



72 x 72

PARAMETER	SPECIFICATIONS
Display	3 digit, 7 segment digital display
LED Indications	R : Control output ON
Keys	3 keys for digital setting
<b>INPUT SPECIFICATIONS</b>	
Input Signal	Thermocouple (J, K)
Sampling time	250 ms
Input Filter (FTC)	0.2 to 10.0 sec
Resolution	Fixed 1° resolution
Temperature Unit	°C / °F selectable
Indication Accuracy	0.25% of FS ±1°C (20 min of warm up time)
<b>FUNCTIONAL SPECIFICATIONS</b>	
Control Method	ON-OFF control
Hysteresis Width	0.1 to 99.9°C
<b>OUTPUT</b>	
CONTROL OUTPUT Relay	Relay contact (SPST) 10A@250V AC / 30V DC, Resistive
<b>POWER SUPPLY</b>	
Supply Voltage	85 to 270V AC/DC (AC : 50 / 60 Hz )
Power Consumption	4 VA max
Temperature	Operating : 0 to 50°C Storage : -20 to 75°C
Humidity	95% RH (non-condensing)
Weight	170 g

## 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 1mm<sup>2</sup> 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.
- 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

Outline Dimensions (in mm)						Panel cutout (in mm)		
MODEL	DIM	A	B	C	D	E	F	G
DTC231		72	72	83.7	67	4.5	69	69

- 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.

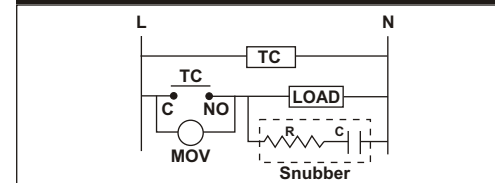
## EMC GUIDELINES

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

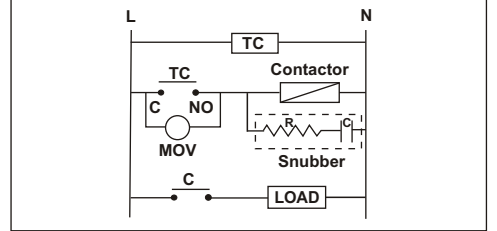
## LOAD CONNECTIONS

- 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



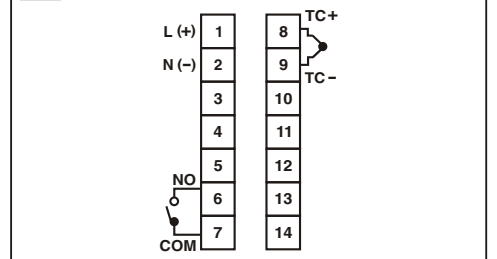
## ELECTRICAL PRECAUTIONS DURING USE

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 :

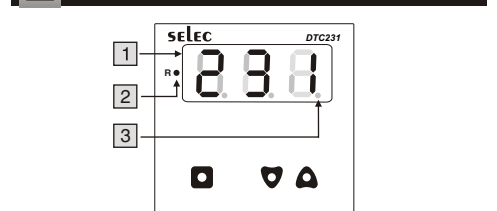
- Use of snubber circuits across loads as shown above, is recommended.
- Use separate shielded wires for inputs.

## TERMINAL CONNECTIONS



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 for 1 sec. and then parameter values. 3) Displays PV error conditions. (refer Table 2)
	Set-value (SV)	4) Displays a set value (SV) when  key pressed.
2	Control output indication	The LED is lit when the control output is ON
3	Tune	1) Auto tune : Blinking at faster speed. 2) Self tune : Blinking at slower speed.

## 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. Filter Time Constant :** The input filter is used to filter out quick changes that occur to the process variable in a dynamic or quick responding application which causes erratic control.

The digital filter also aids in controlling processes where the electrical noise affects the input signal.

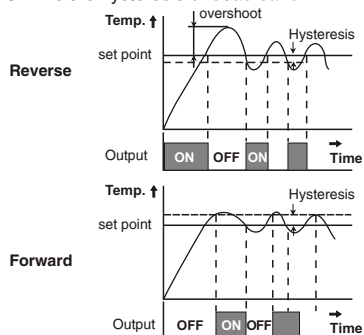
Larger the value of FTC entered, greater the filter added and the slower the controller reacts to the process and vice versa.

**3. ON/OFF control action (For Reverse Mode) :**

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 the relay switches 'OFF' is the hysteresis or dead band.



## CONFIGURATION INSTRUCTIONS

KEY FUNCTIONS	ONLINE	CONFIGURATION MENU
	> Press for 3s to enter configuration menu	> To view previous parameter
	_____	> To view next parameter > Press for 3s to exit configuration menu
	> To view SP (Set point)	_____
	> To increment / decrement SP	> To increment / decrement Parameter value
	> Press for 3s to enter protection level	_____

## OPERATIONAL MENU

**POWER ON**

▼

selec DTC231

Press key for 3 sec.

▼

Level 1			
Display (For 1sec)	Description	Default Value	Range
INP	Input type (Refer Table 1)	J	J/K
UNIT	Temperature unit	°C	°C/°F
SP.L	Set point low limit	-199	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
RCt	Control action	RE	RE/FD
HYS	Hysteresis	1.0	0.1 to 99.9°
ds.b	Display bias (Refer user guide)	0.0	-19.9 to 19.9°
RSt	Factory default (Reset all)	NO	NO/YES

Press + keys for 3 sec.

▼

Protection Level			
Display (For 1sec)	Description	Default Value	Range
SP	Lock setpoint	UNL	UNK/LCK
LV1	Lock configuration menu	UNL	UNK/LCK

**NOTE**

- Locking parameters (LV1 / SP) will not permit change in the value of respective level parameters.
- Continuous operation of / keys for SP or + / for other parameters makes update speed faster in 3 stages after 3 seconds.

**Table 1 : INPUT RANGE**

### FOR THERMOCOUPLE

INPUT TYPE	RANGE	
J	Resolution : 1	UNIT
	-199 to 750	°C
	-199 to 999	°F
K	-199 to 999	°C
	-199 to 999	°F

**Table 2 : ERROR DISPLAY**

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

Error	Description	Control Output Status
5.bn	Sensor break / Over range condition	OFF
5.nE	Sensor reverse / Under range condition	OFF

## CALIBRATION CERTIFICATE

Date :

Model No :

**Claimed Accuracy :** 0.25% of FS  $\pm 1^\circ\text{C}$   
(20 min of warm up time)

Sources calibrated against :

Multimeter calibration report no :

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

SENSOR SELECTION	VERIFICATION VALUE (°C)
K	~25.0
	~-475.0
	~-975.0

The thermocouple 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.

CHECKED BY :

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

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