

1. General Information

Description

The FLT Series models are multipurpose measurement instruments. The FLT Series models that are included in this manual are FLT93-C, FLT93-F, FLT93-L and FLT93-S. Each model is a single instrument that is capable of detecting air flow, fluid flow and temperature. It is also able to detect liquid level or fluid media interfaces. The instrument has two field adjustable alarm set points, two buffered voltage outputs, as well as a built-in calibration circuit. The output of the alarm set points are 6 amp relay contacts that can be used to control customer process applications. One buffered voltage output is available for flow or level monitoring and the second buffered voltage output is available for temperature monitoring.

Theory of Operation

The flow switch is a fixed position, single-point flow, level, interface and temperature switch. The operation of the sensing element is based upon the thermal dispersion principle: A low-powered heater is used to produce a temperature differential between two Resistance Temperature Detectors (RTDs). The RTD temperature differential varies as a function of forced convection for flow measurement and as a function of fluid thermal conductivity for level and interface measurement. The measurement of the fluid's temperature is obtained from the non-heated RTD.

Sensing Element

The sensing element consists of two thermowells (hollow tubes) that when inserted into the flow process allows an unimpeded flow inside the process line. The top thermowell has a self-heated RTD inserted into it. The bottom thermowell has a reference RTD inserted into it. In order to correctly orient the sensing element a flow arrow has been etched onto the threaded portion of the sensing element. See Figure 1-1 for a view of the sensing element.

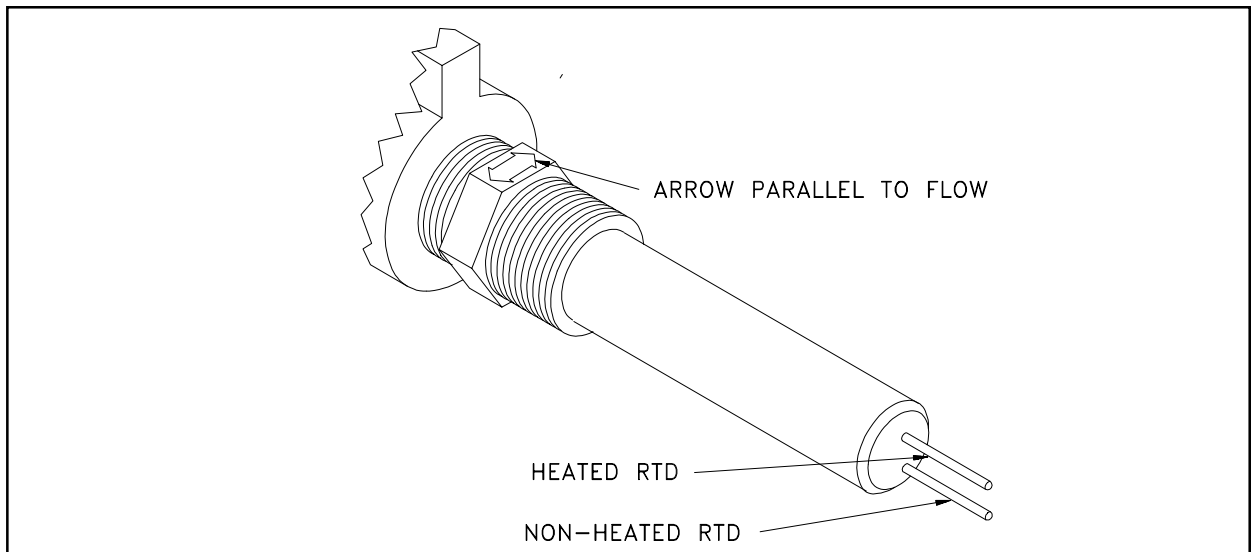


Figure 1-1 View of the Sensing Element

Control Circuit

The control circuit converts the sensing element's RTD temperature differential into an analog DC voltage signal. Dual comparators monitor the sensing element signal and activates the relay alarm circuits if the signal exceeds an adjustable set point.

The control circuit contains all the removable jumpers that configure the instrument to perform as needed by the customer.

Technical Specifications

- **Process Connection**

3/4 inch male NPT standard. 1 inch BSP, 1 inch male NPT, 1/4 inch male NPT (FLT93-F only), flanged mounting, spool piece with 3/4 inch NPT tee or retractable sensing element available.

- **Insertion Length**

Beginning as low as 0.9 inches (23 mm). Standard as well as custom lengths are available.

- **Sensing Element Material**

All wetted surfaces are 316 Stainless steel, with all-welded construction. Hastelloy C-276, Monel 400 and electro-polished stainless steel surface preparation optionally available. Titanium is optionally available on the FLT93-S configuration only.

- **Operating Temperature**

Control circuit:

Ambient: -40 to 140°F (-40 to 60°C).

Sensing element:

Standard temperature configuration:
-40 to 350°F (-40 to 177°C).

Medium temperature configuration:
-100 to 500°F (-73 to 260°C).

High temperature configuration:
-100 to 850°F (-73 to 454°C).

- **Operating Pressure**

Hydrostatically proof pressure tested to 3500 psi (241.3 bar) at 70°F (21.1°C). De-rated with temperature, the maximum recommended operation service is 2350 psi (162 bar) at 500°F (260°C). Higher ratings available with special construction and test certification.

- **Flow Range**

From 0.01 to 5 fps (0.006 to 0.15mps) with fluid or 0.25 to 120 fps (0.076 to 38.1 mps) with gas, depending upon model.

- **Signal Output**

Buffered voltage output available as a standard for temperature and either flow or level/interface. The minimum load impedance is 100 K ohms.

- **Accuracy**

Switch point accuracy:

Up to $\pm 2\%$ of the switch point velocity.

Monitoring accuracy:

$\pm 5\%$ reading (or ± 0.04 fps, 0.012 mps, which ever is larger for liquid applications and ± 2 fps, 0.061 mps, which ever is larger for gas applications).

Level accuracy:

Down to ± 0.1 inch (± 0.25 cm)

Temperature accuracy:

Up to ± 2 °F, (± 1.1 °C) depending upon application. Higher accuracy is available with factory calibration.

- **Repeatability**

$\pm 0.5\%$ of monitor reading.

Up to ± 0.05 inch (± 0.13 cm) of level depending on model.

± 1.0 °F, (± 0.56 °C) of temperature.

- **Response Time**

Alarm set point may be set as low as 0.5 seconds.

Alarm reset may be as low as 2.5 seconds.

- **Input Power**

Field or factory selectable for 115 Vac ± 15 V, 13VA 100 mA maximum; 230 Vac ± 30 V 14 VA 50mA maximum; 24 Vac +2 to -6V 12.5 VA 485 mA maximum; or 24 Vdc +6, to -3V, 7 watts, 230 mA maximum. 100 Vac ± 10 V is optionally available. All AC Power is 50 to 60 Hz. Power applied is indicated by an LED.

- **Heater Power**

Field or factory selectable for specific fluid service requirements.

- **Relay Rating**

Dual alarm SPDT or single alarm DPDT field configurable 6 amp resistive at 240 Vac, 115 Vac or 24 Vdc. Options available on auxiliary relay board are 2 amp or 10 amp DPDT, plastic sealed, 0.5 amp DPDT hermetically sealed.

- **Enclosure**

Hazardous Location Class I, II, Div. 1, 2 Groups B, C, D, E, F, and G. NEMA type 4X optionally available.

- **Electronics**

Part Number: 5294- _ _ _ FlexSwitch™

- **Agency Approvals**

Factory Mutual and CSA system approved. CENELEC (hazardous location only) system approved. Approved CE marking.