THERMAL DIFFERENTIAL FLOW & LEVEL SWITCHES

Kenco's Thermal Differential Switches are designed for a wide range of flow and level applications. These switches can be used to detect either the overall liquid level or a liquid – liquid interface. They can also be used to detect a specific flow rate or a flow/no flow condition in liquids and gasses.

FEATURES	BENEFITS OF OWNERSHIP
Level and Interface detection	Application Flexibility
Flow detection for Liquids and Gasses	Application Flexibility
Fast Response Time	Better Process Control
No Moving Parts	Reliability
Temperature Compensation	Stability and Repeatability

APPLICATIONS

- **Level detection**
- **Nitrogen Flow detection**
- **Low Flow Monitoring**
- **Liquid-Liquid Interface detection**
- **Foam-Liquid Interface detection**
- **Pump Protection**
- **Flare Systems**

INDUSTRIES

- **Chemical**
- **Petroleum**
- **Water / Wastewater**
- **Pharmaceutical**
- **Pulp & Paper**
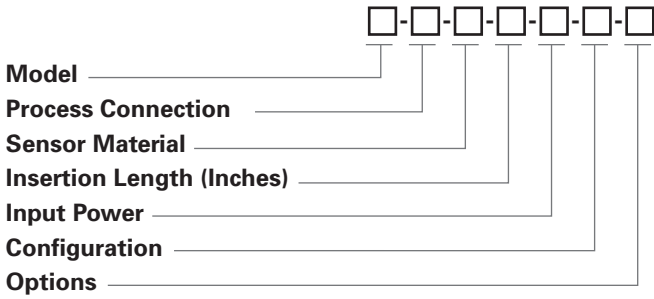- **Power**
- **Aerospace**

PRINCIPLE OF OPERATION

The sensor consists of (2) Resistance Temperature Detectors (RTDs). One RTD measures the temperature of the fluid around the sensor. The other RTD is self-heated. This provides a temperature differential between the two RTDs.

In a Level application, the thermal conductivity of the liquid is higher than the gaseous layer above the liquid. When the RTDs make contact with the liquid, there is a cooling effect with the liquid absorbing the heat from the heated RTD. This reduces the temperature differential between the two RTDs, and causes the relay to change state. When the liquid level drops below the sensor, the temperature differential increases, causing the relay to reset. This will also work in a liquid-liquid interface when the two liquids have different thermal conductivity (ex. oil and water).

In a Flow application, there is a temperature differential during a no-flow or low-flow condition (the actual setpoint is adjusted during the calibration procedure). As the flow rate increases, the temperature differential between the RTDs decreases, causing the relay to change state. When the flow rate decreases, the temperature differential increases, causing the relay to reset.

MODEL CONFIGURATION

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Model
Process Connection
Sensor Material
Insertion Length (Inches)
Input Power
Configuration
Options

Model

Description	Code
Level Switch	KTDL
Flow Switch	KTDF

Process Connection

Description	Code
½″ NPT	050
¾″ NPT	075
1″ NPT	100
1½″ Sanitary	3A1
1″ 150# ANSI Flange	RA1
2″ 150# ANSI Flange	RA2
1″ 300# ANSI Flange	RB1
2″ 300# ANSI Flange	RB2
Low Flow Sensor	LFS
Special Connection	SPL

Configuration

Description	Code
Integral Mounting	LE
Remote Mounting	RE

Sensor Material

Description	Code
316L SS	S6
304 SS	S4
304L	SL
Hastelloy-B	HB
Hastelloy-C	HC
Inconel 600	IO
Monel	MN
3 Alloy-20	A2
Special Material	SM

Input Power

Description	Code
110Vac	110
220Vac	220
24Vdc	24D
24Vac	24A

Insertion Length

002.00 (standard)
002.50 – 120.00 (optional)

Options

Description	Code
No Options	00
RTD Output	RT
Live Tap	LT
CE Approved	CE

Options (cont.)

Description	Code
Extended Neck	EN
*High Temp (850°F)	HT
*Medium Temp (572°F)	MT
Explosion-proof Window	XW

Remote Mounting Required

Options (cont.)

Description	Code
Additional Cable	CA
Variable Insertion	VI
Factory Calibration	CB
Thermocouple Output	TO

Options (cont.)

Description	Code
SS Tag	TG
Sensor Installed in Tee	TE

PRODUCT SPECIFICATIONS

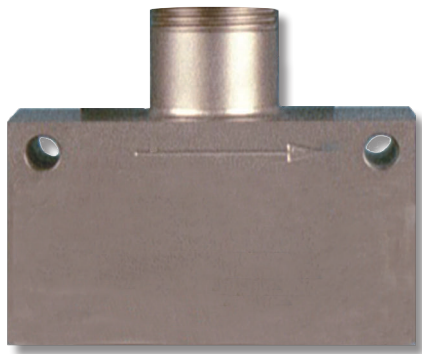| Description		Specification
Power Supply	AC	110Vac or 220Vac @ 50/60 Hz
	DC	24Vdc
Output	Relay	5A DPDT – Failsafe is field selectable
Temperature Range (Electronics)		-40°F to 140°F (-40°C to 60°C)
Temperature Range (Sensor)	Standard	-100°F to 390°F (-70°C to 200°C)
	Medium Temp.	-100°F to 572°F (-40°C to 300°C)
	High Temp.	-100°F to 850°F (-40°C to 458°C)
Pressure Range		Atmospheric to 3000psig
Operating Range (Flow)	Aqueous Liquids	0.01 to 2.5 feet/second
	Hydrocarbon Liquids	0.01 to 5.0 feet/second
	Gasses	0.1 to 500 feet/second
Response Time		0.5 to 5.0 seconds (media dependent)
Stability		<0.5% from calibrated setpoint over a range of ±50°F
Repeatability		±1.0%

AGENCY APPROVAL

Agency	Models	Protection Method	Approval
CSA	KTDL-X-X-X-X-X-X KTDF-X-X-X-X-X-X	Explosion-proof	Explosion-proof for: Division 1 Class I – Groups B, C , D; Class II – Groups E, F, G; Class III

APPLICATION EXAMPLES

Gas Vent

High Level
Alarm

Interface Level
Alarm

Low Level
Alarm

Pump
Protection
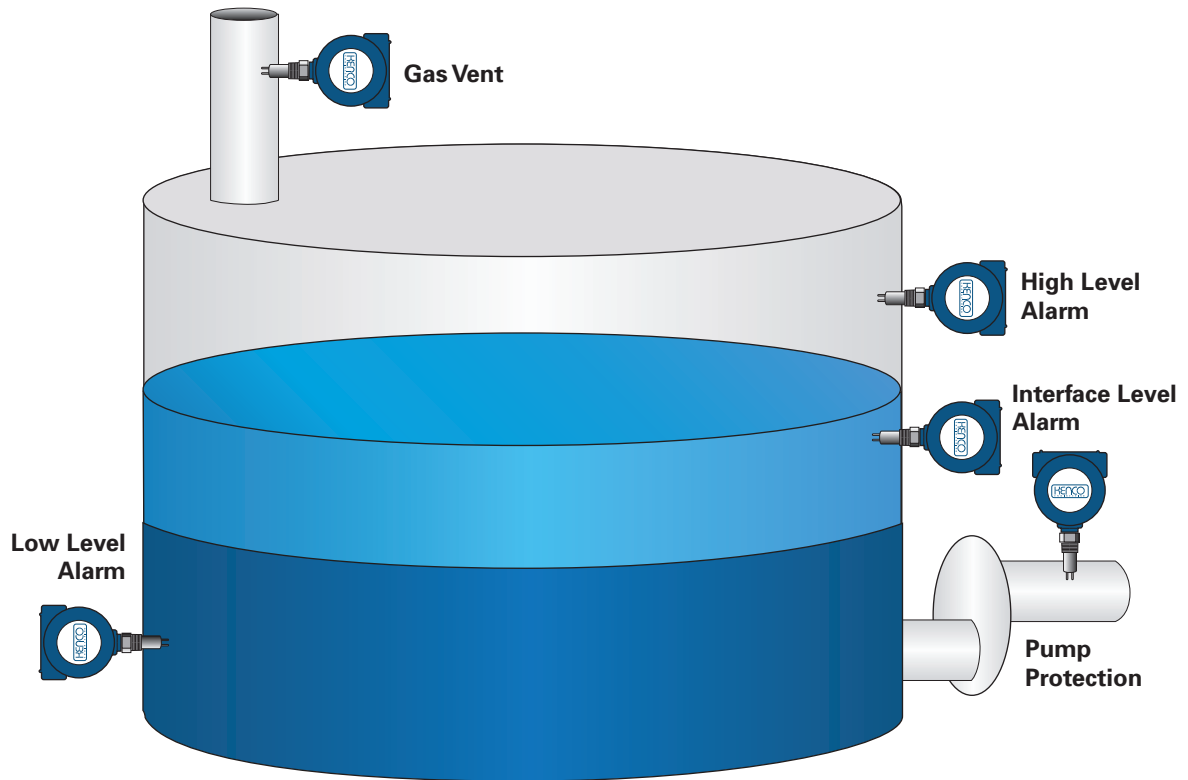
SPECIAL SENSORS

LOW FLOW SENSOR

- Developed for low flow gas and liquid applications where reliability and durability are mandatory
- Very low internal volume so that sample times are short and system response remains fast
- All welded stainless steel construction
- ¼" Female NPT process connections
- Operating temperature range: -100°F to 392°F

SANITARY SENSOR

- 3-A Certified
- Designed for use in food, beverage, dairy, and pharmaceutical applications
- Standard insertion length is 2.5". Contact Kenco for custom lengths.
- Operating Temperature Range: -100°F to 392°F
- Maximum Working Pressure of 1500 psig
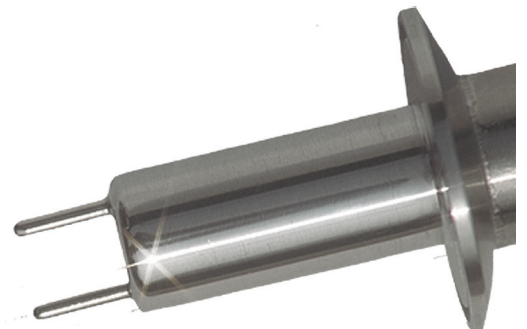
ADDITIONAL APPLICATIONS

Low flow monitoring in food processing plants – different lines are used to blend ingredients. If one of these lines becomes blocked, the product can be ruined. By monitoring the flow in each of the blending lines, a Kenco Model KTDF can prevent product loss.
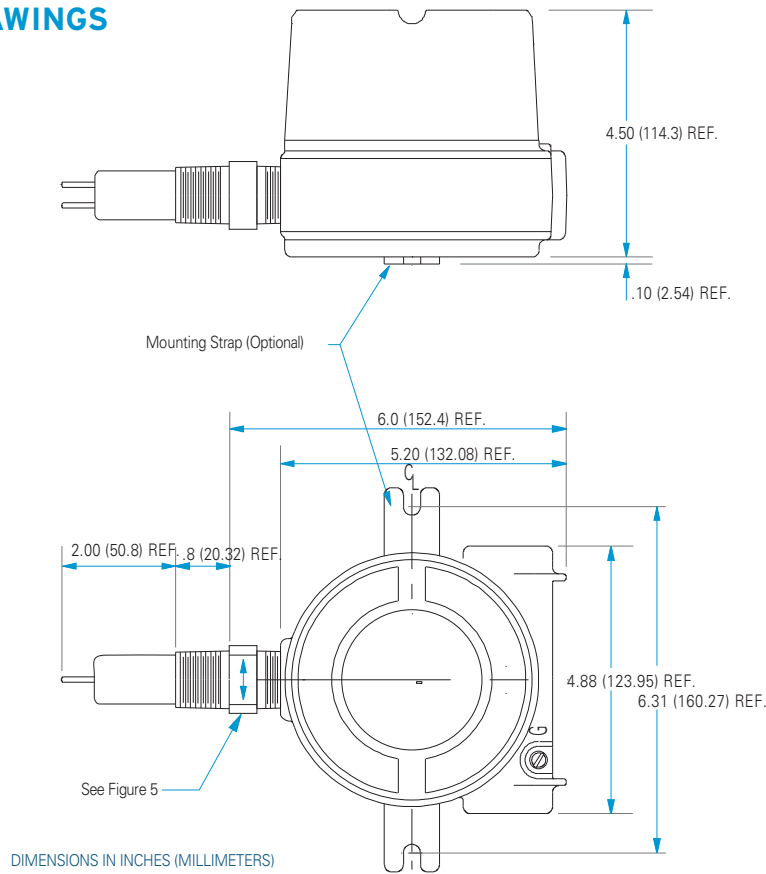
Monitoring flow through heat exchangers – The Kenco KTDF flow switch can monitor the flow and activate a shut-down at a specific low flow, or no flow condition in the exchanger.

Eye wash station monitoring – The Model KTDF can be used to monitor the condition of an eyewash station. When the station is used, a signal is sent to notify emergency medical personnel.

Diesel Fuel / Water Interface Detection – Over time, fuel tanks can accumulate a significant amount of water. This water reduces the capacity of the tank. A Kenco Model KTDL can be used to detect the water, turn on a pump to remove the water and shut off the pump to prevent pumping the diesel fuel.

Flare Systems – A Kenco KTDF flow switch can be used to detect which vessel is emitting to the flare line. It can also be used to activate the flare igniter when gas flow is present, or to detect if the flare does not ignite in the presence of gas flow.

DIMENSIONAL DRAWINGS

4.50 (114.3) REF.

.10 (2.54) REF.

Mounting Strap (Optional)

6.0 (152.4) REF.

5.20 (132.08) REF.

2.00 (50.8) REF. .8 (20.32) REF.

4.88 (123.95) REF.
6.31 (160.27) REF.

See Figure 5

DIMENSIONS IN INCHES (MILLIMETERS)

HOW TO PROCEED

Selecting a Kenco Thermal Differential Switch for your application is a snap!
1. Contact your local Kenco Engineering Representative.
2. Discuss your application.
3. Request a quote

An experienced Applications Engineer will evaluate your application, and select the best switch to meet your needs.