



# MODEL K-3750

## DIGITAL INDICATOR & CONTROLLER for THERMOCOUPLE INPUT

OPERATION

AND

INSTRUCTION MANUAL



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**INTRODUCTION**

Model K-3750 temperature instruments are designed and manufactured using the latest state of the art technology. The instruments are versatile, compact, easy to install and have wide options to suit customer requirements.

This model accepts wide range of thermocouples like Type-K, T, J, R, S, N as its input to display the process temperature.

A 3½ digit 14.2mm LED display provides the readout to ±1999 counts. Also provides either a single or double set point relay output. This set point control can be used for Alarm function with narrow dead band or control purposes with wider dead band.

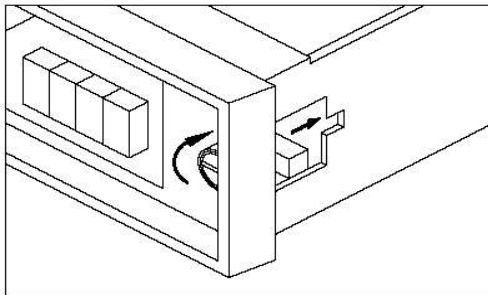
The instrument incorporates a SMPS circuitry for universal mains operation from 90 to 250V AC. The indicator is housed in panel mounted enclosure with size of 96x48mm bezel.

**INSTALLATION INSTRUCTIONS**

The instrument is designed to fit into a standard panel cutout measuring 91 mm x 43 mm (+0.75mm -0.0)

- The front window should be gently levered from the instrument by using the notch at bottom of the lens.
- Insert the instrument through the cutout from the panel front.
- Once the instrument has been positioned in the cutout, it is securely fitted by tightening the two front facing clamp screws in a clockwise direction.
- Replace the display window by positioning against the window stops on the front and simply pushing into place.

**Fig-1: Panel locking arrangement**

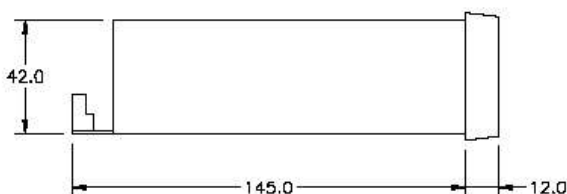


**OVERALL DIMENSIONS**

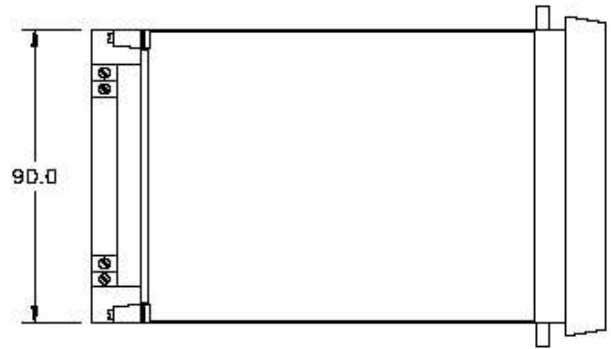
**Fig-2: Front**



**Fig-3: Side**



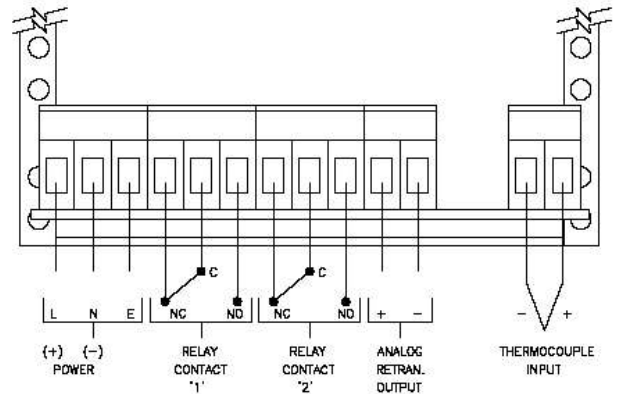
**Fig-4: Top**



**WIRING INSTRUCTION**

Terminals for electrical connection are located on the rear of the instrument. These are of screw clamp type to accept 2.5mm<sup>2</sup> wires maximum either single or multi strand.

**Fig-5: Wiring details – Instrument rear view**



**CALIBRATION PROCEDURE**

**Equipment Required**

1. 3½ digit multimeter with current range of 20 mA.
2. Millivolt source for simulating thermocouple input
3. 0°C chamber (ice box)

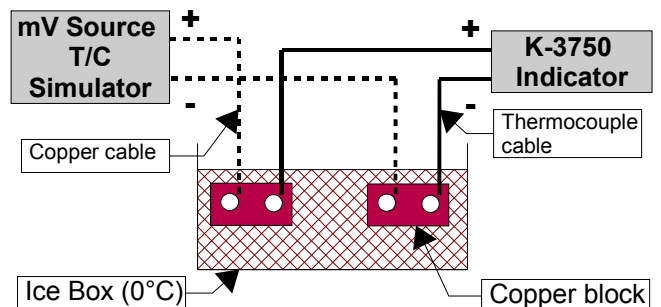
**Procedure**

1. Remove top cover and front red filter to access Zero, Span and set point adjustments.

**Display Calibration - Zero Adjustment**

1. Connect appropriate power supply to the power terminals.
2. Connect the millivolt source to the sensor terminals of the instrument as indicated in below figure.
3. Set 000 mV in the source.
4. Adjust Zero pot for a reading of 000.

**Fig-6: Connection drawing**





**Display Calibration - Span Adjustment**

Refer Table-1 below. Select required resolution, thermocouple, its span and display values.

1. Input selected mV.
2. Adjust Span pot till readings equal the selected display value.
3. Check intermediate values.
4. This completes calibration.

**Table-1: Range, Accuracy, Input value table**

T/C	Range in °C	Accuracy	Span	
			Input (mV)	Display (°C)
K	(-) 50 to 1200	±0.3% of reading ±0.5°C	48.828	1198
T	(-) 50 to 400		20.869	398
J	(-) 50 to 700		39.130	698
R	500 to 1700	±0.5% of reading ±0.5°C	20.215	1698
S	500 to 1700		17.942	1698
N	100 to 1200		43.846	1197

**ALARM SETTING**

**(A) Set point and Dead band Adjustment for Single Set point option.**

Dead band adjustment is applicable for single set point only. The location of potentiometers are given in Fig-7 & 8. Refer following table for jumper selection.

**Table-2: High Alarm – Set Jumper J1 to H**

Signal Status	Relay operating mode – Jumper J2	
	1 - Failsafe	2 - Normal
PV < SP	Relay ON	Relay OFF
PV > SP	Relay OFF	Relay ON

**Table-3: Low Alarm – Set Jumper J1 to L**

Signal Status	Relay operating mode – Jumper J2	
	1 -Normal	2 - Failsafe
PV > SP	Relay OFF	Relay ON
PV < SP	Relay ON	Relay OFF

1. Select the required alarm and relay mode operations by J1 and J2. Refer above table for details.
2. Press the set point switch and adjust set point pot for the required set point.

**High – Normal: J1-H, J2-2**

1. Turn offset and dead band pots fully counter clockwise. Relay will be OFF.
2. Bring the process variable to the set point.
3. Turn offset pot clockwise till the relay just comes ON.
4. Turn dead band pot fully clockwise. Relay will remain ON.
5. Bring the process variable to the nearest dead band below the set point.
6. Adjust dead band pot counter clockwise till the relay just goes OFF.
7. Check the operation of relay at the set point and below the set point (equal to dead band).

**High – Failsafe: J1-H, J2-1**

The setting procedure is identical to High – Normal, except that the relay status is just opposite to the above status.

**Low – Normal: J1-L, J2-1**

1. Turn offset and dead band pots fully counter clockwise. Relay will be ON.
2. Bring the process variable to the set point.
3. Turn offset pot clockwise till the relay goes OFF and trim it slowly counter clockwise to just make the relay ON.
4. Turn dead band pot fully clockwise. Relay will remain ON.
5. Bring the process variable to the nearest dead band above the set point.
6. Adjust dead band pot counter clockwise till the relay just goes OFF.
7. Check the operation of relay at the set point and above the set point (equal to dead band).

**Low – Failsafe: J1-L, J2-2**

The setting procedure is identical to Low – Normal, except that the relay status is just opposite to the above status.

**(B) Set point and Dead band Adjustment for Dual Set point option.**

This option provides a fixed setting about 2 to 5 counts. These are not field adjustable and are factory set. For set point selection and adjustment refer to Fig-7 & 8.

For dual set point option, Relay mode will be normal only. Failsafe mode is not available.

**High Alarm**

Relay energizes when process value goes above set point.

**Low Alarm**

Relay energizes when process value goes below set point.

**Table-4: Set point selection table for Dual set point option**

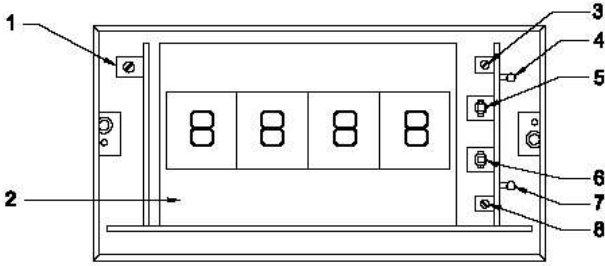
Set point 1 Switch	Set point 2 Switch	Displayed value
Pressed	Pressed	Process value
Released	Pressed	Set point 1
Pressed	Released	Set point 2
Released	Released	Set point 1

**ANALOG OUTPUT (OPTIONAL)**

Connect multimeter to Analog Retransmission output terminal indicated in Fig-5. Calibration procedure is provided for 4-20 mA retransmission output.

1. Set the required mV input corresponding to the Zero value of the retransmission range.
2. Adjust Zero (4mA) pot for an output current of 4mA measured at the external output terminals.
3. Set the required mV input corresponding to the Span value of the retransmission range.
4. Adjust Span pot (20mA) pot for an output current of 20mA measured at the external output terminals.
5. Check for linearity at intermediate values, if non linear, repeat steps 1 to 4.

**Fig-7: Internal front view**

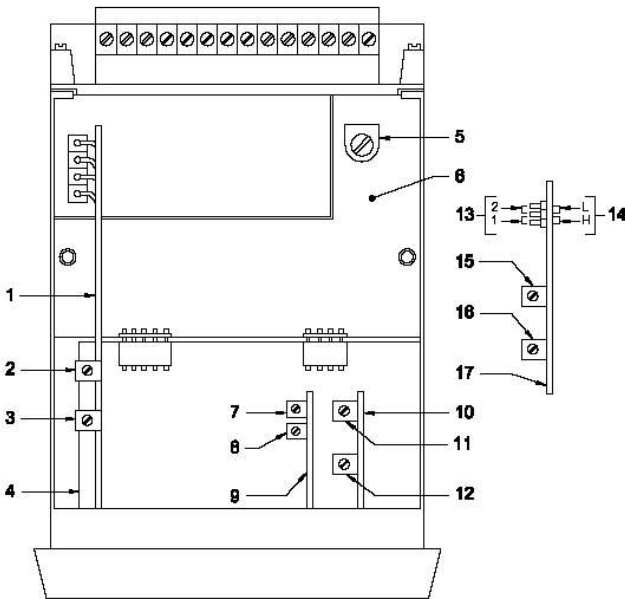


**Part Identification – Internal front view**

1. Display – ZERO adjust
2. Display board
3. Set point-1 adjust
4. Alarm LED for Set point-1
5. Set point-1 Selection Switch
6. Set point-2 Selection Switch
7. Alarm LED for Set point-2
8. Set point-2 adjust

**Note: For Single Set point option only the Set point-1 elements (Parts 3, 4 & 5) are present.**

**Fig-8: Internal top view**



**Part Identification – Internal top view**

1. Input Signal conditioner board
2. PTC adjust. **FACTORY SET. DO NOT ADJUST.**
3. SPAN adjust
4. A/D Converter board
5. Fuse holder
6. Power Supply board
7. Analog output – ZERO adjust
8. Analog output – SPAN adjust
9. Analog output board – Optional
10. Control board – Dual Set point
11. Dead band -1 adjust
12. Dead band-2 adjust
13. J2 relay mode selection
14. J1 Alarm mode selection. (*Located beneath J2*).
15. Dead band adjust
16. Offset adjust
17. Control board – Single Set point. (*This board is present in place of Dual Set point board for Control Output option which calls for Single Set point. This is Part-10 in the above figure*).

**TECHNICAL SPECIFICATIONS**

**ELECTRICAL**

<b>Input</b>	Thermocouple – K, T, J, R, S, N
<b>Range</b>	Refer table in this document
<b>Accuracy</b>	Refer table in this document
<b>Input Impedance</b>	30MΩ typical
<b>Cold Junction Compensation</b>	Automatic by precision thermistor
<b>Sensor Break Indication</b>	Automatic Up/Down scale
<b>Resolution</b>	1°C
<b>Display</b>	3½ digit LED, 7 segment, with Character size of 14.2mm
<b>Power Supply</b>	90 to 250V AC; 100 to 300V DC; 18 to 32V DC
<b>Power Consumption</b>	3VA
<b>Alarm Outputs</b>	1 or 2 set point; 1 SPDT changeover relay contact rated at 5A 230VAC / 28VDC (res) for each set point
<b>Dead band</b>	
<b>For 1 set point</b>	Adjustable from 2 to 20 counts
<b>For 2 set point</b>	Fixed at 2 or 3 counts
<b>Analog Output</b>	
<b>Current output</b>	4-20mA, 0-20mA with accuracy of 0.2% of span; max load of 750Ω
<b>Voltage output</b>	1-5VDC, 0-5VDC with accuracy of 0.2% of span
<b>Electrical Connection</b>	PCB mount Screw clamp terminals

**MECHANICAL**

<b>Enclosure</b>	Engineering plastic suitable for flush panel mounting
<b>Overall dimensions</b>	95(W) x 47(H) x 157(L) mm
<b>Panel Cutout</b>	91 x 43 mm (+0.75, -0.00 mm)
<b>Depth behind panel</b>	145 mm
<b>TEMPERATURE LIMITS</b>	
<b>Ambient</b>	0°C to 50°C
<b>Relative Humidity</b>	Max. of 95% RH, non-condensing