INSTRUCTION MANUAL FOR VT9621 FUZZY ENHANCED

PID DUAL CHANNEL CONTROLLER
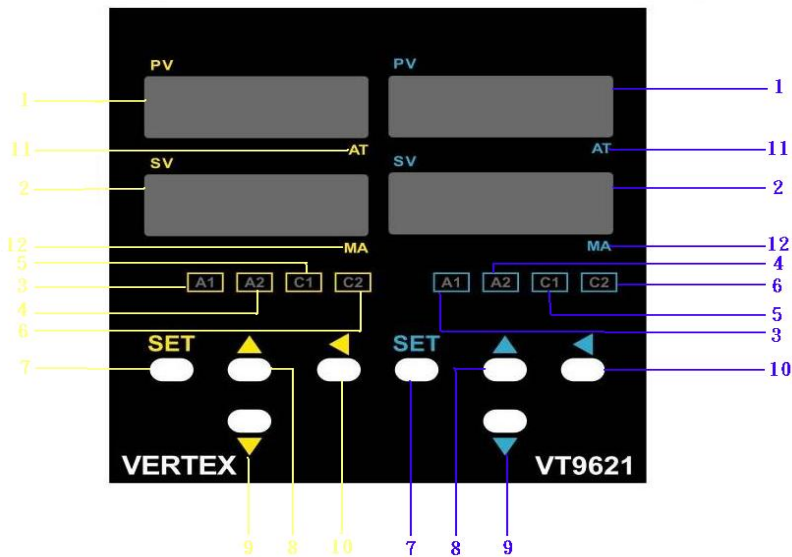

VT 9621

INDEX

■FRONT PANEL DESCRIPTION：

Code	Display& Indicator	Description
1／1	**PV**	Displays the actual measurement of the input sensor. Displays the parameter index code.
2／2	**SV**	Displays the set value. Displays the parameter data.
11／11	**AT**	When the controller is auto tuning. The rightmost decimal on the PV display will blink. When the tuning process is finished or stopped, the decimal will cease blinking and disappear.
12／12	**MA**	When the manual control mode is selected. The rightmost decimal on SV display will blink.
3／3	**A1**	A1 status LED indicator (Alarm 1 relay status LED) This LED is lit in red when the alarm 1 relay is active.
4／4	**A2**	A2 status LED indicator (Alarm 2 relay status LED) This LED is lit in red when the alarm 1 relay is active.
5／5	**C1**	C1 status LED indicator (Control output 1 status LED) Illuminates in green when the control output 1 is active.
6／6	**C2**	C2 status LED indicator (Control output 2 status LED) Illuminates in green when the control output 2 is active.

Code	Key	Description
7／7	**SET**	Press once to access the next programmable parameter. Press this key for 5 seconds to reset alarm timer.
8／8	**∧**	Press to increase the set point or parameter value.
9／9	**∨**	Press to decrease the set point or parameter value.
10／10	**◀**	1. SHIFT KEY. 2. Press the shift key for 5 seconds to execute Auto Tune process (Yes. 1
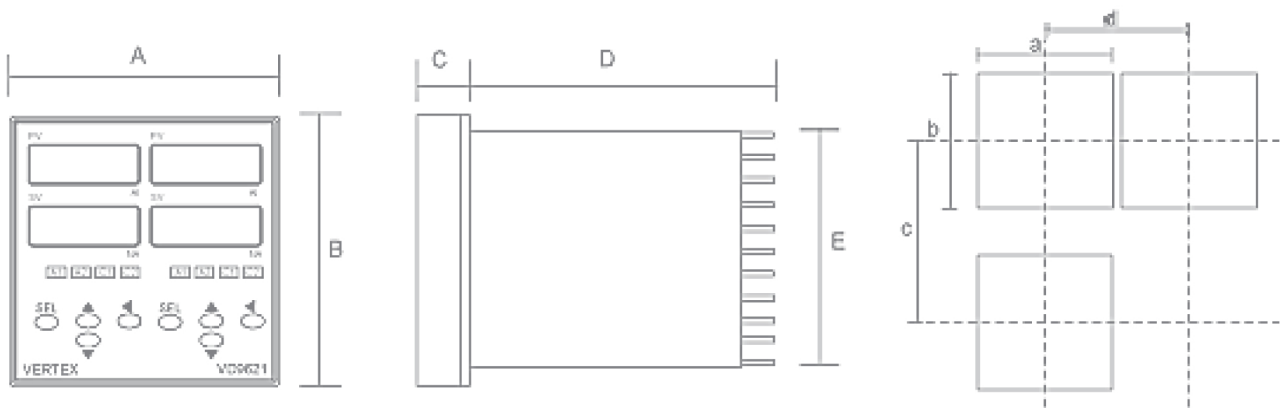
PANEL CUTOUT :

(Unit: mm)

Model型號	A	B	C	D	E	a	b	c	d
VT-9621	96	96	10	80	91	91+0.5	91+0.5	120	96

■ WIRING DIAGRAM :
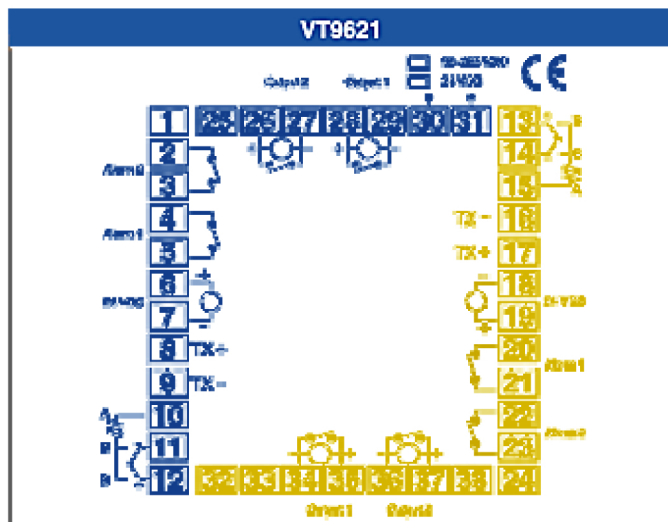
■ WIRING PRECAUTIONS:

1. Before wiring, verify the controller label for correct model number and option.

2. For thermocouple input, use the appropriate compensation wire. And note the polarity of input signal.

3. To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.

■ PROGRAMMING LEVEL PARAMETERS

```
                    LEVL      ∧ →      LEVL      ∧ →      LEVL
   SET + < 五秒  →   SoFt    ← ∨        Pid     ← ∨       oPti       ∧ + ∨ 五秒

          SP          rAmP            Pb               tYPE          LnLo

          A1SP        SSP             ti               Unit          LnHi

          A2SP        oUt             td               dP

          At                          Ct               ACt

          HAnd                        CPb              LoLt

          oUtL                        Cti              HiLt

                                      Ctd              FiLt

                                      CCt              PtmE

                                      HYS1             A1FU

                                      HYS2             A1md

                                      A1HY             A2FU

                                      A2HY             A2md

                                      db               Addr

                                      SPoF             bAUd

                                      PyoF

                                      LoCt
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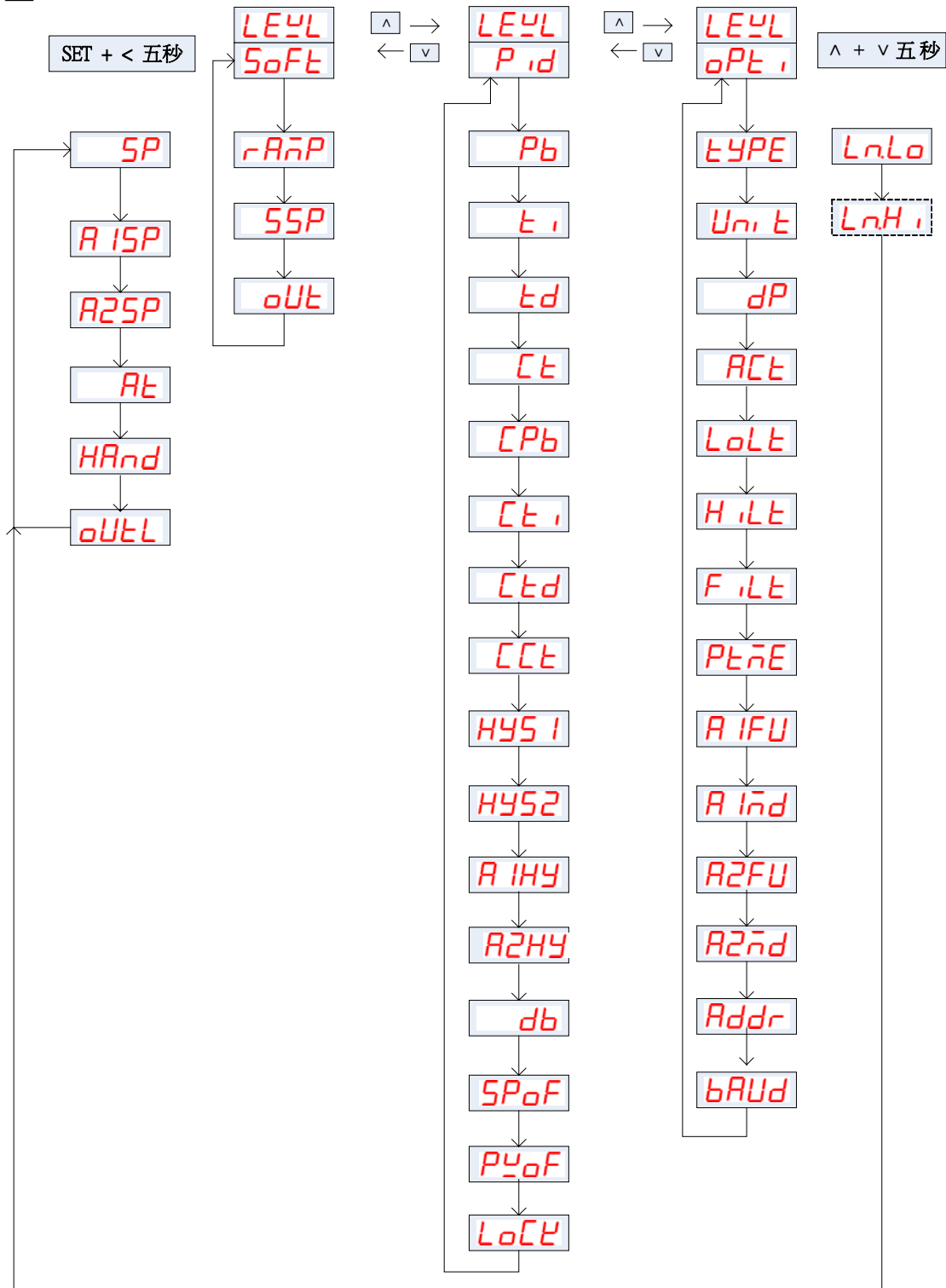
1. When 2nd Output (Cooling) is not selected, CPb、Cti、Ctd、HYS2 and db parameters are not available.
2. When Pb≠0.0， HYS1 will be skipped.
3. When CPb≠0.0，HYS2 will be skipped.
4. When Pb＝0.0，ti、td will be skipped.
5. When CPb＝0.0，Cti、Ctd will be skipped.

■PARAMETER DESCRIPTION：（Refer to attachment for display format.）

LEYL	**LEVEL Selection** Press SET+◀ keys for at least 5 seconds to access *SoFt* Level. Use ▲ or ▼ key to select programming level. Then press SET key to enter this level. <table><tr><th>LEVEL</th><th>Description</th></tr><tr><td>*SoFt*</td><td>**Soft Level**</td></tr><tr><td>*P id*</td><td>**PID Level**</td></tr><tr><td>*oPt i*</td><td>**Option Level**</td></tr></table>

■USER LEVEL

CODE	DESCRIPTION	RANGE	DEFAULT
SP	Set point value of control	LoLt － HiLt	**500**
A1SP	Alarm 1 set point value/Timer set value while A1FU is set to T.on or T. off, the unit can be HH.MM or MM.SS. It depends on the "P.tnE" parameter.	-1999 － 9999/ 00.00~99.59	10
A2SP	Alarm 2 set point value/ Timer set value while A2FU is set to T.on or T. off, the unit can be HH.MM or MM.SS. It depends on the "P.tnE" parameter.	-1999 － 9999/ 00.00~99.59	10
At	Autotune　　*no*：Auto-tuning is disable *YES.1*：Standard type auto-tuning. 　　　　PV is compared wit SV during auto tuning. *YES.2*：Low PV type auto-tuning. 　　　　PV is compared with SV-10%FS during 　　　　Auto-tuning.	*no* *YES.1* *YES.2*	no
HAnd	Manual control　*no*：Disable the manual mode *YES*：Enable the manual mode.	*no* *YES*	no
oUtL	Output percentage. Adjustable when "Hand" is set to "Yes"	-100.0 － 100.0	0.0

■SOFT LEVEL

CODE	DESCRIPTION	RANGE	DEFAULT
rAmP	Ramp rate for the process value to limit an abrupt Change of process.(℃/min.)	0 - 9999（0.0 – 999.9）	0.0
5.5P	Set point value of soft-start	LoLt － HiLt	0
oUt	Output percentage of soft-start	0.0 - 100.0	100.0

■PID LEVEL

CODE	DESCRIPTION	RANGE	DEFAULT
Pb	Proportional band variable. Set to 0.0 for ON/OFF control mode.	0.0-300.0%	10.0
ti	Integral time (Reset). This value is automatically calculated by activating the Autotune function. If desired, the user can later adjust this parameter to better suit the application. When PB=0.0, this parameter will be not available. When set to zero, Pb & td $\neq$ 0 for PD control.	0-3600sec	240
td	Derivative (Rate). This value is automatically calculated by activating the Auto tune function. If desired, the user can later adjust this parameter to better suit the application. When PB=0.0, this parameter will be not available. When set to zero, Pb & td $\neq$ 0 for PI control.	0-900sec	60
Ct	Proportional cycle time of output 1.	0-100sec	15
CPb	Proportional band variable for secondary control output (cooling). Set 0.0 for ON/OFF.	0.0-300.0%	10.0
Cti	Integral time for secondary control output. When PB=0.0, this parameter will be not available. When set to zero, Pb & td $\neq$ 0 for PD control.	0-3600sec	240
Ctd	Derivative time for secondary control output. When Pb=0.0, this parameter will be not available. When set to zero, Pb & ti $\neq$ 0 for PI control.	0-900sec	60
CCt	Proportional cycle time of output 2.	0-100sec	15
HY5 1	Hysteresis for ON/OFF control on output 1.	0-2000(0.0-200.0)	1
HY52	Hysteresis for ON/OFF control on output 2.	0-2000(0.0-200.0)	1
A 1HY	Hysteresis of alarm 1.	0-2000	0
A2HY	Hysteresis of alarm 2.	0-2000	0
db	Dead band value. This defines the area in which output 1 and	-1000-1000	0

CODE	DESCRIPTION	RANGE	DEFAULT
	output 2 are both active (negative value) or the area in which output 1 and output 2 are both inactive (positive value).	**(-100.0-100.0)**	
5PoF	Set point offset. This value will be added to SV to perform control. It mainly used to eliminate offset error during P control.	**-1000-1000** **(-100.0-100.0)**	**0**
PYoF	Process value offset. Permits the user to offset the PV indication from the actual PV.	**-1000-2000** **(-100.0-200.0)**	**0**
LoCK	Parameter lock. This security feature locks out selected levels or single parameters prohibiting tampering and inadvertent programming changes.		**0100**

0000	**All parameters are locked out.**	
0001	**Only SP is adjustable**	
0010	**Only USER level is adjustable**	
0011	**USER and PID levels are adjustable.**	
0100	**USER,PID,OPTI levels are adjustable.**	
0101	**USER,SOFT,PID,OPTI levels are adjustable.**	
0101~0111	**All parameters in all levels are opened.**	
1000~1111	**1000=0000,1001=0001,1010=0010,1011=0011,1100=0100 but Output 2 is opened.**	

■OPTION LEVEL

CODE	DESCRIPTION	RANGE	DEFAULT
tYPE	Input type selection. | tYPE	RANGE(°C)	RANGE(°F) | |------|------|------| | J | -50 ～ 1000 | -58 ～ 1832 | | K | -50 ～ 1370 | -58 ～ 2498 | | t | -270 ～ 400 | -454 ～ 752 | | E | -50 ～ 750 | -58 ～ 1382 | | b | 0 ～ 1800 | 32 ～ 3272 | | r | 0 ～ 1750 | 32 ～ 3182 | | S | 0 ～ 1750 | 32 ～ 3182 | | n | -50 ～ 1300 | -58 ～ 2372 | | C | -50 ～ 1800 | -58 ～ 3272 | | d-Pt | -200 ～ 850 | -328 ～ 1652 | | J-Pt | -200 ～ 650 | -328 ～ 1202 | | L inE | -1999 ～ 9999 | |	**Refer to figure**	K
Un it	Unit of process value	°C : Degrees C. °F : Degrees F. EnG : Engineer unit for linear input.	°C
dP	Decimal point selection. 0000 : No decimal point.	**0000** **000.0**	**0000**

	000.0：0.1 resolution 00.00：0.01 resolution, used for linear input only. 0.000：0.001 resolution, used for linear input only. After change decimal point, please reconfirm the parameter.	00.00 0.000	
ACt	Output 1 control action. rEu : Reverse action for heating. d ir : Direct action for cooling.	rEu d ir	rEu
LoLt	Low limit of span or range. Set the low limit lower than the lowest expected SV and PV display.	Full range	0
HiLt	High limit of span or range. Set the high limit higher than highest expected SV and PV display.	Full range	1000
FiLt	Software filter.	0.0-99.9	10.0
PtmE	Time scale for timer alarm. HHmm Hours:Minutes; mmSS Minutes:Seconds	00.00~99.59	00.00
A1FU	Alarm 1 function. Refer to alarm function section for detail. If A1FU=None, it means alarm fuction is cancelled.	None, Hi, Lo, dif.H, dif.L, bd.Hi , bd.Lo t.on, t.oFF	d iF.H
A1md	Alarm 1 mode. Refer to alarm mode section for detail..	none, Stdy, Lath, St.La	nonE
A2FU	Alarm 2 function. Refer to alarm function section for detail If A2FU=None, it means alarm fuction is cancelled.	none, Hi, Lo, dif.H, dif.L, bd.Hi, bd.Lo t.on, t.oFF	d iF.L
A2md	Alarm 2 mode. Refer to alarm mode section for detail.	none, Stdy, Lath, St.La	nonE
Addr	Address of controller when communication with master device.	0 - 255	0
bAUd	Communication baud rate. 2.4k=2400bps, 4.8k=4800 bps, 9.6k=9600 bps, 19.2k=19200 bps	2.4k, 4.8k 9.6k, 19.2k	9.6k

■SCALING FOR LINEAR INPUT

1. Press ▲ + ▼ keys simultaneously for 5 seconds to access "LnLo" parameter.

2. Adjust LnLo setting to correspond the low scale and after adjustment press SET key once to access "LnHi"

   parameter.

3. Adjust LnHi setting to correspond the high scale and after adjustment press SET key once for normal

   operation.

CODE	DESCRIPTION	RANGE	DEFAULT
LnLo	Low Scale of Linear Input	-1999~9999(-199.9~999.9)	0.0
LnHi	High Scale of Linear Input	-1999~9999(-199.9~999.9)	100.0

■ALARM FUNCTION

A1FU/A2FU	ALARM TYPE	ALARM OUTPUT OPERATION
nonE	Alarm function OFF	Output OFF
H i	Process high alarm	▲ PV / SP
Lo	Process low alarm	▲ PV / SP
d iF.H	Deviation high alarm	▲ PV / SP+ALSP
d iF.L	Deviation low alarm	▲ PV / SP+ALSP
bdH i	Band high alarm	OFF / ▲ ▲ ▲ PV / SP-ALSP SP SP+ALSP
bdLo	Band low alarm	OFF ... OFF / ▲ ▲ ▲ PV / SP-ALSP SP SP+ALSP
t.on	On-timer	ALSP / ▲ ▲ PV / SP ON
t.oFF	Off-timer	ALSP / ▲ ▲ PV / SP OFF

■ALARM MODE

A1md/A2md	DESCRIPTION
nonE	Normal alarm mode**/ When timer function is selected, PV<SV timer function is not available.**
StdY	Standby mode When selected, in any alarm function, prevents an alarm on power on. The alarm is enabled only when the process value reach alarm set point. Also known as "Startup inhibit" and is useful for avoiding alarm trips during startup.
LAtH	Latch mode. When selected, the alarm output and indicator latch as the alarm occurs. The alarm output and indicator will be energized even if the alarm condition has been cleared unless the power is shut off.

	When Timer function is selected, PV< SV timer function is available.
5ŁLA	**Standby and latch mode**

■ AUTOMATIC AND MANUAL OUTPUT CONTROL

Automatic control is the normal mode of controller operation. In automatic control mode the controller automatically adjust the control output percentage by PID algorithm so that the PV=SV. The PID parameter Pb, Ti and Td can be also calculated by Auto Tune procedure.

Manual control allows the user to manually drive the output percentage from 0.0 to 100.0%. To access the manual mode, set the "HAnd"parameter to " YES", the rightmost decimal (MA) on SV display will flash. Then the "oUŁL " parameter will display alternately "oUŁL " and process value. The output percentage then can be adjusted by pressing UP or DOWN key.

To abort the manual control just simply set the "HAnd" to " no".

■AUTO TUNE

In order to automatically set the PID parameter in PID level ("Pb" proportional band, "ti: integral time or reset and "td" derivative time or rate), first adjust the controller's set point to a value, which closely approximates your application. Set the " AŁ " parameter to "YES. I" for standard type auto tune or "YES.2" for low PV type auto tune. The right-most decimal point (AT) on the PV display begins flashing. The auto tune procedure will take two cycle oscillations. After that, the controller performs PID control with the "learned" PID value to verify the results. Finally the PID values will be entered into the nonvolatile memory and then start the Fuzzy enhanced PID control. The auto tune process can last from several minutes up to two hours, depending on the system's parameter. A time out error will occur if the auto tune process can not be completed within two hours, in this case, try to set the PID parameters manually.

To abort an auto tune process, simply set the " AŁ " parameter to " no".
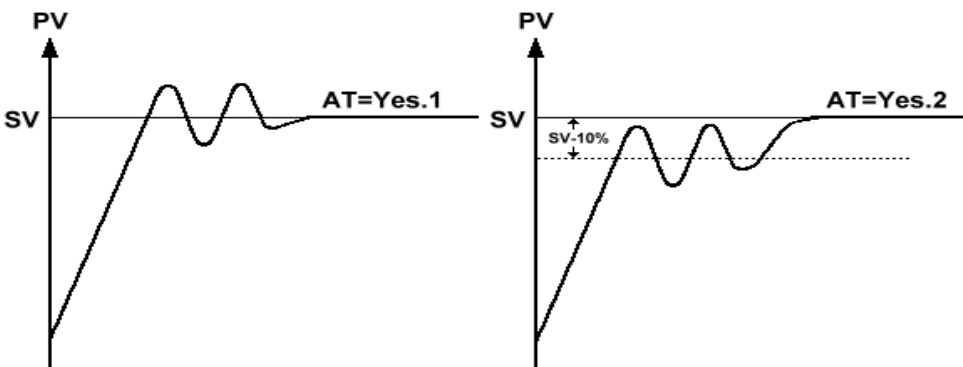

The controller can also be set to ON/OFF, PI, PD and P control mode. Set Pb = 0 for ON/OFF control mode. Set ti = 0 for PD control mode. Set td = 0 fro PI control mode and ti, td = 0 fro P control mode. The

Hysteresis (dead band) 0f ON/OFF control can be set as follow:

ON

OFF

SP-HYST   SP+HYST

SP
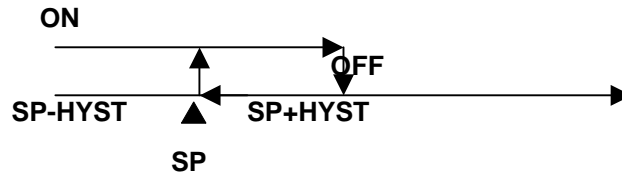
When the second control output (output 2) is equipped the proportional band of output 2 and dead band are defined as follow:

Output

Heating   Cooling

PV

Overlap   Dead
Band   Band
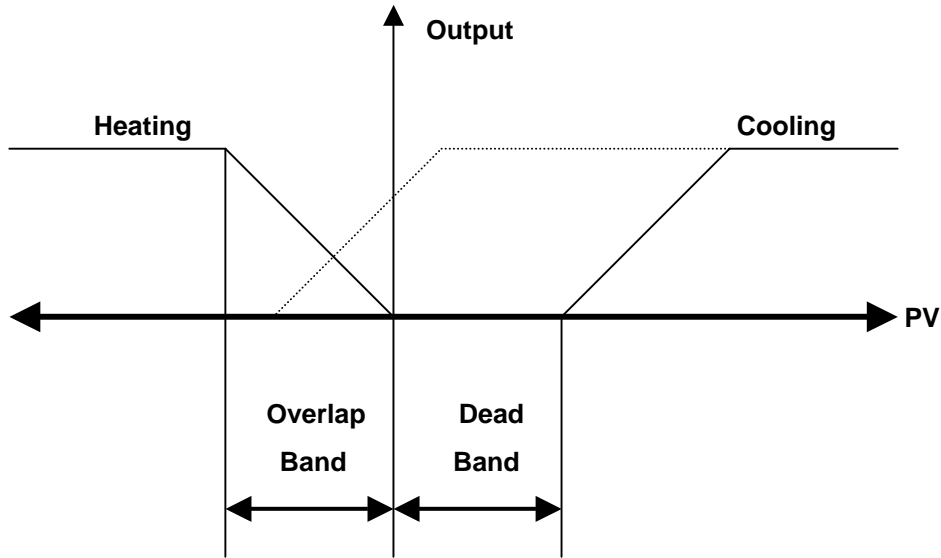
■ERROR MESSAGE AND TROUBLE SHOOTING

Symptom	Probable	Solution
$P\underline{u}$ Display flashing	Incorrect wiring for input	Check correct input sensor selection.
	Input signal out of range	Adjust proper values for $H \cdot L t$ and $L o L t$ parameter as request.
	Input signal doesn't correspond to input $t Y P E$	Adjust a proper value for $t Y P E$ parameter as request.
$o P E n$	Incorrect wiring for input	Check correct input sensor selection.
	Sensor abnormal	Check the sensor is connected correctly./ Replace senor.
	the input hardware damage by too high linear input	Set a proper value for high limit
	Input signal doesn't correspond to input $t Y P E$	Adjust a proper value for $t Y P E$ parameter as request.
$R t E r$	Auto tune error	Set the values for $P b$ 、 $t \cdot$ 、 $t d$ manually.
$R d E r$	Analog switch IC abnormal	Return the controller to supplier and advise the correct signal information to supplier.
	Abnormal high voltage/surge for input signal	
	The linear input signal which is actual used is higher than ordering sepc.	
$C S E r$	Controller memory IC abnormal	Check if the signal is abnormal and return the controller to supplier.
	Abnormal high voltage/surge for power source or input terminal	
Control Function	Control output action isn't fit for request.	Check the setting of $R C t$ parameter. $r E u$: heating $d \cdot r$: cooling
	$R t$ parameter can't be adjusted	When $P b$ =0.0, $R t$ can't be done.
		When $H R n d$ = $Y E S$, $R t$ can't be done.
	$o U t L$ parameter can't be adjusted.	When $H R n d$ = $n o$, $o U t L$ parameter can't be adjusted
	The error is far than process value.	Check the setting value for $P u o F$. Set $P u o F$ =0 to see if the error is eliminated.
		Check the setting for $t Y P E$ and $U n \cdot t$ and adjust the values as your request.
	The error is far than setting value.	Check the setting value for $S P o F$. Set $S P o F$ =0 to see if the error is eliminated.
	Control output continues while error message appears.	When $H R n d$ = $Y E S$ ，manual output control doesn't limit by error message.
	Control output doesn't stop while the setting value is exceeded.	When control LED is on, check the setting value for $S P o F$. Set $S P o F$ =0 to see if the error is eliminated.
		When $H R n d$ = $Y E S$ ，manual output control doesn't limit by $S P$.
		Check if output still act.
Alarm function	The settings for $R 1 S P$, $R 1 H Y$, $R 2 S P$,and $R 2 H Y$ are limited.	Check if the other parameter regarding to $R 1 F U$ 、 $R 2 F U$ are correct.
RS-485 Communication	RS-485 error	Check if the RS-485 module is equipped.
		Communication software should fit ModBus RTU protocol
		Check if $R d d r$ parameter is correspond to the software address setting.
		Check if $b R U d$ parameter is correspond to the software address setting.

■ATTACHMENT

Display Format	Parameter Notation	Display Format	Parameter Notation	Display Format	Parameter Notation	Display Format	Parameter Notation
SP	SP/SV	SPoF	SPOF	diF.L	DIF.L	E	E
PV	PV	PVoF	PVOF	bdHi	BD.HI	b	B
A1SP	A1SP	LoCK	LOCK	bdLo	BD.LO	r	R
A2SP	A2SP	TYPE	TYPE	t.on	T.ON	S	S
At	AT	Unit	UNIT	t.oFF	T.OFF	n	N
HAnd	HAND	dP	DP	StdY	STDY	C	C
oUtL	OUTL	ACt	ACT	LAtH	LATH	d-Pt	D-PT
rAmP	RAMP	LoLt	LOLT	St.LA	ST.LA	J-Pt	J-PT
S.SP	S.SP	HiLt	HILT	oPEn	OPEN	LinE	LINE
oUt	OUT	FiLt	FILT	AtEr	ATER	℃	℃
Pb	PB	PtmE	PTME	AdEr	ADER	℉	℉
ti	TI	A1FU	A1FU	CSEr	CSER	EnG	ENG
td	TD	A1md	A1MD	SoFt	SOFT	rEV	REV
Ct	CT	A2FU	A2FU	Pid	PID	dir	DIR
CPb	CPB	A2md	A2MD	oPti	OPTI	HH.mm	HHMM
Cti	CTI	Addr	ADDR	no	NO	mm.SS	MMSS
Ctd	CTD	bAUd	BAUD	YES.1	YES.1	t.on	T.ON
CCt	CCT	LnLo	LNLO	YES.2	YES.2	t.oFF	T.OFF
HYS1	HYS1	LnHi	LNHI	YES	YES	2.4K	2.4K
HYS2	HYS2	nonE	NONE	USEr	USER	4.8K	4.8K
A1HY	A1HY	Hi	HI	J	J	9.6K	9.6K
A2HY	A2HY	Lo	LO	K	K	19.2K	19.2K
db	DB	diF.H	DIF.H	t	T		