DIGITAL CONTROLLER

DTX SERIES
INSTRUCTION MANUAL

1. GENERAL INTRODUCTION

DTX series PID Temperature Controller is the new product developed by our company. It adopts special microcomputer adjusting meter that employs switching power and surface mount technology (SMT), therefore, the controller is quite smart and reliable. Its special functions like auto diagnosing, auto setting and intelligent control. It can be used widely in the display and control of the parameter of the temperature, pressure, flow, and liquid level.

2. MAIN TECHNICAL INDEX

2.1 Input:

Thermocouple(TC),Resistance Temperature Detect（RTD）
Standard Current and voltage signals.

2.2 Display:

Process Value（PV）、 Setting Value(SV):-1999~+1999
Output（OUT1、OUT2）Alarm（ALM1、ALM2）Auto setting(AT)
Display: LED

2.3 Control way

(1).PID Control(including ON/OFF, position PID and continuous PID)
(2).Auto Setting Control

2.4 Accuracy

Measurement Accuracy:0.5%FS
Compensation error of cold terminal: 2 ℃(amend within 0~50℃ by soft)
Resolution:14bit. Sampling period:0.5Sec.

2.5 Setting Range:

Setting Value(SV): same range with PV
Proportional Band(P):0~full range(ON/OFF Control when set to 0)
IntegrationTime(I):0~3600Sec(no integral action when set to 0)
Derivative Time(D):0~3600Sec(no derivative action when set to 0)
Proportional Period:1~100Sec
On-off control output hysteretic loop width:1~100℃(or other PV units)

2.6 Control Output

(1)Currency output: DC 0~10Ma,4~20mA(RL<500Ω)
(2)Voltage output: DC 0-5V,1-5V(RL>10K)
(3)Relay output: Contact capacity:250V AC 3A(resistive load)
(4)Voltage Impulse output:0-12V(applicable for solid state relay SSR)
(5)Silicon Controlled Rectifier(SCR) output: zero-cross triggering or phase-shift triggering(resistive load)
(6)Alarming function output: 2 groups output at most,12 modes
Output Contact Capacity:250V AC 3A

2.7 Other Parameters

(1)Insulation resistance:>50MΩ(500V DC)
(2)Insulation strength:1500V AC/min
(3)Power consumption:<10V
(4)Service environment:0~50℃,30~85RH,no corrosive gas

3. OUTLINE MOUNTING BORING

Outline & boring size

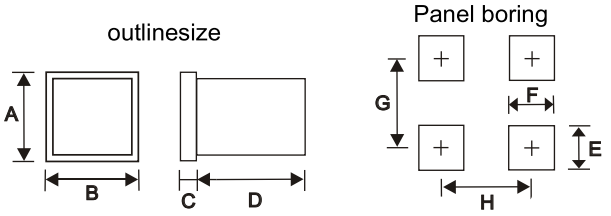


Fig. 1

Form 1

	A	B	C	D	E	F	G	H
DTXG	48	48	10	100	45	45	80	80
DTXE	96	48	10	100	92	45	116	80
DTXF	48	96	10	100	45	92	80	116
DTXD	72	72	10	100	68	68	96	96
DTXA	96	96	10	100	92	92	116	116

4. PANEL NAME AND FUNCTION

PV: Measured value / mode display value
SV: Setting value/mode display value
AT: PID auto calculation indicator lamp
OUT1: Output 1 indicator lamp
OUT2: Output 2 indicator lamp
ALM1: Alarm 1 indicator lamp
ALM2: Alarm 2 indicator lamp

SET: Setting mode key ＜R/S: Shift key V: Up key Λ: Down key

5. MODEL DESCRIPTION AND MODEL SELECTION

DTX□ - □ □ □ - □ □ * □ □
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

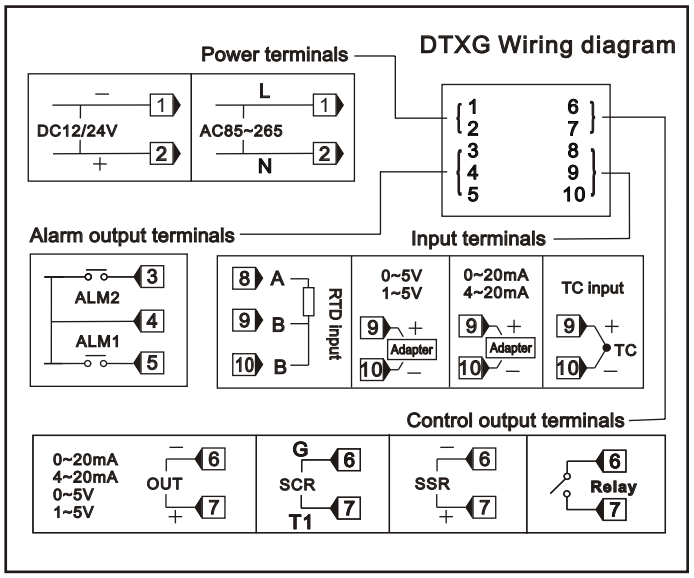
① Outline size(See Form 1)
② Control type
F:PID operation and auto calculation(Reverse operation)
D:PID operation and auto calculation(Forward operation)
③ Input type: refer to input range table (See Form 2)
④ Range Code: refer to input range code table
⑤ First Control Output(OUT1)(Heating side)
M: Relay contact output 8:Current output(DC 4~20mA)
V: Voltage impulse output
T: Hydration driving output
⑥ Second Control Output(OUT2)(Cooling side)
Null: when control operation is F or D
M: Relay Contact output 8: Current output(DC 4~20mA)
V: Voltage impulse output T: Hydration driving output
⑦ First Alarm(ALM1) ⑧ Second Alarm(ALM2)
N: No alarm
A: Upper-Limit bias alarm
B: Lower-Limit bias alarm
C: Upper/Lower Limit bias alarm
D: Alarm in area
E: Standby upper-limit bias alarm attached
F: Standby lower-limit bias alarm attached
G: Standby upper/lower limit bias alarm attached
H: Upper-Limit input value alarm
J: Lower-limit input value alarm
K: Standby upper-limit input value alarm attached
L: Standby lower-limit input value alarm attached

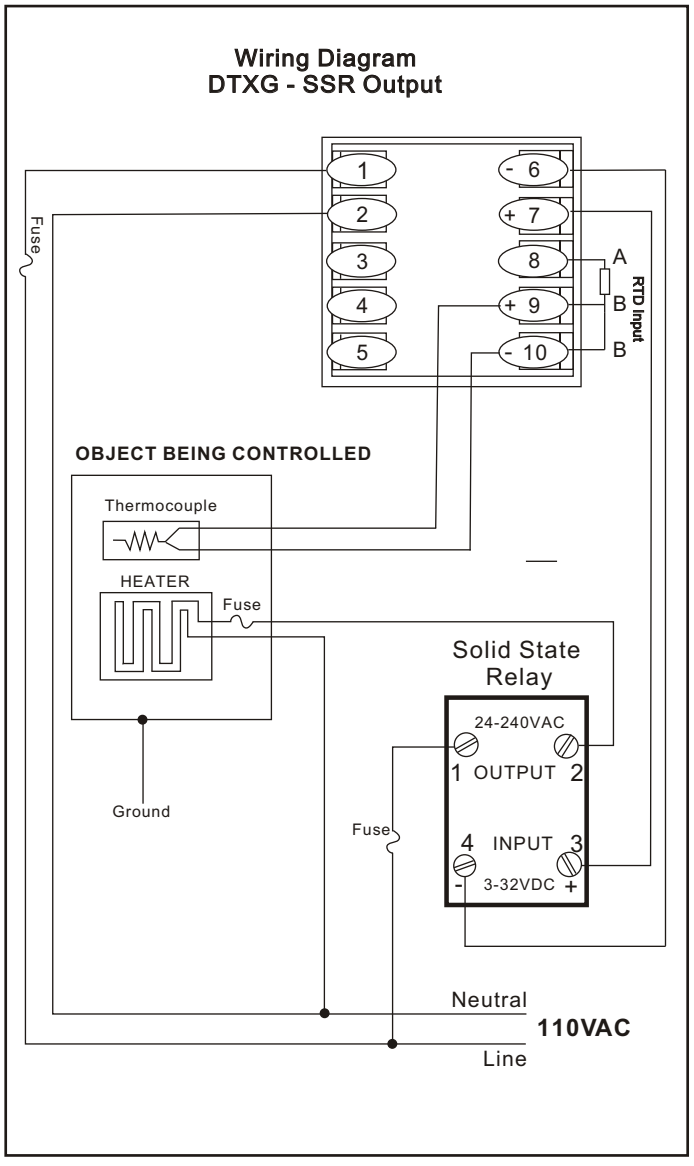
Form2:Input type & Input range code

Input type		Code	Input range	Code	Input range	Code	Input range
Thermocouple (TC)	K	K01	0-200℃	K02	0-400℃	K03	0-600℃
		K04	0-800℃	K05	0-1000℃	K06	0-1200℃
		K07	0-137.2℃	K13	0-100℃	K14	0-300℃
	J	J01	0-200℃	J02	0-400℃	J03	0-600℃
		J04	0-800℃	J05	0-1000℃	J06	0-1200℃
	R *1	R01	0-1600℃	R02	0-1769℃	R03	0-1350℃
	S *1	S01	0-1600℃	S02	0-1769℃		
	B *1	B01	100-1800℃	B02	0-1769℃		
	E	E01	0-800℃	E02	0-1000℃		
	N	N01	0-1200℃	N02	0-1300℃		
	T *2	T01	0-350℃	T02	-199.9-100℃	T03	-199.9-200℃
		T04	-199.9-400℃				
RTD	PT100	D01	-199.9-649.0℃	D02	-199.9-200.0℃	D03	-199.9-50.0℃
		D04	-100.0-100.0℃	D05	-100.0-200.0℃	D06	-100.0-50.0℃
		D07	0.0-100.0℃	D08	0.0-200.0℃	D09	0.0-300.0℃
		D10	0.0-500.0℃				
	JPT 100	P01	-199.9-649.0℃	P02	-199.9-200.0℃	P03	-199.9-50.0℃
		P04	-100.0-100.0℃	P05	-100.0-200.0℃	P06	-100.0-50.0℃
		P07	0.0-100.0℃	P08	0.0-200.0℃	P09	0.0-300.0℃
		P10	0.0-500.0℃				
Voltage	0-5V	401	0.0-100.0℃				
	1-5V	601	0.0-100.0℃				
Current	0-20mA	701	0.0-100.0℃				
	4-20mA	801	0.0-100.0℃				

＊1, 0-399 ℃ Accuracy is not guaranteed.
＊2, −199. 9−100℃ Accuracy is not guaranteed.

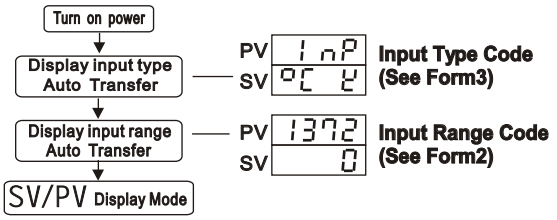
6. TERMINAL CONFIGURATION





7. OPERATION PROCEDURES

7.1 Procedures of Starting



Form3 Input Type Code

Display																
Input type	Thermocouple(TC)												RTD		Voltage (Current)	
	K	J	L	E	N	T	U	R	S	B	W5Re W26Re	PL Ⅱ	JPT 100	PT 100		

Note: When the input signal is current or voltage,you must use our appropriative current & Voltage input adapter

7.2 SV Setting Mode

Under SV/PV normal display state, first, press SET key to make the SV display in the flashing state, second, press the ‹ key to find the place number of required setting temperature, third, press UP or DOWN key to set the required temperature, after ending the setting, press SET key again to let the meter come back to SV/PV normal display state.

7.3 Parameter Setting Mode

This parameter is used to set the alarming parameter, PID constant, etc, under the normal displaying state, press the SET key for three seconds, the PV display will show the parameter setting state, and SV display will show the corresponding value, then, press SET key in turn to display the parameter symbol specified in the following table:

Form4

Display symbol	Description	Setting range	Factory value
PV SV	**Measured Value** **Setting Value**	Full range	
AL 1	Alarm1 setting	Full range	50.0or50
AL2	Alarm2 setting	Full range	50.0or50
ArU	Self setting	0:Auto-setting for closing 1:Auto-setting for opening	0
P	Proportional band (Refer to*for heating side)	ON/OFF control when setting to 0	30 or 30.0
I	Integration time(s)	1-3600sec No derivative action when setting to 0	240
d	Derivative time(s)	1-3600sec No derivative action when setting to 0	60
Ar	Limit integration operation work range	Proportional band **1-100%** (heating side)	100
T	**Proportional Period (heating side)**	1-100sec NO display when current outputs	Refer to*1
Pc	Proportional band **(Cooling side)**	1-1000%of proportional band(Heating band)	100
db	**Dead Band**	0000-01111	0&0.0
t	**Proportional Period (Cooling side)**	1-1000sec NO display when current outputs	Refer to*1
Pb	PV deviation amendment	PV amendment	0&0.0
LCY	Date lock	(refer to*2)	0000

Note: some parameter signals maybe not showed

* 1. Relay contact output:20s, voltage impulse output or driving of gas control tube is made by trigger output or gas control tube output for 2s
* 2. Data lock grade selects
  - Monitored only after data locked
  - Each alarm data(HBA.LBA.LBD) can be lock under the following grades 0001.0011.0111

1. When LCK=0000 all data may be amended
2. When LCK=0001, all data may not be amended except SV, AL1,AL2
3. When LCK=0011, all data may not be amended except SV,
4. When LCK=0111, all data may not be amended

7.4 Function Setting

When the meter is energized normally, find the data lock parameter LCK according to the parameter setting mode, SET the code to 1000, then press SET key to make the meter confirm, press both SET key and R/S key at the same time for 3s, the PV display will show Cod When Cod=0000,press SET key in turn to get the following parameters in circular display: **(See Form 6)**

Form6

Display symbo	Setting value				Description	
SL 1	0	0	0	0	K	Thermocouple(TC)
	0	0	0	1	J	
	0	0	1	0	L	
	0	0	1	1	E	
	0	1	0	0	N	
	0	1	0	1	T	
	0	1	1	0	U	
	0	1	1	1	R	
	1	0	0	0	S	
	1	0	0	1	B	
	1	0	1	0	W5Re/W26Re	
	1	0	1	1	P12	
	1	1	0	0	PT100(JIS/INC)	RTD Input
	1	1	0	1	JPT100(JIS)	
	1	1	1	0	0-20mA,0-5V	Voltage(Current)
	1	1	1	1	4-20mA,1-5V	
SL2				0	°C Centigrade	Selection of nominal unit
				1	°F Fahrenheit	
			0		Air cooling(A type)	Selection of cooling method
			1		Water cooling(W type)	
	0	0			Null	
SL3	0	0	0	0	Omit	
SL4		0	0	0	No set alarm 1 function	Selection of Alarm1(ALM) type
		0	0	1	Upper-limit bias alarm	
		0	1	0	Upper/lower-limit bias alarm	
		0	1	1	Process value upper-limit alarm	
		1	0	1	Lower-limit bias alarm	
		1	1	0	With alarm (Alarm in area)	
		1	1	1	Process value lower limit alarm	
	0				No standby alarm function	Selection of alarm1 standby functoin
	1				With standby alarm function	
SL5					Setting of Alarm 2 function	Ditto
SL6				0	Forward-operation control(**Cooling**)	Main forrward/reverse operation selection
				1	Reverse-operation control(Heating)	
		0			Main control time scalc output	Selection of main control output type
		1			Main control continuous output(4-20mA)	
SL7				0	Excitation alarming	Excitation alarming/Non-excitation alarming(Alarm 1 side)
				1	Non-excitation alarming	
			0		Non-excitation alarming	Excitation alarming/Non-excitation alarming(Alarm 2 side)
			1		Non-excitation alarming	
SL8	0	0	0	0	Omit	
SL9				0	Omit	
SL10				0	Non	Run/Stop function setting*2
				1	Run/Stop function	
	0				Non	Selection of autocorrection function
	1				Autocorrection function	
SL11	0	0	0	0	Omit	

***1. Excitation alarming means alarm relay contact changes from NO to NC. Non-excitation alarming means alarm relay contact changes from NC to NO**

***2. Run/Stop setting is effective, press "<R/S" key for about 2s, the device stop operating. PV window will display "StoP", press "<R/S" key again for about 2s, return to work.**

7.5 Constant Setting

When Cod=0001,press SET key in turn to get the fo llowing parameters in circular display: **(See Form 7)**

Form7

Display symbol	Description	Factory value
SLH	Upper limit of setting value measurement range	*
SLL	Lower limit of setting value measurement range	*
PGdP	Place number of decimal	0001
oH	Main output no-operation bandwidth	2or2.0
AH1	Alarm 1 output no-operation bandwidth	2or2.0
AH2	Alarm 2 output no-operation bandwidth	2or2.0
Cr	Current transformer ratio (For wire break alarm transformer)	*
dF	Digital filter constant: range 0-100s	1sec
Srn	Time factor of stable measuring value：range 0-200s	100
SrPb	Calculating factor of proportional band: range 0-200s	67
SrIt	calculating factor of integration: range 0-200s	16

* according to the order

7.6 Instrument Data viewing

When Cod = 0002, all data is the recorder of meter operation, can be only seen but not amended **(See Form 8)**

Form8

Display symbo	Description
rCJ	Maximum temperature value of instrument input terminal air
urH	Maximum use time of instrument, min unit 10000 hours
urL	Minimum use time of instrument ,min unit 1 hour

7.7 Failure Message Indicate

Fault information indication: When meter can't work normally, the meter diagnosed automatically to display the message prompt. **(See Form 9)**

Form9

Display symbo	Description
Err	Meter occurs fault
oooo	The wire is disconnected at inputting, the polarity is connected inversely or above input range
uuuu	The wire is disconnected at inputting, the polarity is connected inversely or below input range

8. OPERATION PROCEDURES (See Fig.3)

9. LINE AR INPUT ADAPTER WIRING DIAGRAM

(See Fig.2)

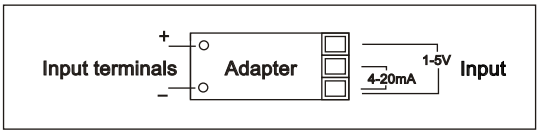


Fig.2

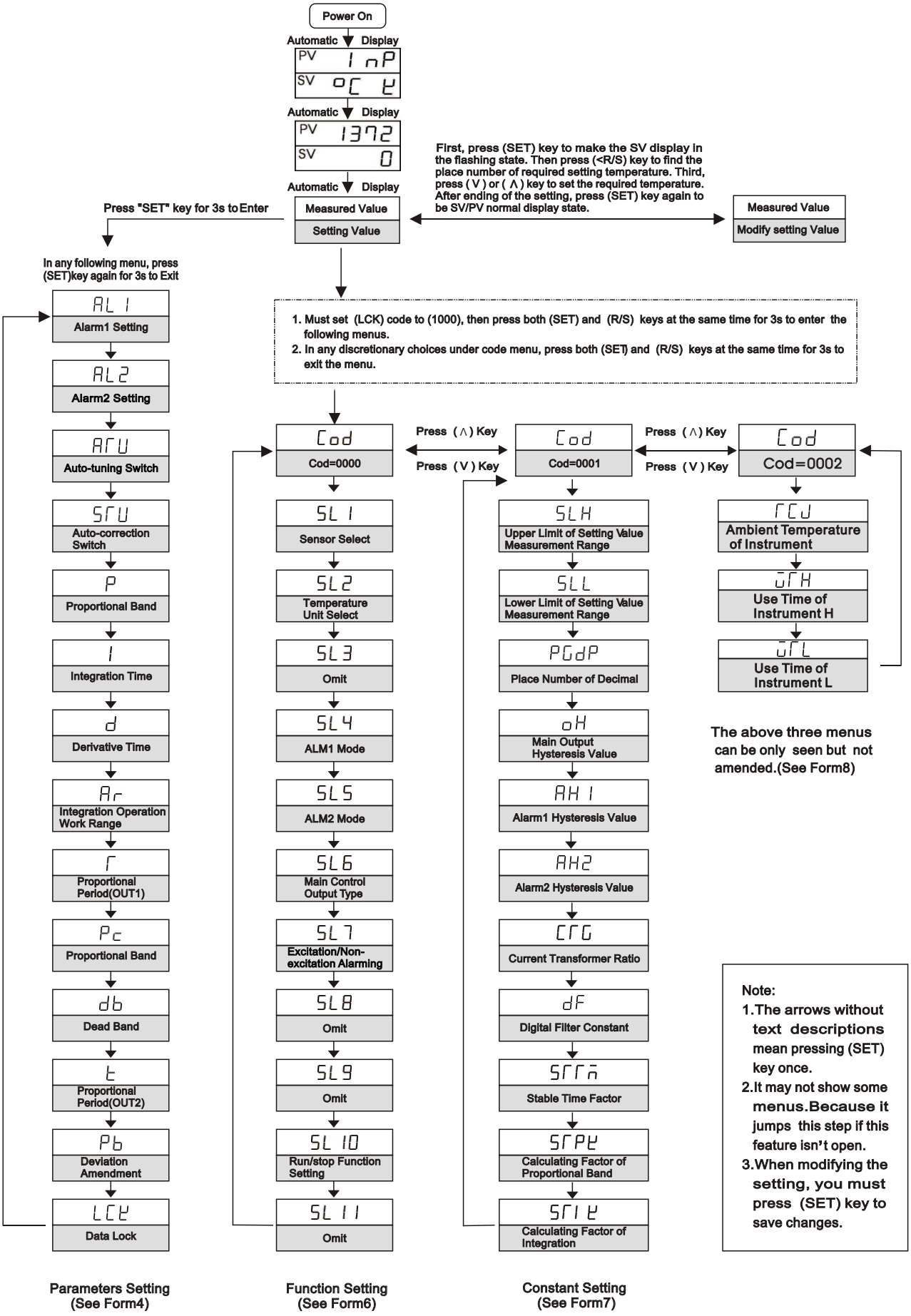
10. AFTER SERVICE

The instrument is guaranteed of 18-month free maintenance or changing after the date whenproduct leaves the factory.For product damaged by mistake operating or product withexpired warranty, the maintenance will requiresome reasonable charge. Besides,we can give the lifelong maintenance for ourproducts.

About Safety Proceeding

1. Before use the product, please read carefully this manual, then use it correctly on the base of understanding its content.
2. The product can be used manufacture machinery, work machinery, calculation and measurement instrument (Don t use it for the medicine machine)
3. If in the state of interruption or unusual may cause terrible system accident, please set proper protect electrical route outside, in case of the accident.

Fig.3 OPERATION PROCEDURES



DTXG PID Temperature Controller Instruction Manual (Reference Revision 2)

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