

# FCI FLUID COMPONENTS INTERNATIONAL LLC

24 Hour Factory Service Hot Line: 1 (800) 854-1993

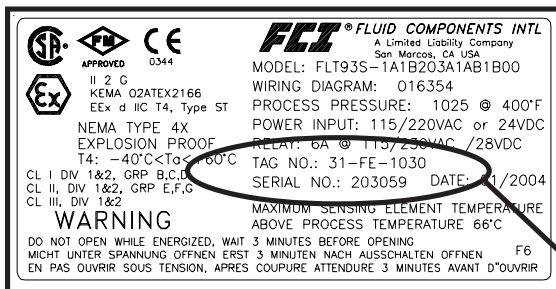
Document 06EN003312 Rev. C

## FLT93 Installation, Operation and Troubleshooting Guide

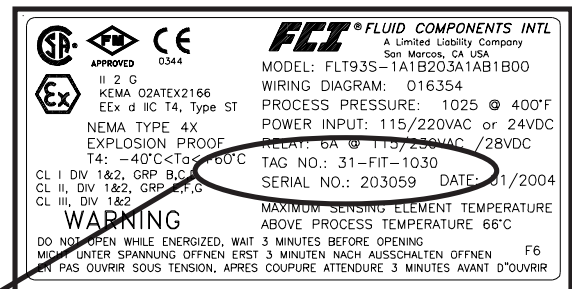
### Step 1. Pre-Installation

- A. To get the best results from the instrument, the instrument should be mounted 20 pipe diameters downstream from any valve, pipe elbow, or other flow disturbance and 10 pipe diameters upstream from any disturbances.

The instrument tag shows the model number, tag number (if noted on the customer's order), serial number along with other important safety information. Compare this information with the appropriate pipe installation drawings to verify the instrument is the correct configuration.



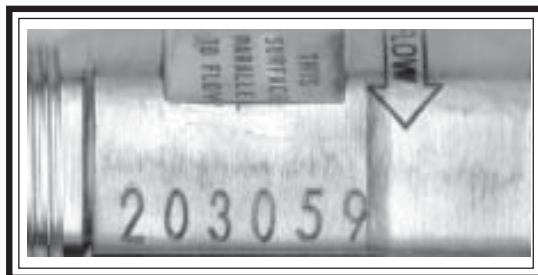
Tag Location - Between Conduit Ports  
On Integral or Local Enclosure



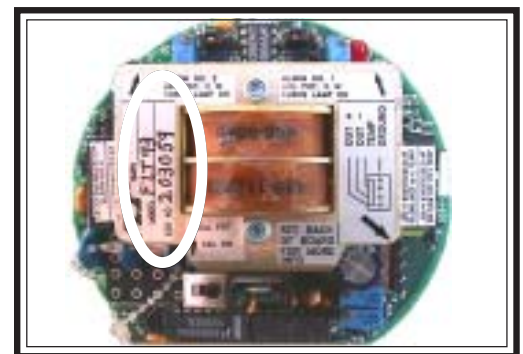
Tag Location - Top Side of  
Remote Enclosure Option

If the instrument is a remote configuration, the serial number on the enclosure tags must match. The recommended tag number on the local enclosure will have an FE in the tag number. The recommended tag number on the remote enclosure will have an FT in the tag number. (Tags are specified by the customer, "FE/FT" is a recommended naming convention.)

- B. Verify the serial numbers on the enclosure(s), flow element and electronics match. The instrument may not work if the serial numbers do not match. (The remote option has a remote transmitter enclosure (FT) and a local flow element enclosure (FE). The integral option has one enclosure.)



Flow Element Serial Number  
Also Showing Flow Arrow  
(Located near the FE enclosure.  
It is also on the enclosure tag.)

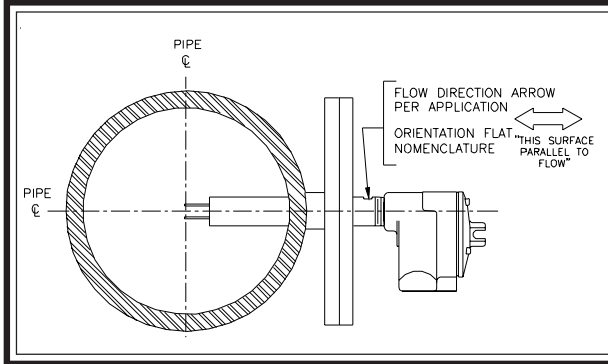


Electronics Serial Number  
(It is also on the transmitter's (FT) enclosure tag.)

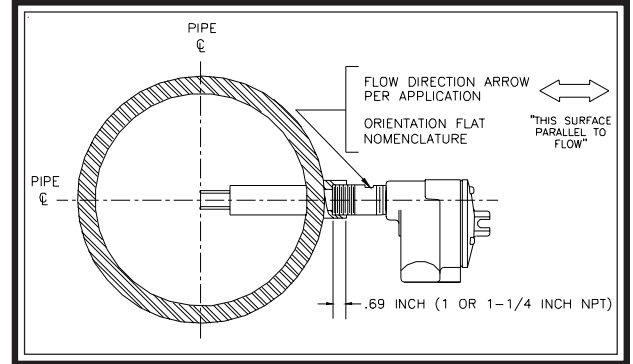
- C. Recommended installation/troubleshooting tools are an open-ended wrench to fit the NPT connection, an open-ended wrench to fit the flanged fitting nuts and bolts, a small flat blade screw driver for manipulating potentiometers, both a medium flat blade screwdriver and a medium phillips head screwdriver for tightening connections, 3 mm allen wrench for CENELEC approved instruments, a measuring tape for proper flow element placement, and a DVM for Ohm/Voltage measurements.

## Step 2. Flow Element Installation

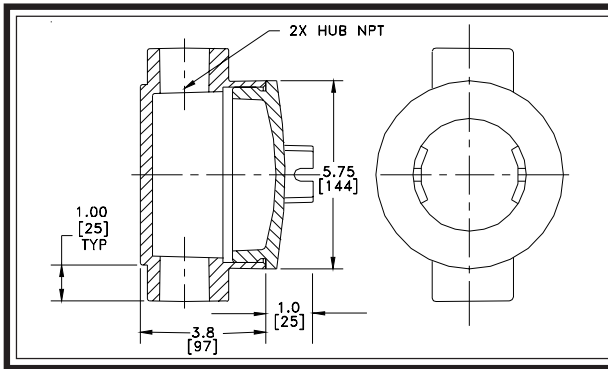
Install the flow element, with the flow arrow (shown on Page 1) in the direction of media flow. The element should be in the center line of the process pipe or rectangular duct. The flow arrow flat area is to be parallel  $\pm 2^\circ$  with the media flow. If the remote control circuit option is used, the serial number of the flow element must match the serial number of the electronic enclosure. See the Installation Section in the FLT Series Manual, Document Number 06EN003246, for more details. Below are the most common instrument mounting options.



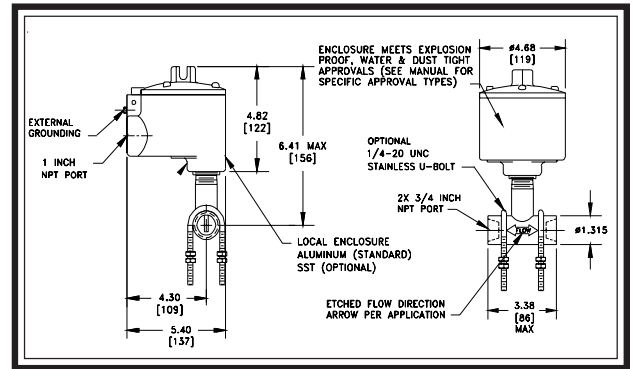
Flanged Integral Instrument Shown in a Customer Process



NPT Integral Instrument Shown in a Customer Process



Remote Enclosure Option



FLT93L Local Inline Mount


## Step 3. Wiring Preparation

Before the instrument is opened to install the wiring, FCI recommends that the following ESD precautions be observed:

Use a wrist band or heel strap with a 1 megohm resistor connected to ground. If the instrument is in a shop setting there should be static conductive mats on the work table and floor with a 1 megohm resistor connected to ground. Connect the instrument to ground. Apply antistatic agents such as Static Free made by Chemtronics (or equivalent) to hand tools to be used on the instrument. Keep high static producing items away from the instrument such as non-ESD approved plastic, tape and packing foam.

The above precautions are minimum requirements to be used. The complete use of ESD precautions can be found in the U.S. Department of Defense Handbook 263.

Unscrew the instrument's lid. Remove the control circuit by prying up on the metal transformer tabs (under the serial number label) while rocking the transformer back and forth. This exposes the wiring block shown on the next page.



**Caution:** Be sure the instrument is configured correctly for the applied input power. If Factory Mutual specifications were ordered, the input power should be 115 VAC and the instrument jumpers should be set for 115 VAC as shown on Page 4. Otherwise, the power input has been set for 220 VAC unless otherwise specified.

# Step 4. Wiring the Instrument



**Caution:** Only qualified personnel are to wire or test this instrument. The operator assumes all responsibilities for safe practices while wiring or troubleshooting.



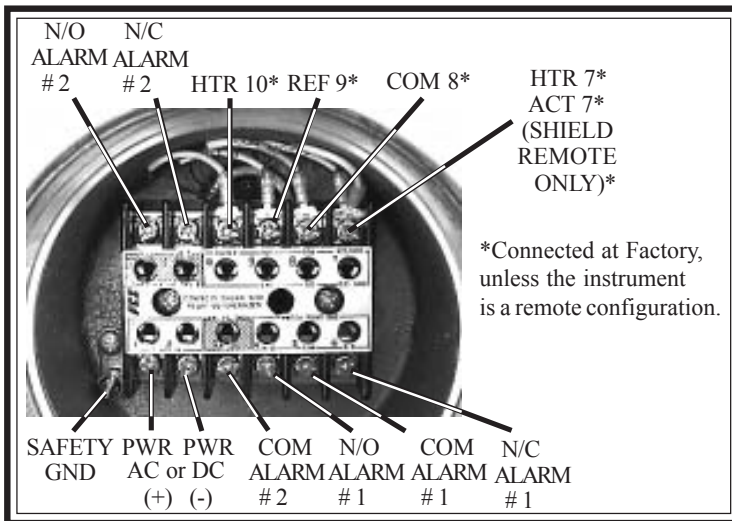
**Alert:** The instrument contains electrostatic discharge (ESD) sensitive devices. Use standard ESD precautions when handling the control circuit.

## Wiring the Instrument into the Customer Application:

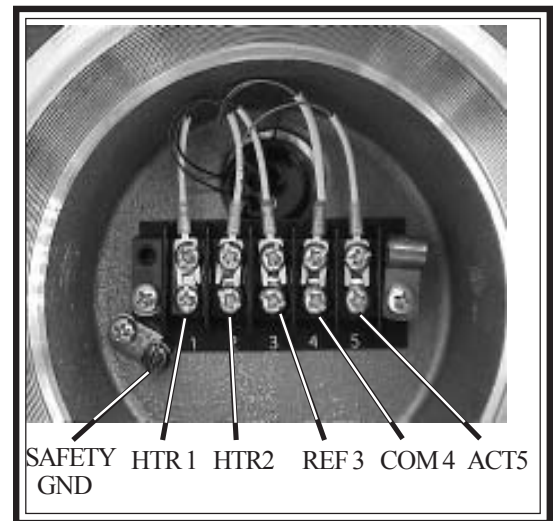
This section describes proper wiring to the transmitter inputs, outputs and interconnection cabling for the optional remote configuration. See the following table to determine the size of wiring to be used versus the length of the wire.

Connection	Maximum Distance for AWG					
	10 ft. (3m)	50 ft. (15m)	100 ft. (31m)	250 ft. (76m)	500 ft. (152m)	1000 ft. (305m)
AC Power	22	22	22	20	18	16
Relay (6A)	22	16	12	Not Recommended		
Flow Element Wires*	22	20	20	18	18	18

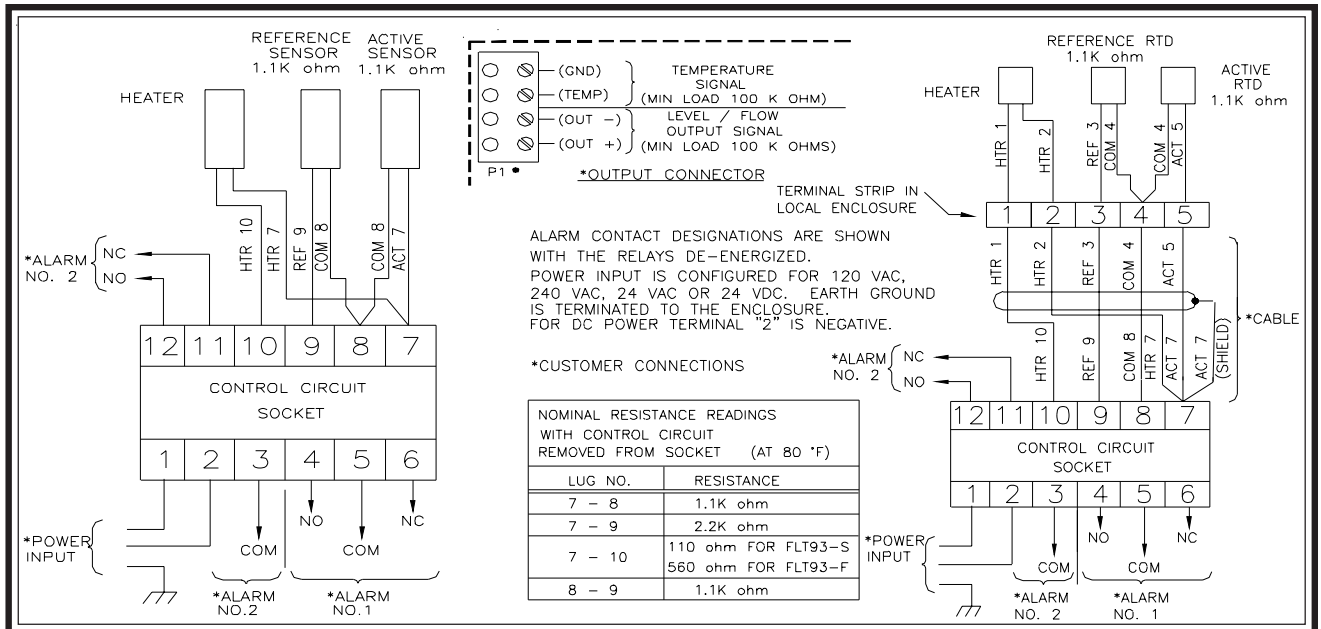
\*Requires a shielded cable with the shield wire connected to the control socket only.



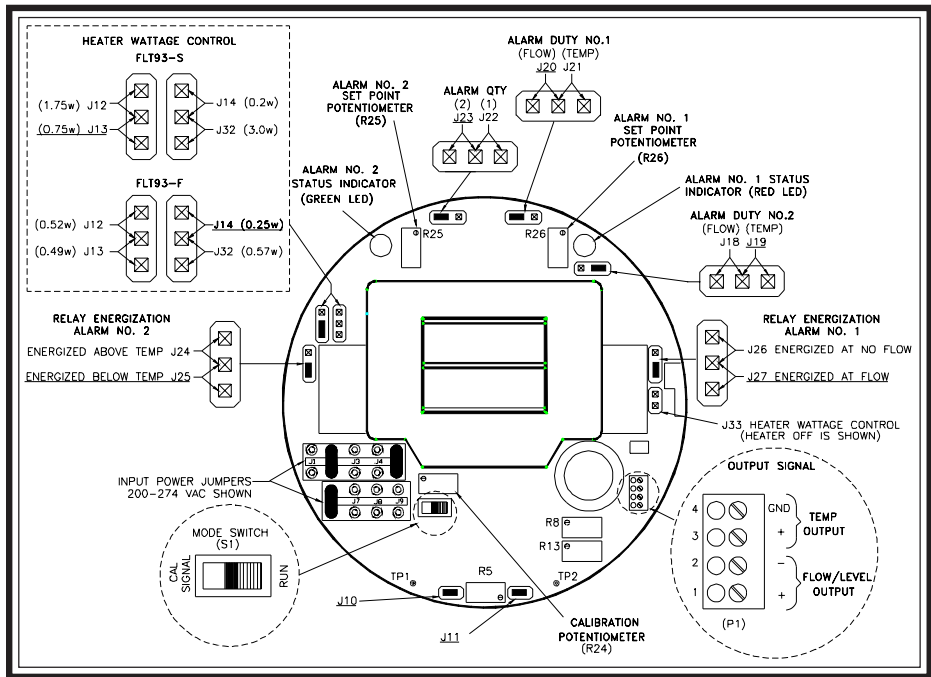
FLT93 Integral (Remote) Wiring Pictorial



FLT93 Local Wiring Pictorial



# Step 5. Jumper Placement



**Jumper Locations (Underlined Jumpers are default)**

### Alarm Application

	FLOW /LEVEL	TEMP.
ALARM NO. 1	<u>J20</u>	<u>J21</u>
ALARM NO.2	<u>J18</u>	<u>J19</u>

### Optional Fixed Heater Wattage Control

JUMPER	J13	J14
FLT93-F ELEMENT WATTAGE (560 OHM HTR)	N/A	0.20 WATTS
FLT93-S ELEMENT WATTAGE (110 OHM HTR)	0.75 WATTS	N/A

### Input Power

JUMPER	POWER SELECT			
	100-130 VAC	200-260 VAC	18-26 VAC	21-30 VDC
J1	IN	OUT	OUT	OUT
J2	OUT	IN	OUT	OUT
J3	IN	OUT	OUT	OUT
J4	OUT	OUT	IN	OUT
J5	IN	IN	OUT	OUT
J6	OUT	IN	IN	IN
J7	OUT	OUT	OUT	IN
J8	OUT	OUT	OUT	IN
J9	OUT	OUT	IN	OUT

### Relay Energization

JUMPER	
	ALARM NO. 1
<u>J27</u>	RELAY DE-ENERGIZED WITH LOW FLOW, LOW LEVEL (DRY) OR HIGH TEMPERATURE.
J26	RELAY DE-ENERGIZED WITH HIGH FLOW, HIGH LEVEL (WET) OR LOW TEMPERATURE.
	ALARM NO. 2
<u>J25</u>	RELAY DE-ENERGIZED WITH LOW FLOW, LOW LEVEL (DRY) OR HIGH TEMPERATURE.
J24	RELAY DE-ENERGIZED WITH HIGH FLOW, HIGH LEVEL (WET) OR LOW TEMPERATURE.

### Selectable Heater Wattage Control

JUMPER	J32	J12	J13*	J14*	J33
FLT93-F ELEMENT WATTAGE (560 OHM HTR)	0.57 WATTS	0.52 WATTS	0.49 WATTS	0.20 WATTS	OFF
FLT93-S ELEMENT WATTAGE (110 OHM HTR)	3 WATTS	1.75 WATTS	0.75 WATTS	0.27 WATTS	OFF

\*J13 IS STANDARD FOR FLT-S AND J14 IS STANDARD FOR FLT93-F.

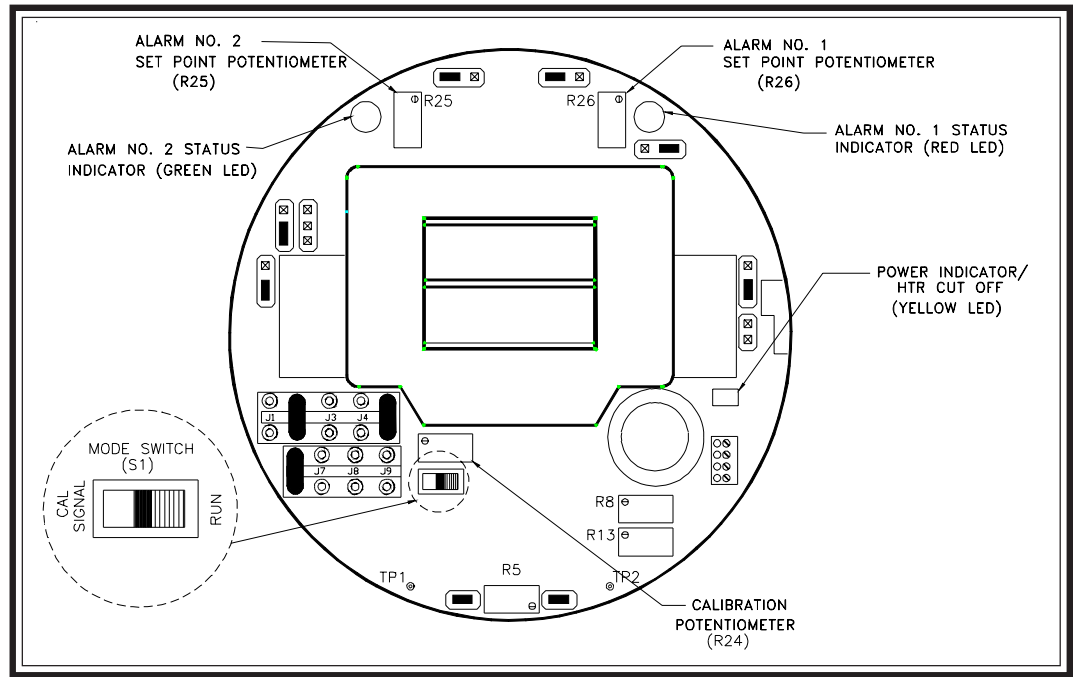
### Relay Contact Configuration

<u>J23</u>	DUAL SPDT (ONE RELAY PER ALARM)
J22	SINGLE DPDT (DISABLES ALARM NO. 2)

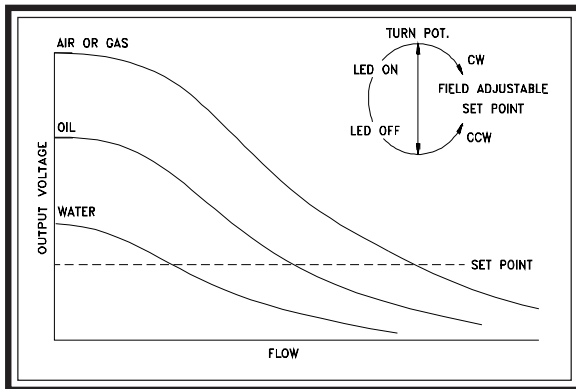
### Standard Default Jumper Configuration

INPUT POWER	230 VAC (J2, J5 AND J6), OR FM APPROVAL 120 VAC (J1, J3, J5)
HEATER POWER	FLT93-S 0.75 WATTS FOR AIR OR LIQUID APPLICATIONS (J13) FLT93-F 0.25 WATTS FOR AIR OR LIQUID APPLICATIONS (J14)
NUMBER OF ALARMS	TWO (J23). EACH ALARM HAS ONE SET OF SPDT CONTACTS.
ALARM NO. 1 RED LED SET POINT POT R26	SET TO MONITOR FLOW OR LEVEL SIGNALS (J20). RELAY ENERGIZED AT FLOW OR WET (J27).
ALARM NO. 2 GREEN LED SET POINT POT R25	SET TO MONITOR TEMPERATURE SIGNALS (J20). RELAY ENERGIZED BELOW TEMPERATURE (J25). SET POINT AT APPROXIMATELY: 250° F (121° C) FOR STANDARD TEMPERATURE, 500° F (260° C) FOR MEDIUM TEMPERATURE, 850° F (454° C) FOR HIGH TEMPERATURE (FLT93-S ONLY).

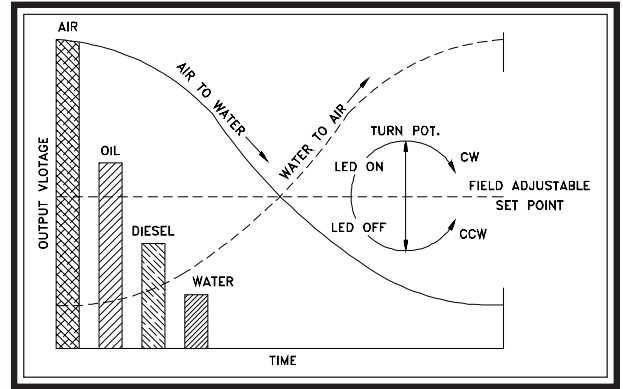
# Step 6. Alarm Adjustment Procedure (Not necessary if the instrument has been factory calibrated.)



Control Circuit Adjustment Locations



Flow Application Signal Output



Level Application Signal Output

## Adjustment by Observation (Option 1)



**Note:** The control circuit has two mutually exclusive alarms; they are identified as Alarm No. 1 and Alarm No. 2 and each has a set point adjustment potentiometer and LED indicator. Each alarm can be setup for one of three applications: flow, level/interface, or temperature. The following application specific adjustment procedures are generic and can be used for setting either or both alarms. The mode switch must be in the RUN position. Use the top figure on this page to help locate the adjustment potentiometers and LEDs.

### Flow Applications

1. Ensure that the instrument has been properly installed in the pipeline. Fill the pipeline so the sensing element is surrounded by the process media.
2. Apply power to the instrument and allow fifteen minutes for the sensing element to become active and stabilize.
3. Flow the pipeline at the normal or expected rate. Remove the enclosure cover to allow access to the control circuit to make adjustments.

### Detecting Decreasing Flow (low flow alarm)

If the status LED is off, turn the set point adjustment potentiometer clockwise until the LED turns on. With the LED on, slowly turn the potentiometer counterclockwise one turn past the point at which the LED just turns off. The potentiometer may have up to one-quarter turn of hysteresis, therefore, if the mark is overshoot, the procedure should be repeated.

### Detecting Increasing Flow (high flow alarm)

If the status LED is on, turn the set point adjustment potentiometer counterclockwise until the LED turns off. With the LED off, slowly turn the potentiometer clockwise one-half turn past the point at which the LED just turns on. The potentiometer may have up to one-quarter turn of hysteresis, therefore, if the mark is overshoot, the procedure should be repeated.

### Signal Output for Flow Applications

The output signal at connector P1 is a non-linear voltage representation of the flow rate. The output signal level is also relative to the type of process media, see flow application signal output figure on the previous page.

## Level Applications

1. Ensure that the instrument has been properly installed in the vessel.
2. Apply power to the instrument and allow fifteen minutes for the sensing element to become active and stabilize.
3. Remove the enclosure cover to allow access to the control circuit to make adjustments.

### Detecting Dry Condition (adjustment with sensing element wet)

Verify that the sensing element is wet. If the status LED is off, turn the set point adjustment potentiometer clockwise until the LED turns on. With the LED on, slowly turn the potentiometer counterclockwise one turn past the point at which the LED just turns off. The potentiometer may have up to one-quarter turn of hysteresis, therefore, if the mark is overshoot, the procedure should be repeated.

### Detecting Wet Condition (adjustment with sensing element dry)



**Alert:** Give consideration to the fact that air or gas flowing over the sensing element may decrease the output signal resulting in a false alarm. If the sensing element is exposed to air or gas flow in the dry condition, or where the process media is highly viscous, make set point adjustments in the wet condition only.

Field adjustments made in the dry condition should be performed in the actual service environment or within a condition that approximates that environment. Provision should be made for the worst case condition of air or gas flow on the sensing element. If the status LED is on, turn the set point adjustment potentiometer counterclockwise until the LED turns off. (If the LED cannot be turned off, the instrument must be set in the wet condition.)

With the LED off, slowly turn the potentiometer clockwise 1 turn past the point where the LED just lights. The potentiometer may have up to one-quarter turn of hysteresis, therefore, if the mark is overshoot, the procedure should be repeated.

### Signal Output for Level Applications

The output signal at P1 is low in liquid and high in gas. See the level application signal output figure on the previous page.

## Temperature Applications



**Note:** It is recommended not to use the instrument for a dual flow and temperature application in air or gas unless the flow rate is greater than 5.0 SFPS. (The instrument may be used for a dual flow and temperature application in liquids at any flow rate.)

When using the instrument for both level and temperature applications, the temperature signal can be as much as 50°F (28°C) high when the sensing element is in still air.

Turn the heater off for temperature only applications. To turn off the heater remove the heater control jumper from the heater wattage control. The jumper may be stored on the control circuit by plugging it across J12 and J14. Placing the jumper here will not turn on the heater.

Ensure that the instrument has been properly installed. Apply power to the instrument and allow fifteen minutes for the sensing element to become active and stabilize.

Establish the normal or expected temperature. Remove the enclosure cover to allow access to the control circuit. Perform either the detecting increasing temperature or detecting decreasing temperature procedure shown below.

#### Detecting Increasing Temperature (high temperature alarm)

If the status LED is off, turn the alarm adjustment potentiometer clockwise until the LED turns on. With the LED on, slowly turn the potentiometer counterclockwise one half turn past the point at which the LED just turns off. The potentiometer may have up to one-quarter turn of hysteresis, therefore, if the mark is overshot, the procedure should be repeated.

#### Detecting Decreasing Temperature (low temperature alarm)

If the status LED is on, turn the set point adjustment potentiometer counterclockwise until the LED turns off. With the LED off, slowly turn the potentiometer clockwise one-half turn past the point at which the LED just turns on. The potentiometer may have up to one-quarter turn of hysteresis, therefore, if the mark is overshot, the procedure should be repeated.

## Adjustment by Measurement (Option 2)

### Air/Gas Flow Applications

1. Remove the instrument's enclosure cover.
2. Ensure the configuration jumpers on the control circuit are correct for this application. See tables on page 4.
3. Check to make sure the input power jumpers match the power to be applied to the instrument. See the power table on page 4.
4. Apply power to the instrument. Verify the yellow LED is on and allow the instrument fifteen minutes to warm-up.
5. Verify the mode switch is in the RUN position.
6. Attach a DC voltmeter to the P1 terminal block with the positive (+) lead to position one and the negative (-) lead to position two.



**Note:** The terminal block can be unplugged from the control circuit to facilitate easy connections. The terminal block is used in late production instruments. Early production instruments used a mating cable and connector. If a cable and connector are required use FCI part number 015664-01 to order.

7. Establish the normal process flow condition and allow the signal to stabilize.



**Note:** The output signal at connector P1 will vary inversely with changes in the process flow rate. The output signal level is relative to the type of process media being measured and the heater wattage setting. See flow application figure on page 5.

- Record the normal flow signal value.

Normal Flow Signal = \_\_\_\_\_ volts DC

- Follow either the Detecting Decreasing Flow or the Detecting Increasing Flow procedure for each flow application alarm.

#### Detecting Decreasing Flow (low flow alarm)

- Stop the process flow and allow the signal to stabilize.

- Record the no-flow signal. (The no-flow signal should be greater than the normal flow signal.)

No-Flow Signal = \_\_\_\_\_ volts DC

- Determine the set point by calculating the average of the normal and no-flow output signals. (i.e.; If the normal signal is 2.000 volts and the no-flow signal is 5.000 volts, then the calculated set point would be 3.500 volts.)

- Record this value.

Calculated Set Point = \_\_\_\_\_ volts DC

**Note:** The calculated set point must be at least 0.020 volts greater than the normal signal to ensure that the alarm will reset.

- Slide the mode switch to the CALIBRATE position.

- Adjust the calibrate potentiometer (R24) until the voltmeter equals the calculated set point.

- For the appropriate alarm, determine whether the status LED is on or off (red for No. 1 or green for No. 2).

If the LED is off, turn the set point adjustment potentiometer (R26 for alarm No. 1 or R25 for alarm No.2) slowly clockwise just until the LED turns on .

OR

If the LED is on, turn the set point adjustment potentiometer (R26 for alarm No. 1 or R25 for alarm No. 2) counterclockwise until the LED turns off and then slowly clockwise just until the LED turns on.

- If this is the only flow application alarm to be setup, then skip to the Continue With the Air/Gas Flow Procedure.

#### Detecting Increasing Flow (high flow alarm)

- Establish the excessive process flow condition and allow the signal to stabilize.

- Record the high flow signal. (The high flow signal should be less than the normal flow signal.)

High Flow Signal = \_\_\_\_\_ volts DC

- Determine the set point by calculating the average of the normal and high flow output signals. (i.e., If the normal signal is 2.000 volts and the high flow signal is 1.000 volts, then the calculated set point would be 1.500 volts.)

- Record this value.

Calculated Set Point = \_\_\_\_\_ volts DC

**Note:** The calculated set point must be at least 0.020 volts less than the normal signal to ensure that the alarm will reset.

- Slide the mode switch to the CALIBRATE position.

- Adjust the calibrate potentiometer (R24) until the voltmeter equals the calculated set point.

- For the appropriate alarm, determine whether the status LED is on or off (red for No. 1 or green for No. 2).

If the LED is on, turn the set point adjustment potentiometer ( R26 for alarm No. 1 or R25 for alarm No. 2) slowly counterclockwise just until the LED turns off.



OR

If the LED is off, turn the set point adjustment potentiometer ( R26 for alarm No. 1 or R25 for alarm No. 2) clockwise until the LED turns on and then slowly counterclockwise just until the LED turns off.

Continue With the Air/Gas Flow Procedure

1. Slide the mode switch to the RUN position.
2. Establish the normal process flow condition. For low-flow alarm setups, the status LED should be off. For high flow alarm setups, the status LED should be on.
3. Establish the process alarm condition and monitor the voltmeter display.
4. When the output signal passes through the calculated set point value, the status LED should turn on for low-flow alarms, off for high flow alarms, and the relay contacts should change state.
5. Reestablish the normal process flow condition. Both the LED and the relay contacts should reset.
6. Disconnect the voltmeter from P1.
7. Replace the enclosure cover.



**Note:** The alarm can be set for a specific flow rate. Follow the Air/Gas Flow Application procedure up to step 7 except establish the specific flow rate rather than the normal flow. The output signal will be the set point value. Determine whether the alarm should actuate with decreasing or increasing flow and skip to the appropriate step 4 in Detecting Decreasing Flow or Detecting Increasing Flow, respectfully. Enter the specific flow rate value as the set point. Then follow the Continue With the Air /Gas Flow Procedure steps.

The relay logic default configuration is set for the relay coil to be de-energized when the flow signal voltage is greater than the set point value. (i.e., Assume that the normal process flow condition has been established. In this state, the relay coil will be energized if the alarm has been set for low-flow detection and de-energized if the alarm has been set for high flow detection.) A recommendation is to have the relay coils energized when the process condition is normal. This will enable the alarm to close or open the contacts in case of a power failure.

**Wet/Dry Liquid Level Applications**

1. Remove the instrument's enclosure cover.
2. Ensure the configuration jumpers on the control circuit are correct for this application. See the tables on page 4.
3. Check to make sure the input power jumpers match the power to be applied to the instrument. See the power table on page 4.
4. Apply power to the instrument. Verify the yellow LED is on and allow the instrument fifteen minutes to warm-up.
5. Verify the mode switch is in the RUN position.
6. Attach a DC voltmeter to P1 with the positive (+) lead to position one and the negative (-) lead to position two.



**Note:** The terminal block can be unplugged from the control circuit to facilitate easy connections. The terminal block is used in late production instruments. Early production instruments used a mating cable and connector. If a cable and connector are required use FCI part number 015664-01 to order.

7. Raise the process fluid level so the sensing element is wet.
8. Allow the output signal to stabilize and record the wet condition value.

Wet Condition Signal = \_\_\_\_\_ volts DC



**Note:** The output signal at P1 is relative to the type of process media detected. See the figure on page 4.

9. Lower the process fluid level so the sensing element is dry.
10. Allow the output signal to stabilize and record the dry condition value. (The dry signal should be greater than the wet signal.)  
Dry Condition Signal = \_\_\_\_\_ volts DC
11. Determine the set point by calculating the average of the wet and dry output signals. (i.e., If the wet signal is 0.200 volts and the dry signal is 4.000 volts, then the calculated set point would be 2.100 volts.)
12. Record this value.  
Calculated Set Point = \_\_\_\_\_ volts DC



**Note:** The calculated set point must be at least 0.015 volts greater than the wet signal and 0.020 volts less than the dry signal to ensure that the alarm will reset.

13. Slide the mode switch to the CALIBRATE position.
14. Adjust the calibrate potentiometer (R24) until the voltmeter equals the calculated set point.
15. For the appropriate alarm, determine whether the status LED is on or off (red for No. 1 or green for No. 2).
16. Follow either the Detecting Dry Condition or the Detecting Wet Condition for each level application alarm.

#### Detecting Dry Condition (low level alarm)

If the status LED is off, turn the set point adjustment potentiometer (R26 for alarm No. 1 or R25 for alarm No. 2) slowly clockwise just until the LED turns on.

OR

If the status LED is on, turn the set point adjustment potentiometer (R26 for alarm No. 1 or R25 for alarm No. 2) counterclockwise until the LED turns off and then slowly clockwise just until the LED turns on.

#### Detecting Wet Condition (high level alarm)

If the status LED is on, turn the set point adjustment potentiometer (R26 for alarm No. 1 or R25 for alarm No. 2) slowly counterclockwise just until the LED turns off.

OR

If the status LED is off, turn the set point adjustment potentiometer (R26 for alarm No. 1 or R25 for alarm No. 2) clockwise until the LED turns on and then slowly counterclockwise just until the LED turns off.

17. Slide the mode switch to the RUN position. The status LED should be on if the sensing element is dry and off if the sensing element is wet.
18. Monitor the voltmeter display while raising or lowering the process fluid level. When the output signal passes through the set point, the status LED should change states and the relay contacts should change state.
19. Reestablish the normal level condition. Both the LED and relay contacts should reset.
20. Disconnect the voltmeter from P1.
21. Replace the enclosure cover.



**Note:** The relay logic default configuration is set for the relay coil to be de-energized when the level signal is greater than the set point value. (i.e., The relay coil will be de-energized when the sensing element is dry.) A recommendation is to have the relay coils energized when the process condition is normal. This will enable the alarm to close or open the contacts in case of a power failure.

**Temperature Applications**

If the adjustment by observation is not accurate enough for the application, adjustment with a voltmeter can be accomplished using manual 06EN003246. See the Operation Section of the manual for complete instructions.

## Step 7. Troubleshooting

1.	Is the Yellow LED on, off, blinking, or dim.	<p><b>LED ON</b> Although the LED is on, it may appear dim. This is usually caused by the instrument being supplied with 115 Vac and the Input Power Jumper Configuration set to 220 Vac.</p> <p><b>Input power and jumper configuration:</b> <b>OK:</b> See Step 2. <b>NOT OK:</b> Remove the control circuit and set the jumpers correctly. Reinstall the control circuit and restart the system.</p> <p><b>LEDOFF</b> Check the Input Power Jumper Configuration setting and verify the input power. <b>OK:</b> See Step 4 <b>NOT OK:</b> Remove the control circuit, set the jumpers correctly and verify the input power. Reinstall the control circuit, restart the system and check for proper operation. If LED is still off go to Step 4.</p> <p><b>LEDBLINKING</b> For Liquid Flow Applications: Sensor is DRY. Make sure the pipe is full. For Gas Flow Applications: Heater power set too high. Set to lower value by moving heater jumper. For Liquid level Applications: Heater power set too high. Set to lower value by moving heater jumper. For Liquid Interface Applications: Set the heater power to the maximum value to achieve the maximum signal difference between the two liquids. For liquid applications, it is normal for the LED to blink if the element goes dry. Go to Step 2.</p>
2.	Mode Switch	<p>Make sure the mode switch is in the “RUN” position. <b>OK:</b> See Step 3.</p>

## Step 7. Troubleshooting Cont'd.

3.	Signal Voltage Observation	<p>Remove the Heater Wattage Control jumper. Measure the signal voltage at P1, Terminals 1 and 2.</p> <p><b>a) The voltage is 0 volts +/- 25 mV:</b>  <b>OK:</b> Reinstall the jumper and wait 5 minutes. Go to c) or d) which ever is applicable.</p> <p><b>b) The voltage is out of tolerance:</b>  <b>NOT OK:</b> The serial numbers on the control board and the sensing element must match. If the serial numbers are OK then contact FCI Field Service.</p> <p><b>c) The Voltage is between 1 and 6 volts and changes with flow or level changes:</b>  <b>OK:</b> See Step 7.</p> <p><b>d) The voltage is still about 0 volts: or the voltage is over + 7 volts: or the voltage is negative, between -1 and -6 volts and changes with flow or level changes:</b>  <b>Not OK:</b> Sensing element not wired correctly or defective. Incorrect wiring on remote instruments is not uncommon upon initial installation. See Step 5 integral installation, or Step 6 remote installations.</p>
4.	Power Supply Check	<p>Measure the voltage at P1 terminals 2 to 4.</p> <p><b>Voltage is 0 volts: NOT OK;</b> Contact FCI Technical Service. Replace with spare control board.</p>
5.	Sensor Element Check for Integral Installation	<p>Turn off the power and remove the control circuit. Check sensing element connections.</p> <p><b>Sensor Failure:</b> Call the Factory</p> <p><b>Sensors are OK:</b> See Step 7.</p>
6.	Sensor Element Check for Remote Installation	<p>Turn off the power and remove the control circuit. Check the flow element connections versus the wiring diagram.</p> <p><b>Remote cable incorrectly wired or damaged:</b> Repair and restart the system.</p> <p><b>Sensor Failure:</b> Call the Factory</p> <p><b>Sensors are OK:</b> See Step 7.</p>
7.	Alarm Switch Point Settings	<p>Make sure that the jumpers are set correctly. The related settings are the "Alarm Duty", "Alarm Quantity" and the "Energization". Refer to the previous tables or the bottom side of the control circuit for more information.</p> <p>Using the Mode Switch set to Cal, check and record the alarm settings. Compare these setting to the signals generated by the process and make adjustments if necessary.</p>

If there are still problems with the instrument, see the Troubleshooting Section in the FLT93 Manual, Document Number 06EN003246. To acquire a manual call your local FCI sales representative.

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