Temp. Controller Manual "SAMWON DIN SIZE H72x W72"
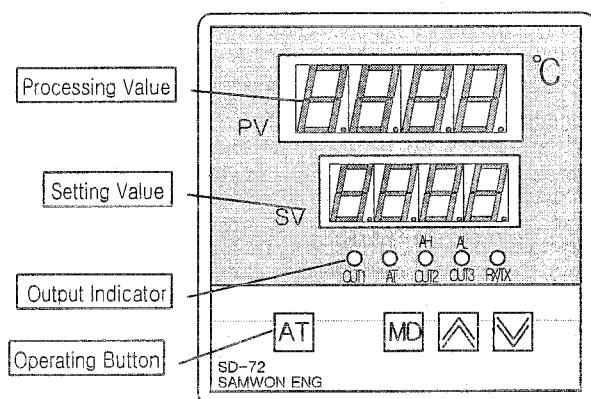
Model	Temperature Range	Sensor	Remark
SD-72 Pt	-199.9℃~400.0℃	Pt100	Communication,4-20mA(C, T)
SD-72 K	-150℃~1200℃	K-Ca	Communication,4-20mA(C, T)
SD-72 Hum	0.0%~100.0%	Humidity	Communication,4-20mA(C, T)

SD-72

※ 저희 (주)삼원 ENG 제품을 구입해 주셔서 감사합니다. 본 사용 설명서는
부주의에 의한 제품의 손상과 고장을 막고 정확한 사용 방법을 알려 드리
기 위하여 배포하고 있습니다. 잘 보관하셔서 사용 중에 의문점이 생기면
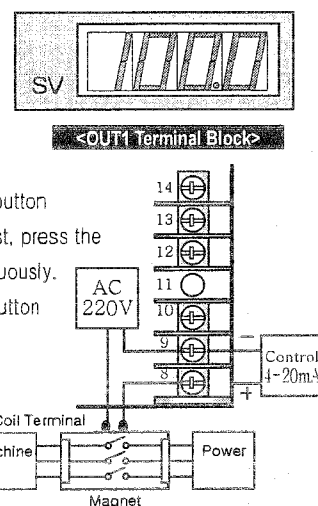참고하시기 바랍니다. 감사합니다.

1. Parts name and Function

Processing Value
PV
°C

Setting Value
SV

Output Indicator
AH A
OUT1 AT OUT2 OUT3 RX/TX

Operating Button
AT MD ∧ ∨
SD-72
SAMWON ENG

P.V	Processing Value from Sensor	
S.V.	Setting Value(Main Output Value)	
Output Indicator	OUT1	Main Output Indicator
	OUT2	Upper Alarm Output (Sub Output 1)
	OUT3	Lower Alarm Output (Sub Output 2)
	AT	PID Auto Tuning Indicator
	RX/TX	Communication Indicator
Operating Button	AT	PID Auto Tuning Button
	MD	Selecting Button for setting Mode
	∧	Up Setting Value
	∨	Down Setting Value

2. Features

▶ Monitoring on Personal Computer/Communication for remote control
˙ Monitoring on PC of Max. 99 sets , Convertible SV with PC
˙ No need Recorder for graphic
▶ Built-in Digital periodic Timer for defrosting for 48 hour
˙ Periodic ON / OFF per Minute (Range : 0~4880minute)
▶ Cooling / Heating Control
˙ Multiple-stage heating/cooling control (Cooling 3, Heating 3 stage,
  Cooling /Heating Combination control)
˙ Hysteresis 0.1~9.9℃, Delay timer 0~240 Sec. Heat/Cool Selectable
▶ PID Auto tuning Control
▶ Lock/Limited function for operator
˙ Setting range is limited and Setting value is locked by operator.
˙ Operator is not able to change any function, after locking.

3. How to set OUT1
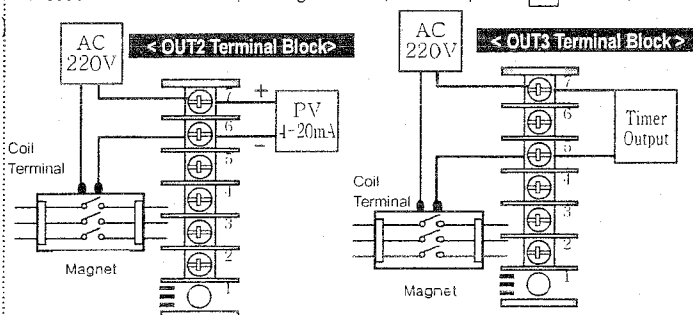
▶ Power on SD controller.
  Processing Value is appear on SD.
▶ Press the button MD one time.
  Setting Value is flickering on SD
  controller.
▷ At this time, SV is set by pressing the button
  up(∧),down(∨). If want to change fast, press the
  button for more than 4 seconds continuously.
▶ If want to keep in memory, press the button
  MD once more.
  The data of SV is kept in SD Controller,
  even if power is off.
▶ Terminal Block No. 18~20 is
  used by OUT1.

SV

<OUT1 Terminal Block>
AC 220V
Control 4-20mA
Coil Terminal
Machine Power
Magnet

4. How to set OUT2/OUT3 (Alarm output)
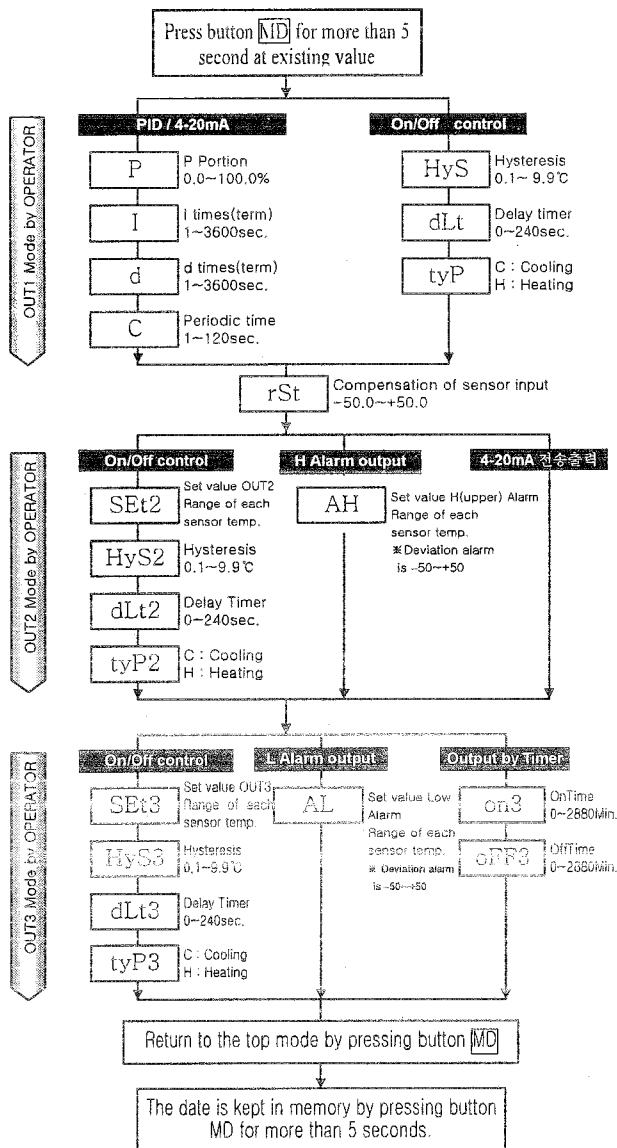
▶ Power on SD Controller. Processing Value is appear on SD.
▶ Press the button MD for more than 5 seconds, and then
  select AH, instead of P or HyS on Indicator of PV.
▶ At this time, SV(OUT2) is set by pressing the button up(∧),
  down(∨). If want to change fast, press the button for more
  than 4 seconds continuously.
▶ Press button MD once more to Select AL, instead of AH.
▶ SV(OUT3) is set by pressing the button up(∧), down(∨).
▶ If want to keep in memory, press the button MD for more than 5
  second. The data of SV(OUT2, OUT3) are kept in SD Controller,
  even if power is off.
▶ Terminal Block No.16, 17 are used by OUT2, and
  NO.14,15 are used by OUT3.
Please be referred the operating manual.(How to operate MD button.)

AC 220V < OUT2 Terminal Block>
PV 4-20mA
Coil Terminal
Magnet

AC 220V < OUT3 Terminal Block >
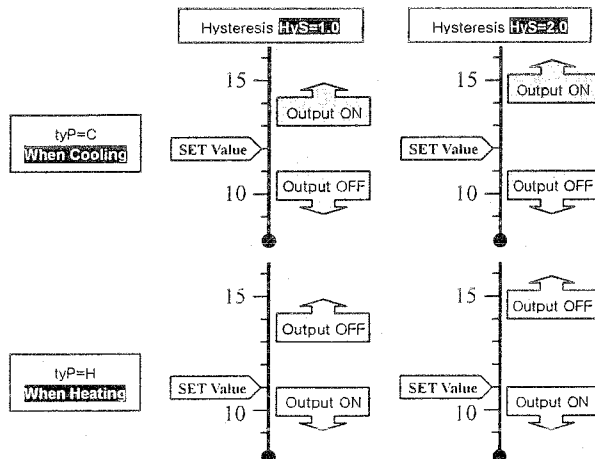Timer Output
Coil Terminal
Magnet

5. The mode by Operator (Operating mode)

▶ Change Output mode 'OUT1/OUT2/OUT3', when need.

▶ Please use each item properly for the accuracy of output

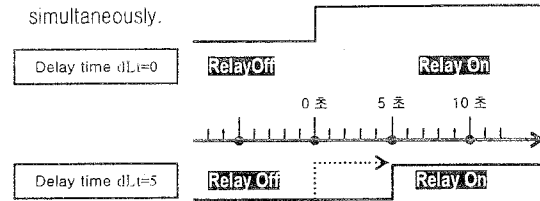　Each time button [MD] is pressed, each item appear on SV Display.

```
Press button [MD] for more than 5
second at existing value
```

OUT1 Mode by OPERATOR

PID / 4-20mA		On/Off control	
P	P Portion 0.0~100.0%	HyS	Hysteresis 0.1~9.9℃
I	I times(term) 1~3600sec.	dLt	Delay timer 0~240sec.
d	d times(term) 1~3600sec.	tyP	C : Cooling H : Heating
C	Periodic time 1~120sec.		

rSt	Compensation of sensor input -50.0~+50.0

OUT2 Mode by OPERATOR

On/Off control		H Alarm output		4-20mA 전송출력
SEt2	Set value OUT2 Range of each sensor temp.	AH	Set value H(upper) Alarm Range of each sensor temp. ※Deviation alarm is -50~+50	
HyS2	Hysteresis 0.1~9.9℃			
dLt2	Delay Timer 0~240sec.			
tyP2	C : Cooling H : Heating			

OUT3 Mode by OPERATOR

On/Off control		L Alarm output		Output by Timer	
SEt3	Set value OUT3 Range of each sensor temp.	AL	Set value Low Alarm Range of each sensor temp. ※ Deviation alarm is -50~+50	on3	OnTime 0~2880Min.
HyS3	Hysteresis 0.1~9.9℃			oFF3	OffTime 0~2880Min.
dLt3	Delay Timer 0~240sec.				
tyP3	C : Cooling H : Heating				

```
Return to the top mode by pressing button [MD]
```

```
The date is kept in memory by pressing button
MD for more than 5 seconds.
```

▶ Select Heating/Cooling and operating with Hysteresis value

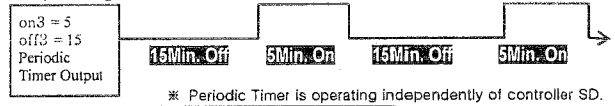**Hysteresis HYS=1.0** / **Hysteresis HYS=2.0**

typ=C When Cooling

typ=H When Heating

▶ Operating wit4h Delay Timer Value

° Delay Timer Value is 0(Zero), Output is ON and Relay is On simultaneously.

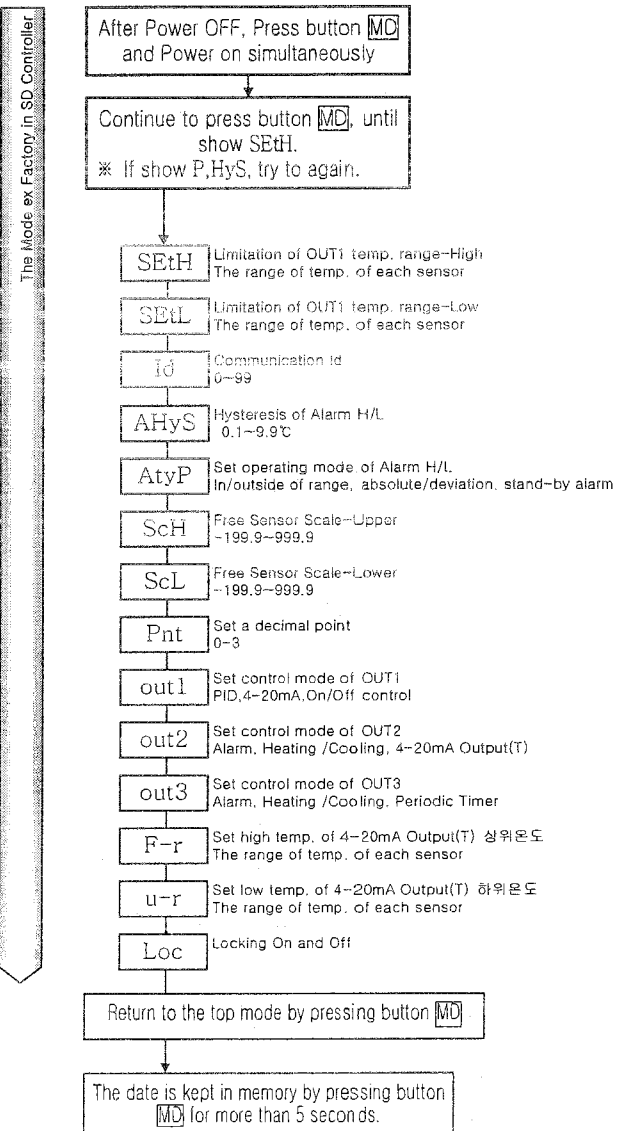| Delay time dLt=0 | Relay Off | Relay On |

　　　　　　　　　　0초　　5초　　10초

| Delay time dLt=5 | Relay Off | Relay On |

° Delay Timer Value is 5, Output is ON and than Relay is ON after 5 seconds.

▶ Operating with Periodic Timer

on3 = 5
off3 = 15
Periodic Timer Output

| 15Min. Off | 5Min. On | 15Min. Off | 5Min. On |

※ Periodic Timer is operating independently of controller SD.

6. The ex factory Mode

▶ Remember the Mode ex factory, before changing.

　Please check set items, and then change the mode.

▶ Please return to A/S center, if don't make a mistake to set .

The Mode ex Factory in SD Controller

```
After Power OFF, Press button [MD]
and Power on simultaneously
```

```
Continue to press button [MD], until
show SEtH.
※ If show P,HyS, try to again.
```

SEtH	Limitation of OUT1 temp. range-High The range of temp. of each sensor
SEtL	Limitation of OUT1 temp. range-Low The range of temp. of each sensor
Id	Communication Id 0~99
AHyS	Hysteresis of Alarm H/L 0.1~9.9℃
AtyP	Set operating mode of Alarm H/L In/outside of range, absolute/deviation, stand-by alarm
ScH	Free Sensor Scale-Upper -199.9~999.9
ScL	Free Sensor Scale-Lower -199.9~999.9
Pnt	Set a decimal point 0~3
out1	Set control mode of OUT1 PID,4-20mA,On/Off control
out2	Set control mode of OUT2 Alarm, Heating /Cooling, 4-20mA Output(T)
out3	Set control mode of OUT3 Alarm, Heating /Cooling, Periodic Timer
F-r	Set high temp. of 4-20mA Output(T) 상위온도 The range of temp. of each sensor
u-r	Set low temp. of 4-20mA Output(T) 하위온도 The range of temp. of each sensor
Loc	Locking On and Off

```
Return to the top mode by pressing button [MD]
```

```
The date is kept in memory by pressing button
[MD] for more than 5 seconds.
```

7. How to operate OUT1

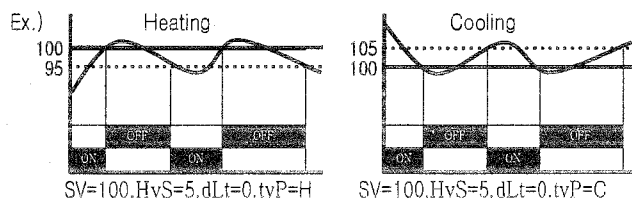| Ex factory M	Output	Set item	Operating
	out1	PID	Relay Output(Control) for PID response
		4-20	DC4-20mA Current Output for PID response
		OnOf	Relay Output(Control) for On/Off (Heat/Cool)

① PID / 4-20mA Current Output(Control)
▶ Auto-tune control make PV reach at SV by providing each value of P, I, D properly.
▶ Press button |AT| on the front panel of SD controller. The button |AT| will be flickering.
※Auto-tune control is cancelled by pressing button |AT| once more.
▶ On/Off output(control) will be operating 2~3times for researching the Heater and Loader. After that the button |AT| will be off.
▶ SD controller start to control the Output to make PV reach at SV by providing each value of P, I, D properly.
At this time, each value of P, I, D is induced, and kept in memory.
② On/Off Output(Control)
▶ ON/Off is operation for cooling control.
▶ To be able to set Hysteresis 0.1~9.9 (Operator Mode HyS).
▶ Delay Timer 0~240 second (Operator Mode dLt).
▶ To be able to select Heating/Cooling (Ex factory Mode tyP).
* Relay B contact point.

Ex.)

Heating
100
95

Cooling
105
100

SV=100,HyS=5,dLt=0,tyP=H   SV=100,HyS=5,dLt=0,tyP=C

8. How to operate OUT2, OUT3

■OUT2,OUT3 is used for various purposes.

Ex factory M	Output	Set Item	Operating
	out2	AL	Upper Alarm output
		SEt	On/Off Relay Output (Heating / Cooling)
		Pv	DC 4-20mA Output(T) of PV

① Upper Alarm Output
▶ To be able to set Hysteresis 0.1~9.9℃ by AhyS on EXfactory Mode
▶ In/Outside of range, Absolute/deviation, stand-by alarm by AtyP on ex factory Mode --"10.How to set OUT2, OUT3(Alarm setting)"
② On/Off Output(Control)
▶ ON/Off is operation for cooling control.(The same as OUT1 On/Off).
③ 4-20mA Transmission Outptu
▶ The Output to record PV on recorder. Set the range of current by F-r,U-r on Ex factory Mode. For Ex. If F-r=1000℃, U-r=500℃, At 500℃ output is 4mA, At 1000℃ output is 20mA.

Ex factory M	Output	Set item	Operating
	out3	AL	Lower Alarm Output
		SEt	On/Off Relay Output (Heating / Cooling)
		tI	Periodic Timer 0~2880Minutes

① Lower Alarm Output
▶ Is the same as Upper Alarm.

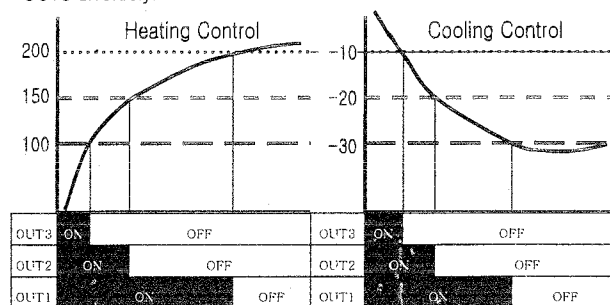### ※For Example, To be able to set OUT2=AL, OUT3=SEt.

② On/Off Output(Control)
▶ ON/Off is operation for cooling control.(The same as OUT1 On/Off).
③ Periodic Timer Output
▶ Relay is On during On3, and Relay is Off during OFF3 on Operating Mode. This periodic action is repeated continuously in minute.
▶ To be used for defrosting, and controlling cooling fan.

9. 3 stage control (Heating/Cooling)

▶To be able to used for 3 stage control by combining OUT1,OUT2, OUT3 diversely.

Heating Control   Cooling Control
200   -10
150   -20
100   -30

OUT3	ON	OFF	OUT3	ON	OFF
OUT2	ON	OFF	OUT2	ON	OFF
OUT1	ON	OFF	OUT1	ON	OFF

▶ Set point for 3 stage control of Heat/Cool by On/Off output.

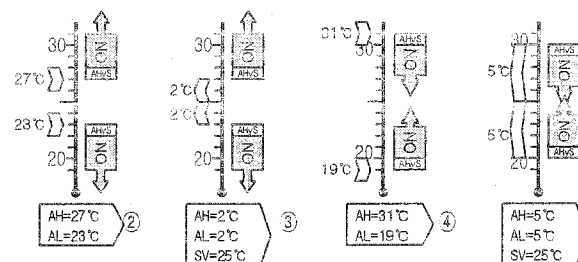| Case	SV	HyS	dLt	tyP		SV	HyS	DLt	tyP
OUT1	200	1.0	0	H		-30	1.0	0	C
OUT2	150	1.0	0	H		-20	1.0	0	C
OUT3	100	1.0	0	H		-10	1.0	0	C

**(On Operating Mode)

10.How to set OUT2, OUT3(Alarm setting)

▶ OUT2,OUT3 is used for Upper and lower alarm output.
※On ex factory mode, OUT2 is set Upper and OUT3 is set Lower.

Ex factory M	Output	Set Item	Operating	Terminal
	out2	AL	Upper Alarm Output	No. 6, 7
	out3	AL	Lower Alarm Outptut	No. 5, 7
	AHyS	1.0	Hysteresis Alarm(0.1~9.9)	-
	AtyP	⎦ ⎴⎾	Out of range Alarm	-

⎦ Outside Absolute	⎦ Outside ⎾ Deviation	⎴⎾ Inside Absolute	⎾ Inside ⎦ Deviation

30 AHyS
27℃
23℃ AHyS
20 ON

30
2℃
2℃
20 AHyS ON

31℃ 30 AHyS
AHyS
20
19℃ AHyS

30
5℃ ON
5℃
20 AHyS

AH=27℃ ②
AL=23℃

AH=2℃ ③
AL=2℃
SV=25℃

AH=31℃ ④
AL=19℃

AH=5℃
AL=5℃
SV=25℃

①The Absolute Alarm
When PV is upper than 27℃, AH(OUT2) is going to ON. and lower than 23℃, AL(OUT3) is going to ON. If set AHyS=1.0℃ on ex factory mode,the tremble of Relay is protected.
②The Variation(deviation) Alarm
As SV is 25℃, and AH is +2℃, at 27℃ AH(OUT2) is going to ON. And as AL is -2℃, at 23℃ AL(OUT3) is going to ON.
③When PV is inside of Absolute Temp. 31℃ and 19℃, AH, AL output is operating.-- Inside/Absolute Temperature Alarm.
④SV is 25℃,therefore when SV reach at 30℃ and 20℃, AH, AL Output is operating.-- Inside/Deviation Alarm.
■If Decimal point is appear, Stand-by alarm function is included.
※If you want, you can change the function of OUT2, OUT3 on EX factory Mode as below table.

Case	OUT2 (Ex factory mode)		OUT3 (Ex factory mode)	
①	AL	Set Upper Alarm	SEt	Set OnOff Heat/Cool output
②	SEt	Set OnOff Heat/Cool output	AL	Set Lower Alarm
③	Pv	Set 4-20mA(T)	AL	Set Lower Alarm
④	AL	Set Upper Alarm	tI	Set Delay timer 0~2880

11. How to lock for SV

① Please use a lock function of SV to prevent a mistake of operating.
▶ Turn off power on SD controller. Press button MD, and turn on power simultaneously. Continue to press button MD.
▶ Release button MD, when show up SetH at PV indicator.
▶ Select Loc by pressing button MD. And change set item by pressing button ∧, ∨ as bellows.

EX factor	item	Set value	Operating
	Loc	On	Lock function.
		OFF	Release Lock function.

▶ Press button MD for more than 5 seconds to keep in memory.
※ Operate Loc function in Operating mode, after releasing Lock function in Ex factory Mode.

② Operator is able to change SV. But to prevent too wide range to control, use the function of limited SV range.
▶ Turn off power on SD controller. Press button MD, and turn on power simultaneously. Continue to press button MD.
▶ Release button MD, when show up SEtH at PV indicator.
▶ And change set item by pressing button ∧, ∨ as bellows.

EX factor	item	Set Value	Operating
	SEtH	100	Upper SV.
	SEtL	90	Lower SV.

▶ Press button MD for more than 5 seconds to keep in memory.
※ After taking function, Operator ia able to change the range of SV from 100℃ to 90℃.

12. Communication function for remote controlling

① PV is shown and SV is able to be controlled by personal computer from the distance of 1.2Km.
OUT1, OUT2, OUT3 are also able to check the state of ON/OFF.
② The 1 set of PC can be communicated with 99 set of SD controller. And to be able to control by using monitoring program, and able to print out the need data. The data for 1 year can be kept in memory.
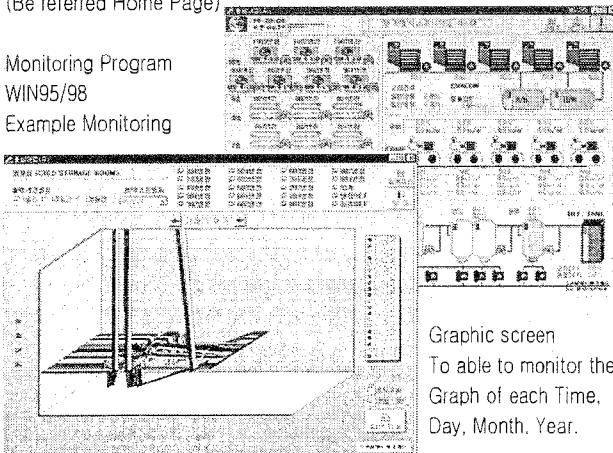③ Please set Call No. to communicate with PC.
▶ Turn off power on SD controller. Press button MD, and turn on power simultaneously. Continue to press button MD.
▶ Release button MD, when show up SEtH at PV indicator.
▶ Select Id by pressing button MD. And change set item by pressing button ∧, ∨ as bellows.

EX factor	item	Set Valau	Operating
	Id	1~99	Set call No. for communication.

▶ Press button MD for more than 5 seconds to keep in memory.
④ Please ask sales Dept. in head office for Communication Protocol.
(Be referred Home Page)

Monitoring Program
WIN95/98
Example Monitoring

Graphic screen
To able to monitor the
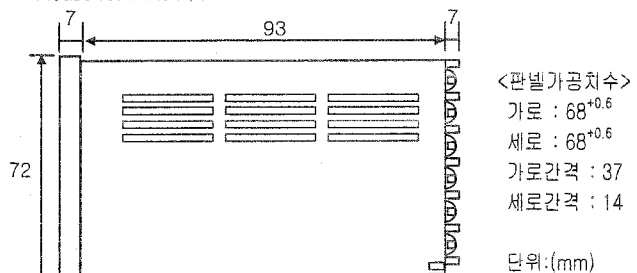Graph of each Time,
Day, Month, Year.

13. How to reset PV

▶ Please reset PV, when you find that PV is not correct.
Press button MD for more than 5 seconds at the state of PV.
And release button MD, when show up P or HyS at indicator.
▶ Select rSt by pressing button MD. And change set item by pressing button ∧, ∨ as bellows.

Ex factor	item	Set value	Operating
	rSt	−50~50	Set Deviation value from Sensor.

▶ Press button MD for more than 5 seconds to keep in memory.

14. Remark and measurement

① When show up 'Err' at indicator, please check the factor as bellow.
▶ The connection with sensors. ▶ The connection with Terminal
▶ Checking the Sensor.
② When show up '93c' at indicator, please check the factor as bellow.
▶ The problem is on the memory system for SV.
Please return to A/S center

〈판넬가공치수〉
가로 : 68$^{+0.6}$
세로 : 68$^{+0.6}$
가로간격 : 37
세로간격 : 14

단위:(mm)

15. 제품사양 및 주의사항

Power Supply	AC110/220V (50/60Hz) ±10%
Power consumption	less than 5VA
Input Sensor	Thermo couple:K(CA) Line resistor – less than 100Ω PT100Ω : Line resistor less than 5Ω
Display Accuracy	Thermo couple : Indicating value±0.5% +1digit PT100Ω : Indicating value ±0.2% +1digit
Hysteresis	0.1 ~ 9.9 (or 1~9)
Control Output	Relay Output : AC250V 5A(Resistor Load) Contact point life : more than 300,000 times(St. Load) Current Output : DC4-20mA(Max. 300Ω)
Control Method	ON/OFF Control or PID response (with Auto tuning)
Current Output	Current Output : DC4-20mA(Max. 300Ω)
Alarm Outptu	Relay Output : AC250V 2A(Resistor Load) Contact Point life : in excessive 50,000times(St. Load)
Set method	Digital operating by button Up, Down
Others	T Output, Compensation PV, Remote control by PC.
Operating Temp.	0℃ ~ 50℃
Operating Humidit	Less than 85% RH

① Be carefule to install SD controller, please avoid a place as bellow;
▶ The place with corrosion Gas, machinery with excessive vibration
▶ The cable with high voltage(for preventing Noise).
② 본 콘트롤러로 인명사고, 재산피해가 예상되는 곳에 사용하실 경우 반드시 2중 안전장치를 부착한 후에 사용하십시오.

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