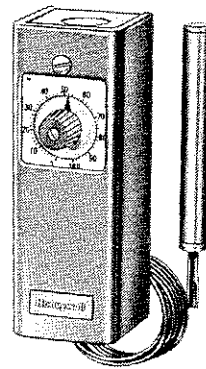


# Honeywell

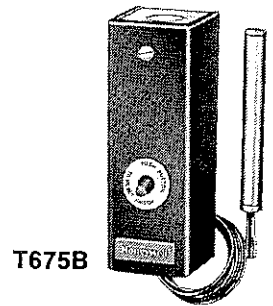
THE T675 AND T678 TEMPERATURE CONTROLLERS REGULATE THE TEMPERATURE OF AIR OR LIQUIDS IN DUCTS, PIPES, TANKS, AND BOILERS. TYPICAL USES INCLUDE CONTROL OF DAMPERS AND VALVES IN HEATING, COOLING, OR HEATING-COOLING SYSTEMS.

- T675A has 1 single-pole, double-throw (spdt) switch that breaks R-B and makes R-W at the set point on a temperature rise.
- T675B Manual Reset Low Limit has 1 single-pole, single-throw (spst) switch that breaks at the set point on a temperature fall, and requires manual resetting.
- T678A has 2 single-pole, double-throw (spdt) switches that operate in sequence. The right switch breaks R-B and makes R-W at the set point on a temperature rise. The left switch breaks R-B and makes R-W if the temperature continues to rise through the interstage differential.
- T675A models available with an adjustable differential.
- T675A and T678A have set point adjustment knob on front of case.
- Capillary tubing allows remote mounting of sensing element; models available with various lengths.
- T675A and T678A models available with a fast-response sensing element.
- Controller can be mounted in any position.
- Mounting accessories available for all applications.
- Ambient temperature compensated.
- Insert supplied with TRADELINE models replaces set point knob to discourage tampering.

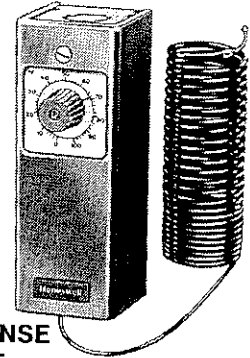
## TEMPERATURE CONTROLLERS



T675A,  
T678A



T675B



T675A, T678A  
WITH FAST-RESPONSE  
SENSING ELEMENT

## T675A,B; T678A

# SPECIFICATIONS

## TRADELINE MODELS

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value. TRADELINE model specifications are the same as those of standard models except as noted below.

### TRADELINE MODELS AVAILABLE:

T675A and T678A Temperature Controllers—see Table I for TRADELINE models available.

CAPILLARY: 5 ft [1.5 m] long, copper (except 1 T675A model with a 20 ft [6.1 m] capillary).

### TRADELINE FEATURES:

- All TRADELINE models include tamper-resist-

ing insert and 107324A Capillary Holder. (Models with fast-response sensing element include 131524A Capillary Holder.)

- TRADELINE models of T675A, T678A supplied with impact-resistant Norel covers.
- TRADELINE pack with cross reference and special instruction sheet.

TABLE I—TRADELINE MODELS AVAILABLE

MODEL	DIFFERENTIAL	OPERATING TEMPERATURE RANGE (SCALE RANGE)		MAXIMUM SAFE BULB TEMPERATURE	
		F	C	F	C
T675A (1 spdt switch)	Adjustable 3 F to 10 F [1.7 C to 5.6 C]	0 to 100 <sup>a,b</sup>	-18 to + 38	125	52
		160 to 260	71 to 127	280	138
	Adjustable 3.6 F to 12 F [2.0 C to 6.7 C]	55 to 175 <sup>a</sup>	13 to 79	200	93
	Fixed at 1 F [0.6 C]	0 to 100	-18 to + 38	125	52
T678A (2 spdt switches)	Each switch: Fixed at 3 F [1.7 C] Interstage: Adj. 3 F to 10 F [1.7 C to 5.6 C]	0 to 100 <sup>a</sup>	-18 to + 38	125	52
	Each switch: Fixed at 3.6 F [2.0 C] Interstage: Adj. 3.6 F to 12 F [2.0 C to 6.7 C]	55 to 175 <sup>a</sup>	13 to 79	200	93

<sup>a</sup>TRADELINE model also available with a fast-response sensing element, including a 131524A Capillary Holder.

<sup>b</sup>TRADELINE model also available with a 20 ft [6.1 m] copper capillary.

*continued on page 3*

## ORDERING INFORMATION

**WHEN PURCHASING REPLACEMENT AND MODERNIZATION PRODUCTS FROM YOUR TRADELINE WHOLESALER OR YOUR DISTRIBUTOR, REFER TO THE TRADELINE CATALOG OR PRICE SHEETS FOR COMPLETE ORDERING NUMBER, OR SPECIFY—**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Order number; specify TRADELINE model, if desired.</li> <li>2. Operating temperature range (scale range).</li> <li>3. Standard sensing bulb or fast-response sensing element (if available).</li> </ol> | <ol style="list-style-type: none"> <li>4. Capillary length and material.</li> <li>5. Fixed or adjustable differential on a T675A.</li> <li>6. Differential range on adjustable T675A and T678A models.</li> <li>7. Replacement parts, if desired.</li> <li>8. Accessories, if desired.</li> </ol> |
|---|---|

**IF YOU HAVE ADDITIONAL QUESTIONS, NEED FURTHER INFORMATION, OR WOULD LIKE TO COMMENT ON OUR PRODUCTS OR SERVICES, PLEASE WRITE OR PHONE:**

1. YOUR LOCAL HONEYWELL BUILDING CONTROLS SALES OFFICE (CHECK WHITE PAGES OF YOUR PHONE DIRECTORY).
2. BUILDING CONTROLS DIVISION CUSTOMER SERVICE  
HONEYWELL INC., 1885 DOUGLAS DRIVE NORTH  
MINNEAPOLIS, MINNESOTA 55422 (612)542-7500  
(IN CANADA—HONEYWELL LIMITED/HONEYWELL LIMITEE, 740 ELLESMERE ROAD, SCARBOROUGH, ONTARIO M1P 2V9) INTERNATIONAL SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES OF THE WORLD.

# STANDARD MODELS

MODELS (also refer to Table II):

T675A Temperature Controller—spdt switching to make or break a circuit on a temperature change; fast-response models operate approximately 4 times faster than standard models.

T675B Low Limit Temperature Controller—spst

switching to break a circuit on a temperature fall; must be manually reset.

T678A Temperature Controller—2 spdt switches operate 2 independent circuits in sequence; fast-response models operate approximately 4 times faster than standard models.

TABLE II—STANDARD MODELS AVAILABLE.

MODEL	SNAP-ACTING SWITCHES	DIFFERENTIAL <sup>a</sup>	OPERATING TEMPERATURE RANGE (SCALE RANGE) <sup>c</sup>		MAXIMUM SAFE BULB TEMPERATURE	
			F	C	F	C
T675A	1 spdt	Adjustable 3 F to 10 F [1.7 to 5.6 C]	0 to 100	-18 to + 38	125	52
			160 to 260	71 to 127	280	138
		Adjustable 3.6 F to 12 F [2.0 to 6.7 C]	55 to 175	13 to 79	200	93
			Fixed at 1 F [0.6 C]	0 to 100	-18 to + 38	125
		55 to 175 <sup>d</sup>		13 to 79	200	93
		160 to 260		71 to 127	280	138
T675B	1 spst	Manual reset <sup>b</sup>	30 to 50 <sup>e</sup>	- 1 to + 10	125	52
T678A	2 spdt	Each switch: Fixed at 3 F [1.7 C] Interstage: Adjustable 3 F to 10 F [1.7 C to 5.6 C]	0 to 100	-18 to + 38	125	52
			160 to 260	71 to 127	280	138
		Each switch: Fixed at 3.6 F [2.0 C] Interstage: Adjustable 3.6 F to 12 F [2.0 C to 6.7 C]	0 to 100 <sup>f</sup>	-18 to + 38	125	52
			55 to 175	13 to 79	200	93

<sup>a</sup>All differentials are subtractive except for the T675B (which has manual reset) and the interstage differential on T678A models.

<sup>b</sup>Temperature should rise 10 F [5.6 C] above the set point before resetting.

<sup>c</sup>Celsius scaleplates available. See Accessories.

<sup>d</sup>Model available with a fast-response sensing element, including a 131524A Capillary Holder.

<sup>e</sup>Factory-set and locked at 37 F [3 C].

<sup>f</sup>Sensing element is a 12 ft [3.7 m] averaging element on the end of a 10 ft [3.0 m] copper capillary.

## ELECTRICAL RATINGS:

T675A models with adjustable differential and T678A:

	120 Vac	240 Vac	277 Vac
Full Load	8.0	5.1	4.2
Locked Rotor	48.0	30.6	25.2
Pilot Duty	125 VA	125 VA	125 VA

T675A models with fixed differential—125 VA at 120/208/240/277 Vac.

T675B—125 VA pilot duty up to 277 Vac.

T678A—maximum connected load = 2000 VA.

OPERATING TEMPERATURE RANGE (SCALE RANGE):  
See Table II.

DIFFERENTIAL: See Table II.

ADJUSTMENTS:

Set Point (Operating Temperature):

T675A and T678A—adjustment knob on dial on front of controller.

T675B—screwdriver slot in center of dial (cover must be removed).

Differential (cover must be removed):

T675A models with adjustable differential—adjustment dial on snap-acting switch.

T678A interstage differential—star wheel on left side of chassis.

MAXIMUM SAFE BULB TEMPERATURE: See Table II.

TEMPERATURE SENSING ELEMENT: Standard element is a liquid-filled, remote bulb. Some models are available with a fast-response, liquid-filled, coiled capillary element which reduces response time to approximately 1/4 that of the standard bulb.

SENSING BULB SIZE:

Length—4-3/16 in. [106.4 mm].

Diameter—1/2 in. [12.7 mm].

MAXIMUM SENSING BULB PRESSURE: 50 psi [344.7 kPa] for direct immersion.

CAPILLARY LENGTH AND MATERIAL:

T675A and T678A standard models—5 ft [1.5 m] copper, or 20 ft [6.1 m] copper, monel, or stainless steel.

T675A and T678A fast-response models—5 ft [1.5 m] copper capillary with a coiled sensing element on the end; sensing element is coiled 1/8 in. [3.2 mm] tubing, 1-1/2 in. [38.1 mm] diameter x 5 in. [127 mm] long. The coil may be stretched to approximately 10 in. [254 mm].

T675B—10 ft [3.0 m] copper.

CAPILLARY HOLDER: 107324A included with TRADELINE models (except fast-response models). 131524A included with all fast-response models.

WIRING KNOCKOUTS: Two, 7/8 in. [22.2 mm] diameter knockouts for 1/2 in. conduit (1 in the top and 1 in the bottom).

CONTROLLER MOUNTING: Any position; 3 screws through slotted holes in back of case (Fig. 1).

SENSING BULB MOUNTING:

In air ducts—capillary holder (Figs. 2 and 3).

In boilers or storage tanks—immersion well (Fig. 4) or capillary compression fitting (Fig. 5).

DIMENSIONS: See Fig. 1.

APPROVALS:

UNDERWRITERS LABORATORIES INC. LISTED:

T675A and T678A—File No. E4436, Vol. 4; Guide No. XAPX.

T675B—File No. SA481, Vol. 3; Guide No. SDFY.

CANADIAN STANDARDS ASSOCIATION CERTIFIED (120 V, 240 V, and some 208 V models only): T675A and T678A—File No. LR1620, Guide No. 400-E-0.

REPLACEMENT PART:

1. 131524A Capillary Holder, for mounting a fast-response sensing element in an air duct.

ACCESSORIES:

1. 107324A Capillary Holder—for mounting a sensing bulb in an air duct; 8-3/8 in. [212.7 mm] long.

2. 311266D Duct Bulb Holder.

3. Immersion Well Assembly—to protect sensing bulb from mechanical or chemical damage when mounting in a boiler or storage tank; copper, 4-3/4 in. [120.7 mm] insertion length; includes 112721 Tube Clip for clamping capillary tube to immersion well—

—112622AA, 1/2-14 NPT external threads on spud.

—112630A, 3/4-14 NPT external threads on spud.

4. Capillary Compression Fitting—to provide seal-off when mounting sensing bulb directly in a boiler or storage tank; brass, 5/8 in. [15.9 mm] thread length—

—104484A, 1/2-14 NPT external threads on spud.

—104484B, 3/4-14 NPT external threads on spud.

5. 105900 T-strap—for clamping sensing bulb to a pipe or similar mount.

6. 7640HY Bag Assembly—with standoff bracket for mounting the controller to an insulated duct.

7. Q615A Splash-proof Enclosure.

8. 34886A Sun Shield.

9. 801534 Calibration Wrench.

10. 194899 Tamper-resisting Insert Button to conceal set point.

11. Celsius scaleplates for T675.

—194486D: 75 to 125 °C replaces 160 to 260 °F scaleplate.

—194486F: 15 to 75 °C replaces 55 to 175 °F scaleplate.

—194486H: minus 30 to 50 °C replaces 0 to 100 °F scaleplate.

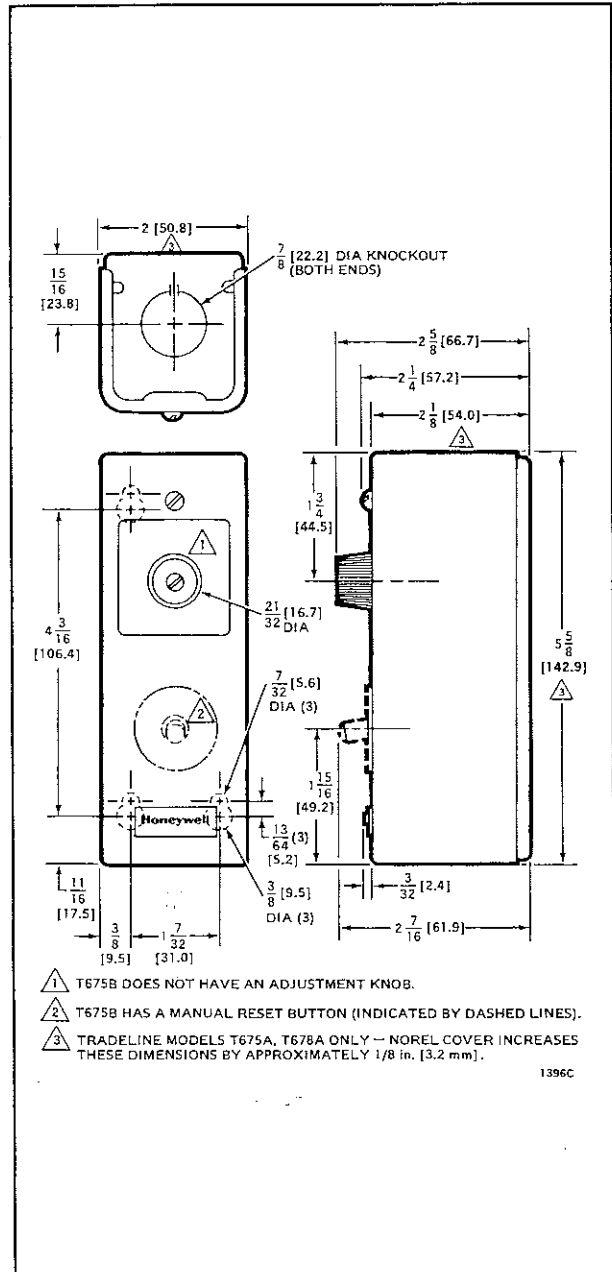


FIG. 1—DIMENSIONS OF THE T675 AND T678 TEMPERATURE CONTROLLER, IN in. [mm IN BRACKETS].

# INSTALLATION

## WHEN INSTALLING THIS PRODUCT. . .

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

## CAUTION

Disconnect power supply before beginning installation to prevent electrical shock and equipment damage.

## LOCATION AND MOUNTING

The controller may be installed in any convenient position. Mount it with 3 screws through the slotted holes in the back of the case (Fig. 1). Be sure to consider the length of the capillary before mounting the controller.

Install the sensing element where it is exposed to the average temperature of the controlled medium. The sensing bulb may be directly immersed or mounted in a well. T675A or T678A fast-response models must use the capillary holder furnished with the device (Fig. 2). The remote sensing bulb of standard models should be held in place with a capillary holder, immersion well, or compression fitting (Figs. 3-5). Sharp bends or kinks in the capillary tubing affect the efficiency of the controller and must be avoided. Excess capillary should be carefully coiled and left directly beneath the controller.

NOTE: When pressure fittings are used in areas of vibration, such as pipe lines, the bulb must be adequately supported.

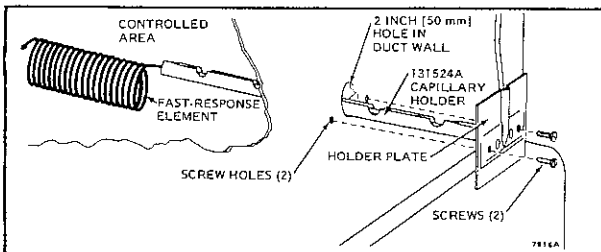


FIG. 2—MOUNTING A FAST-RESPONSE ELEMENT IN AN AIR DUCT.

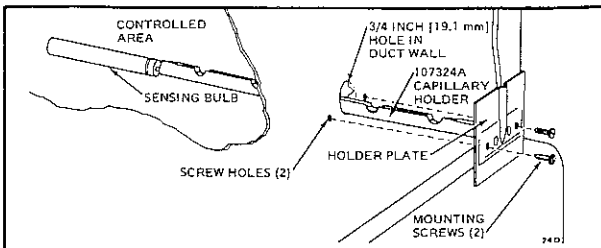


FIG. 3—MOUNTING THE SENSING BULB AND CAPILLARY HOLDER IN AN AIR DUCT.

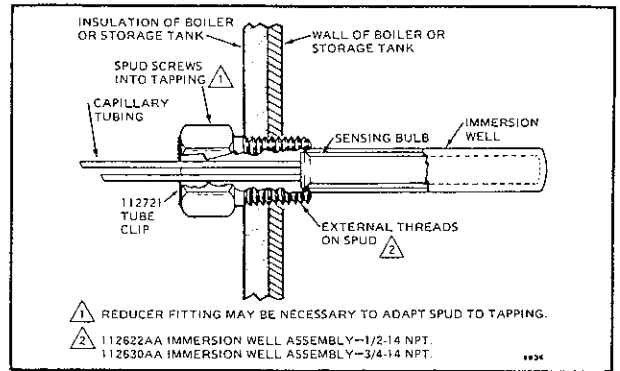


FIG. 4—MOUNTING THE SENSING BULB IN AN IMMERSION WELL.

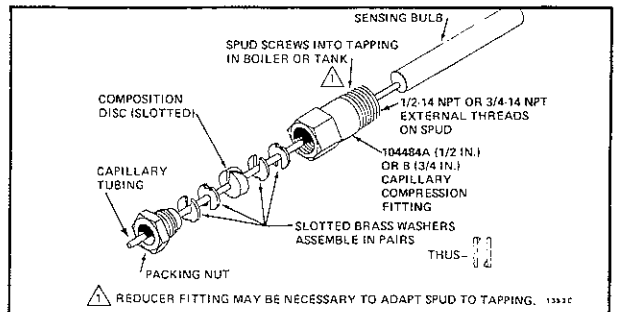


FIG. 5—MOUNTING THE SENSING BULB USING A CAPILLARY COMPRESSION FITTING.

## WIRING

Disconnect the power supply before making wiring connections to prevent electrical shock and equipment damage. All wiring must comply with applicable electrical codes, ordinances, and regulations. If using the controller with a flame safeguard control, use moisture-resistant No. 14 wire suitable for at least 167 F [75 C] for a primary control (such as an RA890), or for at least 194 F [90 C] for a programming control (such as an R4140). For high temperature installations, use moisture-resistant No. 14 wire selected for a temperature rating above the maximum operating temperature.

Two knockouts for 1/2 in. conduit are provided—one in the top and one in the bottom of the case. Follow the wiring instructions furnished with the heating or cooling system. Fig. 6 shows the switching action.

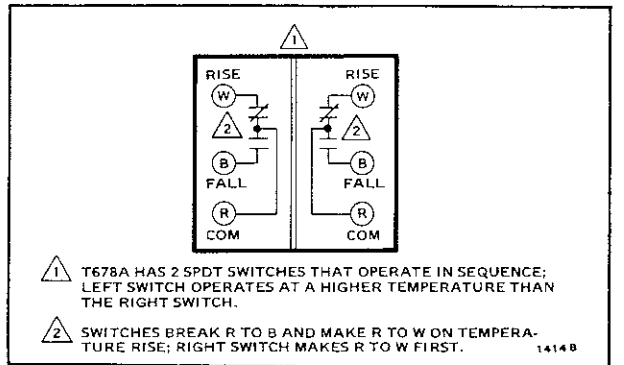


FIG. 6—T678A SWITCHING. T675A HAS ONE SPDT SWITCH. T675B HAS ONE SPST SWITCH (opens on temp. fall).

# OPERATION

## T675A

As the temperature of the controlled medium falls below the set point less differential, the T675A switch makes terminals R to B and energizes a normally closed solenoid valve to provide heat. In cooling applications, the T675A makes terminals R to W as the temperature rises above the set point, energizing cooling equipment. Fig. 7 shows the operation of the T675A. Fig. 8 shows the location of the adjustment dial on models with an adjustable differential.

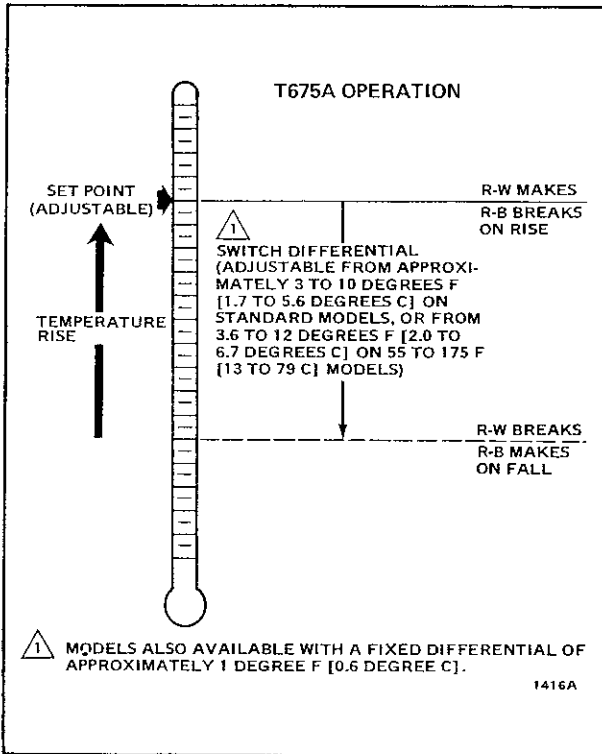


FIG. 7—OPERATION OF THE T675A.

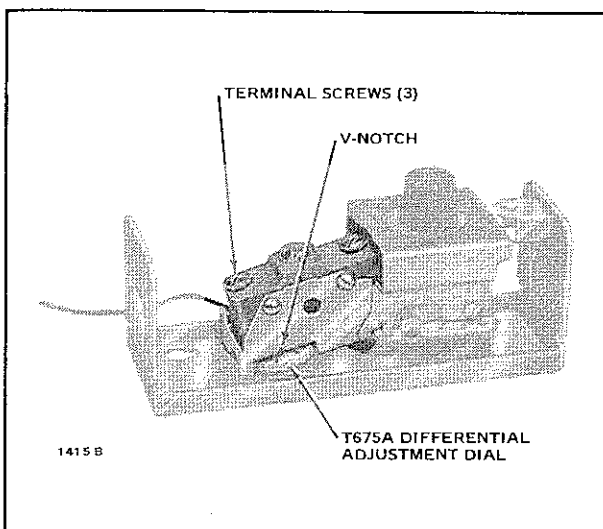


FIG. 8—LOCATION OF THE ADJUSTMENT DIAL ON T675A MODELS WITH AN ADJUSTABLE DIFFERENTIAL.

## FREEZE-UP PROTECTION

When using the T675A (auto-recycling) for freeze-up protection, the recommended set point is 38 F [3.3 C] plus the switch differential.

EXAMPLE: Set point of 38 F [3.3 C] plus 1 F [0.6 C] (fixed differential model) equals an actual set point of 39 F [3.9 C].

EXAMPLE: Set point of 38 F [3.3 C] plus 3 F [1.7 C] (adjustable differential model) equals an actual set point of 41 F [5 C].

This provides an adequate safety factor for freeze-up protection.

NOTE: The T675B is a manual reset device specifically designed for freeze-up protection.

## T675B

Used as a low limit controller, the T675B interrupts the operation of equipment if the temperature of the controlled medium falls below the set point. The device is reset manually after a rise in temperature of approximately 10 F [5.6 C]; push in the manual reset button on the front of the case. The operation of the T675B is shown graphically in Fig. 9.

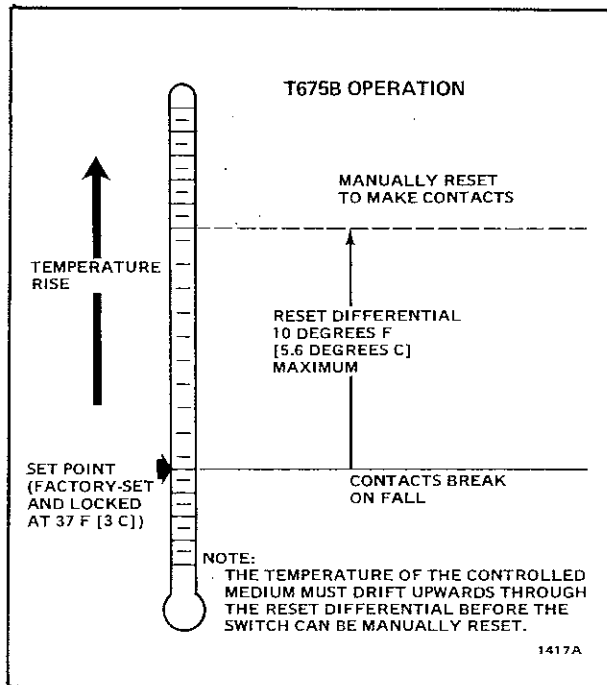


FIG. 9—OPERATION OF THE T675B.

## T678A

When the temperature at the sensing element rises above the set point of the controller, the switch on the right makes R-W. Should the temperature continue to rise through the preselected interstage differential of the controller, the switch on the left will make R-W.

Conversely, on a temperature fall, the switch on the left makes R-B, providing first step switching. If the temperature continues to fall, the switch on the right makes R-B to provide sequencing of equipment.

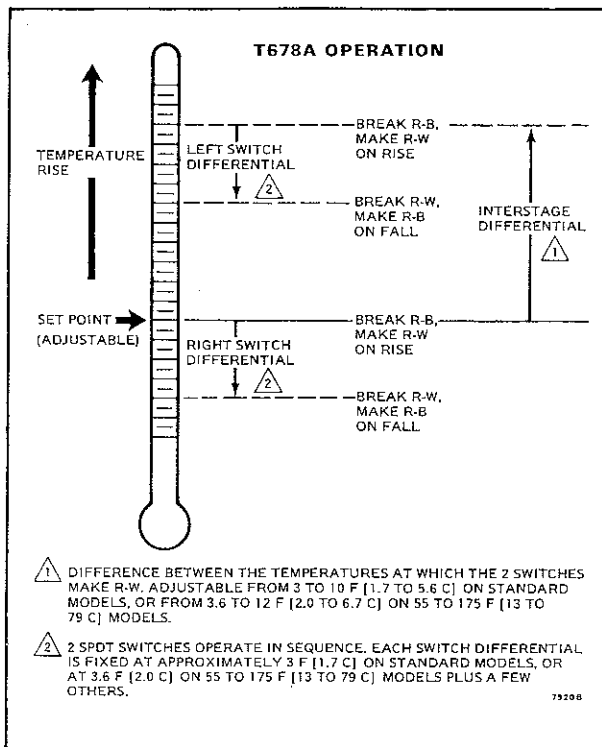


FIG. 10—OPERATION OF THE T678A.

The T678A Temperature Controller has an adjustable interstage differential. The set point adjustment knob determines the temperature at which the right switch operates. The left switch can be adjusted to operate from 3 F to 10 F [1.7 C to 5.6 C] (or 3.6 F to 12 F [2.0 C to 6.7 C] on some models) above the point of operation of the right switch. An illustration depicting the operation of the T678A is shown in Fig. 10. The interstage differential is adjusted by turning the star wheel with a narrow screwdriver inserted into the rectangular hole in the chassis (Fig. 11).

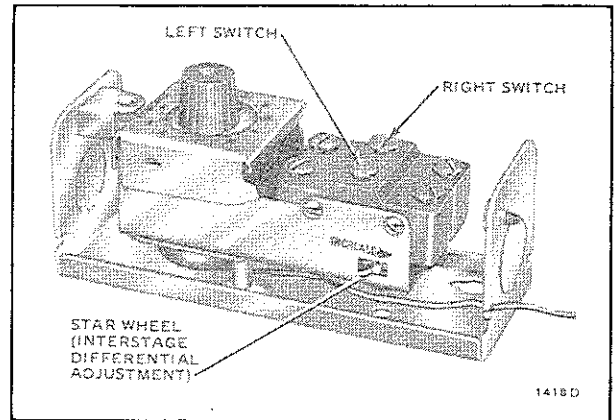



FIG. 11—INTERSTAGE DIFFERENTIAL ADJUSTMENT ON A T678A.

## CALIBRATION AND CHECKOUT

All controllers are carefully tested and calibrated at the factory under controlled conditions. If the controller is not operating at a temperature corresponding to the scale setting and differential setting, check to see that the sensing bulb senses the average temperature of the medium controlled. If the temperature of the controlled medium is changing rapidly, the differential will appear wider than its setting.

For calibration, an accurate temperature reading of the controlled medium must be taken. Place an accurate thermometer near the sensing bulb, or refer to a thermometer that has been installed as part of the system. If the sensing bulb is installed in an inaccessible area, or if the controlled medium is unstable, the bulb should be removed and placed in a controlled bath for accurate calibration.

### T675A

These controllers are calibrated so that the dial setting, indicated by the pointer on the adjustment knob, is the point at which the R-W switch contacts make on a temperature rise. Measure the temperature at the bulb. Rotate the adjustment knob counterclockwise  from the top of the scale, simulating a temperature rise, until the R-W switch contacts make. Note the dial reading. If it differs from the bulb temperature, calibrate the dial as follows:

1. Determine the number of degrees difference between the bulb temperature and the dial reading at which the R-W switch contacts make.
2. Remove the adjustment knob and slip the fingers of the calibration wrench (accessory, Part No. 801534) into the slots of the dial. Rotate the dial until the fingers


of the wrench drop into the slots of the calibration nut under the dial. Note the dial indication at this point. Turn the dial and the calibration nut up or down scale the number of degrees that the bulb temperature differs from the point at which the contacts make (determined in step 1). For example, move the dial from 45 to 65 if the dial reading in step 1 was 45 degrees and the bulb temperature was 65 degrees.

3. Check the calibration adjustment by moving the adjustment knob up and down the scale while listening for the contacts to make and break. If the dial is still out of calibration, repeat the calibration procedure.

### T675B


NOTE: The cover must be removed to see the dial. All T675B models have been factory-set and locked at 37 F [3 C].

These controllers are calibrated so that the dial setting, indicated by the fixed pointer at the top of the dial, is the point at which the switch contacts break on temperature fall.


Measure the temperature at the bulb. Remove the cover of the controller. Loosen the locking screw. Insert a screwdriver in the slot in the center of the dial. Start with the dial at the bottom of the scale, and rotate the dial counterclockwise  to simulate a temperature fall until the switch contacts break. Note the dial reading. If it differs from the bulb temperature, follow the calibration procedure outlined for the T675A. Tighten the locking screw and replace the cover.

## T678A

These controllers are calibrated so that the dial setting, indicated by the pointer on the adjustment knob, is the pointer at which the R-W contacts of the right switch make on a temperature rise. If the temperature continues to rise, the R-W contacts of the left switch make at the dial setting *plus* the interstage differential. (The interstage differential is adjustable as shown in Figs. 10 and 11.)

Measure the temperature at the bulb. Rotate the adjustment knob counterclockwise  from the top of the scale, simulating a temperature rise, until the R-W contacts of the right switch make. Note the dial reading. If it differs from the bulb temperature, follow the calibration procedure outlined for the T675A.

After calibrating the dial, check the setting of the interstage differential. Set the adjustment knob at the

bulb temperature. Then rotate the adjustment knob counterclockwise , simulating a temperature rise, until the R-W contacts of the left switch make. Note the dial reading. The difference between this reading and the bulb temperature is the interstage differential. The interstage differential may be adjusted if necessary (Fig. 11).

## CHECKOUT

Check the operation of the controller by raising and lowering the set point through the temperature range of the air or liquid being controlled. Make sure that the controlled equipment operates as intended.

To install tamper-resisting insert on TRADELINE models, remove screw from adjustment knob, remove knob, install insert.

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