



Temperature Switches – 700 series

**Weatherproof
Flameproof**

Model 720, 770, 780: Remote mount / Model 730: Direct mount

- **Good repeatability** ● **S.S. Internals** ●
- **Tamperproof setpoint adjustment with locking device** ●
- **Robust design** ●



Model 720 / 770 in Style 'GM' Enclosure



Model 730 in Style 'GK' Enclosure

700 series temperature switches have been developed especially for safety-critical applications. High quality of the product with established systems and manufacturing process will ensure reliable monitoring of your plant. Robust in construction, supreme in performance 700 series temperature switches are designed to meet a variety of applications in oil, gas, power, steel and petro-chemical industries. Various combinations and features are available to make it versatile.

Models 721, 723, 781 and 771, 773 & 774 have capillary systems for remote sensing. Models 731, 733 & 734 have rigid-stem thermal systems.

Several convenient standard temperature ranges are available. Setpoint is continuously adjustable over the instrument range. A calibrated scale is provided for approximate switch setting.

GENERAL SPECIFICATIONS

Switch enclosure		Repeatability	± 1% FSR standard (Note 4) ± 0.5% FSR optional
GM	GM style aluminium pressure die cast, weatherproof to IP66 with nitrile gasket as per IEC 60529	Scale Accuracy	± 5% FSR (Note 6)
GA	GA style 304 stainless steel casting, weatherproof to IP66, fit for off shore	Switching	Switching contacts with micro-switch 1 × SPDT or 2 × SPDT (single pole double throw)
GA6	GA style 316 stainless steel casting, weatherproof to IP66, fit for off shore	Switching function	Instrument quality snap acting microswitch (notes 10 & 11)
GK	GK style aluminium pressure die cast, weatherproof to IP66 and flameproof to group IIC as per IS/IEC 60079 (Note 1)	On-off differential Permissible medium temperature	Fixed or wideband adjustable
Enclosure Gasket	GM/GA–Nitrile; GK–Neoprene	Permissible ambient temperature	Refer range table
Range	Several standard ranges between (–)50°C to (+)300°C	Connection	(–)10°C to (+)60°C (Note 12)
Measuring element	Vapour Pressure / Gas filled thermal system actuating a 316L SS Bellows	To Thermowell	Through sliding gland – 3/8" NPT(M) standard 1/2" NPTM through adaptor optional
Sensing membrane	316 SS bulb	Electrical	1/2" NPTF single entry standard Dual entry optional
Bulb dimension	Refer Bulb dimension table	Mounting	Back panel / wall / Field
		Conformity	Generally to BS 6134

ORDERING INFORMATION

Switch enclosure

GM style aluminium pressure die cast, weatherproof to IP66 as per IEC:60529 — **GM**
 GA style 304 stainless steel casting, weatherproof to IP66, fit for off shore as per IEC:60529 — **GA**
 GA style 316 stainless steel casting, weatherproof to IP66, fit for off shore as per IEC:60529 — **GA6**
 GK style aluminium pressure die cast, weatherproof to IP66 and flameproof to group IIC as per IS/IEC 60079 — **GK**

Models

Remote Mount Types

Models 721, 723 & 781 — Vapour Pressure,

Models 771, 773 & 774 — Gas filled

Temperature switch with **flexible thermal system** comprising of bulb, semi-rigid stem extension, capillary and armour, having **close**

fixed non-adjustable switching differential — **721**

Same as 721/771, but with auxiliary mechanism permitting **771**

wide adjustable band of switching differential without disturbing the setpoint (falling temperature) — **723**

A variant of 721/771, employs twin levers each operating a SPDT microswitch — **773**

actuated by a single thermal system through an unique linkage thereby providing two independent adjustable set points, each with its own setting scale, spring & switch — **781**

— **774**

Direct Mount Types

Models 731, 733 & 734 — Vapour Pressure

Similar to 721, but with a **rigid stem thermal system** comprising of bulb and rigid stem — **731**

Similar to 731, but has a **wide adjustable band** of switching differential — **733**

A variant of 731, provides two independent adjustable setpoints actuated by a single rigid stem thermal system similar to 781 — **734**

Thermal System Data

For Series 720 / 770 (Capillary shall be supplied only in multiples of 3 meters)

3 metre capillary without semi rigid stem — **EZZ**

6 metre capillary without semi rigid stem — **GZZ**

3 metre capillary 100 mm semi rigid stem — **Q**

3 metre capillary 250 mm semi rigid stem — **E**

3 metre capillary 500 mm semi rigid stem — **F**

6 metre capillary 250 mm semi rigid stem — **G**

6 metre capillary 500 mm semi rigid stem — **H**

9 metre capillary 250 mm semi rigid stem — **J**

9 metre capillary 500 mm semi rigid stem — **K**

12 metre capillary 250 mm semi rigid stem — **L**

12 metre capillary 500 mm semi rigid stem — **M**

15 metre capillary 250 mm semi rigid stem — **N**

15 metre capillary 500 mm semi rigid stem — **P**

For 730 Series

For all ranges 250 mm Rigid stem except range 'C11'; For range C11 400 mm Rigid stem.

Rigid stem includes bulb length — **T**

335 mm Rigid stem (for C08 and C07 only) including bulb length — **Z**

400 mm Rigid stem — **X**

Range Code : Refer Table-1 — **□**

Switch Code and Rating : Refer Table-2 — **□**

Electrical Entry : Refer Table-3 — **□**

Bulb dimensions : Refer Table-4 — **□**

Mounting

On-line — **Z**

Wall — **W**

2" pipe — **2**

Universal — **U**

Mounting material

Not applicable — **0**

Mild steel — **C**

316 SS — **2**

CE Conformity

Non CE conformity — **ZZ**

CE conformity — **CE**

Thermowell

With thermowell — **WT**

Without thermowell — **WO**

The below "Options" are available, consult sales

Special repeatability ($\pm 0.5\%$ FSR or 0.5 deg C which ever is higher)

Sliding gland 1/2" NPTM, 304 SS

Optional MWT (125 Deg C for C008 only)

316 SS, semi rigid stem (721 / 771 / 774 / 781)

316 SS, armour (721 / 771 / 774 / 781)

3 meter capillary 100 mm semi rigid stem (bulb dimension 14 mm dia \times 50 mm long & 14 mm dia \times 60 mm long)

SS tag plate (Maximum allowed three three lines)

PVC cover for armor

Table-1 : Range Code and Availability

RANGE CODE	RANGE Deg. C	MWT Deg. C	721 & 723	731 & 733	781	734	771 & 773	774
C007	- 25 to +35	45	✓	✓	✓	✓	X	X
C008	20 to 100	110	✓	✓	✓	✓	X	X
C011	90 to 200	210	✓	✓	✓	✓	X	X
C012	180 to 300	310	✓	X	✓	X	X	X
C003	- 50 to +150	250	N.A.	N.A.	N.A.	N.A.	✓	✓
C016	50 to 120	130	N.A.	N.A.	N.A.	N.A.	✓	✓

Table-2 : Switch Code, Rating and Availability (Note 11)

SWITCH CODE (SPDT)	AC RATING	DC RATING IN AMPS						AVAILABILITY OF SPDT IN MODELS	AVAILABILITY OF DPDT IN MODELS
		RESISTIVE			INDUCTIVE				
		220V	110V	24V	220V	110V	24V		
D	15A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0	721, 731, 771 781, 734 & 774	721, 731 & 771
3	15A 250 / 125V	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	721, 731, 771 781, 734 & 774	721, 731 & 771
W	15A 250 / 125V	0.3	0.5	6.0	0.05	0.1	4.0	723, 733 & 773	723, 733 & 773
4	1A 125V	N.A.	0.5	0.5	N.A.	0.25	0.25	721, 731, 771 781, 734 & 774	721, 731 & 771
5	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	3.0	721, 731, 771 781, 734 & 774	721, 731 & 771
J	15A 250V	N.A.	N.A.	2.0	N.A.	N.A.	N.A.	721, 731 & 771	721, 731 & 771
K	1A 125V / 0.5A 250V	N.A.	N.A.	0.5	N.A.	N.A.	N.A.	721, 731 & 771	721, 731 & 771
9	1A 115V 400 Hz	N.A.	N.A.	3.0	N.A.	N.A.	1.0	721, 731 & 771	721, 731 & 771
G	N.R.	N.R.	N.R.	1.0	N.R.	N.R.	0.25	721, 731 & 771	721, 731 & 771

Codes D, 3 & W – For General purpose usages.

Code 4 – With Noble metal contact.

Codes 5 – For General purpose with good DC rating.

Code J – Argon sealed micro switch with silver contact.

Code K – Argon sealed micro switch with gold contact.

Code 9 – Hermetically sealed, inert gas filled with silver alloy contact.

Code G – Hermetically sealed, inert gas filled with gold plated contact.

Note : In the model number for 781 / 774 / 734 specify only one character for switch code i.e. 3, D, 4, 5, 9, G, J & K

For DPDT, change switch code to "33", "44", etc., while ordering

N.A. – Not Available **N.R.** – Not Recommended

Table 3: Electrical entry

Size *	Single Entry		Dual Entry	
	GM / GA	GK	GM / GA	GK
1/2" NPTF	A	A	N	N
3/4" NPTF through adaptor	L	---	O	---
M20 × 1.5 **	E	E	EB	EB
7 pin plug through connector	C	---	---	---
9 pin plug through connector	D	---	---	---

* Cable gland available on request.

** Optional cable entry. Direct entry in GK enclosure and via adaptor in GM / GA enclosure.

Table 4: Bulb Dimension (standard)

Bulb size	Code	Series			
		720	730	770 'C03'	770 'C16'
12Ø × 80	F80	Up to 6 Mtrs.	✓	×	✓
12Ø × 140	F140	9 to 15 Mtrs.	×	✓	✓

Blub Dimension (optional)

Bulb size	Code
Optional bulb sizes for model 720 Series up to 6 meters and 730 series	
16Ø × 45 mm	J45
15Ø × 50 mm	I50
14Ø × 50 mm	H50
14Ø × 60 mm	H60
14Ø × 100 mm	H100
14Ø × 150 mm	H150
12.7Ø × 70 mm	K70
10Ø × 125 mm	E125
10Ø × 225 mm	E225
9.5Ø × 140 mm	D140
9Ø × 160 mm	C160
8Ø × 200 mm	B200
Optional bulb sizes ONLY for model 720 Series from 9 to 15 meters	
14Ø × 100 mm	H100
10Ø × 225 mm	E225
14Ø × 150 mm	H150

Response Time for Switzer Temperature Switches

Series	Response time		
	Capillary length & Temperature range	Without Thermowell	With Thermowell *
720 / 770	up to 6 mtrs. & 100°C	15 sec.	45 sec.
	up to 6 mtrs. & 300°C	25 sec.	75 sec.
	> 9 mtrs. to 15 mtrs. & 100°C	25 sec.	75 sec.
	> 9 mtrs. to 15 mtrs. & 300°C	40 sec.	90 sec.
730	All ranges	15 sec.	40 sec.

* Will vary depending on the design of the Thermowell and filling media.

SWITCHING DIFFERENTIAL DATA

TABLE – A : Fixed on-off differentials for style GM/GA –721/ 731/771 with 1 SPDT contact switching differentials will be less than or equal to the published values. For style GK multiply the listed differential by 1.5 times.

Model	Range Code	Range Deg. C	On-off Differential in Deg. C			
			Switch Code			
			3, D, 4	5	J, K	9, G
721 / 731	C007	(-) 25 to +35	4	9	12	12
	C008	20 to 100	2	6	6	6
	C011	90 to 200	3	7	9	9
721	C012	180 to 300	4	9	12	12
771	C003	(-) 50 to +150	5.5	14	14	14
771	C016	50 to 120	8	N.A.	N.A.	N.A.

TABLE – B : Fixed on-off differentials for style GM/GA – 721/731/771 with 2 SPDT contacts (for DPDT action). Switching differentials will be less than or equal to the published values. For style GK multiply the following differentials by 1.2 times.

Model	Range Code	Range Deg. C	On-off Differential in Deg. C			
			Switch Code			
			33, DD, 44	55	JJ, KK	99, GG
721 / 731	C007	(-) 25 to +35	5	12	18	18
	C008	20 to 100	3	8	9	9
	C011	90 to 200	4	9	13	13
721	C012	180 to 300	5	12	18	18
771	C003	(-) 50 to +150	8	18	18	18
771	C016	50 to 120	12	N.A.	N.A.	N.A.

TABLE – C : Wide band adjustable on-off differentials for style GM/GA –723 / 733 / 773 with SPDT/2SPDT (for DPDT action) contacts. For style GK multiply the lower limit of the listed wide band adjustable differential values by 1.2 times.

Model	Range Code	Range Deg. C	Wideband Adjustable Switching Differential in Deg. C	
			Switch Code	
			W	WW
723 / 733	C007	(-) 25 to +35	10 – 30	12 – 30
	C008	20 to 100	10 – 30	13 – 30
	C011	90 to 200	8 – 30	13 – 30
723	C012	180 to 300	10 – 30	12 – 30
773	C003	(-) 50 to +150	30 – 100	40 – 100

For Switching Differential of models 781, 734, 774 please consult factory.

NOTES

1. Gr.IIA & IIB of IS/IEC 60079–1 is equivalent to NEC CL.1, Gr.C & D. Gr.IIC of IS/IEC 60079–1 is equivalent to NEC CL.1, DIV.1, Gr.A & B.
2. Style GM/GA is weatherproof only if all entries and joint faces are properly sealed. Style GK is weatherproof only if cover 'O' ring is retained in position and proper FLP cable gland is used. It is recommended to procure cable glands along with GK instruments to avoid neglect of it while installation.
3. Intrinsic Safety (Exi) — Temperature Switches are classified as simple electrical apparatus as per BS 5345–6.3.3. Hence Temperature Switches with GM/GA enclosures may be used in intrinsically safe systems without certification if energy levels are limited to 1.2V, 0.1A or 25 mW.
4. Accuracy & Repeatability are one and the same for all blind temperature switches.
5. The instrument is calibrated in the mounting position depicted in the drawing. Hence mounting in any other direction will cause a minor range shift.
6. A Temperature switch is a switching device and not a measuring instrument — eventhough it has a scale to assist setting. For this reason, Test Certificates will not contain individual ON-OFF switching values at different scale readings. Maximum differential obtained alone will be declared, besides other specifications.
7. Select working range of the instrument such that the set value lies in the mid 35% of the range i.e., between 35% and 70% of range span.
8. For switching differential values please refer respective Range Table. Switching differentials furnished are nominal values under test conditions at mid-scale and will vary with range settings and operating conditions.
9. On and off settings should not exceed the upper or lower range span.
10. DPDT action is achieved by two SPDT switches synchronised to practical limits i.e., $\pm 2\%$ of FSR. Differential for DPDT contacts are higher than that of SPDT as force required to actuate the contacts are more. Please refer respective range table for exact values.
11. Contact life of microswitches are 5×10^5 switching cycles for nominal load. To quench DC sparks, use diode in parallel with inductance, ensuring polarity. A 'R-C' network is also recommended with 'R' value in Ohms equal to coil resistance and 'C' value in micro Farads equal to holding current in Amps.
12. All models are suitable for operating within a range of ambient temperature from $(-)$ 10°C to $(+)$ 60°C . Below 0°C , precautions should be taken in humid atmospheres to prevent frost formation inside the instrument from jamming the mechanism.

In models 721, 723 & 781 it is advisable to avoid the condition where the ambient temperature is within $\pm 5^{\circ}\text{C}$ of the setpoint. Under this condition the liquid / vapour phase becomes less well defined and the switching differential increases. Where this condition is unavoidable refer to models 740/760 liquid expansion temperature switches or 771–4.

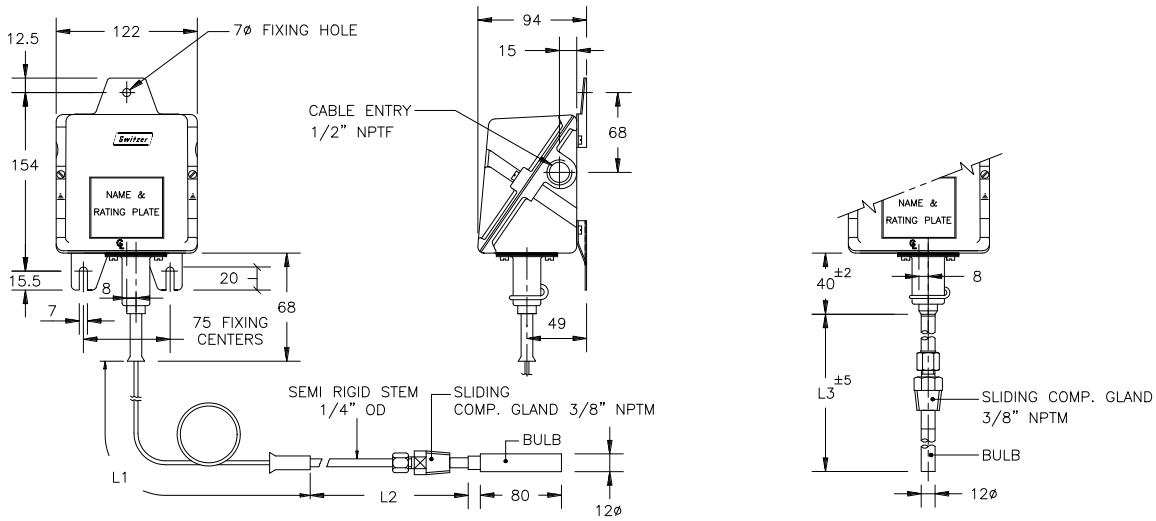
In Models 771, 773 & 774 a 10°C rise in ambient temperature will on average result in 1°C fall in setpoint.
13. Accuracy figures are exclusive of test equipment tolerance on the claimed values.

MOUNTING DIMENSIONS IN mm

WEATHERPROOF ENCLOSURE — STYLE 'GM'

MODELS 721, 723, 781, 771, 773 & 774

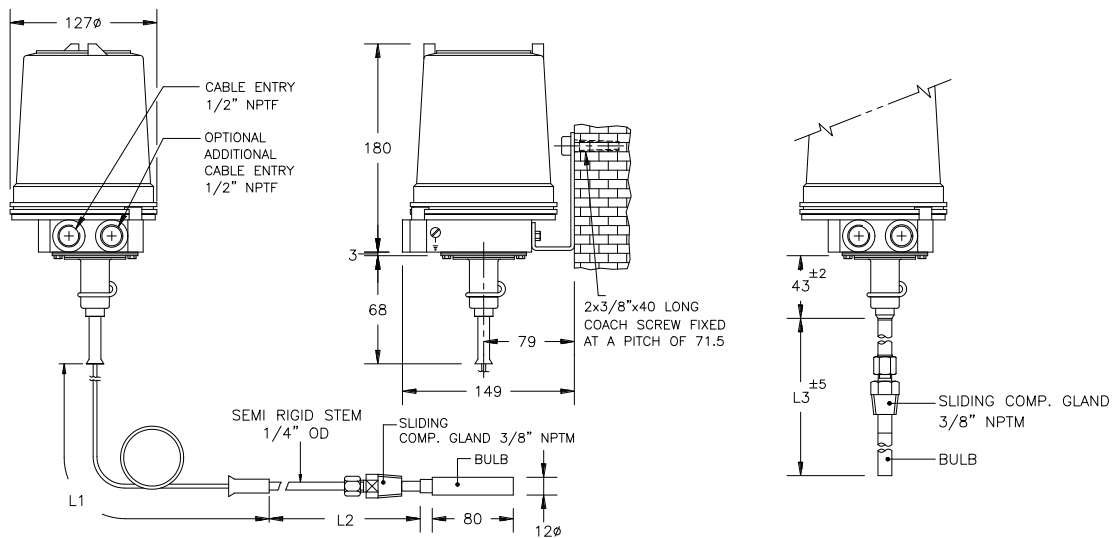
MODELS 731, 733 & 734



FLAMEPROOF ENCLOSURE — STYLE 'GK'

MODELS 721, 723, 781, 771, 773 & 774

MODELS 731, 733 & 734



NOTES:

- Dim L1, L2 varies depending on armoured capillary length
- Use certified weatherproof cable gland for GM enclosure
- It is mandatory to use certified flameproof cum weatherproof cable gland for flameproof enclosures.

- L1 — Length of armoured SS capillary 3 / 6 / 9 / 12 / 15 Mtrs.
- L2 — Length of semi rigid stem 250 mm or 500 mm (excludes compression gland length)
- L3 — Length of rigid stem including bulb 250 mm

This is not a contractual document. Prior notification of changes in specifications is impracticable due to continuous improvement



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