OP823-V01

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 :

1. 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.
2. 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.
3. Cable used for connection to power source, must have a cross section of 1mm^2 or greater. These wires shall have insulation capacity made of at least 1.5kV.
4. 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.
5. A better anti-noise effect can be expected by using standard power supply cable for the instrument.

MAINTENANCE

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

INSTALLATION GUIDELINES

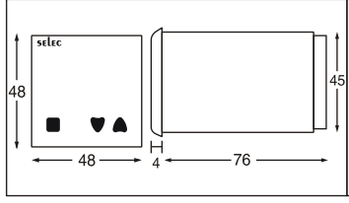
1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and Internal wiring.
2. Do not allow pieces of metal, wire clippings, or fine metallic fillings from installation to enter the product or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
3. 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.
4. Use and store the temperature controller within the specified ambient temperature and humidity ranges as mentioned in this manual.

CAUTION

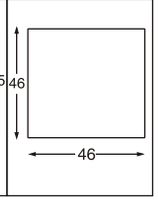
1. When powering up for the first time, disconnect the output connections.
2. Fuse Protection : The unit is normally supplied without a power switch and fuses. Make wiring so that the fuse is placed between the mains power supply switch and the controller. (2 pole breaker fuse - rating : 275V AC,1A for electrical circuitry is highly recommended)
3. 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 BSEN 61010 respectively.
4. 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.
5. The output terminals shall be strictly loaded to the manufacturer specified values / range.

MECHANICAL INSTALLATION

Outline Dimensions (in mm)



Panel cutout (in mm)



1. Prepare the panel cutout with proper dimensions as shown above.
2. Fit the unit into the panel with the help of clamp given.
3. 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.
4. 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.
5. Do not connect anything to unused terminals.

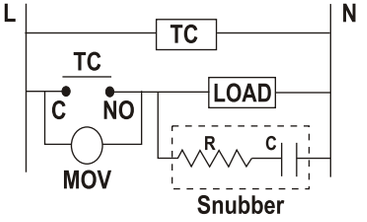
EMC GUIDELINES

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

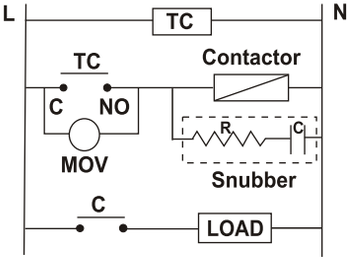
LOAD CONNECTIONS

1. 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.
2. 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.
3. 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



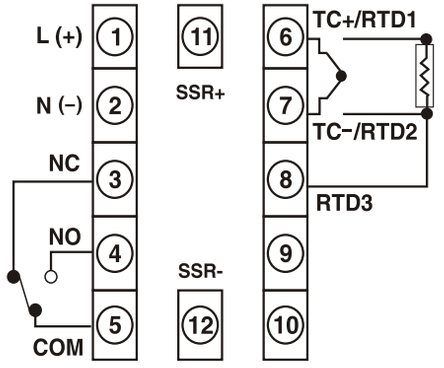
ELECTRICAL PRECAUTIONS DURING USE

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:

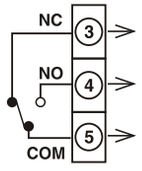
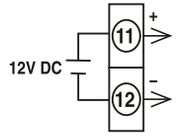
a) Use of snubber circuits across loads as shown above, is recommended.
b) Use separate shielded wires for inputs.

TERMINAL CONNECTIONS

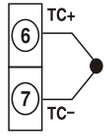
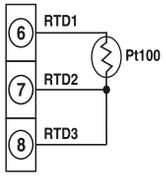


WARNING : Please check the power supply voltage and controllers output type ordered (with reference to the order code) before installation.

Control Output

Relay Output	SSR Drive Output
	

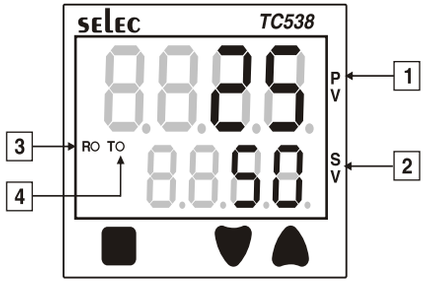
Measured Value Input

Thermocouple (J, K, T, R, S)	RTD (Pt100)
	
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	-150 to 850
	°F	-238 to 1562	-199 to 999

FOR THERMOCOUPLE

Input		Ranges	
Resolution		1	0.1
J	°C	-199 to 750	-199 to 750
	°F	-328 to 1382	-199 to 999
K	°C	-199 to 1350	-199 to 999
	°F	-328 to 2462	-199 to 999
T	°C	-199 to 400	-199 to 400
	°F	-328 to 750	-199 to 750
R & S	°C	0 to 1750	N/A
	°F	32 to 3182	N/A

ERROR DISPLAY (Table 2)

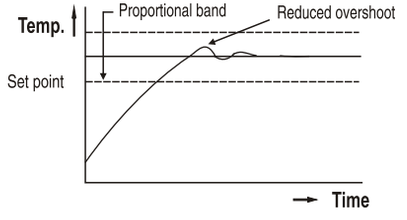
When an error has occured, the upper display indicates error codes as given below.

Error	Meaning	Control output Status
S.br	Sensor break / over range condition	OFF
S.rE	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 ±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 FS ±1°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 (°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.)

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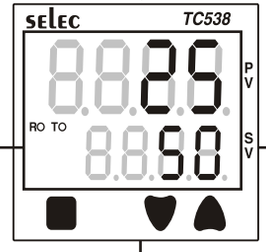
CONFIGURATION INSTRUCTIONS

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

POWER ON



Press ▼ key for 3sec.

Press ▲ key for 3sec.

Press ▲+▼ keys for 3sec.

Level 1

Display	Description	Default Value	Range	Display Condition
INPt	Input type (Refer Table 1)	J	J / K / T / R / S / RTD	—
RESL	Display resolution	1	1 / 0.1	Not prompted for R & S type
UNIt	Temperature unit	°C	°C / °F	—
SPLL	Set point low limit	-199	Min range of sensor selected to SPHL	—
SPHL	Set point high limit	750	SPLL to Max range of sensor selected	—
FtC	Filter time constant (Refer user guide)	1.0	0.2 to 10.0 sec	—
ACt	Control action	rE	RE / FD	—
CNtL	Control logic	PId	PID / ONF	—
OUt	Control Output selection	rLY	RELAY / SSR	—
ArY	Anti reset windup %	25	1.0 to 100.0 %	For CNTL = PID
rSt	Factory default (Reset all)	nO	NO / YES	—

Level 2

Display	Description	Default Value	Range	Display Condition
tUNE	Tune (Refer user guide)	St	OFF / ST / AT	For CNTL=PID
P	Proportional band	10	1.0 to 400.0°	For CNTL=PID
I	Integral time	120	0 to 9999 sec	For CNTL=PID
d	Derivative time	30	0 to 9999 sec	For CNTL=PID
CYC.A	Cycle time mode	AUtO	AUTO / USR.F	For CNTL=PID
CYC.t	Cycle time	15.0	0.1 to 99.9 sec	For CNTL=PID
HYSt	Hysteresis	1.0	0.1 to 99.9°	For CNTL=ONF
MNLr	Manual reset (Refer user guide)	0.0	-19.9 to 19.9°	For CNTL=PID & I=0
dSP.b	Display bias (Refer user guide)	0.0	-19.9 to 19.9°	—

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

Protection Level

Display	Description	Default Value	Range	Display Condition
SP	Lock setpoint	UNLt	UNLK / READ	—
LUL1	Lock Level 1	UNLt	UNLK / READ / LOCK	—
LUL2	Lock Level 2	UNLt	UNLK / READ / LOCK	—

Note

1. Locking parameters (LVL1 or LVL2 or SP) will not permit change in the value of respective level parameters.
2. 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.