SCANTECH

Dear Clients:Thanks for choosing IBEST TCN SERIES Temperature Controller! Before installing and using this product, please read this user manual carefully in order to operate the unit in the appropriate conditions to avoid any damage. Keep this user manual for future reference.

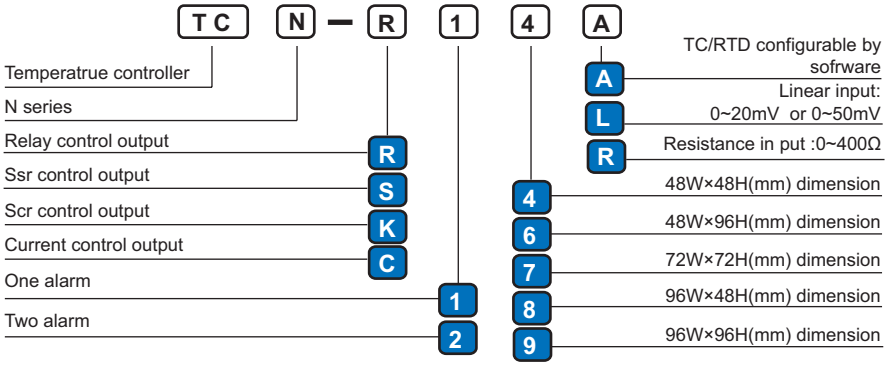
## CAUTIONS

- ELECTRICAL CONNECTION CAUTIONS:
  a.When the controller occurs error, the system might get into malfunction, the users need to configure external protection circuit to avoid the accident.
  b.To protect the controller from damage or invalidation, please select the appropriate fuse to protect the power supply cable and the in/out cable to prevent current impact.
- CONTROLLER POWER SUPPLY
  a.The controller supply is 85-264V AC, working beyond the stated supply might cause damage or invalidation to the controller
  b.Make sure all connections must be done before POWER ON.
- Do not operate the controller in flammable, explosive gas and vapor environment.
- Do not touch the controller internal parts:
  There are high-voltage and high-temperature parts inside the controller, it is dangerous for the user to touch the parts. If there are any quality questions, please contact with our sales people or technical people for assistance.
- To modify to controller by the user is prohibited to avoid damage or accident.
- Maintenance
  a.Users are prohibited to repair the controller by themselves to avoid any damage to the controller
  b.The controller needs to check and maintain regularly so as to operate safely long-term. To change the damaged components, please contact our sales people or technical people for assistance.
- CAUTIONS:
  a.When clean the instrument, make sure the power is at “OFF” status.
  b.To clean out the dust or dirt on the instrument screen, please use soft cloth or cotton papper.
  c.Do not touch the instrument screen by hard objects to avoid scratch of the screen.
  d.Do not use screw driver or hard pin to touch the soft buttons on the faceplate.

## 1.FEATURES

- PID temperature controller or ON/OFF control; built with SMT technology
- Auto tune function, fuzzy PID, Cooling/heating function.
- Dual line 4 LED digit display: upper LED: red; lower LED: green
- Soft buttons, easily operate
- Optional input signals: thermocouple: K,S, E, J,T,B; thermo resistance: Pt100, Cu50,
- Optional control output: Relay, SSR(Logic), SCR or Linear output.
- 2 alarm output
- Measuring accuracy：≤±0.5%F.S±1 digit (under normal conditions)
- Optional instrument size: 48W×48H;48W×96H;72W×72H;96W×48H;96W×96H.(mm)
- Apllication ranges: food&beverage; oven, furnance, plastic extruder, chemicals processing, heating process...etc. (For temperature measuring and control)

## 2.ORDERING CODE

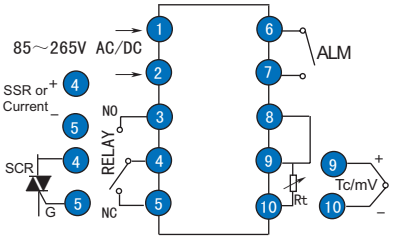



## 3.TECHNICAL SPECIFICATIONS

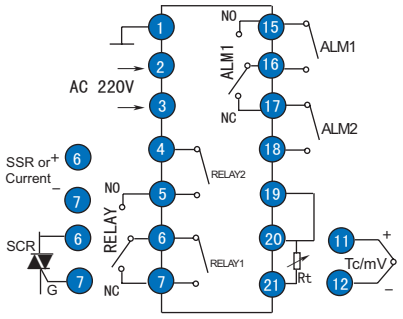
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| INPUT TYPE | A | TC/RTD configurable by sofrware | Thermocouple | K | 0~1300℃ | S | 0~1600℃ |
| | | | | E | 0~600℃ | T | 0~300.0℃ |
| | | | | J | 0~800℃ | B | 200~1800℃ |
| | | | Thermo resistance | Pt100 | | -200~800 ℃ | |
| | | | | Cu50 | | -50~150 ℃ | |
| | L | Linear input | 0~20mV or 0~50mV or 0~400Ω | | | | |
| | R | Resistance input | 0~400Ω | | | | |
| CONTROL OUTPUT | Relay | | 240V AC /3A | | | | |
| | Ssr | | Logic(SSR) output 12VDC/30mA | | | | |
| | Scr | | Scr out put | | | | |
| | Current | | 0~10mA or 4~20mA | | | | |
| CONTRON TYPE | ON/OFF control / PI control / fuzzy PID | | | | | | |
| MEASURING ACCURACY | 0.5%±1digit | | | | | | |
| OPERATION CONDITION | 0~50℃/45~85RH%/86~106KPa | | | | | | |
| INSULATION STRENGTH | AC 1500V 1 min / DC500V ⩾50MΩ | | | | | | |
| POWER SUPPLY | 85~260V AC 50~60HZ | | | | | | |
| DIMENSIONS | 4:48W×48H / 6:48W×96H/ 7:72W×72H/ 8:96W×48H/9:96W×96H | | | | | | |

## 4.PANEL ILLUSTRATION

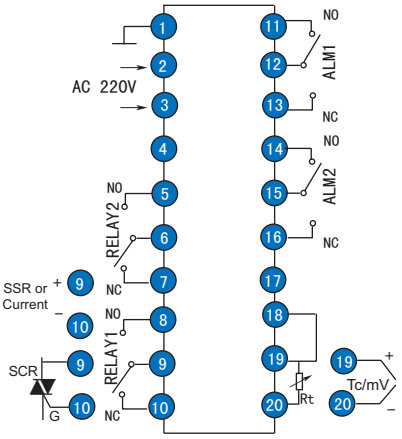
## 5.ELECTRICAL CONNECTIONS




TCN-□14□




TCN-□17□



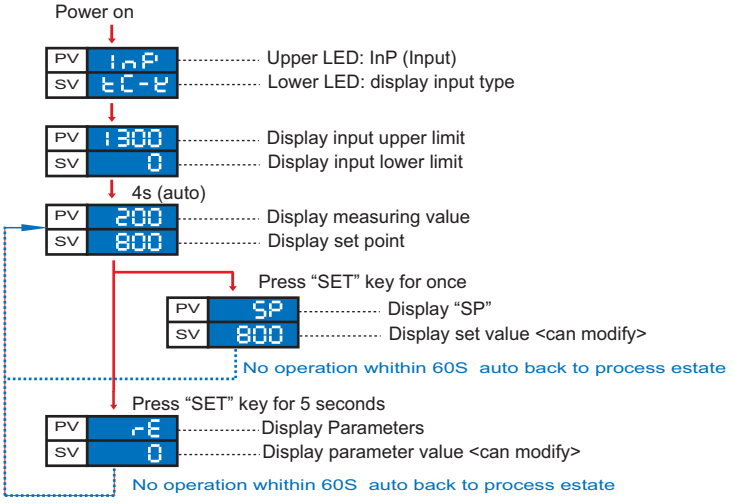

TCN-□16□, TCN-□19□

## 6.OPERATION ILLUSTRATION

a. Input Signals

| CODE | INP | Measuring range |
|---|---|---|
| tC-S | S | 0~1600℃ |
| tC-b | B | 200~1800℃ |
| tC-U | K | 0~1300℃ |
| tC-E | E | 0~600℃ |
| tC-t | T | 0~300.0℃ |
| tC-J | J | 0~800℃ |
| Pt-H | Pt100 | -200~800 ℃ |
| CuSO | Cu50 | -50~150 ℃ |
| nU20 | 0~20mV | |
| nUSO | 0~50mV | |
| 400r | 0~400Ω | |

b.Process operation




c.Parameter function instructions:

### Set Point

Press“ ” key, the upper LED display “SP”; lower LED display set point , press “ ” or “ ” to modify the value you need.Then confirm the value by press“ ” key again.

### Control parameters

Press“ ”key for 5 seconds,the upper LED display the control parameters, the lower LED display the parameters value.To modify the parameters value, please press “ ”and “ ” key. Press “ ” key to confirm the value modified and then press “ ” to shift to the next parameter . If you want to escape the control paraneters menu, please press “ ” key for 5 seconds; or no operation whithin 60s also let the controller go back to measuring estate. The parameters list, please refer to page “P3”

### Auto-tune function

- Press “ ” for 20 seconds , “AT” lamp flashing, the controller start “auto-tune”; when “auto-tune” finish, “AT” lamp goes out. The controller will get new P, I, D value that makes the temperature rise quickly;
- Press “ ” key for 20s, “AT” lamp flashing, the controller start “auto-tune”; when “auto-tune” finish, “AT” lamp goes out. The controller will get new P, I, D value that can restrain exceeding temperature range.
- The new P, I, D parameter value can be found in the controller (menu).
- In case user want to escape in the middle course of “Auto-tune”, press “ ” or “ ” key for 20s , “AT” lamp will goes out, “Auto-tune” is stopped. The controller works on its original P, I, D value.

**Notice** If the upper LED display "0000", it means the input signal exceeds the measuring range or the sensor open circuit.

d.Menu of control parameters

| PARAMETER | NAME | SPECIFICATIONS | RANGE | FACTORY SETTING |
|---|---|---|---|---|
| rE rE | Proportion control modification | When I=0, Proportion control modification functions; (used for static deviate of adjustable Proportion control) | -99~100℃ | 0 |
| rt rt | Process value deviate | Measuring value compensation, used for correct deviate caused by sensor or sensor compensation cable. | -99~100℃ | 0 |
| dF dF | Dead zone | Used for control dead zone, function when P/d=0; used for dead zone of adjustable ON/OFF control) | 0.4~100℃ | 0.4 |
| AL1 AL1 | Alarm 1 output | Set Alarm 1 output value, alarm dead zone is 0.4(fixed) | Measure range | Max. value |
| AL2 AL2 | Alarm 2 output | Set Alarm 2 output value, alarm dead zone is 0.4(fixed) | Measure range | Max. value |
| P P | Proportion band (heating) | When "P" is bigger, the proportion is less function, the system gain is lower. (Only for heating function, P=0, ON/OFF control) | 0~300℃ | 30 |
| I I | Integral time | The bigger "I" is, the weaker integral functions; I=0,means PD control | 0…3600s | 240 |
| d d | Derivative time | The bigger "D" is, the stronger Derivative functions and can restrain exceeding temperature range. D=0 ,means PI control | 0…3600s | 60 |
| T T | Control cycle (heating) | Relay output<20s; SSR/SCR output<2s; Linear output=1s (only for heating function) | 1~100s | 30 |
| Pc Pc | Proportion band (Cooling) | When "P" is bigger, the proportion is less function, the system gain is lower. (Only for cooling function) | Percentage of Heating: 1~1000% | 100 |
| db db | (Between heating and cooling) | Non- superposition zone between Cooling and heating Proportion band) | -10~10 C | 0 |
| t t | Control cycle (Cooling) | Relay output<20s; SSR/SCR output<2s; Linear output=1s (only for cooling function) | 1~100s | 30 |
| FILt FILt | Filter modulus (measuring value) | When Filter modulus is smaller, display reaction is sensitive, but liable to fluctuate; whereas display is more stable. | 0~255 | 200 |
| Lck Lck | Lock key | 0: all parameters can be modified 1: only set point can be modified 2: all parameters can read only, can not be modified | 0…2 | 0 |

## 7.DIMENSION AND INSTALLATION HOLE DIMENSION( unit: mm)

| MODE | DIMENSION | | INSTALLATION HOLE DIMENSION:a × b |
|---|---|---|---|
| | W × H | C × D × L | |
| TCN-□14□ | 48 × 48 | 44 × 44 × 100 | 45 × 45 |
| TCN-□16□ | 48 × 96 | 44 × 92× 100 | 45 × 93 |
| TCN-□17□ | 72 × 72 | 68 × 68 × 100 | 69 × 69 |
| TCN-□19□ | 96 × 96 | 92 × 92 × 100 | 93 × 93 |

## 8. CALIBRATION PARAMETERS

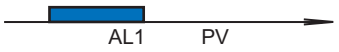
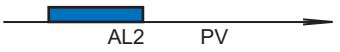
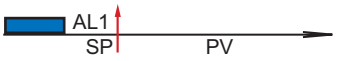
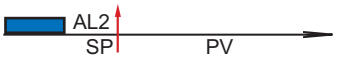
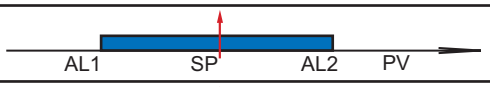
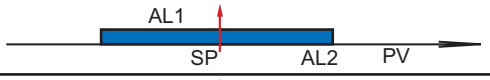
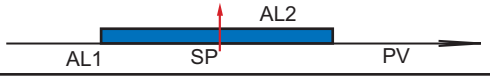
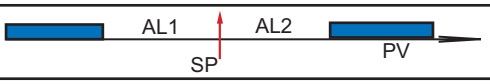
a, Press both " ▲ " and " ▼ " key at the same time for 5s to enter into calibration parameters.
b, First parameter is "LC", only set = 256 can go to next parameters. Please refer to following table. Press "↺" key to move from one parameter to next.

| PARAMETER | NAME | SPECIFICATIONS | RANGE | FACTORY SETTING |
|---|---|---|---|---|
| LC LC | LOCK key | When LC=256, can enter into parameters; LC=other no., can't enter into parameters | | 0 |
| InPt InPt | Input signals Select by press " ▲ " or " ▼ " key | 0: "S" (TC)<br>1: "B" (TC)<br>2: "K" (TC)<br>3: "E" (TC)<br>4: "T" (TC)<br>5: "J " (TC)<br>6: "We-Re3-25"<br>7: "HPt100"<br>8: "LPt100"<br>9: "Cu50"<br>10: "20mV" (linear)<br>11: "50mV" (linear)<br>12: "400 ohm" | 0, 0~1600℃<br>1,200~1800℃<br>2.0~1300℃<br>3.0~600℃<br>4.0~300℃<br>5.0~800℃<br>6,600~2000℃<br>7,-200~800℃<br>8,-200~200℃<br>9,-50~150℃<br>10,-1999~9999℃<br>11,-1999~9999℃<br>12,-1999~9999℃ | 2 |

| | | | | |
|---|---|---|---|---|
| OR | PID control function<br>Select by press " ∧ " or " ∨ " key | 0: No control<br>1: PID control (reverse function)<br>2: PID control (direct function)<br>3: Dual loop PID<br>4: PID control (direct function ) continuous output | | 2 |
| SA1 | Alarm 1 output modes<br>Select by press " ∧ " or " ∨ " key | 0: No alarm output<br>1: High absolute value alarm<br>2: Low absolute value alarm<br>3: High deviation value alarm<br>4: Low deviation value alarm<br>5: Hi / Lo deviation value alarm ( Hi and Lo deviation value are AL1)<br>6: Hi / Lo symmetrical deviation alarm with respect to the control setpoint (Hi and Lo deviation value are AL1)<br>7: Hi / Lo symmetrical absolute value alarm with respect to the control setpoint (Hi-AL2, Lo-AL1)<br>8: Hi / Lo symmetrical deviation alarm with respect to the control setpoint (Hi deviation-AL2, Lo-AL1)<br>9: Hi symmetrical absolute value and Lo symmetrical deviation alarm with respect to the control setpoint (Hi-AL2, Lo deviation-AL1)<br>10: Hi symmetrical deviation and Lo symmetrical absolute value alarm with respect to the control setpoint (Hi deviation-AL2, Lo-AL1)<br>11: Hi / Lo symmetrical absolute value alarm with respect to the control setpoint (Hi-AL2, Lo-AL1)<br>12: Hi / Lo deviation value alarm (hi deviation - AL2, Lo deviation - AL1) | | 2 |
| SA2 | Alarm 2 output modes<br>Select by press " ∧ " or " ∨ " key | 0: No alarm output<br>1: High absolute value alarm<br>2: Low absolute value alarm<br>3: High deviation value alarm<br>4: Low deviation value alarm<br>5: Hi / Lo deviation value alarm ( Hi and Lo deviation value are AL2)<br>6: Hi / Lo symmetrical deviation alarm with respect to the control setpoint (Hi and Lo deviation value are AL2) | | 0 |
| RAGL | Adjust measuring range Lo limit, select by press " ∨ " or " ∧ " key | | With respect to probe | 0 |
| RAGH | Adjust measuring range Hi limit, select by press " ∨ " or " ∧ " key | | With respect to probe | 400 |
| DP | Decimal point ,select by press " ∨ " or " ∧ " key | 0: 0000<br>1: 000.0<br>2: 00.00<br>3: 0.000 | | 0 |

C, Till to the end of parameter "DP", press " ↩ " key, controller return to measuring estate.

e.Alarm output mode illustrations

| Code | Alarm output mode | ALM1 and AL2 is independent alarm output | |
|---|---|---|---|
| | | ALM 1 output | ALM 2 output |
| 1 | High absolute value alarm | | |
| 2 | Low absolute value alarm |  |  |
| 3 | High deviate alarm | | |
| 4 | Low deviate alarm |  |  |
| 5 | High/low deviate alarm | | |
| 6 | (Hi and Lo)Symmetrical deviation alarm with respect to the control setpoint | | |
| | ALM1 and AL2 is used in combination, ALM1 output active, ALM2 output inactive | | |
| 7 | (Hi and Lo)Symmetrical absolute value alarm with respect to the control setpoint (ALM2 output inactive) | | |
| 8 | (Hi and Lo)Symmetrical deviation alarm with respect to the control setpoint (ALM2 output inactive) |  | |
| 9 | Hi Symmetrical absolute value alarm and Lo Symmetrical deviation alarm with respect to the control setpoint (ALM2 output inactive) |  | |
| A | Hi Symmetrical deviation alarm and Lo Symmetrical absolute value alarm with respect to the control setpoint (ALM2 output inactive) |  | |
| B | (Hi and Lo) Symmetrical absolute value alarm with respect to the control setpoint (ALM2 output inactive) | | |
| C | (Hi and Lo) Symmetrical deviation alarm with respect to the control setpoint (ALM2 output inactive) |  | |