Temperature Controller System

TY Series

Installation and Operation Manual

First General Technology Inc.

FGT

Essential Instructions

Read this page before proceeding!

FGT designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using and maintaining FGT products.

- Read all instructions prior to installing, operating and servicing the products. If this instruction manual is not the correct manual, telephone 886-6-2632460 and the requested manual will be provided. Save this instruction manual for future reference.
- If you do not understand any of the instructions, contact your FGT representative for clarification.
- Follow all warnings, cautions and instruction marked on and supplied with the products.
- Inform and educate your personnel in the proper installation, operation and maintenance of the product.
- Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate update, program and maintain the products.
- When replacement parts are required, ensure that qualified people use replacement parts specified by FGT. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result inn fire, electrical hazards or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

⚠CAUTION

This Instrument contains electronic components that are susceptible to damage by static electricity. Proper handling procedures must be observed during the removal, Installation or other handling or internal circuit boards or devices.,

Handing Procedure

4. Power to unit must be removed.
5. Personnel must be grounded, via a wrist strap or other safe, suitable means before any printed circuit card or other internal device is installed, removed or adjusted.
6. Printed circuit cards must be transported in a conductive bag or other conductive container. Boards must not be removed from protective enclosure until immediately before installation. Removed boards must immediately be placed in protective container for transport, storage or return to factory.

Comments

This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, CMOS, etc,) Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components even though they appear to function properly, exhibit early failure.

FGT

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2. Specifications

Model TY series Temperature controller System accurately measures and controls Temp..

This instrument is used for Temp. control in a wide range of application including various

1-1. Specifications

Model	TY04	TY04R	TY08	TY08R
Number of channel	4	4	8	8
Input Type	TC,RTD,DCV(Refer to Input type & Range Code)			
Standard contact	±0.1 % ℃(0~50℃)			
Input Range	Refer to Inoput Type * Range code			
Memory Backup	Memory Backyup By EEPROM,Life span of EEPROM:100,000 writing possible,Save Data for Over 10 years			
Control Type	On/Off,P,PI,PD,PID control			
Contact input	Direct,Reverse On:less than 2KΩ,Off:over 15KΩ			
Operation environment	Ambient Temp.:0~50℃			
	Ambient Humi.:20~85 % RH			
Connunication	No	RS485/422+Contact	No	RS485/422+Contact
Power Voltage	AC 100~240 V,50/60 Hz			

1-2. Unit of Temp.

Our Temp. controller Systems is based on the SEMIIE12-91(semi-standard).

The applied unit is ℃ (Standard Temp.) or ℉.The status of this gas is the same as the reference(normal) conditions of 0℃.If the applied Temp. unit and definition thereon differ, inquire us of it or give us your instructions. If the unit you require is a ℃ unit or unit approved by the current measuring law, we will make a production on the basis of the unit you require.

2. Standard configuration and Wiring Connection

2-1. Standard Configuration

⚠WARNING

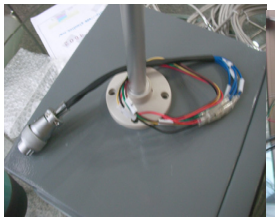
Do not operate this instrument in excess of the specifications. Failure to heed this warning may result in serious personal injury and / or damage to the equipment

The fist Step will be chick the power supply. Then, installing the Power Cable into the AC Line. The Temp. Sensor were inserted under a Temp. Jack connector. The Temp. Sensor will be 4 pcs or 8 pcs by Model no. Plug-in Alarm light Cable into the Alarm Jack connector. Please make sure the total Jack to lock the connector. Open the Power Switch and Alarm Switch. The TY Temp. Controller System will be display in Panel and show Multi-light with LED light.

Power/Alarm Jack connector

TY-Sensor Jack Connector

TY-Sensor



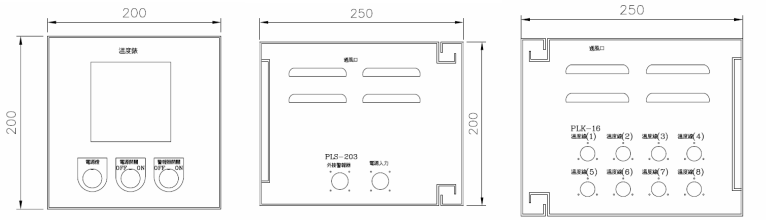
Alarm Light

Controller Panel

Power Switch & Alarm Switch &

2. Standard configuration and Wiring Connection

2-2. Electric connection Diagram and Wiring Connection



Front view **Left View** **Right view**

3.. Install

3-1. Input Type & Power Supply

WARNING

Do not operate this instrument in excess of the specifications. Failure to heed this warning may result in serious personal injury and / or damage to the equipment.

Input Type	Input Range(℃)	Order Code
K	-200~1370	K0
	-199.9~999.9	K1
J	-200~1200	J0
	-199.9~999.9	J1
R	0~1700	R0
	0.0~999.9	R1
S	0~1700	S0
	0.0~999.9	S1
B	0~1800	B0
	0.0~999.9	B1
E	-200~1000	E0
	-199.9~999.9	E1
N	-200~1300	N0
	-199.9~999.9	N1
T	-199.9~400.0	T0
W	0~2300	W0
PL2	0~1390	A0
U	-199.9~600.0	U0
L	-199.9~900.0	L0
Pt100	-199.9~600.0	D0
JPt100	-199.9~500.0	P0
0~5V	-199.9~999.9	V0
1~5V	-199.9~999.9	V1
0~10V	-199.9~999.9	V2

This instrument apply the Power voltage from AC100~240 V 50/60HZ(±10%)

3-2. Name & Function

Operator Panel(Fig-1)

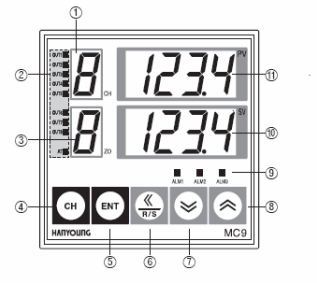


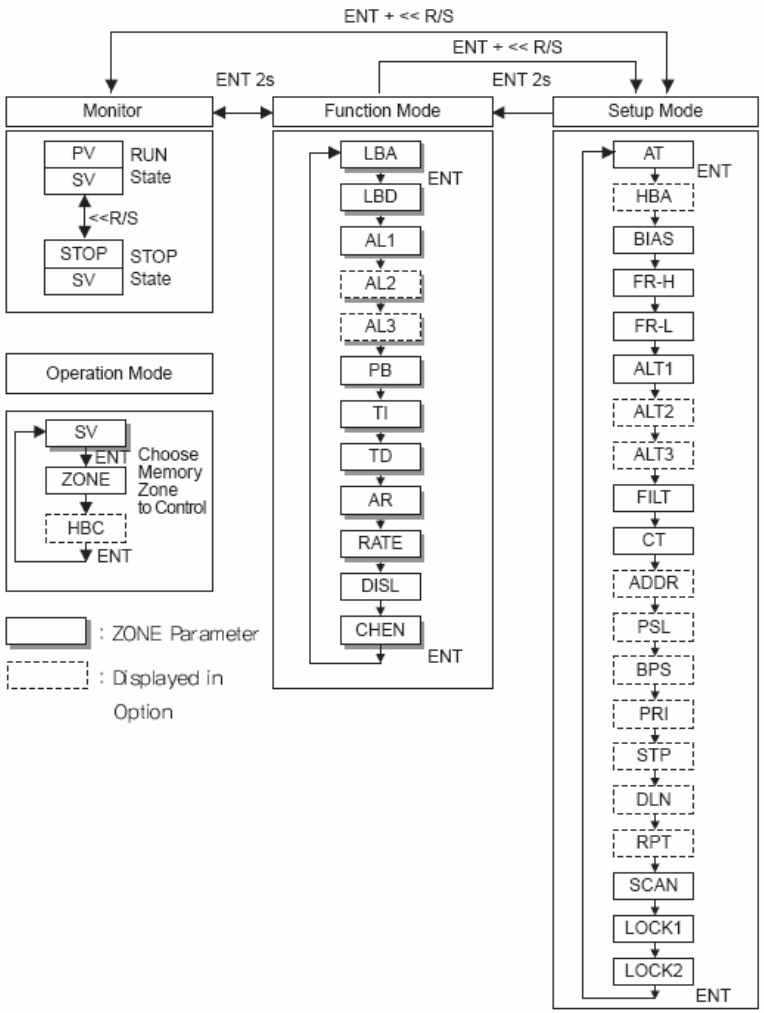
Fig-1

No.	Paramete	Main Function	Description
1	Channel display	Windwos for displaying Channel("A" Batch Setting)	Monitor screen:Displays the channel of PV/SV currently. Screen except Monitor:Displays Parameter channel for setting currently.
2	Output/AT	Indicate Lamp(Output 1~8 AT)	Lights Lamp when Output 1~8 is On. Flickes Lamp when the displayed channel is in AT currently.
3	Meonry Range	Windows for displaying Memory Zone(Display Monory Zone)	Monitor screen:Displays the number of controlling Zone currently. Screen except Monitor:displays the number of Parameter Zone for setting currently.
4	CH Key	Key for changing Channel	Monitor screen:Press this key for 1 sec to change Auto-scan during scanning each. Channel to scan is changed by pressing CH Key during scanning each. Screen except Monitor:Changes the Channel number of Parameter for setting currently.
5	ENT Key	Setting Key	Saves Parameter changed or turns into the next Parameter.
6	R/S Key	Shift &^ Reset Key	Monitor screen:Staring or finishing Control by pressing for 1sec. Screen except Monitor:Operating by Shift-Key.
7	Key	Key for decreasing Set-values(SV)	Decreases Parameter values.
8	Key	Key for increasing Set-values(SB)	Increases Parameter Values.
9	ALM1~3	Alarm Output Lamp(Alarm1~3)	Lights Lamp when Alarm Output is On
10	SV Windows	Windows for displaying Set-Values(SV Windows)	Monitor screen:Displays Set-Valu(SV). Screen except Monitor:displays Parameter Value.
11	PV Windows	Windows for displaying Process-Values(PV Windows)	Monitor screen:Displays Set-Valu(PV). Screen except Monitor:displays Parameter name as an abbreviation.

CAUTION

∗Before Starting for TY Controller Panel. Please Chick the contents of the products. In case the instrument has external damage or some contents are missing, please contact to FGT's sales department.

3-3. Flowchart of Parameter



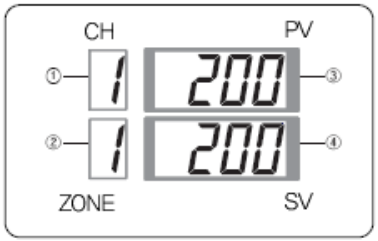
CAUTION

∗If you don't operate any key on the screen of Operation, Function & Setup for 1min.,it is moved on Monitor screen.

3-4. Parameter Range & Initial Value

Signal	Name	Range	Initial Value	Unit	Area	CH
SV	Set Value	EU(0 ~ 100 %)	EU(0 %)	EU	○	○
ZONE	Memory Zone	1 ~ 8	1	ABS	○	○
HBC	Heater Break Current	0.0 ~ 100.0	0.0	Ampere	×	○
LBA	Loop Break Alarm	OFF, 0.1 ~ 200.0	8.0	Min	○	○
LBD	Loop Break Alarm Deadband	EUS(0 ~ 100 %)	EUS (0 %)	EUS	○	○
AL1	Alarm 1	Refer to 5 - 3 Alarm			○	○
AL2	Alarm 2				○	○
AL3	Alarm 3				○	○
PB	Proportional Band	EU(0 ~ 100 %)	30.0 ℃ /3.0 %	EU	○	○
TI	Time of Integral	0 ~ 3600	240	sec.	○	○
TD	Time of Derivative	0 ~ 3600	60	sec.	○	○
AR	Anti-Reset Windup	0 ~ 100	0 (AUTO)	%	○	○
RATE	SV rate	EUS(0 ~ 100 %)	OFF	EUS	○	○
DISL	DI Select	0, 1	0		×	×
CHEN	Channel Enable	OFF, MONI, CONT	CONT	ABS	○	○
AT	Auto-Tuning	OFF, ON	OFF	ABS	○	○
HBA	Heater Break Alarm	OFF, 0.0 ~ 100.0	OFF	Ampere	×	○
BIAS	Bias	EUS(0 ~ 100 %)	0.0	EUS	×	○
FR-H	Range High Limit	FR-L~High Limit	High Limit	EU	×	×
FR-L	Range Low Limit	Low Limit~FR-H	High Limit	EU	×	×
ALT1	Alarm 1 type	0 ~ 16	0		×	×
ALT2	Alarm 2 type	0 ~ 16	0		×	×
ALT3	Alarm 3 type	0 ~ 16	0		×	×
FILT	Filter	OFF, 1 ~ 100	OFF	sec.	×	○
CT	Cycle Time	1 ~ 100	20/2	sec.	×	○
ADDR	Address	1 ~ 99	1	ABS	×	×
PSL	Protocol select	0, 1	0		×	×
BPS	Bits Per Second	0 ~ 3	3	ABS	×	×
PRI	Parity	0 ~ 2	0	ABS	×	×
STP	Stop Bit	1, 2	1	ABS	×	×
DLN	Data Length	7, 8	8	ABS	×	×
RPT	Response Time	0 ~ 10	0	ABS	×	×
SCAN	Scan Time	1 ~ 10	2	sec.	×	×
LOC1	Lock 1	Refer To LOC 1		ABS	×	×
LOC2	Lock 2	Refer To LOC 2		ABS	×	×

3-5. Monitor Display



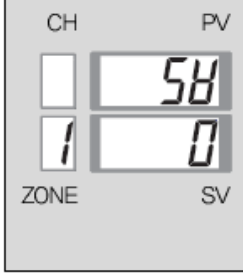
This screen is to check Process-Value(PV) & Set-Value(SV) come under Channel number displayed on CH window. Channel number is changed by pressing CH key (Each Scan), and automatically it is changed by doing CH key for 1 sec. over(Auto Scan).
Scanned time is decided in "Scan" Parameter in that time(Refer to "SCAN" in Setup Mode).

* If SV Rate is operated, Rated SV is displayed.
* If PV is on stop running, it displays STOP(Refer to 5-1. RUN/STOP). In case of an error, it displays ERROR(Refer to 6-4. Error Code).

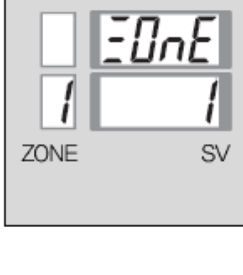
① Monitor screen: Displays the channel of PV/SV currently.
Screen except Monitor: Displays the number of Parameter Channel (CH) for setting currently.
② Monitor screen: Displays the number of controlling Zone currently.
Screen except Monitor: Displays the number of Parameter Zone for setting currently.
③ Monitor screen: Displays current Process-Value(PV).
Screen except Monitor: Displays Parameter name as an abbreviation.
④ Monitor screen: Displays Set-Value(SV).
Screen except Monitor: Displays Parameter Value

3-6. Operation Mode

Set SV & Zone to control. Also you can check HBA value in case of HBA option.



Initial Value	: 0 ℃, 0.0 ℃
Setting range	: Within input range.
Contents	: Set SV Allowable to set 8 SV in maximum from 1CH to 8CH. Allowable to set SV as the same value simultaneously from 1CH to 8CH.



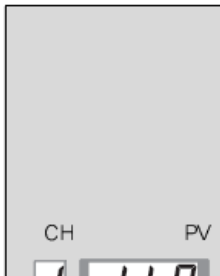
Initial Value	: 1
Setting range	: 1 ~ 8
Contents	: Set Memory range(ZONE) to control. Save Setting value per each channel to Memory zone in maximum 8(Available to create Setting value per each channel 8 * 8 Zone =64)

3-7. Function Mode

If you press ENT key in monitor screen for 2 sec. , it enters into Function mode.
Generally users create setting value easily on occasion in selecting function mode.
There are functions as follows ; LBA, Alarm 1, Alarm 2, Alarm 3
P, I, D needed to control,
Rate (In case SV is changed by AR value & Variation of SV)
CHEN(Not displayed a channel not to use)
You can select by ENT key. It is available to register and change setting value by using ⊛, ⊛, ⊛ keys.

■ Description of each parameter

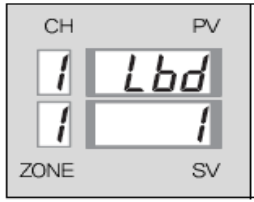
● LBA : Control Loop Break Alarm



Initial Value	: 8 min
Setting range	: 0.1~200.0 min
Contents	: LBA watches variation of PV and set time to detect any abnormal control loop. Displayed in case only LBA is set in alarm 1. If AT operates, double TI is set automatically. No operate in case LBA is Off.
Operation	: In case output is 0% and control direction is direct If PV value is not rising over 2C(2F,2%) within setting time in LBA, it happens. In case output is 0% and control direction is reverse If PV value is not falling over 2C(2F,2%) within setting time in LBA, it happens. In case output is 100% and control direction is direct If PV value is not falling over 2C(2F,2%) within setting time in LBA, it happens. In case output is 100% and control direction is reverse If PV value is not rising over 2C(2F,2%) within setting time in LBA, it happens.

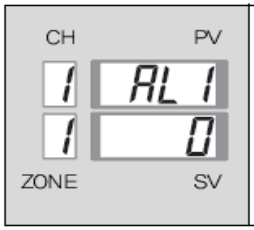
3-7. Function Mode

● LBD : Control Loop Break Alarm Deadband



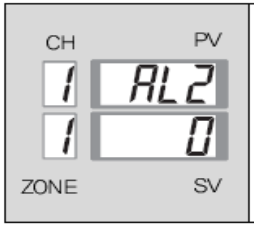
Initial Value	: Voltage input : 0 ℃, 0.0 ℃
Setting range	: 0 ~ 100 sec
Contents	: Contents: Set all extents except the range of errors occurred. Displayed in case only LBA is set in alarm 1. Not operated if LBA setting value is set as "0".)

● AL 1 : Alarm 1



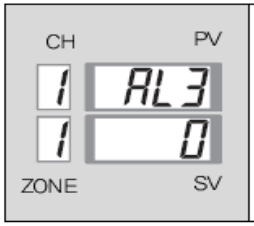
Initial Value	: Maximum value of range (Refer to Input type & Range code)
Setting range	: Range(Refer to Input type & Range code)
Contents	: Set the setting value of Alarm 1. Displayed in case only LBA is set in alarm 1. Not displayed if alarm type is FAIL or LBA(HBA).

● AL 2 : Alarm 2



Initial Value	: Maximum value of range (Refer to Input type & Range code)
Setting range	: Range(Refer to Input type & Range code)
Contents	: Set the setting value of Alarm 2. Displayed in case only LBA is set in alarm 2. Not displayed if alarm type is FAIL or LBA(HBA).

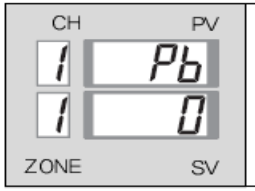
● AL 3 : Alarm 3



Initial Value	: Maximum value of range (Refer to Input type & Range code)
Setting range	: Range(Refer to Input type & Range code)
Contents	: Set the setting value of Alarm 3. Displayed in case only LBA is set in alarm 3. Not displayed if alarm type is FAIL or LBA(HBA).

3-7. Function Mode

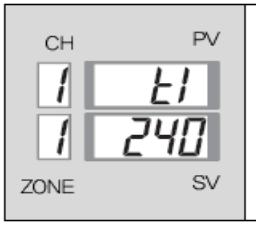
● PB : Proportional Band



Initial Value	: 30 ℃, 30.0 ℃, Voltage input : 3.0 %
Setting range	: 0(0.0) ~ Maximum value of range
Contents	: Set PB to control P, PI, PD & PID. If you operates AT, it is set automatically.

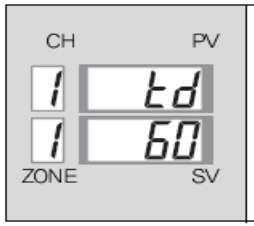
ON/OFF : If it set as PB=0, operate ON/OFF control.

● TI : Integral Time



Initial Value	: 60 sec.
Setting range	: 1 ~ 3600 sec.
Contents	: Contents: Set Integral operation time.. If you operates AT, it is set automatically.

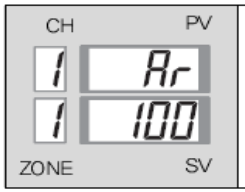
● TD : Derivative Time



Initial Value	: 60 sec.
Setting range	: 1 ~ 3600 sec.
Contents	: Set Derivative operation time . If you operates AT, it is set automatically.

3-7. Function Mode

● Anti Reset Windup

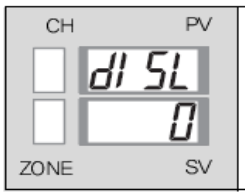


Initial Value : 0 (Auto)
Setting range : 0 (Auto) ~ 100 %
Contents : Set the range of valid operation in Integral operation to prevent from overshoot by the effect of over-integral. If set Ar=0 it operates automatically.

● Rate : SV Rate

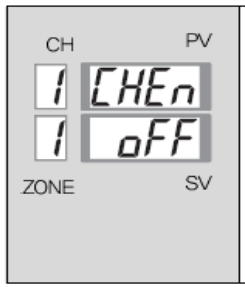
Initial Value : OFF
Setting range : 0 (0.0) ~ maximum range / min
Contents : Set SV variation per min.
If it is Off, it doesn't operates.
If you change SV in RUN, Rate operates.
If you operate AT during Rate is operating, Rate is stopped at once and AT operates as new SV.

● DISL : DI Select



Initial Value : 0
Setting range : 0, 1
Contents : Select whether you use DI function or now
0 : Not used DI
1 : Used DI

● CHEN : Channel Enable



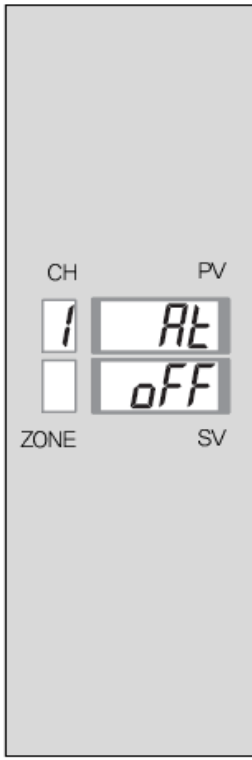
Initial Value : CONT
Setting range : OFF, CONT, MONI
Contents : Select whether you use each channel about each Memory zone or not.
OFF : Appoint a channel not used. Not displayed a channel display in setting Off.
CONT : become normal control condition.
MONI : Displayed only PV value and Not operated to control.

3-8. Setup Mode

If you press ENT key + key in the monitor screen or Function mode, you can enter into Setup mode.
Generally Setup mode is used when user builds system. There are AT, HBA, BIAS, FILT, CT, Communication mode parameter, LOCK1/LOCK2 & etc.
You can register & change Setting value by choosing , , keys.

■ Description of each parameter

● AT : Auto – Tuning



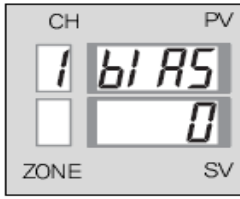
Initial Value : OFF
Setting range : OFF, ON
Contents : Set whether At operates or not.
AT operation : If you press ENT key after AT parameter is On, AT operates & AT lamp flickers.
AT cancel : AT is cancelled automatically as follows:
When AT parameter is Off
When SV is changed
Burn-out
When ADC error happens
Running is stopped
When you operate AT of 8 channels simultaneously, channel parameter becomes "1->2->···->A" by pressing CH key. When "A" is shown , change Off in the window SV into On. AT of all channels operates by pressing ENT key simultaneously.
When you operates AT in a channel only, AT is On after you choose channel by pressing CH key.
AT operates in the channel wanted in that time.

3-8. Setup Mode

● HBA : Heater Break Alarm 1

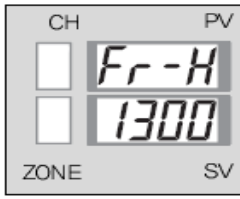
Initial Value : OFF
Setting range : 0.0 ~ 100.0 A
Contents : If you choose HBA option & Alarm type, you can know Current value in detected in HBC of operation mode.
Set HBA value as 85% of Current load.
HBA can't be used in case of Current output. Set HBA SV a little bit lower when variation of power supply is big.
Current detection extent : ± 5 % of span
Current detection resolution: 0.5 A
Detection method: Detect Heater Current after output is On(200ms). If On time(CT* output %) is less than 200ms, it doesn't proceed detection operation. Detection operation : When HBA value is bigger than HBC value after detection is finished, Alarm operates.

● BIAS : PV Bias



Initial value : 0 ℃, 0.0 ℃, Voltage input 0.0 %
Setting range : BUS (0 ~ 100 %)
Contents : If measured value is different from standard value as sensor compensation function, it is the function to meet by compensating as the amount of deviation.

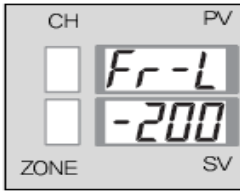
● FR-H : Range High Limit



Initial value : Upper of input range
Setting range : FR-L~Upper of input range
Contents : Set upper value in the input range for user. If input value is higher than this one, OVR or bout happens.

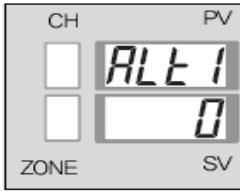
3-8. Setup Mode

● FR-L : Range Low Limit



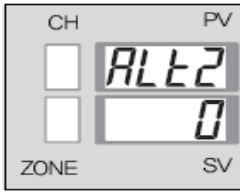
Initial value : Lower of input range
Setting method : Set the lower of input ~ FR-H
Contents : Set Lower value of input range.
If input value is lower than this one, -OVR or bout happens.

● ALT1 : Alarm 1 type



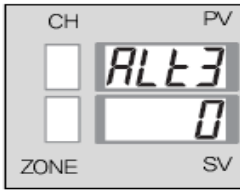
Initial value : 0
Setting range : 0 ~ 16
Contents : Set type of Alarm 1
Refer to 5-3 Alarm

● ALT2 : Alarm 2 type



Initial value : 0
Setting range : 0 ~ 16
Contents : Set type of Alarm 2.
Refer to 5-3. Alarm.

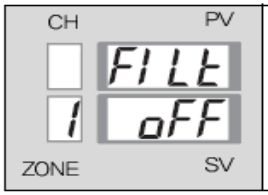
● ALT3 : Alarm 3 type



Initial value : 0
Setting range : 0 ~ 16
Contents : Set type of Alarm 3.
Refer to 5-3. Alarm.

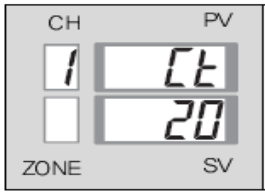
3-8. Setup Mode

● FILT : Filter



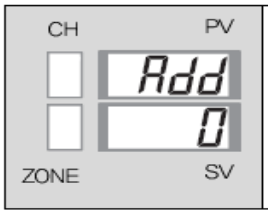
Initial value	: OFF
Setting range	: 0 ~ 120 s
Contents	: Set the first time of delayed filter to remove any noise in the measured input value.

● CT : Cycle Time



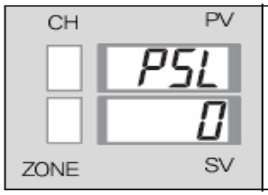
Initial value	: Relay 20 s, SSR & TRIAC : 2 s
Setting range	: 1 ~ 100 s
Contents	: Set the cycle of control output. Set output cycle in case of Relay, Pulse & Triac output. It is not applied in case of Current output.

● ADDR : Address



Initial value	: 1
Setting range	: 1 ~ 99
Contents	: If communication option is chosen, Parameter is displayed. It is appointed address of instrument in case of RS232/485/422 communication. Refer to Communication manual in detail.

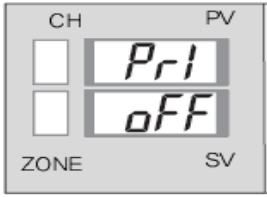
● BPS : Bits per Second



Initial value	: 0
Setting range	: 0, 1
Contents	: Set type of Communication Protocol 0 : pc link sum None 1 : pc link sum Existed

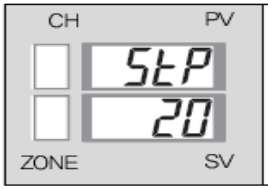
3-8. Setup Mode

● PRI : Parity



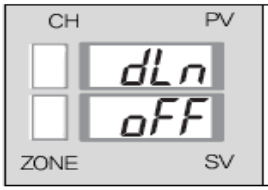
Initial value	: 0
Setting range	: 0 ~ 2
Contents	: Set Communication Parity If communication option is chosen, Parameter is displayed 0 : NONE 1 : EVEN 2 : ODD

● STP : Stop Bit



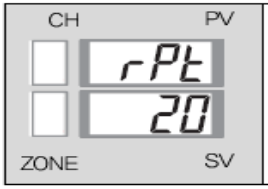
Initial value	: 1
Setting range	: 1 ~ 2
Contents	: Set Communication Stop Bit. If communication option is chosen, Parameter is displayed 1 : 1 BIT 2 : 2 BIT

● DLN : Data Length



Initial value	: 7
Setting range	: 7 ~ 8
Contents	: Set Communication Data Length. . If communication option is chosen, Parameter is displayed 7 : 7 BIT 8 : 8 BIT

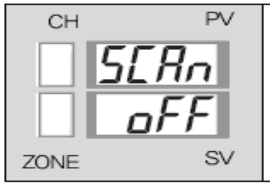
● RPT : Response Time



Initial value	: 0
Setting range	: 0 ~ 10
Contents	: Set Communication Response Time. If communication option is chosen, Parameter is displayed. Response time = Processing time+ RPT * 20ms

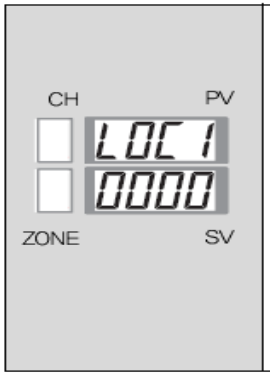
3-8. Setup Mode

● SCAN : Scan Interval Time



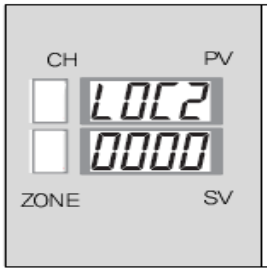
Initial value	: 2 s
Setting range	: 1 ~ 100 s
Contents	: Set time until current displayed channel is changed into next channel.

● LOC1 : Lock 1



Initial value	: 0000
Contents	: It is an equipment to limit a change of parameter setting by controlling key. DIGIT 1 : Prohibited the setting of all parameters except SV, Alarm1, Alarm2 & Alarm3. 0 : Cancel 1 : Lock DIGIT 2 : Prohibited the setting of Alarm1, Alarm2 & Alarm3. 0 : Cancel 1 : Lock DIGIT 3 : Prohibited the setting of SV. 0 : Cancel 1 : Lock DIGIT 4 : Not used(Fixed "0")

● LOC2 : Lock 2



Initial value	: 0000
Contents	: It is an equipment to limit prohibition of RUN/STOP & Zone change. DIGIT 1 : Prohibited a change of RUN/STOP DIGIT 2 : Prohibited a change of Zone DIGIT 3 : Not used (Fixed "0") DIGIT 4 : Not used(Fixed "0")

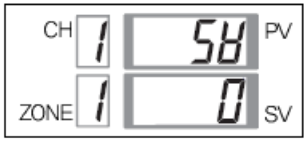
4.Setting Method

4-1. Setting each Channel

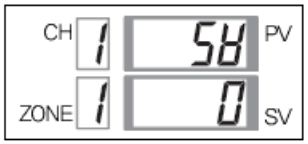
There are some examples to change SV. Others are applied as same method.

■ SV value setting method

If you want SV value to change CH"1" in Zone "1" from 0C to 300C, please setup as following a procedure .



Pressing ENT button once in PV/SV display mode, SV setting mode is displayed like a figure of the left side.



If you press button once, "0" of the first SV is flickered. If you press button again, "00" is flickered and then do once more 0 of "000" is flickered.

And then make 3 By pressing key. Pressing ENT key again, 300 is registered in setting above. Doing ENT key one more, it is moved on the range of Zone Memory.
Ex) 0<-0<-0<-0<-0 Whenever you push key, digit of SV is moved like a figure with flickering operation. Set by using , key in sequence of numbers wanted.

■ When you increase SV value(Changing 399 to 400)

● Press key to flicker Number of 9 unit like Figure [A] once.
Press key to change into "0" once.
Changed into 400 in the window of SV display like a figure below.

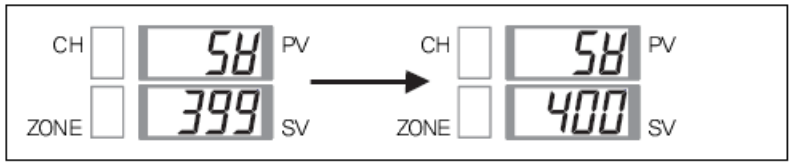


Figure [A] Figure [B]

4-1. Setting each Channel

■ When you decrease SV value(Changing 400 to 390)

- Press key to flicker Number of 10 unit like Figure [A] twice.
- Press key to change "0" of 10 unit into "9" once.
- Changed into 390 in the window of SV display like a figure below.

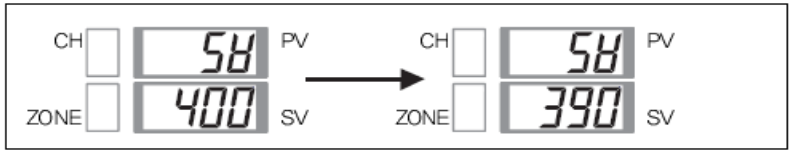


Figure [A] Figure [B]

■ When you set a value in (−)(Changing 100 to −100)

- Press key once to flicker Number 9 of unit like Figure [A] three times
- Press key to change into "0" twice.
- Changed into −100 in the window of SV display like a figure below.

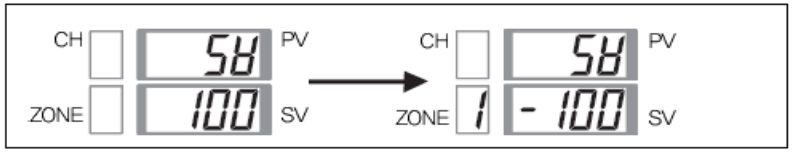
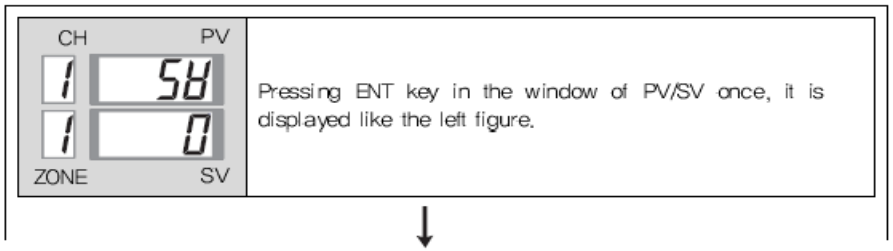


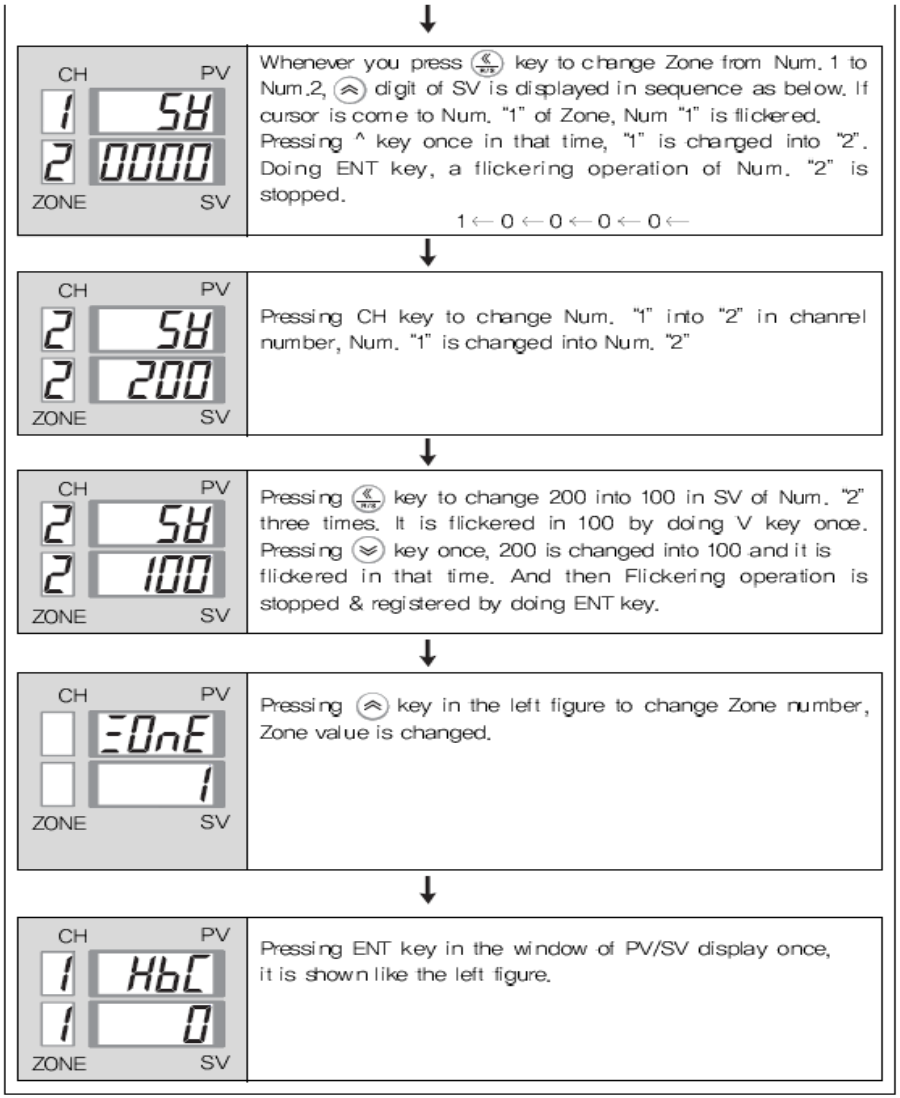
Figure [A] Figure [B]

■ When you change SV of another Zone without changing current control Zone.

Current control Zone is Zone 1, and changeable Zone is Zone 2. in case of changing SV from 200 to 100 in the channel 2 of Zone 2.



4-1. Setting each Channel



4-1. Setting each Channel

■ When you set all SV at the same time["A"]

Set SV in channel 1~8 from 0C to 200C at the same time.

CH PV 1 SU 1 0 ZONE SV	Pressing ENT key in the window of PV/SV display, it is displayed like the left window. Press CH key. Character "A" is displayed next to number in the window CH display and "----" is displayed in the window of SV display.
CH PV A SU 1 - - - - ZONE SV	Character "A" means collective setting. Whenever you press CH key, channel number is changed as follows: 1-2-3-4-5-6-7-8-A
CH PV A SU 1 200 ZONE SV	Cursor is move to the position of 100 unit by pressing key and 200 is set by pressing key twice. If you press ENT key, SV values of all channels are registered as 200 simultaneously. Parameter is changed into the next parameter.

⚠ CAUTION

∗If this procedure is finished, SV of channel not used become collective setting

4-2. RUN/STOP

This mode is to operate an instrument after it is finished that initial parameter setting of control

Section		RUN / STOP(by contact input)	
		RUN : Contact is closed	STOP : Contact is opened
RUN/STOP (by key control)	RUN	RUN	dStP
	STOP	PStP	StoP

If contact input status is RUN mode, RUN/STOP is selected by key control.

■ Selection of RUN/STOP by key control

- When you change RUN into STOP, please push key in the state of PV/SV display for 1 sec. It is going to RUN.
- When you change RUN into STOP, character suitable for STOP is displayed in the window of PV if you push key. It is going to STOP.

⚠ Caution "LOCK 1" is selected by LOCK level 2, RUN/STOP is not possible by key.

■ Selection of RUN/STOP by contact input

According to terminal 37 & terminal 38 are OFF or ON, RUN/STOP is selected.

Terminal number	RUN	STOP
37 – 38	Contact is closed	Contact is opened.

4-2. RUN/STOP

● Without DI OPTION
- In PV/SV screen, you can change RUN ↔ STOP by pressing key.
- In case of STOP, " rSt P " will be displayed on PV window.

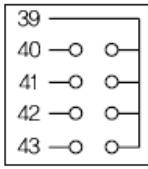
● With DI OPTION
- RUN/STOP DI(Terminal No.37-38) will be connected. By pressing key, it starts to run on PS/SV screen.

● When RUN/STOP DI is disconnected, it stops running and " dSt P " will be displayed.
● When it stops running by means of key, " rSt P " will show up.
● When it stops running by means of DI and Key simultaneously, " StoP" will show up.

■ CONTROL ZONE CHANGE

● Without DI OPTION
- According to Zone's value, Control Zone will be decided.

● With DI OPTION
- According to Zone's value, Control Zone will be changed. In addition, you can change ZONE according to ZONE DI(Terminal No. 39-43). How to change ZONE through DI : Firstly select ZONE as terminal no. 40-42. After that you can list ZONT by connecting terminal no. 39-43.



Terminal NO.	ZONE							
	1	2	3	4	5	6	7	8
39 - 40	×	-	×	-	×	-	×	-
39 - 41	×	×	-	-	×	×	-	-
39 - 42	×	×	×	×	-	-	-	-

× : OPEN, - : COSED

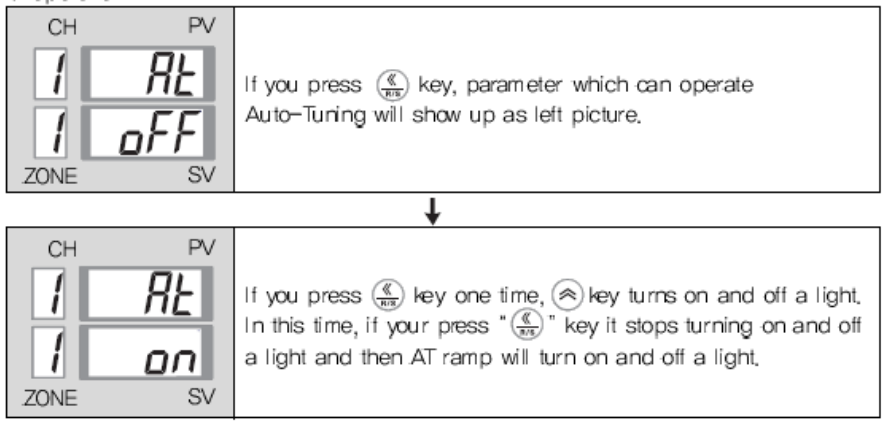
■ Auto-tuning

Auto-Tuning calculate the most suitable PID and LBA value automatically and set yp PID and LBA value into each parameter.

● START Auto-Tuning
- Please select all parameters except for PID/LBA.
- Lock level 1 & Lock level 2 should be set up as "0000".
- RUN/STOP should be selected to RUN mode.

4-2. RUN/STOP

● Operation



● Cancel Auto-Tuning

If the below conditions happened, Auto-Tuning will be cancelled.
- Burn-out or ADC error on account of broken sensor input cable.
- Auto-Tuning parameter was OFF during Auto-Tuning.
- In case of Power Off
- In case of changing into RUN/STOP mode.

After finishing Auto-Tuning, changed parameters are PB,AR,TI,TD and LBA. If AT is cancelled, controller will be back to the previous PID and LBA value and it starts control. After Auto-Tuning, If control is not working smoothly, please adjust value of PID integral number to meet suitable controller's value.

4-3. Batch Setting

This function is used when you want to set same value up from channel 1 to channel 8 in the designated zone.

1 -> 2 -> 3 -> 4 -> 5 -> 6 -> 7 -> 8-> A

"A" will be shown om CH display window, "----" will be shown on SV window. At this time, please set set-value up by (ENT), (∧), (∨) key. If you press ENT key, same value will be set up from channel 1 to channel 9.

Installation and Operation Manual
U-TY-EN
Part number:1004TWAD
April,2010
FGT® Model TY Temperature Controller System

4-4. Alarm

Alarm will act as a "OR" condition against all channels.
(* OR condition : If any channel out of total 8 channels exceeded alarm setting value, alarm output happened)

- Hysterisis against alarm is set up as " 2 ℃
- When setting Wait Alarm, in the below mentioned occasion, waiting movements will be operated.

In case of starting operation for the first time.
In case of changing set value
Set Value was changed due to the change of zone.

• Initial Value & Setting Range in accordance with Alarm Type

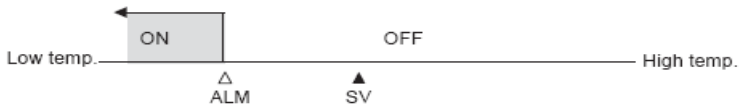
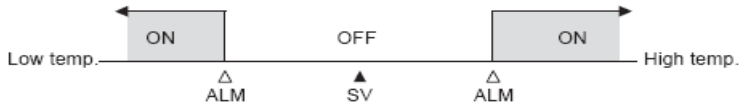
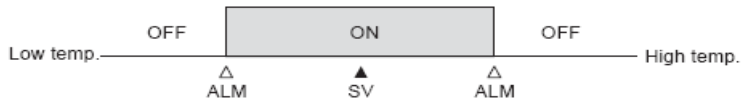
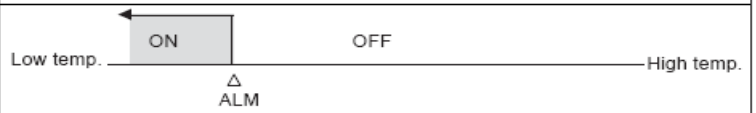
Alarm No	Alarm Type	Initial Value	Setting Range
0	No Alarm	-	-
1	Upper limit Alarm hysterisis	EUS (100 %)	EUS (-100~ 100 %)
2	Lower limit Alarm hysterisis	EUS (100 %)	EUS (-100~100 %)
3	Upper & Lower limit Alarm hysterisis	EUS (100 %)	EUS (0 ~ 100 %)
4	Alarm within it range	EUS (0 %)	EUS (0 ~ 100 %)
5	Upper limit hysterisis hold alarm	EUS (100 %)	EUS (-100 ~ 100 %)
6	Lower limit hysterisis hold alarm	EUS (100 %)	EUS (-100 ~ 100 %)
7	Upper&Lower limit hysterisis hold alarm	EUS (100 %)	EUS (0 ~ 100 %)
8	Hold alarm within range	EUS (0 %)	EUS (0 ~ 100 %)
9	Absolute upper limit alarm	EU (100 %)	EU (0 ~ 100 %)
10	Absolute lower limit alarm	EU (0 %)	EU (0 ~ 100 %)
11	Absolute upper limit hold alarm	EU (100 %)	EU (0 ~ 100 %)
12	Absolute lower limit hold alarm	EU (0 %)	EU (0 ~ 100 %)
13	SV upper limit alarm	EU (100 %)	EU (0 ~ 100 %)
14	SV lower limit alarm	EU (0 %)	EU (0 ~ 100 %)
15	LBA/HBA Alarm	-	-
16	FAIL alarm	-	-

※ If you select in Alarm No. 15 in ALT1, LBA Alarm will operate. If you select in Alarm No. 15 in ALT2,3, HBA alarm will operate.
※ HBA alarm could be operated only in case output type is RELAY or SSR output.
※ You can select within its setting range : -1999 ~ 9999

4-4. Alarm

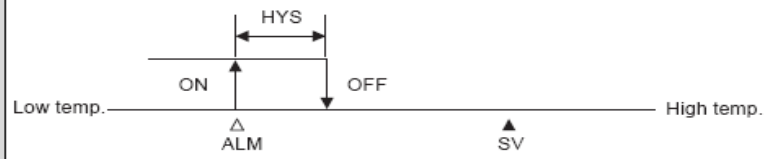
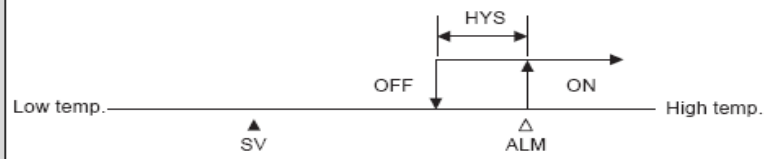
● Alarm operation

· High · Low deviation alarm

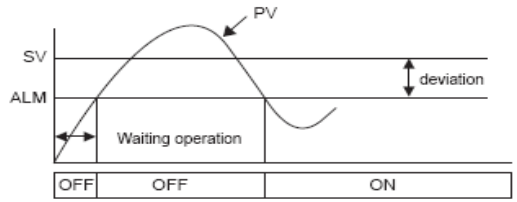
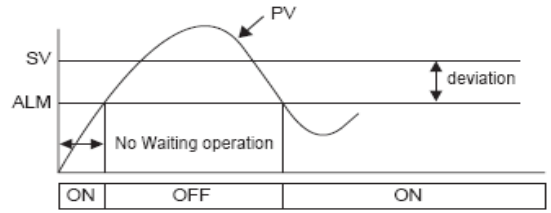
Alarm type	Alarm operation
High deviation alarm	
Low deviation alarm	
High · Low deviation alarm value	
Alarm within range	
High absolute alarm	
Low absolute alarm	
High SV alarm	
Low SV alarm	

4-4. Alarm

■ Alarm hysterisis

Alarm type	Alarm operation
Low alarm	
High alarm	

■ Alarm waiting operation

Alarm type	Alarm operation
Waiting operation	
No waiting operation	

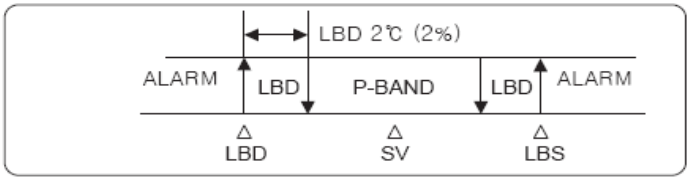
4-4. Alarm

■ LBA (Loop Break Alarm)

If PV value is within P band, LBA does not operate. After it is out of P band, LBA begins to operate.
LBA operation
In case output is 0% and control direction is direct
If PV value is not rising over 2C(2F,2%) within setting time in LBA, it happens.
In case output is 0% and control direction is reverse
If PV value is not falling over 2C(2F,2%) within setting time in LBA, it happens.
In case output is 100% and control direction is direct
If PV value is not falling over 2C(2F,2%) within setting time in LBA, it happens.
In case output is 100% and control direction is reverse
If PV value is not rising over 2C(2F,2%) within setting time in LBA, it happens.

■ LBD (Control Loop Break Alarm Deadband)

- LBD sets Deadband of LBA.
- Although alarm happens, PV is still within LBD as LBA operation. Alarm is not happened in that time.

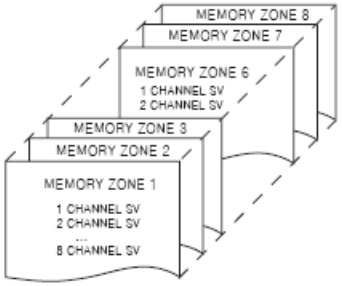


■ HBA (Heater Break Alarm)

- Parameter is displayed by option selection.
- Not used in case of current output
  (Available to detect HBA in case Heater output is 0% or 100%).
- HBA consists from CT1 to CT8 as the concept of "OR".
  (If CT of any channel is a cause of alarm, alarm is output.)
- Current detection range : 1 ~ 100 A
- Current detection status : ± 5 % of span
- Current detection resolution : 0.5 A
- Minimum detection time : 200 ㎳
- Detection method : • After output is happened(200ms), measure current by CT.
  • If On time(CT*output%) is not within 200ms in minimum, detection operation is happened.
- Operation method
- In case detected Current value(HBC) in CT is less than Setting value(HBA), HBA alarm operates.

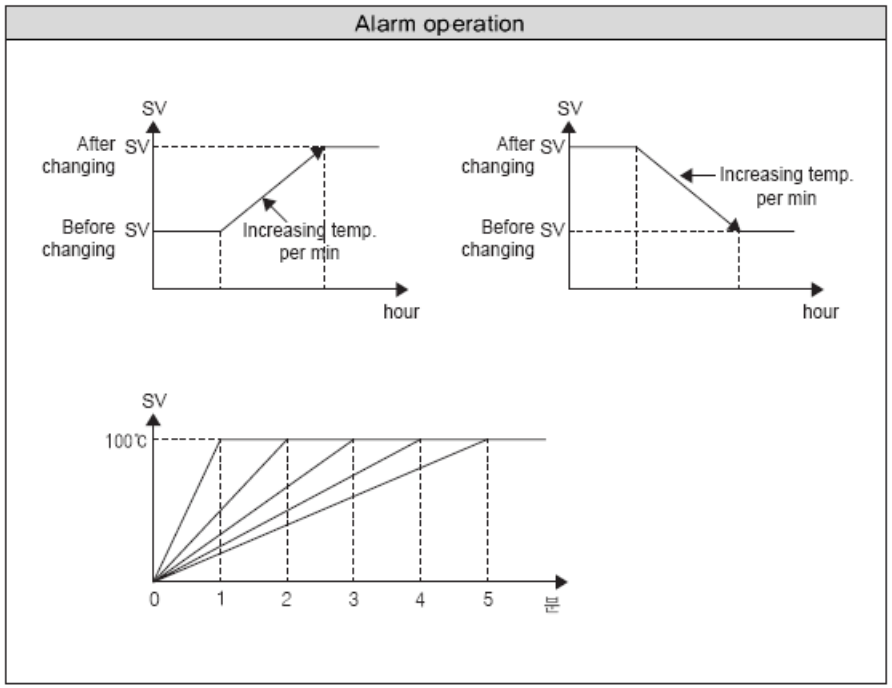
4-5. Multi-Memory Zone

There are 8 channels in MC9 and each channel has 8 Memory zone.
Available to recall pre-setting value in Memory zone by changing zone number.
Thus, it is useful in case of continuous work.
For example, you can set 64 values because it is possible that SV is among 8 Memory zones from channel 1 to channel 8.



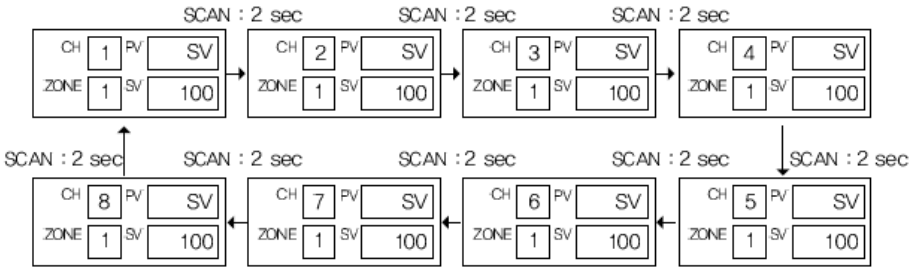
■ Rate Function

This function is to come to target value by inclining under a given time



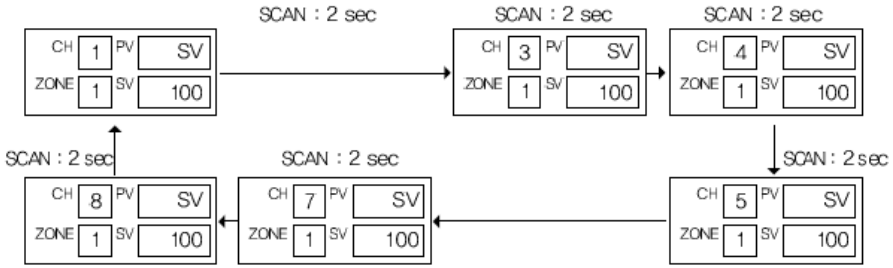
4-6. Scan

Set time to display the window of PV/SV from channel 1 to channel 8 one after the other.



Operation in case of "SCAN" = 2 seconds. It displays each channel by 2 seconds in consecutive order. It displays just from the channel which is being currently displayed in consecutive order.

In case "CHEN = OFF" was set in order not to use channel 2 & channel 6, the channel display is, as follows.



Because channel 2 & channel 6 is in the state of "CHEN = OFF, next channel will be displayed without displaying channel 2 & channel 6. Displaying period: 2 seconds per each channel will be maintained in the same way.

5.Troubleshooting

5.1 Troubleshooting and actions for quality assurance, and cautions for maintenance

Display	Caution	PV window	Measure & Control condition
oVr -oVr	PV value exceeds input range	OVR: Displays current PV value to EU(105%) in turn, OVR: Displays current PV value to EU(-5%) in turn.	Measure: Check PV value Output status : Normal operation PV status: Normal operation
rJC	RJC error happens	Displays PV value, not including RJC value.	Measure: POWER OFF->ON Output status : Normal operation PV status: Normal operation
EEP	EEPROM error happens	Displays current PV value. Displays BOUT	Measure: POWER OFF->ON Output status : Normal operation PV status: Normal operation
boUt	Input sensor is out of order or PV value exceeds EU(-5~105%)	BOUT	Measure: Check Input sensor or PV value. Output status : Direct (100%), Reverse(0%) PV status: less than Direct(0%), over Reverse(100%)
AdC	AD converter is out of over.	ADC	Measure: POWER OFF->ON If it is not returned to normal, please contact our agent in near or speak to a customer service representative of main office. Output status : Direct (100%), Reverse(0%) PV status: less than Direct(0%), Reverse(100%)

6.Product Warranty

The warrant period shall be one (1) year after the shipment.
If a malfunction of the products you purchased occurs because of our responsible reasons, it will be charge-free repaired in our factory. The range of the warrant shall be limited to the main machine. Any damages caused by the malfunction of the main machine can not be compensated by us.
If a malfunction of the main machine occurs due to the following reasons, even within the warrant period, it will be onerously repaired by us.

A. Malfunctions due to erroneous applications, repairs or remodeling
B. (Including the case in which the manufacturing specifications differs from the application conditions.)
C. Malfunctions due to the falling after the purchase.
D. Malfunctions caused by natural disasters such as fire, earthquake, water disaster and lightning stoke, or riots or wars.
E. Malfunctions caused by mixinging-in of foreign matters out of the piping.
F. Malfunctions caused by the peculiar problems due to combinations with other built-in equipment.

Installation and Operation Manual
U-TY-EN
Part number:1004TWAD
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FGT® Model TY Temperature Controller System

First General Technology Inc.(FGT®)
Head Office
Overseas Division
No.6,Shin-Ai Rd.,South District, Tainan,702,Taiwan
Tel:+886-6-2632460(Key number)
Fax:+886-6-2650141
URL:www.fgttw.com