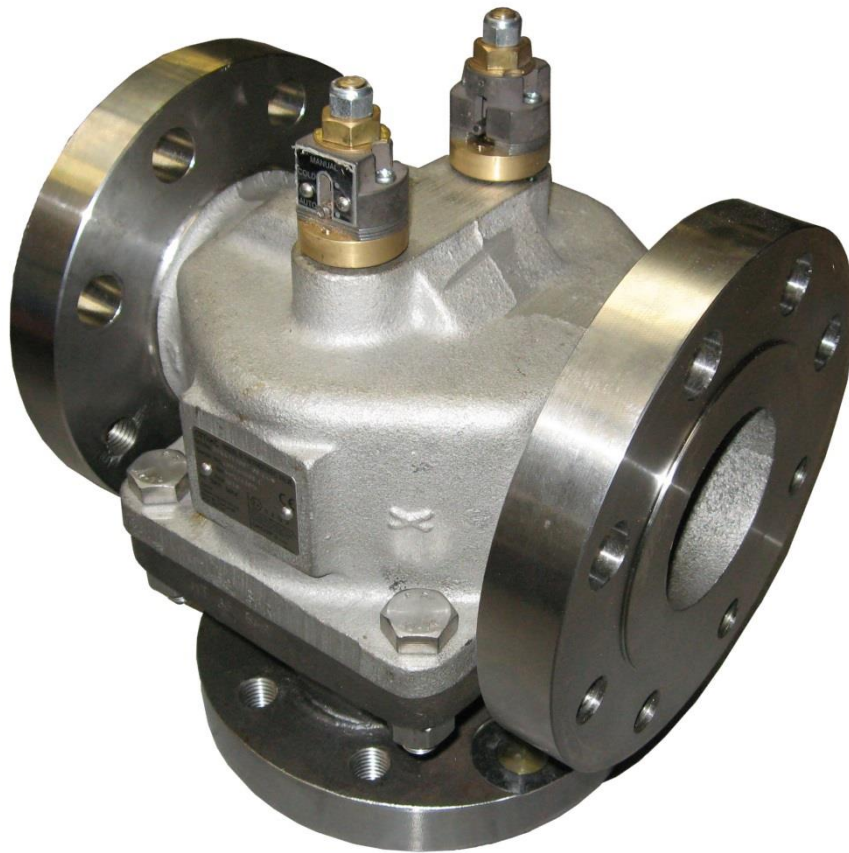




Model B Valve Thermostatic valve for diverting and mixing applications

Installation, Operation and Maintenance Manual



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Section 2

Introduction

2.1 Scope

This manual details the installation, operation and maintenance of the AMOT Model B Valve range.

2.2 Safety

Certain operations within this manual are potentially hazardous and could cause injury to personnel or damage to equipment if the instructions are not carried exactly as described. Where a significant, potential hazard exists, the following text appears immediately before steps in the procedure that present a particular hazard:

WARNING

A Warning identifies a hazard that could cause injury to personnel. The text of the warning describes the hazard and details the precautions that must be applied before the next step of the procedure is carried out.

CAUTION

A Caution identifies a hazard that could cause damage to equipment. The text of the caution describes the hazard and details the precautions that must be applied before the next step of the procedure is carried out.

Note

A Note contains supplementary information that may be useful to the Operator before the next step of the procedure is carried out.

2.3 Product support

All necessary settings and, where appropriate, alterations inside the equipment are described in this Operating Manual. If any difficulties arise during start-up, you are asked not to carry out any unauthorized actions on the unit. You could endanger your rights under the equipment warranty.

For spares and service support, call the telephone number listed on the back cover of this Manual.

Section 3

Description

3.1 Overview

The Model B Valve is designed to provide fully automatic, 3-way fluid temperature control for diverting or mixing applications. Typical applications include engine water jackets, lubricating oil cooling systems, and mixing and diverting of fluids in process control and industrial applications.

The thermostatic element (also referred to as 'element') in a Model B valve is fully enclosed and factory set, providing tamper-proof operation. For maintenance or to achieve a different set temperature the element can be changed, although this requires removal of the valve from its pipe work except the Model 8B Valve where the elements are accessible whilst the valve is in position. Elements are available with set temperatures from 13 to 116°C (55 to 240°F). Valves are available in nine sizes, and a variety of materials to suit different fluids.

3.1.1 Manual override

As an option, Model B Valves can be fitted with a manual override, which allows the operator to drive the elements towards the maximum cooling position. On the larger sizes with multiple elements, each has its own override. Manual override should only be used in emergencies; however on valves with multiple elements sometimes one element can be locked partially open to prevent the cooler from freezing and to change operating temperature slightly.

3.2 Features

Typical applications

- Lubricating oil temperature control
- Jacket water high temperature (HT)
- Secondary water low temperature (LT)
- Heat recovery
- Water saving applications
- Boiler inlet temperature control
- Co-generation, cooling towers
- Temperature mixing or diverting
- Engine and compressor cooling system

Key benefits

- No external power source required – simple low cost installation.
- No user setting needed – 'fit and forget' solution.
- Small No of parts – simple maintenance and low cost ownership.
- Robust design capable of high vibration and shock applications

Description

3.3 Valve Selection

A wide range of valve sizes and materials of construction are available, covering the applications in Section 3.2. An AMOT B Valve datasheet containing information on selection of the appropriate valve type is available, contact AMOT for a copy.

It is the responsibility of the end user to ensure suitability of the valve with its intended use. The valve, element, and seal materials in particular should be carefully selected to ensure compatibility with the process fluid and the installation.

For further help in selecting the correct valve for the application, contact AMOT (contact details available on the back cover of this manual).

3.4 Identification of Model Number

Example Code	4	BO	S	J	075	07	-0	0	-XXX	Code Description	
Valve Size										Nominal Bore Size	Number of Elements
	1 1/2									1 1/2 inch (DN40)	1
	2									2 inch (DN50)	1
	2 1/2									2 1/2 inch (DN65)	2
	3									3 inch (DN80)	2
	33									3 inch (DN80)	3
	4									4 inch (DN100)	4
	5									5 inch (DN125)	6
6									6 inch (DN150)	9	
8									8 inch (DN200)	16	
Valve Model										Model	
	BO									Screwed connections (1 1/2" and 2" only)	
	BO									Flanged (2 1/2" to 8" only)	
	BC									Flanged "T" configuration (1 1/2" and 2" only)	
	BF									Flanged "F" configuration (2" only)	
	BH									Screwed high pressure (1 1/2" and 2" only)	
	BR									Manual override (2" to 8" only")	
BP									Special ST.ST with Manual Override (Contact AMOT for detail)		
BQ									Special ST.ST B Valve (Contact AMOT for detail)		
Valve Material										Valve Material	
	A									Aluminium (not 8 and 33)	
	B									Bronze (not 33)	
	C									Cast Iron*	
	D									Ductile iron	
	S									Steel (2", 2 1/2", 3" and 4" only)	
R									Stainless steel (2", 2 1/2", 3" and 4" only)		
Port Connection										Port Connection	
	A									Flanged PN6	
	B									Flanged PN10	
	C									Flanged PN16	
	F									Flanged ANSI 125 lb (cast iron, bronze and ductile only)	
	J									Flanged ANSI 150 lb (steel and stainless steel only)	
	H									Flanged ANSI 300 lb (steel and stainless steel only)	
	L									Flanged JIS 10k	
	P									Flanged JIS 5k	
T									Threaded NPT (1 1/2" and 2BO only)		
U									Threaded BSP (PL) (1 1/2" and 2BO only)		
Control Temperature (°F)										Control Temperature (°F)	
										*** See Element Temperatures Table 2	

...continued overleaf

Example Code	4	BO	S	J	075	07	-0	0	-XXX	Code Description
Element Type						**				Element Type
										See Element / Seal Types Table 3
Leakhole sizes										Leakhole sizes inches
							0			None
							A			1/2" Dia
							B			1/4" Dia
							C			3/8" Dia
							D			1/8" Dia
							E			1/16" Dia
							F			3/32" Dia
							G			3/16" Dia
							H			5/16" Dia
Leakhole Quantity										No. of elements with Leakhole
							0			None
							1			One (Max for 2" Size)
							2			Two (Max for 2 1/2" & 3" sizes)
							3			Three
							4			Four (Max for 4" size)
							5			Five
							6			Six (Max for 5" size)
							7			Seven
							8			Eight
							9			Nine (Max for 4" size)
Customer Special Requirements										Customer Special Requirements
									-AA	Standard Product
									**_*	Customer special code assigned

Table 1 - Model Identification

* AMOT reserves the right to substitute a ductile iron product in place of cast iron to meet customer delivery requirements.

Other Flange connections are available. Contact AMOT for details.

Description

Code	Control Temp		Rated Range				Max Temp Continuous		Max Temp Short Period	
			Crack Open		Full Open					
	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
045	7.2	45	1	39	11	52	16	61	35	95
055	13	55	8	47	20	68	35	95	40	104
057	14	57	10	50	18	65	30	86	40	104
075	24	75	20	68	30	86	38	100	54.5	130
090	32	90	27	81	35	95	43	110	60	140
095	35	95	29	85	41	105	49	120	68	154
100	38	100	34	93	42	108	50	122	63	145
105	41	105	35	95	45	113	55	131	70	158
110	43	110	38	100	47	117	56	133	74	165
115	46	115	40	104	50	122	61	142	79	174
120	49	120	43	110	54	130	66	150	76.2	169
130	54	130	51	124	60	140	68	155	82	180
135	57	135	54	129	63	145	71	160	84	183
140	60	140	57	135	66	151	74	165	88	190
145	63	145	60	140	69	156	79	174	94	201
150	66	150	63	145	72	161	82	180	95	203
155	68	155	66	150	74	165	85	185	96	205
160	71	160	68	155	78	173	88	190	102	216
165	74	165	71	160	80	175	88	190	102	216
170	77	170	74	165	83	181	93	200	107	225
175	79	175	77	170	85	185	102	215	118	244
180	82	180	79	175	88	191	104	220	121	250
185	85	185	82	180	91	196	106	223	121	250
195	91	195	87	188	98	209	107	225	121	250
205	96	205	93	200	102	215	108	226	121	250
215	102	215	98	209	107	225	115	239	120	248
225	107	225	102	216	113	236	118	244	125	257
230	110	230	104	219	115	239	118	244	125	257
240	116	240	108	227	122	252	123	253.5	125	257

Table 2 - Element Temperatures

Code	Element and Valve Seal Material
01	1096X standard with Nitrile seals
02	1096P plated with Viton seals
03	1096X standard with Viton seals
05	6836S saltwater with Nitrile seals
07	2433X manual override with Nitrile seals
08	2433P manual override (plated) with Viton seals
09	6938S saltwater manual override with Nitrile seals
11	5566X higher over-temperature with Nitrile seals
17	7406X manual override higher over-temperature with Nitrile seals
20	5566X reduce stroke with Viton seals
53	2433X manual override with Viton seals

Table 3 - Element/Seal Types

Other Elements and Seals are available. Contact AMOT for details.

Description

Section 4

Use within the European Union (EU)

4.1 Pressure Equipment Directive (PED)

The Pressure Equipment Directive (PED) is applicable to the design, manufacture and conformity of pressure equipment and assemblies of pressure equipment with a maximum allowable pressure greater than 0.5 bar.

In its design application of a thermostatic valve, this equipment is defined as a Pressure Accessory under the terms of the EU Pressure Equipment Directive (PED).

The Model B Valve, when suitable for use within the European Community, carries a nameplate, an example of which is shown in Figure 1. The nameplate contains the following information pertinent to the Pressure Equipment Directive requirements:

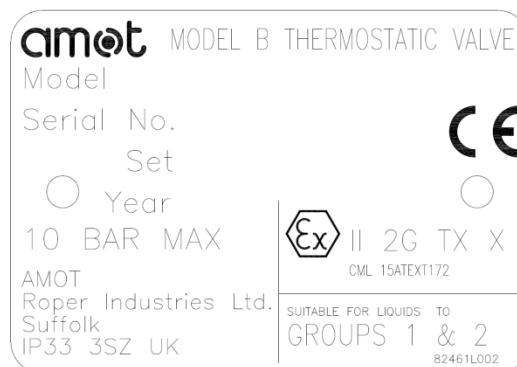


Figure 1 – B Valve Nameplate

- Model** An alphanumeric text identifier stamped onto the nameplate that fully describes the type of equipment.
- Serial No** A unique serial number stamped on the nameplate to allow traceability of manufacture.
- Year** The year in which the equipment was manufactured is stamped here.
- ** BAR MAX** The maximum pressure that the equipment is permitted to see in service (refer to Section 9.1.2 for value).

Name and address

Equipment complying with the Pressure Equipment Directive must be marked with the name and address of the manufacturer and where appropriate, of his authorised representative established with the European Community.

Suitable for liquids to Groups 1 & 2 and CE Marking

When used with liquids defined as Groups 1 or 2, the Model B Valve falls into the PED Sound Engineering Practice (SEP) category. Note that 8" B Valves, and B Valves with Class 300lb flanges (Port Connection "H" – See *Table 1*, Section 3.4) are only suitable for use with liquids defined as Group 2, and the nameplate is marked accordingly for these versions. Units must not be CE marked in the SEP category (although are CE marked for compliance with the ATEX Directive (see Section 4.2)).

Users who are uncertain as to the applicability of the Pressure Equipment Directive should contact AMOT, particularly if using more hazardous (Group 1) fluids.

4.2 Hazardous Areas**4.2.1 Hazardous Area Directive (ATEX)**

The ATEX Directive is applicable to all equipment both electrical and mechanical that is put into service in a designated hazardous area.

The Model B Valve, as mechanical equipment, has been assessed in accordance with EN13463-1 and has been designated as Group II equipment. Group II equipment is suitable for use in places where a potentially explosive atmosphere may be present. Group II equipment shall not be used underground in mines, or in the surface installations of such mines that are susceptible to firedamp or combustible dust.

The Model B Valve has been assessed for use in places designated as containing hazardous gas; they shall not be used in places designated as containing hazardous dust.

The Model B Valve, when suitable for use within the European Community, carries a nameplate, an example of which is shown in Figure 1. The nameplate contains the following information pertinent to the ATEX Hazardous Area Directive requirements:

Model	An alphanumeric text identifier stamped onto the nameplate that fully describes the type of equipment.
Serial No	A unique serial number stamped on the nameplate to allow traceability of manufacture.
Year	The year in which the equipment was manufactured is stamped here.
Ex Symbol	The EU Mark for hazardous area application.

Equipment designation:

II	Equipment Group (non-mining applications).
2	Equipment Category (high protection level).
G	Hazardous Area Type (hazardous gas environments).
TX	Max surface temp (maximum surface temperature depends on not on the equipment itself but on the operating conditions, and a single temperature class cannot be marked by the manufacturer).
X	Special Conditions for safe use (Special conditions for safe use apply, including the Ambient Temperature Range below, see Section 4.2.2).

CML 15ATEXT172 Confidential Technical File reference (c/o Notified Body).

CE Marking All equipment used in a hazardous area under the ATEX Directive must be CE marked. Mechanical equipment in Group II Category 2 is self-assessed, and a confidential Technical File lodged with a Notified Body (per Technical File ref. above). Equipment that is CE marked must comply with all relevant EU Directives. The CE mark on the AMOT B Valve only represents compliance to the ATEX Directive and not to other EU Directives.

Name and address Equipment complying with the Hazardous Area Directive must be marked with the

name and address of the manufacturer and where appropriate, of his authorised representative established with the European Community.

For safe and trouble-free use within hazardous areas the instructions within this Operating and Maintenance Manual must be strictly adhered to.

The maximum temperature and internal pressure that this equipment is permitted to work at is contained within Section 9.1.

The conditions for safe installation and commissioning of this equipment are contained in Section 5.

The equipment must be maintained in accordance with Section 7 and between maintenance periods it should be kept clean in accordance with Section 4.2.2.

Users who are uncertain as to the applicability of the ATEX Directive should contact AMOT for further advice.

4.2.2 Special conditions for Safe Use

1. The equipment is designed for use in an extended ambient temperature range of -20°C to +60°C.
2. The equipment contains no heat generating parts and assumes the temperature of the fluid inside it, as denoted by the "TX" marking. The fluid temperature must remain within the limit specified in Section 9.1.3.
3. Cleaning of equipment must only be completed using a damp cloth or anti-static cloth.
4. Process fluids capable of generating ionising radiation (such as radioactive substances) are not suitable for use with the equipment.
5. The equipment is not suitable for use with process fluids that could cause exothermic reactions within the equipment or with the equipment and its materials.

4.3 Machinery Directive

The Model B Valve supplied by AMOT is classified as a component. The equipment falls outside the scope of the machinery directive. Components are only intended to be incorporated into or assembled with other machinery or equipment thereby forming Machinery.

Section 5 Installation

WARNING

The valve is heavy; refer to Section 9.1.4. The appropriate manual handling precautions must be applied to avoid personnel injury.

5.1 Installing the valve

5.1.1 Before starting installation

1. Upon receipt, the valve should be checked for damage sustained in shipping. All AMOT valves have nameplates attached, which are stamped with the valve model number and serial number.
2. Understand the intended use of the valve as described in Section 3.
3. Before installation, ensure that the valve is suitable for the purpose, checking temperature, pressure and material parameters, and any special approval requirements (refer to Section 3.3). Check that the intended pipe fittings are suitable for the application.
4. Check that the valve size has been selected in accordance with the anticipated flow rate through the valve (refer to Section 3.3). To maintain good temperature regulation the pressure drop across the valve should be in the 0.14 to 0.5 bar (2 to 7 psi) range.
5. If the valve is to be fitted at a high point in the system, the system should be vented to prevent trapped air around the temperature elements.
6. For optimum temperature regulation the system should be designed so that the element is in the mid-position under nominal conditions. To achieve this it may be necessary to balance the fluid flow by inserting an orifice in the by-pass circuit.
7. If appropriate, read and understand the legal requirements of installing the valve within the European Union as described in Section 4.

5.1.2 Mounting the Valve in the Pipe

The valve may be mounted in any orientation; but should be properly supported and not subjected to excessive bending. Ensure the pipe flange connections are correctly aligned to avoid stressing the valve body.

For the main flanged ports bolting and gaskets should comply with the relevant standard.

All relevant local regulations must also be observed.

5.1.3 Start up

Upon installation and on start-up of the system, all parts of the circuit should be closely monitored to ensure correct performance. A system in which the valve has been properly selected for the anticipated flows should operate very closely to the valve's nominal temperature rating.

Water cooling systems will usually operate at or slightly below the nominal temperature. Lubricating oils and most other higher viscosity fluids will operate at or slightly above the nominal temperature.

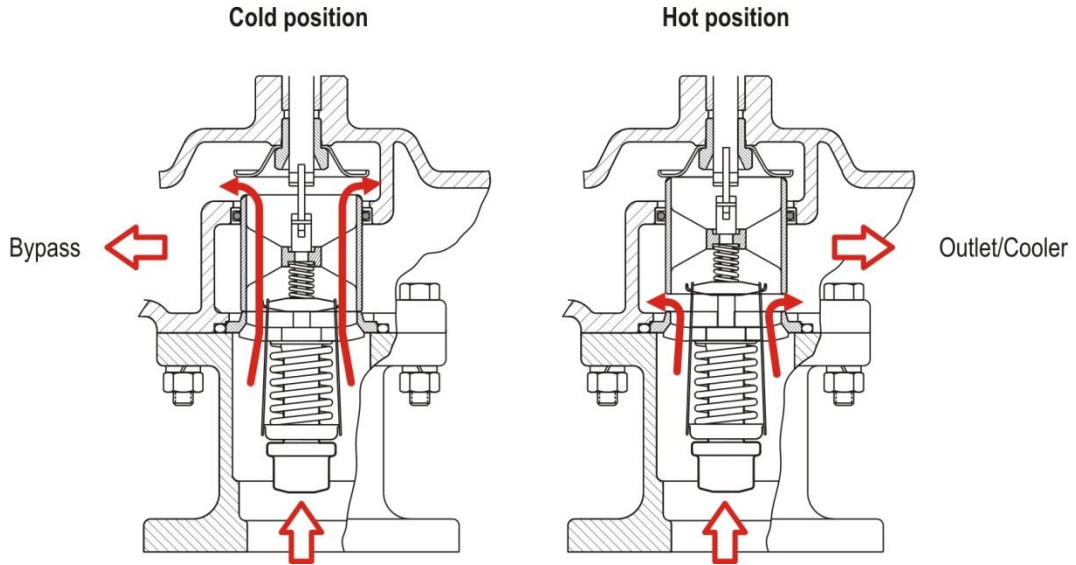
In any system where the indicated temperatures are more than 2.7°C (5°F) from the nominal temperature, then an effort should be made to locate the cause.

Any system operating at an indicated 5.5°C (10°F) or more from the nominal anticipated temperatures may well be malfunctioning and the cause should be located and rectified immediately. See troubleshooting section for possible causes.

Section 6 Operation

6.1 Operation

The Model B Valve is completely automatic in operation, and needs no power supply

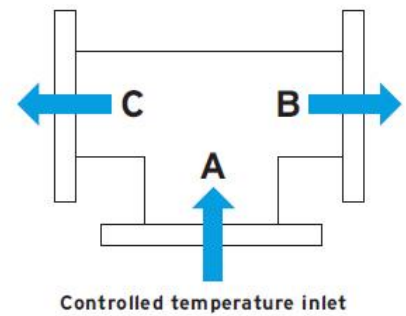
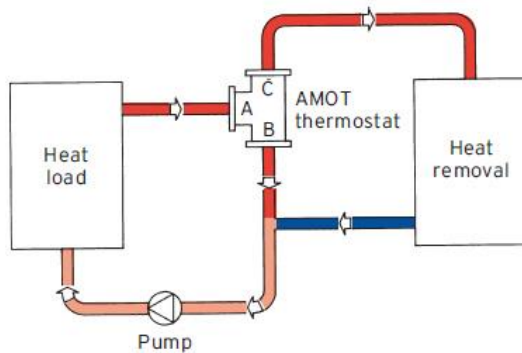


The temperature control power is created by the expansion of a wax/copper mixture which is highly sensitive to temperature changes. Large forces are created by the warming/expansion of the mixture which in turn acts upon the sliding valve, thus regulating the flow.

6.1.1 Diverting applications

(controls outlet temp from load source)

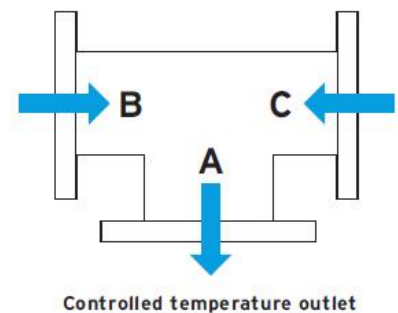
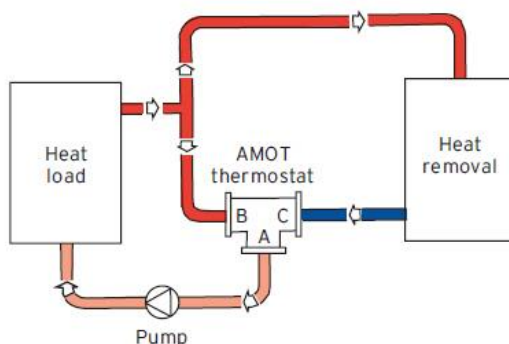
In diverting applications temperature is sensed at port A, which remains open to port B (bypass) until the fluid temperature reaches a point 3-6°C (5-10°F) below the nominal setting, when the valve will start to move, progressively closing port B and opening port C (the cooler connection). If the temperature continues to rise, port B will be fully closed 4 to 6°C (8-10°F) above the set temperature.



6.1.2 Mixing applications

(controls inlet temp to load source)

In mixing applications the hot supply is connected to port B, the cold supply to port C, and the mixed flow appears, via the temperature sensor, at port A. Because of the position of the controlling wax 'pill', in mixing applications the controlled temperature may be 2-3°C above the nominal.



6.1.3 Manual override (if fitted)

CAUTION

Manual override is for emergency use only. If operated incorrectly, damage to the valve can occur.

1. If emergency cooling is required then firstly loosen the locknut on the top of the override (reference Section 7.1, Figure 2, Item 38).
2. Turn adjusting nut (reference Section 7.1, Figure 2, Item 33) clockwise until indicator pin (reference Section 7.1, Figure 2, Item 36) has reached 'manual' position or desired cooling has been achieved then tighten locknut. Do not over adjust.
3. In valves with multiple elements, adjust the other overrides accordingly.
4. When returning to Auto mode, loosen the locknut, turn adjusting nut anti-clockwise until indicator pin has reached auto position and adjuster slackens then tighten locknut. Do not over adjust or damage may occur to the adjuster nut retaining pins.

Section 7 Maintenance

To obtain maximum service life from the valve, periodic inspection and cleaning should be incorporated into a normal preventative maintenance program. Properly applied and installed AMOT thermostatic valves require minimal maintenance. Inspection at 2 year intervals is adequate to detect normal wear.

CAUTION

Before starting any maintenance, understand the intended use of the valve as described in Section 3.

If appropriate, read and understand the requirements associated with use of the valve within the European Union as described in Section 4.

Most valves must be removed from the system pipework before commencement of maintenance. Elements in the 8" B Valve may however be removed with the valve still in the pipework.

Ensure replacement seal kits are available (Table 7) before maintenance begins.

WARNING

Ensure that all pressure is relieved from within the valve and ancillary equipment and drain system (or isolate valve) before commencing any maintenance work.

7.1 Dismantling the valve

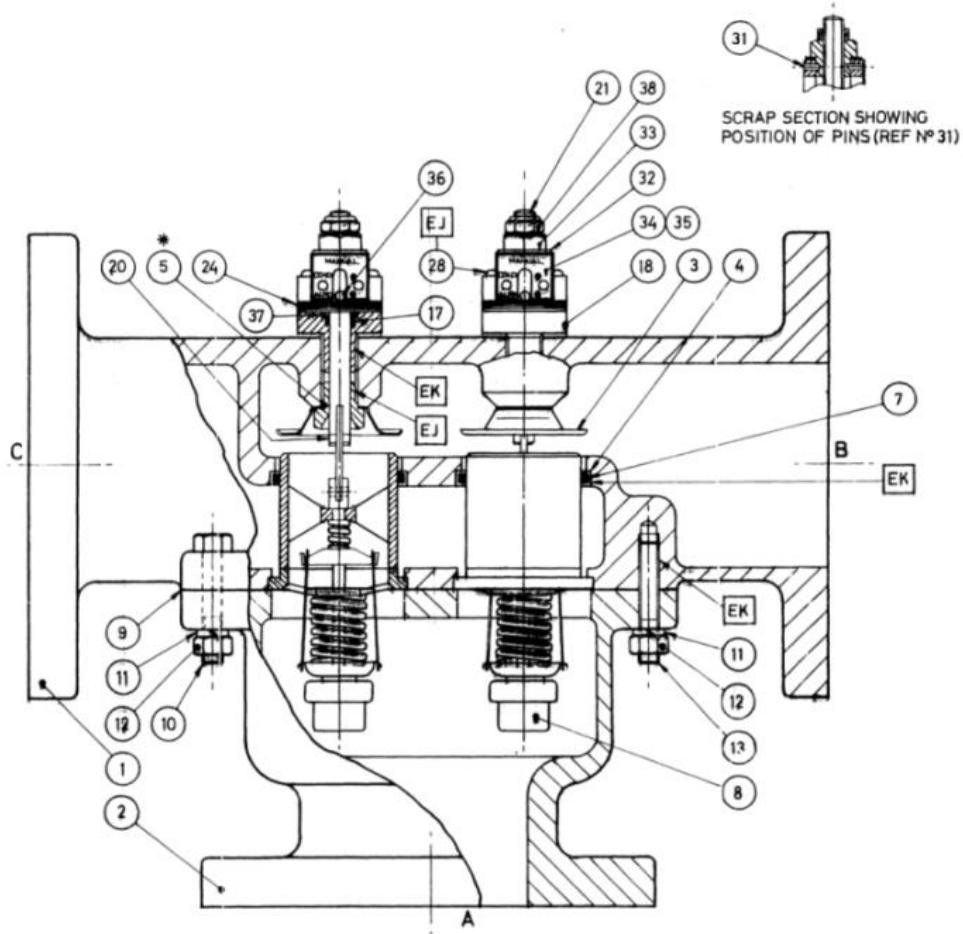


Figure 2 - Diagram showing 4" B valve with manual override

1. Refer to Figure 2. Remove housing nuts (Item 12) and split valve. Remove the lower housing (Item 2) taking care not to damage the elements. Remove and discard housing gasket (Item 9) ensuring any traces of the gasket are removed from the housing mating faces. Note that in some sizes of Model B Valves 'O' rings are used instead of gaskets.
2. If removing element from BO valve (non manual override) simply pull the element from the upper housing. Go to step 9.
3. If removing element from BR valve (manual override) only dismantle one at a time to eliminate the chance of the manual override parts being mixed up.
4. Carefully remove the indicator pin (item 36).
5. Remove the locknut (Item 38) from the override stem (Item 21).
6. Remove override housing retaining screws (Item 28).
7. Unscrew override housing from the override stem (Item 21) and set aside the shims.
8. Pull the element from the upper housing and if changing the element un-pin the override stem from the element link.
9. Remove 'O' rings. BO valve item 7. BR valve item 7 & 17.

10. Inspect valve seat for wear or damage. If required replace valve seat (Item 3), remove by unscrewing bushing (Item 5). Bushing A/F 7/8".

7.2 Reassembling the valve

1. Where fitted, lubricate gasket (Item 9) liberally with a good grade of petroleum grease, allow to soak.
2. If valve seat changed, refit bushing with Loctite 2400 locking compound.
3. Lightly grease and stretch new 'O' ring (Item 7) and fit into upper housing. Position 'O' ring concentrically to assist element assembly.
4. If replacing a BR valve element, then fit override stem (Item 21) to element link with pin (Item 20).
5. Insert element into the upper housing taking care not to damage the 'O' ring.
6. For BO valves go to step 10
7. For BR valves. Lightly grease 'O' ring (Item 17) and slide over override stem and seat into recess in the stem adaptor followed by the 'O' ring retainer (Item 37).
8. Screw manual override housing onto override stem. Refit shims (Item 24). Ensure indicator plates are facing outward, on 6BR one row to face nameplate and two rows to face other side. Secure housing to stem adaptor with screws (Item 28) and Loctite 241. Fit indicator pin (Item 36) into override stem, ensuring element assembly still closes.
9. Wind manual operator nut and check sliding valve fully closes onto seat. Return valve to auto position and secure operating nut with locknut (Item 38). Ensure washer (Item 32) is free.
10. Position lubricated gasket (where fitted) on upper housing joint face, or lightly grease and fit replacement 'O' Rings in upper housing joint face element recess(es). Position lower housing over upper housing, and secure with nuts and washers (Items 12 & 11). For nut torque settings, see *Table 4*.

Maintenance

Size Code	O ring		Gasket	
	Nm	lb ft	Nm	lb ft
1 ½	54	40	N/A	N/A
2	54	40	N/A	N/A
2 ½	80	60	N/A	N/A
3	80	60	N/A	N/A
33	80	60	N/A	N/A
4	54	40	68	50
5	80	60	122	90
6	80	60	122	90
8	80	60	122	90

Table 4 - Tightening torques for housing nuts

7.3 User maintenance parts

Table 5 shows the number of elements per valve.

Size Code	Valve nominal bore		Number of elements
	Inches	mm	
1 ½	1.5	40	1
2	2	50	1
2 ½	2.5	65	2
3	3	80	2
33	3	80	3
4	4	100	4
5	5	125	6
6	6	150	9
8	8	200	16

Table 5 - Number of elements per valve

Table 6 provides the part numbers for spare element assemblies.

Part Number	Description	Qty
1096X(°F)	Element assembly	See Table 5
1096P(°F)	Plated element assembly	
2433X(°F)	Element assembly with manual override	
2433P(°F)	Plated element assembly with manual override	
5566X(°F)	Element assembly, higher over-temperature	
7406X(°F)	Element assembly, higher over-temperature with manual override	
6836S(°F)	Element assembly, 'Saltwater' plated	
6938S(°F)	Element assembly, 'Saltwater' plated, with manual override	

Table 6 - Element assembly part numbers

Other Elements are available. Contact AMOT for details.

Table 7 provides the part numbers for spare seal kits, containing the required seals to maintain a complete valve.

Seal Kits						
Size	Material					
	BO/BC/BF/BH			BR		
	Nitrile	Viton	Neoprene	Nitrile	Viton	Neoprene
1.1/2"	46342X151	46342X152	46342X153	46342X154	46342X155	46342X156
2"	46342X201	46342X202	46342X203	46342X204	46342X205	46342X206
2.1/2"	46342X251	46342X252	46342X253	46342X254	46342X255	46342X256
3" 3BO,3BR	46342X301	46342X302	46342X303	46342X304	46342X305	46342X306
3" 33BO, 33BR	46342X331	46342X332	46342X333	46342X334	46342X335	46342X336
4" 4BOA,4BOB 4BOC,4BOD	46342X401	46342X402	46342X403	46342X404	46342X405	46342X406
4" 4BOR,4BOS 4BRR,4BRS	46342X411	46342X412	46342X413	46342X414	46342X415	46342X416
5"	46342X501	46342X502	46342X503	46342X504	46342X505	46342X506
6"	46342X601	46342X602	46342X603	46342X604	46342X605	46342X606
8"	46342X801	46342X802	46342X803	46342X804	46342X805	46342X806

Table 7 - Seal kit part numbers

Note that as of 2010, 4" and 5" B valves, and as of 2011, 6" and 8" B Valves, use 'O' rings to seal the upper and lower housing. The seal kits for these valves contain the original type gasket and the 'O' rings to suit both types of sealing configuration.

Section 8

Trouble shooting

In the event that the cooling system does not operate close to the desired temperature, the following guide may help to identify or locate the problem.

8.1 System temperature too cold

1. Insufficient heat rejected to coolant to maintain temperature.
2. Wrong nominal element temperature selected.
3. Thermostatic valve greatly oversized or cooling capacity of system much greater than required.
4. Thermostatic valve installed backwards, thus sending water to cooler at low temperatures.
5. Worn or leaking O-rings allowing leakage to cooler.
6. Excessive pressure drops across valve.
7. Foreign matter preventing closure of elements.
8. Bimetallic type thermometers will indicate low if calibrated in oil.

8.2 System temperature too hot

1. Cooling capacity of system inadequate.
2. Thermostatic valve too small for flow rate causing high pressure drops and possible cavitation problems.
3. Valve installed backwards, reducing flow to cooler as temperature increases.
4. Bypass will not close due to worn or pitted seats, sliding valve, seals etc.
5. Elements may have seen sufficient over-temperature to prevent full movement, thus preventing full cooling.
6. Solids building up on element sliding valve preventing correct operation.
7. Foreign matter stuck between sliding valve and seat.

Section 9 Technical Specification

9.1 General valve specification

9.1.1 Materials

Body materials..... Aluminium, Bronze, Cast Iron, Ductile Iron, Steel, Stainless steel
 Internal materials (elements) Stainless Steel and Bronze
 Option: Nickel plating
 Seal materialNitrile, FKM (Viton), Neoprene or Ethylene propylene rubber

9.1.2 Maximum working pressure (bar)

Type	Bronze	Cast Iron	Ductile Iron	Steel	Stainless Steel	Aluminium
1½"	10	10	N/A	N/A	N/A	N/A
2"BC/BR	10	10	16	45	45	10
2"BH	N/A	22	N/A	N/A	N/A	N/A
2 ½"	10	10	16	45	45	10
3"	10	10	16	45	45	10
33	N/A	6	N/A	N/A	N/A	6
4"	10	10	16	20	20	10
5"	10	10	10	N/A	N/A	10
6"	10	10	10	N/A	N/A	10
8"	10	10	10	N/A	N/A	N/A

Table 8 - Maximum working pressure

9.1.3 Maximum working temperature

The maximum continuous temperature that the valve can operate at is determined by the temperature element(s) fitted to the valve. This information is contained in Section 3.4, Table 2.

The element(s) in the valve may be subjected to slightly higher maximum temperature for a short term period, the value for which is also stated in Section 3.4, Table 2. The process fluid must be reduced to the maximum continuous temperature within 30 minutes however, or permanent damage to the element(s) may occur.

9.1.4 Valve handling

Suitable care must be taken to avoid injury when handling valves. The mass of the units varies between 11 kg (25 lb) and 315kg (695 lb), depending on size and material. See Table 9 for details of all variations (all weights in Kg).

Type	Bronze	Cast or Ductile Iron	Steel (inc. SS)	Aluminium
1 1/2"	13	11	N/A	N/A
2" BO/BH/BG	13	11	N/A	N/A
2" BF	22	18	N/A	7
2" BC/BR	26	18	20	N/A
2 1/2"	29	24	34	10
3"	36	27	36	11
33	42	35	N/A	14
4"	68	61	N/A	24
5"	109	91	N/A	35
6"	136	123	N/A	48
8"	315	285	N/A	N/A

Table 9 - Model B Valve weights

9.1.5 Storage

Protect stored valves against ingress of dirt and airborne contaminants, and avoid frost or direct sunlight. Do not allow the temperature of the storage area to rise above the maximum continuous temperature rating of the selected element (refer to Section 9.1.3).

Storage is permitted down to -40°C (-40°F) for valves containing Nitrile, EPDM, Neoprene 'O' rings and down to -26°C (-14.8°F) for valves containing FKM (Viton) 'O' rings but this must be followed by a slow increase of no higher than 1°C per minute.

Valves must be kept dry and not subjected to any shock loads or abrasion. Valves may be stored in any position and will not deteriorate with time, with the exception of the 'O' rings, which must be replaced after 7 years.

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