



HG-700D

染色机控制电脑

HG-700D CONTROLLER
FOR
DYEING MACHINE

使用说明书

USER'S MANUAL

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I. Brief Introduction of Characteristics

TC-700D Microprocessor Controller For Dying Machine adopts LCD screen with Chinese display method. It adopts friendly man-machine interface with the big, clear and simple screen. This system can hold the whole process control totally automatically. It is the ideal equipment in dying line to improve the dying quality, reduce engine consume, alleviate the labor strength and increase economic performance. It can be widely applied for different objects of controlling temperature, such as: Normal temperature dyeing machine, High temperature dyeing machine and yarn dyeing machine.

Main Specification

1 Output interface

Relay output 16(Relay output: 240VAC 3A)

communicate with PLC, 32 switching value outputs at most.

Three 4~20mA analog outputs.

All the switching value outputs and analog outputs can be defined by users.

2 Input interface

Two PT100 inputs

Eight switching value inputs

Four analog input signals (4~20mA)

One pulse value input signals

All the switching value inputs and analog inputs can be defined by users.

3 Temperature control specifications

Temperature measurement component: Pt100 platinum heat resistance.

Test temperature range: 000℃---153℃

Temperature Control range: 030℃ ---140℃

Temperature s Control Speed: 0.1℃---9.9℃/min

Temperature s Control accuracy: isotherm state±0.5℃

Temperature control method: optimized automatically control

4. Programmable functions:

Programmable process number: 100 (0—99), 100 programmable steps per process(0—99).

5. Protective function of control system

- 1) If there is suddenly power off while the machine is working, the previous operation can be kept on working if the power comes again.
- 2) The computer will alarm and stop working when there is any trouble of probe.(the vat temperature is 0℃ or over 150℃.

6. Power working range

Power supplying range: **AC100~250V 50/60HZ**

Power consume of the whole machine:≤20 W

7. Working environment:

Working temperature: ≤50℃,

Relative humidity ≤90%

8. Dimension of apparatus:

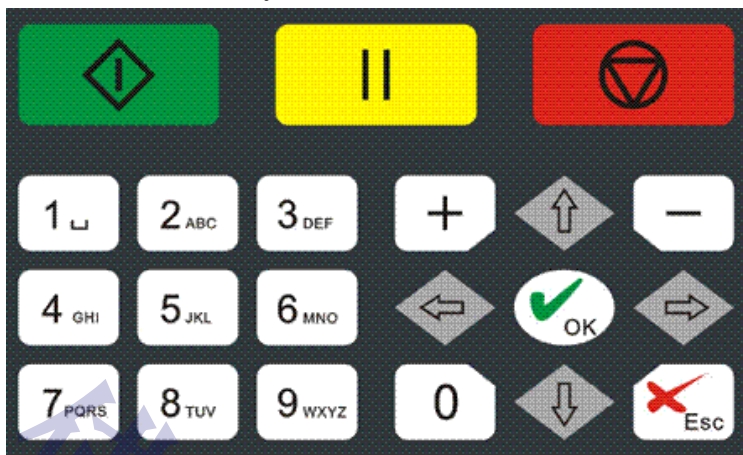
(162)W*(216)H* (120)L (mm²)

Installing hole dimension: 133(W)×185(H)(mm²)


Installing way: embedded way of tray

II. Operating Guide

2. 1 Functions of keys



Number key 0-9: used to enter number of 0~9


RST key  make the computer to return to the previous interface;

RUN key  make the computer to operating state;

STOP key  make the computer to pause;

ESC  make the computer escape from the current menu;

Confirm key  enter next menu or confirm the current operation;

Delete key  used to delete the characters and symbols input from the keyboard.

+key: positive sign input, insert one step when programming or forward one step when running jump.

- key: minus input, delete one step when programming or backward one step when running jump.

Direction key: They are cursor-up/down/left/right moving keys under edit state, cursor-left and right



keys respectively are page up and down under list state.

2. 2 Main interface (主界面)

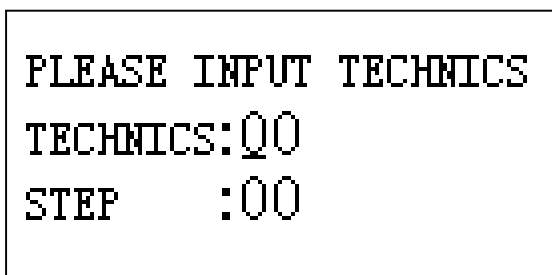
1 > RUN	TEMP. 1
2 PROGRAM	100.0°C
3 PARAMETER	TEMP. 2
4 RECORD	153.0°C

III. Running Process

3.1 RUN

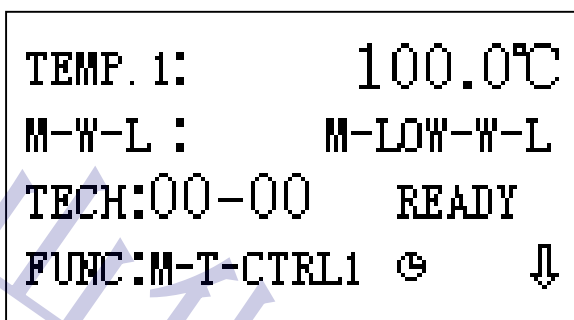
Under main interface, press  key or move the curse to RUN item then press  key, it can enter into following interface

Choosing running process interface



Enter the program number and step number of needed running process, press“confirm”或“RUN”key to the ready prepared running interface, as the following picture:

the ready prepared running interface




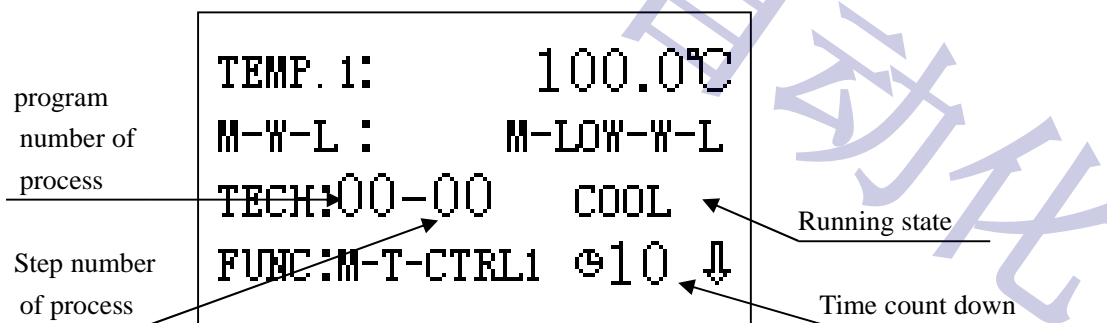
Main vat temperature: 100.0°C

Main vat water level: main minimum water level



Process: 00—00 Ready

Function: main vat temperature control

Under the ready state, press “” key to start the process, as the following picture



Under the running process mode: press   key to view the feeding state, output state, input state, running curve.

Under the running process mode: According to the indication of the screen arrowhead, press   key to page up and down to view the running parameter.

3.2 Pause and Jump

Under the ready state or pause state, press “+” key can jump to next step, press“—” key can return

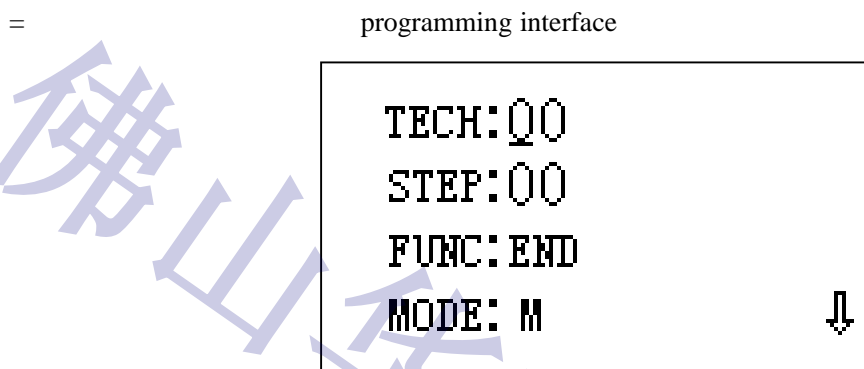
to last step. After jumping to the needed running step number, press “RUN” key, the computer will start running from this step.

Notice: When jump, the running assistant function will go on running; the parallel function will stop running when jump the main function.

IV、Process Management

4.1 Process Programming

Under main interface, press “2” key or move the curse to process management item then press confirm key, it can enter process management interface. Press “1” key to move the curse to process programming item then press confirm key, it can enter process programming interface, as the following picture:



Instruction:

Move the curse to corresponding item, it can modify the corresponding setting value. When the curse is on “Process” item, It can directly enter the subroutine number of needed programmed process by the number key. When the curse is in the left, press ← to make the subroutine number of process reduce one; When the curse is in the right, press → to make the subroutine number of process add one; When the curse is on “Step number” item, it can directly enter the step number of needed programmed process by the number key. When the curse is in the left, press ← to make the subroutine number of process reduce one; When the curse is in the right, press → to make the subroutine number of process add one; When the curse is in “function” item, press ← → to choose the needed function, choose different function, the following set items will change with it, page down to enter the complete setting value correctly. After programming the process of each step, press “✓OK” key to save, then the computer will automatically jump to next step to go on programming.

Programming Function


Program End, Main vat temperature control, Assistant vat temperature control, Automatic prompt, Forward/Reverse rotation, Main pump, Assistant pump, Dyestuff vat, Water intake, mixing water intake, full water intake, Assistant water intake, Dyestuff vat water intake, Water drain, High temperature water drain, full water drain, Assistant water drain, Dyestuff water drain, Overflow, full overflow, Wash 1, Wash 2, Wash 3, Direct heat, Pressurizing、 Pressure relief, Open overflow valve, Assistant vat reflux, Dyestuff reflux, Mixing, Circle feeding, Time feeding 1, Time feeding 2


Step	Function Description
------	----------------------

number	
00	Open water intake 1 to intake the water to 800 mm, water intake protective time 10 mins
01	Open main pump
02	Open forward/reverse rotation, forward rotation 5 minutes, interval 10 seconds, reverse rotation 3 minutes
03	Quick increase temperature to 60°C, no heat preservation
04	Prompt of feeding
05	Increase the temperature to 100°C according to speed rate of 2.0, isotherm 30 minutes.
06	Decrease the temperature to 50°C, no heat preservation
07	Open water drain 1 to drain the water to 50mm in main vat.
08	Program End

The details of operation procedurals are as following:

0) Under the program state, move the curse to

The process item and enter 10, then press 


To move the curse to function item, press 

 key to choose "water intake", press  to


Move the curse to mode item then press

  key to choose "Main", press 


To page down, enter the water level as 0800

Press  to move the curse to control item






```
TECH:10
STEP:00
FUNC:FILL-CTRL
MODE: M
```




```
MODE: M
W-L:0800
CTRL:0
TIME:10M
```




And enter 0, press  to move the curse to time item and enter 10. After programming, press

 key, If the password is locked, the password entering window will appear, enter the general password, press  key, the choosing window asking if it is needed to be saved will appear, press   to choose "Yes"/"no", choose "yes" and press  to save. The step number will automatically add one and go on programming next process.


1) Move the curse to function item to choose "main pump", choose "Assistant" in mode item



press  key to page down, enter the water level as 0200, this water level is the main pump protective water level, when the water level is lower than this, the main pump will be turned off, program speed rate item as 080, it means the main pump is running at the speed of 80%, program time item as 00, if program the digit other than 0, the main pump will be turned off when the time is up; if program 00, the main pump will be on till the running of

```
TECH:10
STEP:01
FUNC:M/P-CTRL
MODE: A
```





```
MODE: A
W-L:0200
SPEED:080%
TIME:00M
```



turning off function. Press  key, the choosing window asking if it is saved or not will appear. choose “yes” and press  to save, then the step number will automatically add one and go on programming next process.



```
TECH:10
STEP:02
FUNC:TURN-CTRL
MODE: A ↓
```

2) Move the curse to function item to choose “forward/reverse rotation”, choose “assistant”

in mode item, press  key to page down, enter forward rotation as 05 minutes, interval 10 seconds, reverse rotation 03 minutes, then press  key to save the process, the step number will automatically add one and go on programming next process.


```
MODE: A ↑
FWD:05 M 00S
ITV:10 S
REV:03 M 00S
```

3) Program “main vat temperature control” in function item, program mode item as “main”,

press  key to page down, in temperature setting item enter 060.0°C, set the speed rate item as 00, it means quick increase and decrease temperature program time item as 00, after programming, press  key to save the process, the step number will automatically add one and go on programming next process.

```
TECH:10
STEP:03
FUNC:M-T-CTRL1
MODE: M ↓
```

```
MODE: M ↑
TEMP:060.0°C
SPEED:0.0°C/M
TIME:00M
```

4) Program “Automatic prompt” in function item, program mode item as “main”, program prompt item as “feed”, program control item as 0, program time item as 00, after programming, press  key to save the process, the step number will automatically add one and go on programming next process.

```
TECH:10
STEP:04
FUNC:AUTO-CUE
MODE: M ↓
```

```
MODE: M ↑
CUE:ADD-ST
CTRL:0
TIME:00M
```

5) Program “main vat temperature control” in function item, program mode item as “main”, program temperature setting item as 060.0°C, program the speed rate item as 2.0, program time item as 30, after programming, press “OK” key to save the process, the step number will automatically add one and go on programming next process.

```
TECH:10
STEP:05
FUNC:M-T-CTRL1
MODE: M
```

↓

```
MODE: M
TEMP:100.0°C
SPEED:2.0°C/M
TIME:30 M
```

↑

6) Program “main vat temperature control” in function item, program mode item as “main”, program temperature setting item as 050.0°C, program the speed rate item as 0.0, program time item as 00, after programming, press “OK” key to save the process, the step number will automatically add one and go on programming next process.

```
TECH:10
STEP:06
FUNC:M-T-CTRL1
MODE: M
```

↓

```
MODE: M
TEMP:050.0°C
SPEED:0.0°C/M
TIME:00 M
```

↑




7) Program “Water Drain” in function item, Program “Main” in mode item, program The water level item as 0050, program control item as 0, program time item as 10 minutes for the protective time of water drain. After completing the programming, press “OK” Key to save the process, the step number will Automatically add one and go on programming Next process.

```
TECH:10
STEP:07
FUNC:DRAIN
MODE: M
```

↓

```
MODE: M
W-L:0500
CTRL:0
TIME:10 M
```

↑

8) Program “program end” in function item, program mode item as “main”, program temperature setting item as 000.0°C, program the speed rate item as 0.0, program time item as 00, after programming, press “” key to save the process, the programming is completed, then press “” key to escape from programming state or press “” key to return to RST state.

```
TECH:10
STEP:08
FUNC:END
MODE: M
```

```
MODE: M
TEMP:000.0°C
SPEED:0.0°C/M
TIME:00M
```

4.2 The function of “Main”、 “Assistant”、 “Parallel” Modes

During full automatic dyeing, the system may need several functions, but the process programming only allows one function in each step. In order to run several functions at the same time, we divided these functions into main, assistant and parallel modes and combine them together in the process during programming, so as to reach the above requirement.

Main mode:

The mode item is 0, the main function works in the foreground. In this mode, the computer must complete the work before entering the next step. In other words, jumping step is not allowed or we can see only one main function is allowed to run at the same time, but a main function can be combined with several assistant functions and Parallel functions.

Assistant mode:

The mode item is 1. It works at background. In this mode, the computer can jump immediately to the next step and work together with the main function and assistant function of that step. One assistant function can work together with many main functions. The assistant function will stop only when its operating condition is ended or a function that will terminate appears, otherwise, it will continue to run until the whole process is completed.

Parallel mode:

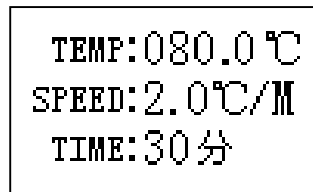
The mode item is 2, it also works at background. The difference from the assistant function is that it can only work together with one main function, but not with several functions. It will end with the main function or after finishing its only function.

During programming, if a function will operate in combination with several main functions, you can set it into an assistant function. For example, starting the main pump, forward/reverse rotation. If a function will operate in combination with only one main function, you can make it into a parallel function.

Notice: Since most of the functions can be operated in any of the three ways, it is needed to be sure that the assistant function, parallel function should not contradict with the main function. For example, main pump temperature control, direct heating and proportion heating can't run at the same time.

4.3 Brief introduction of all Functions :

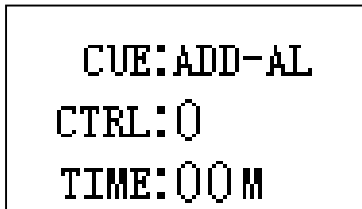
End: Every process needs to program the end step



Main vat temperature control: It can work with modes of main assistant and parallel. Edit a target temperature in the temperature setting item. If program Speed item as 0.0, it indicates quick up/down grading temperature. Program 0.1 ~ 9.9 indicates up/down grading temperature according to the programmed speed. The time item is used to edit heat preservation time. When first to open heating, the computer will automatically direct drain, the time of each time direct drain and interval time can be set in parameter set item.

Assistant vat temperature control: It can work with modes of main, assistant and parallel. Program interface is same with main vat temperature control. When first to open heating, the computer will automatically direct drain 1, the time of each time direct drain and interval time can be set in time parameters setting item.

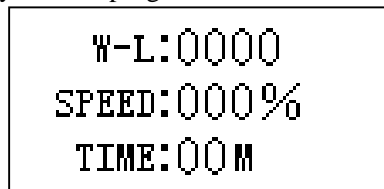
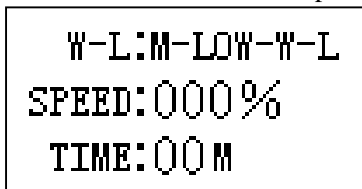
Prompt: It can only work with main mode. Process will stop automatically and alarm when it reaches this step and appear prompt information, press confirm key to cancel the alarm. Press RUN key to run next step. If the curse is in prompt item during programming, press ← → key to choose the prompt content including: alkali feeding, salt feeding, assistant dose, water intake, water drain, sampling, pause, cloth in, cloth out, yarn in, yarn out, dyestuff feeding, acid feeding. Temperature setting item and time item has no use.





Forward and reverse rotation:

It can work with modes of assistant and parallel. Program forward rotation in forward rotation item; program interval time in interval item; program reverse rotation in reverse item; You can turn off the forward and reverse function by editing all these three items into 0.

Main pump, It can work with modes of main, assistant and parallel. Program protective water lever in water level item. If use the liquid level gauge, enter the protective water level directly in water level item; when use maximum, medium and minimum water level, move the curse to water level item, press ← → key to choose the protective water level. Program the percentage of speed rate of main pump in speed rate item, 100% is full speed running. Program the time item as the digit other than 0, the pump start time will operate according to the edited time, when time is up, the pump will stop; When time item is programmed as 0, it means that pump start will not be limited by time and the main pump will operate until the end step of shut down main pump or end step of parallel function, so if want to shut down the main pump, only need to program 0 in time item when use main mode



Assistant pump, It can work with modes of main, assistant and parallel. Program protective water lever in water level item. If use the liquid level gauge, enter the protective water level directly in water level item; when use maximum, medium and minimum water level, move the curse to water level item, press   key to choose the protective water level. Delay item has no use. Program the time item as the digit other than 0, the pump start time will operate according to the edited time, when time is up, the pump will stop; When time item is programmed as 0, it means to shut down the pump when use main mode; when use assistant and parallel mode, it will not be limited by time and the assistant pump will operate until the end step of shut down assistant pump or end step of parallel function, so if want to shut down the assistant pump, only need to program 0 in time item when use main mode

```
W-L:A-LOW-W-L
CTRL:0
TIME:00M
```

```
W-L:0000
CTRL:0
TIME:00M
```

Dyestuff pump: this function is same with assistant pump, the difference is this function is used to control dyestuff pump.

Water intake: It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for water intake. **Water level item** is used to program the target water level in main pump. **Control item** is used to program the valve of water intake. Program 0 to control water intake 1, program 1 to control water intake 2. **Time item** is used to program protective time of water intake, it will end the water intake function when main pump water level reaches to the set water level; when the temperature in main vat is over the temperature of pressure relief, it will give the alarm of “high temperature water intake protection”. If overtime water intake, it will give the alarm of “overtime water intake” and go on in taking water.

Mixing Water intake: It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for water intake. Open water intake 1 and 2 during water intake. **Water level item** is used to program the target water level in main pump. **Control item** has no use. **Time item** is used to program protective time of water intake, it will end the water intake function when main pump water level reaches to the set water level; when the temperature in main vat is over the temperature of pressure relief, it will give the alarm of “high temperature water intake protection”. If overtime water intake, it will give the alarm of “overtime water intake” and go on in taking water.

Full Water intake: It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for full water intake. **Water level item** is used to program the target water level in dyestuff pump. **Control item** has no use. **Time item** is used to program protective time of water intake. During water intake, turn off the main pump and dyestuff pump, open water intake 1, pressure relief valve and balance valve, if the water level reaches the minimum water level in dyestuff vat, it will turn off the balance valve; when the water level reaches the set water level in dyestuff vat, it will end the water intake function and turn off the pressure relief valve; if the water

intake time is up but the set water level didn't reach the set level, it will alarm; if the temperature is higher than 90°C, it will refuse water intake and give alarm.

Assistant vat water intake: It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for assistant vat water intake. Open assistant water intake valve during water intake. **Water level item** is used to program the target water level in assistant vat. When the water level reaches the set water level in assistant vat, it will end the water intake function. **Time item** is used to program protective time of water intake, If overtime water intake, it will give the alarm of "overtime water intake" and go on in taking water.

Dyestuff vat water intake: It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for dyestuff vat water intake. Open dyestuff water intake valve during water intake. **Water level item** is used to program the target water level in dyestuff vat. When the water level reaches the set water level in dyestuff vat, it will end the water intake function. **Time item** is used to program protective time of water intake, If overtime water intake, it will give the alarm of "overtime water intake" and go on in taking water.

Water drain, It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for water drain. **Water level item** is used to program the target water level in main vat. When the water level of main vat reaches the set water level, it will open main vat drain delay to drain the rest water, it will end the drain program when the delay time is up. When the temperature in main vat is over the temperature of pressure relief, it will stop water drain and give the alarm of "high temperature water intake protection". **Control item** is used to program the valve of water drain. Program 0 to control water drain 1, program 1 to control water drain 2. **Time item** is used to program protective time of water drain,; If overtime water drain, it will give the alarm of "overtime water drain" and go on draining water.

Full Water drain, It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for full water drain. Water level item and speed rate item have no use., **Time item** is used to program time of water drain。 This function will open dyestuff vat drain and pressure relief valve, delay 6 seconds, then open drain, delay 1 minute, open overflow valve, then start to count drain time, when time is up or the temperature is over 90°C, it will refuse water drain and give the alarm.

High temperature water drain, It can work with modes of main, assistant and parallel. This function is used for high temperature water drain. This function is same as the main vat water drain, the only difference is this function is not affected by temperature, the output is corresponding to high temperature drain.

Assistant vat water drain: It can work with modes of main, assistant and parallel. The setting interface is same with assistant pump. This function is used for assistant vat water drain as water. **Water level item** is used to program the target water level in assistant pump. **Time item** is used to program protective time of water drain, if overtime water drain, it will give the alarm of "overtime water drain" and go on draining water. Main mode works in front, when water level reaches set water level, it starts

to count the dyestuff vat drain delay, when the delay time is reached, it will end water drain and enter into next step; Assistant mode works in back, when water level reaches set water level, it starts to count the dyestuff vat drain delay, when the delay time is reached, it will stop water drain; Parallel mode works in back, when water level reaches set water level, it starts to count the dyestuff vat drain delay, when the delay time is reached, it will stop water drain or stop water will the end of the following main mode. This function can control assistant vat drain valve.

Dyestuff vat water drain: This function is same as the assistant vat water drain, the only difference is this function is can control dyestuff vat drain valve.

```
DELAY:00 S
CTRL:0
TIME:00 M
```

Overflow: It can work with modes of main, assistant and parallel. Delay item is used to edit delay time for extra water, Control item has no use. Time item is to edit overflow time. When the program runs to this function, open water intake valve 1, overflow valve for water intake, when the water reached the maximum level, it stops water intake. When the water level is lower than the maximum level, it will delay the time, when the delay time is up, it will go on water intake to the maximum level then stop water intake. This operation will repeat till the overflow time is ended, it will turn off the overflow valve and water intake valve 1 then end the overflow function. When the temperature is higher than the temperature of pressure relief, it will end overflow and give the “high temperature overflow protection” and alarm.

Full Overflow: It can work with modes of main, assistant and parallel. Delay item and control item have no use. Time item is to edit overflow time. When the temperature is higher than 90°C, it will refuse water intake, overflow and give alarm. Otherwise, open water intake 1 valve, overflow valve, dyestuff vat drain, reverse rotation, when the water level of main vat reaches the minimum water level, it will turn on the main pump, when time is up, it will end the overflow function.

Washing 1: It can work with modes of main, assistant and parallel. the temperature item is used to edit washing temperature; cycle item is used to edit washing cycles; time item is used to edit the washing time of each cycle; when process runs to this step, open water intake 1 to maximum water level in main vat, then stop water intake 1, open main pump and heat 1 to set temperature. When washing time is up, it turns off main pump and stops heating then turns on water drain 1. When the water is drained down to the minimum level, one washing cycle is completed. If edit cycle item as other digit other than 0, it will repeat the above operation till the cycle times are finished. If no need to heat, edit “temperature item” as 0. When the temperature of main vat is higher than the temperature of pressure relief, it will stop washing and jump “high temperature washing protection” and alarm.

```
TEMP:000.0°C
CYC:00T
TIME:00M
```

Washing 2: this function is same as washing 1 except direct steam is needed for heating. This function is suitable of bulk-fiber vat.

Washing 3: It can work with modes of main, assistant and parallel. When the process runs to this step,

open water intake 1 to maximum water level in main vat, then stop water intake 1, open main pump, overflow valve and heat to set temperature. When the water level is lower than maximum water level, open water intake 1 to maximum water level then turn off water intake 1. When washing time is up, it turns off main pump and stops heating then turns on water drain 1. When the water is drained down to the minimum level, one washing cycle is completed. If edit **cycle item** as other digit other than 0, it will repeat the above operation till the cycle times are finished. If no need to heat, edit “temperature item” as 0. When the temperature of main vat is higher than the temperature of pressure relief, it will stop washing and jump “high temperature washing protection” and alarm.

Direct heating : It can work with modes of main, assistant and parallel. Programming is same with temperature control. This function can open heat 1 and direct heat at the same time, it will turn off direct heating after entering into heat preservation, only need heat 1 for heat preservation.

Pressurizing: It can work with modes of main, assistant and parallel. Temperature item and speed item have no use. **Time item** is used to program pressurizing time, edit 00 means endless delay time. It will lock the vat during pressurizing, it will automatically turn off pressurizing valve if there is the input signal of pressure switch 1, otherwise open pressurizing valve; If there is the input signal of pressure switch 2, it will automatically open pressure relief valve otherwise turn off pressure relief valve.
Notice: if program time as 00 under main mode, the process can't jump to next step automatically.

Pressure relief: It can work with modes of main, assistant and parallel.
When run to this step, stop the previous pressurizing function first then begin pressure relief according to time. Open pressure relief valve, it will turn off pressurizing function when time is 0. It will end pressure relief function when time is up.

Open overflow valve: It can work with modes of main, assistant and parallel.
Temperature item and speed item have no use. **Time item** is used to program time of overflow. It will end overflow function when time is up..

Assistant Vat Reflux: It can work with modes of main, assistant and parallel.
edit assistant water level in the **water level item**, **Control item** has no use; **Time item** is used to program reflux protective time. This function is used for assistant vat reflux water intake. Open reflux 1 during running, reflux water intake to set assistant vat water level, then turn off reflux 1 to end the function. If reflux time is up but the water level doesn't reach, it will jump the alarm and go on reflux water intake.

Dyestuff Vat Reflux: It can work with modes of main, assistant and parallel.
edit assistant water level in the **water level item**, **Control item** has no use; **Time item** is used to program reflux protective time. This function is used for dyestuff vat reflux water intake. Open reflux 2 during running, reflux water intake to set assistant vat water level, then turn off reflux 2 to end the function. If reflux time is up but the water level doesn't reach, it will jump the alarm and go on reflux water intake.

Mixing: It can work with modes of main, assistant and parallel. Temperature item and speed item have

no use. Time item is used to program mixing time. Open mixing 1 during running, it will turn off the mixing 1 and end the function when the mixing time is up.

Cycle feeding: It can work with modes of main, assistant and parallel. Delay item is used to program delay time; control item has no use. Time item is used to program feeding time. During running of this function, Open reflux 2 valve, dyestuff pump, feeding 1, mixing 1, When the water level reaches maximum water level of dyestuff, it will turn off reflux 2; if the water level is lower than maximum water level, it will start delay time, when time is up open reflux 2 again till the feeding time is up then turn off reflux 2, feeding 1, mixing 1, open feeding 2 and mixing 2 to feed till the minimum water level of dyestuff, then enter into dyestuff vat washing state. The process of automatic dyestuff vat washing is: dyestuff water intake 5 seconds, stop 5 seconds, repeat three times, start to count delay time, when time is up, it will turn off dyestuff pump, feeding 2 and mixing 2, the cycle feeding is ended.

Time feeding 1: It can work with modes of main, assistant and parallel. Opening item is used to program dyestuff valve opening time. Interval item is used to program interval time. During feeding, Open dyestuff pump, mixing 1, feeding 1, when the opening time is up, it will turn off feeding 1, open cycle valve to next time opening feeding open feeding 1 and turn off cycle valve, the dyestuff doesn't stop till feeding to the minimum water level of dyestuff then enter into dyestuff vat washing state. The dyestuff won't stop during automatically vat washing. The process of automatic dyestuff vat washing is: dyestuff water intake 5 seconds, stop 5 seconds, repeat three times, start to count delay time, when time is up, it will turn off dyestuff pump, feeding 1. The mixing 1 valve will keeping on during the whole process. It will automatically turn off after reaching the minimum water level.

Time feeding 1: This function is same with time feeding 1, the difference is feeding by feeding 2, mixing by mixing 2.

Ration feed : It can work with modes of main, assistant and parallel.

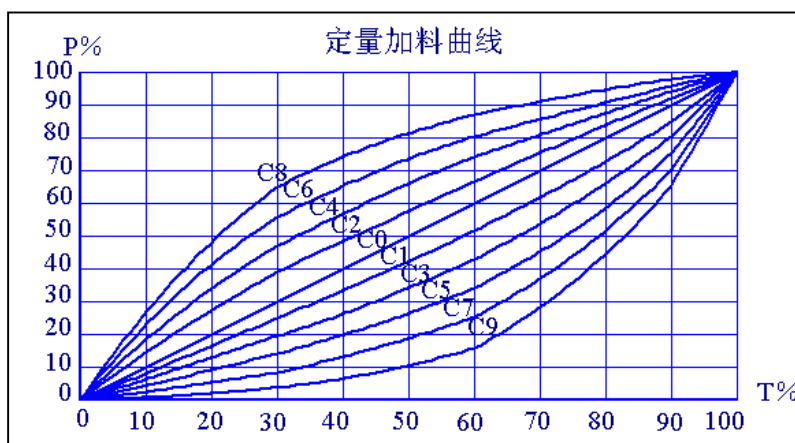
Remaining dyestuff item is to edit remaining dyestuff (the full vat 100%)。

Curve item is used to edit curve number (nine curves in total: 0-8)。

Time item is used to edit feed time.

During the process of ration feed, the computer feed the set quantity of dyestuff according to the curve track; Feeding state will display in the second page of running interface

REMAIN:000%
CURVE:0
TIME:00M



Analogy heating : it can work with main, assistant and parallel mode. This function is same with temperature control, temperature control mode should be changed by 4 ~ 20mA output to control analogy valve. The computer will open heat valve and turn off cooling valve during heating, adjust analogy valve to control temperature; Automatically open cooling valve and turn off heating valve during cooling and decrease temperature, adjust analogy valve to control the temperature.

Running time : it can only work with main mode. This function is used to count the time, when the program runs to this step, it starts to count the time; when time is up, it will enter into next step.

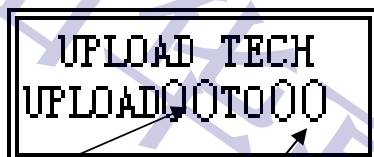
Temperature of pressure relief and vat lock: it can work with assistant and parallel mode. During the running of this function, the temperature of pressure relief and vat lock work according to the programmed temperature, otherwise it will work at 85°C.

4.4 Process Delete

Delete one by one: delete the process one by one according to the process number.

Delete all: delete all the process in one time.

4.5 Process upload



```
UPLOAD TECH
UPLOAD 00 TO 00
```

The process number in computer

The process number in IC card.

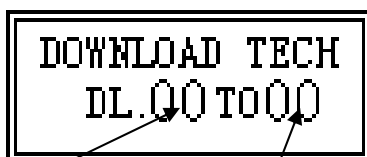
Upload process

Upload 00 to 00

Upload one by one: copy the the process one by one to IC card.

Upload all: copy all the process in the computer to IC card.

4.6 Process download



```
DOWNLOAD TECH
DL 00 TO 00
```

The process number in IC card.

The process number in computer

download process

download 00 to 00

Download one by one: copy the process from IC card to computer one by one .

Download all: copy all the process in the IC card to computer

V. Parameter setting

5.1 General parameters

5.1.1 Temperature parameters

Main vat modification temperature: used to modify the temperature deflection between actual temperature and test temperature in main vat. The range of modification: $-9.9\sim+9.9^{\circ}\text{C}$ 。

Assistant vat modification temperature: used to modify the temperature deflection between actual temperature and test temperature in main vat. The range of modification: $-9.9\sim+9.9^{\circ}\text{C}$ 。

Default pressure relief temperature:

Use to set the temperature of turning off pressure relief valves. When the temperature is higher than this set temperature, it will turn off the pressure relief valve; otherwise, it will open the pressure relief valve; but if there is the step of pressure relief function edited in process, the control temperature of pressure relief is depended on it, in other word, the process takes the priority.

Default vat locking temperature:

Use to set the temperature of opening vat lock. When the temperature is higher than this set temperature, it will open the vat lock valve; otherwise, it will turn off the vat lock valve; but if there is the step of the vat lock function edited in process, the control temperature of the vat lock is depended on it, in other word, the process takes the priority.

Maximum temperature of heat preservation:

the maximum temperature deflection between actual temperature and set temperature is over the maximum temperature limitation, it will open cooling valve to decrease the temperature.

Minimum temperature of hear preservation:

the minimum temperature deflection between actual temperature and set temperature is lower the minimum temperature limitation, it will open heating valve to increase the temperature.

5.1.2 Time parameters

Main vat direct draining valve opening time:

To set the opening time of the direct drain valve; the unit is second; this time can't be so long, otherwise it will waste steam.

Main vat direct draining interval

During heating, the computer will automatically open the direct draining interval, the unit is minute.

Assistant vat direct draining valve opening time:

To set the opening time of the direct drain valve 2; the unit is second;

Assistant vat direct draining interval

During heating, the computer will automatically open the interval of direct draining 2, the unit is minute.

Main vat direct draining delay:

During computer controlled water draining, when the water is drained to the minimum level, there is still some water remaining in the dye vat. The setting of delay parameter is to prolong the draining time and allow the water in the vat to be completely drained off. The unit is second.

Assistant vat water draining delay

The same with main vat direct draining delay. The difference is this parameter is used for assistant vat water drain.

Dyestuff vat water draining delay

The same with main vat direct draining delay. The difference is this parameter is used for dyestuff vat water drain.

Main vat water intake delay:

The setting of delay parameter is to prolong the water intake time after the water level reaches target water level because the wave of water will make the water level unstable, when the test water level reaches the target water level but the actual water level doesn't reach the target water level. The function of this parameter is to assure the actual water intake level reaches target water level.

Assistant vat water draining delay

The same with main vat water intake delay. The difference is this parameter is used for assistant vat water intake.

Dyestuff vat water draining delay

The same with main vat water intake delay. The difference is this parameter is used for dyestuff vat water intake.

Dyestuff vat feed delay:

When the dyestuff is feeded to the minimum level, there is still some dyestuff remaining. The setting of delay parameter is to prolong the feeding time and allow the dyestuff to be completely feeded. However, this time can't be too long, it should be set according to the debug because the dyestuff pump is easily broken after completing the dyestuff feeding but the time is not up.

5.1.3 Water level related parameters.

Water level of main vat:

Set the actual water level of the full vat, or use the full-scale value of the continuous liquid level gauge, unit is mm.

Main vat water level deviation:

If the 0 scale of the liquid level gauge is different from that of the vat, the difference can be compensated by setting this parameter. The compensated range is -999~+999mm

Minimum water level setting of main vat:

This item is used to set minimum water level in main vat.

Medium water level setting of main vat:

This item is used to set the medium, water level in main vat.

Maximum water level setting of main vat:

This item is used to set the maximum water level in main vat.

Advanced water intake control for the main vat:

In order to avoid over water intake, you can set this parameter to turn off the water intake valve in advance.

Water gauge flow parameter:

This item is unload.

5.1.4 Control parameters

Proportion strip: the PID adjusting parameters of analogy heating , when the input value is large and appear shaking, should reduce this value, otherwise increase it.

Integral time: the PID adjusting parameters of analogy heating , usually choose 100

Differential time: the PID adjusting parameters of analogy heating , usually choose 10~30.

5.2 System parameters

Main vat water level: the input mode of main vat water level signal, respectively are : maximum, medium , minimum water level input mode, continuous liquid water level mode.

Assistant vat water level: the input mode of assistant vat water level signal, respectively are : maximum, medium , minimum water level input mode, continuous liquid water level mode.

Dyestuff vat water level: the input mode of dyestuff vat water level signal, respectively are : maximum, medium , minimum water level input mode, continuous liquid water level mode.

Output mode: Output mode of control valve, respectively are: relay output, Sanling PLC mode,

LGOLC mode.



Centralizing control: used to forbidden and start centralizing control

Networking Address: This item is used to set the networking address of this computer, mainly use to monitor the system. In the same net, each computer only can has one address, it can't be repetitive, so need to be careful.

5.3 Input and output parameters

The input and output parameters are respectively: analog input, on-off input, analog output and on-off output. Changing Input and output parameters needs special password.

5.3.1 analog input



Press   key to choose the function



Mode of input Press   key to move the Curse.

Notice the function mode can't be repeated.

```
AN-INPUT1:M-W-L
AN-INPUT2:A-W-L
AN-INPUT3:S-W-L
AN-INPUT4:_-----
```

5.3.2 on-off input



Press   key to choose the function



Mode of input, Press   key to move the Curse.

Notice the function mode can't be repeated.

```
SW-INPUT0:M-LOW-W-L
SW-INPUT1:M-MIN-W-L
SW-INPUT2:M-HIG-W-L
SW-INPUT3:_----- ↓
```

5.3.3 analog output



Press   key to choose the function

Mode of output Press   key to move the Curse.

Notice the function mode can't be repeated.

```
AN-OUTPUT1:M-T-CTRL
AN-OUTPUT2:ADD-ST. 4
AN-OUTPUT3:MP-SPEED
```

5.3.4 on-off output

Press   key to choose the function

Mode of output, Press   key to move the Curse.

Notice the function mode can't be repeated.

```
RELAY00: CALL
RELAY01: FILL1
RELAY02: DRA1
RELAY03: _-- ↓
```

5.4 Other parameters

5.4.1 modify general password

5.4.2 modify advance password

5.4.3 modify special password

General password is used for process modification right, original password is 000000. Advance password is used for parameters modification right, original password is 111111. The advance password can include the lower grade password, in other word, advance password can modify the low grade password and also can replace the low grade password. The grades of password from high to low is Special password, advance password, general password.

5.5 Renew factory value

5.5.1 Renew the general parameters:

can renew the general parameters to the default set value of factory

5.5.2 Renew the system parameters:

can renew the system parameters to the default set value of factory

5.5.3 Renew the input and output parameters:

can renew the input and output parameters to the default set value of factory

5.6 Upload parameters

5.6.1 upload general parameters: Copy the general parameters in computer to IC card.

5.6.2 upload system parameters: Copy the system parameters in computer to IC card.

5.6.3 upload input and output parameters: Copy the input and output parameters in computer to IC card.

5.7 Download parameters

5.7.1 download general parameters: Copy the general parameters in IC card to computer

5.7.2 download general parameters: Copy the system parameters in IC card to computer

5.7.3 download general parameters : Copy the input and output parameters in IC card to computer

六、History Record

This computer can save 20 latest running temperature record curves (00~19). Curve 00 is the latest one, 01 is the one before 00, 02 is the one before 01

VII、Communication agreement between TC700D and PLC

7.1 SANLING FX SERIES（Be available to FX2N）

Improprate resource:

M240~M271 32 outputs in total, corresponding to the relay 00~31

M230~M237 8 inputs in total, corresponding to the switch inputs 0~7 of TC700D.

D100~D115 16 data register.

M238 is corresponding to alarm confirm input, M239 is corresponding to input of prompt jump running

M272 — M280 9 point in total of 4 — 20mA water level of maximum, medium, minimum, respectively corresponding to main vat minimum water level, main vat medium water level, main vat maximum water level, assistant vat minimum water level, assistant vat medium water level, assistant vat maximum water level, dyestuff vat minimum water level, dyestuff vat medium water level, dyestuff vat maximum water level.

7.2 LG—Master—K SERIES（except for K10S1）

Improprate resource:

M250—M26f 32 outputs in total, corresponding to the relay outputs 00~31

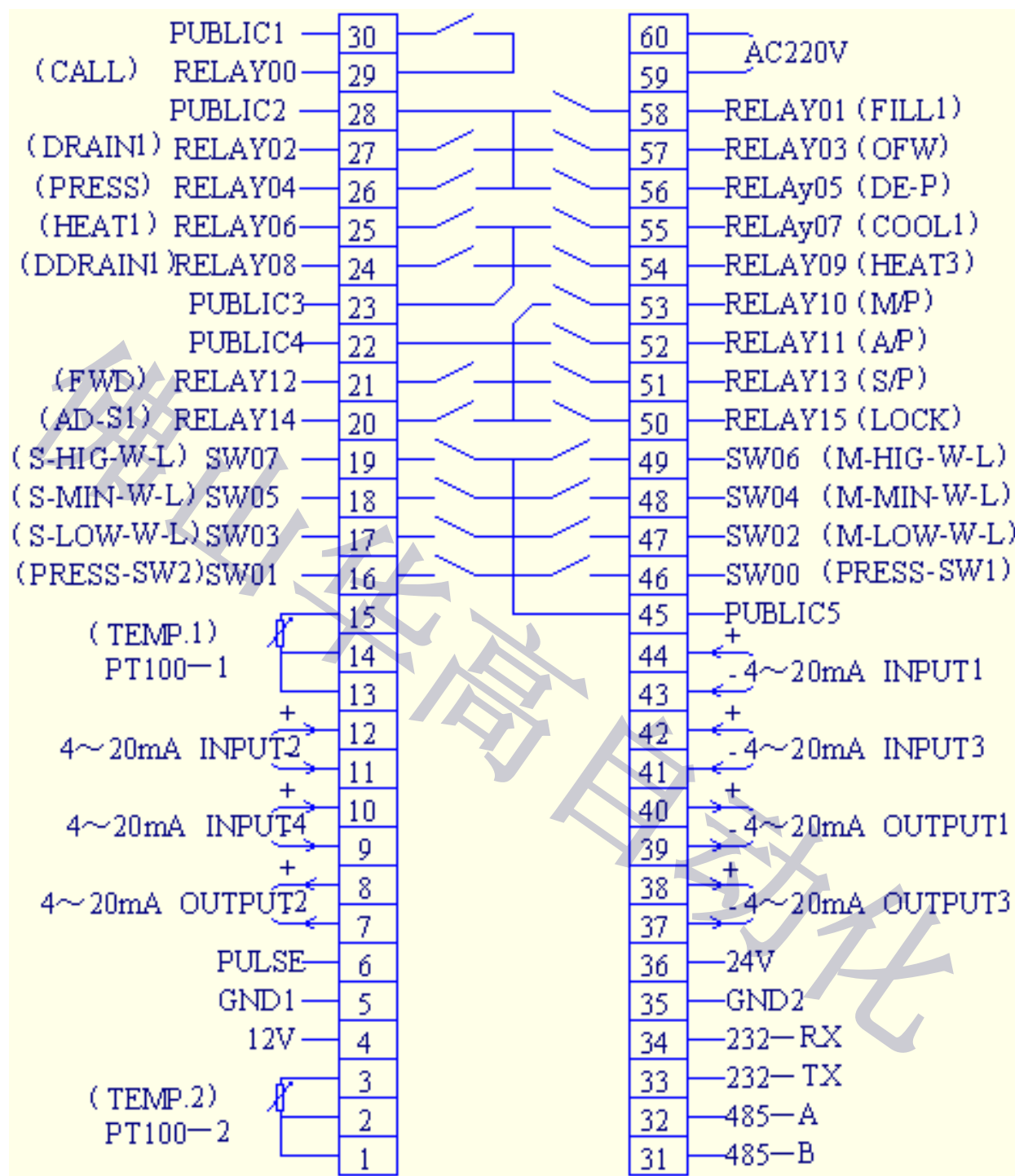
M240—M247 8 outputs in total, corresponding to the switch outputs 0~7

M248 is corresponding to alarm confirm output, M249 is corresponding to output of prompt jump running

M270 — M278 9 point in total of 4 — 20mA water level of maximum, medium, minimum, respectively corresponding to main vat minimum water level, main vat medium water level, main vat maximum water level, assistant vat minimum water level, assistant vat medium water level, assistant vat maximum water level, dyestuff vat minimum water level, dyestuff vat medium water level, dyestuff vat maximum water level.

The communication mode of TC700D is **RS485 with all kinds of PLC, baud rate: 9600、data bit: 8、odd and even checkout: no ; Stop bit: 1.**

TC700D The back line diagram



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