DETROIT SWITCH, INC.

444 MIL Spec

pressure or temperature actuated control switches

DETROIT SWITCH, INC. 444 MIL

The **444-10** and **444-32** Series Temperature and Pressure Control Switches are designed to meet requirements and withstand the test for Grade A Class 1 Type A of Naval Sea System Command Military Specifications **MIL-S-901** for High Shock, **MIL-C-2212 (444-10)** for A.C. and D.C. switching devices, **MIL-E-2036** for Watertight when specified, **MIL-R-16743** for Refrigeration, **MIL-STD-167-1** for type 1 Vibration, **MIL-S-16032 (444-32)** for Alarm Systems.

444 Model switches are bellows actuated. Pressure (from a volatile liquid on a temperature switch) powers the switch lever mechanism to operate the snap switch(es).

SETTING ADJUSTMENT: The external range screw adjusts the operation point(s) of the control by changing the amount of spring pressure opposing the bellows. This adjustment can be for either rising or falling pressure (temperature). Differentials (open to close of the snap switch) are not adjustable.

SEQUENCE ADJUSTMENT: Controls with more than one snap switch will have the highest setting on the back switch and the lowest setting on the front switch if they are not simultaneous. Adjustments to the back switch are via the range screw only. The other switches are adjusted relative to the back switch by adjusting the length of their actuating screws.

Setting repeatability is approximately one percent of the bellows pressure range and must be interpolated for temperature switches depending on settings and range.

AMBIENT TEMPERATURE: The maximum ambient is 150 F. (66 C.). Ambient temperature compensation (cross ambient) is available for temperature switches.

ELECTRICAL CONNECTIONS: A terminal board is standard on single stage (Model N) controls. Multi-stage controls (Models E, X, and D) are furnished with lead wires. Pin connectors and junction boxes are available options.

NON-INDUCTIVE RATINGS – STANDARD		
ELECTRICAL RATING – AMPERES		
VOLTAGE	A. C.	D. C.
115	15	0.5
230	12	0.25
440	8	----

MOTOR DUTY RATING - STANDARD		
ELECTRICAL RATING - AMPERES		
VOLTAGE	RUNNING	LOCKED ROTOR
	A. C.	A. C.
115	2.0	12.0
230	1.0	6.0
440	0.5	3.0

MOTOR DUTY RATING - OPTIONAL		
ELECTRICAL RATING - AMPERES		
VOLTAGE	RUNNING	LOCKED MOTOR
	A. C.	A. C.
115	8.0	48.0
230	4.0	24.0
440	2.0	12.0

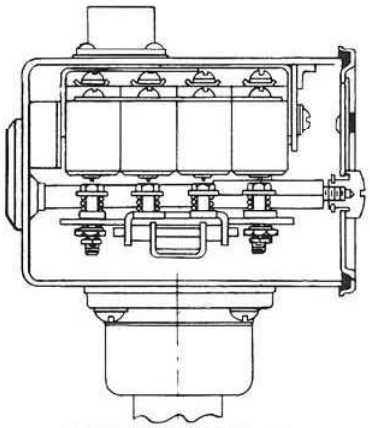
NON-STANDARD DEFFERENTIALS

NON-INDUCTIVE RATINGS - OPTIONAL		
ELECTRICAL RATING - AMPERES		
VOLTAGE	A. C.	D. C.
115	20	0.5
230	15	0.25
440	10	----

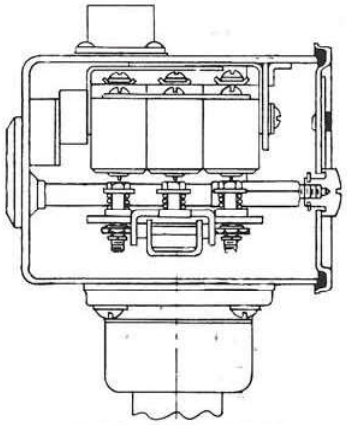
NON-STANDARD DIFFERENTIALS

Power Elements

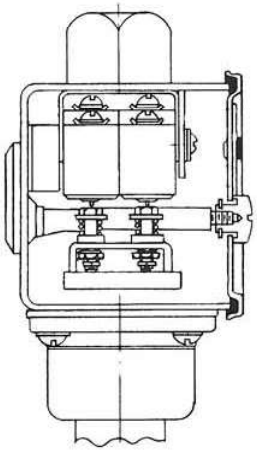
Seamless phosphor bronze bellows construction in all models provides a long life and accurate repeatability at set point.



CONTROL MODEL D
(4 STAGE)



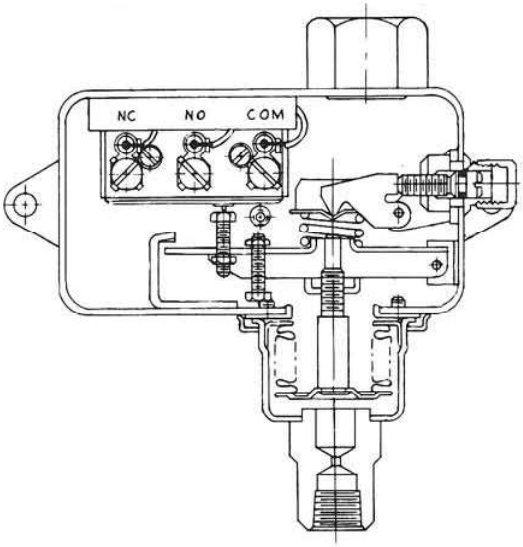
CONTROL MODEL X
(3 STAGE)



CONTROL MODEL E
(2 STAGE)

NOTE: All dimensions are for "roughing in" typical controls and are approximate.

Spec Control Switches



444-10 temperature switches with standard (1⅜" dia.) bellows will have differential characteristics at the high end of the range similar to those of a B-1 pressure switch (1°F = 1 PSI). 444-32 temperature differentials with standard (¾" dia.) bellows compare with a B-6 pressure switch with some exceptions per MIL-S-16032. As a general rule, differentials at the low end of a temperature range are two and one half (2½) times greater than at the high end of the range.

444-10 Pressure Switches

For further information: See Form 444-10 PT — Drwg. TS-2062

PRESSURE CONTROL RANGES AND DIFFERENTIALS							
STANDARD RANGES VAC. IN INCHES MERCURY PRESS. IN P.S.I.G. (a)	MODEL	MAX. PRESS P.S.I.G.	APPROX. NON-ADJUSTABLE DIFFERENTIAL P.S.I.G. (b)			BELLOWS DIAMETER	MAX. SEQUENCE P.S.I.G. (c)
			STANDARD	NON-STANDARD	NON-STANDARD		
30" VAC. TO 10" VAC.	C-3	20	0.2	0.4	0.5	3	3
30" VAC TO 20 P.S.I.G.	A-1	80	0.5	1.0	2.5	1-⅜	8
20" VAC. TO 100 P.S.I.G.	B-3	216	2.0	4.0	8.0	¾	24
20" VAC. to 250 P.S.I.G.	A-7	400	3.0	9.0	14.0	9/16	40
3" VAC. TO 3 P.S.I.G.	C-2	20	0.1	0.2	0.2	4-⅜	2
6" VAC. TO 8 P.S.I.G.	C-5	20	0.2	0.4	0.5	3	3
0.1 TO 4-½ P.S.I.G.	• C-1	20	0.1	0.2	0.2	4-⅜	2
0.1 TO 8 P.S.I.G.	• C-4	20	0.2	0.4	0.5	3	3
3 TO 50 P.S.I.G.	• B-1	80	0.5	1.0	2.5	1-⅜	7
5 TO 80 P.S.I.G.	• B-4	160	0.8	1.6	3.0	1-⅛	12
10 TO 200 P.S.I.G.	B-6	216	1.6	3.2	8.0	¾	36
20 TO 1300 P.S.I.G.	• A-16	2360	16.0	32.0	80.0	¼	200
25 TO 350 P.S.I.G.	• B-7	400	3.0	9.0	14.0	9/16	40
60 TO 600 P.S.I.G.	• B-12	900	6.0	12.0	18.0	15/32	60
100 TO 1800 P.S.I.G.	*B-16	2360	16.0	32.0	80.0	¼	200

(a) ADDITIONAL RANGES AVAILABLE ON REQUEST.
(b) DIFFERENTIALS WILL VARY WITH NON-STANDARD SNAP SWITCHES. DIFFERENTIALS GIVEN ON APPLICATION.
(c) MAX SEQUENCE IS THE TOTAL SPREAD BETWEEN ACTUATION POINTS FOR MULTI-SWITCH CONTROLS
• INDICATES STANDARD BELLOWS RANGE

444-10 Temperature Switches

For further information: See Form 444-10 PT— Drwg. TS-2063

TEMPERATURE CONTROL RANGES AND DIFFERENTIALS							
RANGE F° (a) (c)	MAX. TEMP. °F	APPROX. NON ADJUSTABLE DIFFERENTIAL F° (b)				BULB STYLE	
		STANDARD		NON-STANDARD			
		HIGH END	LOW END	HIGH END	LOW END	REMOTE	DIRECT
– 30 TO + 22	---	.5	1.5	3	7	L, N	H-1, H-2
– 10 TO + 60	---	.5	1.5	3	7	L, N	H-1, H-2
25 TO 90	120	.5	1.5	3	7	L, N	H-1, H-2
70 TO 140	167	.5	1.5	3	7	L, N	H-1, H-2
90 TO 165	195	.5	1.5	3	7	L, N	H-1, H-2
140 TO 215	245	.5	1.5	3	7	L, N	H-1, H-2
185 TO 250	276	.5	1.5	3	7	L, N	H-1, H-2
220 TO 290	317	.5	1.5	3	7	L, N	----
255 TO 330	355	.5	1.5	3	7	L, N	----
300 TO 400	437	.7	1.5	4	9	L, N	----
375 TO 480	500	1.0	2.0	4	9	L, N	----
400 TO 580	625	ON APPLICATION				L, N	----
560 TO 750	800	ON APPLICATION				L, N	----

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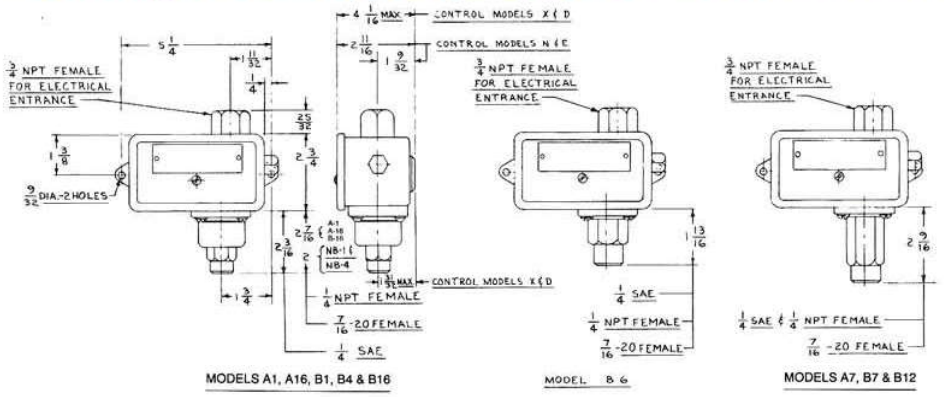
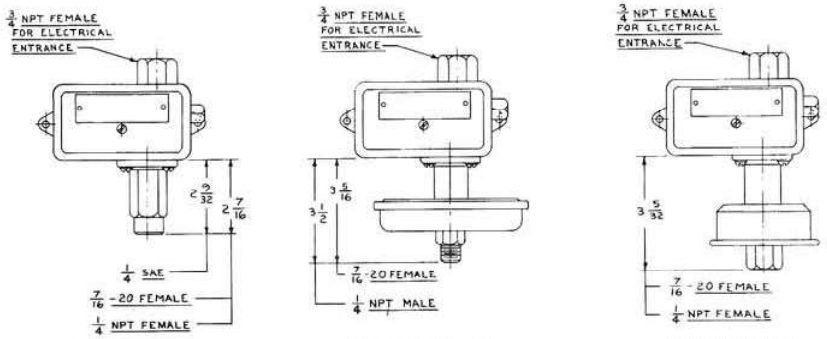
(c) SEQUENCE CAPABILITIES GIVEN ON APPLICATION.

Sensing Element and Switch Dimensions



MODELS A1, A16, B1, B4 & B16 — MODEL B6 — MODELS A7, B7 & B12

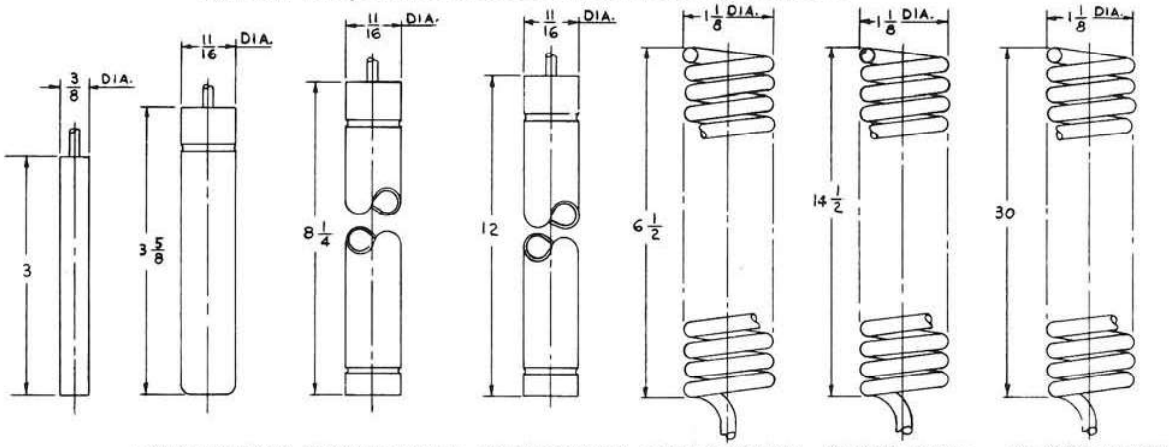


MODEL B3 — MODELS C1 & C2 — MODELS C3, C4 & C5

ROUGHING IN DIMENSIONS

Standard Temperature Bulbs in Correct Mounting Positions

REMOTE



FOR BULB COLDER THAN CONTROL MODEL L MAY BE MOUNTED IN ANY POSITION

FOR BULB WARMER THAN CONTROL MODEL L

FOR CROSS AMBIENT UP TO 15 FT. CAP. TUBING MODEL LM

FOR CROSS AMBIENT OVER 15 FT. CAP. TUBING MODEL LM

FOR LIQUIDS

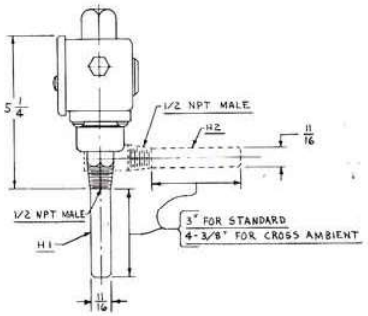
FOR BULB COLDER OR FOR BULB WARMER THAN CONTROL MODEL N

FOR CROSS AMBIENT UP TO 15 FT. CAP. TUBING MODEL NM

FOR CROSS AMBIENT OVER 15 FT. CAP. TUBING MODEL NM

FOR GASES

DIRECT



DIRECT CONNECT MODELS H1 & H2

H - Model's

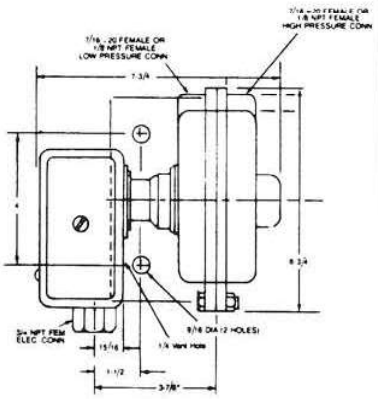
Special bulbs are available for non-standard mounting positions and non-standard differentials

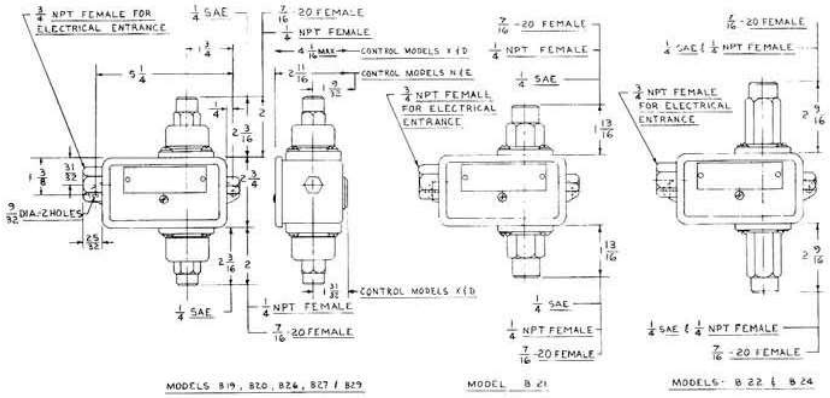
444-10 Difference Switches

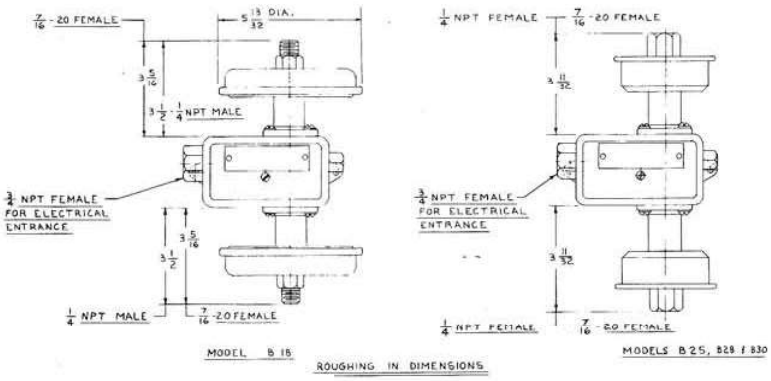
For further information: See Form 444-10 DA — Drwg. TS-2061

ADJUSTABLE RANGE OF PRESSURE DIFFERENCE (a) (c)	MODEL	SYSTEM PRESSURE	MAX PRESSURE PSIG	APPROX. DIFFERENTIAL (MAKE/BREAK) PSIG (b)	BELLOWS DIAMETER (STANDARD RANGE-PSIG)
0.3 TO 3 PSID	B-18	30" HG VAC TO 12 PSIG	20	0.1	4-3/8 (4.4)
4 TO 35 PSID	B-19	30" HG VAC TO 50 PSIG	80	0.6	1-3/8 (47)
7 TO 70 PSID	B-20	30" HG VAC TO 80 PSIG	160	0.9	1-1/8 (75)
16 TO 160 PSID	B-21	30" HG VAC TO 180 PSIG	216	1.8	3/4 (190)
25 TO 250 PSID	B-22	30" HG VAC TO 250 PSIG	400	3.2	9/16 (325)
80 TO 500 PSID	B-24	30" HG VAC TO 800 PSIG	900	6.2	15/32 (540)
0.3 TO 3 PSID	B-25	30" HG VAC TO 15 PSIG	20	0.2	3 (7.9)
1 TO 7 PSID	B-30	30" HG VAC TO 15 PSIG	20	0.2	3 (7.9)
1 TO 40 PSID	B-31	30" HG VAC TO 80 PSIG	160	0.9	1-1/8 (75)
1 TO 20 PSID	B-32	30" HG VAC TO 50 PSIG	80	0.6	1-3/8 (47)
10 TO 100 PSID	B-33	30" HG VAC TO 180 PSIG	216	1.8	3/4 (190)
25 TO 450 PSID	B-34	30" HG VAC TO 800 PSIG	900	6.2	15/32 (540)
8" H_2O to 55" H_2O	B-23	30" HG VAC TO 40 PSIG	60	1" H_2O	5 (2)

(a) ADDITIONAL RANGES AVAILABLE ON REQUEST.
(b) DIFFERENTIALS WILL VARY WITH NON-STANDARD SNAP SWITCHES. DIFFERENTIALS GIVEN ON APPLICATION.
(c) SEQUENCE CAPABILITIES GIVEN ON APPLICATION.







Ambient Compensated Pressure and Temperature Switches

(Upper Element Evacuated and Sealed)

For further information: Contact the Factory

Ambient pressure compensated switches are designed with equal sized bellows opposing each other. The upper bellows is evacuated and sealed thus acting as an additional range spring force in the switch. Therefore, ranges are different than our standard ranges. Switch configuration is similar to that of the pressure difference control of the same bellows size. See drawing TS-2061. Ambient pressure compensation also applies to temperature switches since they are designed to operate off a saturated vapor pressure curve. Contact the factory for further information.