



VAPOUR AND GAS FILLED TEMPERATURE SWITCHES

SERIES 700

FOR NON-HAZARDOUS AREA APPLICATIONS



DIRECT MOUNTING VERSION SHOWN –
ALSO AVAILABLE WITH CAPILLARY

MANUFACTURED IN THE U.K.

Designed to complement the extensive Series 700 Pressure and DP switches, Series 700 Temperature Switches offer accurate, reliable switching in a robust cast enclosure. Featuring:

■ **RANGES FROM -50°C TO $+400^{\circ}\text{C}$**

Both vapour filled and gas filled systems are available. Vapour filled systems have the advantage of negligible ambient temperature effects on the switching point. Gas filled temperature systems provide larger ranges and are more suited to applications where switching points are close to ambient temperature.

■ **WIDE RANGE OF OUTPUT SWITCHES**

The wide range of electrical output switches available includes gold contacts for low current d.c. and silver contacts for high current a.c. A single pole double-throw microswitch (SPDT) can make or break a circuit at the required switching point. Dual switches (2 x SPDT) can make or break two independent circuits at the same or different switching points.

Versions are also available for electrical switching in hazardous areas and pneumatic switching (see data sheets TD700 THAZ and TD700 TPNU).

■ **DIRECT AND REMOTE MOUNTING VERSIONS AVAILABLE**

Direct mounting (as shown opposite) allows the switch to be screwed directly into a thermowell (pocket). With remote mounting versions the temperature bulb is secured in the thermowell and connected to the switch housing via a capillary tube.

Both types are available with aluminium housings for general industrial use or stainless steel housings for ultimate protection from the environment.

The temperature system in all versions is fully welded in 316 Stainless Steel.

■ **FIELD ADJUSTABLE**

The setpoint of the switch is adjusted by means of a capstan head screw, located within the lower section of the enclosure. As the main cover does not need to be removed, adjustment can be made even when the switch is energised.

■ **ACCURACY AND REPEATABILITY**

These switches provide excellent repeatability and long in-service life. In addition switching differentials are typically below 2% of range.

QUALITY ASSURANCE

Designed and manufactured by HNL in accordance with BS EN ISO 9001:2000.



Range Selection

SETPOINT RANGES			MIN TEMP. (°C)	MAX TEMP. (°C)	SYSTEM TYPE	MOUNTING	
RANGE CODE	MIN (°C)	MAX (°C)				DIRECT	REMOTE
78A T	-15	30	-30	90	Vapour	✓	✓
78B T	0	70	-30	90	Vapour	✓	✓
78C T	40	100	-30	170	Vapour	●	✓
78D T	60	150	-30	170	Vapour	●	✓
78E T	110	170	0	230	Vapour	●	✓
78F T	130	215	0	230	Vapour	●	✓
78G T	80	160	-30	230	Vapour	●	✓
78H T	110	210	-30	230	Vapour	●	✓
78J T	110	190	-30	290	Vapour	✗	✓
78K T	130	260	-30	290	Vapour	✗	✓
78L T	-35	10	-40	60	Vapour	✓	✓
78M T	-20	45	-30	60	Vapour	✓	✓
78N T	-50	150	-50	175	Gas	●	✓
78P T	-50	350	-50	400	Gas	✗	✓
78Q T	0	200	-50	225	Gas	●	✓
78R T	0	400	-50	400	Gas	✗	✓

✓ = available ✗ = not available ● = available if housing temperature does not exceed maximum (see note on page 4)

Vapour Filled Systems

For correct operation of vapour filled temperature switches a quantity of the filling liquid must be maintained in the bulb at all times. This cannot be assured if the bulb volume is small, relative to the total volume of the temperature system.

Consequently if a long capillary is required either the bulb length and/or the bulb diameter must be increased. The availability of various combinations of bulb length and capillary length is shown in the table below:

BULB LENGTH x DIAMETER (mm)	DIRECT MOUNTED	CAPILLARY LENGTH (m)		
		1.5	2.5	4.0
50 x 12	✓	✗	✗	✗
75 x 12	✓	✓	✗	✗
100 x 12	✓	✓	✓	✗
150 x 12	✓	✓	✓	✓

Temperature Coefficient:

For vapour filled systems the typical error due to changes in ambient temperature is 0.2% per 10°C.

Gas Filled Systems

The pressure in a gas filled system is dependent upon both the temperature of the bulb and the temperature of the fill outside of the bulb (in the capillary and pressure chamber). Consequently changes in ambient temperature will affect the switching point of the switch.

This effect can be minimised by selecting the largest bulb and the shortest capillary.

Temperature Coefficient:

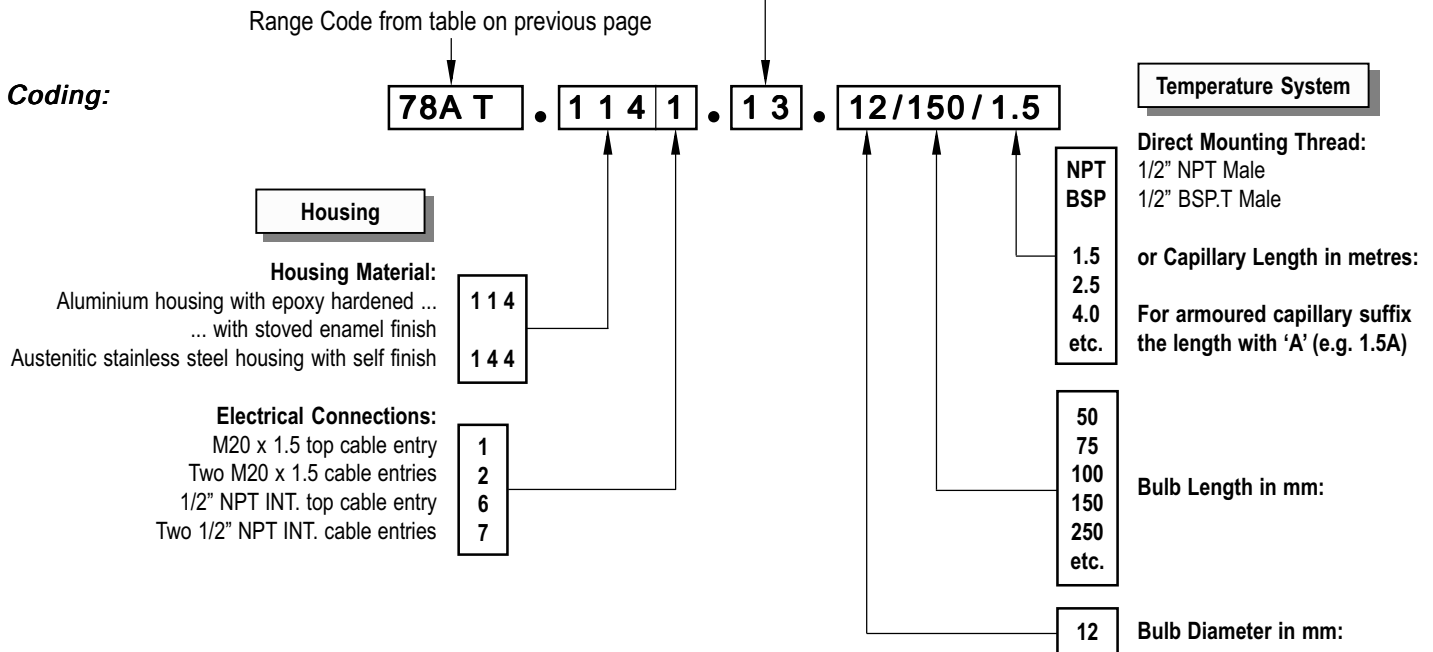
For a 150 x 12mm dia. bulb with a 1.5m capillary gas filled system the switching point will typically change by 1°C for each 10°C change in ambient temperature. An increase in ambient temperature will reduce the switching point.

Thermowells (Pockets)

HNL can supply, with your Series 700 temperature switches, a wide range of thermowells for most applications. Please contact Sales Support with your requirements.

Output Switch

Output Switch Codes				
Single Switch	Twin Switch 2 x SPDT	Output Switch Rating	Contact Material	Notes
01	—	250/480 Vac 10A, 28 Vdc 4A	Silver	Adjustable differential microswitch (≈ 5 to 12% of span)
13	23	250 Vac 4A, 28 Vdc 2A	Silver	HNL standard low differential microswitches
14	24	125 Vac 800mA, 28 Vdc 800mA	Gold	
15	25	125 Vac 800mA, 28 Vdc 800mA	Gold	Environment free encapsulated low differential microswitch
17	27	250 Vac 4A, 28 Vdc 2A	Silver	Environment free encapsulated low differential microswitch
1A	2A	250 Vac 6A, 28 Vdc 2.5A	Silver	HNL standard encapsulated microswitches
1B	2B	250 Vac 100mA, 28 Vdc 100mA	Gold	



Notes on Output Switch Selection:

1. Gold contact microswitches are especially well suited for low voltages and currents, or for applications with low switching frequencies or sulphurous atmospheres. When heavier loads need to be switched preference should usually be given to silver contacts.
2. The use of twin switches will increase the basic reset by 1%. The combined reset band must not exceed 7%.
3. When twin switches are set up to operate as DPDT, simultaneous operation on both rising and falling pressures cannot be guaranteed due to mechanical variations between individual microswitches.
4. The use of output switch codes 1A, 2A, 1B and 2B will increase the basic reset by 3%.
5. Output switch code 01 cannot be used with an enclosure having two electrical entries.

Notes:

1. The preferred mounting attitude of these switches is with the centreline of the switch vertical. The bulb on the remote mounted switches (with a capillary) can be mounted at any attitude.
2. At the preferred mounting attitude dust and weatherproof ratings are IP66 to BS EN 60529 (IEC 60529).
3. For direct mounted switches the bulb length dimension is taken from the bottom of the tapered mounting thread to the end of the bulb. This is commonly referred to as the 'U' length.
4. On vapour filled systems the switching differential may be higher, and the speed of response lower if the switching point is close to ambient temperature. A gas or liquid filled system is recommended for these applications.

Scale Accuracy & Setpoint Calibration:

A 0-100% scale is fitted to all switches and provides an approximate indication of the setpoint relative to the range of the switch. The scale is not intended for precise calibration purposes. For precise calibration the scale should be used for initial guidance and the final adjustment made against an instrument sufficiently accurate to meet the site requirements.

Combined Switching Errors & Maximum Working Temperature (MWT):

The sum of the average switching errors and the operating value repeatability will typically not exceed 0.3% of range span, at setpoints of 10%, 50% and 90% of span.

The maximum working temperature of the temperature element is detailed in the range table on page 2 of this data sheet.

Reset (Switching Differential):

There may be some variation in the reset throughout the range of the switch. The figure quoted on page 1 of this data sheet is the basic switching differential value expressed as a percentage of the span at a mid range setpoint.

Ambient Temperature Ratings:

Enclosures are rated for continuous use over the ambient temperature range -20°C to $+85^{\circ}\text{C}$, except where restricted by the min. or max. process temperature shown on the range selection table on page 2.

Exposure of the enclosure to direct sunlight should be such that the heat gain due to absorption of radiant energy does not cause the enclosure temperature to exceed the recommended maximum.

In addition it must be ensured that heat conduction from the process will not cause the switch enclosure to operate outside the stated ambient temperature limits. When using direct mounted switches at high temperatures, they should be fitted into a thermowell with a large 'T' length. Alternatively use a remote mounted switch.

Special Options & Specifications:

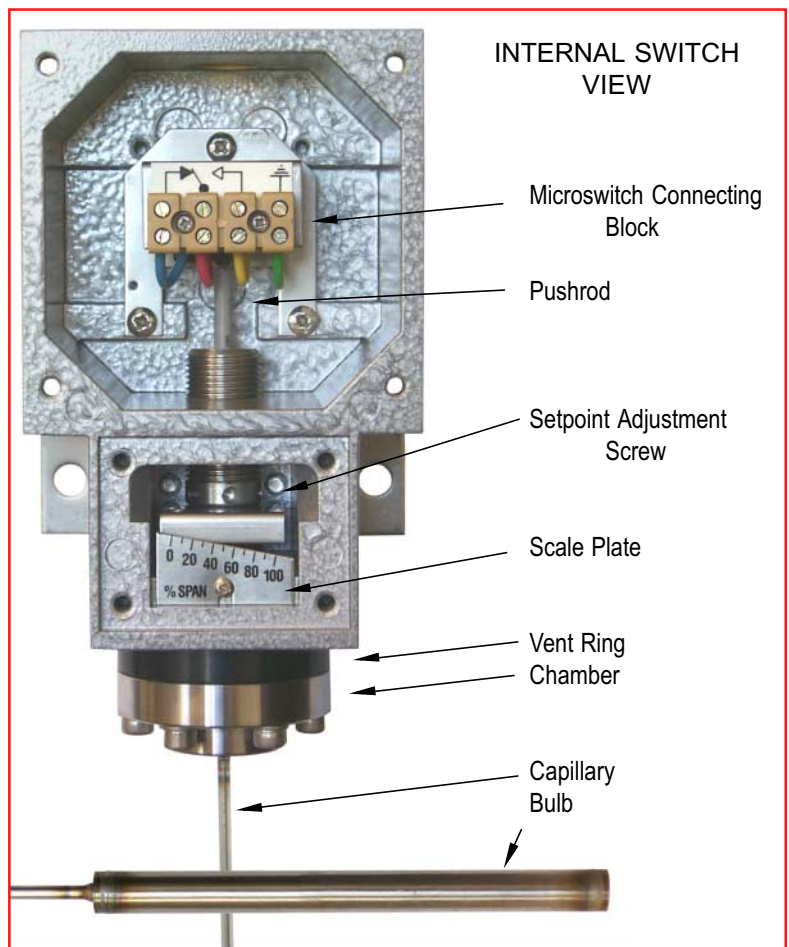
Where the standard temperature system options in this data sheet do not meet your application HNL can manufacture a custom system for you. Within certain technical limitations almost any size of bulb and capillary length can be supplied. Please contact Sales Support with your requirements.

Standards

This product satisfies the requirements of the Low Voltage Directive 73/23/EEC as amended by directive 93/68/EEC by compliance with standards EN60947-1:1991 and EN60947-5-1:1991.

Dimensions:

Housing dimensions are 175 x 100 x 81 (H x W x D in mm).



Instruments & Controls

Pressure, DP and Temperature Switches & Transmitters. Rotary and linear positioners. Flow regulators & Bubblers. Control Systems.

Precision Machining

Turning, Milling, Drilling, Tapping, Sawing, Welding, Painting, Anodising. From small to large batch sizes in a wide range of materials.

Manifolds & Valves

Wide range of distribution manifolds in both anodised aluminium and stainless steel. Stainless steel ball valves.

The information contained in this data sheet may be changed without notice.