OP292-V05

selec

TC513A / TC513AX / TC221A / TC203AX / TC303A / TC303AX

Operating Instructions

SPECIFICATIONS

Display
3 digit, 7 segment digital display
LED Indications
R : Control output ON
Keys
3 keys for digital setting

INPUT SPECIFICATIONS
Input Signal
Thermocouple (J,K,T,R,S) / RTD (Pt100)
Sampling time
250ms
Input Filter (FTC)
0.2 to 10.0 sec
Resolution
Fixed 1 resolution
Temperature Unit
°C / °F selectable
Indication Accuracy
For TC inputs: ±0.5% of FS ±1 digit
For R & S inputs: ±0.5% ±2 °F of F
(20 min of warm up time for TC input)
For RTD inputs: ±0.1% FS ±1 digit

FUNCTIONAL SPECIFICATIONS
Control Method
1) PID control with auto tuning
2) ON-OFF control
Proportional Band (P)
1 to 400 °
Integral Time (I)
0.0 to 99.9 min
Derivative Time (D)
0 to 999 sec
Cycle Time
0.1 to 99.9 sec
Hysteresis Width
0.1 to 99.9 °
Manual Reset value
-19.9 to 19.9 °

CONTROL OUTPUT : Relay or SSR
(One Output at a time)
Relay contact (SPST) (For TC513A,TC221A,TC303A)
10A@250V AC / 30V DC, resistive
Relay contact (SPDT) *(For TC513AX, TC203AX, TC303AX)
10A@250V AC / 30V DC, resistive
SSR Drive Output (Voltage Pulse) *
12V DC, 50 mA

* Not applicable for TC513A,TC221A,TC303A

POWER SUPPLY
Supply Voltage
85 to 270V AC/DC (AC : 50 or 60Hz)
OPTIONAL - 24V AC/DC
Power Consumption
5VA max @230V AC
Temperature
Operating : 0 to 50°C ; Storage : -25°C to 75°C
Humidity (non-condensing)
95% RH
Weight
TC513A/TC513AX : 129 gms
TC221A/TC203AX : 180 gms
TC303A/TC303AX : 240 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 length as possible 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 1mm² 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 products supplied by us 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.

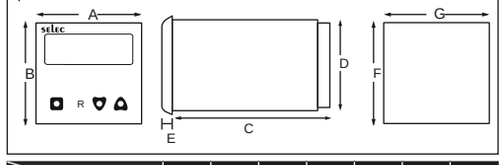
CAUTION

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 equipments shall also comply with basic EMI/EMC and other safety requirements like BSEN61326-1 and BSEN61010 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 manufacturers specified values/range.

MECHANICAL INSTALLATION

NEW

Outline dimensions (in mm) | **Panel cutout dimensions (in mm)**



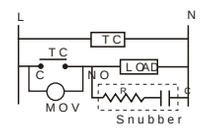
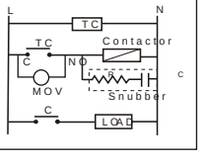
MODELS \ DIM	A	B	C	D	E	F	G
TC513A/TC513AX	52	52	94	45	4	46	46
TC221A/TC203AX	72	72	83.76	67	4.5	69	69
TC303A/TC303AX	96	96	73	90.55	5	92	92

1. Prepare the panel cutout with proper dimensions as shown above.
2. Remove the clamp from the controller and push the controller into the panel cutout. Insert the clamp from the rear side until the main unit is securely fit into the panel.
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 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

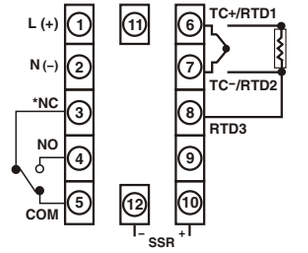
Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display latch up, data loss or permanent damage to the instrument.

To reduce noise :

a) Use of snubber circuits across loads as shown above, is recommended.

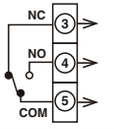
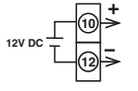
b) Use separate shielded wires for inputs.

TERMINAL CONNECTIONS

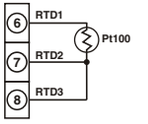


*NC contact valid only for TC513AX

Control Output

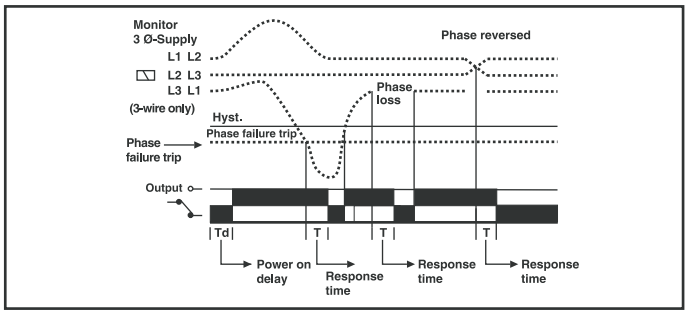
Relay Output	SSR Drive Output
	

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

For TC513A/TC513AX

Timing Diagram



Ordering Information

Product code	Operating Range	Certification
600PSR-CE	154 to 500V AC	CE

Compliance

Applicable EMI / EMC Standards		
Product Standard : IEC 61326-1		
Category	Reference Standards	Testing Level
Electrostatic Discharge	IEC 61000-4-2	Level-3
Electrical Fast Transient / Burst	IEC 61000-4-4	Level-3
Electromagnetic Field	IEC 61000-4-3	Level-3
Surge	IEC 61000-4-5	Level-3
Conducted RF	IEC 61000-4-6	Level-2
Rated Power Frequency	IEC 61000-4-8	Level-4
Voltage Dip / Short Interruptions	IEC 61000-4-11	Level-3
Conducted Emissions	CISPR-11	Class-B
Radiated Emissions	CISPR-22	Class-A
Emission & Immunity	IEC 61326-1	
Safety	IEC 61010-1	

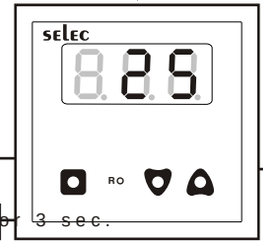
CONFIGURATION INSTRUCTIONS

KEY FUNCTIONS

- Press for 3 sec to enter Level 2 → Press once to view next parameter in configuration menu
- Press for 3 sec to enter Level 1 → Press once to view previous parameter in configuration menu
- + → Press for 3 sec 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 3 sec

OPERATIONAL MENU

POWER ON



Press key for 3 sec.

Press key for 3 sec.

Press + keys for 3 sec.

Level 1

Display (For 1sec)	Description	Default Value	Range	Display Condition
INP	Input type (Refer Table 1)	J	J/K/T/R/S/RTD	—
UNt	Temperature unit	°C	°C/°F	—
SP.L	Set point low limit	100	Min range of sensor selected to SP.H	—
SP.H	Set point high limit	750	SP.L 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	—
CNt	Control logic	PId	PID/ONF	—
ARY	Anti reset windup %	25	1 to 100	For CNT=PID
rSt	Factory default (Reset all)	NO	NO/YES	—

Level 2

Display (For 1sec)	Description	Default Value	Range	Display Condition
tUn	Tune (Refer user guide)	OFF	OFF/ON	For CNT=PID
P	Proportional band	10	1 to 400°	For CNT=PID
I	Integral time	2.0	0.0 to 99.9 min	For CNT=PID
d	Derivative time	30	0 to 999 sec	For CNT=PID
CY.M	Cycle time mode	Aut	AUT/US.F	For CNT=PID
CY.t	Cycle time	15.0	0.1 to 99.9 sec	For CNT=PID
HYS	Hysteresis	1.0	0.1 to 99.9	For CNT=ONF
MN.r	Manual reset (Refer user guide)	0.0	-19.9 to °19.9	For CNT=PID & I=0
dS.b	Display bias (Refer user guide)	0.0	-19.9 to °19.9	—

Protection Level

Display (For 1sec)	Description	Default Value	Range	Display Condition
SP	Lock setpoint	UNK	UNK/LCK	—
LU1	Lock Level 1	UNK	UNK/LCK	—
LU2	Lock Level 2	UNK	UNK/LCK	—

Note

1. Locking parameters (LV1 or LV2 or SP) will not permit change in the value of respective level parameters.
2. Continuos operation of keys for SP or other parameters makes Update speed faster in 3 stages after 3 seconds.

Programming Setpoint (Online): Default: 50

Range: SP.L to SP.H

To view setpoint: Press the key

To increase/decrease setpoint: Press + / keys.

INPUT RANGES (Table 1)

FOR RTD

Input		Ranges
Pt100	°C	-150 to 850
	°F	-199 to 999

FOR THERMOCOUPLE

Input		Ranges
J	°C	-199 to 750
	°F	-199 to 999
K	°C	-199 to 999
	°F	-199 to 999
T	°C	-199 to 400
	°F	-199 to 750
R & S	°C	0 to 999
	°F	32 to 999

ERROR DISPLAY (Table 2)

When an error has occured, the 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

(Specifications are subject to change, since continuous process)

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