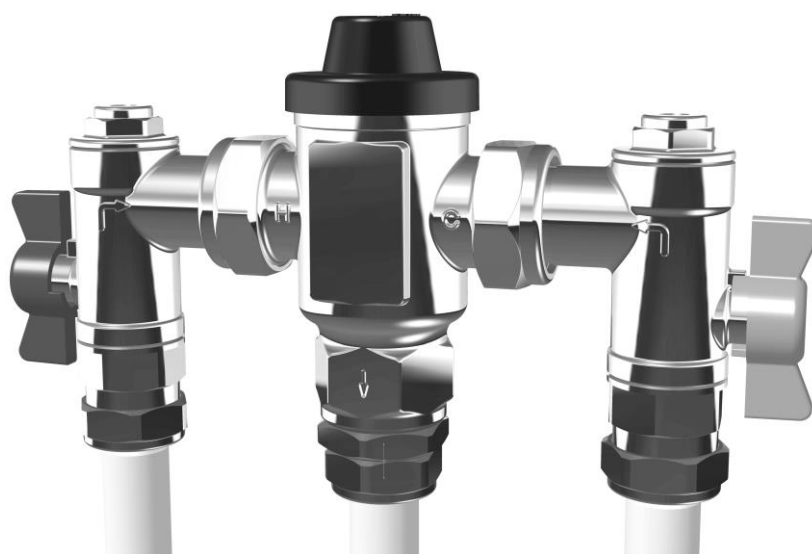




# **TMV20**

## **THERMOSTATIC MIXING VALVE**

**INSTALLATION, COMMISSIONING AND MAINTENANCE MANUAL**



**Caroma - TMV 20 - G3/4" Plumbed Assembly**

**Caroma Australia Pty Limited**

Level 1, 7-9 Irvine Place Norwest Business Park Bella Vista, NSW, 2153, Australia  
Ph: 1300 CAROMA (1300 227 662) Fax: 1800 241 199

[specify.caroma.com.au](http://specify.caroma.com.au)

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*No liability can be accepted for any consequences which may arise as a result of its application.*

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## 1 Introduction

The CAROMA TMV20 Thermostatic Mixing Valve is a high performance Thermostatic Mixing Valve that is suitable for a wide range of water temperature control applications. The CAROMA TMV20 valve is designed to comply with AS4032.1 Thermostatic Mixing Valves.

The TMV20 thermostatic mixing valve has the following features:

- Complies with the requirements of AS4032.1 Thermostatic Mixing Valves.
- Provides high stability of mixed water temperature even under changing inlet conditions.
- Ensures a rapid shut-down of mixed water flow from the outlet in the event of a hot or cold water supply failure.
- Designed for quick and simple in-situ servicing with its unique integrated Thermostatic Cartridge.
- Suitable for installation into AS3500 compliant systems with hot water inlet temperatures as low as 55°C.
- Anti Scaling Coating for hard water areas.
- Fitted with a Tamper Resistant temperature adjustment mechanism.

## 2 Safety

The CAROMA TMV20 Thermostatic Mixing Valve is a high performance valve designed to give stable and dependable operation, provided it is installed, commissioned, operated and maintained as per the recommendations outlined in this manual.

It should be noted that this valve should not be considered as an alternative to adequate supervision and duty of care during its use and operation.

**Note:** When installed, components such as the mixing valve, inlet controls, pipework and the surrounding area may become hot, which may cause burn injuries. Adequate precautions should be taken by installers to ensure that these surfaces cannot cause such injuries.

## 3 Product Range and Physical Description

The CAROMA TMV20 Thermostatic Mixing Valve is available complete with inlet service fittings. The inlet to the fittings is  $\frac{3}{4}$ " BSP male, and the outlet from the valve is  $\frac{3}{4}$ " BSP male adaptor with an optional  $\frac{1}{2}$ " BSP male adaptor. The service fittings consist of isolating ball valves, strainers, pressure test points and non-return valves. The internal mesh strainers can be serviced and cleaned without disturbing the installation (refer to Section 10). The valve incorporates an integrated **Thermostatic Cartridge** that allows for quick in-situ servicing.

The inlet service fittings have been designed with union type fittings, enabling the valve to be removed, if required, from its installation without disturbing the associated pipework.

The CAROMA TMV20 Thermostatic Mixing Valve is also available housed within a Stainless Steel mounting enclosure, with hinged and removable access panels and in a range of plumbing configurations (refer to Section 11).

Dimensions of the valve and its corresponding product order code are shown below in Figure 1.

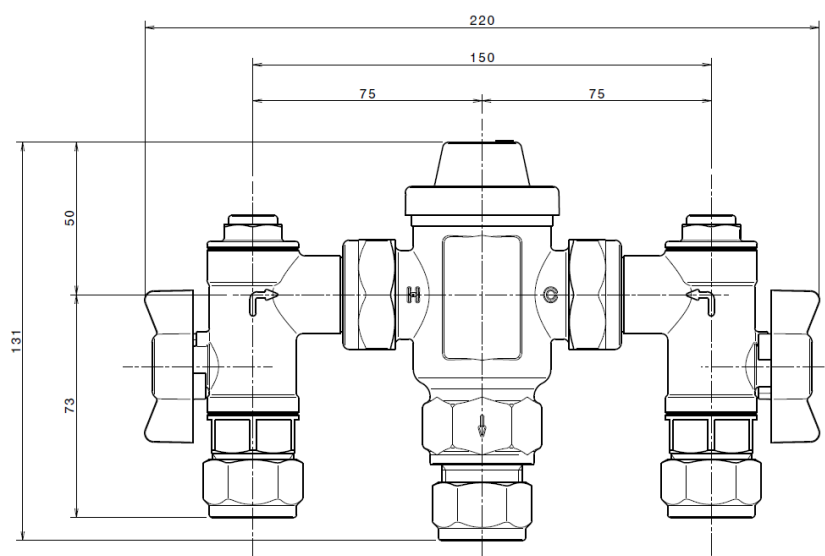


Figure 1: Physical Size; Caroma TMV20 – AS CAST NICKEL PLATED FINISH (Code: TMV004)  
 $\frac{3}{4}$ " Male Thread Inlet and Outlet Fittings (Dry Weight 2kg)

## General Operating Principles

The general arrangement drawing of the CAROMA TMV20 is shown below in Figure 2.

Hot and cold water is supplied to the Thermostatic Mixing Valve via the Isolation Valves (with integrated Check Valves) as marked. The hot water enters into the Mixing Chamber through a port below the Piston; the cold water enters through a port above the Piston. The two sources of water enter the Mixing Chamber and begin to blend.

The mixed temperature water makes contact with the thermostatic wax sensor within the mixing chamber. The length of thermostatic wax sensor will extend or contract in response to the water temperature it is exposed to. The length change of in the sensor causes the attached Piston to move axially within the chamber, varying the distance between the piston and port sealing surfaces thereby changing the effective inlet port size. The variable port sizes regulate the amount of hot and cold water entering the valve. By sensing and responding to the temperature of the mixed water, the thermostatic mechanism will maintain the mixed water temperature at a constant, preset temperature.

As an example, if there is a reduction of **pressure** to the hot water inlet, then the flowrate of hot water into the valve also reduces. In this situation, the TMV20 would react as follows:

- The Element is exposed to mixed water at a reduced temperature.
- The Thermostatic Wax Sensor contracts in response.
- The Piston is pushed upwards by the return spring, reducing the cold water port gap. This action effectively restricts the flow of cold water into the valve.
- Simultaneously, the piston moves away from the hot port sealing surface, increasing the size of the hot water port gap, allowing an increased flow of hot water into the chamber, resulting in an increased mixed water temperature as the valve restores itself to the original temperature setting.

Similarly, if the **temperature** of the water supplied to the hot inlet is reduced, the sensor would sense the mixed water at a lower temperature than set. The Element would again contract, reducing the cold port piston gap and simultaneously increasing the hot port, thereby allowing an increased flow of hot water into the chamber and a reduction to the flow of cold water. Once again, the valve restores itself to its original setting resulting in no noticeable change temperature change for the user.

This process will occur for all changing conditions, including changes to flowrate, inlet temperatures and pressures. In the event of a **sudden loss** of the cold water supply the Piston will **shut off** the hot port thereby stopping any flow through the valve. Similarly if there is a hot water supply failure, the valve will shut down the cold port, effectively isolating water supply to all outlets.

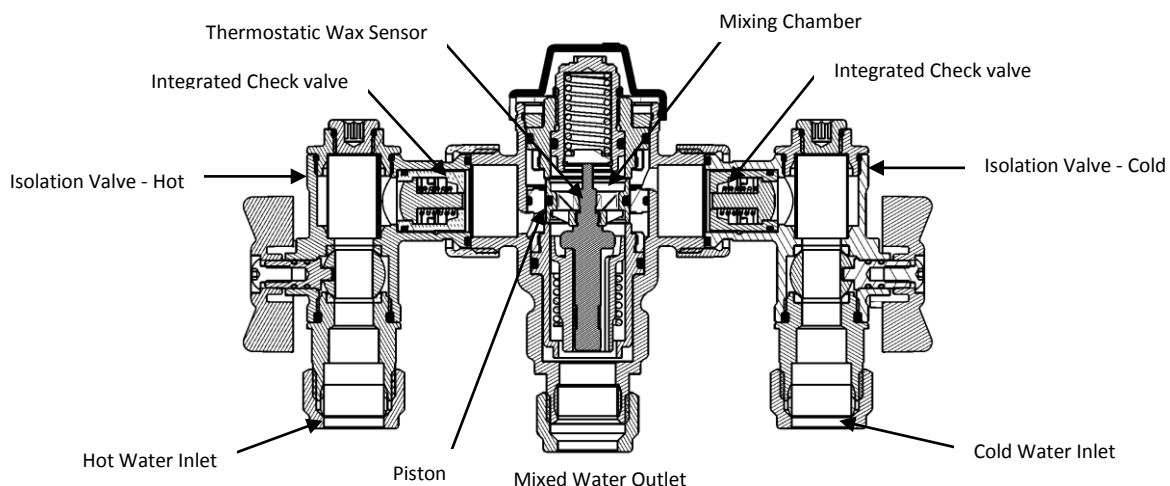


Figure 2: General Arrangement of TMV20

## 4 Recommended Pressures and Temperatures

<b>MIXED OUTLET TEMPERATURE</b> Temperature Adjustment Range	35° - 50°Celsius
<b>INLET TEMPERATURES</b> Cold Supply Hot Supply	Minimum 5° Celsius - Maximum 25° Celsius Minimum 55° Celsius - Maximum 90° Celsius
<b>TEMPERATURE DIFFERENTIAL</b> Hot or Cold to Mixed Temperature Differential required for Stable Operation	Minimum 10° Celsius
<b>FLOWRATES</b> To ensure stable outlet conditions	Minimum 2 litres/minute
<b>DYNAMIC INLET PRESSURES</b> Hot and Cold Inlet Pressures	Minimum 20kPa - Maximum 500kPa
<b>STATIC INLET PRESSURES</b> Hot and Cold Inlet Pressures	Maximum 1000kPa
<b>INLET PRESSURE RATIO</b> Maximum inlet pressure ratio for stable operation. (Hot : Cold or Cold : Hot)	10:1 (either supply)

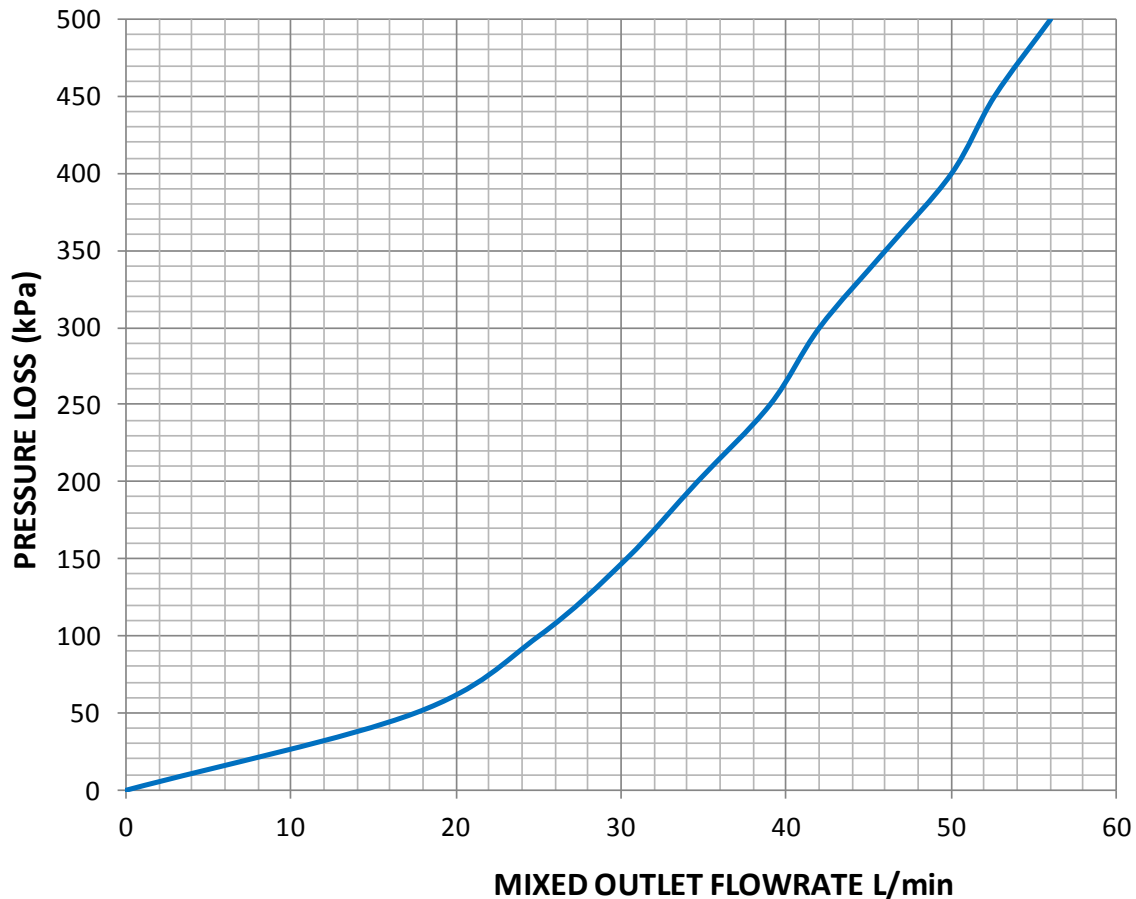
**NOTE:** For optimum operation it is recommended that the hot and cold water supply pressures be balanced to within +/- 10%.

**NOTE:** Notwithstanding the above, compliance with AS3500 must be maintained.

## 5 Flow Sizing Graph

The Headloss Characteristic curve for Mixed Outlet Flowrate versus the Balanced Inlet Pressure is shown below in Graph 5.1.

### HEADLOSS CHARACTERISTICS OF CAROMA TMV20



Graph 5.1 - Headloss Characteristics; Caroma TMV20,  
Mixed water temperature = 43°C

#### NOTE:

- To ensure optimum performance, the minimum flow at the outlet of the thermostatic mixing valve during operation should be at least 2 litres/minute.
- It is important that the valve is sized so that the flowrates from the supplied outlets are not less than those listed in AS/NZ3500.1.
- The pipework between the valve and the system must be sized in accordance with AS3500.1 - Appendix B to ensure the water velocity in the pipework is within the allowed limit.
- It is important that the valve is not oversized for its intended application.
- If the valve is to be installed and operated under unequal inlet pressures the lower inlet pressure determines the outlet flowrate. However, for optimum performance and stability it is recommended that the valve be installed with balanced dynamic inlet pressures ( $\pm 10\%$ ).

## 6 Installation

The CAROMA TMV20 Thermostatic Mixing Valve should be installed using the appropriate Standards, Codes of Practice and legislation applicable to each state and following the details outlined in this section.

The CAROMA TMV20 must be installed by a licensed plumber, or where applicable, a licensed plumber who has undertaken Accredited Training in Thermostatic Mixing Valve installation.

*Note: To effectively control microbial hazards during system design, installation, commissioning and maintenance, the requirements outlined in AS/NZS3666 and local legislation must be adhered to.*

The inlets and outlet connections of the valve are clearly marked. The letters H and C cast into the valve body indicates the Hot and Cold Inlets respectively. An arrow is cast into the body of the thermostatic valve body to identify the direction of water flow through the outlet.

**NOTE: If the valve is not installed correctly, it will not function correctly and may put the user in danger and will also void the warranty of the valve.**

Prior to the installation of the valve, the plumbing system must be checked to ensure that its operating conditions fall within the recommended operating range of the valve (Section 4).

If hot water is supplied at a temperature greater than 90°C, the valve may be damaged. If hot water supply can exceed 90°C, a suitable temperature limiting valve must be fitted to the hot water supply, prior to the inlet fittings. The temperature limiting valve must be installed as per the manufacturer's instructions.

It is also important that both inlets' dynamic supply pressures are no greater than 500kPa. If either supply pressure exceeds 500kPa then a suitable Pressure Reducing Valve must be fitted prior to the inlets of the valve in order to reduce the pressure to an acceptable limit. The pressure reducing valves must be installed as per the manufacturer's instructions.

**NOTE:** In order to achieve optimum performance from the valve it is recommended that the inlet pressures are balanced to **within 10%** of each other.

The water quality conditions should also be checked to ensure they do not exceed the limits as set out in AS3500.4, Section 1.6. If they do exceed these limits then it will be necessary to install a water softener or appropriate water treatment device.

**NOTE:** In some installations, certain tapware devices such as mixer taps and solenoid valves are used. Due to the rapid shutoff action that is a characteristic of these devices, spikes in water pressure greater than recommended values may be observed. Although these spikes may only last a fraction of a second it is still considered to be outside the operating conditions and may cause the valve to operate incorrectly. In the event that this does occur, measures such as the installation of inline pressure reducing valves, prior to the valve inlets, must be undertaken to control the pressure spikes.

**It is necessary to flush the pipework thoroughly with clean water before the valve is installed. This will remove any physical contaminants from the pipework, ensuring trouble-free operation.**

Isolating valves, Mesh Strainers, and non-return valves are all supplied with the CAROMA TMV20 Thermostatic Mixing Valve.

It is required by AS/NZ3500.4 that “Each thermostatic mixing valve shall have an isolating stop tap/valve, line strainer and non-return valve fitted to the hot and cold water supply lines”, **as shown in Figure 3.**

Isolating valves are required to be fitted, so that the water supply to the valve can be isolated in the event that servicing is required. Line strainers must be fitted to prevent any particulate contamination from entering the valve. Non-return devices must also be fitted to both the hot and cold inlets to prevent cross-connection.

Test points are provided at each inlet (on top of the Isolation Valve) and can be used to check supply pressures. A test point is also provided on the outlet pipe to allow the installer to check the temperature of the mixed water at the Valve outlet.

It is essential that the mixing valve and inlet fittings are easily accessible for maintenance or servicing.

During installation or servicing, the application of heat (i.e.: from brazing torches) must be minimised and not applied near the mixing valve or inlet fittings. Excessive heat during installation may damage the valve and inlet fitting internals. Any damage to the valve may put the user at risk and will void the warranty of the valve.

### Schematic Installation Diagram

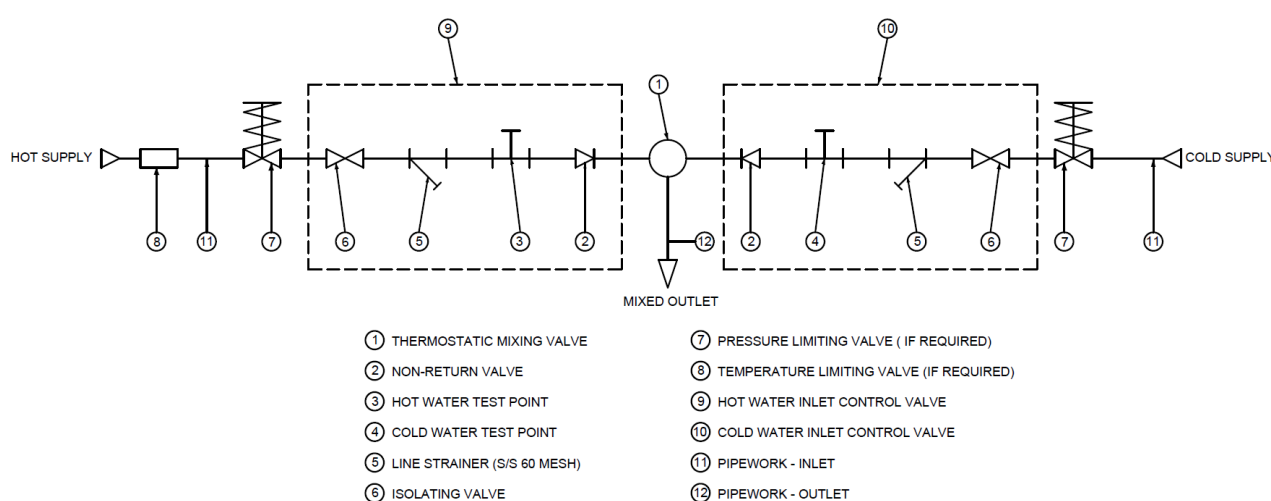


Figure 3: Schematic - Installation Diagram

## 7 Commissioning

The CAROMA TMV20 valve should be tested and commissioned as per the procedure outlined below and as specified by the local authority. The entire procedure should be read through carefully and fully understood prior to the commissioning of the valve. Equipment required for the commissioning include; a calibrated digital thermometer having a rapid response time and a maximum temperature hold function, a small flat bladed screwdriver and the CAROMA TMV20 Adjusting Key (supplied with the TMV20).

Ensure all outlets that will be serviced by the valve have adequate warning signs posted to ensure that no outlet is used during commissioning.

- Fully open the cold supply line to the valve. Then fully open the hot supply line, ensuring there are no leaks.
- Identify the outlet that is serviced by the **shortest** length of pipe work between the mixing valve and outlet fixture.
- Open this outlet and allow the mixed water to flow for at least 60 seconds to allow the temperature to stabilise. The flowrate should be at least 2L/min. The flowrate can be checked with the aid of a known size container and a stopwatch or by using a suitable Flow Test Cup.
- Note the temperature at the outlet with a digital thermometer.
- If the outlet temperature requires adjustment to meet the nominated set temperature, the following steps are required:

### 7.1 Temperature Adjustment

1. Using a small, flat bladed screwdriver, carefully lever the Protective Cap off the valve (figure 4).
2. Loosen the Adjustment Locknut.
3. Fit the supplied Adjusting Key over the adjusting spindle (figure 4)
  - a. To **increase** the mixed outlet temperature, rotate the spindle **anti-clockwise**.
  - b. To **decrease** the mixed outlet temperature, rotate the spindle **clockwise**.
4. Allow the mixed outlet temperature to stabilise for at least 60 seconds and once again take a temperature reading.
5. Repeat the procedure until the desired temperature has been reached at the outlet.
6. Lightly tighten the Adjustment Locknut to prevent further spindle movement.
7. Replace the top cover, by pushing the top cover firmly onto the top of the valve until it clips back into place.
8. Check that the outlet temperature is stable over the full range of flowrates and that the flowrate is adequate for the application.
9. Close the outlet fixture.
10. The mixing valve is now set and locked.

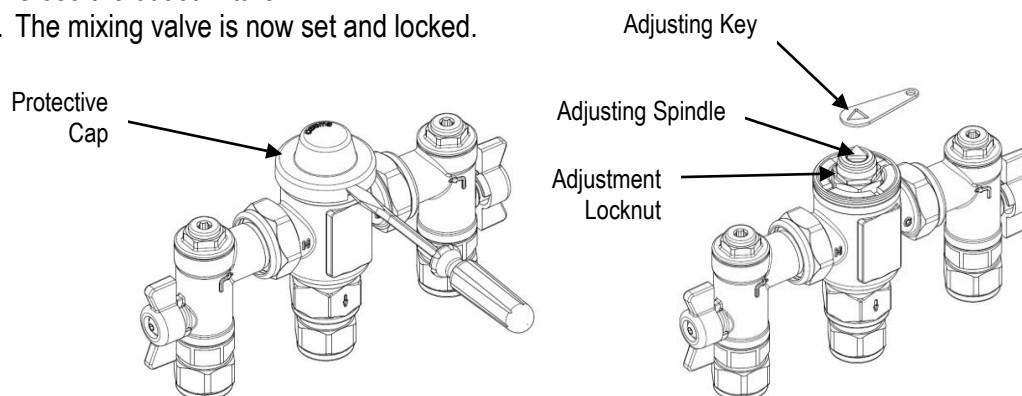


Figure 4: Adjusting the Mixed Water Temperature

## 7.2 Shut Down Test

- After the Thermostatic Mixing Valve has been set and locked, conduct a Shut Down test. Run water through the valve and allow the outlet temperature to stabilise. Note the outlet temperature. Whilst monitoring the outlet flow temperature using a digital thermometer, rapidly isolate the cold water supply to the valve with the Isolation valve. The outlet flow should quickly cease flowing and should be no more than approx 0.1L/min. Continue monitoring the flow and record the maximum outlet flow temperature on the Commissioning Report (see Section 12). The outlet flow temperature should not exceed that allowed by the applicable standard or code of practice for each state. Restore the cold water supply to the valve. When the mixed water temperature has stabilised, note the outlet temperature. Ensure that the outlet temperature has returned to the nominated set value.
- Repeat the Shut Down test with the Hot Water Supply. Stabilise the valve outlet temperature. Rapidly isolate the hot water supply to the valve. The outlet flow should quickly slow to a trickle (typically less than 0.4L/min@500kPa down to approx 0.1L/min@100kPa). Restore the hot water supply to the valve and measure and record the outlet temperature after the mixed water temperature has stabilised. Ensure that the outlet temperature has returned to the nominated set value.

Ensure that all details in the Commissioning Report are completed and signed by the relevant signatories and a copy is kept with the installer and owner of the premises.

**The valve is now commissioned and can be used within the technical specification limits of operation.**

## 8 Maintenance And Servicing

The CAROMA TMV20 Thermostatic Mixing Valve will only require minimal preventative maintenance to ensure it operates at its optimum level of performance. The valve should be commissioned and serviced annually, unless the installed operating conditions necessitate more frequent servicing. Field-testing and maintenance is to be carried out in accordance with AS4032.3.

**Every 12 months** the CAROMA TMV20 should be inspected and tested. The exterior surfaces of the valve should be wiped down with a cloth. The valve and surrounding area should be inspected for evidence of leaks or water damage and appropriate action taken if required. The Mesh Strainer should be checked (see 8.1).

As per the requirements of AS4032.3; the valve piston 'O' ring and thermostatic element / piston assembly must be replaced at intervals **not exceeding 5 years** (see 8.2 and 8.4). For ease of maintenance, the Caroma TMV20 has the capability to replace the complete Thermostatic Cartridge as a unit (see 8.2).

### 8.1 Maintenance Procedure – Mesh Strainer

1. Ensure a clean dry work area is available.
2. Isolate the hot and cold supplies to the mixing valve by closing the inlet ball valves.
3. Remove the inlet fitting top cover with a suitable spanner and then remove the mesh strainer, as shown in Figure 5.
4. The strainers should be cleaned with a dilute water solution of suitable descaling solvent (such as C.L.R.), checked for physical damage and then thoroughly rinsed with clean water.
5. Carefully re-install the Strainers into the valve. Replace the top cover into the inlet valve bodies and tighten to a torque of 15Nm. Check that the test point caps in the top of the inlet fittings are tight and that there is no evidence of water

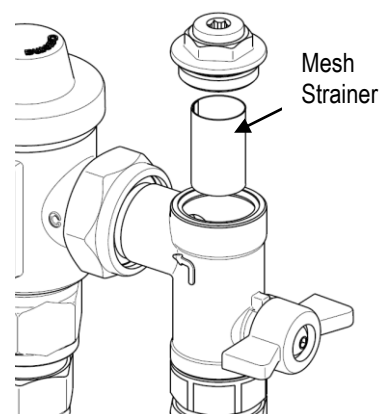


Figure 5: Removing the Inlet Strainer

leakage.

## 8.2 Maintenance and Installation instructions for Thermostatic Mixing Cartridge (TMV001)

1. Ensure a safe, clean dry work area is available.
2. Isolate the hot and cold supplies to the mixing valve by closing the inlet ball valves.
3. Pry off the plastic Protective Cap using a small screwdriver or similar (Figure 6a).
4. Remove brass Cartridge Locknut with the supplied tool. Use an M8 Hex key, as shown, for additional torque.
5. Gently remove the cartridge assembly.

It may be necessary to use the flat bladed screwdriver to gently lift the cartridge before it can be removed by hand (Figure 6c).

- a. Unscrew Adjustment Locknut, 1 turn, and carefully insert flat bladed screwdriver underneath.
  - b. Gently lever the cartridge up 3-5 mm, then proceed to carefully extract the cartridge by hand.
6. Lightly grease O-rings of replacement cartridge. (Use only potable water approved silicon-based lubricating grease such as Molykote™111).
  7. Insert replacement cartridge assembly, taking extreme caution not to damage any surface of the cartridge.
  8. Refit the Cartridge Locking Nut back to the body using the supplied tool and tighten to a maximum torque of 10Nm.
  9. Replace the Protective Cap by pushing down to snap into position.
  10. **The valve must now be re-commissioned as per instructions in Section 7, including Temperature Adjustment and Shut Down test.**

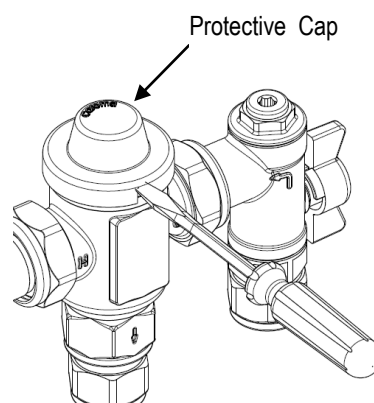


Figure 6a: Removing the Protective Cap

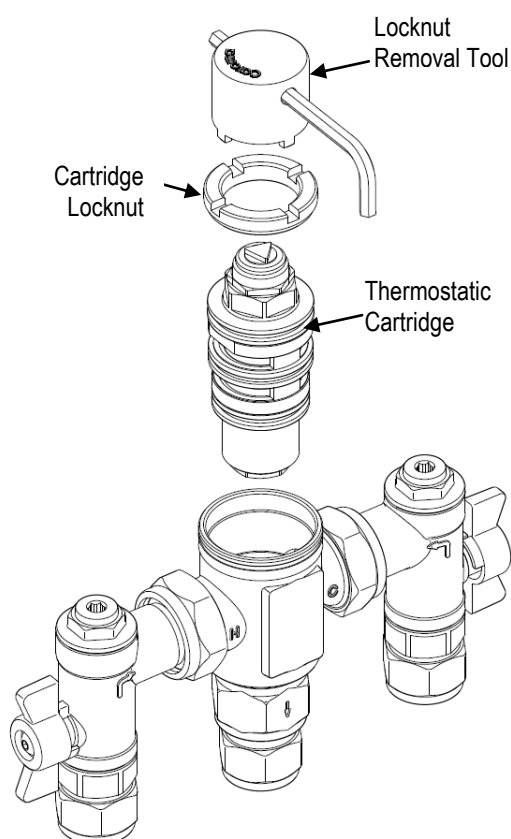


Figure 6b: Removing the Thermostatic Cartridge

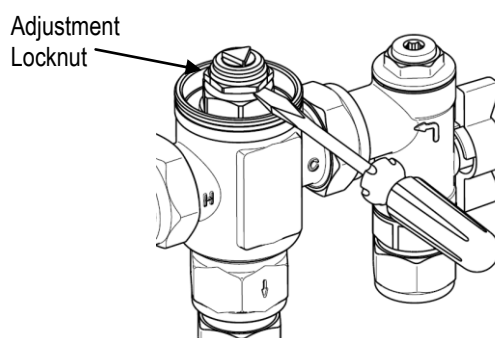


Figure 6c: Using a Screwdriver to lift the Thermostatic Cartridge

### 8.3 Installation instructions for O-ring replacement

1. Remove Thermostatic Cartridge Assembly TMV001. Refer 8.2 Steps 1 thru 5.
2. Remove O-rings from Thermostatic Cartridge.
3. Replace the O-rings supplied in the kit (lightly grease O-rings with potable water approved silicon-based lubricating grease such as Molykote™ 111 before refitting).
4. Insert cartridge assembly, taking extreme caution not to damage any surface of the piston.
5. Refit the Cartridge Locking Nut back to the body using the supplied tool and tighten to a maximum torque of 10Nm.
6. Replace the Protective Cap by pushing down to snap into position.
7. **The valve must now be re-commissioned as per instructions in Section 7, including Temperature Adjustment and Shut Down test.**

### 8.4 Replacement of Actuator Assembly (Thermal Sensor, Element Piston and O-ring)

1. Remove Thermostatic Cartridge Assembly TMV001. Refer 8.2 Steps 1 thru 5.
2. Carefully disassemble the Cartridge Body (Figure 7). Unscrew Lower Housing from the Mid Housing. Securely hold Mid Housing with a 35 A/F spanner. Use a 22 A/F spanner to unscrew Lower Housing. Ensure the Return spring and Support Sleeve remain within the Lower Housing.
3. Carefully extract, by hand, Actuator Assembly (Element, Piston and O-ring) and Support Sleeve.
4. Lightly grease to the replacement Actuator Assembly O-ring with potable water approved silicon-based lubricating grease such as Molykote™ 111 before refitting.
5. Replace the Actuator Assembly and Support Sleeve supplied in the Actuator Service Kit (SP99094).
6. Reassemble the Cartridge (See Step 2).
7. **Important:** Re-tighten the Lower Housing to 10Nm.
8. Replace all external Cartridge O-rings (Cartridge O-ring Kit SP99084) and apply potable water approved silicon-based lubricating grease such as Molykote™ 111 to all seals.
9. Re-insert cartridge into Valve Body taking extreme caution not to damage any surface of the Cartridge.
10. Refit the brass Cartridge Locknut back to the body using the supplied tool and tighten to a maximum torque of 10Nm.
11. Replace the Protective Cap by pushing down to snap into position.
12. **The valve must now be recommissioned as per Section 7 of this manual, including Temperature adjustments and the Shut down test.**

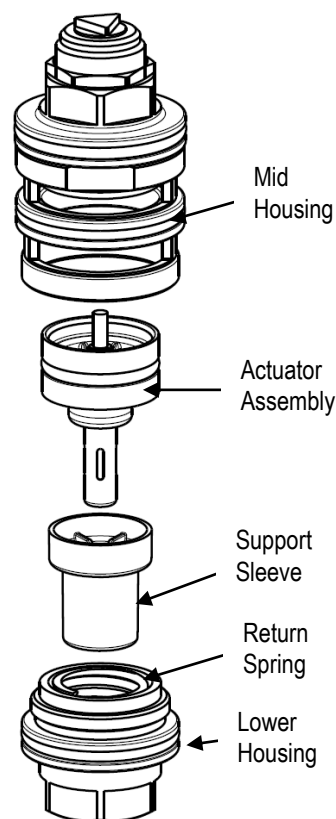


Figure 7: Replacing the Actuator Assembly (Element, Piston and O-ring): Thermostatic Cartridge Assembly

**NOTE:** It is a requirement of AS4032.3, that “the valve piston ‘O’ ring and thermostatic element / piston assembly must be replaced at intervals not exceeding 5 years”.

For ease of maintenance, Caroma offers the capability to replace the Thermostatic Cartridge as a complete, integrated unit (see 8.2), which reduces down time during maintenance.

## 8.5 Instructions for disinfection (Chlorination)

The following procedure will allow for the disinfection of the Caroma TMV20 as required under AS/NZS3500.1.

1. Using a small, flat bladed screwdriver, carefully lever the Protective Cap off the Valve (figure 8)
2. Loosen the Adjustment Locknut several turns.
3. Using the adjustment tool provided, adjust the TMV temperature setting to the minimum by winding the spindle down in a clockwise direction **until it stops**.
4. Next, wind the spindle back up approximately 1¼ turns in an anticlockwise direction.
5. Check that the flow through both Hot & Cold sides is approximately equal.
  - a. Close the Hot Isolation Valve and open the Cold Isolation Valve; note the flow at the nearest outlet.
  - b. Close the Cold Isolation Valve and open the Hot Isolation Valve and compare the flow.  
(Note: it may be necessary to remove the flow regulator from the outlet.)
  - c. If the hot flow is greater, wind the spindle in approximately 1/10<sup>th</sup> of a turn in a clockwise direction and check both flows again by repeating steps 5a & 5b.
  - d. If the cold flow is greater, wind the spindle out approximately 1/10<sup>th</sup> of a turn in an anticlockwise direction and check both flows again by repeating steps 5a & 5b.
6. Ensure both Isolation Valves (and by-pass valves if fitted) are fully open before disinfection begins.
7. Perform Disinfection procedure in accordance with AS/NZS3500.1.
8. Perform Flushing procedure in accordance with AS/NZS3500.1
9. **The valve must now be re-commissioned as per instructions in Section 7, including Temperature Adjustment and Shut Down test**

**NOTE:** It is important that after flushing and disinfection of the system the filters must be removed, cleaned and re-installed. Similarly where tap outlets are fitted with a regulated aerator, they should also be removed and cleaned.

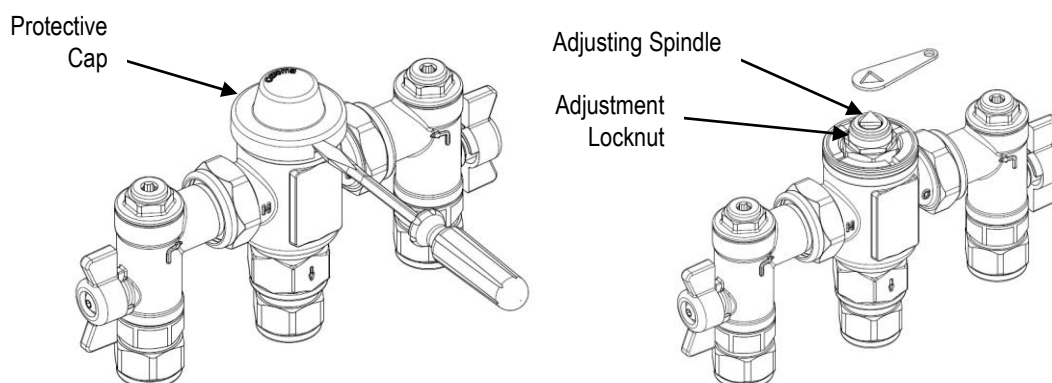


Figure 8: Adjusting the Mixed Water Temperature

## 8.6 Instructions for Thermal Flush

The following procedure will allow for Thermal Flush of the Caroma TMV20 as required.

**NOTE:** Thermal Flush is an optional procedure and does not form part of the specified commissioning and servicing requirements of AS4032.3-2004.

1. Follow the site safety policy for all notifications, warning signs, lock-outs, etc.
2. Ensure BOTH Hot & Cold Isolation Valves (and by-pass valves if fitted) are fully **closed** before procedure begins.
3. Using a small, flat bladed screwdriver, carefully lever the Protective Cap off the Valve (Figure 9) Loosen the Adjustment Locknut several turns.
4. Using the adjustment tool provided, adjust the TMV temperature to maximum setting by winding the spindle up in a **ANTICLOCKWISE** direction **until it stops**.
5. Open the HOT water isolation valve.
6. Progressively open the downstream outlets and flush with hot water until the required temperature has been maintained for the required duration as set by the facilities Thermal Flush procedure.  
*Note: The valve will be delivering HOT Water from the tapware. Care must be exercised to prevent scalding during the procedure.*
7. Close the HOT water isolation valve at the TMV inlet when the disinfection of the pipework & fittings has been completed.
8. Close all downstream outlets.
9. Re-open the BOTH Cold and Hot water Isolation Valves to the TMV-20.
10. **The valve must now be re-commissioned as per instructions in Section 7, including Temperature Adjustment and Shut Down test**
11. **To prevent scalding, ensure that the water supply to ALL OUTLETS has been purged of residual HOT water by opening each downstream outlet and discharging any Hot water from the line AFTER the TMV20 has been recommissioned in step 10.**

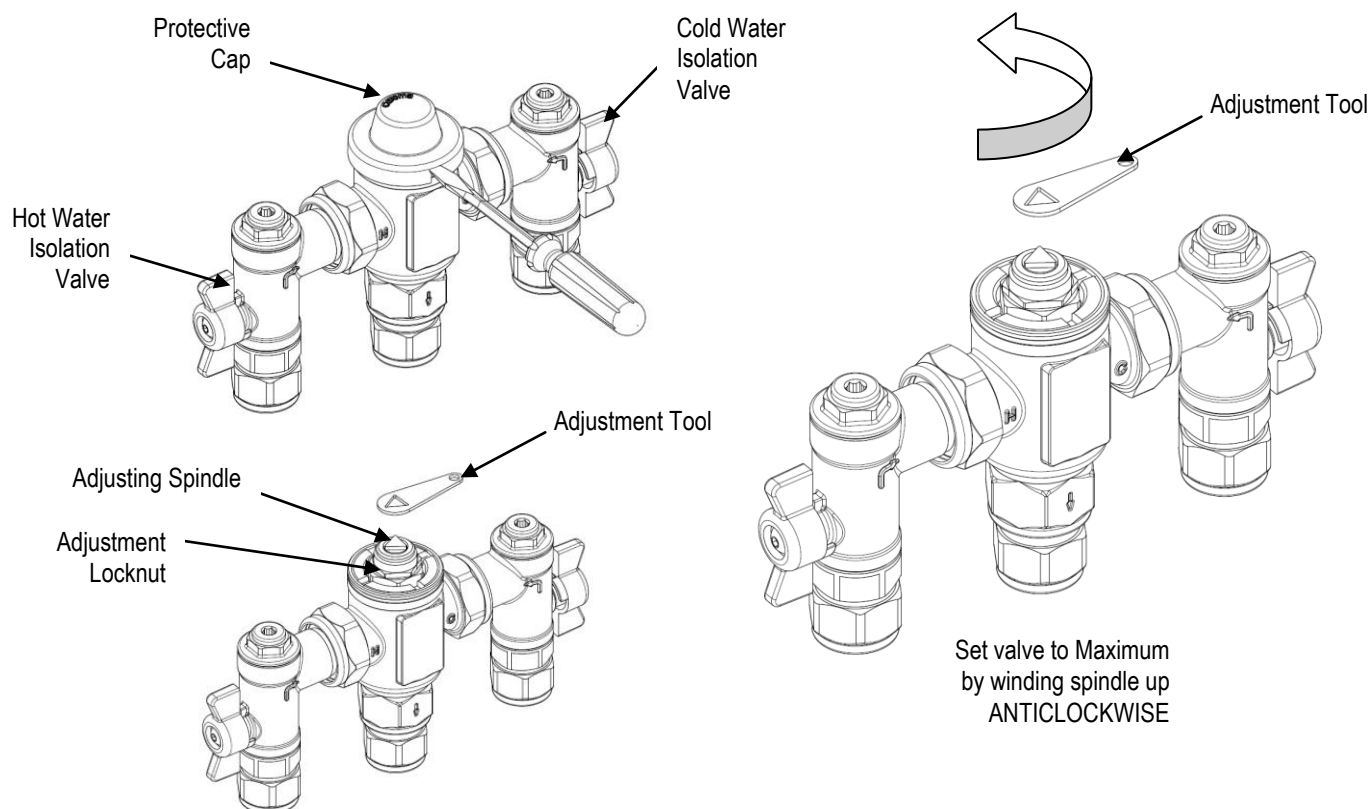


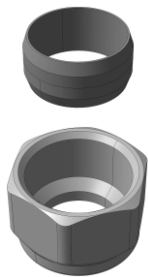


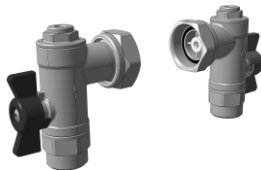

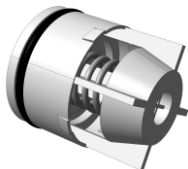
Figure 9: Adjusting the Mixed Water Temperature for Thermal Flush




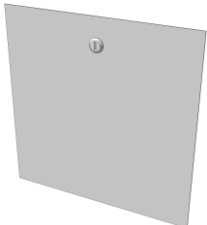


## 9 Fault Finding

FAULT / SYMPTOM	POSSIBLE CAUSE	RECTIFICATION
1) The desired mixed water temperature cannot be obtained or valve is difficult to set.	• Hot and cold supplies are fitted to the wrong connections.	• Refit the valve with Hot / Cold supplies fitted to the correct inlet connections.
	• Valve contains debris.	• Check and clean the valve ensuring that all debris is removed and components are not damaged. (Refer to Section 8.2)
	• Strainers contain debris.	• Clean strainers ensuring debris is removed. (Refer to Section 8.1)
	• Non-return devices are damaged.	• Check non-return device is not jammed; Clean if necessary.
	• Piston O-rings are damaged.	• Check Piston O-rings for damage; Replace if necessary.
2) The valve will not shut down.	• The hot to mix temperature Differential is not 10°C or greater.	• Raise the hot water temperature.
	• The piston O-ring is damaged.	• Replace piston O-ring. (SP99087)
	• Sealing seats (cartridge) is damaged or fouled by debris.	• Inspect sealing seats and clean if necessary.
	• Thermostatic element has failed.	• Replace Thermostatic cartridge (TMV001).
3) Mixed water temperature is unstable	• Debris is fouling the valve.	• Clean the valve, ensuring that all debris is removed and components are not damaged.
	• Flowrate is below 2L/min.	• Rectify any supply pressure loss.
	• Strainers are fouled.	• Clean strainers.
4) Mixed water temperature changing over time	• Inlet conditions (pressures or temperatures) are fluctuating.	• Install suitable pressure control valves to ensure inlet conditions are within those stated in Section 4.
	• Strainers contain debris.	• Clean strainers ensuring debris is removed
5) Either full hot or cold water is flowing from outlet fixture.	• Valve is incorrectly set.	• Adjust valve's mixed temperature to between 35 - 50°C as required.
	• Hot/Cold water has migrated to other inlet.	• Replace faulty non-return valves (SP97559).
	• Refer also to fault symptom 1 and 2.	
6) No water flow from the valve outlet.	• Hot or cold water supply failure.	• Valve functioning correctly; Restore inlet supplies and re-check mixed water temperature.
	• Strainers are fouled.	• Clean strainers.

FAULT / SYMPTOM	POSSIBLE CAUSE	RECTIFICATION
7) Flowrate reduced or fluctuating over time.	• Valve or inlet fittings fouled by debris.	• Check valve and inlet fittings for blockages.
	• Dynamic inlet pressures are not within recommended limits.	• Ensure operating conditions are within specified limits and the dynamic inlet pressures are nominally balanced to within $\pm 10\%$ .
8) Mixed water temperature too hot or cold.	• Valve has been tampered with.	• Re-adjust valve to required set temperature. (Refer to Section 7.1)
	• Valve incorrectly set.	• Re-adjust valve to required set temperature. (Refer to Section 7.1)
	• Inlet temperatures are not within specified limits.	• Ensure inlet temperatures are within the specified limits as listed on Section 4.
9) Mixed water temperature doesn't change when the temperature adjuster is altered.	• Thermostatic element inside cartridge has failed.	<ul style="list-style-type: none"> <li>• Replace Thermostatic Cartridge (TMV004).</li> <li>• Optionally, replace the Actuator Assembly (SP99094)</li> </ul>
10) Mixed water temperature adjuster difficult to move.	• Adjustment spindle at maximum or minimum mix temperature stop.	• Mixed water is at maximum or minimum position in valves adjustment temperature range. No higher or lower mix temperature adjustment is available.
	• Valve piston has been forced into an "overstroke" situation.	• Turn adjuster in/out until set temperature required is achieved.
11) Hot water flows into the cold water system or vice versa.	Missing or Faulty Non-return valves.	• Replace non-return valves (SP97559).
12) Valve is noisy during operation.	Water velocity is above velocity requirements of AS/NZ3500.1	• Reduce water velocity to comply with AS/NZ3500.1.

**10 SPARE PARTS**

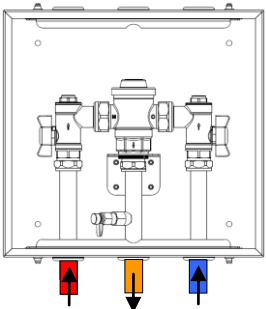
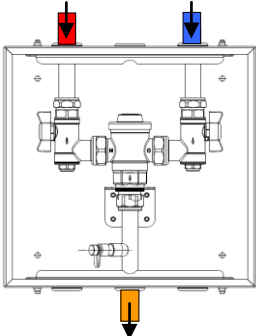
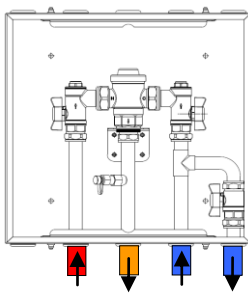
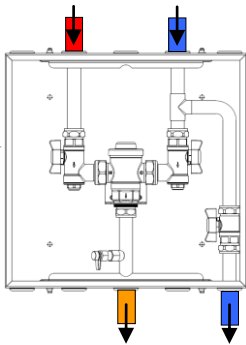
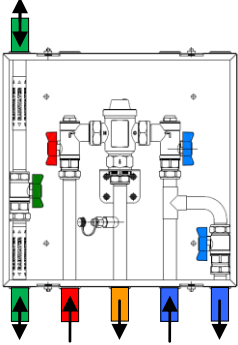
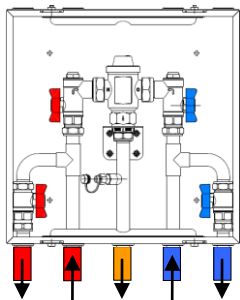
PART	DIAGRAM	REPLACEMENT PERIOD	SPARE PART CODE
Compression Olives and Nuts (Inlet Fitting Service Pack)		As required	SP99086
Thermostatic Cartridge		5 Yearly	TMV001
O-ring Kit		5 Yearly	SP99084
Hot and Cold Isolating Valves (Pair)		As required	SP99085
Strainers (2 per pack)		As required	SP97558
Check Valves (2 per pack)		As required	SP97559

PART	DIAGRAM	REPLACEMENT PERIOD	SPARE PART CODE
Valve Assembly		As required	TMV004
Actuator Service Kit		5 Yearly	SP99094
Adjustment Spanner		As required	SP97564
Cover Panel (Included Lock & Key)		As required	<i>Suit Standard configurations (300mm Box):</i> SP97572  <i>Suit Bypass configurations (350mm Box):</i> SP97587
Door Panel – Hinged (Included Lock & Key)		As required	<i>Suit Standard configurations (300mm Box):</i> SP97636  <i>Suit Bypass configurations (350mm Box):</i> SP97637
Adaptor kit - DN15 (1 per pack)		As required	SP99093

## 11 CONFIGURATIONS

In addition to the unboxed, Plumbed Assembly (Code: TMV004), the Caroma TMV20 is also available in 4 boxed configurations.

Each plumbing configuration is also available with either a removable cover panel or removable hinged door, both of which are lockable.

 <p><b>Standard - Bottom Inlet</b> 300mm X 300mm X 75mm</p>	 <p><b>Standard - Top Inlet</b> 300mm X 300mm X 75mm</p>	 <p><b>Bypass - Cold Water Bottom Inlet</b> 350mm X 350mm X 75mm</p>
<p><b>BTMV20001</b> (REMOVABLE COVER PANEL) BTMV20005 (HINGED DOOR)</p>	<p><b>BTMV20002</b> (REMOVABLE COVER PANEL) BTMV20006 (HINGED DOOR)</p>	<p><b>BTMV20003</b> (REMOVABLE COVER PANEL) BTMV20007 (HINGED DOOR)</p>
 <p><b>Bypass - Cold Water Top Inlet</b> 350mm X 350mm X 75mm</p>	 <p><b>Rainwater Bypass Cold Water Bypass Bottom Inlet</b> 350mm X 350mm X 75mm</p>	 <p><b>Hot &amp; Cold Water Bypass Bottom Inlet</b> 350mm X 350mm X 75mm</p>
<p><b>BTMV20004</b> (REMOVABLE COVER PANEL) BTMV20008 (HINGED DOOR)</p>	<p><b>BTMV20009</b> (REMOVABLE COVER PANEL) BTMV20010 (HINGED DOOR)</p>	<p><b>BTMV20011</b> (REMOVABLE COVER PANEL) BTMV20012 (HINGED DOOR)</p>

# 12 Commissioning Report &/or Maintenance Report

Note:

1. Please use a separate form for **each** valve.
2. The original copy of the report is to be given to the owner/occupier and retained on site for a minimum of 7 years.

Indicate Report Type:                      **Commissioning Report**   ☐                      **Maintenance Report**   ☐

**Name of Owner / Occupier:** \_\_\_\_\_

**Address :** \_\_\_\_\_

**Contact Person:** \_\_\_\_\_

**Phone Number:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Work Order #:** \_\_\_\_\_

**Work Order No.:** \_\_\_\_\_

**Make, Model and Serial Number of Hot Water System:** \_\_\_\_\_

<b>Temperature of HOT Water to the Valve: (°C)</b>		<b>Temperature of COLD Water to the Valve: (°C)</b>	
<b>Pressure of Hot Water supply to Valve (kPa)</b>		<b>Pressure of Hot Water supply to Valve (kPa)</b>	

**Manufacturer of Mixing Valve:** \_\_\_\_\_ **Model No:** \_\_\_\_\_ **Size:** \_\_\_\_\_

**Location of Valve :** \_\_\_\_\_

**Valve Identification No:** \_\_\_\_\_

**Total No. of Valves on the Site/Building:** \_\_\_\_\_

**No of Outlets Serviced by this Valve:**      Basins [       ]                      Showers [       ]                      Baths [       ]

**Other Outlet Types - (Details) :** \_\_\_\_\_

**Valve has been installed & tested to: (tick relevant boxes):**

The Valve manufacturers requirements:                      Yes ☐                      No ☐

The methods & requirements of AS4032.3:                      Yes ☐                      No ☐

The NSW Code of Practice Plumbing and Drainage:                      Yes ☐                      No ☐

The HOSPLAN Code of Practice for Thermostatic

Mixing Valves in Health Care Facilities:                      Yes ☐                      No ☐

The Local Water Supply or Authority:                      Yes ☐                      No ☐

The specifications and drawings for the project:                      Yes ☐                      No ☐

If No, give details: \_\_\_\_\_

## 12 Commissioning Report &/or Maintenance Report

Valve considered satisfactory for use:

YES ☐

NO ☐

If No, state the reason and action taken:

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### Commissioning Work

It is hereby certified that all the commissioning work has been carried out by the undersigned in accordance with the requirements of the Standards & Codes of Practice indicated prior.

Date of Valve Commissioned: \_\_\_\_\_

Name of Licensed Plumber: \_\_\_\_\_

License/Cert No: \_\_\_\_\_ Contract Authority No: \_\_\_\_\_

Licensee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Owner/Occupier's signature: \_\_\_\_\_ Date: \_\_\_\_\_

Date of Initial Service - Due: \_\_\_\_\_

*Test results attached on following page...*

# 12 Commissioning Report &/or Maintenance Report

## Test Results

Location of Valve: \_\_\_\_\_

Warm Water Outlet Fixture No:	*Name / Type / Size and location of Outlet Fixture (eg: Bath, Shower, Basin, Other)	Flowrate of Design Water (Litres / Second)		Temperature of Warm Water (°C)	
		Max Flow (One Outlet in Use)	Min Flow (All Outlets in Use)	Max Flow (One Outlet in Use)	Min Flow (All Outlets in Use)
1					
2					
3					
4					
5					
6					
7					
8					

*\*Give details of brand and model designation.*

**NOTE:** An accurate (+/-0.5°C between 35-55°C) digital thermometer is required for Temp. Measurements

Prescribed temperature range for warm water \_\_\_\_\_ °C to \_\_\_\_\_ °C

### Thermal shutdown Test:

Hot Water Isolation (**Passed**)

Yes ☐

No ☐

Cold Water Isolation (**Passed**)

Yes ☐

No ☐

Name Of Plumber: \_\_\_\_\_ License/Cert No. \_\_\_\_\_

Licensee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

## 12 Commissioning Report &/or Maintenance Report

The following information is to be provided by the site manager/owner/occupier.

Valve size and installation specified by : \_\_\_\_\_

Valves supplied by: \_\_\_\_\_

Date of Installation: \_\_\_\_\_ Specification No. \_\_\_\_\_

Is the Service Manual accessible on Site: Yes ☐ No ☐

### ☐ Commissioning Tests for new installation or valve replacement

Temperature setting at completion of commissioning \_\_\_\_\_ °C

**This set of testing procedures and report received and witnessed by (Print Name):**

**Name:** \_\_\_\_\_

**Position:** \_\_\_\_\_ **Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

### ☐ Maintenance Tests

Date of Previous Service: \_\_\_\_\_

Previous Service carried out by: \_\_\_\_\_

<b>Strainers</b>	Cleaned <input type="checkbox"/>	Replaced <input type="checkbox"/>	<b>Non Return Valves</b>	Checked <input type="checkbox"/>	Replaced <input type="checkbox"/>
<b>O-Rings</b>	Checked <input type="checkbox"/>	Replaced <input type="checkbox"/>	<b>Valve Replaced</b>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<b>Actuator Replaced</b>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<b>Other:</b>		

The valve has been operating satisfactorily for the previous 12 months: Yes ☐ No ☐

Mixed Water Temperature setting at time of completion: \_\_\_\_\_ °C

**Current Report received and witnessed by (Print Name):**

**Name:** \_\_\_\_\_

**Position:** \_\_\_\_\_ **Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_



**Caroma Australia Pty Limited**

Level 1, 7-9 Irvine Place Norwest Business Park Bella Vista, NSW, 2153, Australia

Ph: **1300 CAROMA (1300 227 662)** Fax: **1800 241 199**

[specify.caroma.com.au](http://specify.caroma.com.au)