±3digits	100Ω	9
* 0 ~ 10V	$\mathcal{V}$	-1999 ~ 9999	12bit	0.5%F.S±3digits	>1MΩ	10

\* Please note when you choose the model

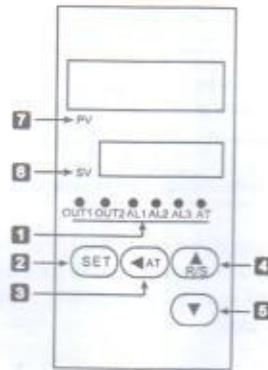
3. Isolation diagram



⎯⎯ : Isolation

Note : When the auxiliary power supply between ( I ) & ( II ) is used as the power supply of external sensor, if the sensor is non-isolated, it does not isolate.

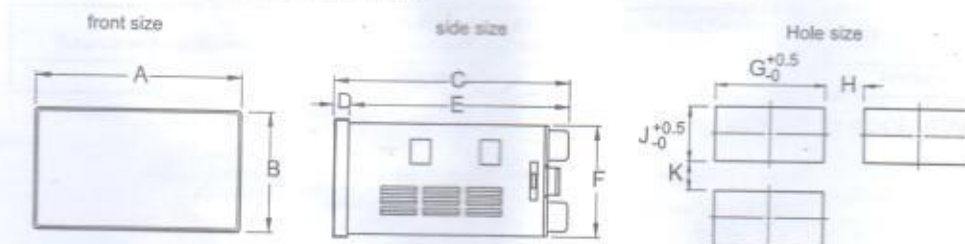
■ Name of universal panel



No	Symbol	Name	Function
1	OUT1	out1 indicate light(red) *	Main control output indicate light, it lights when the output is ON
	OUT2	out2 indicate light(red) *	Cooling output indicate light,it lights when output is ON
	AL1	Alarm1# indicate light(red)	1st alarm output indicate light
	AL2	Alarm2# indicate light(red)	2nd alarm output indicate light
	AL3	Alarm3# indicate light	3rd alarm output indicate light (can be ordered)
	AT	AT indicate light(green)	Auto-tuning indicate light,it indicates auto-tuning status when lighting on
2	SET	SET function key	Menu key/confirm key, to enter or exit modified mode or confirm modified parameters
3	◀AT	Shift/AT key	Activation/shift key/AT auto-tuning key,long press to enter/exit auto-tuning under measure control mode
4	▲	Increase key/R/S	Increase key, long press it to shift RUN/STOP mode under measure control mode.
5	▼	Decrease key	Decrease key
6	SV	Display window (green)	Setting value/parameters display window.display "STP" =stop control
7	PV	Display window (red)	measured value/parameters code display window

\* : Size "3" is green color.

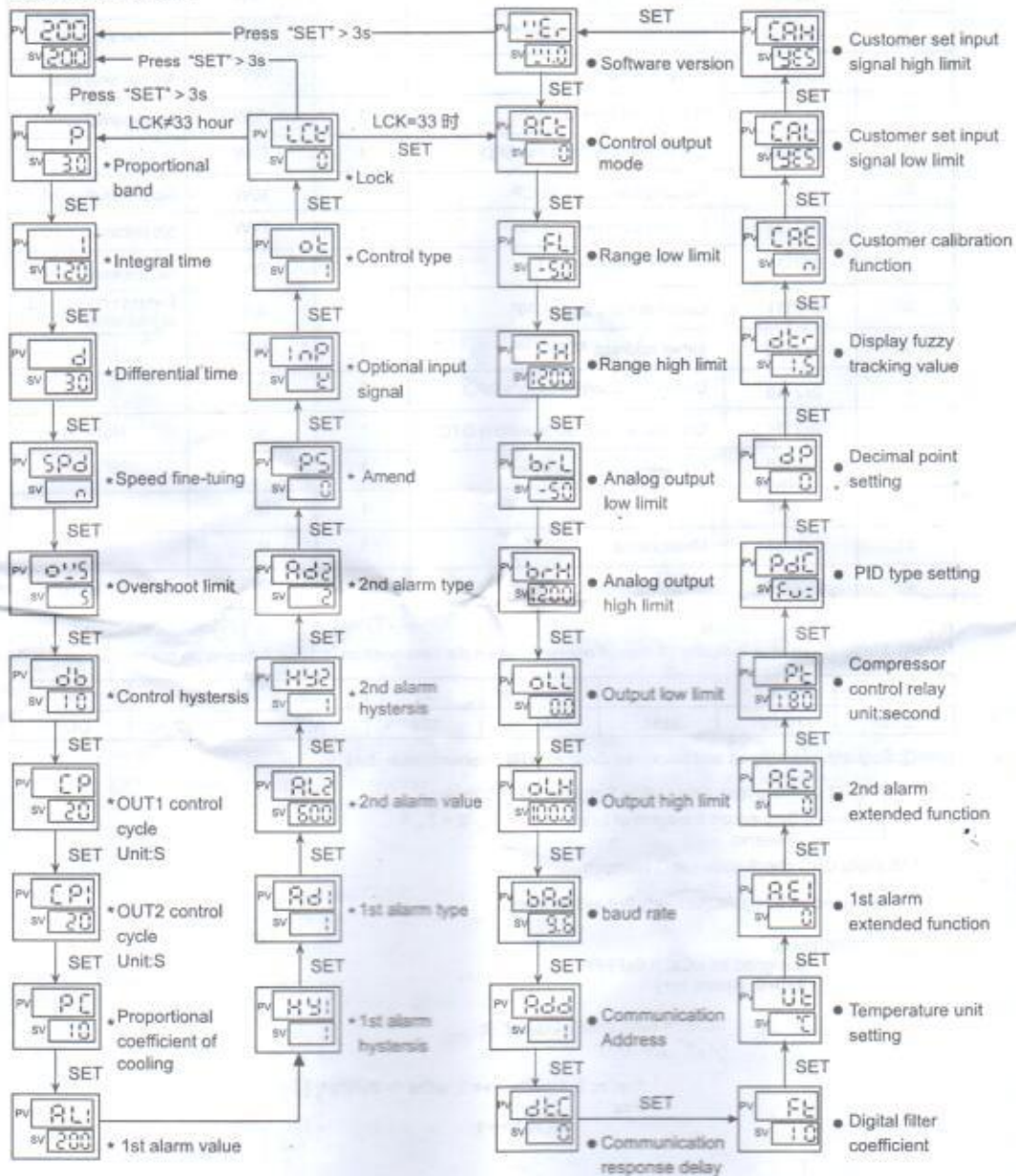
■ Dimension and installation size



型号	A	B	C	D	E	F	G	H(Min)	J	K(Min)
3:(72*36)	72	36	70.5	6.5	64	32	68	25	33	25
4:(48*48)	48	48	101	10	91	45	45.5	25	45.5	25
6:(96*48)	48	96	100	6	94	91	45.5	25	91.5	25
7:(72*72)	72	72	100	10	90	67.5	68	25	68	25
8:(48*96)	96	48	100	6	94	45	91.5	25	45.5	25
9:(96*96)	96	96	100	10	91	90.5	91	25	91	25
80:(80*160)	160	80	102	10	92	76	154	30	76.5	30
16:(160*80)	80	160	102	10	92	153.5	76.5	30	154	30

## ■ Operation & menu

### 1. Operation process & method measure control mode



- : Normal menu parameters
- : Project menu parameters

- a. In the normal measure control mode , after power-on,long press "SET" key more than 3s to enter parameters checking mode.
- b. In the menu parameter checking mode, press "SET" key short time to check the menu parameters in cycle.
- c. In the menu checking mode, press "◀ AT" to flash the menu parameters to be modified, it can move one position to left,when pressing each short time (in this cycle)
- d. In the menu modifying mode, press "▲" or "▼" key short time to increase or reduce the value.
- e. In the menu modifying mode, press SET key to confirm modified parameters , and exit to menu checking mode.
- f. In the normal measure control mode, press "◀ AT" shortly to enter SV value modifying status. The method of modifying SV value is same as modifying menu parameters.
- g. In the normal measure control mode, press "◀ AT" more than 3s to enter auto-tuning status. During auto-tuning, PV value needs to be lower than SV value.
- h. In the normal measure control mode,long press "▲" key more than 3s to enter or back to control mode.

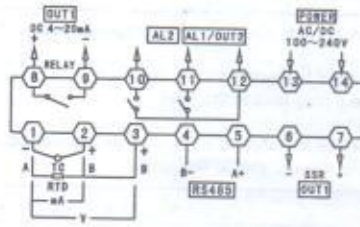
## 2. Menu description

No.	Menu name	Description	Set range	Factory set
1	PV	Measure display value,it will flash or display LLLL/HHHH when the value is over the setting range.	Refer to measured signal table	No
2	SV	Set value (target control value)	FL ~ FH	200
3	P	Proportional band,the lower of setting value,the faster of system heating . Increase proportional band can reduce vibration,but it may increase control bias .Reduce proportional band can reduce control bias, may cause vibration	0 ~ 9999	30
4	I	Integral time the lower of the value,the stronger of integral action,the more tendency to eliminate and deviation of set value.If integral action is too weak, it may not eliminate the deviation. Unit: Second	0 ~ 9999	120
5	D	Differential time,reduce the effect of differential time to a proper value,which can prevent the system oscillation. The higher value,the stronger function of differential.Units	0 ~ 9999	30
6	SPD	Control speed fine tuning,optional 0(N)no function,1(slow),2(ss)medium slow, 3 ( SSS ) very slow , 4 ( F ) fast , 5 ( FF ) medium fast , 6 ( FFF ) express	0 ~ 6	N
7	OVS	Overshoot limit,in the process of PID control,when PV>SV+OVS,it force off output; The lower value,the lower PID adjusted range,the worse control stability;please set a proper value according actual state.	0 ~ 9999	5
8	DB	On-off control backlash(negative backlash on-off control)or cooling control and compressor cooling control dead zone. please change value according to decimal position,when you change input sigal type type.	0 ~ 1000	10
9	CP	OUT1 control cycle,1:SSR control output, 4-200:relay control output. Unit:second	1 ~ 200	20
10	CP1	OUT2 control cycle,cooling relay output cycle.Unit:second	4 ~ 200	20
11	PC	OUT2 cooling proportionality coefficient,the higher of value,the stronger of cooling	1.0 ~ 100.0	10.0
12	AL1	1st alarm value,note:the minus is dealed as absolute value when it is as a deviation value .	FL ~ FH	200
13	HY1	1st alarm backlash value	0 ~ 1000	1
14	AD1 (1)	1st alarm type.note:the value should set 0 when 1st alarm is as out2 . Set AD2 to 0 when setting value>6. Otherwise it will close alarm function when it is 0.	0 ~ 12	1
15	AL2	2nd alarm value,note:the minus is dealed as absolute value when it is as a deviation value .	FL ~ FH	600
16	HY2	2nd alarm backlash value	0 ~ 1000	1
17	AD2 (1)	2nd alarm type.note:the value should set 0 to close alarm function when the AD1>6.	0 ~ 6	2
18	PS	Amend value,display value=actual measured value+ amend value	-1999 ~ 9999	0

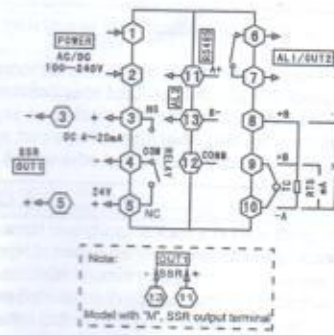
19	INP	Optional input measured signal type:refer to input signal parameters table.Note:it need to change the relevant parameters after changing.	0 ~ 10	0
20	OT	Control type,0:ON/OFF control;1:PID heating control; 2:compressor cooling control; 3:PID & cooling control,it should set the AD1 to 0,then OUT2 can operate.	0 ~ 3	1
21	LCK	Lock function;0001:SV value can not be modified, 0010:menu setting value only can be checked ,cannot modified. If set it as 0033 when checking the menu, it can enter to project menu	0 ~ 9999	0
22	ACT	Control output mode,0:relay/SSR output;1:single SSR output control 2 : 4 ~ 20mA output control, please set according selected meter 3:ZTF3,ZTF4,ZTF7 can set 3and change 4-20mA to analog output.	0 ~ 2/0-3	0
23	FL	Measure range low limit,the setting value must be less than measure range high limit	Refer to measured signal parameter table	-50
24	FH	Measure range high limit,the setting value must be more than measure range low limit.	Refer to measured signal parameter table	1200
25	BRL	Analog range low limit . Note: it also support reserve analog output function	FL ~ FH	-50
26	BRH	Analog range high limit. Note: it also support reserve analog output function	FL ~ FH	1200
27	OLL	current output low limit amplitude, limit the current output low limit amplitude	-5.0% ~ 100.0%	0
28	OLH	current output high limit amplitude, limit the current output high limit amplitude	0.0 ~ 105.0	100
29	BAD	RS485 communication baud rate 0 ( 4.8 ) : 4800 ; 1 ( 9.6 ) : 9600	0 ( 4.8 ) , 1 ( 9.6 )	9.6
30	ADD	Communication Address	0 ~ 255	1
31	DTC	Sequenced transport of communication data and setting 000 of respon relay. 1st is function reserve,2nd is byte sequenced exchange,3rd is respon relay,it can set 0~9 to 10~100ms.	Refer to communication protocol note②	0
32	FT	PV filter coefficient of digital filter,the higher of value,the stronger of filter function	0 ~ 255	10
33	UT	Temperature unit:°C : degrees Celsius F : Fahrenheit,note:the unit is only for temperature measure signal.	25 ( °C ) 26 ( °F )	25 ( °C )
34	AE1(2)	1st loop alarm extensions	0 ~ 5	0
35	AE2(2)	2nd loop alarm extensions	0 ~ 5	0
36	PT	Starting relay time of compressor,units	0 ~ 9999	180
37	PDC	Optional PID type 0(FUZ) : Advanced fuzzy PID arithmetic ; 1(FCT):Single prediction PID arithmetic; 2(STD) : normal PID arithmetic	0 ~ 2	FUZ
38	DP	Decimal point setting,it will be effective for line signal input.	0 ~ 3	0
39	DTR	PV fuzzy tracking value,it can get a stable control display value in some status. Note:when the alarm setting value is equal with SV setting value after setting the DTR value,operation of alarm output is subject to actual measured value.Setting 0 to close the function. Temperature unit:F/C	0.0 ~ 2.0/0 ~ 20	1.5/15

■ Connections

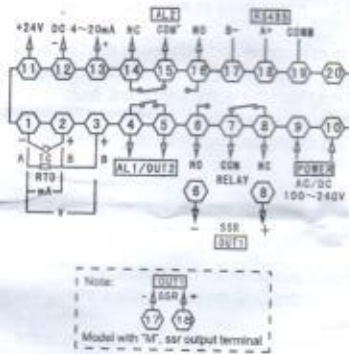
ZTF3



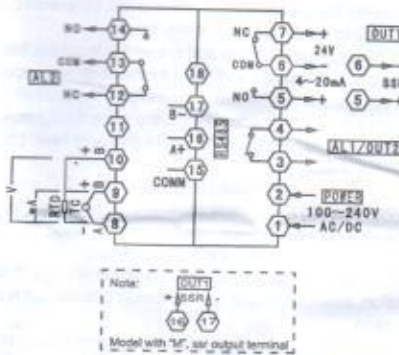
ZTF4



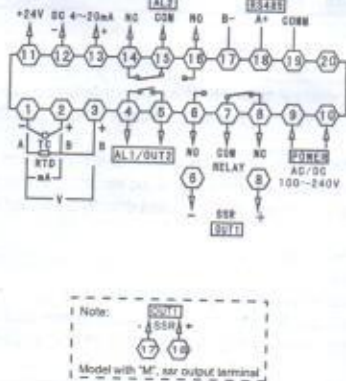
ZTF6



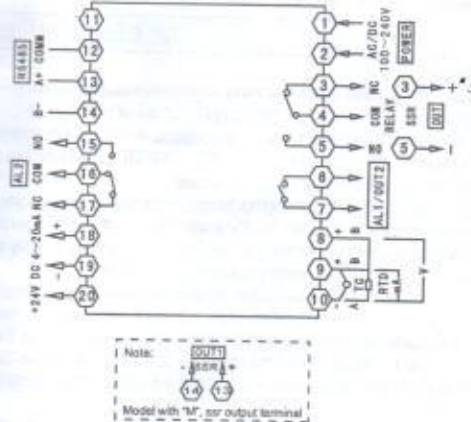
ZTF7



ZTF8



ZTF9





25	0x2107	Decimal point DP	1	R/W	
26	0x2108	Unit display UT	1	R/W	25 ( °C ) 26 ( °F )
27	0x2109	Filter constants FT	1	R/W	
28	0x210A	Proportional coefficient P	1	R/W	No decimal point
29	0x210B	Integral time I	1	R/W	No decimal point
30	0x210C	Differential time D	1	R/W	No decimal point
31	0x210D	Control speed fine-tune SPD	1	R/W	
32	0x210E	Heating control cycle CP	1	R/W	No decimal point
33	0x210F	Cooling control cycle CP1	1	R/W	No decimal point
34	0x2110	Cooling relay time PT	1	R/W	No decimal point
35	0x2111	Optional input signal INP	1	R/W	Refer to measured signal table
36	0x2112	Meter address ADD	1	R/W	
37	0x2113	Communication baud rate BAD	1	R	
38	0x2114	Communication delay setting DTC	1	R	Note ②
39	0x2115	PID arithmetic type PDC	1	R	
40	0x2116	Lock key LCK	1	R	
41	0x2117	Meter name	1	R	
42	0x2118	Output status	1	R	Note ①

R : Read ; R/W : Read/write

Note① :Measuring status indication,it means operation when the data position is 1,but it means no operation when it is 0.

D7	D6	D5	D4	D3	D2	D1	D0
STOP	HHHH	LLLL	AT	AL2	AL1	OUT2	OUT1

Note②:Sequenced transport and response delay of DTC communication data

DTC :    — Response delay : 0 ~ 9 means 10 ~ 100ms  
 — Sequenced transport of byte : 0 = 1 , 2 , 2 = 2 , 1  
 — Reserve

※16 digits CRC check code get C program

```

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

```