DTC1 Series

Intelligent Temperature/Humidity PID Controller with 60 Step Program Control

User Manual V 1.0

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

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.

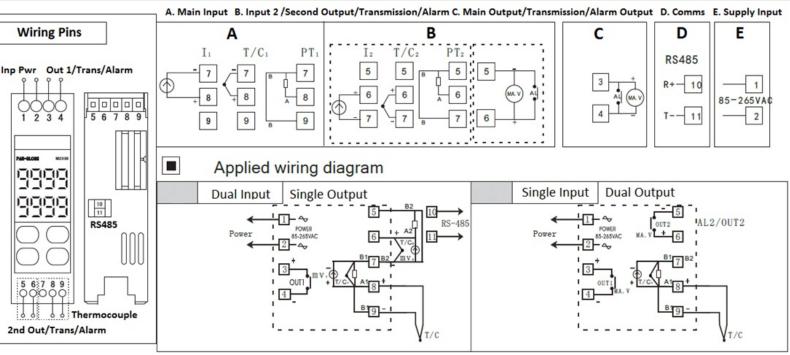


Improved Features

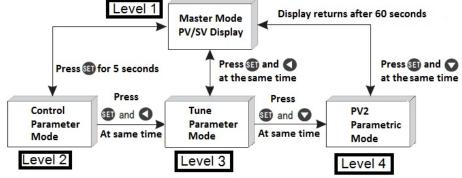
- (1) Slope value offset compensation.
- (2) 2 in (input) 2 out (output) : 1 to 2 isolated transmission, 2 to 1 isolated transmission (Optional)
- (3) Multiple alarm modes
- (4)Transmission of PV, SV and MV: forward, reverse and difference value in 8 ways.
- (5) Output soft start function.
- (6) Dehumidification function.
- (7) Servo Motor Control (Optional)
- (8) Optional 60 Segment, Multi Sequence, Program Control

Information	Instructions	Solution
וחחח	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
nnni	The first set of input signals is lower than Lower Scaling Limit	Please check the input range
EJEE	Normal temperature compensation failure	Please check the temperature compensation diode
пппп	Open T/C circuit	Please check T/C or compensating wire

Wiring Configuration



Programming Menu



For application notes and examples please visit https://fastron.com.au/blogs/pid-temperature-controllers

	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		
		High/Low Limit Range Alarm with Standby (2nd		
	9	Crossing)		
10		Program Control Overange Alarm		
	11	Pattern End Output (End of Program)		
	12	Constant Temperature and Timing Alarm		

DTC1 Operational Flow Chart Control Parameter LEVEL1 | Master Mode LEVEL2 LEVEL3 Tune Parameter Mode LEVEL4 PV2 Parametric Mode Mode ON Power on Proportional band INP2 INP Input Type Selection PV2 Input Type Selection (%) 0. 1-300. 0% See Input Selection Function self-check 4.0 b-w2 b-w2 P= 0 for ON/OFF Control all leds on Table SET SET SET INP Input Signal Type LSP PV2 Lower Limit LSP Set lower limit (1 Integral Time (s) Displayed -1999-9999 second transfer zero) TPYE -1999/9999 Range 0 - 3600 200 ↓SET √ 5 SET High limit setting USP2 PV2 Upper Limit USP Set upper limit (D Derivative Time (s) -1999-9999 second transfer zero) Low limit setting -1999/9999 Range 0 - 900 40 , 5 ↓SET SET SET PVS2 PV2 Input Correction Р۷ SFT PV/SV value display Input Filter time constant OUD 0: heating 80 -50-50 SV Up/Down key to set SV 0 1: cooling SET SET 0:PV2 does not open SET SET 1:PV2 detection display TOSV DP Decimal Place: Position OUL Output lower limit Hy1 (At SV window) Alarm 1 Hysteresis setting 0-3 0-3 0 LSP/USP 2: outside the SV is set SET SET SET SET 3: load break alarm CLO Master Current output Zero ANL2 0UH Output upper limit Ad1 PV2 Input Zero Adjustement Alarm 1 Type Selection Adjustment +100% setting ±100% 100 00-19 SET ↓SET SET SET CH0 Control output Span ANH2 PV2 Input Span Adjustment ΑT Hy2 adjustment Alarm 2 Hysteresis $\pm 100\%$ $\pm 100\%$ 1/0 1 = YesLSP/USP 0 = Use Preset PID Parameter SET ↓SET SET SET 1 · PV4-20MA TM1 Alarm 1 Value :PV20-4MA :SV4-20MA AL1 Ad2 TH1 Alarm 2 Type Selection LSP-USP LSP-USP Range: Low limit 0-19 0-8 SV20-4MA SET to High limit : MV4-20MA (TM3, TM3) SET ▼ SET 6:MV20-4MA 7:4-20MA Differential 8:20-4MA TS1 Alarm 2 Value AL2 SET (TM2, TS2) Ну3 0-±100 Range: Low limit LSP-USP Alarm 3 Hysteresis LSP/USP to High limit ↓SET Out 1 to Out 2 Ratio K۷ SET SET 300. 0-3:1 100. 0-1:1 50. 0-0. 5:1 TM2 \wedge 0.1-300.0 (TM1, TS1) RAP Slope Ad3 LSP-USP Alarm Type 3 Selection SET Temperature: ℃ 0-600 0-19 ↓SET (compensation CL1 √ SET TS2 Zero Adjustment of 1st Transmitter SET TS ±100% △ :Constant compensation: RTM Slope 0-±100 Cycle Time 0:mA CYT SET slope compensation Time: minute 0-600 1:SSR SET 0-60 CH1 1. TM1=0, TM2=0, other : Relay(sec.) Span Adjustment of 1st Transmitter TM3 SET 0: Fixed Point Control SET TM3=0N compensation $\pm 100\%$ LSP-USP SET 1: Program control starts SRT STA Dehumidification ↓SET from 0 2. When TM1=USP, TS1 is 0-50 TRL Transmitter Zero Adjustment. temperature setting 0-3 $2 \colon \operatorname{Program} \operatorname{control}$ TS3 constant compensation Output 1 0-USP ↓ SET starts from current (full range). 0-±100 The maximum output SET SET LMO SET+ TRH Transmitter Span Adjustment. when dehumidifying 0-20 3. If power is cutoff while CAL Output 1 0-USP LEVEL1 heating, PV starts SET (Second transfer) 0-90 0:No Transfer 1:PV4-20MA 2:PV 20-4MA 3:SV4-20 MA 4:SV20-4MA SET automatically TH2 √ SET DLY Select the first Parameter number of the group 0-8 Output soft start (seconds) Sn 0-30 0-90 5:MV4-20MA 6:MV20-4MA Current running segment number 0-90 SET Program Control Settings SET SET PAR 7:4-20MA 8:20-4MA Communication data format E81 N81 N82 St The current running section counts down 0-999 MAN 0:Manual open 0-999 points (MODBUS communication baud rate) 0-1 1:The manual is SET SET 0:Master slave communication prohibited SET BAD between machines 1:4800 4:3840 C01 The end temperature of Differential transfer LCK 0-6 4:38400 the first segment is 0-0-USP 2:9600 5:76800 000-111 SET 3:19200 3:19200 6:153600 Communication Address SET ADD SET+ ADD=1 (The host sends) PV, SV, MV ADD=2 T01 The first end time is 0-0-255 LEVEL3 (SV), 3(PV), 4(MV) (Sub-machine 999 points 0-999 reception) **SET** =0. PID control mode OPAD If $\neq 0$, overshoot suppression is automatically 0U01 The first MV output high 0-300 introduced during cold startup limit 0-100.0 Fuzzy control function Note: when PV= ambient temperature or lower temperature, set SV value and start AT will automatically obtain the corresponding optimal **∮** SET fuzzy control parameters 0U90 Parameter 90 MV output SET 0-100.0 high limit System operating point output percentage display value U0 SET5 10 An At is automatically LEVEL2 ↓ SET established when it ends

WB

0. 1–10

RE

0-200

SET

END

0-1

SET

SET

Programmed automatic cycle number

1: At the end of program controller

will continue to carry out fixed point

Program Control End 0: SV, MV turn off

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-

Running segment countdown

Rate of Change

Press the key V 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

Wait value for program control wait function. WB = 0 for no wait value CL2 Channel 2 Transmitter Zero ±100% Adjustment SET

> CH2 Channel 2 Transmitter Span ±100%

SET+ LEVEL1

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

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.

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

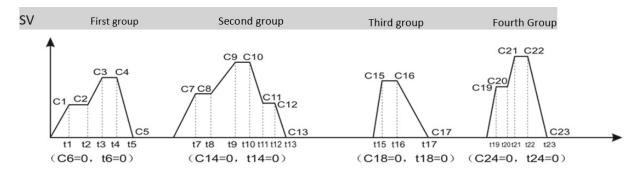
Step (4): Program Control Setting and Operation (Optional)

- 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

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 If 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.

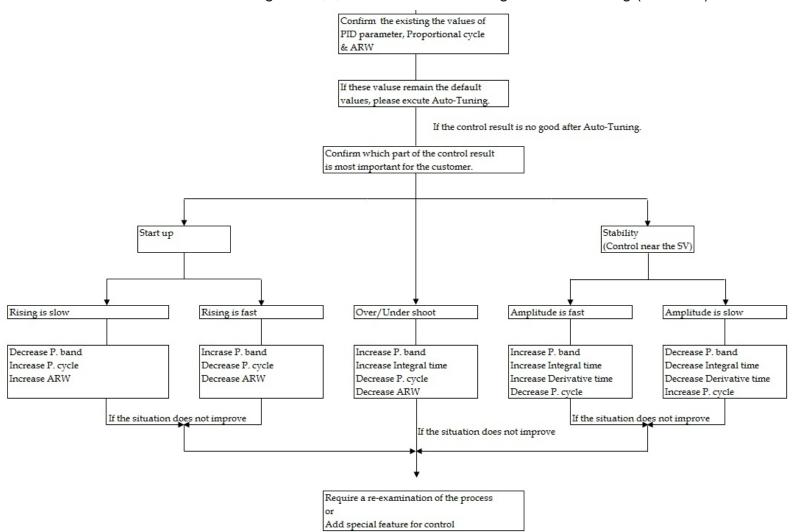
The fourth set of five segments: the first segment, the end temperature is C19, the end time is T19.In the second segment, the end temperature is C20 and the end time is T20.In the third section, the step temperature is C21

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 is not started (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 process, press SET key several times to reach AT option,

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)

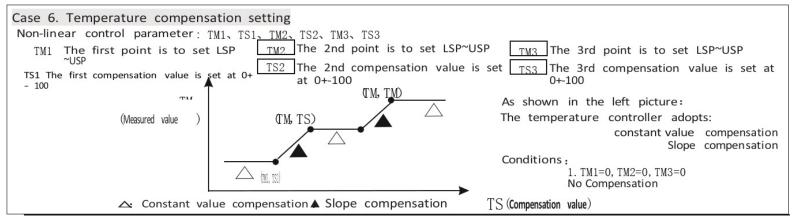


Soft Start Function

Output Soft Start

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

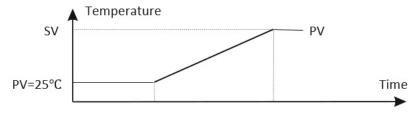
Set SV value -> In level3 press SET key to reach DLY, SET the output soft start value in seconds (I.e. if DLY is set to 10, then the soft start time will be 10 seconds). Exit the menu by pressing set until you return to the main screen. Now the soft start function is activated when the control is set 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 to SET slope temperature value, and →then press SET key to find RTM to SET slope time in minutes(for example, SET slope to 10 / min, RAP to 10.0, RTM to 001.0) →after setting, SV value will be SET immediately from the current PV value to 10 / min, until reaching the SET SV value.

Slope heating process PRO The output percentage of normal temperature lights 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	Pango
	Symbol	Range
K	9	0-1370°C/0-2498°F
J	נ	0-1200°C/0-2192°F
R	۲	0-1760°C/0-3216°F
S	J	0-1760°C/0-3216°F
В	Ţ	0-1820°C/0-3308°F
E	Ε	0-1000°C/0-1832°F
Т	П	0-600°C/0-1112°F
Pt100	Į.	-199.9-600°C/-327.8-1112°F
Cu50	cu50	0-150°C/0-302°F
	-45	Linear analogue Signal 4-
LN	С !	20mA, 0-1V, 0-50mV, 0-5V
N	С	0-1300°C/0-2372°F
W1	81	0-2000°C/0-3632°F
W2	82	0-2320°C/0-4208°F

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Information	Instructions	Solution
וטטו	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
EJEE	Normal temperature compensation failure	Please check the temperature compensation diode
טטטט	Open T/C circuit	Please check T/C or compensating wire