

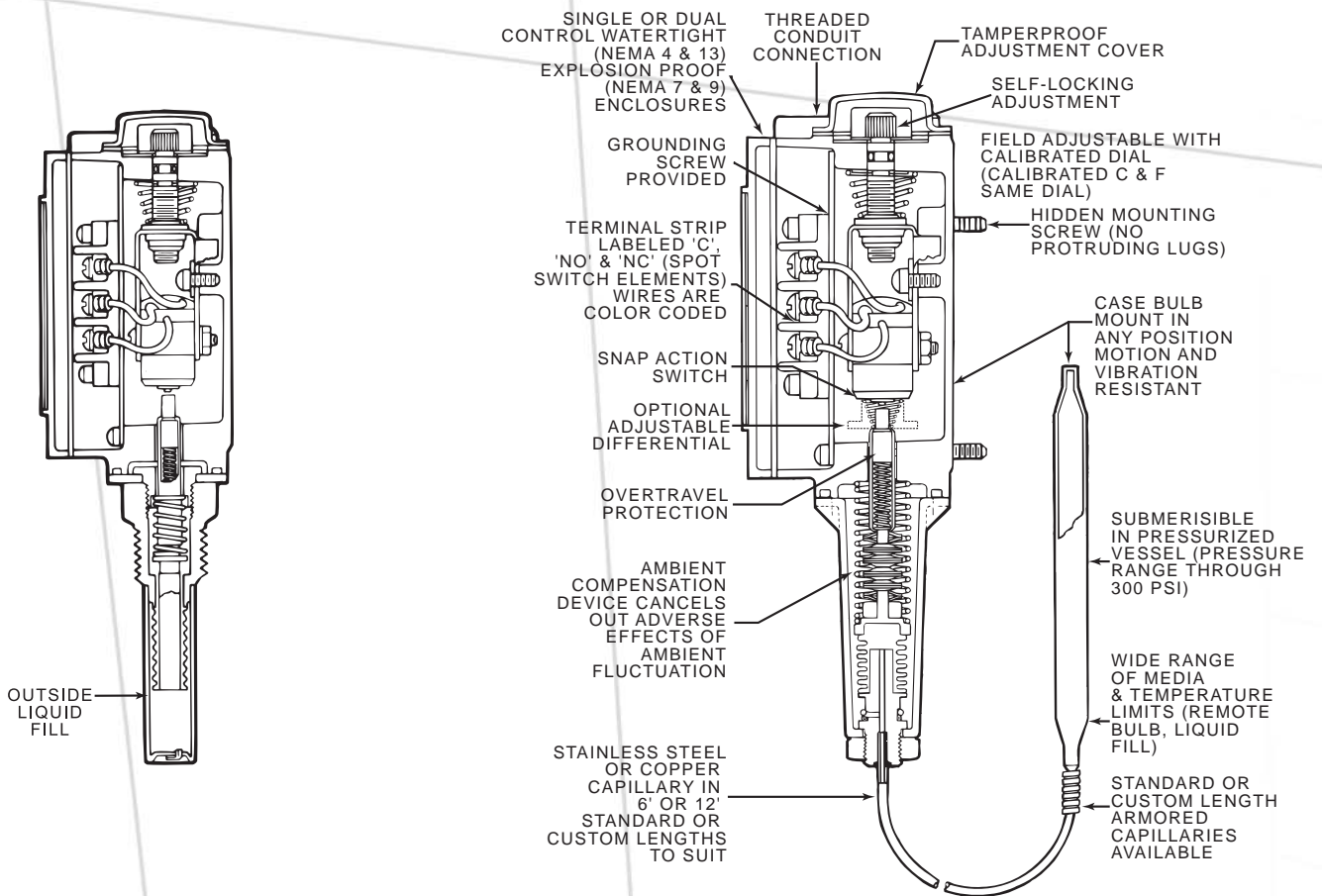
Sensor Types

Local Mount

Local mount type temperature switches are installed in the pipe or vessel. In this type of sensor, the filling fluid surrounds the bellows. A negative temperature change forces the fluid to contract-expanding the bellows to actuate the switch. Positive temperature changes produce the opposite effect.

Remote Bulb & Capillary

Remote temperature switches allow the switch enclosure to be placed up to 25 feet from the media. These models use a bulb and capillary sensing device which may be ordered in standard six and 12 foot lengths. Extra lengths up to 25 feet are available. Six and 12 foot sensors can be copper or stainless steel with or without protective spiral-wound armor. The 25 foot lengths are armored stainless steel only.



Barksdale offers both remote and local mount temperature switches in housed, NEMA 4 and/or explosion proof designs. All are available with one or two adjustable temperature set points and fixed or adjustable differential.

General Data

Barksdale was the first manufacturer to offer effective ambient compensation in electromechanical switches revolutionizing temperature switch accuracy through extreme temperature changes.

In a liquid-filled bulb and capillary system, ambient temperature changes affect the expansion of the fluid resulting in "false" temperature sensing. An extreme ambient change from -65°F to + 165°F will decrease the accuracy of most switches by 20% or more. Or, if the temperature changes only 70°, accuracy can be decreased by 15%.

±1% Accuracy From Barksdale

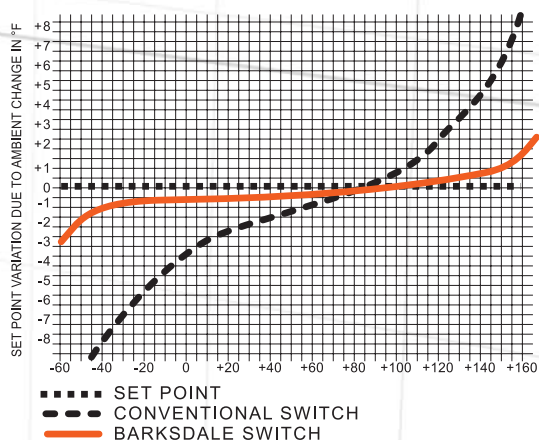
Bulb and capillary configurations overcome ambient temperature swings through stacking of precision, concave bimetal washers. An ambient temperature change causes the liquid fill in the

bulb, capillary and bellows to expand or contract, an equal and opposite reaction occurs between the washers. This compensates for ambient temperature change assuring high repeatable accuracy even under wide ambient temperature swings.

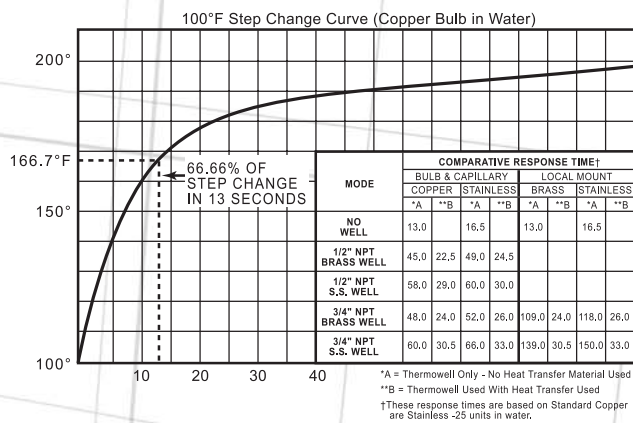
By reacting to ambient temperature changes as extreme as - 65°F to + 165°F, the accuracy of the mid-60% of the adjustable range is still within ±1% of full-scale. Accuracy at constant ambient is ±0.5% full scale.

Local mount temperature switches are not affected by ambient temperature changes in the same way as bulb and capillary types. All of the filling fluid is exposed to the media temperature the bulb is sensing. Therefore, there is no ambient temperature influence on the filling fluid.

Ambient Temperature Compensation Comparison Curve



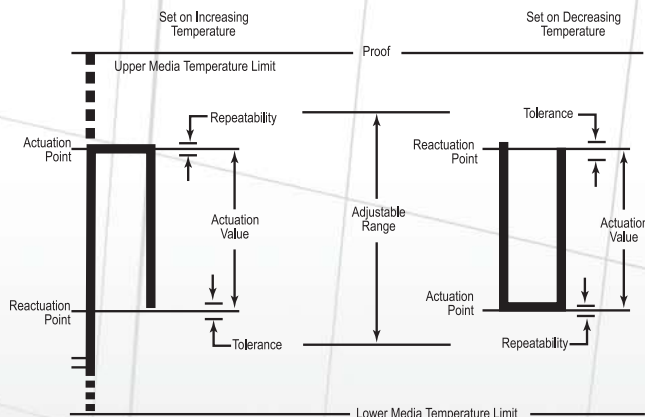
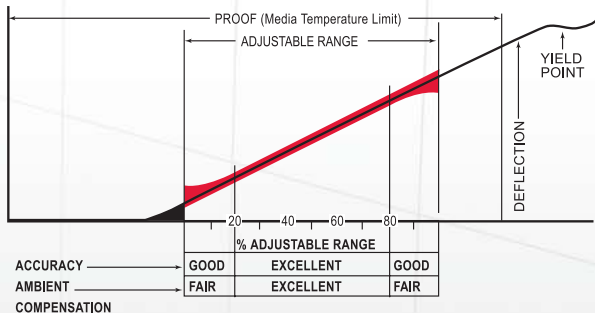
Good Response Time



Local Mount Type response times apply to Models: ML1H, ML1H-RD, L2H, L2H-RD & L1X

Select for Mid-Range Setting

For optimum repeat accuracy in areas of extreme temperature change, select the switch range that enables the desired set point to fall in the mid 60% of the adjustable range.



General Data

Differential

(Actuation Value, Dead Band, Hysteresis)
BY CLASS OF ELECTRICAL SWITCH USED IN BARKSDALE TEMPERATURE SWITCHES

Differential tolerances on temperature switches are due to manufacturing tolerances on limit switches and sensing elements. The differential of each temperature switch will remain fixed within the tolerances shown.

Test conditions and media used could affect differential.

Hermetically Sealed Switches

Barksdale Hermetically Sealed Temperature Switches were created for use in hostile environments where exposure to elements such as salt air, hydrogen sulfide and other corrosive agents and atmospheres might cause contact deterioration and switch failure. The switch elements meet the requirements for Class I, Division II hazardous areas.

The Barksdale hermetically sealed switch element is the same size as most nonsealed micro-switches, making this modification of our standard switches simple and inexpensive.

1. Select the standard unit with the desired characteristics.
2. Refer to the catalog sections showing the actuation value (differential) and electrical rating of switch elements by class. (The "Class of Electrical Switch" for Hermetically Sealed switch elements is either AA, CC or HH.) Select the class (AA, CC or HH) desired.
3. Change the standard catalog number as follows: - Prefix the catalog number with "H".
- Substitute AA or HH for the standard switch element designation.
- Drop any -UL suffixes.

Examples:

- Standard Catalog number T2H-H151
- Hermetically Sealed numbers are HT2H-AA151, HT2H-CC151 or HT2H-HH151

Sensing Element		Adjustable Range - °F	Approximate Differential (Actuation Value, Deadband, Hysteresis) by class of switch element											
Bulb & Capillary Type	Sensor		B	GH, H	J	K	L	M	S Adjustable to from		G** Can be reset after	AA	HH	CC
MT1H	-15	- 65 to + 150	3-5	1-2	1-3	4-6	2-4	2-4	4	15	5	1.0-8.0	1.0-7.0	1.0-10.0
T2H	-25	+50 to +250	3-5	1-2	1-3	4-6	2-4	2-4	4	15	5	1.0-8.0	1.0-7.0	1.0-10.0
T1X	-35	+150 to +350	3-5	1-2	1-3	4-6	2-4	2-4	4	15	5	1.0-8.0	1.0-7.0	1.0-10.0
T2X	-60	+300 to + 600	5-7	2-4	3-5	5-8	4-6	4-6	7	25	5	2.0-12.0	2.0-11.0	2.0-14.0
Local Mount														
ML1H	-201 thru 354	-50 thru +350	4-7	1-3	1-4	6-9	3-6	3-6	6	20	5	2.0-11.0	2.0-10.0	2.0-13.0
L12H	-451 thru 454	+150 thru +450	7-10	3-6	4-7	7-12	6-9	6-9	10	30	5	2.0-11.0	2.0-10.0	2.0-13.0
L1X	-451 thru 454	+150 thru +450	7-10	3-6	4-7	7-12	6-9	6-9	10	30	5	2.0-17.0	3.0-16.0	3.0-19.0

*Differential values are the same for copper and stainless steel

**RD Models

***T2H, T2X, L2H Models

Electrical Rating (Current given in Amperes)

(1) For standard models the electrical ratings are listed on each page under Electrical Characteristics?

(2) For other switch ratings, see table below and refer to corresponding Operating Characteristics.

- Class GH switches are SPOT with gold contacts.
- Class J & K switches are SPDT with fine silver contacts and an Elastomer Boot around pin actuators to prevent moisture and foreign matter from affecting contacts.
- Class G switches are manual reset.
- Class R & S switches are SPOT with fine silver contacts and adjustable differentials.
- All other switch classes are SPOT with fine silver contacts and fixed differentials. - Class H & M switches meet humidity requirements of MIL-S-6743.
- Class AA, CC & HH hermetically sealed.

AC RATINGS		INDUCTIVE LOAD - 50% POWER FACTOR									
CLASS OF SWITCH		MAXIMUM CONTINUOUS CURRENT									
		H,J	B,K	L	M	S	G	GH	AA	HH	CC
VOLTS	125	10	10	15	10	15	10	1.0	4.0	4.0	10.0
AC	250	10	10	15	10	15	10	4.0	4.0	10.0	
	480	3	10	15	3	15	10				
	600	2				2					

DC RATINGS		INDUCTIVE LOAD - L/R = .26							
CLASS OF SWITCH		MAXIMUM CONTINUOUS CURRENT							
		H	B,K	L	M	S	G	GH	
VOLTS	6	.5	15	8.0	8.0	15	15	1.0	
DC	12	.5	10	5.0	5.0	15	15	1.0	
	24	.5	5	1.0	1.0	5	10	1.0	
	125	.05	.03	.5	.05	.4			
	250	.03	.02	.25	.03	.2			

General Data

Temperature Conversion Table

Find in the center column the number of the known temperature. If the known temperature is in Fahrenheit, the Centigrade equivalent is in the left hand column. If in Centigrade, the Fahrenheit equivalent is in the right hand column. The basic conversion formulas are:

$$^{\circ}\text{C} = ^{\circ}\text{F} - 32 \times \frac{5}{9}, \text{ OR } ^{\circ}\text{C} = \frac{^{\circ}\text{F} - 32}{1.8}$$

$$^{\circ}\text{F} = ^{\circ}\text{C} \times \frac{9}{5} + 32, \text{ OR } ^{\circ}\text{F} = ^{\circ}\text{C} \times 1.8 + 32$$

$^{\circ}\text{C}$	$^{\circ}\text{F}/^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}/^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}/^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}/^{\circ}\text{C}$	$^{\circ}\text{F}$
-73.3	-100	-148.0	-3.9	25	77.0	93.3	200	392.0	232.2	450	842.0
-70.6	-95	-139.0	-1.1	30	86.0	98.9	210	410.0	237.8	460	860.0
-67.8	-90	-130.0	1.7	35	95.0	104.4	220	428.0	243.3	470	878.0
-65.0	-85	-121.0	4.4	40	104.0	110.0	230	446.0	248.9	480	896.0
-62.2	-80	-112.0	7.2	45	113.0	115.6	240	464.0	254.4	490	914.0
-59.4	-75	-103.0	10.0	50	122.0	121.1	250	482.0	260.0	500	932.0
-56.7	-70	-94.0	12.8	55	131.0	126.7	260	500.0	265.6	510	950.0
-53.9	-65	-85.0	15.6	60	140.0	132.2	270	518.0	271.1	520	968.0
-51.1	-60	-76.0	18.3	65	149.0	137.8	280	536.0	276.7	530	986.0
-48.3	-55	-67.0	21.1	70	158.0	143.3	290	554.0	282.2	540	1004.0
-45.6	-50	-58.0	23.9	75	167.0	148.9	300	572.0	287.8	550	1022.0
-42.8	-45	-49.0	26.7	80	176.0	154.4	310	590.0	293.3	560	1040.0
-40.0	-40	-40.0	29.4	85	185.0	160.0	320	608.0	298.9	570	1058.0
-37.2	-35	-31.0	32.2	90	194.0	165.6	330	626.0	304.4	580	1076.0
-34.4	-30	-22.0	35.0	95	203.0	171.1	340	644.0	310.0	590	1094.0
-31.7	-25	-13.0	37.8	100	212.0	176.7	350	662.0	315.6	600	1112.0
-28.9	-20	-4.0	43.3	110	230.0	182.2	360	680.0	321.1	610	1130.0
-26.1	-15	5.0	48.9	120	248.0	187.7	370	698.0	326.7	620	1148.0
-23.3	-10	14.0	54.4	130	266.0	193.3	380	716.0	332.2	630	1166.0
20.6	-5	23.0	60.0	140	284.0	198.9	390	734.0	337.8	640	1184.0
-17.8	0	32.0	65.6	150	302.0	204.4	400	752.0	343.3	650	1202.0
-15.0	5	41.0	71.1	160	320.0	210.0	410	770.0	348.9	660	1220.0
-12.2	10	50.0	76.7	170	338.0	215.6	420	788.0	354.4	670	1238.0
-9.4	15	59.0	82.2	180	356.0	221.1	430	806.0	360.0	680	1256.0
-6.7	20	68.0	87.8	190	374.0	226.7	440	824.0	365.6	690	1274.0

Temperature Switch Operation and Safety

WARNING

Product **must** be installed in accordance with applicable NEC, ASME and local regulations as applicable including those that apply to installations in hazardous locations requiring explosion proof enclosures or similar construction.

The temperature limitations shown on the individual catalog pages for the specific switch must not be exceeded.

These temperatures must take into consideration the possible maximum system temperatures encountered. **The maximum allowable pressure on the sensor is 300 psi.** Over 300 psi, use suitable thermowell.

The fluid used must be compatible with the materials of construction. Special cleaning and packaging may be required for special media such as oxygen. **Consult factory.**

Temperature switches are not of sanitary construction and the fill fluid is toxic. Therefore, sensors should not be in contact with materials intended for ingestion unless suitable thermowell is used. Sensors listed in this catalog are filled with silicon oil. When silicon oil is combined with strong oxidizing agents, including (but not limited to) chlorine, nitric acid, and hydrogen peroxide, a spontaneous chemical reaction, ignition or explosion can result. When temperature switches containing fluid are used

in such service, thermowells must be used.

The electrical load through the temperature switch must not exceed the values shown in the catalog for the specific switch involved.

Shock and vibration may affect the switch performance. Therefore, shock and vibration should be minimized. **Consult factory for assistance.**

Troubleshooting and Maintenance

Troubleshooting of the switch must be in strict compliance with the procedure set forth on the Troubleshooting and Maintenance section of this catalog.

Field repair of UL, CSA or other listed units will void the UL or CSA listing of the repaired unit.

Barksdale, Inc. components must not be used in life support applications of any kind.

Failure to observe these warnings could result in serious injury or damage.