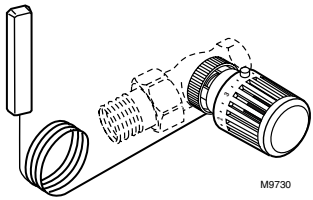
T104F
Thermostatic Control

The T104F Thermostatic Control is used with a V110 Valve Body to control radiators, convectors, baseboard heating units, or other heating units with standard capacity requirements. The control is self-powered and requires no electrical connection. The T100A includes a setpoint dial and valve actuator, connected by a capillary tube to a sensor. The T104F Control attaches to the valve body by threaded connections and may be mounted at any angle. Install the remote sensor beneath the heating coils in the cold air return, or on a nearby wall where the air flow is not restricted.

The setpoint dial has reference marks (1-6). The control has a low limit of 43°F (6°C) when the dial is turned fully clockwise to the frost protection mark. The red button indicates the 68°F (20°C) setpoint limit. Higher settings may be made by holding in the button while turning. The thermostatic sensor is protected by a safety spring against temperatures to 125°F (52°C).*

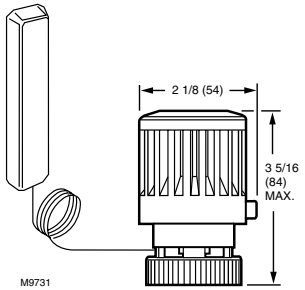


Specifications

MATERIALS OF CONSTRUCTION:
Body: Industrial grade plastics with low thermal conductivity.
Fastening Ring: Plated brass.
Internal Parts: Brass thermostat capsule, other metals.
TEMPERATURE RANGE: 43° to 79°F (6° to 26 °C).
MAX. SENSOR TEMPERATURE: 125°F (52°C).
MAX. OVERALL DIMENSIONS: 2-1/8 in. (54 mm) wide, 3-5/16 in. (84 mm) long. See Fig. 1.
CAPILLARY LENGTH: 6 ft. 8 in. (2 m).
TEMPERATURE SETTINGS:
These are the setpoint temperatures, which correspond to the setpoint dial reference marks, under ideal conditions. Factors affecting the temperature at the sensor vary for each installation. It may be necessary to adjust the setpoint higher or lower to obtain the desired space temperature.

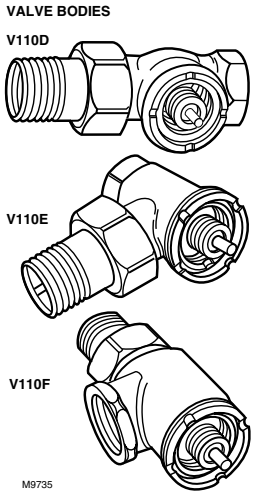
Temperature	0	*	1	2	3	4	5	6
°F	Off	43	46	54	61	68	73	79
°C	Off	6	8	12	16	20	23	26

Fig. 1—T104F dimensions in in. (mm).



AVAILABLE VALVE BODIES:
See Fig. 2.

Fig. 2—V110 Valve Bodies.



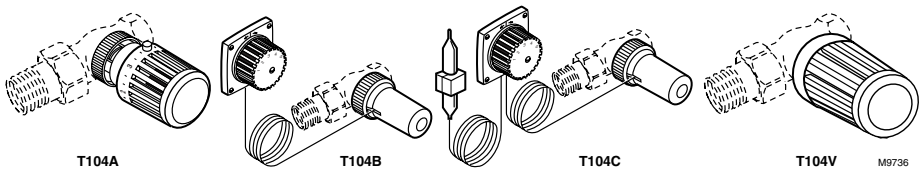
OTHER AVAILABLE T100 THERMOSTATIC CONTROLS (See Fig. 3):

T104A Control with internal sensor.
T104B Control with remote sensor/setpoint.
T104C Control with remote sensor and remote setpoint.
T104V Control with internal sensor and tamper-resistant setpoint and mounting.

ACCESSORY

A104F1007 Limit Pins.
G111B1053 Bulb guard for protection of sensor when mounted on the wall.

Fig. 3—T104A,B,C,V Thermostatic Controls.

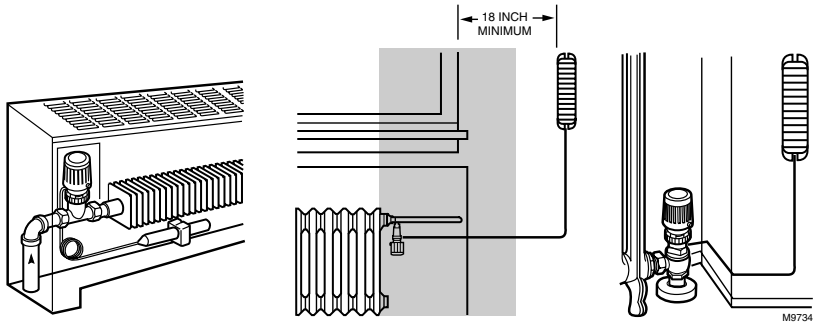


Installation

IMPORTANT: *The T104F can be mounted inside an enclosure if the sensor is located a minimum of 3 in. (76 mm) beneath the heating coils in the cold air return. Coil excess capillary tubing beneath and away from the heating coils. Take care not to break, kink or sharply bend the capillary tubing.*

When mounting the T104F, make sure the bosses on the T104F base fit securely into the valve body grooves. Firmly hand tighten the knurled ring. Improper mounting can cause overheating. Refer to Fig. 4 for typical installations.

Fig. 4—Typical installations.



Settings and Calibration

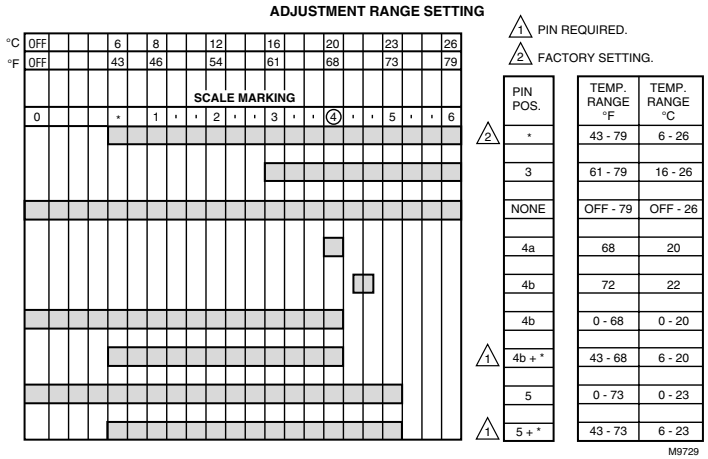
The T104F Control includes an adjustable range limiting pin (order additional pins separately). The pin is factory-set to limit the low range of the control to the frost protection (*) setting (see Fig. 5). The pin can be moved to a different low or high limit setting and lock point, or it can be removed. Use a second pin if both low and high limit settings are desired.

Setting the Limit

To set a limit different from the factory setting, proceed as follows:

1. Determine the desired temperature range limit or locking temperature. Select the appropriate number on the adjustment knob to match the desired temperature setting. See Fig. 5.

Fig. 5—Temperature settings.

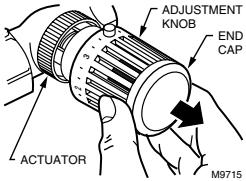


	PIN POS.	TEMP. RANGE °F	TEMP. RANGE °C
2	*	43 - 79	6 - 26
	3	61 - 79	16 - 26
	NONE	OFF - 79	OFF - 26
	4a	68	20
	4b	72	22
	4b	0 - 68	0 - 20
1	4b + *	43 - 68	6 - 20
	5	0 - 73	0 - 23
1	5 + *	43 - 73	6 - 23

2. Lift the end cap off the adjustment knob. See Fig. 6.

Fig. 6—Lift the end cap off the adjustment knob.

3. Remove the adjustment knob from the actuator as

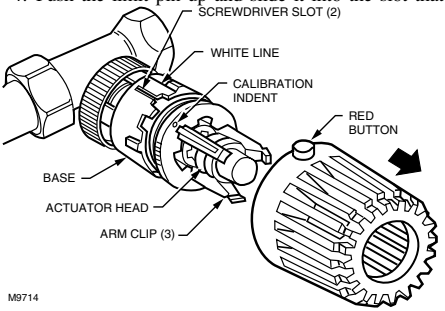


follows:

a. Turn the adjustment knob so the desired knob setting is aligned with the white line on the actuator base.
b. Pull the knob off the head *or* use a screwdriver inserted into one of the slots to pry off the knob. See Fig. 7.

Fig. 7—Remove the knob from the actuator.

4. Push the limit pin up and slide it into the slot that



corresponds with the desired temperature limit. If the lower limit remains at the frost protection mark (*), insert an additional pin in the slot that corresponds with the second limit.

Example 1:

If the desired temperature range is 43° to 73°F (6° to 23°C), leave the pin in the slot marked * and add one pin in slot 5.

Example 2:

If the desired temperature range is OFF to 68°F (23 °C), move the pin to slot 5. No additional pin is required.

5. To replace the adjustment knob, realign the knob setting in step 3a with the white line on the base and push the knob toward the base. Make sure the three arm clips snap into place at the top of the adjustment knob. If the actuator was turned with the adjustment knob off, recalibrate the control according to the instructions in Recalibrate T104F Control section.

6. Replace the end cap.

Locking the Control at a Single Temperature

1. Determine the desired locking temperature. Select the appropriate number on the adjustment knob to match the desired temperature setting. See Fig. 5.

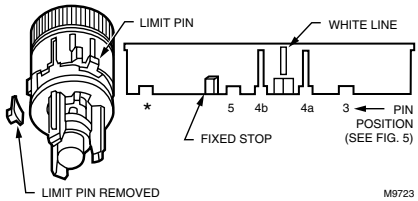
2. Lift the end cap off the adjustment knob. See Fig. 6.

3. Remove the adjustment knob from the actuator as follows:

a. Turn the adjustment knob so the desired knob setting is aligned with the white line on the actuator base.
b. Pull the knob off the head *or* use a screwdriver inserted in one of the slots to pry off the knob. See Fig. 7.

4. Insert the pin in slot 4a for 68°F (20°C) or slot 4b for 72 °F (22°C).

Fig. 8—Insert the pin in the slot to set the limit range.



5. To replace the adjustment knob, align the knob setting from step 3a with the white line on the base and push the knob toward the base. Make sure the three arm clips snap in place at the top of the adjustment knob.

6. Replace the end cap.

Recalibrate T104F Control

1. Lift the end cap off the adjustment knob. See Fig. 6.

2. Pull the knob off the head *or* use a screwdriver inserted in one of the slots to pry off the knob. See Fig. 7.

3. Turn the actuator head clockwise until the head stops (Fig. 7). The calibration indent should be aligned approximately with the white line on the base when the head stops. If the indent is 180 degrees from the white mark, unscrew the head completely from the base and rethread the head to the base so that it is aligned with the white mark. Turn the actuator head clockwise until the head stops. Complete removal of the head from the base is required only if the actuator was previously dismantled.

NOTE: The distance between the actuator head and the static portion of the control should be approximately 3/8 in. (9 mm).

4. Turn the actuator head counterclockwise approximately one turn until the calibration indent on the head aligns with the white line on the base. For the 72 °F (22°C) single temperature setting, align the indent with the center of the adjustable limiting pin.

5. Replace the adjustment knob by aligning the red button with the white line on the base and pushing the knob toward the base. For the 72°F (22°C) single temperature setting, align the red button with the center of the adjustable limiting pin. Make sure the three arm clips snap in place at the top of the adjustment knob.

6. Replace the end cap.

Sympton	Possible Cause	Solution
All sections of the radiator are not heating.	1. Many radiators are over-sized and all sections are not required to heat up to maintain the set room temperature.	1. System is operating properly.
Underheating.	1. Sensor is in the wrong location.	1. Change the sensor location or change the control type. See installation instructions.
	2. Excess capillary tube is coiled above or too near the heat source.	2. Coil excess capillary tube below or away from the heat source.
	3. Flow through the valve is in the wrong direction.	3. Check the arrow on the valve body. It should be in the direction of the flow. Change the valve direction or flow direction.
	4. Inadequate system temperature or pressure.	4. Check the operating and limiting controls on the boiler. Check the circulating pump and isolating valves.
	5. Steam traps are defective.	5. Repair or replace the traps.
	6. Air lock in the hot water system.	6. Open the valve fully to allow air to pass. Install vents.
	7. Scale or debris is blocking flow.	7. Flush the system. Do not use oil base additives. Clean strainer insert in steam applications.
	8. Heating cabinet dampers are closed.	8. Open or remove the dampers.
Overheating.	1. Sensor is in the wrong location.	1. Change the sensor location or change the control type.
	2. Control is not properly installed.	2. Set the bosses in the grooves and tighten the knurled ring to the valve body.
	3. Capillary tube is broken, kinked, or bent sharply.	3. Replace the control.
	4. Dirt or scale is under the seat, preventing tight shutoff.	4. Remove the control from the valve body, allowing the valve to open fully and flush away scale and debris. Reinstall the control and turn fully clockwise. If the valve does not fully close, remove control and cartridge using a cartridge changer tool or service socket (isolate valve from system if not using changer tool). Inspect and clean valve seat area and disc. Always use a strainer insert in steam applications.
	5. Flow through the valve is in the wrong direction, damaging the valve seat.	5. Check the arrow on the valve body. It should be in the direction of the flow. Change the valve direction or flow direction. Remove the valve cartridge and inspect for damage to the seat disk.
	6. Steam traps are defective.	6. Repair or replace the traps.
	7. Excessive differential pressure is forcing the valve open (hot water systems).	7. Install a differential pressure regulator (D146A) to maintain less than 117 kPa (17 psi) differential between supply and return pipes.
Chattering or knocking.	1. Flow through the valve is in the wrong direction.	1. Check the arrow on the valve body. It should be in the direction of the flow. Change the valve direction or flow direction.
	2. Vacuum in the system.	2. For steam—check traps and vents. For hot water—check expansion tank operation and location.
	3. Excessive differential pressure.	3. Install a differential pressure regulator (D146A) to maintain less than 117 kPa (17 psi) differential between supply and return pipes.
	4. Binding of piping.	4. Make sure there is adequate space for piping.

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