KAL-D
COMPACT THERMAL FLOW SWITCH

Flow
Pressure
Level
Temperature
measurement
monitoring
control

- **No Moving Parts**
- **Switching Range 0.15 to 6.6 Ft/Sec.**
- **Max. Pressure 580 PSIG**
- **Max. Operating Temperature 176˚F**
- **Clean-In-Place to 250˚F**

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Model:
KAL-D

Features

- No Moving Parts
- Switching Range 0.15 to 6.6 Ft/Sec.
- Max. Pressure 580 PSIG
- Max. Operating Temperature 176˚F
- Clean-In-Place to 250˚F
- Microprocessor-Based Temperature Compensation

The KAL-D series combines the features of our legendary KAL-K thermal flow switch with a compact size. The KAL-D uses the calorimetric principle to monitor the flowrate of non-viscous water-based liquids. The sensor tip is heated to a few degrees above the liquid temperature. As the liquid flows across the tip, it is cooled by the liquid. The amount of cooling is proportional to liquid velocity. The liquid velocity is compared to the setpoint which is field-adjustable by the user. A transistor switch is activated when the flow setpoint is reached. The KAL-D series has a smooth measuring probe with no moving parts making it exceptionally reliable and insensitive to dirt and solids. The insertion type probe allows for flow monitoring with minimal system pressure loss.

Microprocessor-Based Temperature Compensation

The KAL-D series achieves superior compensation for changes in liquid temperature during the measuring cycle by use of a microcontroller. This method of temperature compensation allows for very precise correction of flow measurement when liquid temperature changes occur.

KOBOLD KAL-D Compact Thermal Flow Switch

Specifications

Applications:	Non-viscous, water-based liquids (viscosity ≤60cSt)
Switching Range:	0.15 to 6.6 Ft/Sec.
Repeatability:	±2%
Response Time:	5.6-12 seconds typical
Switch Point Adjustment:	Via potentiometer. Flashing LED indicates setpoint on 8 LED bargraph indicator
Status Indicator:	1 dual color LED
Maximum Pressure:	580 PSIG
Operating Temperature Range:	-4 to 176°F
Max. Clean-in-Place Temperature:	250°F
Wetted Parts:	316L SS
Housing Material:	304 SS
Power Requirements:	24 VDC ± 10% @150 mA Max.
Switch Type:	NPN or PNP open collector normally open or normally closed based on ordering code
Switch Rating:	400 mA Max. @ 24 VDC, short circuit protected
Electrical Connection:	Micro DC plug, 4-pin male
Electrical Protection:	NEMA 4X/IP65

Measuring/Switch Ranges

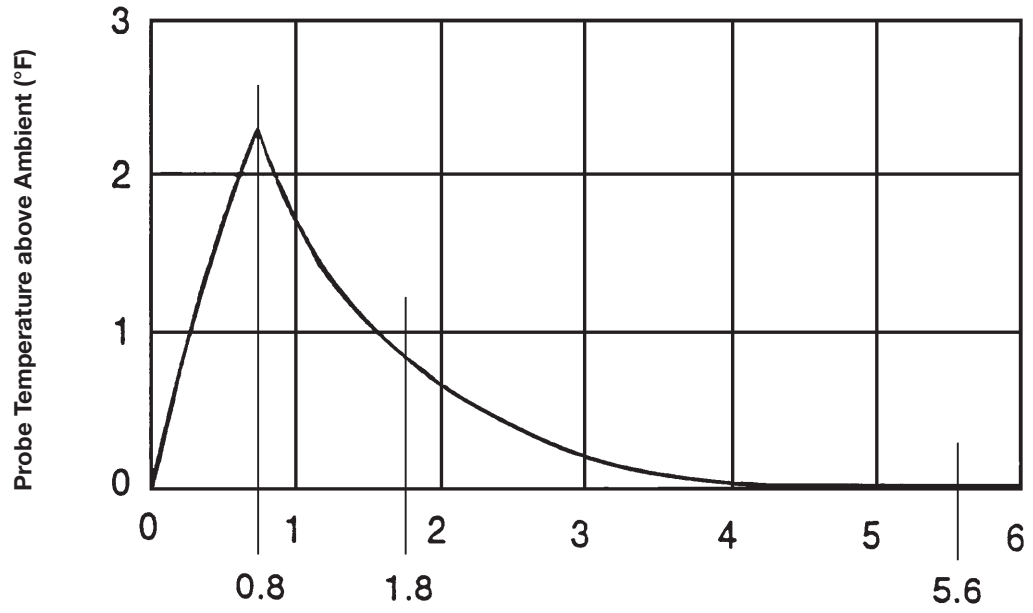
Pipe Diameter	Approximate Switching Range GPM	Pipe Diameter	Approximate Switching Range GPM
1/4”	0.03-1.5	2”	1.3-60
1/2”	0.11-5.8	2-1/2”	2-90
3/4”	0.2-10	3”	4-150
1”	0.3-15.6	4”	5-240
1-1/2”	0.8-40	6”	12-560

Important: The above listed **approximate** measuring ranges were **calculated** based on the pipe size and the KAL-D switching velocity range of 0.15 to 6.6 Ft/Sec. Depending on the pipe size, sensor immersion depth and orientation, large deviations from the above listed ranges occur.

Order Numbers for Standard Types

Fitting Type	Model	Type of Switch	Connector
1/4” NPT	KAL-D5408	...N=NPN, N/O	
1/2” NPT	KAL-D5415	...P=PNP, N/O	
M12 x 1	KAL-D0412	...M=NPN, N/C	...ST3=
1/4” BSP	KAL-D1408	...R=PNP, N/C	Micro-DC plug,
1/2” BSP	KAL-D1415		4-PIN, male
Accessories			
P/N 807.037 = Mating 4-pin Micro DC plug with 6 foot cable			

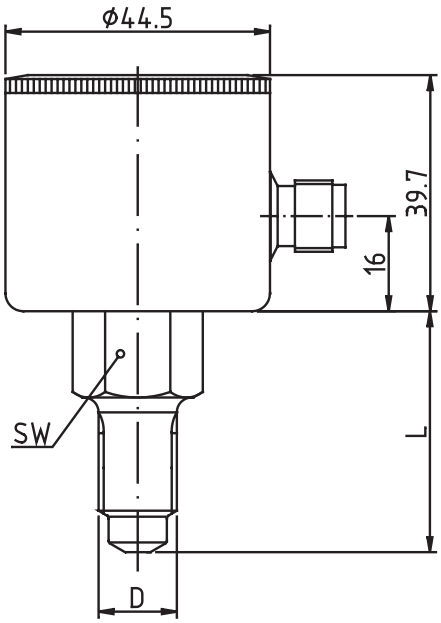
KAL Timing - Heating and Measuring Cycle

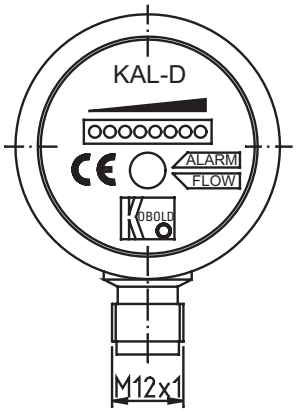


Operating Behavior

1. At t=0, the probe temperature is recorded. This reading represents the ambient liquid temperature.
2. Still at t=0, the KAL begins heating the probe.
3. At t=0.8 seconds, the heating cycle ends and the KAL begins monitoring the probe temperature.
4. At t=1.8 seconds, a temperature reading is taken and compared to the t=0.8 second temperature. The rate of cooling is calculated and compared to a Cooling Rate vs Flow Rate table specific to the ambient temperature recorded at t=0.
5. The probe is allowed to cool until t=5.6 seconds. A temperature reading is taken and compared to the initial t=0 reading. If the temperatures are equal (or nearly so), the flow reading is determined valid and passes through to the KAL output. If the temperatures are not equal, the KAL waits another 5.6 sec, and Step 5 repeats.

Dimensions





D	L	SW
1/4” NPT	1.6”	19mm
1/2” NPT	2.2”	27mm
M12x1	1.6”	19mm
1/4” BSP	1.6”	19mm
1/2” BSP	2.2”	27mm