OPERATING INSTRUCTIONS
TC518

48 X 48

SPECIFICATIONS

SENSOR - (Factory set)

Sensor type	Temperature range (°C)	Resolution (°C)
J	-199 to 750	0.1
K	-200 to1350	0.1
T	-200 to 400	0.1
R	0 to 1750	1
S	0 to 1750	1
RTD	-100 to 850	0.1

DISPLAY
4-digit, dual display 7 segment LED
Upper Display: 10mm high Red (Process value)
Lower Display: 7mm high Green (Set value)

MAIN CONTROL
PID or ON/OFF

OUTPUT
Time Proportioning
a) PROPORTIONAL BAND
0 to 400 °C (Programmable)
Cycle time : Auto/Manual (0.1 to 99.9 sec Programmable)
b) ON/OFF CONTROL
Hysteresis from 0.1 to 99.9°C

AUTO TUNE
Via Keys on front Panel

ACCURACY
± 0.25 % of full scale/ ±1°C (whichever is greater)

SET POINT LIMIT
High limit and low limit settable by user

RELAY ACTION
a) COOL - for Cooling b) HEAT - for Heating

SENSOR BREAK
Indicated on display, relay off

TC REVERSE
Indicated on display, relay off

OUTPUT
One relay (optional SSR)

RELAY RATING
10A@230 VAC / 30 VDC

POWER SUPPLY
85 to 270 VAC / DC @ 50/60Hz,
24 VAC / DC models available on request

OPERATING TEMP.
0 - 50°C

HUMIDITY
95% RH

WEIGHT
Approx. 200 grams

SAFETY SUMMARY

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.
⚠ **CAUTION:** Read complete instructions prior to installation and operation of the unit.

WIRING GUIDELINES

⚠ **CAUTION:**
1. To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement.
2. Wiring shall be done strictly according to the terminal layout with shortest connections. Confirm that all connections are correct.
3. Use lugged terminals to meet M3 screws.
4. To eliminate electromagnetic interference use of short wire with adequate ratings and twists of the same in equal size shall be made.
5. 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.

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.

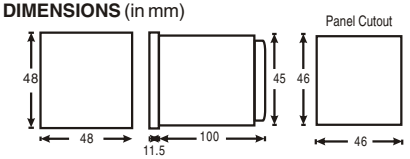
INSTALLATION GUIDELINES

⚠ **CAUTION:**
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. Conductors must not come in contact with the internal circuitry of the equipment 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.

⚠ **CAUTION:**
1. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
2. Fuse Protection: The equipment does not have a built-in- type fuse. Installation of external fuse of rating 275 VAC/1Amp for electrical circuitry is highly recommended.
3. 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.
4. The output terminals shall be strictly loaded to the manufacturer specified values/range.

Mechanical Installation:
For installing the controller
1. Prepare the panel cutout with proper dimensions as shown:

DIMENSIONS (in mm)



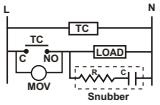
2. Remove the clamp from the controller 43and push the controller into the panel cutout. Secure the controller in its place by pushing the clamp on the rear side.
3. For proper sealing, tighten the screws evenly with required torque.

⚠ **CAUTION**
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.

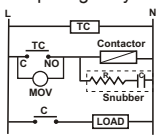
EMC Guidelines:
1. Use proper input power cables with shortest connections and twisted type.
2. Layout of connecting cables shall be away from any internal EMI source.

LOAD CONNECTIONS

1. For load current less than 0.5A



2. For bigger loads, use interposing relay / contactor



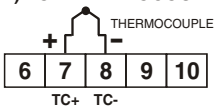
1) Snubber Part No.: APRC - 01.
2) MOV Part No.: AP-MOV - 03.
Note: For inductive loads, use of snubber and MOV, as shown above, is recommended.

ELECTRICAL PRECAUTIONS DURING USE

Electrical noise generated by switching of inductive loads and can create momentary disruption, erratic display, latch up, data loss or permanent damage to the instrument.
To reduce noise:
a) Use of MOV across supply of temperature controller & snubber circuits across loads are recommended
b) Use separate shielded wires for inputs.

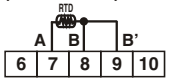
CONNECTION DIAGRAM :

1) FOR THERMOCOUPLE



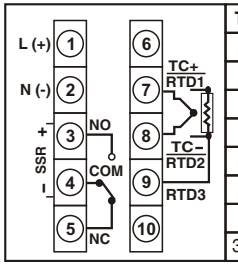
Connect Thermocouple (T/C) according to polarity shown. Positive of TC at terminal no 7 & Negative of TC at terminal no 8

2) FOR RTD (PT-100) 2 WIRE / 3 WIRE



1) FOR TWO WIRE PT-100: Short terminals 8 & 9. Connect PT100 between terminal no. 7 & 8
2) FOR THREE WIRE PT-100: Connect RTD1 & RTD2 of 3 wire PT100 to terminal no. 7 & 8 and RTD3 to terminal No. 9.

TERMINAL CONNECTIONS



TERMINAL DESCRIPTION	NO.
L (Live)	1
N (Neutral)	2
NO	3
COM	4
NC	5
+ve of TC or RTD1	7
-ve of TC or RTD2	8
3rd wire of RTD (PT100)	9

CONFIGURATION SCHEME

To enter configuration menu : Press ▲ & ▼ for 3 secs

Key press	Display	Description
1. Tune		Default setting: OFF
Press ■ + ▲ / ▼	tUNE	**Tune**
	OFF	Tune OFF
	ON	Tune ON
Tune LED will blink indicating tune in progress.		
2. Press ▲ to enter Temperature unit		Default setting: °C
Press ■ + ▲ / ▼	UNIt	**Temperature**
	°C	Celsius
	°F	Fahrenheit
3. Press ▲ to enter Lock code		Default value: 0
Note: This parameter will not be prompted if internal jumper is shorted (See User Guide for explanations)		
Press ■ + ▲ / ▼ to change value	LOCY	
	0	Lock code = 85
4. Press ▲ to enter Input sensor		Default setting: J
	InPt	**Input sensor**
Press ■ + ▲ / ▼	J	-199 to 750
Press ■ + ▲ / ▼	K	-200 to1350
Press ■ + ▲ / ▼	t	-200 to 400
Press ■ + ▲ / ▼	r	0 to 1750
Press ■ + ▲ / ▼	S	0 to 1750
Press ■ + ▲ / ▼	rtd	-100 to 850

Key press	Display	Description
5. Press ▲ to enter Resolution Default value: 1		
Press ■ + ▲ / ▼	RESL → 1 / 0.1	**Resolution**
NOTE: Not prompted for R and S type of input		
6. Press ▲ to enter Display Bias Default value: 0.0		
Press ■ + ▲ / ▼ to change value	dSP.b → 0.0	**Display Bias** Range: -99.9 to 99.9
7. Press ▲ to enter Set point low limit Default value: -199		
Press ■ + ▲ / ▼ to change value	SPLL → -199	**Set point low limit**
8. Press ▲ to enter Set point high limit Default value: 750		
Press ■ + ▲ / ▼ to change value	SPHL → 750	**Set point high limit**
9. Press ▲ to enter Relay mode Default setting: HEAt		
Press ■ + ▲ / ▼	rLY → HEAt / CooL	**Relay mode**
10. Press ▲ to enter Proportional band Default value: 10		
Press ■ + ▲ / ▼ to change value	Pb → 10	**Proportional band** Range: 0 to 400°C
(When Pb = 0, The unit operates in ON-OFF mode)		
11. Press ▲ to enter Integral time Default value: 120		
Note: This parameter will be prompted only in PID mode		
Press ■ + ▲ / ▼ to change value	Int → 120	**Integral time** Range: 0 to 3600 sec
12. Press ▲ to enter Derivative time Default value: 30		
Note: This parameter will be prompted only in PID mode		
Press ■ + ▲ / ▼ to change value	dEr → 30	**Derivative time** Range: 0 to 200 sec

Key press	Display	Description
13. Press ▲ to enter Hysteresis Default value: 1.0		
Note: This parameter will be prompted only in ON-OFF mode		
Press ■ + ▲ / ▼ to change value	HYSt → 1.0	**Hysteresis** Range: 0.1 to 99.9
14. Press ▲ to enter Hysteresis bias Default value: 0.0		
Note: This parameter will be prompted only in ON-OFF mode		
Press ■ + ▲ / ▼ to change value	HYS.b → 0.0	**Hysteresis bias** Range: -99.9 to 99.9
15. Press ▲ to enter cycle mode Default setting: AUtO		
Note: This parameter will be prompted only in PID mode		
Press ■ + ▲	CYCn → AUtO / USEr	**Cycle mode** **Auto** **User**
16. Press ▲ to enter cycle time Default value: 15.0		
Note: This parameter will be prompted only in PID mode		
Press ■ + ▲ / ▼ to change value	CYCt → 15.0	**Cycle time:** Range: 0.1 to 99.9
17. Press ▲ to enter Set 1 lock Default setting: UnLY		
Press ■ + ▲ / ▼	L-S1 → UnLY / LCY	**Set 1 lock** **Unlock** **Lock**
18. Press ▲ to enter Reset all Default setting: no		
Press ■ + ▲ / ▼ Press ▲	rSt → no / YES / donE	**Reset all**
Press ▲ + ▼ for 3 sec. to come out of programming.		

Programming Set Point 1

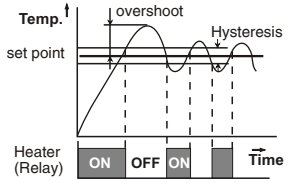
A) To view set point : Press ■ key
B) To increase / decrease set point : Press ■ + ▲ / ▼
Continuous operation of above makes update speed faster in 3 stages after 7 seconds.

USER GUIDE:

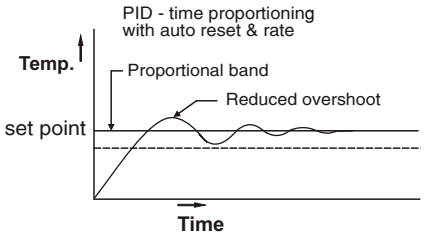
1. Display Bias:
This function is used to adjust the PV value in cases where it is necessary for PV value to agree with another recorder or indicator, or when the sensor cannot be mounted in correct location.

2. ON/OFF control action (For heating):
The relay is 'ON' up to the set temperature and cuts 'OFF' above the set temperature. As the temperature of the system drops, the relay is switched 'ON' at a temperature slightly lower than the Set point.

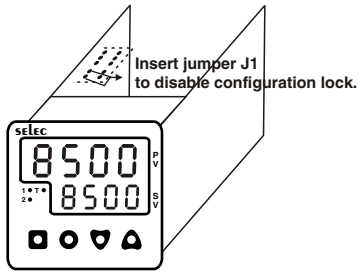
HYSTERESIS:
The difference between the temperature at which relay switches 'ON' and at which relay switches 'OFF' is the hysteresis or dead band.



3. Auto tuning:
The auto tuning function automatically measures, compute and sets the proportional band (P), integral time (I) and Derivative time (D). While Auto tuning, the controller performs proportional Control and determine proper P.I.D. Values.



4. Configuration lock code: To enable configuration lock first remove the housing and then remove the jumper J1. To scroll through next functions set lock = 0085.



CALIBRATION CERTIFICATE

Date:

Model No: _____

Sr. No.: _____

Claimed Accuracy:
± 0.25% of full scale ±1 digit (After 20min warmup time)

Sources calibrated against:
Hinditron Multimeter Model 86, Sr. No.:1094

Multimeter calibration report no:
ERTL(W), Mumbai, INDIA

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

SENSOR	CALIBRATION TEMP (°C) (0.1 resolution)	DISPLAY VALUE (°C)
K	35.0	35.0
	700.0	700.0
	1350	1350
PT100	0.0	0.0
	500.0	500.0
	800.0	800.0

The thermocouple / RTD curves are linearised in this microprocessor based product; and hence the values interpolated between the readings shown above 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.

CHECKED BY:

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(Specifications subject to change as development is a continuous process)

Selec Controls Pvt. Ltd., India.
(Formerly Selectron Process Controls Pvt. Ltd.)
Tel:91-22-28476443, Fax:91-22-28471733,
Website: www.selec.com
E- mail: sales@selec.com.