

**INSTRUCTIONS
FOR
INSTALLATION AND OPERATION**

**No. 1010-Series
Temperature Regulator**

Note to Installer: After installing the regulator, give this instruction folder to operating personnel or see that it is filed for future reference.

Robertshaw

INDUSTRIAL PRODUCTS DIVISION

Manufactured By

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Form No. P-2077 (Rev. B)

SECTION I – GENERAL INFORMATION

This regulator automatically controls flow of the medium passing through its valve by responding to temperature changes affecting the bulb. The bulb contains a thermo-sensitive liquid which vaporizes when heated. Vapor pressure thus generated in bulb is transmitted through the capillary tube to the bellows which in turn positions valve poppet to control flow of the medium through valve. Movement of bellows is opposed by an adjustable spring.

This regulator controls only within the temperature range stamped on its nameplate. Ideally, the setpoint should be located in the upper third of the range. The setpoint is throttling and modulating.

The RT-1010-A Series Regulator possesses a means whereby the valve can be manually operated irrespective of the regulator thermostat. Should the regulator thermostat become inoperative due to damage, the regulator valve can be manually opened, closed or positioned by turning the crank. This feature is advantageous while the thermostat is inoperative or is removed for repair or replacement. An indicator shows position of valve poppet.

SECTION II – INSTALLATION

A. VALVE INSTALLATION

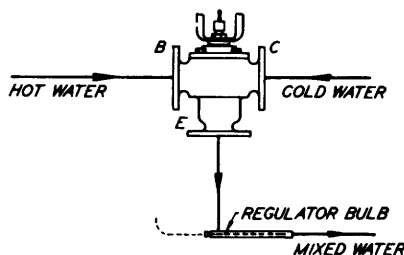
Regulator valves are sized to the demand of heater or other unit to be controlled and are frequently smaller than supply line size.

When making the installation, do not remove valve from the regulator unless absolutely necessary.

The regulating valve should be installed as close as possible to the unit to be controlled and a pipe line strainer should be placed just ahead of the valve. The regulator should be installed in the vertical position with the valve below the regulator frame.

When controlling the flow of water used for cooling, the valve is usually on the supply line to prevent backing up full line pressure into the vessel, but may be installed on either end of the unit.

Particular care must be taken when installing the three-way valve to make sure pipe connections are proper to obtain the control desired. Figures 1, 2 and 3 show the direction of flow through the valve when used for purposes stated. You can identify the side connections by the letters E, B and C stamped on the valve body.



Illustrating a simple means for mixing hot and cold water where a rough mixing is suitable.

Figure 1

B. BULB INSTALLATION

1. General (Important)

Correct bulb location is the most important detail of regulator installation. Bulb should be installed at a point of true representative temperature and should be in good circulation. If a thermometer is used, it should be placed adjacent to the bulb.

NOTE:

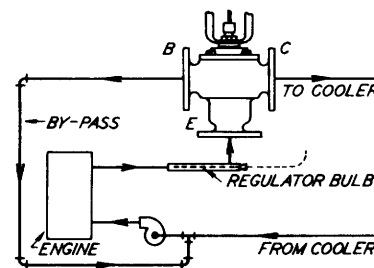
The elevation or depression of a regulator bulb with respect to the regulator sometimes has a marked effect on the range of the regulator. This is due to the effect of the column of liquid on a regulator working under "standard condition" (bulb warmer than tube and bellows).

The effect on the temperature range is as follows:

- Range lowered if the bulb is above the regulator.
- Range raised if the bulb is below the regulator.
- If range begins below 120° F., then regulator head and sensing bulb must be installed at the same height.

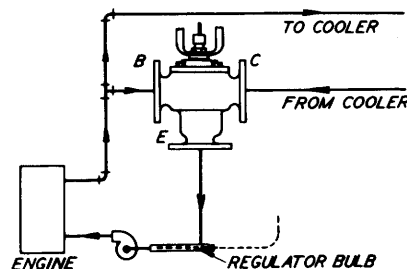
2. Liquid Control Type 12-B

The bulb for liquid control is of smooth tubular form with I.P.S. threaded bulb bushing as shown by Figure 4. To install this bulb, loosen union plug until the bulb bushing turns freely on the bulb. Insert bulb and bulb bushing into the selected opening and screw bulb bushing up tight. Turn bulb until arrow on head plate points UP. Tighten union plug. Bulb bushing can be removed from bulb by screwing union plug all the way out, and in like manner bulb may be removed from installed position without disturbing bulb bushing.



The drawing above illustrates the most widely used method of cooling water control for internal combustion engines.

Figure 2

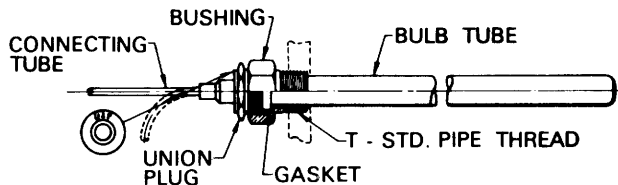


This drawing shows a method of controlling the cooling of engine lubricating oil.

Figure 3

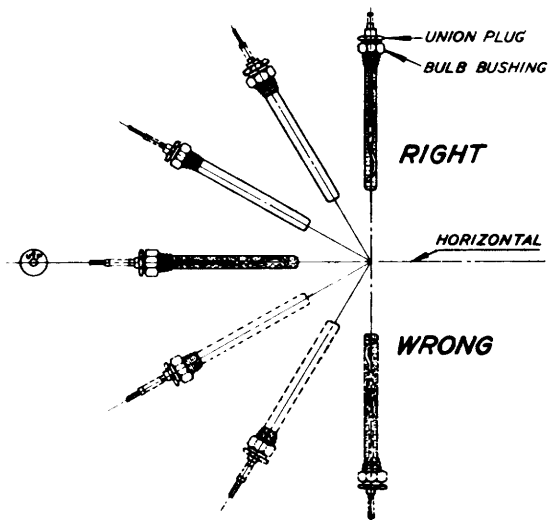
The bulb may be installed horizontally or vertically or at any angle between these positions but in all cases, the arrow on head plate must be uppermost. See "RIGHT," Figure 5. Unless specifically ordered for such installation, the bulb should never be installed with the bushing end down or below the horizontal position. See "WRONG."

Bulbs should never be installed where cold inlet water will flow directly on it or where it will be otherwise affected by false temperatures.



Standard type bulb for temperature control of liquids.

Figure 4



Showing RIGHT and WRONG way to install bulb. Positions from horizontal to vertical, inclusive, are correct if arrow on head plate points UP. For positions below horizontal, marked WRONG, a special bulb must be ordered.

Figure 5

3. Liquid Control Type 6

Type 6 bulb for liquid control is a plain type bulb for open tank or vessel usage. It is not provided with a means for support.

Bulb should be installed vertically below surface of the liquid.

Bulb should be located away from work area inside tank and should be supported in position by suitable means.

NEVER lay bulb on bottom of tank. However, bulb may be installed horizontally if it is securely mounted to side of tank and the word "TOP" on tube end of bulb is up.

4. Air Control – Types 54-A, 54-J and 54-K

The bulb is a fin-type for greater sensitivity. Bulb should be installed at right angle to the air movement and at a location where average temperatures are encountered. Preferably, the bulb should be installed horizontally but it may be installed vertically or at any angle between these positions providing the tube end is uppermost—never install bulb with tube end down unless specifically ordered for such installation. See Figure 5. Some bulbs have a plate attached (See Figure 4) to the tube end indicating that the bulb should be installed with the arrow pointing upward when the bulb is installed in any position "RIGHT."

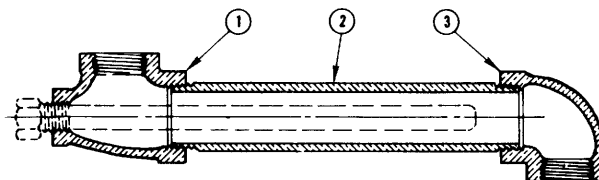
C. CONNECTING TUBING

The flexible tubing connecting the bulb and valve must not be cut, kinked, mashed or unduly twisted. It may be bent on a 3½" radius or larger. Tubing may be fastened in a permanent fashion to a rigid location but not fastened to steam pipes or other locations where subject to extreme temperatures. A small loop of tubing next to the regulator head is recommended to absorb vibrations occurring in pipe line.

5. Well – GA Type

A separable well (or socket) serves to protect the bulb and allows the bulb to be removed without disturbing contents of vessel.

To install, insert socket into the selected opening and tighten. Remove bulb bushing, if any, and insert bulb in well and tighten union plug (figure 4). Be sure arrow is pointing up as plug is tightened.



The drawing above shows how the regulator bulb may be installed in the pipe line. The pipe size (detail 2) should be at least twice the bulb diameter so that free flow can be had around the bulb. Where the pipe line is not of sufficient diameter to accommodate the bulb, an enlarged section with proper fittings could be provided.

Figure 6

SECTION III – TEMPERATURE ADJUSTMENT

This regulator can be set to control at temperatures with the limits of the temperature range stamped on its nameplate.

After placing the regulator in service, allow 20-30 minutes for regulator to reach stable operation, then observe temperature setting as follows:

To RAISE temperature setting, turn adjustment wheel to RIGHT (See Arrow "A") (Figure 7).

To LOWER temperature setting, turn adjustment wheel to LEFT (See Arrow "B") (Figure 7).

Make new settings as necessary until desired temperature is obtained but allow sufficient time between changes to reach stable operation.

The regulator has a scale plate to indicate the position of the adjustment. This feature is helpful in resetting the adjustment when frequent changes are necessary. Scale graduations are not in degrees of temperature.

MANUAL POSITIONING:

The crank mechanism of the RT-1010-A Series regulator is provided for MANUAL opening or closing of the regulator valve.

Set the pointer "F" (Figure 7) to "Thermostatic" on scale "G" (Figure 7). In this position, the regulator valve is operated thermostatically from temperature changes on the regulator bulb. When manual operation of valve is desired or necessary, turn the crank to open or close the valve. **Do not force** manual operator when pointer is at highest or lowest mark on scale as this will damage regulator.

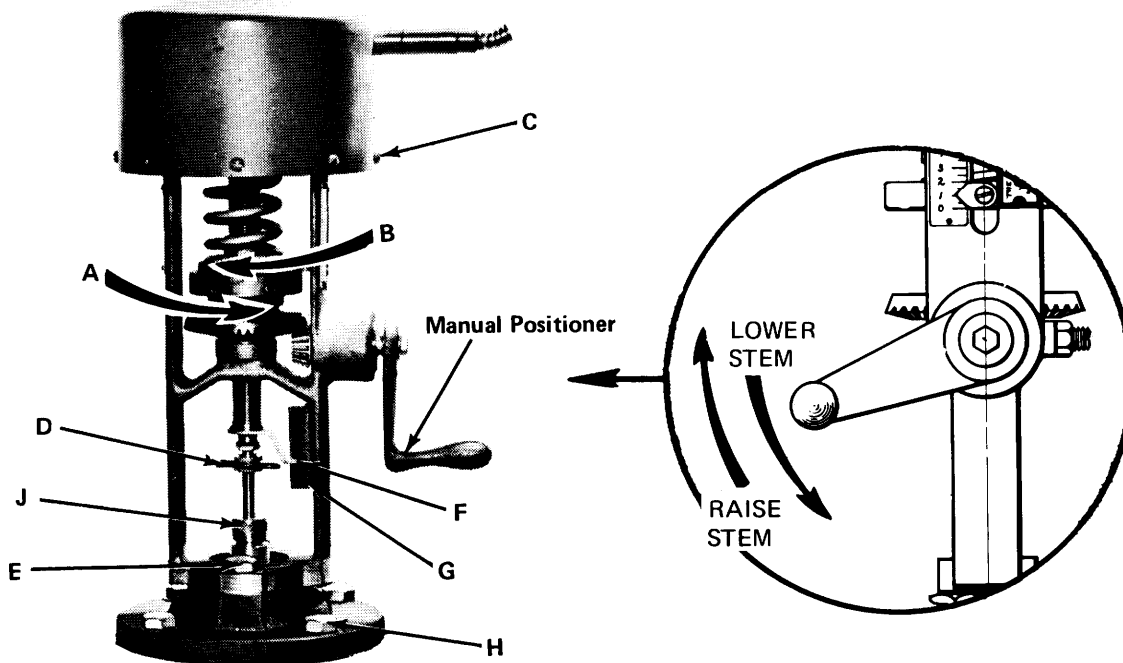


Figure 7

SECTION IV – MAINTENANCE

This regulator, if properly installed and used, should require very little attention or maintenance; however, every piece of mechanical equipment deserves some care.

A. PACKING

Valve stem packing nut should be kept only finger-tight. If valve stem packing must be replaced, follow these steps. (See Figure 8.)

1. Remove lock pin.
2. Remove locknut and separate control from valve.
3. Remove packing nut and packing gland.
4. Remove bonnet from valve.
5. Remove packing.
6. Clean out packing box with a clean rag or soft paper.
7. Wipe off stem with clean rag. DO NOT attempt to polish. If stem is scratched or nicked around packing area, it should be replaced.
8. Replace bonnet on valve.
9. Carefully place new packing in packing in packing box. If U-cup packing is not available, in an emergency, repack with a good grade of graphited string packing. Put a small amount of good packing lubricant in the stuffing box while repacking. This packing, however, should be replaced with U-cup packing as soon as possible.
10. Replace packing gland.
11. Replace packing nut and tighten.
12. Connect valve to control and tighten locknut.
13. Insert lock pin.

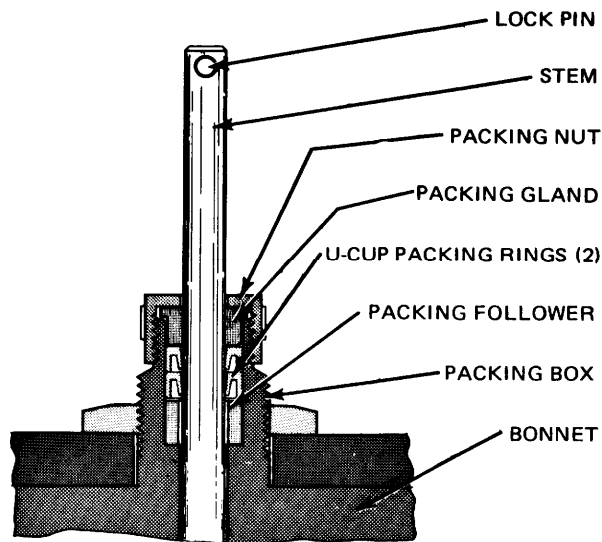


Figure 8

The thermostatic element consists of bulb, flexible tubing, and bellows assembly. This unit contains the thermostatic charge. In event this charge is lost as result of damage or otherwise, thermostatic unit must be purchased as, and installed as, a complete unit. It is not repairable in the field and must be returned to the factory for repairs or replacement parts.

CAUTION – Never remove or install thermostatic unit when temperature of bulb is above lowest temperature of the range stated on nameplate.

To remove thermostatic element follow steps listed below.

1. Remove regulator bulb from its location by screwing union plug (Figure 4) all the way out.
2. If room temperature is above lowest temperature of range stated on nameplate, place bulb in bucket of water, ice or dry ice.
3. Turn adjusting wheel to left (see Arrow "B" Figure 7) until wheel is all the way down.
4. Remove screws "C" (Figure 7) and lift off element.
5. To install thermostatic element, reverse the above operations.

B. REFACING VALVE SEAT

For engine cooling, this valve does not require tight seating and therefore, it should not be necessary, except in cases of excessive leakage, to resurface valve seats. Excessive leakage at upper (cooler port) seat results in slow warmup. Valve normally does not close at lower (by-pass port) seat unless regulator is undersized or unless something occurs to the cooling system to cause a condition of overheating. Under normal operating conditions after engine warmup, the valve will throttle between seats to maintain a steady control temperature.

In case it does become necessary to reface valve seats, machine very light amount from seating surfaces C, D, E, and/or F (See Figure 9). Add values of amount of metal removed from these surfaces and then machine that amount from either surfaces A or B (or from both) in order to maintain original valve stroke.

1. Remove lock pin "D" (Figure 7). (Do not disturb locknut connecting regulator stem to connector.)
2. Remove locknut "E" (Figure 7) and lift regulator frame off valve body.
3. Remove valve from line.
4. To install valve, reverse the above operation.

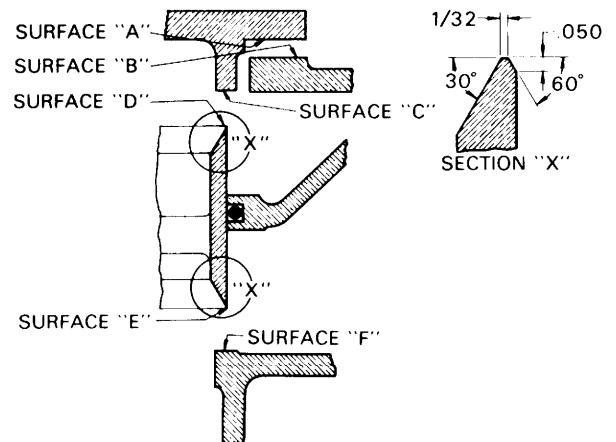


Figure 9

C. REPLACING "O"-RING SEAL

"O"-ring is cut to allow approximately 1/8" gap between ends to allow for expansion and prevent binding. This is not a true "O"-ring seal. It acts as a floating gasket.

1. Remove bonnet cap, lift out entire poppet assembly and upperworks assembly.
2. Remove old "O"-ring and replace with new one.
3. Replace poppet assembly, taking care when passing over "O"-ring not to cut or pinch ring.

Note: The general purpose "O"-ring is made of nitrile and the lube oil "O"-ring is made of polyacrylate.

These materials should be checked for suitability when coolants, inhibitors and other additives are present.

SECTION V – TROUBLE SHOOTING

This regulator is designed to operate within the temperature range stated on the nameplate. If the regulator does not function properly immediately after completing the installation, and you are unable to correct the trouble, contact a field office or the factory.

Be sure manual operator is set on "thermostatic."

If engine jacket or lube oil overheats with lowest adjustment setting, be sure to check circulation of jacket water and lube oil through cooling circuit. Also check circulation of water in primary cooling circuit. All lines, strainers, hand valves, and passages in heat exchanger should be free and open. Check for fouling of heat exchanger tubes, which would reduce cooling effect.

Be sure packing gland is not binding valve stem, or valve is not otherwise stuck in "up" (minimum cooling) position.

If none of the above reveals trouble, it is probable that the thermostatic element is inoperative and should be replaced.

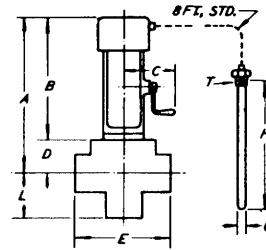
If undercooling is experienced at highest adjustment setting, check for sticking of valve in "down" (maximum cooling) position. This may be caused by dirt under lower valve seat thus letting excessive cooling water flow through heat exchanger.

Failure of the thermostatic element is indicated by failure of the regulator to respond to temperature changes affecting the bulb. With such failure the valve stem would be up.

To test thermostatic element, remove bulb from its location and observe valve stroke by placing the bulb in a suitable vessel where it can be quickly heated with hot water or steam and cooled with cold water or crushed ice. If thermostatic element does not readily respond, it has lost its charge and a new unit must be installed.

NOTE – When contacting a field office or the factory, be sure to give serial number and other information appearing on the nameplate.

DIMENSIONS AND SHIPPING WEIGHTS



Regulator Number	RT-1010-A1	RT-1010-A2	RT-1010-A3	RT-1010-A3
Valve Size, Inches	3	4	5	6
Valve Type	WD	WD	WD	WD
Shipping Weight, Lbs.	130	220	300	530
A	18	19 $\frac{1}{8}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$
B	14 $\frac{3}{8}$	15 $\frac{15}{16}$	15 $\frac{15}{16}$	15 $\frac{15}{16}$
C	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$
D	3 $\frac{3}{8}$	3 $\frac{3}{8}$	5 $\frac{9}{16}$	5 $\frac{9}{16}$
E	10 $\frac{1}{2}$	15 $\frac{7}{8}$	19 $\frac{1}{4}$	23 $\frac{1}{2}$
L	6 $\frac{3}{4}$	8 $\frac{9}{16}$	11 $\frac{5}{8}$	13 $\frac{7}{16}$

Regulator Number	RT-1010-A1	RT-1010-A2	RT-1010-A3	RT-1010-A3
Valve Size, Inches	3	4	5	6
Valve Type	WD	WD	WD	WD
Standard bulb for temperature ranges beginning at 120° F. or above				
G	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$
H	24	24	24	30
T (Std. pipe thread)	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$
Standard bulb for temperature ranges beginning below 120° F. *				
G	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$
H	32	32	32	36
T (Std. pipe thread).....	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$

*Bulb sizes for ranges beginning below 120°F. are necessary to provide "cross-ambient" charge. This assures operation with ambient temperatures either above or below the control setting. Under some conditions, smaller bulbs may be used with lower ranges. If the larger bulb cannot be used, consult the factory or your nearest Robertshaw representative.

Product Certification

RT1010 models with CE Approval are distinguished by the addition of the CE mark on the Nameplate. The Nameplate includes additional information:

Robertshaw Industrial Products, 1602 Mustang Drive, Maryville, TN 37922 = the manufacturer's name and address
RT1010A1, RT1010A2, or RT1010A3 = the manufacture's Model numbers
II3 G = marking according to Group II, Category 3, Gas
T4, $-28^{\circ}\text{C} \leq T_a \leq +65^{\circ}\text{C}$ = markings essential for safe use
Cert. Nr. ITS03ATEX41501X = certificate number

Essential information for safe use:

1. The equipment temperature code is T4. The maximum recommended fluid/gas operating temperature is $+265^{\circ}\text{F}$ (129°C).
2. The ambient temperature range for this equipment is -20°F (-28°C) to $+150^{\circ}\text{F}$ ($+65^{\circ}\text{C}$).
3. The equipment must be grounded to avoid the buildup of static electricity. The user must verify that the installation is grounded through the mating pipes, or by providing a ground attachment to the equipment mounting bolts.
4. Equipment provides a manual crank mechanism for over riding automatic temperature control. In the rare event that this crank mechanism is used, take care to avoid the rotating gears.
5. Equipment is shipped with Hazard Material Data sheet that describes the charge material in the regulator bulb.



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