# Combo temperature controller+Timer

FTX00-612/FTX16-612 Series

FTX00-612

General Information

- Timer triggering mode: When PV reach to timer triggering SV and stay for 5 seconds, timer will be triggered
  Timer triggering SV=SV-tSP Timer range:0-9999 minutes
  Timer alarm AL2: AL2 can be triggered when timer starts working or triggered when timer finish working
  When timer ends, controller can be configured to keep working or controller turn off
  Display: when timer starts, the SV display window display the time, PRG indicator flashes
  Turn off/on the power can restart the controller when program ends or you can press increase key for 5 seconds to restart the PID cotnroller

## 1. Ordering Information

| | |
|---|---|
| Model( Size Width*Height) | FT100-612(48mm*48mm)<br>FT101-612(48mm*48mm)<br>FT400-612(48mm*96mm)<br>FT700-612(72mm*72mm)<br>FT900-612(96mm*96mm) |

Function Code

□-□-□-□ □-□-□
1 2 3 4 5 6 7

**1: Temperature Control Output**

R: Relay(3A 250Vac Resistive load)
V: SSR Drive
D: 4-20mA
6: 0-10Vdc

**2: Alarm for Temperature control**

1: 1 alarm

**3: Alarm for Timer control**

N: no alarm
1: 1 alarm

**4: Power Supply**

96: 85~265Vac 50/60HZ
24: 24Vdc/ac

**5: Communication**

N: No communication
K: With RS-485 communication

**6: PV Re-transmission**

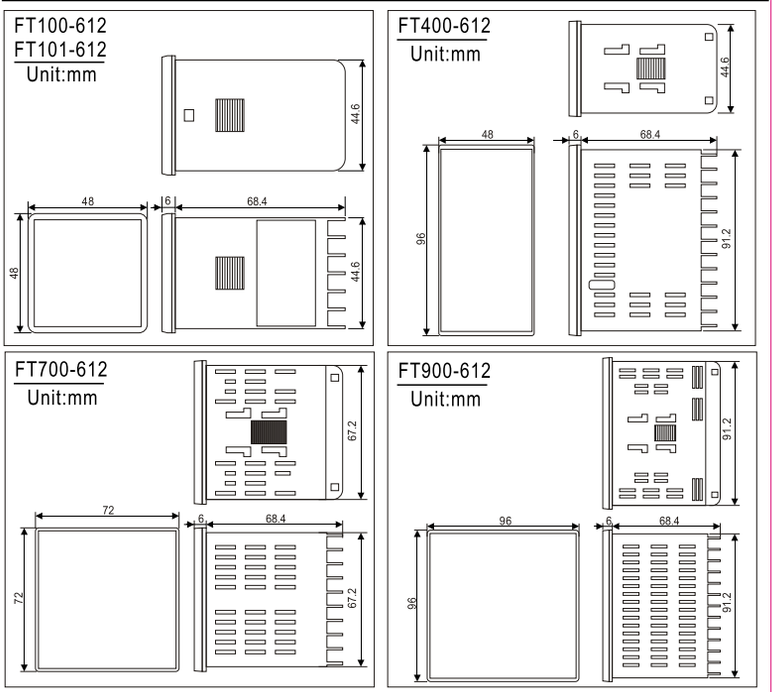
N: No Re-transmission
P42: PV Re-transmitted as 4-20mA
P010: PV Re-transmitted as 0-10Vdc

**7: Auxiliary Power supply**

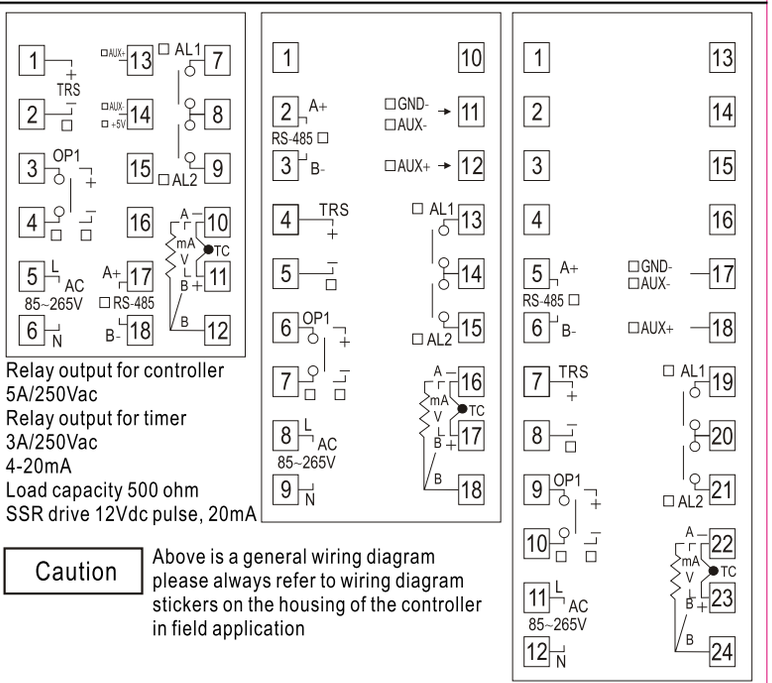
N: No Aux Power
A: 24Vdc isolated
B: 24Vdc grounded
C: 12Vdc isolated
D: 12Vdc grounded
E: 9Vdc isolated
F: 9Vdc grounded
G: 5Vdc isolated
H: 5Vdc grounded

Example: FT100-612-R-1-1-96-NNN
Ft100, size 48mm*48mm, Relay output, 1 alarm for controller, 1 alarm for timer source : 85~265Vac, no communication, no re-transmission, no AUX power

## 2: Mounting and Dimensions




## 3: Wiring Diagram

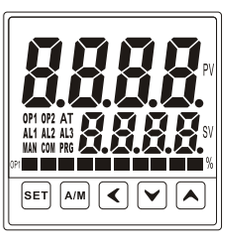



Relay output for controller
5A/250Vac
Relay output for timer
3A/250Vac
4-20mA
Load capacity 500 ohm
SSR drive 12Vdc pulse, 20mA

Caution

Above is a general wiring diagram please always refer to wiring diagram stickers on the housing of the controller in field application

## 4: Panel Discription

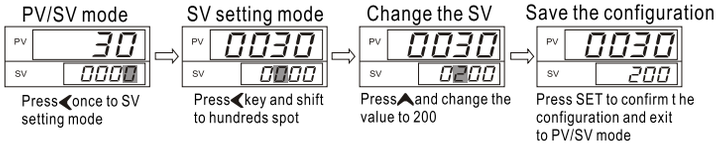



>PV display window, Display process value and parameter notation
>SV display window, Display setting value and timer display and parameter value
>Bar graphic display: Indicates the output percentage 0-100%
>SET Function
>A/M Auto control manual control switch key
Shift key(confirm key)
Number decrease key
Number increase key(Re start controller after timer finish counting)

OP1: Output 1 indicator
OP2: Output 2 indicator
AT: Auto-tuning indicator
AL1: Alarm 1 indicator
AL2: Alarm 2 indicator
AL3: Reserved, not applicable
MAN: Manual control indicator
COM: communication indicator
PRG: Flashing when timer is working, lit when timer finished
SPR: Reserved not applicable

# 5: SV setting

## 5.1 Configure the SV, for example, change the SV from 0 to 200°C




*Press up or down key once, the number increase or decrease by 1, keep hand hold and fast decrease or increase the numbers
*A/M key can be used to save the configuration, press A/M once can save and exit

## 5.2 Configure other parameters

The procedure is similar to SV setting once locate the parameter

# 6. Parameter Levels

## 6.1 Parameter level 1


6.1.1 Configuration on parameters under level 1

Press SET key once to parameter level 1

Below parameter will be displayed one by one by pressing SET key once

configuration made to parameter won't be saved until exit to PV/SV mode

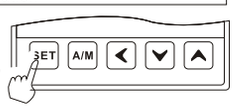
press SET key 3 seconds can save and exit

| Notation | Name | Range | Factory default | Description |
|---|---|---|---|---|
| AT | Auto-tuning | NO or YES | NO | At=Yes, AT on At=No, AT off |
| AL 1 | Alarm 1 value | -1999~9999 | 0 | Alarm 1 value |
| t 1 | Timer range | 0 to 9999 Min | 0 | To define the timer range Unit: Minutes |
| UAd | Address | | 1 | To define the unit address in case of communication |

## 6.2 Parameter level 2

Press SET for 3 seconds to parameter level 2

Below parameter will be displayed one by one by pressing SET key once




| Notation | Name | Range | Factory default | Note |
|---|---|---|---|---|
| P 1 | P1 | 0.0~200.0 | 20.0 | 1 |
| I 1 | I1 | 0~3600 S | 210 | 2 |
| d 1 | D1 | 0~3600 S | 30 | 3 |
| AtoL | AT off-set | 0-199°C | 0 | 4 |
| CYt 1 | Cycle time | 0~999 S | 20 | 5 |
| HYS 1 | HYS1 | 0.0 to 100.0 | 1.0 | 6 |
| rSt 1 | RST1 | -30 to 30 | -5.0 | 7 |
| OPL | OPL | 0.0 to 100.0% | 0.0 | 8 |
| OPH | OPH | 0.0 to 100.0% | 100.0 | 9 |
| bUFF | BUFF | 0.0 to 100% | 100.0 | 10 |
| LCt | LCK | 0000-0255 | 0 | 11 |

Note 1: Proportional band in PID, When P1=0, the control mode switch to ON/OFF mode Set P1=2 for analog input

Note 2: Integral time for PID, When I1=0, the integral action off, the effective of integral action gets stronger when I1 value gets smaller, more fluctuation expected when I1 gets smaller

Note 3: Derivative time for PID, when D1=0, derivative action off, the effective of the derivative action gets stronger when D1 value gets bigger, more fluctuation expected when D1 gets bigger

Note 4: Auto-tuning offset value, the auto-tune offset will shift the SV value down by the AtuL ,during the auto-tune process, that will prevent the system from damage due to over heating during the auto-tune

Note 5: Control cycle time, Set cycle time at 20 seconds for relay output, set cycle time at 2 seconds for SSR drive output.

Note 6: Hysteresis value for ON/OFF control mode, when P1=0, the control mode switch to ON/OFF control mode, PV>SV, OP1 output terminated, PV<SV-HYS1, OP1 active PV>SV+HYS1, OP1 active, PV<SV, OP1 terminated

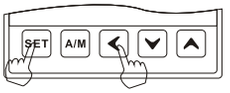
Note 7: This parameter used to suppress the overshoot during the first round of heating up process, this parameter will be calculated automatically by auto-tuning, and the best way to come up with this value is via auto-tuning

Note 8: This parameter used to define the output lower limit for OP1

Note 9: This parameter used to define the output higher limit for OP1

Note 10: Soft-start function for analog output, this parameter used to define the output variance percentage, 100% means no soft-start function, if buF=5%, means the output variance maximum is 5%.

Note 11:Access protection, LCK=0000, all parameter can be modified. LCK=0001, only SV can be modified, LCK=0010, parameter level 1 and SV can be modified, LCK=0011, all parameters locked, LCK=0101, all parameters can be modified, accessible to parameter level 3




## 6.3 Parameter level 3

6.3.1 Access to parameter level 3

>Following the instruction under 6.2 and goes to parameter level 2, put 0101 as the LCK value, press SET for 3 seconds to exit

>Press SET and left arrow key "◀" for 3 seconds to parameter level 3.

| Notation | Name | Range | Factory default | Note |
|---|---|---|---|---|
| INP 1 | Input signal selection<br>Notation: tY1 tY2 tE1 tE2 tJ1 tJ2 tn tU<br>Description: K K E E J J N Wu3_Re25<br>Range: 400.0 °C 1300 °C 300.0 °C 600 °C 400.0 °C 800 °C 1300 °C 2000 °C<br>Notation: tS tt tr tb AN4 AN3 F2 F1 Pt1 Pt2<br>Description: S T R B 2-10VDC 1-5VDC 4-20mA 0-10VDC 0-5VDC 0-20mA Reserved Reserved Pt100 Pt100<br>Range: 1600 °C 400.0 °C 1700 °C 1800 °C -199.9~200.0 °C -200~800 °C<br>Note 1: User can select between thermocouple and Pt100 inputs via software menu<br>Note 2: All analog input signals except 0-20mA, 0-50mA need to pre-determined before order | | | |
| dP | dP | 0 ,1,2,3 | 0 | 12 |
| LSPL | LSPL | -1999 to 9999 | 0 | 13 |
| USPL | USPL | -1999 to 9999 | 400 | 14 |
| UNIt | UNIT | 0 ,1,2 | 0 | 15 |
| PVOS | PVOS | -199to 199 | 0.0 | 16 |
| PVFt | PVFT | 0 to 60 | 55 | 17 |
| ANL 1 | ANL1 | -199~9999 | 0 | 18 |
| ANH 1 | ANH1 | -1999~9999 | 2000 | 19 |
| ALd 1 | ALd1 | 00 to 16 | 10 | 20 |
| AH 1 | AH1 | 0.0 to 100.0 | 0.4 | 21 |
| tSP | TSP | 0 to 2000 | 1 | 22 |
| tOd | TOD | 0 or 1 | 0 | 23 |
| End | END | 0 or 1 | 0 | 24 |
| bEr | bEr | 0,1,2 | 0 | 25 |
| IdNO | IdNO | 0-127 | 1 | 26 |
| bAUd | bAUd | 0,1,2,3 | 2 | 27 |

Note 12: Decimal points for analog input,0 for no decimal point, 1 for 1 decimal point, 2 for 2 decimal points, 3 for 3 decimal points, 4 for 4 decimal points

Note 13: Setting value lower limit, or zero point for re-transmission function.

Note 14: Setting value higher limit, or full range point for re-transmission function.

Note 15: Display unit, C for celsius display, F for fahrenheit display

Note 16: Sensor error correction, this parameter used to offset the error caused by input sensors.

Note 17: Digital filter,1-30 Normal filter strength, 31-60 enhanced filter strength, The greater the value is , the stronger the filter strength will be. stronger filtering strength increase the stability of the readout but cause more delay in the response to changes in the temperature

Note 18: Lower limit display for analog input, for example, when input is 4mA, the display will be ANL1

Note 19: Higher limit display for analog input, for example, when input is 20mA, the display will be ANH1.

Note 20: Define the alarm mode for alarm 1

Note 21: Hysteresis value for alarm 1

Note 22: This parameter defines the setting value where the timer should be triggered, for example, if you put TSP=1, and SV=100, then when process value gets to SV-Tsp and hold for 5 seconds, the timer will be triggered, in this case, when process value hits 99 and hold for 5 seconds, the timer will be triggered automatically.

Note 23: Timer alarm output mode selection, Tod=0, alarm 2 pull-in when timer finished. Tod=1, alarm 2 pull-in when timer starts the counting.

Note 24: This parameter used to define the PID working pattern after timer finish the process. when END=0, controller output terminated after timer finish the process when END=1,controller output continues after timer finish the process. turn on/off the power or press the "▲" for 5 seconds can restart the controller.

Note 25: This parameter used to define the soft-start function when the output is analog output, when bEr=0, soft-start function disabled, when bEr=1, soft-start function on all the time. bEr=2, when output increase, the soft-start function on, when output decrease, the soft-start function off.

Note 26: This parameter is to define the device address in the communication case.

Note 27: This parameter used to define the communication speed

Baud=0 2.4K, Baud=1 4.8K

Baud=2 9.6K, Baud=3 19.2K

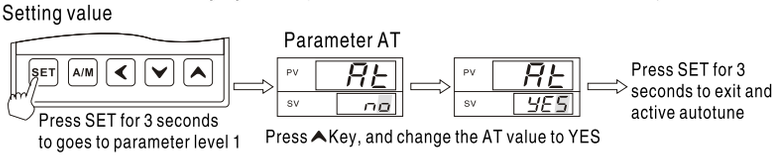
**Alarm mode description (ALd_=00~16)

| | |
|---|---|
| 10: No alarm output | 00: No alarm output |
| 11: Deviation high alarm | 01: Deviation high alarm with hold action |
| 12: Deviation low alarm | 02: Deviation low alarm with hold action |
| 13: Deviation high/low alarm | 03: Deviation high/low alarm with hold action |
| 14: Deviation band alarm | 04: Deviation band alarm with hold action |
| 15: Process high alarm | 05: Process high alarm with hold action |
| 16: Process low alarm | 06: Process low alarm with hold action |

NOTE: The alarm action will be suppressed right after power on even the condition is satisfied, and the alarm standby only works 1 time right after power on. the alarm will go off if the condition satisfied again after suppression at the first time

## 7. Auto-tuning

Please active auto-tuning right after power on when Process value still far away from Setting value




Goes to parameter AT and change the AT value to NO if you want to turn off the auto-tuning. AT indicator flashing after auto-tuning initiated. Auto-tuning is an ON/OFF control mode, significant temperature oscillation is expected and the time duration for the auto-tuning could be extra long than expected depends on different system, AT indicator stop flashing after auto-tune finished, P, I,D, rSt value was calculated automatically during the auto-tune Process. Controller goes back to PV/SV mode and with all the mentioned parameter saved with a new value. Controller starts to control the system with new parameter

## 8. Input Sensor description and Range

| Input type | | | Code | |
|---|---|---|---|---|
| K1 | 0.0 to 100.0 | ℃ | 2 | D1 |
| | 0.0 to 200.0 | ℃ | 2 | D2 |
| | 0.0 to 300.0 | ℃ | 2 | D3 |
| | 0.0 to 400.0 | ℃ | 2 | D4 |
| K2 | 0 to 200 | ℃ | K | A2 |
| | 0 to 400 | ℃ | K | A4 |
| | 0 to 600 | ℃ | K | A6 |
| | 0 to 1300 | ℃ | K | B3 |
| E1 | 0.0 to 100.0 | ℃ | 3 | D1 |
| | 0.0 to 200.0 | ℃ | 3 | D2 |
| | 0.0 to 300.0 | ℃ | 3 | D3 |
| E2 | 0 to 200 | ℃ | E | A2 |
| | 0 to 400 | ℃ | E | A4 |
| | 0 to 600 | ℃ | E | A6 |
| J1 | 0.0 to 100.0 | ℃ | 1 | D1 |
| | 0.0 to 200.0 | ℃ | 1 | D2 |
| | 0.0 to 300.0 | ℃ | 1 | D3 |
| | 0.0 to 400.0 | ℃ | 1 | D4 |
| J2 | 0 to 200 | ℃ | J | A2 |
| | 0 to 300 | ℃ | J | A3 |
| | 0 to 400 | ℃ | J | A4 |
| | 0 to 800 | ℃ | J | A8 |
| T | 0.0 to 100.0 | ℃ | T | D1 |
| | 0.0 to 200.0 | ℃ | T | D2 |
| | 0.0 to 300.0 | ℃ | T | D3 |
| | 0.0 to 400.0 | ℃ | T | D4 |
| S ** | 100 to 1000 | ℃ | S | B0 |
| | 100 to 1600 | ℃ | S | B6 |
| R ** | 100 to 1000 | ℃ | R | B0 |
| | 100 to 1700 | ℃ | R | B7 |
| B | 200 to 1000 | ℃ | B | B0 |
| | 200 to 1800 | ℃ | B | B8 |
| N | 0 to 1000 | ℃ | N | B0 |
| | 0 to 1300 | ℃ | N | B3 |
| Wu3_Re25 | 600 to 2000 | ℃ | W | B0 |

| Input type | | | Code | |
|---|---|---|---|---|
| Pt1 (Pt100) | 0.0 to 50.0 | ℃ | P | 06 |
| | 0.0 to 100.0 | ℃ | P | 07 |
| | 0.0 to 150.0 | ℃ | P | 11 |
| | 0.0 to 200.0 | ℃ | P | 08 |
| | -50.0 to 50.0 | ℃ | P | 12 |
| | -50.0 to 100.0 | ℃ | P | 13 |
| | -100.0 to +100.0 | ℃ | P | 04 |
| | -100.0 to +200.0 | ℃ | P | 05 |
| | -199.9 to +200.0 | ℃ | P | 02 |
| Pt2 (Pt100) | 0 to 100 | ℃ | D | A1 |
| | 0 to 200 | ℃ | D | A2 |
| | 0 to 400 | ℃ | D | A4 |
| | 0 to 600 | ℃ | D | A6 |
| | 0 to 800 | ℃ | D | A8 |
| | -50 to 100 | ℃ | D | C1 |
| | -100 to 200 | ℃ | D | C2 |
| | -100 to 300 | ℃ | D | C3 |
| | -200 to 400 | ℃ | D | C4 |
| | -200 to 500 | ℃ | D | C5 |
| | -200 to 600 | ℃ | D | C6 |
| | -200 to 700 | ℃ | D | C7 |
| | -200 to 800 | ℃ | D | C8 |

| | | | | |
|---|---|---|---|---|
| F1 | Reserved | -1999 to 9999 | V | 01 |
| F2 | Reserved | | V | 02 |
| AN3 | 0 to 5VDC | -199.9 to 999.9 | V | 03 |
| AN3 | 0 to 10VDC | | V | 04 |
| AN4 | 1 to 5VDC | -19.99 to 99.99 | V | 08 |
| AN4 | 2 to 10VDC | -1.999 to 9.999 | V | 09 |
| AN4 | 4 to 20mA | | A | 03 |
| AN3 | 0 to 20mA | | A | 02 |
| AN3 | 0 to 10mA | | A | 01 |

** The accuracy is not guaranteed for S and R type sensor at 0-100C

**End user can select any type of thermocouple or Pt100 via software menu

**Analog signal such as 4-20mA,0-10Vdc etc needs to be pre-determined before order except 0-20mV, 0-50mV

## 9. Working Flow Chart