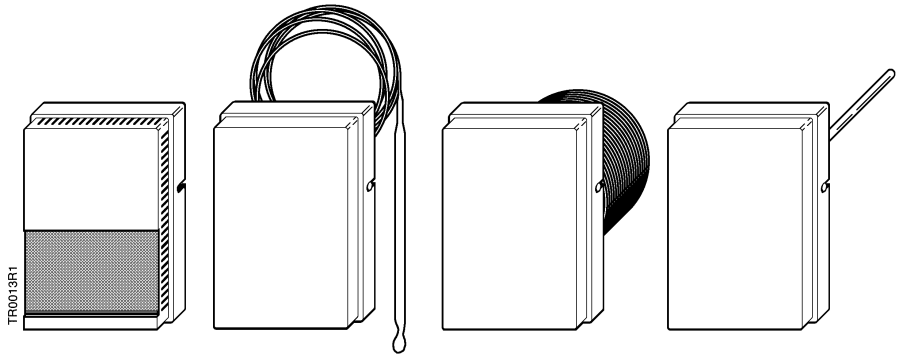
SIEMENS

Technical Instructions
Document No. 155-077P25
TT 184-1
March 10, 2005

Powers™ Controls

TT 184 Temperature Transmitters



Room Transmitter Remote Bulb Average Bulb Rigid Bulb

Description

The TT 184 Temperature Transmitters are direct acting, one-pipe instruments that sense temperature and transmit a proportional pneumatic signal. Normally, this signal is transmitted to a remotely located receiver gauge and/or receiver-controller. The receiver gauge would be calibrated to read directly in temperature.

Features

- Rapid response to temperature changes over their full range
- Internal feedback for excellent linearity and accuracy
- Variety of sensing elements and temperature ranges

Application

The temperature transmitters are ideal for applications requiring indication with a receiver gauge and/or control with a receiver-controller.

Product Numbers

See Table 1.

Specifications

Operating

Action	Direct acting
Output air pressure	3 to 15 psi (21 to 103 kPa)
Ambient temperature range	40 to 120°F (4.4 to 49°C)
Input (supply) air pressure:	
Restrictor size	40 scim (11 ml/s)
Calibration Pressure	22 ± 1.0 psig (152 ± 6.9 kPa)
Maximum	30 psig (207 kPa)
Thermal system:	
Room	Bimetal
Rigid bulb	Rod and tube
Remote bulb	Liquid filled
Air consumption	35 scim (10 ml/s)

Specifications, Continued

Physical

Mounting:	
Room	Wall terminal
Rigid bulb	Mounting flange
Remote bulb	Mounting flange or well bracket mounting kit
Averaging bulb	Mounting flange
Air connection	1/8-inch NPT
Cover finish:	
Room	Desert beige
Rigid, averaging and remote bulb	Gray
Well	See Table 2

Table 1. Product Numbers.

Description	Bulb & Capillary	Product Number	Range (3 - 15 psig) (21 - 103 kPa)	Max. Bulb Temperature
Rigid Bulb Transmitter	1/4-inch × 9-inch (6.4 mm × 229 mm) bulb	184-0001	35 to 135°F (1.7 to 57.2°C)	195°F (91°C)
		184-0002	50 to 100°F (10 to 37.8°C)	130°F (54°C)
		184-0003	80 to 240°F (27 to 116°C)	240°F (116°C)
		184-0028	0 to 100°F (-18 to 37.8°C)	160°F (71°C)
Averaging Transmitter	3/32-inch × 20 feet (2.4 mm × 6.1 m) averaging bulb 12-inch (0.305 m) capillary	184-0004	35 to 135°F (1.7 to 57.2°C)	275°F (135°C)
		184-0048	0 to 100°F (-18 to 37.8°C)	
Remote Bulb Transmitter	1/4-inch × 4-inch (6.4 mm × 102 mm) bulb, 3 feet (0.92 m) capillary	184-0005	- 40 to 120°F (-40 to 48.9°C)	
		184-0018	50 to 100°F (10 to 37.8°C)	
		184-0014	80 to 240°F (27 to 116°C)	
		184-0036	0 to 100°F (-18 to 37.9°C)	
		184-0015	-10 to 65°F (-23 to 18°C)	
		184-0034	35 to 135°F (1.7 to 57.2°C)	
Remote Bulb Transmitter	1/4-inch × 4-inch (6.4 mm × 102 mm) bulb, 3 feet (0.92m) armored capillary	184-0006	- 40 to 120°F (-40 to 48.9°C)	
Room Transmitter (with 180 - 443A wall plate and 192 - 256 cover)	–	184-0340	50 to 100°F (10 to 37.8°)	–

Table 2. Well Specifications.

Product Number	Material	Maximum Temperature °F (°C)	Max. Static Pressure psi (kPa)	Max. Shock Pressure psi (kPa)	Max. Fluid Velocity ft./sec. (m/s)	Max. Steam Velocity ft./sec (m/s)
184-118	347 St. Steel	400 (204)	650 (4478)	1000 (6890)	25 (7.62)	84 (25.6)
184-119	Copper	265 (129)	250 (1722)	400 (2756)	10 (3.05)	84 (25.6)

Accessories

Well bracket mounting kit	184-105
Packing nut	141-333
Restrictors for remote air supply 40 scim (11 ml/s)	See *(TB 167)* (155-213P25)
Outdoor bulb shield	929-043
Remote bulb holder kit See *TB 179* (155-217P25) for details	808-517
Wall plate kit (room)	180-443A

Operation

The transmitter is provided with a restricted (40 scim) supply of air. Assume a rise in temperature at the transmitter sensing element. The free end of the bimetal, the rod and tube, or the liquid-filled element moves downward. This increases the load on the throttling pin (or throttling ball) and moves it closer to the nozzle. Pressure builds up in the chamber below the nozzle until the force of the increased air pressure against the bottom of the throttling pin exactly balances the downward force of the free end of the sensing element.

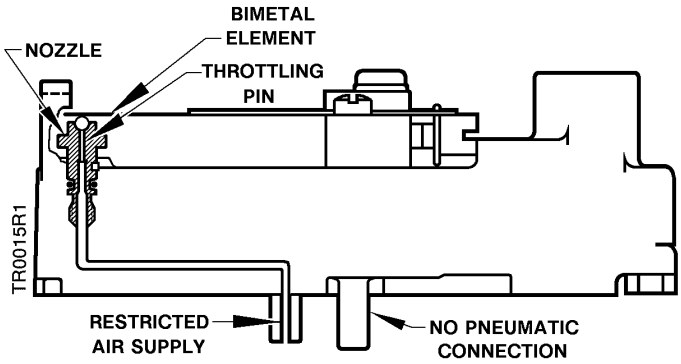


Figure 1. Operation of the Room Transmitter.

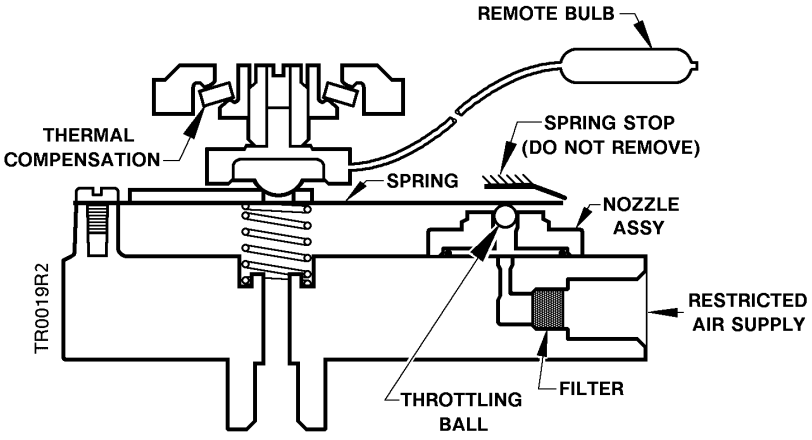


Figure 2. Operation of the Remote Bulb.

Operation, Continued

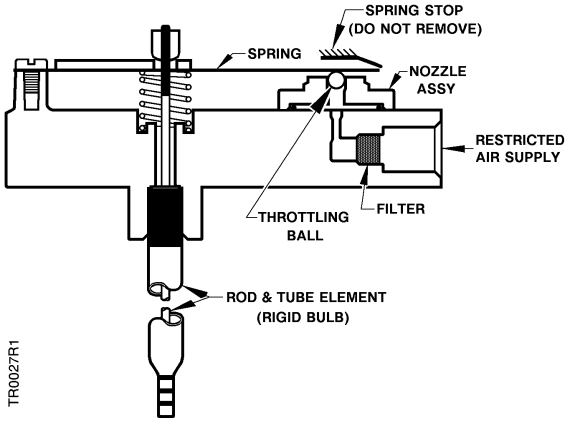


Figure 3. Operation of the Rigid Bulb.

Installation

- Temperature transmitters may be mounted in any position on a vertical surface.
- Installation may be made inside or outside of ducts and near fans, compressors, ducts, and air conditioning equipment. Transmitters, generally, are not affected by light vibration.

Room Transmitters

Room transmitter mounting is shown in Figure 4. The dimensions of the room transmitter are shown in Figure 15. Use the wall plate kit provided with the room transmitter for any surface. See *1 TB 145* (5-210P25) for additional installation information.

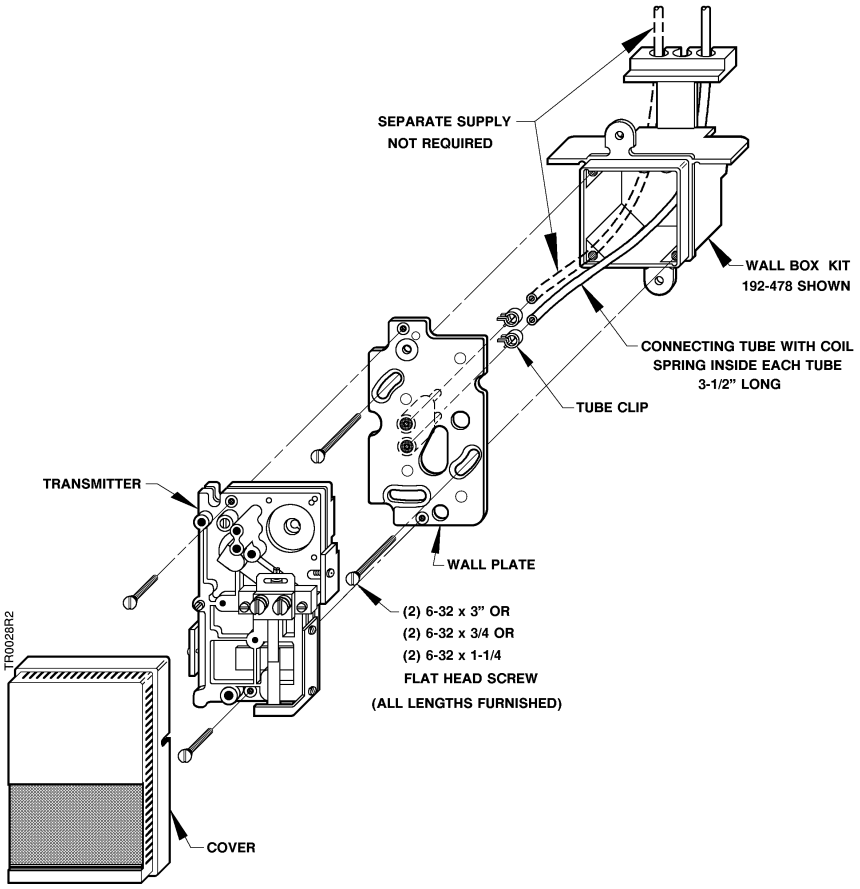


Figure 4. Mounting the Room Transmitter.

Installation, Continued

Rigid Bulb

Rigid bulb transmitter mounting is shown in Figure 5. The transmitter is secured to the flange by a set screw. The dimensions of the rigid bulb transmitter are shown in Figure 14.

When installing rigid bulb temperature transmitters on insulated ducts, the insulation must not cover any portion of the bulb (Figure 11). Incorrect installation of the rigid bulb can create a 16% of span error (for example, 8°F error using the 50 to 100°F transmitter).

NOTE: If it is not possible to properly install a rigid bulb transmitter, then a remote bulb transmitter must be used.

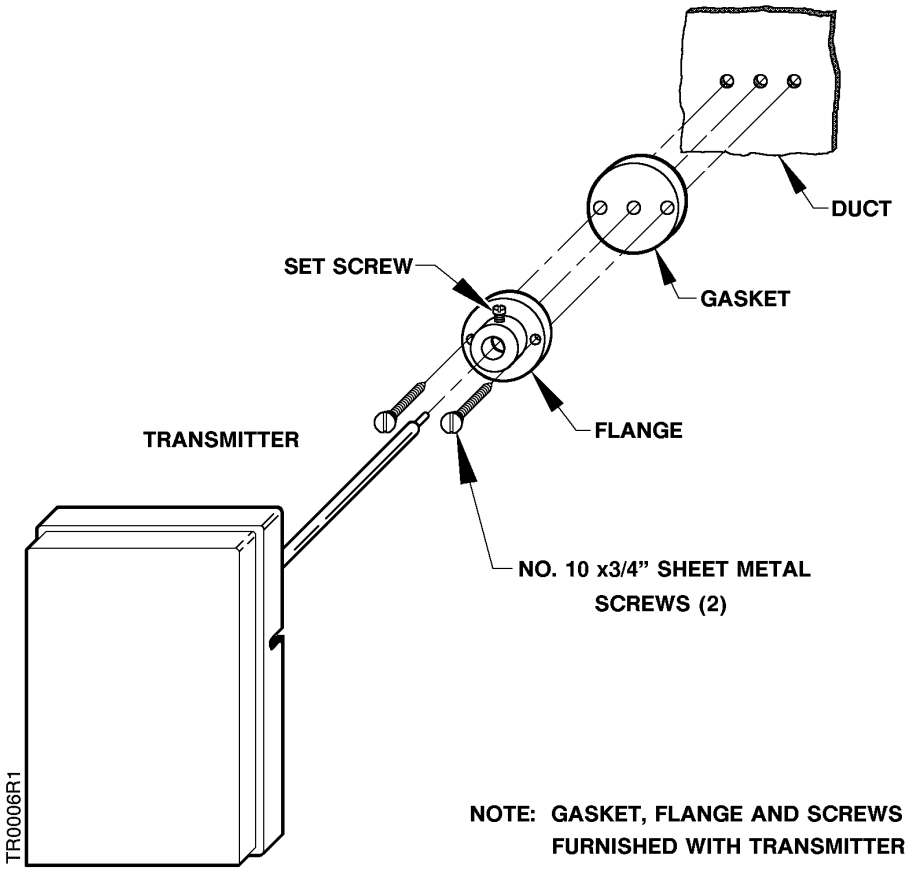


Figure 5. Rigid Bulb Mounting.

Remote Bulb

The remote bulb transmitter mounting is shown in Figure 6. Secure the transmitter to the flange by tightening the set screw. The well mounting of the remote bulb transmitter is shown in Figure 7. The set screw on the well secures the transmitter to the mounting plate.

Dimensions for the remote bulb transmitter are shown in Figure 14.

Installation, Continued

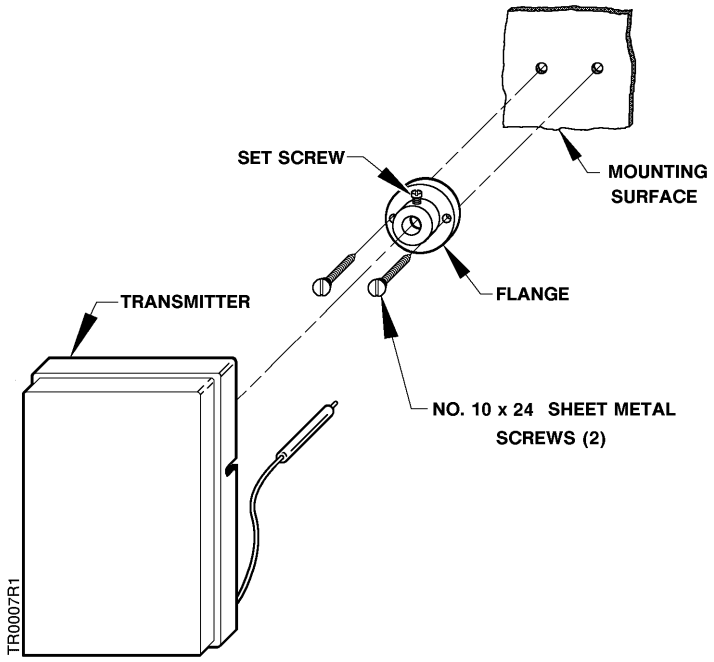


Figure 6. Remote Bulb Mounting.

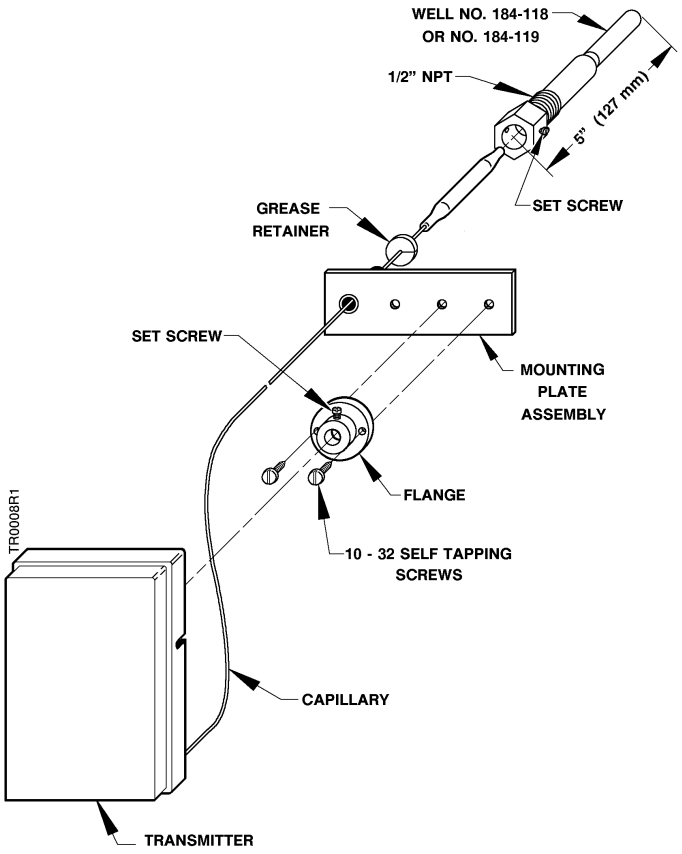


Figure 7. Remote Bulb Mounting in a Well.

Installation, Continued

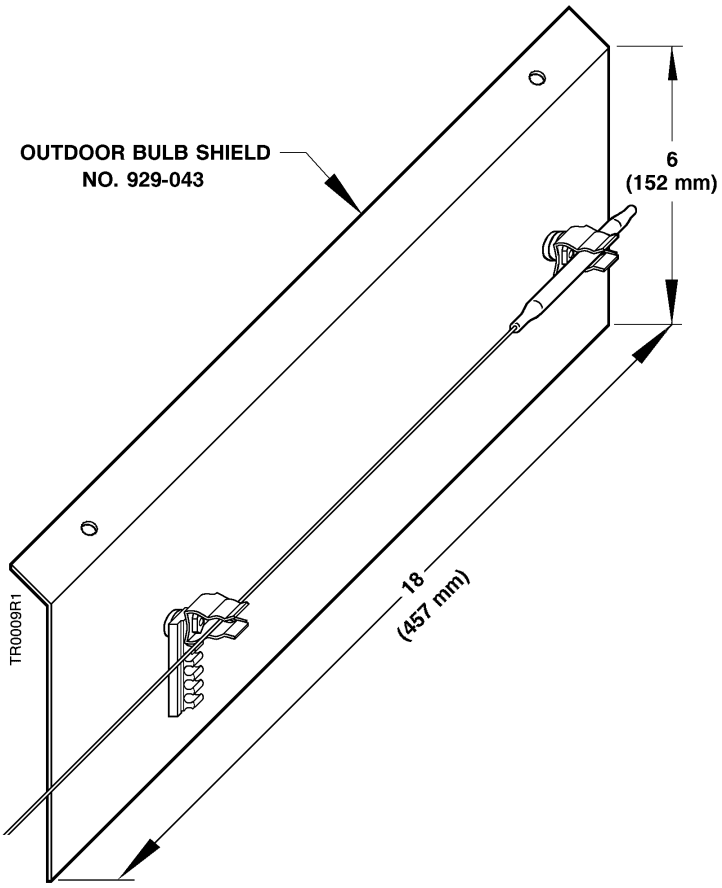


Figure 8. Outdoor Bulb Shield.

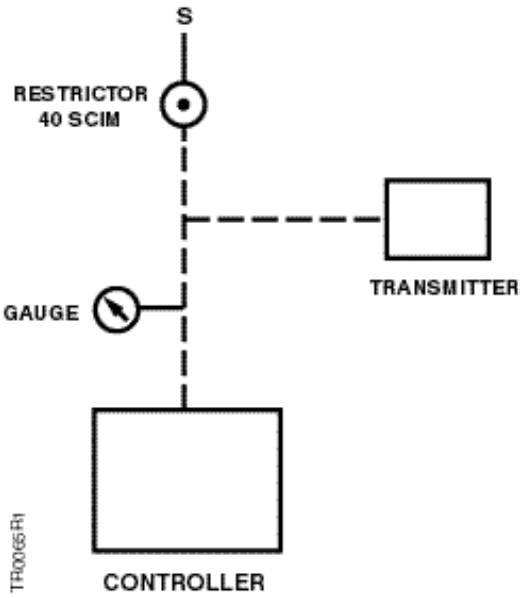


Figure 9. Typical Connections.

Components

Table 3. Room Transmitter Parts (See Figure 10).

Item	Part No.	Part Name	No. Req'd.	Material
1	–	Nozzle	1	Brass
2	–	Guard	1	Brass
3	–	Ball & stem assembly	1	Stainless steel
4	–	Bimetal & spring assembly	1	–
5	–	Mounting screw	2	Brass
6	182-159	Cover screw	2	Stainless steel
7	833-009	Seal screw	1	Bronze

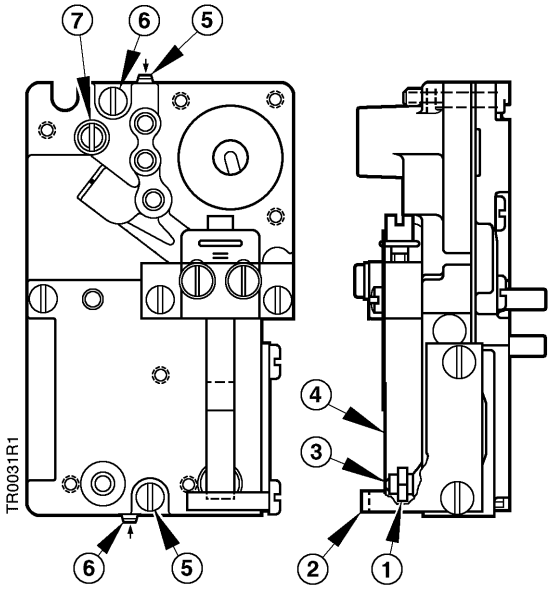


Figure 10. Room Transmitter.

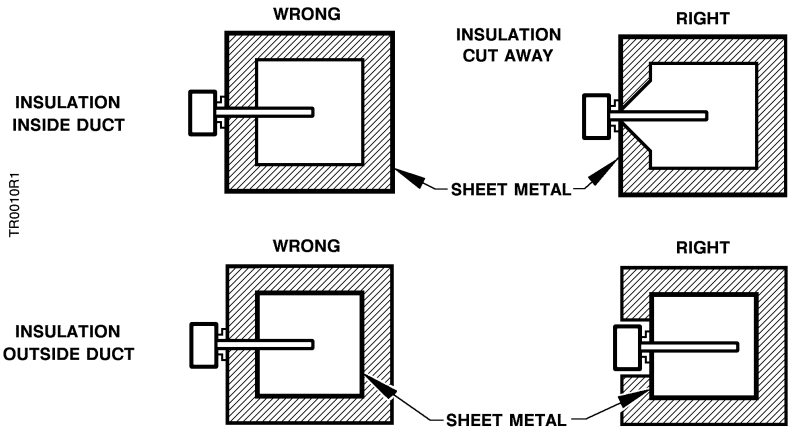


Figure 11. Installation on Insulated Ducts.

Installation, Continued

Table 4. Rigid and Remote Bulb Parts (See Figures 12 and 13).

Item	Part No.	Part Name	No. Req'd	Material
1	–	Adjustment plate & spring assembly	1	Stainless steel
2	–	Preload spring	1	Music wire
3	–	Feedback ball seat	1	Brass
4	–	Ball	1	Stainless steel
5	–	Rigid bulb assembly	1	–
6	184-129	Filter	1	Foam
7	–	O-ring	1	Buna N
9	–	Capsule nest	1	Stainless steel
10	–	Compensator hub	1	Brass
11	–	Bimetal compensator	1	Bimetal
12	–	Thermal system, averaging bulb	1	Copper
		Thermal system, short bulb	1	Copper
		Thermal system, short bulb arm. cap.	1	Copper

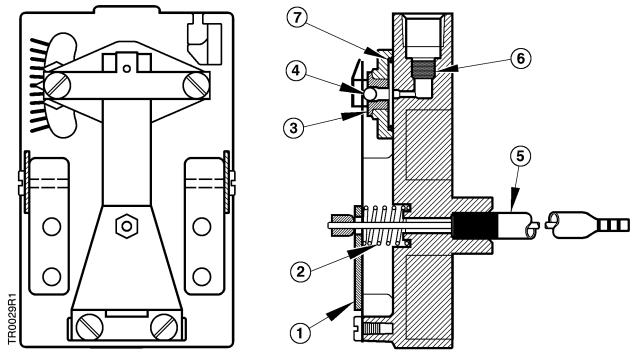


Figure 12. Rigid Bulb.

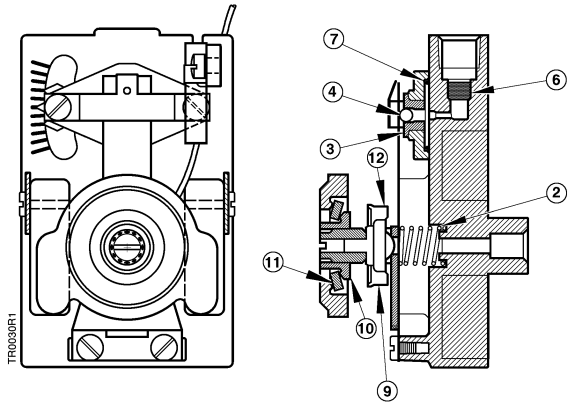


Figure 13. Remote Bulb

Calibration

Because of variations in lengths of pneumatic tubing, airflow through restrictors, ambient temperatures, etc., there will be small errors between actual temperature at sensing element and gauge indication. Adjusting the pointer on the receiver gauge to agree with the temperature at the sensing element will result in greater accuracy. Additional suggestions are given in the Table 5.

The only way to determine if the temperature transmitter is out of calibration (either span adjust or zero adjust) is with an accurate two-temperature bath and an accurate pressure gauge. Span adjustment or zero adjustment cannot be made in the field because of the equipment and time required.

Preventive Maintenance

1. Check yearly to see that temperature at sensing element agrees with temperature at gauge. See *Calibration*.
2. Periodically, clean dust from the transmitter body using a soft hairbrush.
3. Temperature transmitters do not require lubrication.

Troubleshooting

Table 5. Troubleshooting Chart.

Complaint	Check	Probable Cause	Corrective Action
Low temperature indication	Restrictor	Plugged restrictors	Clean and replace if clogged
		Wrong size restrictor	Replace restrictor
	Receiver gauge temperature indication vs. temperature at sensing element	Receiver gauge out of calibration	Adjust receiver gauge
	Fittings and tubing	Leak in transmitter line	As necessary
	Filters	Dirty Filter	Replace filter
	Supply pressure	Low supply pressure	As necessary
High temperature indication	Receiver gauge temperature indication vs. temperature at sensing element	Receiver gauge out of calibration	Adjust receiver gauge
	Restrictor used	More than one restrictor used. Both internal (in receiver-controller) restrictor and external restrictor installed	Remove all but one restricted air supply
		Defective gasket on receiver-controller restrictor	Replace restrictor
		Wrong size restrictor	Replace restrictor

Dimensions

Dimensions in Inches (Millimeters)

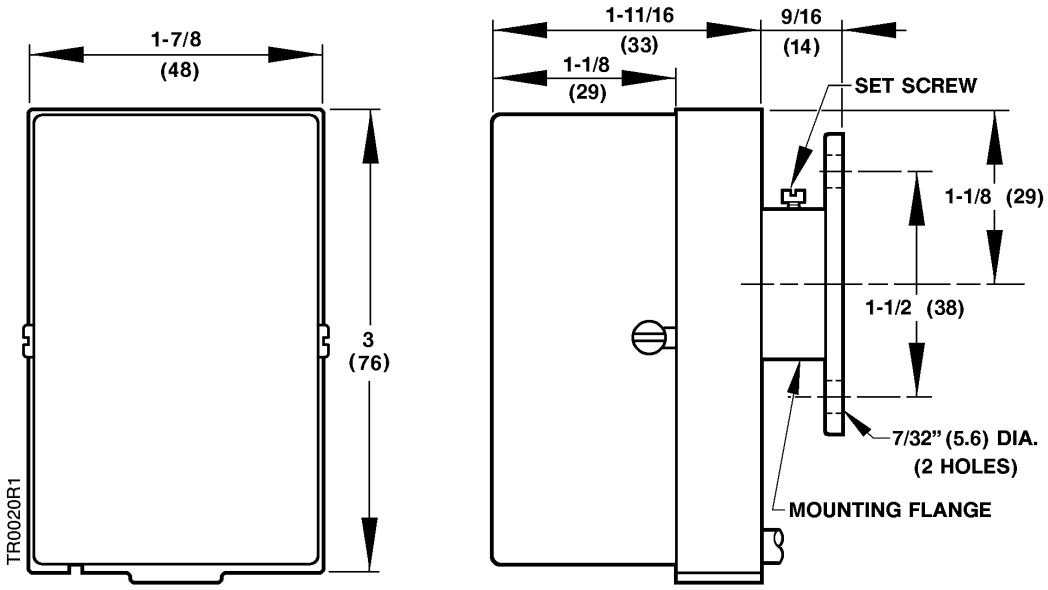


Figure 14. Dimensions of the Rigid Bulb and Remote Bulb Transmitters. (Bulb Not Shown. See Table 1).

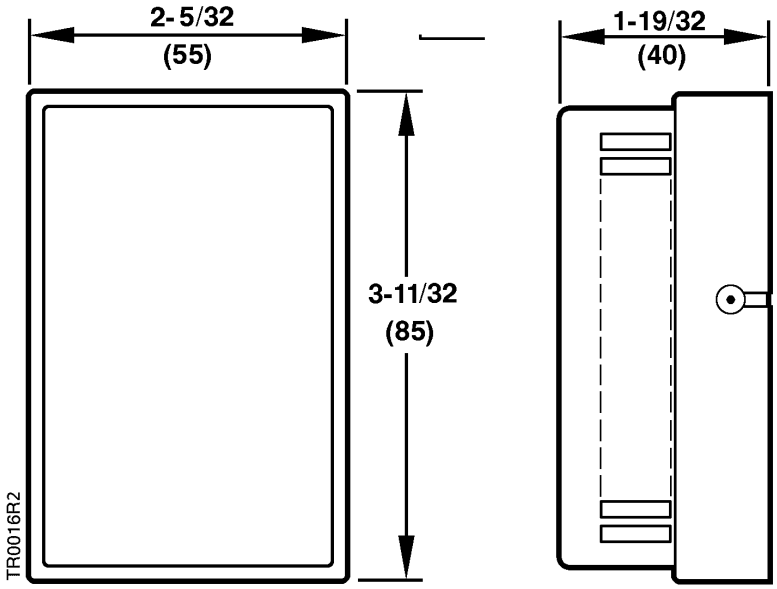


Figure 15. Dimensions of the Room Transmitter.