Warranty Certificate

This instrument is warranted against any manufacturing defects for a period of twelve months from the date of installation, or eighteen months from the date of supply, which ever is early.

Kindly note that:

1. *The warranty is limited to repairing the instrument and no responsibility is taken for any other damage resulted*
2. *The warranty will be void if the instrument is opened or tampered in any way*
3. *The faulty instrument has to be returned to our factory, carriage prepaid & duly insured.*

Product Category : Programmable Process Controller

Model No. : Sleek 9263

Serial number : _____

Date of despatch : _____

Authorized signatory : _____

Company seal

The Inside Stuff

Kindly forward this product manual to the end user. The user is requested to read the manual thoroughly before operating the instrument.

As you unpack

Congratulations
on buying a
Programmable Process Controller!

As you unpack kindly ensure that
1. The material received is in good condition
2. You have received the following material:
   a) Programmable Process Controller as per your order
   b) Mounting bracket pair
   d) This manual along with Warranty certificate

In case of any discrepancies contact our customer support department immediately.

We are sure you will get long and trouble free service from our system.

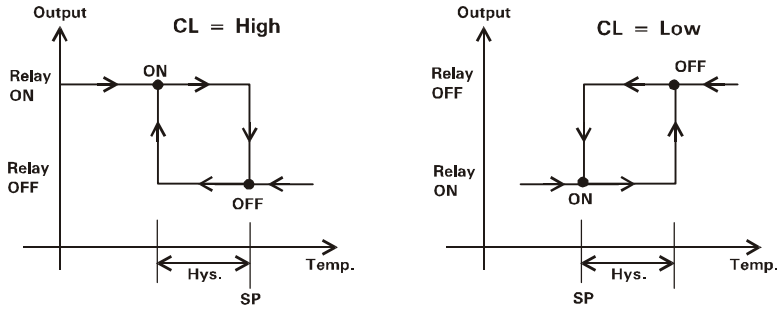
We need your feedback :

Every attempt is made to make this manual clear and easy to understand, so that the user can install, take care of and feel confident in using our product. We welcome your valued suggestions to help us improve this product as well as the document and make it more user friendly.

Important Terms

1) **Control Logic (CL) :** The logic for relay actuation, i.e.
   a) *CL* = High Control Action. The control action is such that the process temperature must not go above the setpoint. Process value < Setpoint Relay ON
   This is generally used in heating applications.
   b) *CL* = Low Control Action. The control action is such that the process temperature must not go below the setpoint. Process value > Setpoint Relay ON
   This is generally used in cooling applications.

2) **Hysteresis :** The On / Off differential gap for an On / Off controller. Figures below show the hysteresis for both high and low control logic.



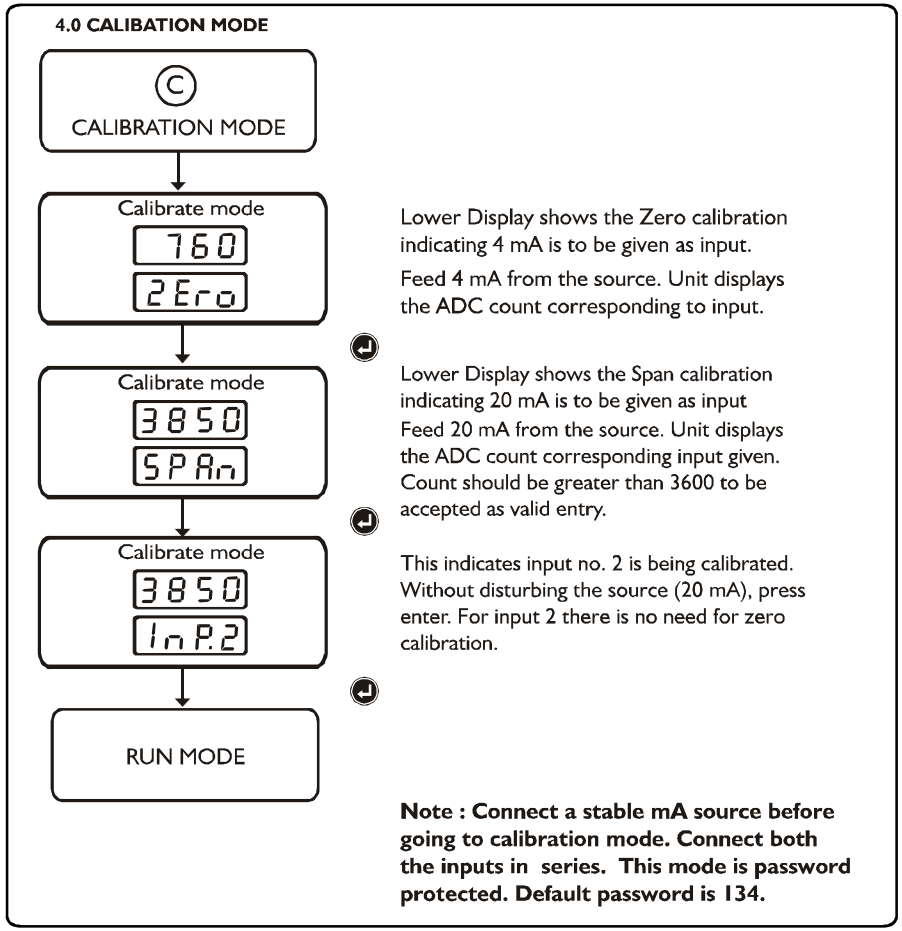
Arrows indicate Process temperature trajectory.
SP = Setpoint
HYS = Hysteresis

3) **On Delay Time :** The minimum time duration which has to elapse before a relay status can change over again. This delay time overrides the hysterisys settings for the setpoints.

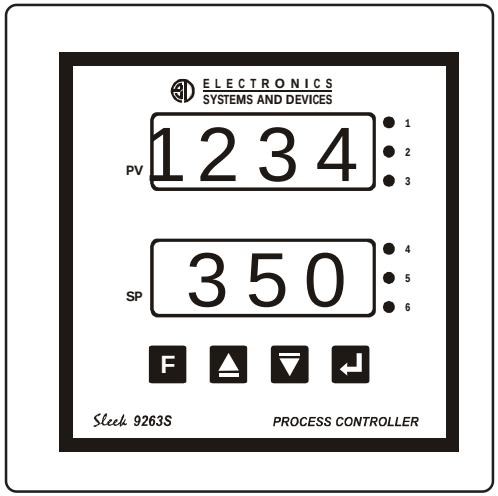
Calibration procedure

Warning : This procedure is to be carried out strictly by technically qualified personnel only.

The instrument is calibrated at the factory using 0.05 % accurate calibrating instruments. No calibration should be required in normal case, however if the instrument requires re-calibration, the procedure to be followed is given below.



Introduction



Process Indicators and Controllers play an mportant part in any process industry. Quick and accurate measurement and control of a process value will improve the final product quality, reliability and reduce rejection.

Process indication and control is therefore one of the prime considerations in any process industry

The Sleek 92 series is a Microcontroller based Linearised Temperature Indicator cum Controller with user friendly programming facility. The Sleek 92 has been designed for fast and accurate measurement and control of temperature . Linearisation of signals provides high accuracy even for most nonlinear sensors. The instrument is designed using highly reliable electronic components. Process temperature is displayed directly in digits, giving better resolution.

The Sleek 92 accepts all types of Thermocouples, Pt - 100, 0 to 20 mA as well as 4 - 20 mA as input . Wide ranges of measurements are available depending on the sensor used.

The instrument is immune to mechanical vibrations. Even the mounting position will not affect the measurement accuracy.

Use of highly reliable electronic components with low tempearature coefficient ensures long and trouble free service.The instrument is tested for its performance under various climatic conditions.

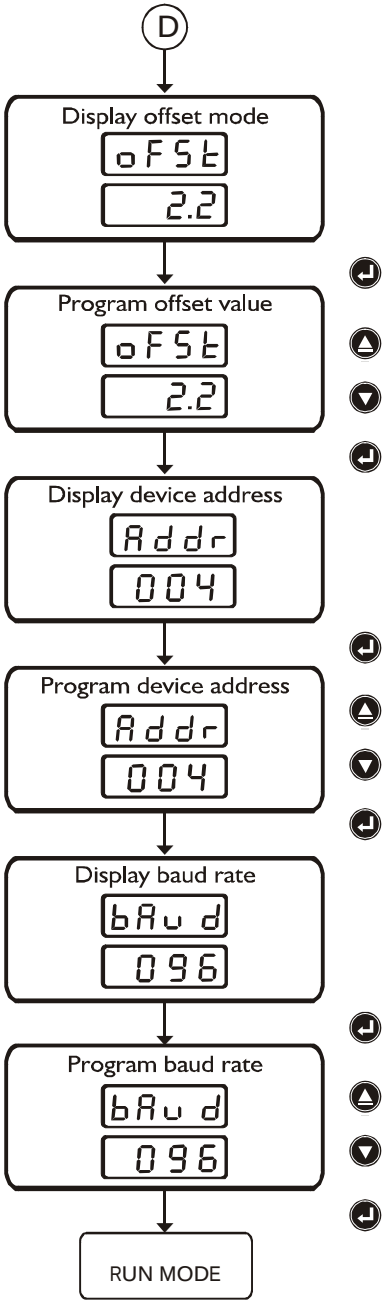
Principle of Operation :

The Sleek 92 series is based on the principle high input impedance amplifier feeding an analog to digital convertor. The input signal generated by the transducer is fed to a signal conditioning amplifier, output of which is digitised by the ADC. This digital signal is linearised by software, displayed and compared to the set value by the microcontroller which initiates the programmed relay action. The linearisation, display and relays are controlled by the microcontroller by virtue of the system software.

Features :

- Microcontroller based logic
- Linearisation of controlled variable achieved through software giving high accuracy
- Highly compact
- Dust and vermin proof enclosure with epoxy powder coating.
- User selectable Control Logic
- Programming through tactile membrane keys
- Seperate display for control setpoint
- NVRAM enables data storage even in events of prolonged power failure
- Fast response time
- Fail safe relay logic
- Maximum MTBF and minimum MTTR

3.0 SETTINGS MODE (cont'd)



Indicates that offset value of the unit is being programmed

By inc & dec keys program the offset value. This value will be added or subtracted from the process value throughout the range.

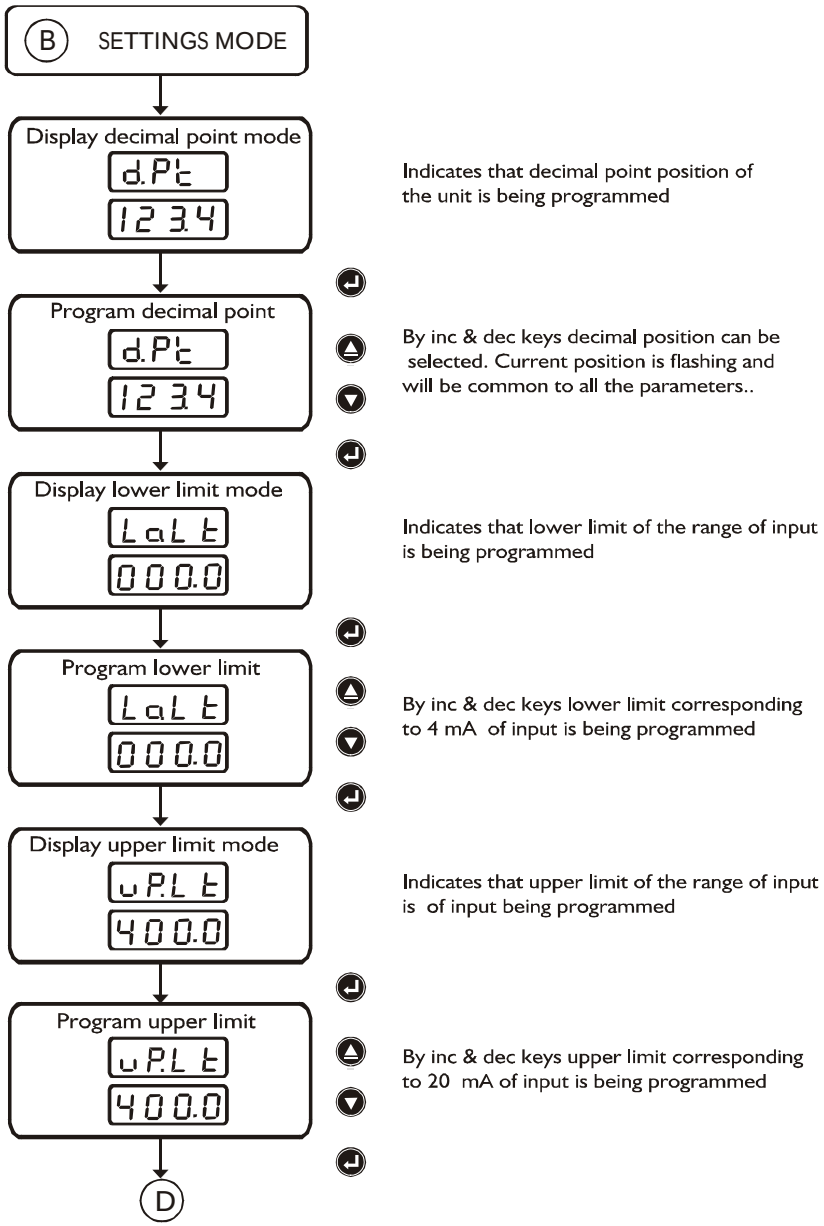
Indicates that device address of the unit is being programmed. This is the slave ID used for RS 232 / RS 485 communication.

By inc & dec keys device address of the unit is being programmed.

Indicates that baud rate of the unit is being programmed.

By inc & dec keys program the baud rate of the unit. Baud rate is selectable between 1200,2400,4800 and 9600 kbps.

3.0 SETTINGS MODE

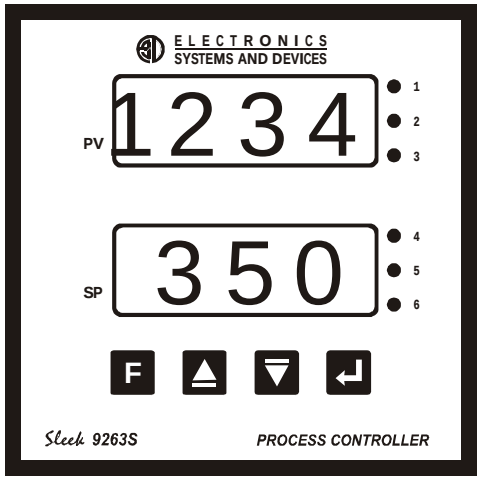


Specifications

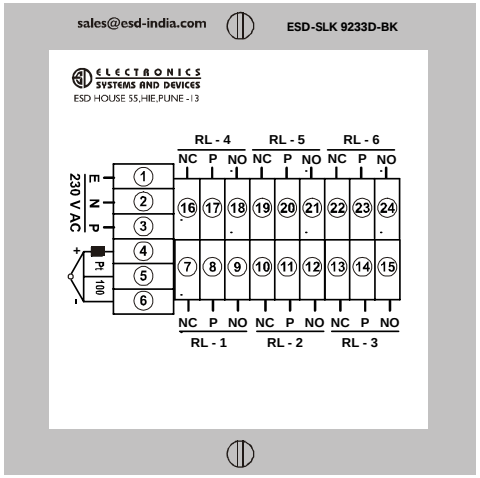
Model	: Sleek 9263
Control action	: On / Off
Ranges	: -200 to 1600 °C as per sensor used.
Input	: Thermocouple / Pt - 100 (3 wire) / 4 - 20 mA
Indication accuracy	: +/- 0.2 % of FS +/- 1 digit
Least count	: 0.1 °C upto 400.0 °C, 1°C above 400 °C
Accuracy deviation due to	
a) Temperature change	: +/- 0.02 % / °C , ref at 25 °C
b) Supply Variation	: +/- 0.01 % /V
No. of Setpoints	: Six
Set point Adjust and Read	: Through Flat Membrane key pads and 8 digit display respectively on front panel
Outputs	: 1 set of potential free Relay change over contacts rated 5 Amp resistive at 230 V AC per set point per input
Relay logic	: User selectable High or Low logic.
Relay ON indication	: By Red LED per set point
On / Off hystersis	: Programmable from 1 to 20 °C (for LC = 1 °C) Programmable from 0.1 to 9.9 °C (for LC = 0.1 °C)
On Delay Time	: Programmable from 0 to 240 Sec
Display	: 8 digit Seven segment 12.5 mm LED display 4 digit RED LED display for Input 4 digit RED LED display for Setpoint
Power supply	: 230 V AC, +/- 10 % , 50 Hz
Ambient Temp. range	: 0 to 55 °C
Amb. Temp. compensation	: Built in upto 55 °C (only for thermocouple input)
Sensor break indication	: Up scale [OPEn]
Sensor break protection	: Relay 'Off' (Relay 'On' by demand)
Power consumption	: 6 VA
Weight	: 1 Kg
Mounting	: Flush panel mounting
Dimensions	: 96 (W) x 96 (H) x 120 (D) mm
Cutout	: 92 x 92 mm, +1, -0 mm

Illustrations

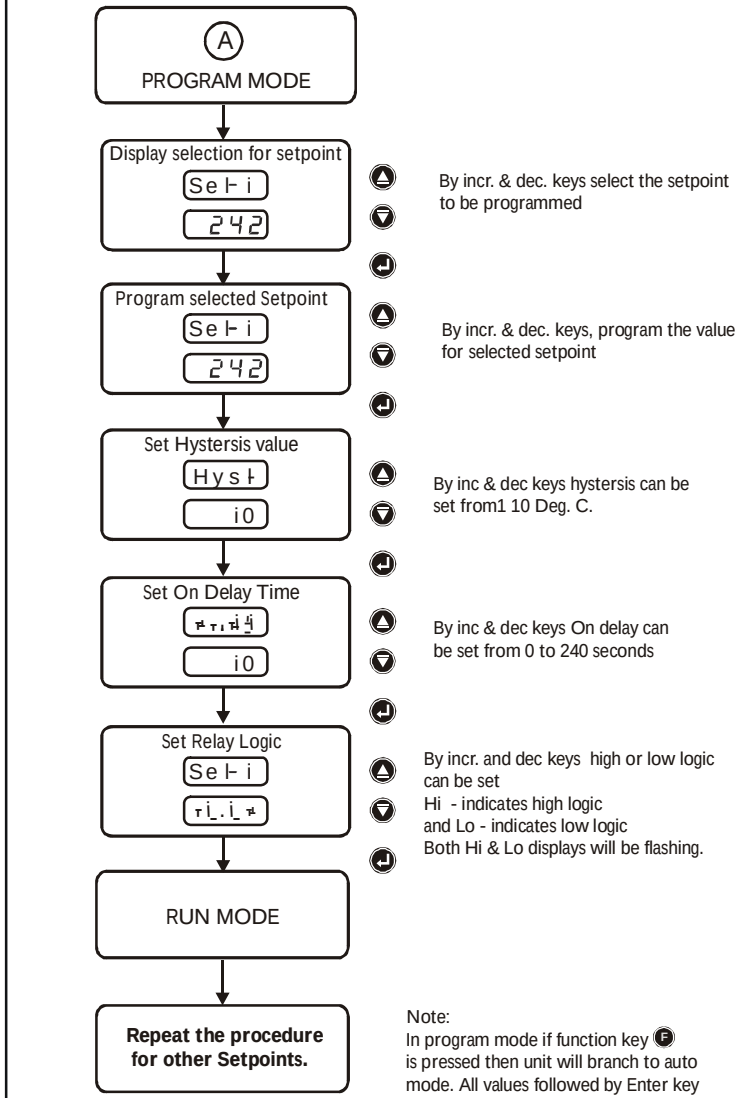
A) Front view



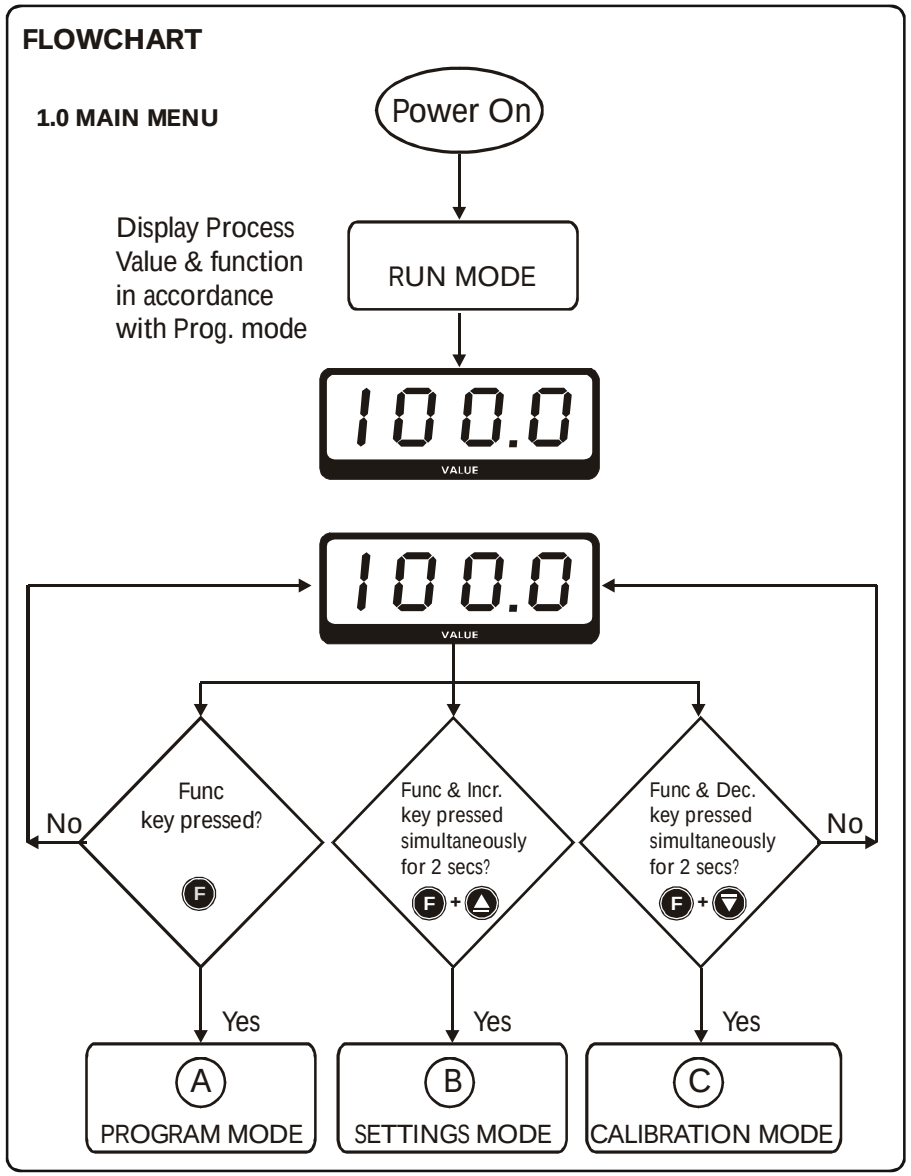
B) Rear View



2.0 PROGRAM MODE

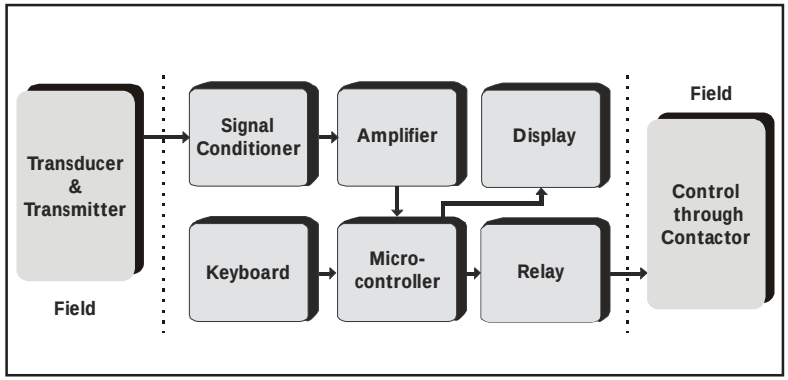


Program Flow Chart



Operation

Block Diagram



1. **Transducer :** This is externally connected to the instrument. Types available are Pt - 100, Thermocouple, 4-20 / 0-20 mA current signal
2. **Signal conditioner:** This circuit accepts the process signal from the sensor performs the necessary compensation (Ambient compensation for T/C and lead wire compensation for PT- 100) and converts it into suitable signal level for ADC.
3. **ADC:** This is a 12 bit Successive Approximation type ADC inbuilt the microcontroller. It accepts the analog input signal, converts it into digital data and feeds it to the processor for further action.
4. **Microcontroller**: This is the heart of the unit and is inter faced to all other peripherals. The transducers, membrane keypad, display, memory and output relays function under the command of the microcontroller.
5. **Memory :** There are two memory elements provided in the circuit. One is the EPROM for monitor (main) program storage and the other is the NVRAM for storage of various user

programmed parameters and process variables (even in events of prolonged power failure).

6. **Keypad :** Feather touch membrane keys are provided on the front panel for user programming. These keys have features like long life, negligible contact bounce, ease of operation.
7. **Display :** The front panel carries all the indications. These are controlled by the CPU. There are five digits on the front panel for indicating various messages and parameter values. 2 LED's indicate the relay status of 2 corresponding setpoints. This acts as an interface between user and CPU.
8. **Output relays :** There are two relays, one for each setpoint.

Modes of Operations :

1. **Program Mode :**
   In this mode the user can program all the setpoints, control action etc.

2. **Run Mode :**
   In this mode the display shows the process value.

For programming sequence please refer program flow chart.

Installation procedure :

Also observe **"Precautions"** as given in this manual

The instrument should be mounted in a place where it is clearly visible and accessible.

1. Insert the instrument in a suitable cut out and fix it using the bracket pair provided on the sides.
2. Make the connections as shown in Rear View diagram
3. In case of Platinum Resistance bulb connect Red wire to the to the terminal with small resistance shown, Green wire to the next terminal & Black wire to the third terminal. The Black and Green wires are shorted and connected together at one end of the bulb inside the bulb head.
4. In case of thermocouple type instruments, connect the positive of the thermocouple to ' + ' terminal and negative of the thermocouple to ' - ' terminal.
5. Use correct type of compensating cables for thermocouple type instruments.
6. Ensure proper earthing to the instrument.
7. Output load connected through the relay changeover contact should be less than the maximum specified load.
8. Connect a series combination of 0.1 u F /600 V non polarized capacitor & 220 ohm 1/2 W resistor across phase & neutral.