Features

■ TAMPER-PROOF TEMPERATURE SETTING
■ NO FRAGILE EXTERNAL BULBS OR TUBING
■ COMPLETELY SELF-CONTAINED
■ POSITIVE 3-WAY VALVE ACTION
■ HOLDS CLOSE REGULATION
■ NOT SENSITIVE TO PRESSURE
■ SIMPLE, RUGGED CONSTRUCTION
■ OPERATES IN ANY POSITION
■ COMPACT SIZE
■ LARGE CAPACITY WITH LIGHT WEIGHT
■ EXCELLENT RELIABILITY EVEN UNDER EXTREME SHOCKS AND VIBRATION
■ PRACTICALLY NO MAINTENANCE EVER REQUIRED

How To Order

See back page of this brochure under "Selecting an AMOT Thermostatic Valve."

Also refer to the other brochures on the specific valve series of interest.

AMOT Thermostatic Valves provide reliable, automatic control of fluid temperatures in turbines, compressors and engine jacket water and lubrication oil cooling systems. They are suitable for process control and industrial applications where fluids must be mixed or diverted depending on their temperatures. They may also be applied to cogeneration systems to control temperatures in the heat recovery loop assuring proper engine cooling and maximizing heat recovery.

All AMOT Thermostatic Valves are equipped with positive 3-way valve action in which the water or lubricating oil is positively made to flow in the direction required. On jacket water applications when the engine is started up and is cold, the AMOT Thermostatic Valve causes all of the water to be positively by-passed back into the engine, thus providing the quickest warm-up period possible. After warm up, the correct amount of water is by-passed and automatically mixed with the cold water returning from the heat exchanger or other cooling device to produce the desired jacket water outlet temperature. If ever required, the AMOT Thermostatic Valve will shut off positively on the by-pass line for maximum cooling. The 3-way action of the AMOT Thermostatic Valve allows a constant volume of water through the pump and engine at all times with no pump restriction when the engine is cold.

AMOT Thermostatic Valves display excellent reliability even under extreme shocks or vibration and can be qualified to MIL-S-901 and MIL-V-19772.

AMOT Thermostatic Valves are available in pipe sizes from 1/2" to 8" for water flow rates of 2-2800 USGPM.
MATERIALS OF CONSTRUCTION

Thermostatic Valve housings in most sizes and series are available in either cast iron, ductile iron, steel, stainless steel, aluminum or bronze. The cast iron models are recommended for most applications because of their cost effective performance. Bronze models are often used on shipboard installations. Steel offers the greatest strength and also the highest pressure ratings. For details on selecting specific valves, refer to the “Selecting an AMOT Thermostatic Valve” section on the last page and then to the brochure covering the valve series which best suits your application.

Standard Temperature Element Assemblies are made of brass and bronze. Standard seals are Buna N. These materials are suitable for most fluids such as cooling water and petroleum-based oils. Certain fluids may be damaging to standard valve body and seal materials. Special materials are available if standard materials are not compatible with the fluids being used.

ADJUSTMENTS & MAINTENANCE

No adjustments are ever required on AMOT Thermostatic Valves. Once installed an AMOT Thermostatic Valve will provide years of trouble-free service. It is entirely self-contained, and there are no external bulbs or lines to become damaged or broken. There are no packing glands to tighten and no parts to oil. The temperature is permanently set at the factory and requires no further adjustment. The operating temperature can be changed only by changing temperature element assemblies which is easily accomplished by unbolting the housing. Element assemblies are all interchangeable within each lettered valve series.

Larger valves in the “B” and “H” series contain multiple element assemblies in one housing. This means that an AMOT temperature element assembly will fit any size AMOT thermostatic valve housing in that series.

TEMPERATURE SETTINGS

Because AMOT Thermostatic Valves are set to a predetermined temperature at the factory, costly errors due to mistakes of operating personnel are eliminated. After an AMOT Thermostatic Valve has been installed, it is impossible for the operator to arbitrarily change the operating temperature and run the equipment too cold or too hot unless the temperature element assemblies themselves are changed.

The temperature range of AMOT Thermostatic Valves should be selected according to the engine or equipment manufacturer recommendations. This information is usually available from AMOT application engineers who work closely with original equipment manufacturers. A few general recommendations can be made, however. For marine and stationary engines using heat exchangers, radiators, or some other type of closed water system, jacket water outlet temperatures of 160 to 180 °F are most common. For direct salt water cooled marine engines a 120°F setting should be used as this temperature is well below the point at which salt will deposit in the water passages of large diesel engines. Special salt water element assemblies are available. A thermostatic valve size corresponding to the outlet pipe size on the engine or pump is usually satisfactory. However, if flow information is available, Figure 7 can be used to select the proper size.

AMOT Thermostatic Valves are temperature rated for the expected nominal operating temperature in jacket water service. On lubricating oil applications the system operating temperature may be slightly above the nominal rating, depending on the flow rate, oil cooler capacity and other conditions of the system.

A wide range of temperature settings is available from 55°F to 240°F (13°C to 116°C).

For long life, AMOT Thermostatic Valves should not be operated continuously at temperatures more than about 25°F (14°C) above their nominal ratings. If higher continuous overtemperatures are expected, contact the factory for recommendations.
OPERATION

The motive force of operation comes from the expansion of a special wax material which remains in a semi-solid form and which is highly sensitive to temperature changes.

Fig. 1A shows an element assembly of the Model B series with the sliding valve in the cold position. The fluid travels out the by-pass (Port B on the valve) as shown by the arrow.

Fig. 1B shows the sliding valve moved up to the extended or warm position. The by-pass closes off as the sliding valve seats and the water is diverted to the outlet (Port C on the valve) as shown by the arrow. In actual operation, the sliding valve is normally in about the mid-position. When the wax material expands with rising temperature, the rubber plug is forced into a reduced diameter in the piston guide, which multiplies the movement of the piston by an extruding action.

The operating range is determined by the chemical composition of the wax material. The expanding wax develops a pressure that is transmitted directly to the piston, producing a large actuation force, which easily overcomes the return spring force of over 100 lb. Construction is simple and rugged, yet the unit is very sensitive to changes in temperature. Changes in pressure do not affect the element and due to the valve construction, surges in pressure do not tend to upset the stability of the thermostatic valve.

PIPING DIAGRAMS

The most common piping diagram for jacket water temperature control is shown in Fig. 2. Radiator may be substituted for the heat exchanger. The AMOT Thermostatic Valve will operate in any position and mounting should be made in accordance with convenience.

For lubricating oil temperature control, the AMOT Thermostatic Valve is used directly in the lubricating oil line as shown in Fig. 3. The oil by-passes the heat exchanger when cold and will reach the desired operating temperature rapidly. When warm, the correct amount of oil will automatically be circulated through the heat exchanger to maintain the desired temperature. The system shown in Fig. 3A is similar to the standard jacket water temperature control system with the thermostatic valve used as a diverting valve. In Fig. 3B the AMOT Thermostatic Valve is used as a mixing valve, in which hot oil enters Port B and cold oil enters Port C. The oil is mixed in proportion so as to emerge from Port A at the desired temperature. AMOT thermostatic valves are used in many other applications, examples of which are shown in Fig. 4, 5, and 6. Fig. 6 shows a basic cogeneration heat recovery system using AMOT thermostatic valves to stabilize temperature and maximize heat recovery.

Cooling water control - Heat Exchanger Valve shown in "diverting" installation. Mount valve in dotted position for "mixing" applications.

Lube Oil Control Valve shown in diverting position to control oil sump temperature. In dotted position valve will "mix" hot and cold flow streams to control supply temperature to engine.

Air Conditioning Valve shown in "mixing" position to control temperature of inlet water to refrigeration system condenser. Valve in dotted position controls outlet temperature.

Water Saving Applications Valve shown maintains minimum flow through cooler to conserve water; requires internal leak hole to permit small flow for sensing.

Single Pump Cogeneration System Valve #1 controls the water temperature entering the engine. Valve #2 as shown diverts the flow of excessively hot water to the radiator when the heat exchanger is not removing enough heat from the cooling loop. Valve #2 in dotted position is an alternative location if mixing instead of diverting service is desired.
Selecting an AMOT Thermostatic Valve

1. Choose appropriate size and model series based on the expected flow rate. Using Fig. 7, select a valve which can handle the desired flow rate. The min. and max. flow rates listed are based on pressure drop through the valve of approximately 2 psi (min.) and 7 psi (max.)

2. Refer to the brochure covering the valve series selected. Select from the standard versions offered, choosing the appropriate valve body material.

   - **Cast Iron** - for most water and oil systems, best value
   - **Ductile Iron** - High strength at lower cost than steel
   - **Steel** - High strength, high pressure rating
   - **Stainless Steel** - Highest corrosion resistance, high strength, high pressure rating
   - **Bronze** - for salt water and Navy applications
   - **Aluminum** - for low cost high pressure service

3. Select nominal temperature from standard temperature settings which are available, commonly between 85°F and 200°F. Temperature settings down to 55°F and up to 240°F are available in some models.

4. Select special features if required. Refer to the specific valve series brochure for availability of special features. Examples include:
   - Electroless Nickel plated temperature element assemblies for fluids incompatible with brass or bronze.
   - End Connections. NPT threads are standard on most valves 2-inches and smaller. Alternate thread connections include SAE, metric (BSP-tapered or BSP parallel, JIS), etc. Larger valves are typically flanged. Flange standards available including ANSI, Navy, metric (DIN), JIS, etc.
   - Element Leak Holes allow a small flow through Port C maintaining flow through the cooler at all times. Leak holes prevent condensation or freezing of cooler, and during start-up slow down the warm-up time. In 2-Way applications with Port B blocked and circuit cold, leak holes are necessary to ensure sensing of temperature changes.
   - Alternative seal materials, such as Viton or Neoprene (where standard Buna-N is not compatible with working fluid)
   - Manual override allows element to be forced open sending full flow through cooler.
   - Special temperature settings.
   - Special high-overtemperature element assemblies.
   - Salt water temperature element assemblies of stainless steel construction (Model B Series only.)

### AMOT Thermostatic Valve Series

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Note: Minimum Flow Rate is for 2 psi pressure drop through the valve. Maximum Flow Rate is for 7 psi pressure drop through the valve.

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