DTC1 Series

Intelligent Temperature/Humidity PID Controller with 60 Step Program Control

User Manual V 1.0

Thank you for purchasing Fastron DTC series PID Temperature/Humidity Controller. This manual explains how to install and operate your new PID Controller. Before operation, please read this manual first to fully understand the operation of this product. This controller should be installed by a qualified Electrical Engineer, Technician or Electrician. For specific technical support please contact your agent or representative.

Fastron Electronics

Safety Warning

1a)Avoid touching the AC power terminals after the controller is powered on.

1b)Always ensure the supply power is off first before connecting any wires.

1c)Do not operate this instrument in places full of explosive and combustible gases.

2. Incorrect Connection of the Power Supply can cause permanent damage.

3. The maximum torque of the terminals should not exceed 8KN.

4. Please do not use in the following circumstances:

- where the temperature changes dramatically
- Places where humidity is too high (~85%) and water is produced
- Where vibration or impact is high
- Where corrosive gases or dust are present
- splash of water, oil and chemicals

6. All Wiring should be kept away from high-voltage, high-current power

Improved Features

(1) Slope value offset compensation.

(2) 2 in (input) 2 out (output) : 1 to 2 isolated transmission, 2 to 1 isolated transmission (Optional)

(3) Multiple alarm modes

(4)Transmission of PV, SV and MV: forward, reverse and difference value in 8 ways.

(5) Output soft start function.

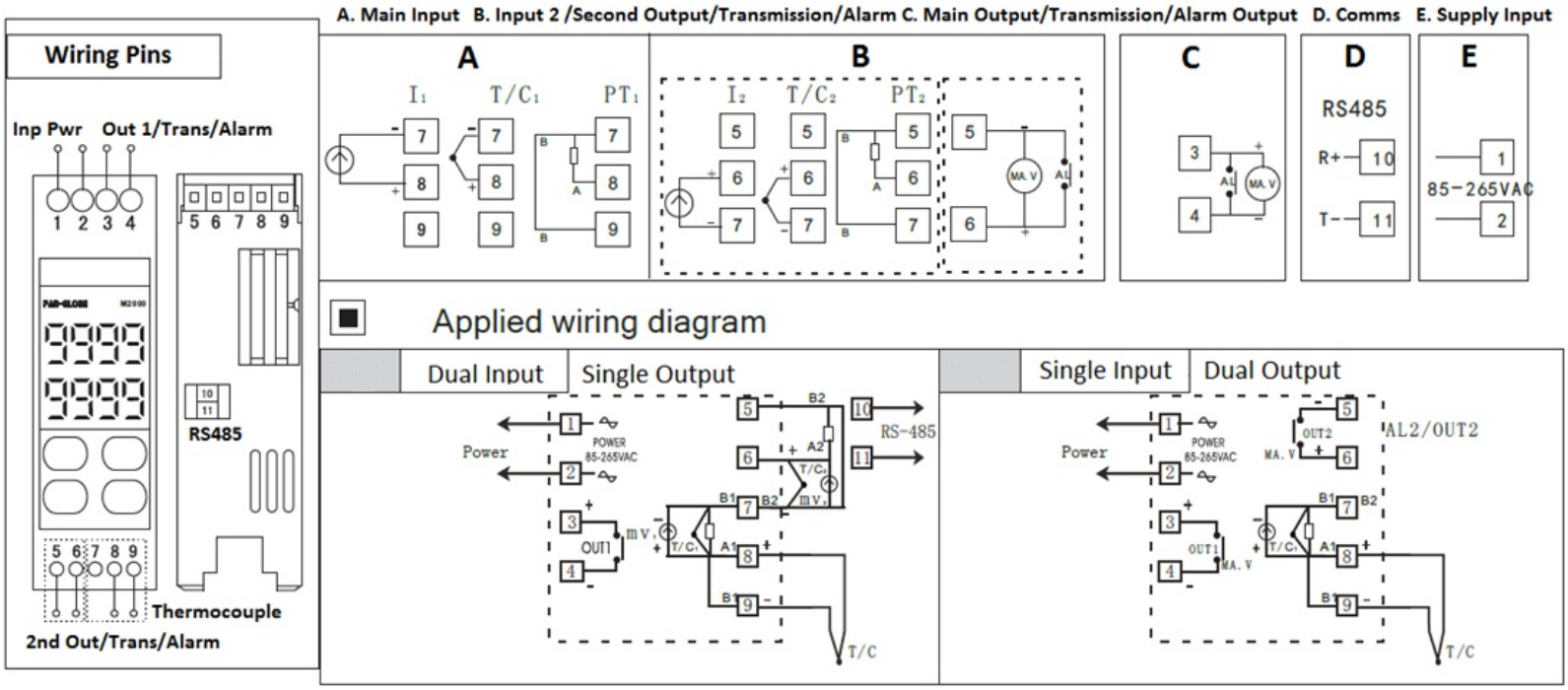
(6) Dehumidification function.

(7) Servo Motor Control (Optional)

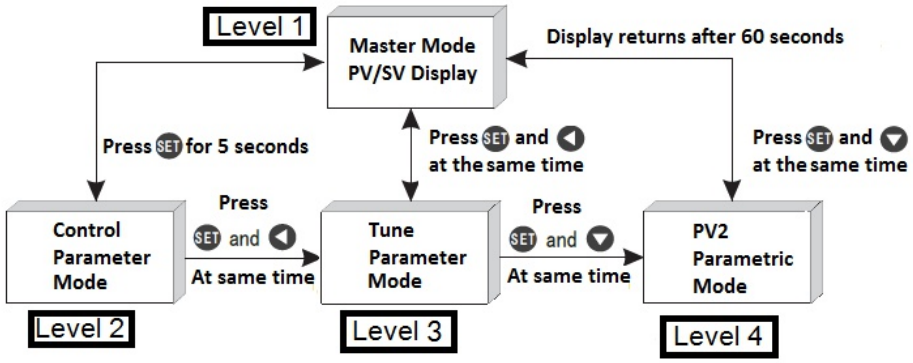
(8) Optional 60 Segment, Multi Sequence, Program Control

Information	Instructions	Solution
uuuu	The first sensor is disconnected, polarity reversed or out of range. The first set of input signals were higher than Higher Scaling Limit	Please check the input signal/sensor for errors and wiring
nnnl	The first set of input signals is lower than Lower Scaling Limit	Please check the input range
CJCE	Normal temperature compensation failure	Please check the temperature compensation diode
uuuu	Open T/C circuit	Please check T/C or compensating wire

Wiring Configuration



Programming Menu



Code	AL1,AL2 Action
0	High Limit Alarm (PV Deviation from SV)
1	Low Limit Alarm (PV Deviation from SV)
2	Process High Alarm (PV Absolute Value)
3	Process Low Alarm (PV Absolute Value)
4	Intraregional Alarm (Inside Deviation value)
5	High/Low Limit Range Alarm
6	Low Limit Alarm with Standby (2nd Crossing)
7	Process Low Alarm with Standby (2nd Crossing)
8	Loop Break Alarm
9	High/Low Limit Range Alarm with Standby (2nd Crossing)
10	Program Control Overange Alarm
11	Pattern End Output (End of Program)
12	Constant Temperature and Timing Alarm

DTC1 Operational Flow Chart

LEVEL1 Master Mode

- ON — Power on
- Function self-check all leds on
- INP / TPYE — Input Signal Type Displayed
- ↓ 5
- High limit setting
- Low limit setting
- ↓ 5
- PV / SV — PV/SV value display; Up/Down key to set SV
- ↓ SET
- OUL / 0 — Output lower limit setting
- ↓ SET
- OUH / 100 — Output upper limit setting
- ↓ SET
- AT / 1/0 — Autotune; 1 = Yes; 0 = Use Preset PID Parameter
- ↓ SET
- AL1 / LSP-USP — Alarm 1 Value; Range: Low limit to High limit
- ↓ SET
- AL2 / LSP-USP — Alarm 2 Value; Range: Low limit to High limit
- ↓ SET
- RAP / 0-600 — Slope; Temperature: ℃
- ↓ SET
- RTM / 0-600 — Slope; Time: minute

Rate of Change

- ↓ SET
- STA / 0-3 — 0: Fixed Point Control; 1: Program control starts from 0; 2: Program control starts from current PV
- ↓ SET
- CAL / 0-90 — 3. If power is cutoff while heating, PV starts automatically
- ↓ SET
- Sn / 0-90 — Select the first Parameter number of the group; Current running segment number 0-90
- ↓ SET
- St / 0-999 — The current running section counts down 0-999 points
- ↓ SET
- C01 / 0-USP — The end temperature of the first segment is 0-USP
- ↓ SET
- T01 / 0-999 — The first end time is 0-999 points
- ↓ SET
- OU01 / 0-100.0 — The first MV output high limit
- ↓ SET
- OU90 / 0-100.0 — Parameter 90 MV output high limit
- ↓ SET5
- LEVEL2

Program Control Settings

LEVEL2 Control Parameter Mode

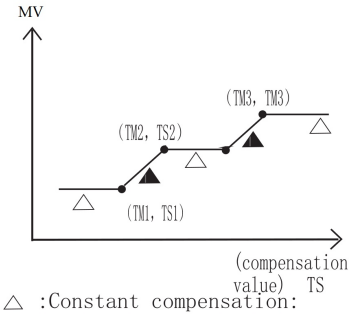
- P / 4.0 — Proportional band (%) 0.1-300.0%; P= 0 for ON/OFF Control
- ↓ SET
- I / 200 — Integral Time (s) Range 0 - 3600
- ↓ SET
- D / 40 — Derivative Time (s) Range 0 - 900
- ↓ SET
- OUD / 0 — 0: heating; 1: cooling
- ↓ SET
- Hy1 / LSP/USP — Alarm 1 Hysteresis
- ↓ SET
- Ad1 / 00-19 — Alarm 1 Type Selection
- ↓ SET
- Hy2 / LSP/USP — Alarm 2 Hysteresis
- ↓ SET
- Ad2 / 0-19 — Alarm 2 Type Selection
- ↓ SET
- Hy3 / LSP/USP — Alarm 3 Hysteresis
- ↓ SET
- Ad3 / 0-19 — Alarm Type 3 Selection
- ↓ SET
- CYT / 0-60 — 0:mA, 1:SSR, other: Relay (sec.); Cycle Time
- ↓ SET
- SRT / 0-50 — Dehumidification temperature setting
- ↓ SET
- LMO / 0-20 — The maximum output threshold is set when dehumidifying
- ↓ SET
- TH2 / 0-8 — (Second transfer) 0:No Transfer 1:PV4-20MA 2:PV 20-4MA 3:SV4-20 MA 4:SV20-4MA 5:MV4-20MA 6:MV20-4MA 7:4-20MA 8:20-4MA
- ↓ SET
- MAN / 0-1 — 0:Manual open; 1:The manual is prohibited
- ↓ SET
- LCK / 000-111 — Differential transfer
- SET+ ◀
- LEVEL3

LEVEL3 Tune Parameter Mode

- INP / b-w2 — Input Type Selection. See Input Selection Table
- ↓ SET
- LSP / -1999-9999 — Set lower limit (second transfer zero)
- ↓ SET
- USP / -1999-9999 — Set upper limit (second transfer zero)
- ↓ SET
- SFT / 80 — Input Filter time constant
- ↓ SET
- DP / 0-3 — Decimal Place Position
- ↓ SET
- CL0 / ±100% — Master Current output Zero Adjustment
- ↓ SET
- CH0 / ±100% — Control output Span adjustment
- ↓ SET
- TH1 / 0-8 — 0:No Transmit; 1:PV4-20MA; 2:PV20-4MA; 3:SV4-20MA; 4:SV20-4MA; 5:MV4-20MA; 6:MV20-4MA; 7:4-20MA Differential; 8:20-4MA
- ↓ SET
- KV / 0.1-300.0 — Out 1 to Out 2 Ratio; 300.0-3:1; 100.0-1:1; 50.0-0.5:1
- ↓ SET
- CL1 / ±100% — Zero Adjustment of 1st Transmitter
- ↓ SET
- CH1 / ±100% — Span Adjustment of 1st Transmitter
- ↓ SET
- TRL / 0-USP — Transmitter Zero Adjustment. Output 1
- ↓ SET
- TRH / 0-USP — Transmitter Span Adjustment. Output 1
- ↓ SET
- DLY / 0-30 — Output soft start (seconds)
- ↓ SET
- PAR / E81 N81 N82 — Communication data format
- ↓ SET
- BAD / 0-6 — (MODBUS communication baud rate) 0:Master slave communication between machines; 1:4800 4:38400; 2:9600 5:76800; 3:19200 6:153600
- ↓ SET
- ADD / 0-255 — Communication Address: ADD=1(The host sends)PV、SV、MV ADD=2 (SV)、3(PV)、4(MV) (Sub-machine reception)
- ↓ SET
- OPAD / 0-300 — =0, PID control mode; If ≠0, overshoot suppression is automatically introduced during cold startup; Fuzzy control function; Note: when PV= ambient temperature or lower temperature, set SV value and start AT will automatically obtain the corresponding optimal fuzzy control parameters
- ↓ SET
- U0 / 10 — System operating point output percentage display value; An At is automatically established when it ends
- ↓ SET
- WB / 0.1-10 — Wait value for program control wait function. WB = 0 for no wait value
- ↓ SET
- RE / 0-200 — Programmed automatic cycle number setting
- ↓ SET
- END / 0-1 — Program Control End; 0: SV, MV turn off; 1: At the end of program controller will continue to carry out fixed point control
- ↓ SET

LEVEL4 PV2 Parametric Mode

- INP2 / b-w2 — PV2 Input Type Selection
- ↓ SET
- LSP / -1999/9999 — PV2 Lower Limit
- ↓ SET
- USP2 / -1999/9999 — PV2 Upper Limit
- ↓ SET
- PVS2 / -50-50 — PV2 Input Correction
- ↓ SET
- TOSV / 0-3 — 0:PV2 does not open; 1:PV2 detection display (At SV window); 2: outside the SV is set; 3: load break alarm
- ↓ SET
- ANL2 / ±100% — PV2 Input Zero Adjustement
- ↓ SET
- ANH2 / ±100% — PV2 Input Span Adjustment
- ↓ SET
- TM1 / LSP-USP
- ↓ SET
- TS1 / 0-±100
- ↓ SET
- TM2 / LSP-USP
- ↓ SET
- TS2 / 0-±100
- ↓ SET
- TM3 / LSP-USP
- ↓ SET
- TS3 / 0-±100
- ↓ SET+
- LEVEL1



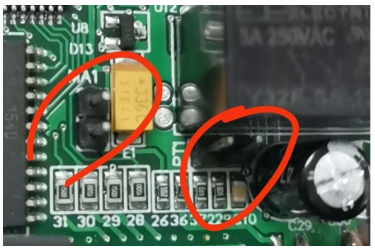
△ :Constant compensation:
▲ slope compensation
1. TM1=0、TM2=0, TM3=ON compensation。
2. When TM1=USP, TS1 is constant compensation (full range).

▼

PCB Jumper Settings

First Input:
TC:Fully Open
RTD:PT1 Closed
4-20mA:MA1 Closed

Second Input:
TC:Fully Open
RTD:PT2 Closed
4-20mA:MA2 Closed



- CL2 / ±100% — Channel 2 Transmitter Zero Adjustment
- ↓ SET
- CH2 / ±100% — Channel 2 Transmitter Span Adjustment
- SET+ ◀
- LEVEL1

Note 1:When the program is running, press the key▼ once in the MV window
Online display optional:
P- output percentage, - current running segment number, t- current
Running segment countdown
Press the key▼for 5 seconds to display or back to the fixed point display.
* note:
SET2 = Default Setting, for AL3 Setting, requires SET2 = 000, otherwise 100 = TH1 setting

1. Sensor Type Setting

A. Press SET +◄ key to enter LEVEL3

B. Once you reach INP Press ◄ and the SV display will blink

C. Press▼or▲select the input type (refer to the signal input selection table). Press SET to confirm

E. At the same time, press SET +◄ to return to LEVEL1

2. AL1/AL2 Alarm mode setting

A. Press SET for 5 seconds to enter LEVEL2

B. Press SET several times to access AD1, then press the ◄ key and the display will start to flash.

C. Press▼or▲select the alarm type (see alarm selection table)

D. Press SET to confirm

E. Press SET to return to LEVEL 1

Step (3): Set alarm value AL1/AL2

See AL1 and AL2 in alarm mode Table

A. Press SET key several times to access AL1 selection, and then press ◄ to enable the selection.

B. Press▲ or▼ to SET the value, and then press the ◄ key to move to the next digit and do Both AL1 and AL2 can choose alarm mode from 0 to 10, which can the same setting .

C. After setting, press SET key to confirm. Pattern End output can be selected as Alarm mode 11. There is also a constant temperature and timing alarm mode 19

D. Press SET to return to LEVEL1 setting and test the alarm function or pattern end output.

Step (4): Program Control Setting and Operation (Optional)

A. At LEVEL1 master PV/SV display press SET key several times to reach “C01” in order to start to set the program. Press ◄ and ▲ or▼ and SET to set the temperature for the frist segment.

B. Press SET to select T01. Press ◄ and ▲ or▼ and SET to set the time for the frist segment.

C. Press SET several times until you reach OU01. Press ◄ and ▲ or▼ and SET to set the MV high limit for the first segment. Repeat for each step to create the pattern.

D. Ensure all remaining CX, TX and OUX values are set to 0

Step (5): Autotuning(AT) Function

A. Once installed in the field, carry out self-tuning to allow the controller to determine the optimum AT parameters.

B. AT calculation will choose the optimum PID Parameters based on the controllers auto tuning algorithm.

C. The maximum value of the process curve should be about 80% of the range of instrument detection.

D. Before the program begins (fixed value control STA=0), it is better to carry out AT around the maximum value of the process curve (SV=0.3).

E. In LEVEL1 press SET key several times to reach AT option, then press ▲and ▼ key to put "1" to start AT calculation.

F. This machine is used as a fixed value control when STA ="0", and as a program controller when STA =1, 2, 3.

G. Once the controller is powered on, as long as STA is set to any value other than 0, the program will not start.

You may want to setup multiple patterns.

E. Note that when presetting of segments Is complete, CX, TX and OUX of the next segment must all be put"0" as the isolation segment and mark between groups.

E. 60 is the maximum of segments.

G.CAL setting is the first step number of the startup operation group. For example, if the second groups begins at C08, then CAL should be set to 08.

F. If the program Control needs to start from 0 Deg C, set STA parameter to 1; if PV is needed, put the STA item into 2 or 3. Program control END mode has two options see operation flow chart (end of LEVEL 3)

G. During operation the program segment or step number SN, can change its current segment/step number to run forward or backward within the range of the current group; Select ST item to set the step time of the current running segment.

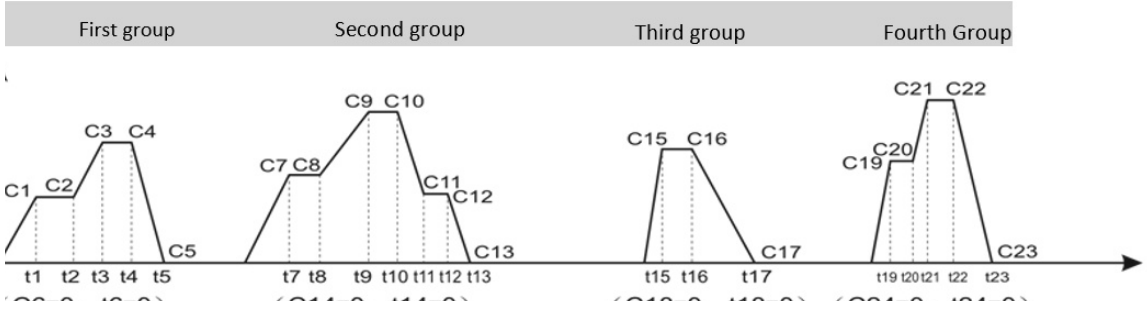
H. To start/end the program, please press SET key and ▲ key at the same time.

I. Press the ▲ button to pause/continue the program.

J. To ensure the controller reaches the desired temperature regardless of the time period, you can select Wait Value (WB) in the range of (0.1-10 Deg C), WB=0 means the controller will advance even if the set temperature is not reached. See end lf LEVEL 3 menu

K. The controller will start either by shorting terminals 6 and 7, or by pressing the

·Press the “XXX” once (3-4 seconds) to start the program control; if press the button once again (3-4 seconds) program control will end; · during the program control operation, press “XXX” key once (1-2 seconds) to stop the program control. If press the “XXX” key again program control will continue to run.



Example: To Set four groups as shown in the above figure

In the first group, there are five stages: the first stage, the step temperature is C1, and the step time is T1.In the second segment, the end temperature is C2 and the end time is T2.In the third stage, the step temperature is C3 and the step time is T3.In the fourth section, the step temperature is C4 and the step time is T4. In paragraph 5, the step temperature is C5 and the step time is T5.

The second set of seven sections: the first section, the end temperature is C7, the end time is T7 .In the second segment, the end temperature is C8 and the end time is T8. In the third section, the end temperature is C9 and the end time is T9. In the fourth segment, the end temperature is C10 and the end time is T10.In paragraph 5, the step temperature is C11 and the step time is T11. In the sixth paragraph, the step temperature is C12 and the step time is T12.In the seventh section, the end temperature is C13 and the end time is T13. The third set of three sections: the first section, the end temperature is C15, the end time is T15. In the second segment, the end temperature is C16 and the end time is T16. In the third section, the end temperature is C17 and the end time is T17.

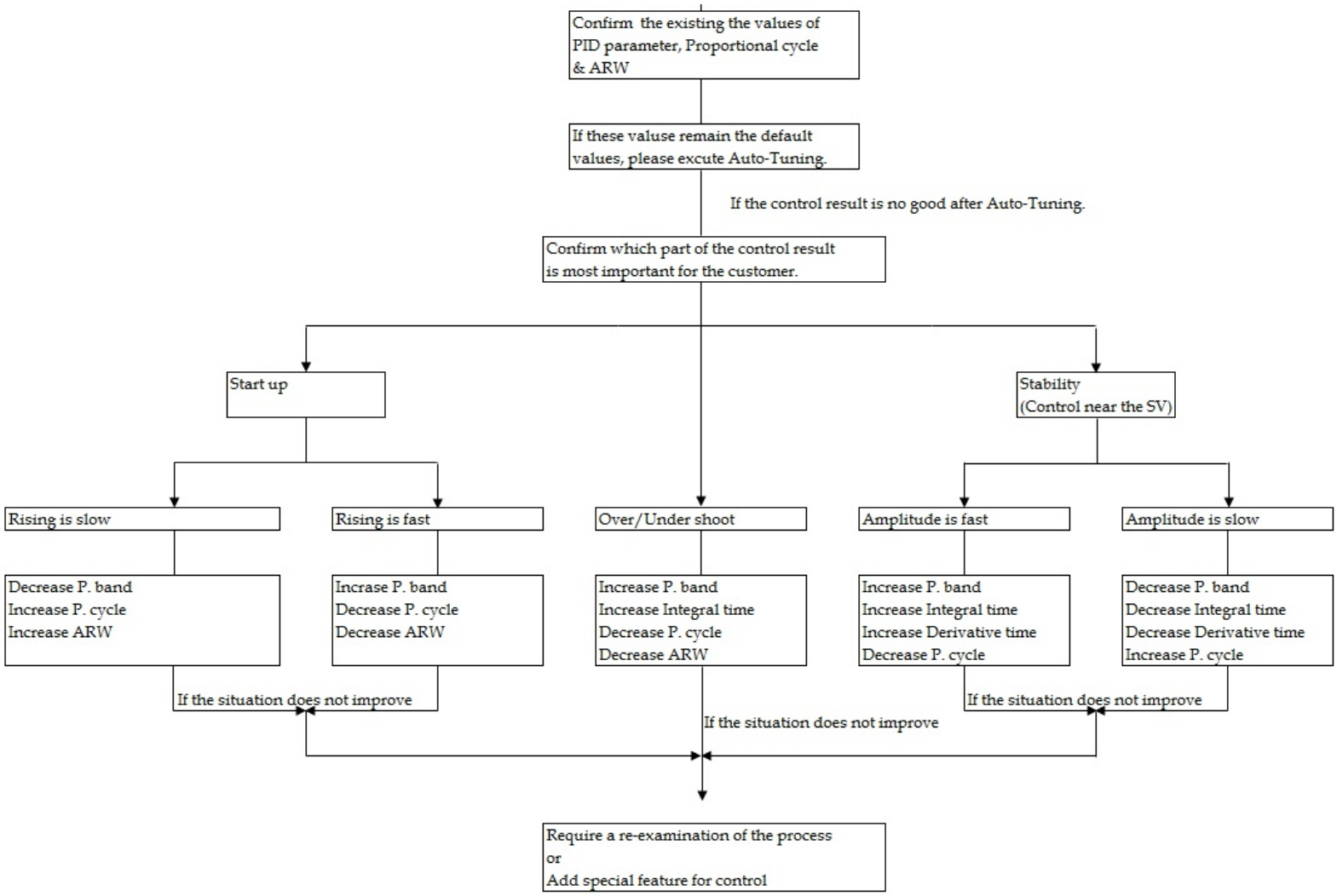
The fourth set of five segments: the first segment, the end temperature is C19, the end time is T19.In the second segment, the end temperature is C20 and the end time is T20.In the third section, the step temperature is C21 and the step time is T21. In the fourth segment, the end temperature is C22 and the end time is T22.In paragraph 5, the step temperature is C23 and the step time is T23.

Step (5): Autotuning(AT) Function

A. Once installed in the field, carry out self-tuning to allow the controller to determine the optimum AT parameters.
B. AT calculation will choose the optimum PID Parameters based on the controllers auto tuning algorithm.
C. The maximum value of the process curve should be about 80% of the range of instrument detection.
D. Before the program begins (fixed value control STA=0), it is better to carry out AT around the maximum value of the process curve (SV=0.3).
E. In LEVEL1 press SET key several times to reach AT option, then press ▲and ▼ key to put "1" to start AT calculation.
F. This machine is used as a fixed value control when STA ="0", and as a program controller when STA =1, 2, 3.
G. Once the controller is powered on, as long as STA is set to any value other than 0, the program will not start. then press and key to put "1" to start AT calculation.
F. This machine is used as a fixed value control when STA ="0", and as a program controller when STA =1, 2, 3.
G. Once the controller is powered on, as long as STA does not equal 0(the program control machine does not start the program operation, the controller has no output.

Step (6) Manually modifying PID parameters. (Optional Fine Tuning)

Use the below duie to change the P, I, D values for fine tuning of manual tuning (LEVEL 2)

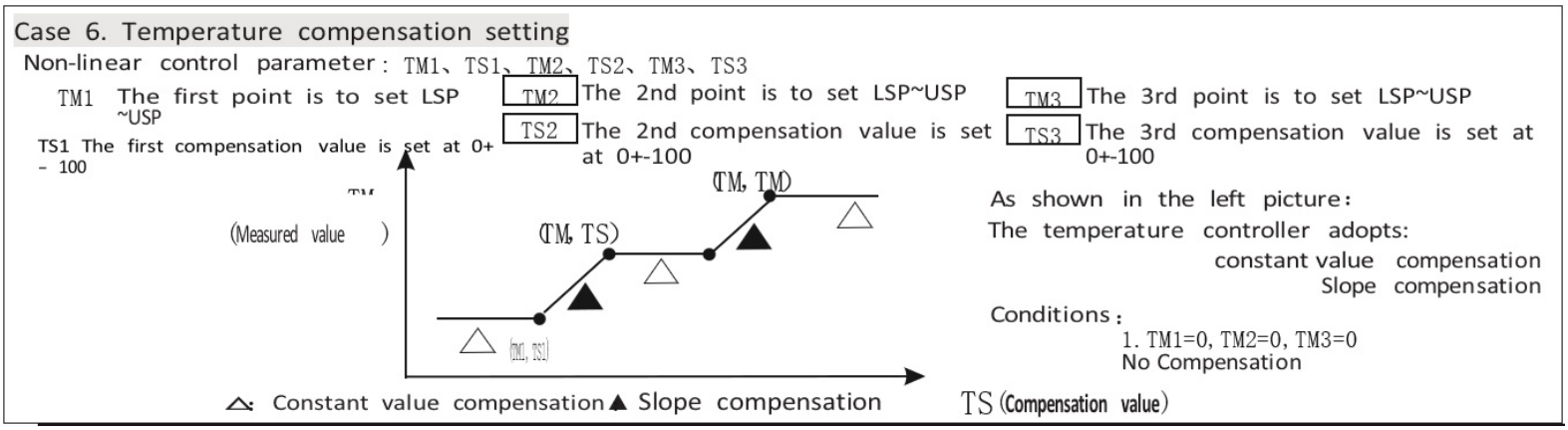


Soft Start Function

Output Soft Start

To enable simple soft start feature set the SV as follows;

Set SV value -> In level3 press SET key to reach DLY, SET the output soft start value in seconds (I.e. if DLY is set to 10, then the soft start time will be 10 seconds). Exit the menu by pressing set until you return to the main screen. Now the soft start function is activated when the control is set to begin heating.

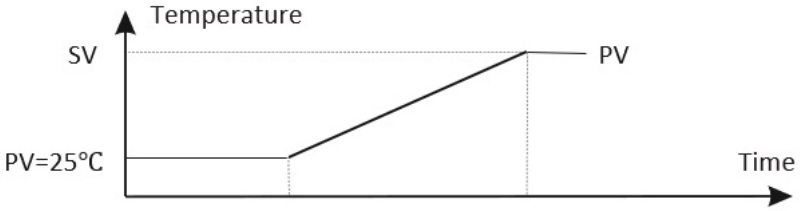


Rate of Change/Slope Temperature Limit

When your system needs a soft start (SV preset slope heating), please operate in the following order:

SET SV value→ at LEVEL1, press SET key to find RAP, SET slope temperature value, and →then press SET key to find RTM to SET slope time in minutes(for example, SET slope to 10°C/ min, RAP to 10.0, RTM to 001.0) →after setting, SV value will be SET immediately from the current PV value to 10°C/ min, until reaching the SV setpoint value.

Slope heating process PRO The output percentage of normal temperature LED flashing control process is automatically controlled by PID.



Dehumidification Function

For systems which require dehumidification function.

In Level 1 Menu, press SET button several times to reach SRT to preset dehumidification PV value, (Most common range is 10-40 Deg C) press SET key again and reach LMO to preset dehumidification work output percentage, generally 2.0 to 5.0%. For example for SRT = 40, and LMO = 2%, the Controller will output at 2% when the system temperature drops below 40 Deg C. This feature can help avoid heater burnout.

The above curve shows two points, the Dip in the heating curve is caused by the dehumidification setting. The second point is the normal output of the PID Controller.

Input Type	Symbol	Range
K	K	0-1370°C/0-2498°F
J	J	0-1200°C/0-2192°F
R	r	0-1760°C/0-3216°F
S	S	0-1760°C/0-3216°F
B	b	0-1820°C/0-3308°F
E	E	0-1000°C/0-1832°F
T	t	0-600°C/0-1112°F
Pt100	Pt	-199.9-600°C/-327.8-1112°F
Cu50	cu50	0-150°C/0-302°F
LN	Ln	Linear analogue Signal 4-20mA, 0-1V, 0-50mV, 0-5V
N	n	0-1300°C/0-2372°F
W1	W1	0-2000°C/0-3632°F
W2	W2	0-2320°C/0-4208°F

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Information	Instructions	Solution
uuuu	The first sensor is disconnected, polarity reversed or out of range. The first set of input signals were higher than Higher Scaling Limit	Please check the input signal/sensor for errors and wiring
nnnl	The first set of input signals is lower than Lower Scaling Limit	Please check the input range
CuCE	Normal temperature compensation failure	Please check the temperature compensation diode
uuuu	Open T/C circuit	Please check T/C or compensating wire