

AMERITROL, INC.

INSTALLATION
OPERATION MANUAL
AND
WIRING DIAGRAM

FX SERIES
FLOW SWITCH
WITH ADDITIONAL
TEMPERATURE SWITCH

Manual Number: FXTX2116-2

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OVERVIEW

This unique instrument is both a flow switch and a temperature switch. Both the flow and temperature switch points are independently adjustable as well as the corresponding relay energization.

The FX Series is an electronic flow switch designed to detect increasing or decreasing flow in virtually all liquids, gases, or slurries. The additional temperature switch is designed to detect the increase or decrease of temperature. Please refer to attached wiring diagram for DIP switches and relay energization switch settings (S1& S2).

- The flow switch factory default settings are configured for liquid flow and relay energized at flow.
- To change from factory default to air flow applications: Change flow switch DIP positions 1 to OFF and 2 to ON.
- To change from factory default relay energization to relay energized at no flow: Reverse red slide switch (S1).
- The application settings switch for temperature is configured as follows: Switches 1 and 2 are off and switches 3 and 4 are on.
- The temperature switch factory default is configured for relay energized below set point.
- To change from factory default relay energization to relay energized above set point: Reverse red slide switch (S2).
- Power input and relay rating are written on the board.

INSTALLATION

Install flow/temperature switch into process. Flow direction is not critical, and it is recommended the flats on the instrument nipple be parallel to flow in horizontal lines and perpendicular to flow in vertical lines.

Conduit Recommendation: Do not place flow/temperature switch at low point of conduit, because moisture can collect at the low point. A conduit seal may be beneficial in preventing moisture from entering the enclosure and damaging the electronics.

Insertion depth recommendations:

- The flow/temperature switch sensor head is extremely versatile in how it is mounted in the process line.
- Ideally at least a 1/4" of sensor head probe is extended into the flow stream for a typical flow/no flow application.
- Top mounted liquid flow installations where the line can be partially full or contain entrained air may need special consideration. To keep the sensor probe immersed in product and improve performance, these applications may require more than 1/4" of the probe to extend into the flow stream.

For mounting threaded units to process lines, it is recommended that:

A half-coupling, thread-a-let or the like be used. It is ideal for probes to extend into the line being monitored as discussed above.

If a pipe Tee is used, it is recommended that the leg used to mount the flow switch be the same as the instrument size (1" MNPT typical). The standard length flow switch sensor (1.8" long) will fit in a 1-1/4" X 1-1/4" X 1" or larger tee.

For mounting flanged units, bolt holes will straddle the process line. Probe length ("U") is specified as the distance from the face of the flange to the tip of the probe.

For liquid service, fill the process line so that the probe is surrounded by liquid.

See attached drawing for wiring details.

CALIBRATION STARTUP

Power the instrument and allow 1 minute for the sensor head to reach equilibrium.

When removing housing cover, observe safety precautions associated with the area in which the unit is mounted.

FLOW SWITCH CALIBRATION

TO DETECT A DECREASE IN FLOW (FACTORY DEFAULT):

It is assumed that the user will have the relay energized at flow and will alarm (relay de-energize) on loss or decrease of flow. Please refer to attached wiring diagram for relay energization switch setting.

Flow product in the process line to the normal /expected rate for 1 minute.

Adjust the potentiometer (R22 on the wiring diagram) on the circuit board until the red LED changes state, as follows:

If the LED is on: Turn the potentiometer clockwise.

If the LED is off: Turn the potentiometer counterclockwise.

Typical backlash for the potentiometer is 1/8 turn.

Once the red LED on/off location is determined, turn the potentiometer in the LED "on" direction (counterclockwise), as follows:

- Air Flow Switch: 4 turns
- Organics/hydrocarbons Flow Switch: 2 turns
- Water Flow Switch: 1 turn

These turn numbers are typical and can be "fine tuned" as required.

TO DETECT INCREASE IN FLOW:

It is assumed that the user will have the relay energized at no flow and will alarm (relay de-energize) on increase of flow. Please refer to attached wiring diagram for relay energization setting. The relay energization switch (red slide switch: S1) will need to be changed from the factory default setting.

Flow product in the process line to the normal condition for 1 minute. If zero flow rate is normal/expected, set with line full at zero flow.

Adjust the potentiometer (R22 on the wiring diagram) on the circuit board until the red LED changes state, as follows:

If the LED is on: Turn the potentiometer counterclockwise.
If the LED is off: Turn the potentiometer clockwise.

Typical backlash for the potentiometer is 1/8 turn.

Once the red LED on/off location is determined, turn the potentiometer in the LED “on” direction (clockwise), as follows:

- Air flow switch: 4 turns
- Organics/hydrocarbons flow switch: 2 turns
- Water flow switch: 1 turn

These turn numbers are typical and can be “fine tuned” as required.

TEMPERATURE SWITCH CALIBRATION

The temperature switch uses the flow switch reference sensor as its primary sensor. Typically the temperature switch is set at the factory per customer specifications. To field calibrate expose the sensor to desired temperature set-point and adjust as shown below.

Power the instrument and adjust as follows:

TO DETECT AN INCREASE IN TEMPERATURE (FACTORY DEFAULT):

It is assumed that the user will have the relay energized below the set-point and will alarm (relay de-energize) on increasing temperature. Please refer to attached wiring diagram for relay energization programming.

Adjust the potentiometer (R8 on the wiring diagram) on the circuit board until the red LED changes state, as follows:

If the LED is on: Turn the potentiometer clockwise.
If the LED is off: Turn the potentiometer counterclockwise.

Typical backlash for the potentiometer is 1/8 turn.

Locate the point where the relay just turns on and the unit is calibrated.

TO DETECT DECREASE IN TEMPERATURE:

It is assumed that the user will have the relay energized above the set-point and will alarm (relay de-energize) on decreasing temperature. Please refer to attached wiring diagram for relay energization programming. The relay energization switch (red slide switch: S2) will need to be changed from the factory default setting.

Adjust the potentiometer (R8 on the wiring diagram) on the circuit board until the red LED changes state, as follows:

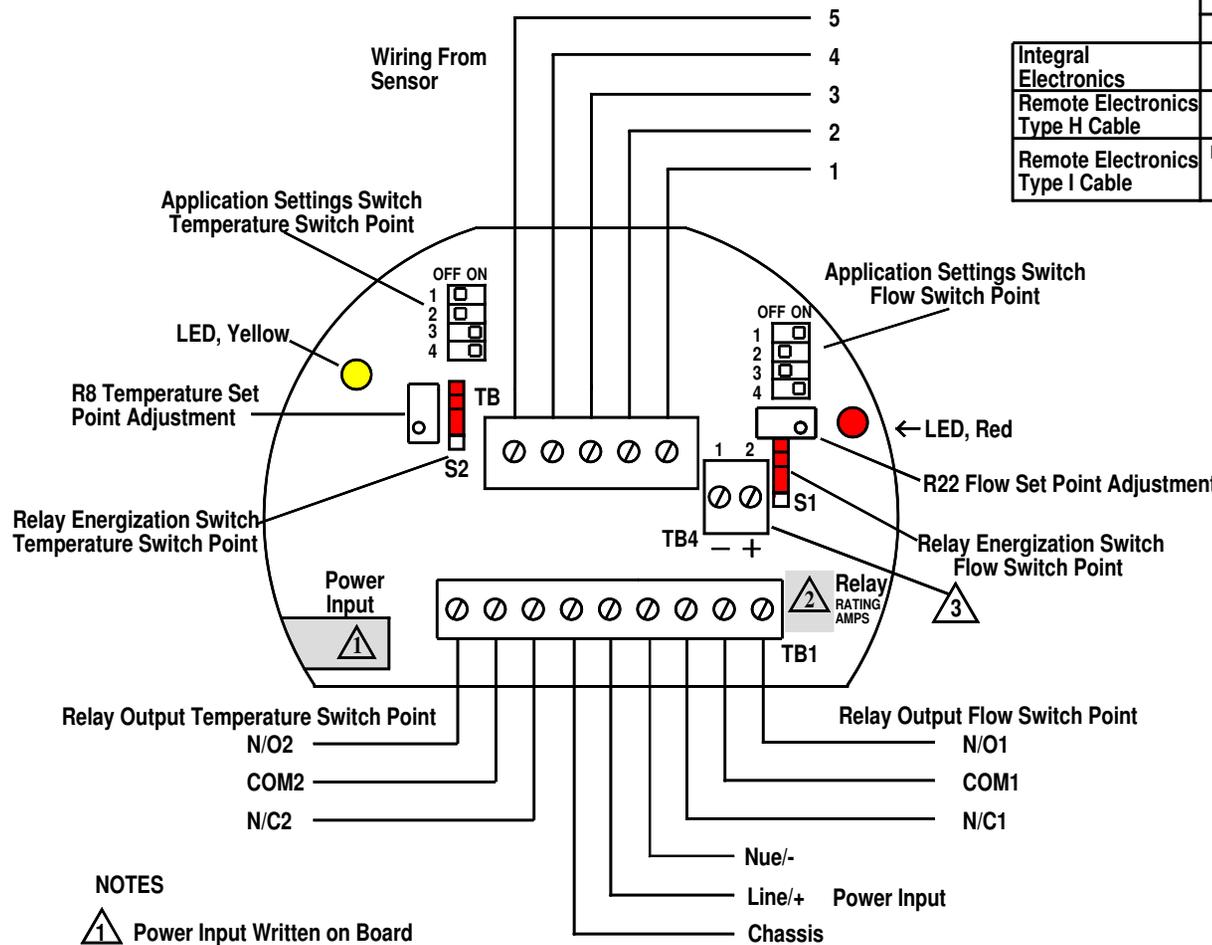
If the LED is on: Turn the potentiometer counterclockwise.

If the LED is off: Turn the potentiometer clockwise.

Typical backlash for the potentiometer is 1/8 turn.

Locate the point where the relay just turns on and the unit is calibrated.

Technical service hours are Monday – Friday from 8:00 AM to 4:30 PM Pacific Standard Time



	Terminal Number (TB)				
	1	2	3	4	5
Integral Electronics	Red or Purple	Red or Purple	Yellow or White	Black	Green
Remote Electronics Type H Cable	White	Blue + Drain	Yellow	Black	Green
Remote Electronics Type I Cable	Red of Pair #1 (Red Foil)	Black of Pair #1 + Drain of Pairs #2 and #3	White of Pair #2 (Green Foil)	Black of Pairs #2 and #3	Green of Pair #3 (Blue Foil)

Application Setting Switches 1 and 2	Switch Position				
	1	2	3	4	
Liquid Flow Switch	ON	OFF	OFF	ON	Factory Default
Air Flow Switch	OFF	ON	OFF	ON	
Liquid Level Switch	OFF	ON	OFF	ON	
Temperature Switch	OFF	OFF	ON	ON	Factory Default

Relay Energization Settings	Switch Position	
Flow Switch		
Energized at Flow	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Factory Default
Energized at No Flow	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
Level Switch		
Energized when Wet	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Factory Default
Energized when Dry	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
Temperature Switch		
Energized below Set Point	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Factory Default
Energized above Set Point	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	

NOTES

1 Power Input Written on Board

"120 VAC"	90-132 VAC, 4 Watts Max.
"12 VDC"	12 VDC +30%, -10% 300 mA
"24 VAC or VDC"	24 VAC or VDC ±10%, 4 Watts or 150 mA
"240 VAC"	200-240 VAC, 4 Watts Max.

2 Relay Rating Written on Board

"3"	3 AMP Relay Rated at 120 VAC or 24 VDC Resistive and 2 AMP at 240 VAC
"10"	10 AMP Relay Rated at 120 VAC or 24 VDC Resistive and 5 AMP at 240 VAC

3 TB4 for Optional mV Output

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Title **Flow Switch with additional Temperature Switch
Wiring Diagram, Dual Switch Point and/or mV Output, X Series Board**

Size A	Drawn by RAL	Drawing No. 2116	Rev 2
Scale	Date 2/01	Sheet 1 of 1	