

selec

TC538CX
 Operating Instructions


48 x 48

| PARAMETERS | SPECIFICATIONS |
|------------------------------|--|
| Display | 4 digits (White) + 4 digits (Green) Display Height:- White Display:- 15.3 mm Green Display:- 8 mm 7 segment digital display |
| LED Indications | R : Control output ON T : Auto Tune |
| Keys | 3 keys for digital setting |
| INPUT SPECIFICATIONS | |
| Input Signal | Thermocouple (J,K,T,R,S) / RTD (PT100) |
| Sampling time | 250 msec |
| Input Filter (FTC) | 0.2 to 10.0 sec |
| Resolution | 0.1 / 1 for TC / RTD input (Fixed 1 for R & S type TC input) |
| Temperature Unit | °C / °F selectable |
| Indication Accuracy | For TC inputs : 0.25% of F, S ±1°C For R & S inputs : 0.5% of F, S ±2°C (30 min of warm up time for TC input) For RTD inputs : 0.1% of F, S ±1°C |
| FUNCTIONAL SPECIFICATIONS | |
| Control Method | 1) PID control with Auto or Self tuning 2) ON-OFF control |
| Proportional Band(P) | 1.0 to 400.0°C, 1.0 to 752.0°F |
| Integral Time(I) | 0 to 9999 sec |
| Derivative Time(D) | 0 to 9999 sec |
| Cycle Time | 0.1 to 99.9 sec |
| Hysteresis Width | 0.1 to 99.9°C |
| Dwell Timer | 0 to 9999 min |
| Manual Reset Value | -19.9 to 19.9°C / °F |
| HEAT COOL PID SPECIFICATIONS | |
| Control Method | PID |
| Proportional Band-Cool | 1.0 to 400.0°C 1.0 to 752.0°F |
| Cycle Time-Cool | 0.1 to 99.9 sec |
| Dead Band | SPLL to SPHL(Programmable) |

| OUTPUT SPECIFICATIONS | |
|---|---|
| Control Output (Relay or SSR user selectable) | Relay Contact : 10A resistive@250V AC / 30V DC SSR Drive Output (Voltage Pulse): 12V DC, 30 mA |
| POWER SUPPLY SPECIFICATIONS | |
| Supply Voltage | 90 to 270V AC / DC (AC : 50 / 60 Hz) |
| Power Consumption | 6 VA max@270V AC |
| Temperature | Operating : 0 to 50°C Storage : -20 to 75°C |
| Humidity | 95% RH (non-condensing) |
| Weight | 113 gms |

SAFETY PRECAUTIONS

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

Read complete instructions prior to installation and operation of the unit.

WARNING : Risk of electric shock.

WIRING GUIDELINES

WARNING :

- To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement. Do not touch the terminals while power is being supplied.
- To eliminate electromagnetic interference use short wire with adequate ratings; twists of the same in equal size shall be made. For the input and output signal lines, be sure to use shielded wires and keep them away from each other.
- Cable used for connection to power source, must have a cross section of 1mm² or greater. These wires shall have insulation capacity made of at least 1.5kV.
- When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring. For the RTD type, use a wiring material with a small lead resistance (5Ω max per line) and no resistance differentials among three wires.
- A better anti-noise effect can be expected by using standard power supply cable for the instrument.

MAINTENANCE

- The equipment should be cleaned regularly to avoid blockage of ventilating parts.
- Clean the equipment with a clean soft cloth. Do not use Isopropyl alcohol or any other cleaning agent.

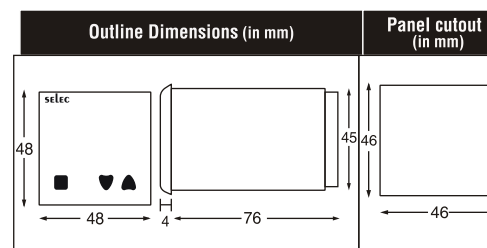
INSTALLATION GUIDELINES

- This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and Internal wiring.
- Do not allow pieces of metal, wire clippings, or fine metallic fillings from installation to enter the product or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
- Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
- Use and store the temperature controller within the specified ambient temperature and humidity ranges as mentioned in this manual.

CAUTION

- When powering up for the first time, disconnect the output connections.
- Fuse Protection : The unit is normally supplied without a power switch and fuses. Make wiring so that the fuse is placed between the mains power supply switch and the controller. (2 pole breaker fuse - rating : 275V AC,1A for electrical circuitry is highly recommended)
- Since this is a built-in-type equipment (finds place in main control panel), its output terminals get connected to host equipment. Such equipment shall also comply with basic EMI/EMC and other safety requirements like BSEN61326-1 and BSEN61010 respectively.
- Thermal dissipation of equipment is met through ventilation holes provided on chassis of equipment. Such ventilation holes shall not be obstructed else it can lead to a safety hazard.
- The output terminals shall be strictly loaded to the manufacturer specified values / range.

MECHANICAL INSTALLATION



- Prepare the panel cutout with proper dimensions as shown above.
- Fit the unit into the panel with the help of clamp given.
- The equipment in its installed state must not come in close proximity to any heating sources, caustic vapors, oils, steam or other unwanted process by-products.
- Use the specified size of crimp terminals (M3.5 screws) to wire the terminal block. Tighten the screws on the terminal block using the tightening torque within the range of 1.2 N.m.
- Do not connect anything to unused terminals.

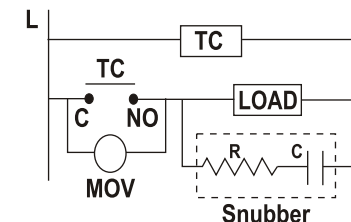
EMC GUIDELINES

- Use proper input power cables with shortest connections and twisted type.
- Layout of connecting cables shall be away from any internal EMI source.

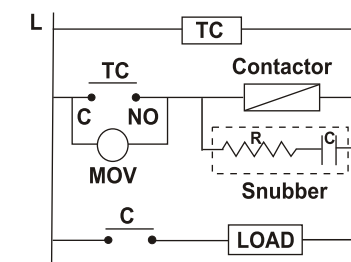
LOAD CONNECTIONS

- The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life.
- Although the relay output is rated at 5/10 amps it is always necessary to use an interposing relay or contactor that will switch the load. This avoids damage to the controller in the event of a fault short developing on the power output circuit.
- Always use a separate fused supply for the "power load circuit" and do not take this from the live and neutral terminals supplying power to the controller.

For load current less than 0.5A



For bigger loads, use interposing relay / contactor



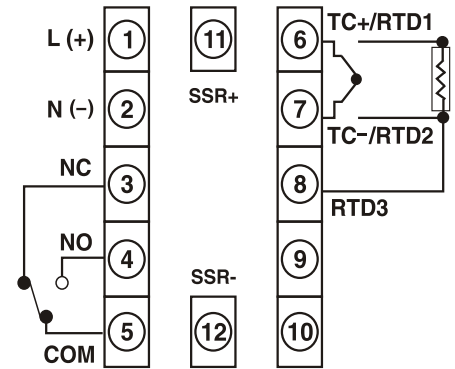
ELECTRICAL PRECAUTIONS DURING USE

Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display, latch up, data loss or permanent damage to the instrument.

To reduce noise:

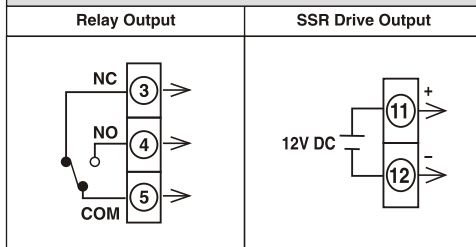
- Use of snubber circuits across loads as shown above, is recommended.
- Use separate shielded wires for inputs.

TERMINAL CONNECTIONS

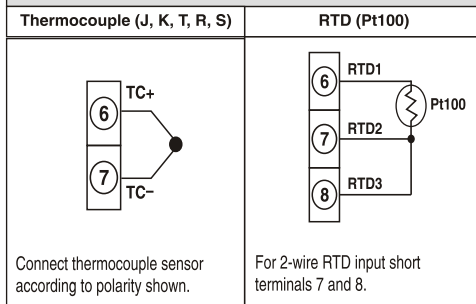


WARNING : Please check the power supply voltage and controllers output type ordered (with reference to the order code) before installation.

Control Output



Measured Value Input



Connect thermocouple sensor according to polarity shown.

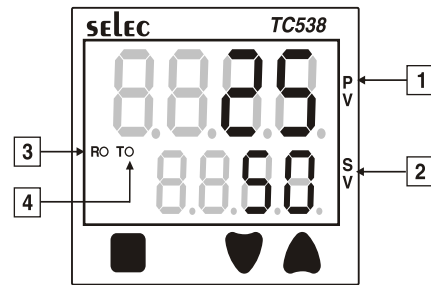
For 2-wire RTD input short terminals 7 and 8.

CAUTION :

Use only the correct thermocouple wire or compensating cable from the probe to instrument terminals avoiding joints in the cable if possible. Failure to use the correct wire type will lead to inaccurate readings.

Ensure that the input sensor connected at the terminals and the input type set in the temperature controller configuration are the same.

FRONT PANEL DESCRIPTION



| | | |
|---|---|---|
| 1 | Process-value (PV) / Parameter name display | 1) Displays a process value (PV). 2) Displays the parameter symbols at parameter setting mode. 3) Displays PV error conditions. (refer Table 2) |
| 2 | Set-value (SV) / Parameter setting display | 1) Displays a set value (SV). 2) Displays the parameter settings at parameter setting mode. |
| 3 | Control output indication | The LED is lit when the control output is ON |
| 4 | Tune | Auto tune : Blinking (With faster rate) Self tune : Blinking (With slower rate) |

FRONT KEYS DESCRIPTION

| Functions | Key Press |
|---|--|
| ONLINE | |
| To view Level 1 | Press key for 3sec. |
| To view Level 2 | Press key for 3sec. |
| To view Protection Level | Press + keys for 3sec. |
| To change setpoint value | Press + / to change setpoint value. |
| PROGRAMMING MODE | |
| To view parameters on the same level. | or key once to view the next or previous function in operational menu. |
| To increase or decrease the value of a particular parameter. | + to increase and + to decrease the function value. Note: Parameter value will not alter when respective level is locked. |
| NOTE : The unit will auto exit programming mode after 30sec. of inactivity. | |
| OR By pressing the or or + keys for 3sec. | |

INPUT RANGES (Table 1)

| FOR RTD | | |
|------------|--------|--------------|
| Input | Ranges | |
| Resolution | 1 | 0.1 |
| PT 100 | °C | -150 to 850 |
| | °F | -238 to 1562 |

FOR THERMOCOUPLE

| Input | Ranges | |
|------------|--------|--------------|
| Resolution | 1 | 0.1 |
| J | °C | -199 to 750 |
| | °F | -328 to 1382 |
| K | °C | -199 to 1350 |
| | °F | -328 to 2462 |
| T | °C | -199 to 400 |
| | °F | -328 to 750 |
| R & S | °C | 0 to 1750 |
| | °F | 32 to 3182 |

ERROR DISPLAY (Table 2)

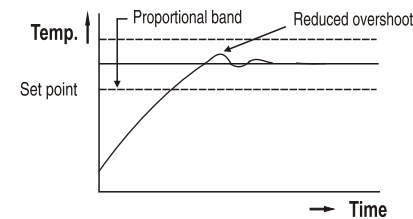
When an error has occurred, the upper display indicates error codes as given below.

| Error | Meaning | Control output Status |
|-------|--|-----------------------|
| 5.b 0 | Sensor break / over range condition | OFF |
| 5.n E | Sensor reverse / under range condition | OFF |

USER GUIDE

Self Tune : It is used where modification of PID parameters is required repeatedly due to frequent change in process condition eg. Setpoint.

- While Self-tune is in progress, 'T' LED will blink at a slower speed.
- After Self-tuning is completed, the 'T' LED stops blinking.



- Self-tuning is initiated under the following conditions :

- 1) When setpoint is altered.
 - 2) When tune mode is altered. (TUNE=ST)
- ST will start tuning only if PV < 50% of setpoint.
 - ST will work only when ACT=RE.
 - The P, I, D parameters in configuration menu will not be prompted for TUNE=ST. To view the PID parameters obtained after completion of self-tuning make TUNE=OFF in Level 2.

CALIBRATION CERTIFICATE

Model No : TC538CX

Claimed Accuracy :

For TC inputs : 0.25% of FS $\pm 1^\circ\text{C}$
For R & S inputs : 0.5% of F.S $\pm 2^\circ\text{C}$
(30 min of warm up time for TC input)
For RTD inputs : 0.1% of FS $\pm 1^\circ\text{C}$

Standard used for Calibration of product is traceable to NABL

The calibration of this unit has been verified at the following values :

| SENSOR SELECTION | VERIFICATION VALUE ($^\circ\text{C}$) |
|------------------|---|
| K | 25.0 |
| | 475.0 |
| | 975.0 |
| RTD | 0.0 |
| | 323.5 |
| | 800.0 |

The thermocouple / RTD curves are linearized in this microprocessor based product; and hence the values interpolated across the input range are also equally accurate ; at every point in the curve.

Unit is accepted as accuracy is within the specified limit of claimed accuracy and certificate is valid upto one year from the date of issue.

(Specifications are subject to change, since development is a continuous process.)

Selec Controls Pvt. Ltd., India

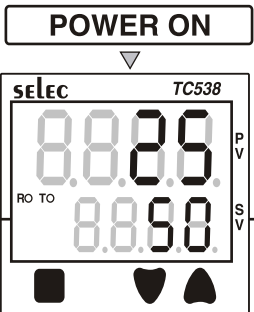
Factory Address :
EL-27/1, Electronic Zone, TTC Industrial Area, MIDC, Mahape,
Navi Mumbai - 400 710, INDIA.
Tel. No. : +91-22-41 418 452/468 | Fax No. : +91-22-28471733
Toll free : 1800 227 353 (BSNL/MTNL Subscribers only)
Website : www.selec.com | Email : sales@selec.com

CONFIGURATION INSTRUCTIONS

KEY FUNCTIONS

- ▲ → Press for 3sec. to enter Level 2
- ▼ → Press once to view next parameter in configuration menu
- ▼ → Press for 3sec. to enter Level 1
- ▲ → Press once to view previous parameter in configuration menu
- ▲ + ▼ → Press for 3sec. to enter protection Level
- + ▲ or ■ + ▼ → Allows the user to increase or decrease associated parameter value
- ▲ or ▼ or ▲ + ▼ → To exit configuration menu press any of these keys for 3sec.

OPERATIONAL MENU



Press ▼ key for 3sec.

Press ▲ + ▼ keys for 3sec.

Press ▲ key for 3sec.

Level 1

Level 2

Protection Level

| Display | Description | Default Value | Range | Display Condition |
|---------|---|---------------|--------------------------------------|-----------------------------|
| ᐱᐱᐱ | Input type (Refer Table 1) | ᐱ | J / K / T / R / S / RTD | — |
| ᐱᐱᐱ | Display resolution | ᐱ | 1 / 0.1 | Not prompted for R & S type |
| ᐱᐱᐱ | Temperature unit | ᐱᐱ | °C / °F | — |
| ᐱᐱᐱ | Set point low limit | -ᐱᐱ | Min range of sensor selected to SPHL | — |
| ᐱᐱᐱ | Set point high limit | ᐱᐱᐱ | SPLL to Max range of sensor selected | — |
| ᐱᐱᐱ | Filter time constant (Refer user guide) | ᐱᐱ | 0.2 to 10.0 sec | — |
| ᐱᐱᐱ | Control action | ᐱᐱ | RE / FD | — |
| ᐱᐱᐱ | Control logic | ᐱᐱᐱ | PID / ONF | — |
| ᐱᐱᐱ | Control Output selection | ᐱᐱᐱ | RELAY / SSR | — |
| ᐱᐱᐱ | Anti reset windup % | ᐱᐱ | 1.0 to 100.0 % | For CNTL = PID |
| ᐱᐱᐱ | Factory default (Reset all) | ᐱᐱ | NO / YES | — |

| Display | Description | Default Value | Range | Display Condition |
|---------|---------------------------------|---------------|-----------------|--------------------|
| ᐱᐱᐱ | Tune (Refer user guide) | ᐱᐱ | OFF / ST / AT | For CNTL=PID |
| ᐱ | Proportional band | ᐱᐱ | 1.0 to 400.0° | For CNTL=PID |
| ᐱ | Integral time | ᐱᐱᐱ | 0 to 9999 sec | For CNTL=PID |
| ᐱ | Derivative time | ᐱᐱ | 0 to 9999 sec | For CNTL=PID |
| ᐱᐱᐱ | Cycle time mode | ᐱᐱᐱᐱ | AUTO / USR.F | For CNTL=PID |
| ᐱᐱᐱ | Cycle time | ᐱᐱᐱ | 0.1 to 99.9 sec | For CNTL=PID |
| ᐱᐱᐱᐱ | Hysteresis | ᐱᐱ | 0.1 to 99.9° | For CNTL=ONF |
| ᐱᐱᐱᐱ | Manual reset (Refer user guide) | ᐱᐱ | -19.9 to 19.9° | For CNTL=PID & I=0 |
| ᐱᐱᐱᐱ | Display bias (Refer user guide) | ᐱᐱ | -19.9 to 19.9° | — |

| Display | Description | Default Value | Range | Display Condition |
|---------|---------------|---------------|--------------------|-------------------|
| ᐱᐱ | Lock setpoint | ᐱᐱᐱᐱ | UNLK / READ | — |
| ᐱᐱᐱ | Lock Level 1 | ᐱᐱᐱᐱ | UNLK / READ / LOCK | — |
| ᐱᐱᐱᐱ | Lock Level 2 | ᐱᐱᐱᐱ | UNLK / READ / LOCK | — |

Note

- Locking parameters (LVL1 or LVL2 or SP) will not permit change in the value of respective level parameters.
- Continuous operation of ■ + ▲ / ▼ keys for SP or other parameters makes update speed faster in 3 stages after 3sec.

Programming Setpoint (Online) : Default : 50
 Range : SPLL to SPHL
 To increase/decrease setpoint : Press ■ + ▲ / ▼ keys.

Note : At power ON lower display shows (momentary) input type selected in Level 1.