



## FCI flow switch guide

*Reliability*

*Accuracy*

*Performance*

**FCI**® FLUID COMPONENTS  
INTERNATIONAL LLC

**R**eliability, accuracy and performance are the key product features required by FCI customers for their flow, level and temperature switch applications.

This Selection Guide identifies FCI's flow switch products with their unique performance features to help you easily select the best model for your application.

## Flow Switches

**FLT93 FlexSwitch™ Series** represent FCI's most flexible and robust family of flow, level and temperature switches for liquid, gas or slurry services. Standard product features include, but are not limited to:

- › Insertion and in-line configurations
- › All welded 316L stainless steel with optional exotic materials/special coatings for extreme environments
- › Extended temperature and pressure ranges
- › Temperature compensation for industry leading accuracy and repeatability performance
- › Field configurable flow/level/temperature alarms and input power settings
- › System fail-safe setup configurability
- › Dual analog outputs
- › Global hazardous area system approvals
- › Nuclear qualified
- › Comprehensive 3-year warranty

**FS2000 Nutec™ Series** switches replace mechanical technologies such as paddle and float devices in liquids, gas and slurry while offering superior flow range sensitivity. Models FS2000L and FS2000H feature patented boundary layer sensing to extend flow detection range. Standard product features include, but are not limited to:

- › Insertion and in-line configurations
- › All welded 316L stainless steel or 304/305 stainless steel
- › High purity surface finishes to 10 Ra optional
- › Patented non-intrusive design
- › Temperature compensation for industry leading accuracy and repeatability performance
- › 2 wire loop power or SDPT relay alarm with NPN collector
- › Global hazardous area system approvals
- › Comprehensive 1-year warranty

**FR73B and FR78B BASIC Series** inline flow switches offer a small compact instrument package weighing as little as 2.5 ounces and detecting ultra low flow rates from 0.00016 cc/sec in liquids and 0.0167 cc/sec in air or gases. Unique product features include, but are not limited to:

- › FR73B provides a precision linear analog output signal for extremely low flow rates in either direction. This instrument is ideal for chemical injection, gas chromatography, and fluid sampling
- › FR78B provides low flow rate sensitivity with fast-response and is ideal for OEM applications

Fluid Components International's  
line of flow, level and  
temperature switches



- › 316 stainless steel with nickel alloy braze
- › Suitable for light industrial locations
- › Comprehensive 1-year warranty

**RF83 Series** insertion flow switch is the only thermal device capable of detecting reverse flow for any application. Standard product features include, but are not limited to:

- › 316 stainless steel with nickel alloy braze
- › Proprietary reverse flow sensor assembly design
- › Dual switch point electronics with fail-safe alarms
- › Suitable for hazardous locations
- › Comprehensive 1-year warranty

**12-64B BASIC Series** insertion flow switch offers an economical instrument for low flow detection in liquids, gases and slurry with same-day shipments available. Standard product features include, but are not limited to:

- › 316 stainless steel with nickel alloy braze
- › External control system can be actuated from DPDT relay
- › Suitable for hazardous locations
- › Global hazardous area system approvals
- › Same day shipments
- › Comprehensive 1-year warranty

## Reliability

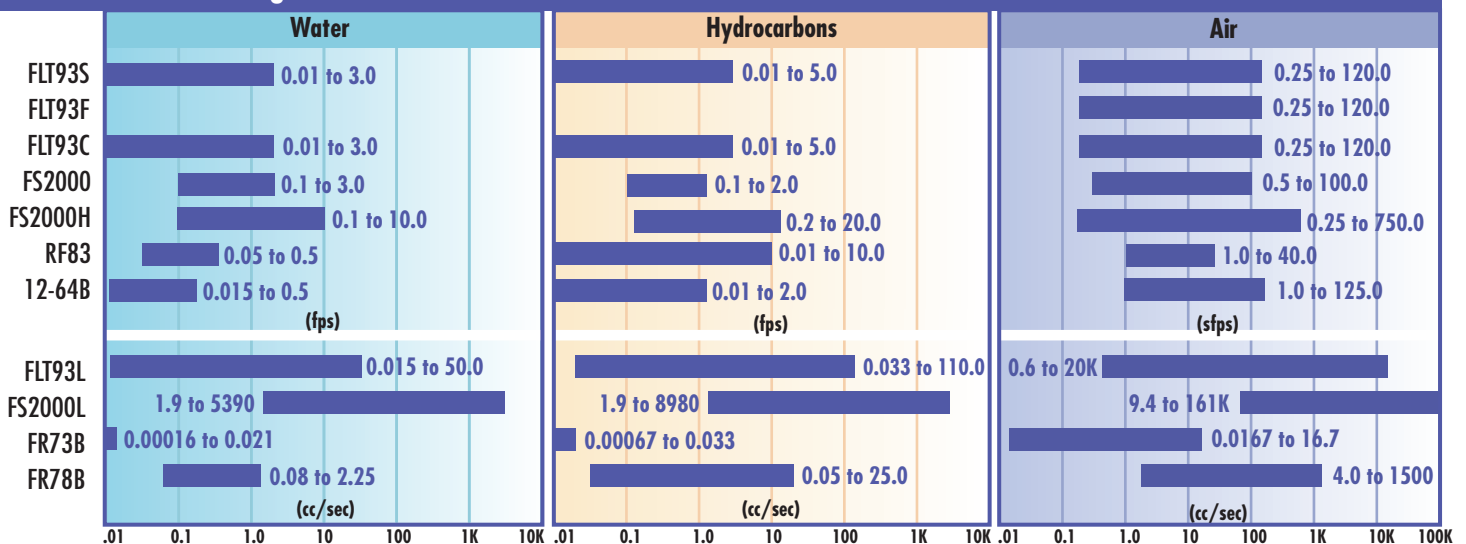
FCI has an established worldwide reputation for the design and manufacture of precision high performance flow, level and temperature instrumentation. With reliability second to none, the company has a global installed instrument base exceeding 250,000 units for critical customer applications in liquid, gas and slurry processes. FCI is ISO 9001 certified and exclusively features a world class NIST flow laboratory servicing all types of process fluids and gases. Sample calibration fluids include:

- › Water – deaerated and de-mineralized
- › Solvents and cleaning fluids
- › Oil – 30 wt, diesel and hydraulic
- › Fuel – JP4, JP5, JP8 and others
- › Sanitary – milk, juice and creams
- › Air and gases – hydrocarbons and mixed gases

## Flow Switch Selection Guide

	Process Media		Sensor Type			Process Requirements					
	Liquid & Slurry	Gas	Insertion	In-Line	Non-Intrusive	Hazardous Locations	500 psig (34.5 barg)	2000 psig (137.9 barg)	Erosion Resistant	Corrosion Resistant	Up to 250°F (121°C)
FLT93S	•	•	•			•	•	•	•	•	•
FLT93F		•	•			•	•	•		•	•
FLT93L	•	•		•		•	•	•	•	•	•
FLT93C	•	•	•			•	•	•		•	•
FS2000L	•	•		•	✗	•	•		•	•	•
FS2000/FS2000H	•	•	•		✗ (H)	•	•			•	•
FR73B	•	•		•							•
FR78B	•	•		•							•
RF83	•	•	•			•	•				•
12-64B	•	•	•			•	•	•	•	•	•

## Switch Point Range

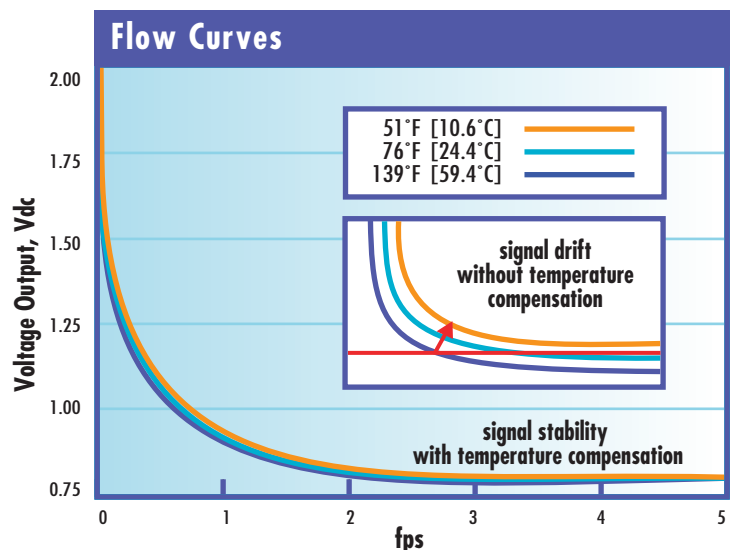


## Accuracy and Temperature Compensation

FLT93 and NuTec Series switches are “precision temperature compensated” to insure the accuracy of factory and field set alarms when installed in dynamic process applications. Accuracy combined with temperature compensation results in:

- Preventing false alarms or alarm failure
- Maximizing operator and process safety
- Having the option to set alarms within a narrow set point range

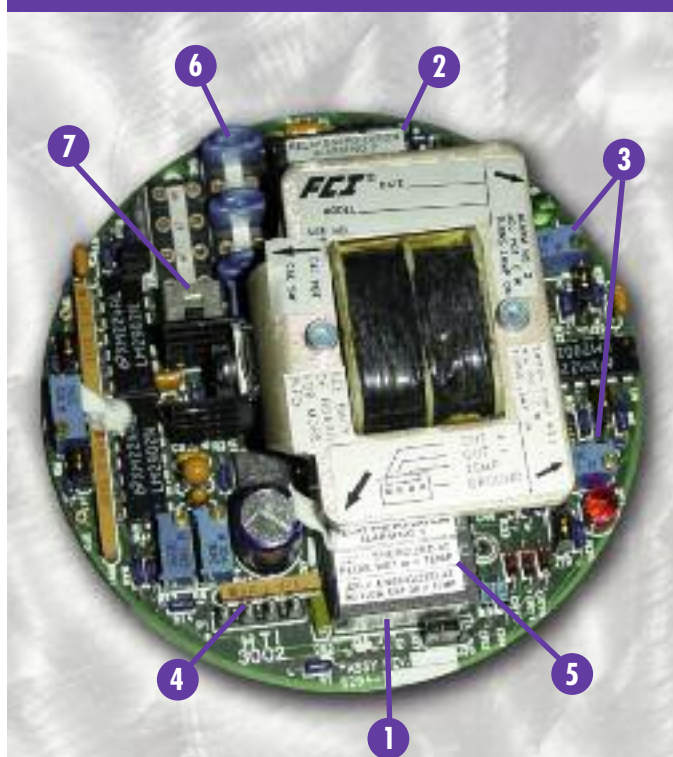
The “Flow Curves” graph (right) illustrates how “temperature compensated” flow switches will not experience signal drift during temperature changes. Whereas a “non-temperature compensated” flow switch experiences signal drift (as indicated by the red arrow) causing alarm failure.



			Sensor Features			Materials of Construction			Custom Features			
Up to 350°F (177°C)	Up to 500°F (260°C)	Up to 850°F (454°C)	Fast Response Time	Precision Temperature Compensation	Ultra High Flow Range	316 L Stainless Steel	Hastelloy, Titanium or Monel	High Purity or Sanitary Service	Field Configurable for Flow, Level & Temperature	Detects Reverse Flow	In-line with Ultra Low Flows	2 Wire Loop Power
•	•	✘		✘		•	•		•			
•	•		•	✘		•	•		•			
•	•		•	✘		•	•		•		•	
•	•			✘		•	•	✘	•			
			✘	✘	✘	•		✘			•	
			✘	✘	✘ 100	•						✘
•			•								•	
•			•								•	
•			•				•			✘		
•			•									

• = yes   ✘ = core strength

### Electronics Performance Features



- 1 System fail-safe
- 2 Optional hermetically sealed relays
- 3 Factory or field set switch point
- 4 Simultaneous dual analog output
- 5 Dual SPDT or single DPDT relay
- 6 Field configurable power selection and relay probes
- 7 Field verification/calibration

### Sensor Element Performance Features

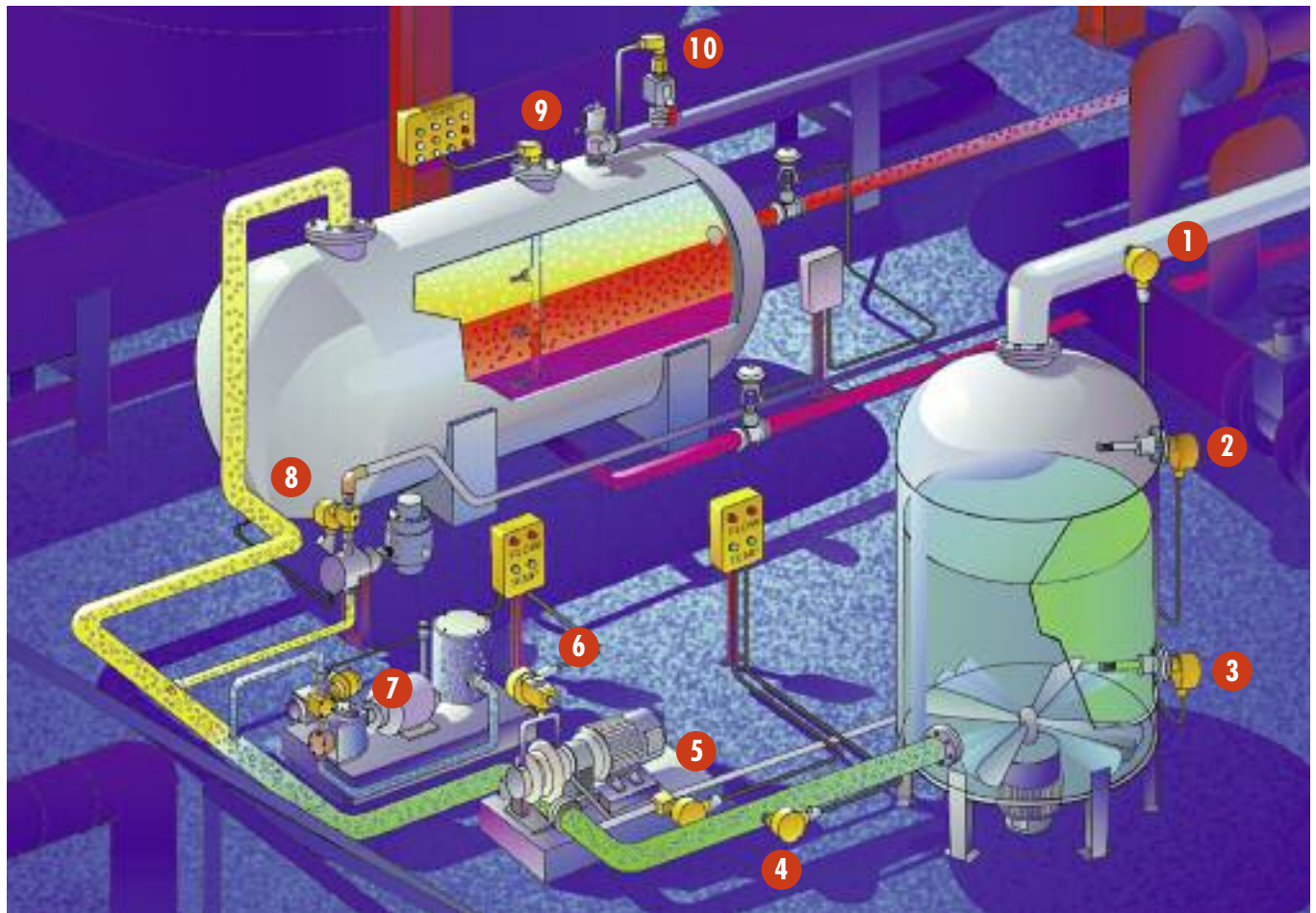
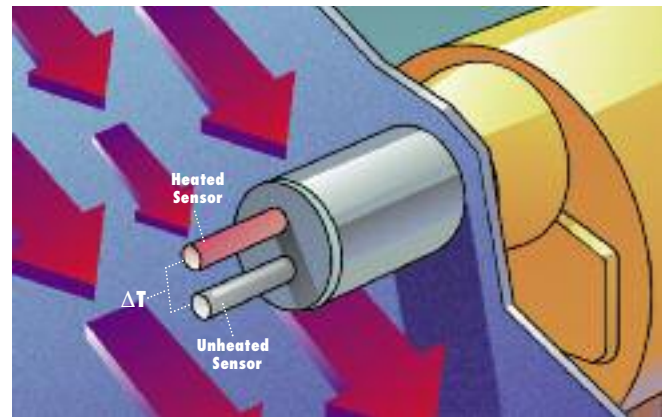


- > No moving parts
- > High repeatability and accuracy
- > All welded construction
- > Exotic alloys and coatings
- > Very low/very high flow rates
- > Fast response
- > Insertion and inline

## Operating Theory

### **Thermal Dispersion Theory of Operation:**

The typical sensing element contains two thermowell-protected platinum resistance temperature detectors (RTD's). One RTD is heated and the other RTD senses the process temperature. The temperature difference between the two RTD's is related to the process flow, level or interface medium. Higher flow rates or denser media cause increased cooling of the heated RTD and a reduction in the RTD temperature difference.



## Flow & Level Switch Applications

- 1 Tank inlet flow detection
- 2 High level detection
- 3 Low level detection
- 4 Low flow pump protection
- 5 Lube oil flow detection
- 6 Seal leak flow detection
- 7 Lube oil bearing flow detection
- 8 Chemical injection flow monitoring
- 9 Level and interface detection
- 10 Off-gas flow detection

## Other Typical Applications

- > Relief valve leak detection
- > Flare gas flow detection
- > HVAC flow monitoring
- > Drain line flow detection
- > Interface control in separation vessels
- > Temperature alarm detection
- > High flow or level alarms
- > Flash or boiling point detection
- > Sampling system flow detection and validation
- > Reverse flow detection and monitoring



# Why buy FCI?



## Rated #1 in Customer Care and Quality

- ✓ *Rated #1 annually in the Control Magazine Reader Poll*
- ✓ *24 x 7 x 365 customer service toll-free*
- ✓ *ISO 9001 certified*
- ✓ *World class NIST flow laboratory*
- ✓ *FM, ATEX, Cenelec, CSA, CRN system approvals and other global approvals such as CPA (China), SAA (Australia), JIS (Japan), CCE (India)*
- ✓ *Flow, level and temperature instrumentation market innovator and leader for over 40 years*
- ✓ *Industry acclaimed product warranty program*

## Fluid Components International

Fluid Components International (FCI) has established a worldwide reputation for the design and manufacture of precision high performance flow, level and temperature instrumentation. With reliability second to none, FCI has placed over 250,000 units in the field, covering the full range of liquids, gas and slurry process requirements since the introduction of their first flow switch/monitor in 1964.

FCI's products support some of the world's most demanding processes in industries such as food & beverage, pharmaceutical, chemical, oil & gas, pulp & paper, power & energy, water & wastewater, nuclear, aerospace, military and many others. Customers rely on FCI's broad range of instrumentation and application solutions that range from standard off-the-shelf devices to customized engineered systems.

FCI's renowned global leadership in Thermal Dispersion technology guarantees product innovation, value and satisfaction to each of its customers. The company's dedication to supply the highest quality flow, liquid/level interface and temperature instrumentation is extended throughout company's international operations.



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*\*Please note: FCI area code changes from "760" to "442" effective 01/01/09*

**FCI is ISO 9001 Certified / Conformance to AS9000**