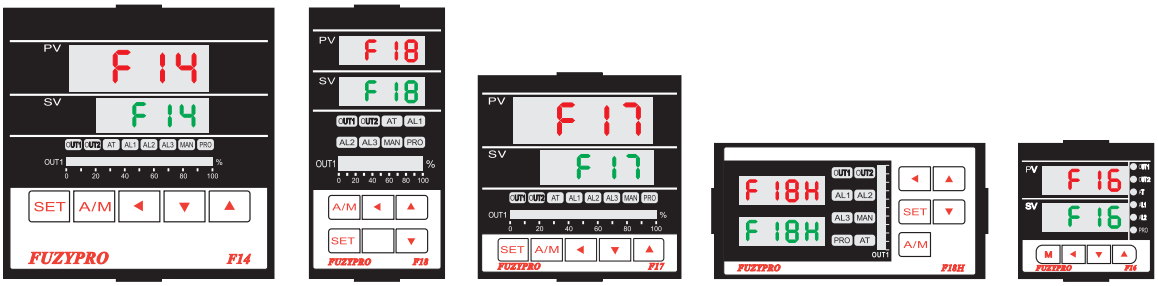
TEMPERATURE CONTROLLER

OPERATION MANUAL

Before using please check whether range, input and output match your requirement.

Thank you for using our microprocessor temperature controller, we have obtained CSA approved NO LR # Mark HCS 519 686 2715. We have also computerized our QC process and testing to provide high quality standard, low price and high functionality in our products.

1. Front panel instruction



1.1 DISPLAY

PV：Process value，4 digit display (red color)
SV：Setting value，4 digit display (green color)

1.2 LED

OUT1	: Output 1，green color
OUT2	: Output 2，green color
AT	: Auto Tuning，yellow color
PRO	: Program，yellow color
AL1	: Alarm 1，red color
AL2	: Alarm 2，red color
AL3	: Alarm 3，red color
MAN	: Manual，yellow color

*Note: When error occurs, the MAN will light up, and will reset output percentage to zero.

1.3 KEY

SET : MODE & SET key

◁ : SHIFT key

▽ : DOWN key (Setting value –1, -10, -100, -1000)

△ : UP key (Setting value +1, +10, +100, +1000)

A/M : Auto/Manual key.

Automatic : The output percentage is determined by internal calculation.

Manually : The output percentage is determined by manually set OUTL at User Level.

2 Auto tuning

2.2 Once AT is set YES，auto tuning is to be performed.

2.3 After auto tuning is finished，a new set of PID parameter is generated internally to replace the existing PID parameter.

* Auto tuning allows the controller to automatically adjust the PID parameter, and is suitable for use when temperature control is not accurate enough.

2.4 ATVL=auto tuning offset，and it will be deduced from SV

(it can prevent over shoot during auto tuning)

SV-ATVL=Auto-tuning value，ATVL=auto tuning offset

Ex.SV=200℃，ATVL=5，Auto tuning point is at 195℃

During auto tuning the PV value will oscillate around 195℃.

Hence PV will not go over 200℃.

＊ In programmable model，ATVL means Auto-tuning point

2.5 Auto tuning failure

Possible Cause 1： ATVL is too big. (If not sure，set ATVL=0)

Possible Cause 2： System time is too long.

(Set PID parameter individually)

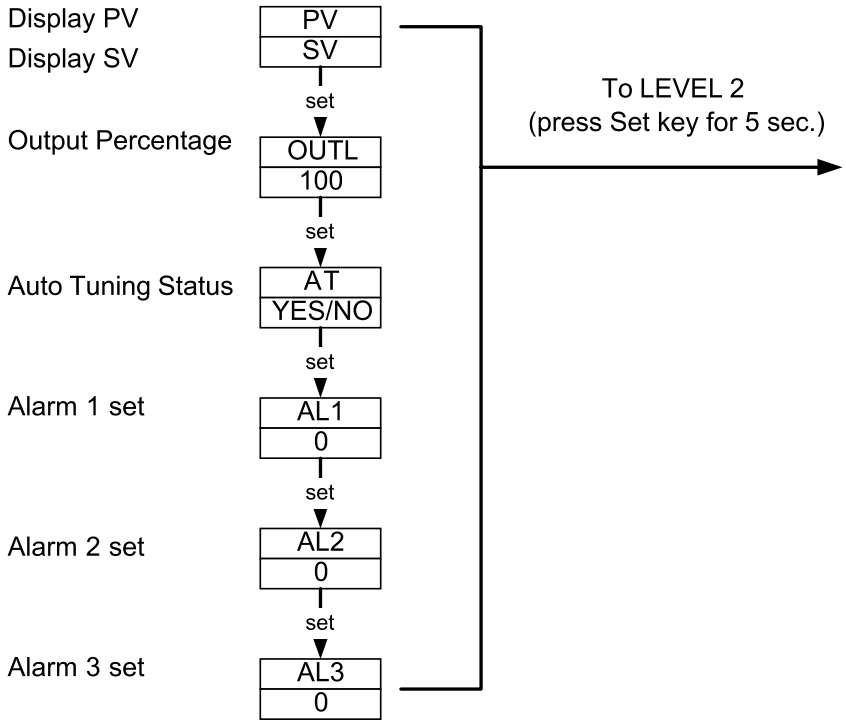
3. Error information

DISPLAY	DESCRIPTION
IN1E	Open circuit of main control sensor.
＊ ADCF	A/D converter failed.
＊ CJCE	Cold junction compensation failed.
IN2E	Open circuit of sub control sensor.
UUU1	PV exceeds USPL.
NNN1	PV under LSPL.
UUU2	Input signal of sub control exceeds the upper limit.
NNN2	Input signal of sub control under the lower limit.
＊ RAMF	RAM failed.
INTF	Interface failed.
AUTF	Auto tuning failed.

NOTE：If the "＊" marked error comes up，the Controller needs repair.
Please send it to the nearest sales office or retail dealer.

4. Operating flow

4.1 LEVEL 1 (User Level)



4.1.1 Press the **SHIFT KEY** (◁) to change the parameters. If the **SHIFT KEY** is pressed，the first digit begins blinking. Press the **UP KEY**(△) or **DOWN KEY**(▽) to increase or decrease the value of the digit，then press the **SHIFT KEY**(◁) again to go to the next digit. As all the digit are written，press **SET KEY** to enter the value.

4.1.2 **SET KEY** also has the function of changing MODEs，if the **SET KEY** is pressed，the display shows the next MODE.

4.1.3 Press **SET KEY** for 5 sec. the display goes to LEVEL 2，and do the same to return LEVEL 1.

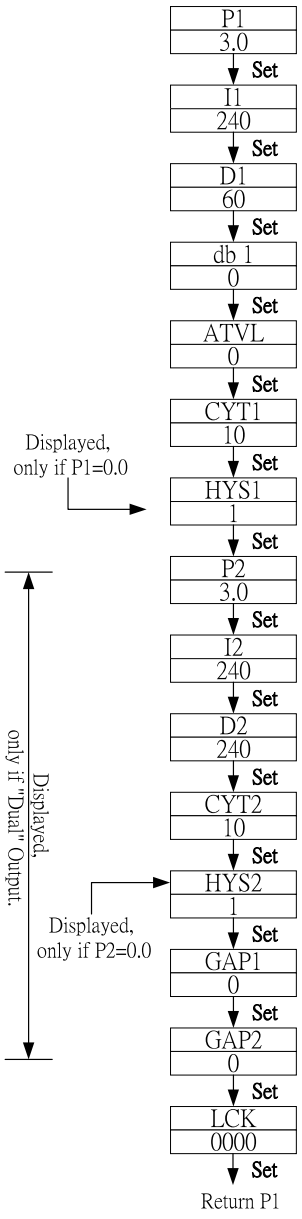
4.1.4 If any key were not pressed for 1 minute，the display would go to LEVEL 1.

4.1.5 Press **A/M KEY** twice will go to LEVEL 1，no matter where it is.

4.1.6 If **OUTL** set "0"，it means the controller has no output,

4.2 LEVEL 2 (PID Level)

press SET key for 5 seconds to enter Level 2



Main Control Proportional Band	Range：0.0-200.0% ON/OFF at P=0
Main Control Integral Time	Range：0~3600 Sec Integral OFF at I=0
Main Control Derivative Time	Range：0~900 Sec Derivative OFF at D=0
Main Control Dead-band Time	Don't care
Main Control Auto tuning off-set	Range：0~USPL
Main Control Proportional Cycle	Output (SSR=1，4 ~ 20mA=0，Relay=over 10) Range：0~150 Sec
Main Control Hysteresis	Range：0~1000 (For ON/OFF control only) OFF: PV > (SV+HYS1) ON: PV <= (SV-HYS1)
Sub Control Proportional Band	Sames as P1
Sub Control Integral Time	Sames as I1
Sub Control Derivative Time	Sames as D1
Sub Control Proportional Cycle	Sames as CYT1
Sub Control Hysteresis	Sames as HYS1
Main Control Gap (Output 1)	OUT1(HEAT) Setting Point=SV - GAP1
Sub Control Gap (Output 2)	OUT2(COOL) Setting Point=SV + GAP2
Function Lock	

LCK=**0000**，To enter any Level (not include SET Level) and change their parameters
LCK=**1111**，To enter any Level (include SET Level) and change their parameters
LCK=**0100**，To enter Level 1 & 2 and to change their parameters.
LCK=**0110**，To enter Level 1 & 2 and to change Level 1parameters only.
LCK=**0001**，To enter Level 1 only and to change SV only.
LCK=**0101**，it can't change any parameter except LCK.

4.3 LEVEL 3 (INPUT Level)

When LCK=0000，press SET key and SHIFT KEY ◁ for 5 seconds to enter LEVEL 3

INP1 K2	Main Control input selection	select the input range，refer to input selection (P.12 ~ 13)
↓ Set		
ANL1 0	Main Control Analog Zero set	It is used when INP1=AN1~AN5 Range：-1999 ~ 9999
↓ Set		
ANH1 5000	Main Control Analog Span set	Range：0 ~ 9999
↓ Set		
DP 0000	Decimal point	To set the position of decimal point (Only applicable when INP1=AN1~AN5)
↓ Set		
LSPL 0.0	Lower set-point limit	To set the lowest point within INP1
↓ Set		
USPL 400.0	Upper set-point limit	To set the highest point within INP1
↓ Set		
ANL2 0	Sub Control Analog Zero set	Range：-1999 ~ 9999
↓ Set		
ANH2 5000	Sub Control Analog Span set	Range：0 ~ 9999
↓ Set		
ALD1 01	Alarm mode of AL1	Range:00~19 (see P.14~15)
↓ Set		
ALT1 10	Time set of Alarm 1	Range：0~99.59 min. 0=flicker alarm， 99.59=continued，and other=on delay time Note:In program model,ALT=Alarm on time
↓ Set		
ALD2 01	Alarm mode of AL2	Range:00~19 (see P.14~15)
↓ Set		
ALT2 0	Time set of Alarm 2	Sames as ALT1
↓ Set		
ALD3 01	Alarm mode of AL3	Range:00~19 (see P.14~15)
↓ Set		
ALT3 0	Alarm 3 time set	Sames as ALT1
↓ Set		
HYSA 0	Hysteresis of alarm	Range：0~1000
↓ Set		
CLO1 230	Main Control calibration	Calibrate the low value of output Range：0 ~ 9999(current output only)
↓ Set		

CHO1 3600	Main Control Calibration high	To calibrate the high value of output Range:0~9999(current output only)
Set		
CLO2 230	Sub control Calibration low	Same as CLO1
Set		
CHO2 3600	Sub control Calibration high	Same as CHO1
Set		
CLO3 0	Transmitter control Calibration low	Same as CLO1
Set		
CHO3 5000	Transmitter control Calibration high	Same as CHO1
Set		
RUCY 5	Timer of motor	Full run time of proportional motor (without potentiometer) Range：5~200 sec.
Set		
WAIT 0	Use in program for waiting continued operation	0=No Wait Other=Wait volume
Set		
SETA 0000		Refer to "SETA" description. (see P.22)
Set		
IDNO 1	ID number (don't care)	Communication ID number
Set		
BAUD 2400	Baud rate (don't care)	UART baud rate selection Range：110~9600 BIT/sec
Set		
SVOS 0	Compensate SV	Range：-1000~1000
Set		
PVOS 0	Compensate PV	Range：LSPL~USPL
Set		
UNIT C	Unit of PV & SV	Range：C，F，A(analog)
Set		
SOFT 0.200	Soft filter (don't care)	Adjust the response time of PV (the bigger， the faster) Range：0.05~1.00
Set		
CASC 	don't care	
Set		
OUD HEAT	Action mode	Range：heat，cool
Set		
OPAD PID	Control action	Range：PID，Fuzzy
Set		
HZ 60	Frequency	Range：50，60HZ
Set		
Return INP1		

5. INPUT

5.1 Input selection (INP1)

TYPE	*CODE*	*RANGE*
K	**K1**	0.0 ~ 200.0℃ / 0.0 ~392.0℉
	K2	0.0 ~ 400.0℃ / 0.0 ~752.0℉
	K3	0 ~ 600℃ / 0 ~1112℉
	K4	0 ~ 800℃ / 0 ~1472℉
	K5	0 ~ 1000℃ / 0 ~1832℉
	K6	0 ~ 1200℃ / 0 ~2192℉
J	**J1**	0.0 ~ 200.0℃ / 0.0 ~392.0℉
	J2	0.0 ~ 400.0℃ / 0.0 ~752.0℉
	J3	0 ~ 600℃ / 0 ~1112℉
	J4	0 ~ 800℃ / 0 ~1472℉
	J5	0 ~ 1000℃ / 0 ~1832℉
	J6	0 ~ 1200℃ / 0 ~2192℉
R	**R1**	0 ~ 1600℃ / 0 ~2912℉
	R2	0 ~ 1769℃ / 0 ~3216℉
S	**S1**	0 ~ 1600℃ / 0 ~2912℉
	S2	0 ~ 1769℃ / 0 ~3216℉
B	**B1**	0 ~ 1820℃ / 0 ~3308℉
E	**E1**	0 ~ 800℃ / 0 ~1472℉
	E2	0 ~ 1000℃ / 0 ~1832℉
N	**N1**	0 ~ 1200℃ / 0 ~2192℉
	N2	0 ~ 1300℃ / 0 ~2372℉
T	**T1**	0.0 ~ 400.0℃ / 0.0 ~752.0℉
	T2	0.0~ 200.0℃ / 0.0 ~392.0℉
	T3	0.0 ~ 350.0℃ / 0.0 ~662.0℉
W	**W1**	0 ~ 2000℃ / 0 ~3632℉
	W1	0 ~ 2320℃ / 0 ~2372℉
PLⅡ	**PL 1**	0 ~ 1300℃ / 0 ~2372℉
	PL 2	0 ~ 1390℃ / 0 ~2534℉
U	**U1**	-199.9 ~ 600.0℃ / -199.9 ~999.9℉
	U2	-199.9 ~ 200.0℃ / -199.9 ~392.0℉
	U3	0.0 ~ 400.0℃ / 0.0 ~752.0℉

TYPE	*CODE*	*RANGE*
L	**L1**	0 ~ 400℃ / 0 ~752℉
	L2	0 ~ 800℃ / 0 ~1472℉
JIS PT100	**JP 1**	-199.9 ~ 600.0℃ / -199.9 ~999.9℉
	JP 2	-199.9 ~ 400.0℃ / -199.9 ~752.0℉
	JP 3	-199.9 ~ 200.0℃ / -199.9 ~392.0℉
	JP 4	0 ~ 200℃ / 0 ~392℉
	JP 5	0 ~ 400℃ / 0 ~752℉
	JP 6	0 ~ 600℃ / 0 ~1112℉
DIN PT100	**DP 1**	-199.9 ~ 600.0℃ / -199.9 ~999.9℉
	DP 2	-199.9 ~ 400.0℃ / -199.9 ~752.0℉
	DP 3	-199.9 ~ 200.0℃ / -199.9 ~392.0℉
	DP 4	0 ~ 200℃ / 0 ~392℉
	DP 5	0 ~ 400℃ / 0 ~752℉
	DP 6	0 ~ 600℃ / 0 ~1112℉
JIS PT50	**JP.1**	-199.9 ~ 600.0℃ / -199.9 ~999.9℉
	JP.2	-199.9 ~ 400.0℃ / -199.9 ~752.0℉
	JP.3	-199.9 ~ 200.0℃ / -199.9 ~392.0℉
	JP.4	0 ~ 200℃ / 0 ~392℉
	JP.5	0 ~ 400℃ / 0 ~752℉
	JP.6	0 ~ 600℃ / 0 ~1112℉
AN1	**AN1**	-10 ~ 10mV / -1999~9999
AN2	**AN2**	0 ~ 10mV / -1999~9999
AN3	**AN3**	0 ~ 20mV / -1999~9999
AN4	**AN4**	0 ~ 50mV / -1999~9999
AN5	**AN5**	10 ~ 50mV /-1999~9999

＊The initial set in factory is “K2” without any certain requirement

6. ALARM

6.1 Alarm function selection

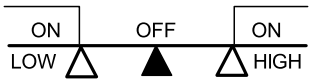
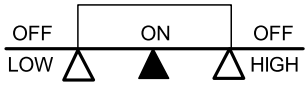
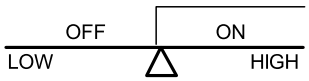
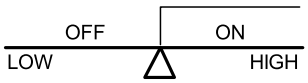
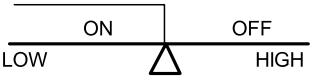
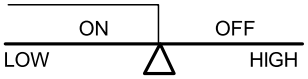
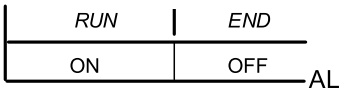
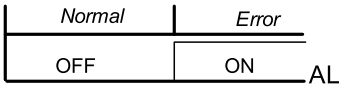
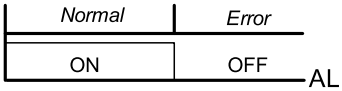
CODE	*DESCRIPTION*	*INHIBIT*
00 / 10	**None**	
01	**Deviation high limit alarm**	**YES**
11	**Deviation high limit alarm**	**NO**
02	**Deviation low limit alarm**	**YES**
12	**Deviation low limit alarm**	**NO**
03	**Deviation high / low limit alarm**	**YES**
13	**Deviation high / low limit alarm**	**NO**
04 / 14	**Deviation high / low limit range alarm**	**NO**
05	**Absolute value high limit alarm**	**YES**
15	**Absolute value high limit alarm**	**NO**
06	**Absolute value low limit alarm**	**YES**
16	**Absolute value low limit alarm**	**NO**
07	**Segment end alarm** **(use for program model only)**	**-**
17	**Program run alarm** **(use for program model only)**	**-**
08	**System error alarm-on**	**-**
18	**System error alarm-off**	**-**
09		**-**
19	**On delay timer alarm**	**-**

Note：the word "**INHIBIT**" means that alarm does not work at the first time.

6.2 Alarm action description

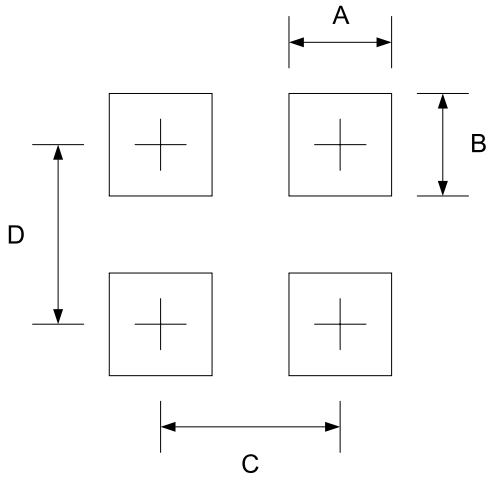
▲ : **SV**

△ : **Alarm set value**
(**inhibit** means alarm doesn't work at the first time)

00 10	**Non**
01	**Deviation high alarm inhibit** 
11	**Deviation high alarm no inhibit** 
02	**Deviation low alarm inhibit** 
12	**Deviation low alarm no inhibit** 
03	**High low alarm inhibit** 
13	**High low alarm no inhibit** 
04 14	**Band alarm** 
05	**Absolute high alarm inhibit** 
15	**Absolute high alarm no inhibit** 
06	**Absolute low alarm inhibit** 
16	**Absolute low alarm no inhibit** 
07	**Segment end alarm** (1) ALD1~3，set **07** (2) AL1~3=alarm segment No.set (3) ALT1~3 if set **0**=flicker alarm ALT1~3 if set **99.59**=continued alarm ALT1~3 if set **others**=ON delay time
17	**Program Run alarm(Refer to SETA.4，P.22)** 
08	**System error alarm - ON** 
18	**System error alarm - OFF** 
09	
19	**On delay timer** When PV=alarm SV，it keeps a certain period(set time)before alarm action. Range:00H.00M~99H.59M

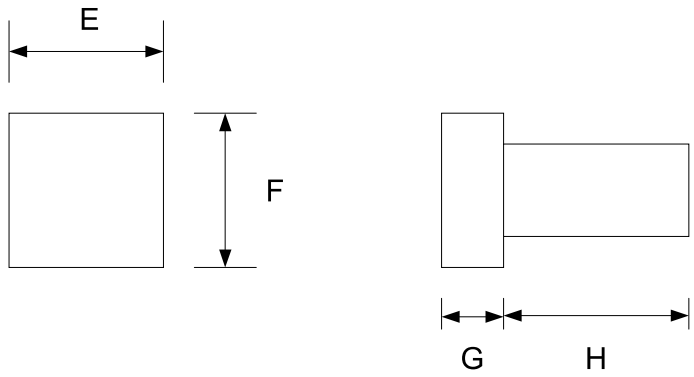
12.Panel cut & Outline Dimension：

12.1 Panel Cut Dimension(Units：mm)



	A	B	C	D
F16	44.5+0.5	44.5+0.5	65	70
F18H	90.5+0.5	44.5+0.5	111	70
F17	68.5+0.5	68.5+0.5	89	94
F18	44.5+0.5	90.5+0.5	65	116
F14	90.5+0.5	90.5+0.5	111	116

12.2 Outline Dimension (Units：mm)



	E	F	G	H
F16	50	50	17	80
F18H	96	50	17	80
F17	74	74	17	80
F18	50	96	17	80
F14	96	96	17	80