

APRICUS TEMPERMATE

OWNERS AND INSTALLATION MANUAL

*Note: This manual must be left with a responsible person
after installation and remain on site.*

IMPORTANT

It is a NSW requirement and may be a requirement in other states that a Warm Water System must be registered by the owner of the building with the local council or regulatory authority.

Notice to Victorian Customers from the Victorian Plumbing Industry Commission.

This warm water system must be installed by a licensed person as required by the Victorian Building Act 1993. Only a licensed person will give you a Compliance Certificate, showing that the work complies with all the relevant Standards. Only a licensed person will have insurance protecting their workmanship for 6 years. Make sure you use a licensed person to install this water heater and ask for your Compliance Certificate.

Notification of Apricus Tempermate Warm Water Installation

The following Apricus Warm Water System(s) and UV Sterilisation System(s) have been installed.

- Warm Water System: _____
- UV Sterilisation System: _____

Date: _____ System Owner: _____

Address: _____

Contact Person: _____ Phone Number: _____

Installer: _____ Phone Number: _____

The system will be ready for commissioning on or around the ____/____/____

Please arrange to contact the owner or installer to organise a suitable date for the system to be commissioned.

A service contract has been sold to the system owner and includes:

- ☐ Routine maintenance
- ☐ UV maintenance
- ☐ Microbial water testing

Contents

IMPORTANT.....	3
GENERAL	6
BENEFITS OF WARM WATER SYSTEMS.....	6
SAFETY.....	6
TECHNICAL DATA	7
WARM WATER COMPONENTS.....	8
DIMENSIONS	9
OPERATION	10
HYDRAULIC CHARACTERISTICS.....	11
SYSTEM SIZING.....	12
INSTALLATION	13
INSTALLATION STANDARDS	13
LOCATION.....	13
SYSTEM PARAMETERS.....	13
WATER PRESSURE	14
PLUMBING	15
PLUMBING DIAGRAM	16
COMMISSIONING THE TMV	17
ADJUSTING THE VALVE TEMPERATURE	18
SYSTEM RECIRCULATION COMMISSIONING	19
TMV FAULT FINDING	20
MAINTENANCE AND WATER TESTING REQUIREMENTS	21
MONTHLY TEMPERATURE CHECK.....	21
MAINTENANCE OF WARM WATER SYSTEM.....	22
YEARLY SERVICE	22
5 YEAR SERVICE	23
MAINTENANCE STICKER.....	23
SPARE PARTS.....	24
MICROBIAL WATER TESTING	25
PROCEDURES FOR SAMPLING FOR MICROBIOLOGICAL TESTING.....	25
LEGIONELLA TESTING	26
LEGIONELLA DETECTION	28
THERMAL DISINFECTION	29

UV DISINFECTION.....	31
UV SYSTEM BYPASS LINE.....	31
OPTIONAL COMPONENTS FOR UV	32
MAINTENANCE CHECK LOG	33
WATER QUALITY TEST LOG	34
COMMISSIONING REPORT	35
SERVICE REPORT	39
WARM WATER UNIT WARRANTY	43

GENERAL

This warm water system is designed for the purpose of providing potable water. Its use in an application other than this may shorten its life.

The Apricus Tempermate Warm Water System provides water at a safe and usable temperature in a situation where the control of the temperature of the water discharging from an outlet is of the utmost importance i.e. within hospitals, schools, aged care facilities, etc. This type of system is intended mainly for use in applications with set temperature between 43-50°C. The valve is designed to prevent the flow of water discharging from the mixed water outlet in the event of the failure of either hot or cold supply.

The Apricus Tempermate utilises one or more Caleffi 2522TM series high performance thermostatic mixing valves that have been specifically designed and manufactured to meet the requirements of: “AS 4032.1 Thermostatic Mixing Valves-Materials, Design and Performance requirements”. This particular series of valves can be used with high temperature water in solar applications.

If this warm water system is to be used where an uninterrupted warm water supply is required, you should ensure that the warm water system is designed in such a way that you have back up redundancy. We recommend you seek advice from your plumber or specifier about your needs with regards to building redundancy into your warm water system.

BENEFITS OF WARM WATER SYSTEMS

Centralised mixing valves provide several benefits over point of use;

- Reduces the installation cost of multiple valves, as well as reducing the cost and inconvenience of having to service multiple units
- Maintenance can be managed from one central location, usually at the hot water plant room
- Reduced interruption of water supply through improved maintenance scheduling
- Improved aesthetics from requiring mixing valves under cabinets, in walls etc
- Energy savings are achieved with warm water systems by reducing the circulation temperature, thereby reducing the heat loss through pipes.

SAFETY

The Apricus Tempermate can give stable operation provided it is installed, commissioned and maintained as per the recommendations outlined in this manual. This unit cannot be considered as an alternative to adequate duty of care during its use and operation.

TECHNICAL DATA

Temperature adjustment range: 30 – 50°C

Factory pre-set temperature: 41°C

Set temperature: must be commissioned on site to achieve desired temperature

Temperature control: $\pm 2^{\circ}\text{C}$

Cold inlet temperature supply (min – max): 5°C – 30°C

Hot inlet temperature supply (min – max): 55°C – 100°C

Maximum working pressure (static): 1400 kPa

Working pressure range (dynamic): 20 – 500 kPa

Maximum unbalanced dynamic supply (hot/cold or cold/hot): 6 : 1

Minimum temperature differential between hot water inlet
and mixed water outlet to ensure shut off function: 10°C

Minimum temperature differential between mixed water outlet
and cold water inlet to ensure stable operation: 5°C

Minimum flow rate for stable operation:

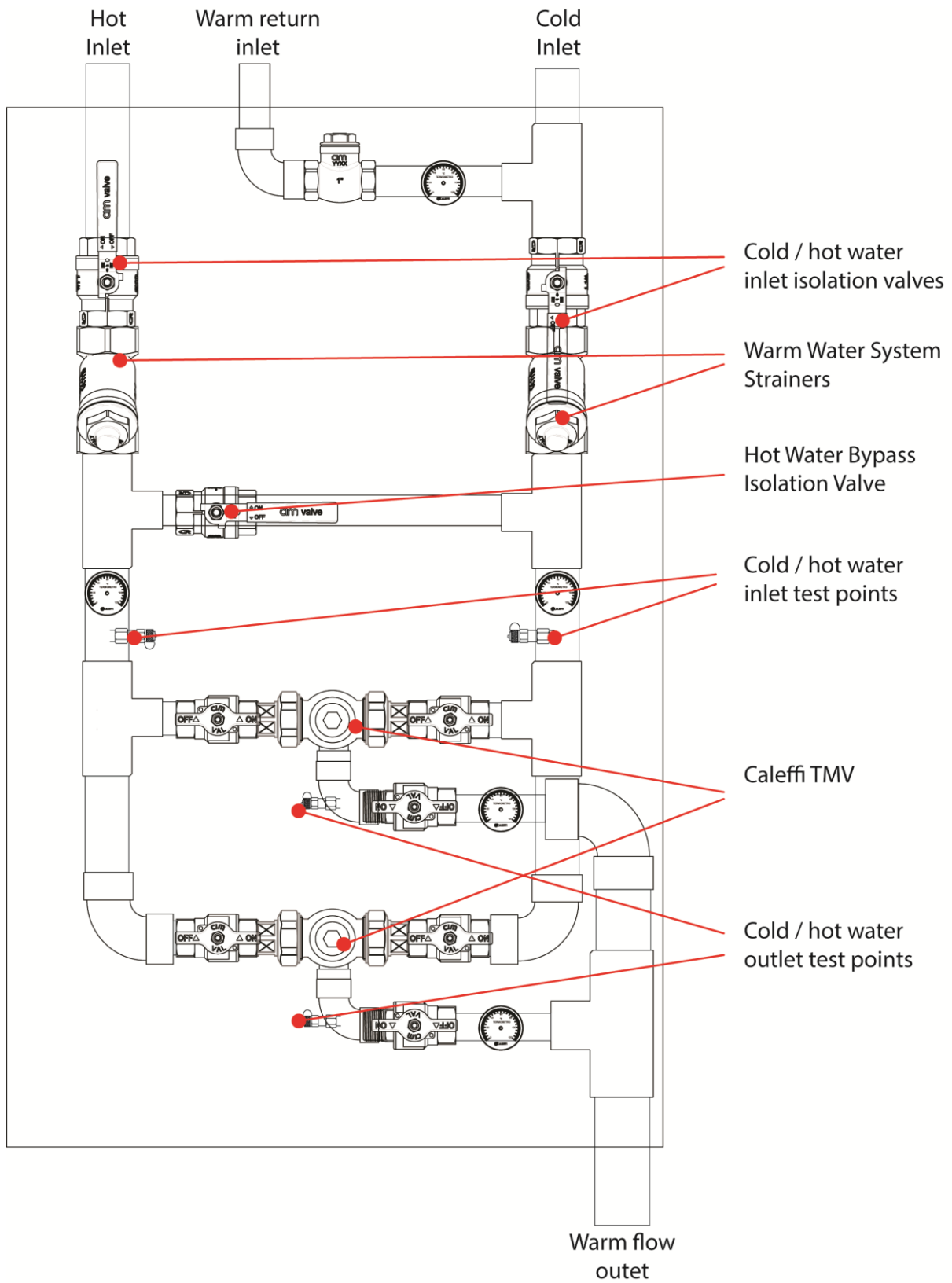
AT80 Model 4 l/min

AT160 Model 8 l/min

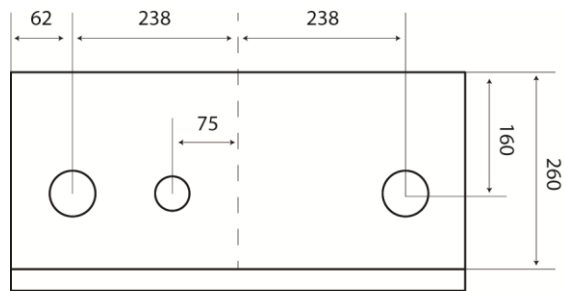
AT240 Model 12 l/min

AT320 Model 16 l/min

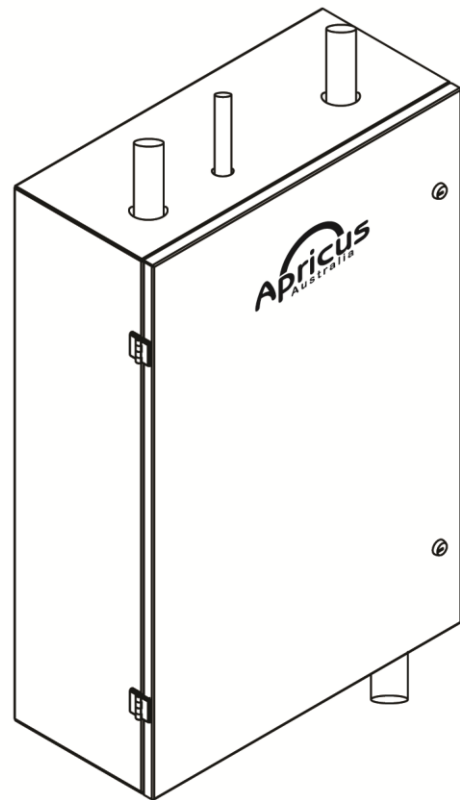
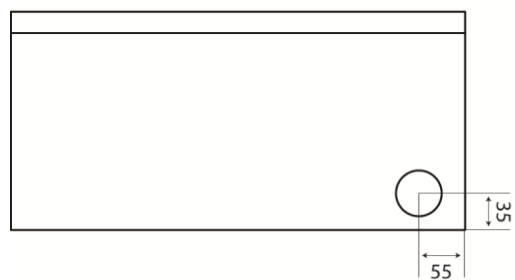
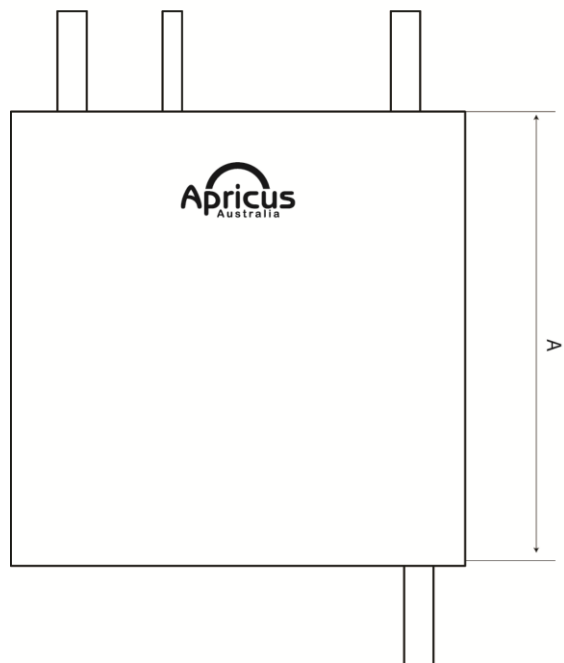
WARM WATER COMPONENTS



DIMENSIONS



SYSTEM MODEL	HEIGHT DIM A. mm
AT80	600
AT160	950
AT240	1200
AT320	1200



OPERATION

The Apricus Tempermate warm water system is a centralised warm water plant which allows warm water to be circulated around a building.

The system utilises a thermostatic mixing valve(s) which mixes hot and cold water in such a way as to maintain the set temperature of the mixed water at the outlet. The TMV thermostatic element is fully immersed into the mixed water. It then contracts or expands causing movement of the piston, closing either the hot or cold inlets, regulating the flow rates entering the valve. If there are variations of temperature or pressure at the inlets, the internal element automatically reacts attempting to restore the original temperature setting.

The Apricus Tempermate Warm Water Unit may have one, two, three or four TMV's depending upon the unit selected. On models with more than one TMV, the valves are manifolded in parallel and operate independently of each other to supply warm water to a common outlet.

Draw-off Mode

When a warm water outlet is opened, hot and cold water flows through the thermostatic mixing valves, and to the opened warm water outlets.

Recirculation Mode

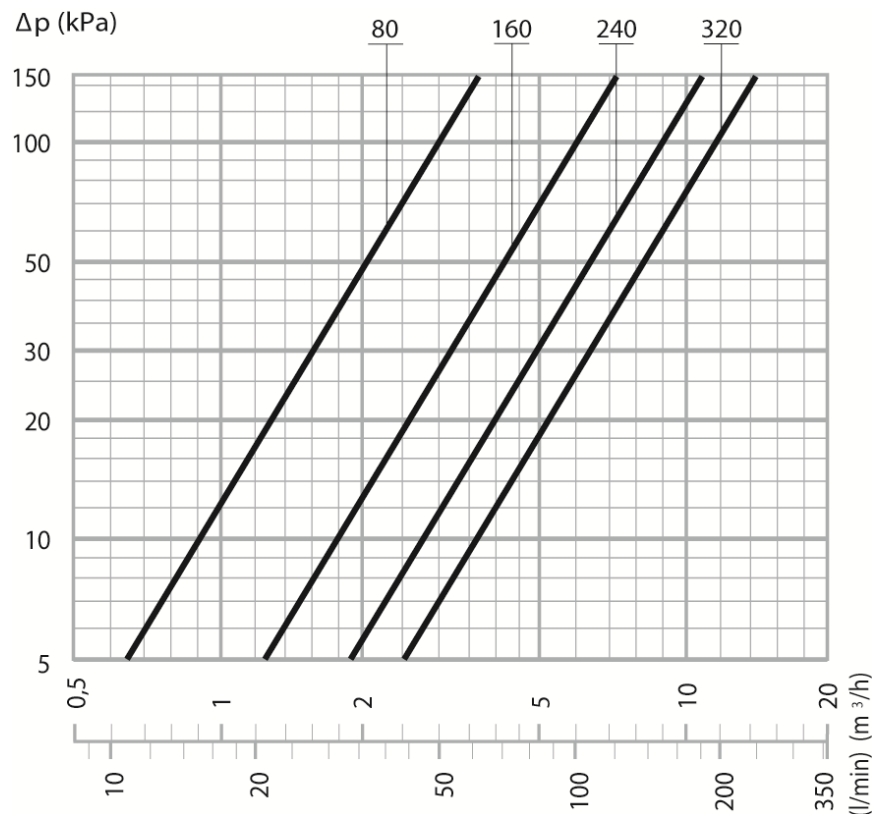
When no warm water is being drawn from the system, the warm water circulates through the unit and continues to keep the water at the set temperature.

The returning water splits at the cold water inlet with a proportion returning to the TMV's cold inlets, and the remaining proportion returning to the TMV's hot inlets. The proportion returning to the hot inlets does so by flowing back up the cold water inlet pipe to the cold water supply line and on to the boiler where it is reheated and returned to the TMVs via the hot water pipe.

THERMAL SHUT OFF

In the event of a failure of the hot or cold supply, the piston will shut off, stopping water discharging from the mixed water outlet. The TMVs require a minimum temperature differential from hot inlet to mixed water outlet of 10°C to ensure the correct operation of the thermal shut off feature.

HYDRAULIC CHARACTERISTICS



MODEL	MINIMUM FLOW	MAX NOMINAL FLOW	MAX RATED FLOW	CONNECTIONS
AT80	4	60	80	25 INLET / 32 OUTLET
AT160	8	120	160	32 INLET / 40 OUTLET
AT240	12	180	240	40 INLET / 50 OUTLET
AT320	16	240	320	40 INLET / 50 OUTLET

The system must be sized taking into account the current legislation with regard to the nominal flow rate of each outlet. The reference is AS/NZS 3500.1.

Note that the Apricus Tempermate systems should be sized on maximum nominal flows. Pipe dimensions are based on velocities of 1.5m/s and the valves not exceeding the recommended maximum differential pressure of 150kPa. The warm water system may exceed nominal flow rates up to the maximum flows as shown in the table for short periods, but these flows should not be used for system sizing purposes.

SYSTEM SIZING

TYPICAL RATES OF FLOW (Informative)

Typical flow rates of hot water demand at the outlet of fixtures are as follows

Bath	0.3 L/s
Shower	0.1 L/s
Handbasin	0.1 L/s
Kitchen Sink.....	0.2 L/s
Washing Machine	0.2 L/s
Laundry Trough	0.2 L/s

These values are for calculation purposes and are not necessarily the minimum that may be supplied (see AS/NZS 3500.1).

Sizing Example

25 x 2 bedroom apartments

1 x shower, 1 x basin, 1 x bath (*warm water fixtures only*)

= (6 + 6 + 18) = 30l/m x 25 apt

= 750 x 20% diversified flow

= 150 l/min

SELECT APRICUS TEMPERMATE 'AT240' WITH MAX NOMINAL FLOW OF 180L/M

Please note that the above calculation is a quick sizing guide only. Flow rates and loading units to work out actual diversified flow are dependent on the type of application, ie hotel, apartments, commercial premises, aged care facility etc, and should be calculated by an experienced designer or engineer.

INSTALLATION

The information below indicates the minimum requirements, particularly for health care installations, as set out by various advisory codes and AS/NZS standards and have been designed to incorporate information as required by state health care publications and AS/NZS 3666:2002.

INSTALLATION STANDARDS

- The Apricus Tempermate must be installed by a licensed plumber or, where applicable, a licenced plumber who has undertaken T.A.F.E. training in Thermostatic Mixing Valves.
- The installer has a duty of care to ensure that all aspects of the installation comply with AS/NZS 3500 current regulations and legislation.
- The Apricus Tempermate should be installed using the appropriate Standard, Code of Practice and legislation applicable to each state and following the details in this manual.

LOCATION

The warm water unit is suitable for both indoor and outdoor installation. The warm water unit should be installed in close proximity to the water heating plant.

The cold water supply to the warm water unit and to the water heating plant must be supplied from the same source in order for the system recirculation to operate correctly.

Clearance must be allowed for servicing of the thermostatic mixing valves. The unit must be secured to a solid wall and be accessible without the use of a ladder / scaffold.

It is recommended the warm water unit be installed at ground or floor level. Note; all local authorities have regulations about locating plumbing equipment into roof spaces.

Where damage to property can occur in the event of the warm water system leaking, the warm water system must be installed over a safe tray. Installation and use of a safe tray must comply with AS/NZS 3500.4 and all local codes and regulatory authority requirements.

SYSTEM PARAMETERS

Prior to the installation of the Apricus Tempermate, the system must be checked to ensure that the system operating conditions fall within the recommended operating range of the unit, i.e. verify supply temperatures, supply pressures, risk assessments, etc.

The supply system into which the Apricus Tempermate is to be installed must be thoroughly flushed and cleaned to remove any debris which may accumulate during the installation. Failure to remove any debris will affect the performance and the manufacturer's warranty on the product.

In areas that are subject to high levels of aggressive water, provision must be made to treat the water prior to it entering the unit.

The connecting hot and cold water supplies must be connected to the unit strictly in accordance with the indications on the inlet pipes. The inlets are clearly marked with green arrows for cold, red arrows for hot and yellow arrows for the warm inlet and outlets.

To ensure that the performance of the Apricus Tempermate is maintained (in the event of cold water failure), the temperature of the hot water supply at the point of entry to the unit must be a minimum of 10°C higher than the set mixed water discharge temperature.

WATER PRESSURE

This warm water system is not suitable for use on gravity fed tank supply systems. If a tank supply is used, a booster pump must be installed to supply cold water to the water heating plant and warm water unit.

Check the cold water supply pressure to the warm water system, the pressure should NOT exceed 500kPa static (*under AS3500.1 Section 3.3.4; maximum pressure within buildings*).

Where one or both the incoming supply pressures are excessive, a Caleffi pressure reducing valve should be fitted to reduce the pressure(s) to within the limits as shown in the specification.

Check the pressure gauges installed in the hot and cold manifold of the warm water system, the pressure difference must NOT exceed 150kPa.

PLUMBING

CONNECTIONS

Check the connections between the Warm Water System and hot water plant closely for correct connection using the plumbing diagrams provided.

The following points are of particular importance:

1. A non-return valve must be installed with the Warm Water System between the cold water take off to the Warm Water System and the inlet to the water heating plant.
2. The HOT water building return line (if fitted) is connected after the non-return valve i.e. between the non return valve and the inlet to the water heating plant.
3. The cold water supply is common to the Warm Water System and the water heating plant to ensure balanced pressure across the system.
4. NO other cold water take offs have been made after the isolating/non-return valve in the common cold water supply to the Warm Water System and the water heating plant.

ISOLATION & NOT RETURN VALVES

Check isolation valves and non-return valves (where required) have been fitted at:

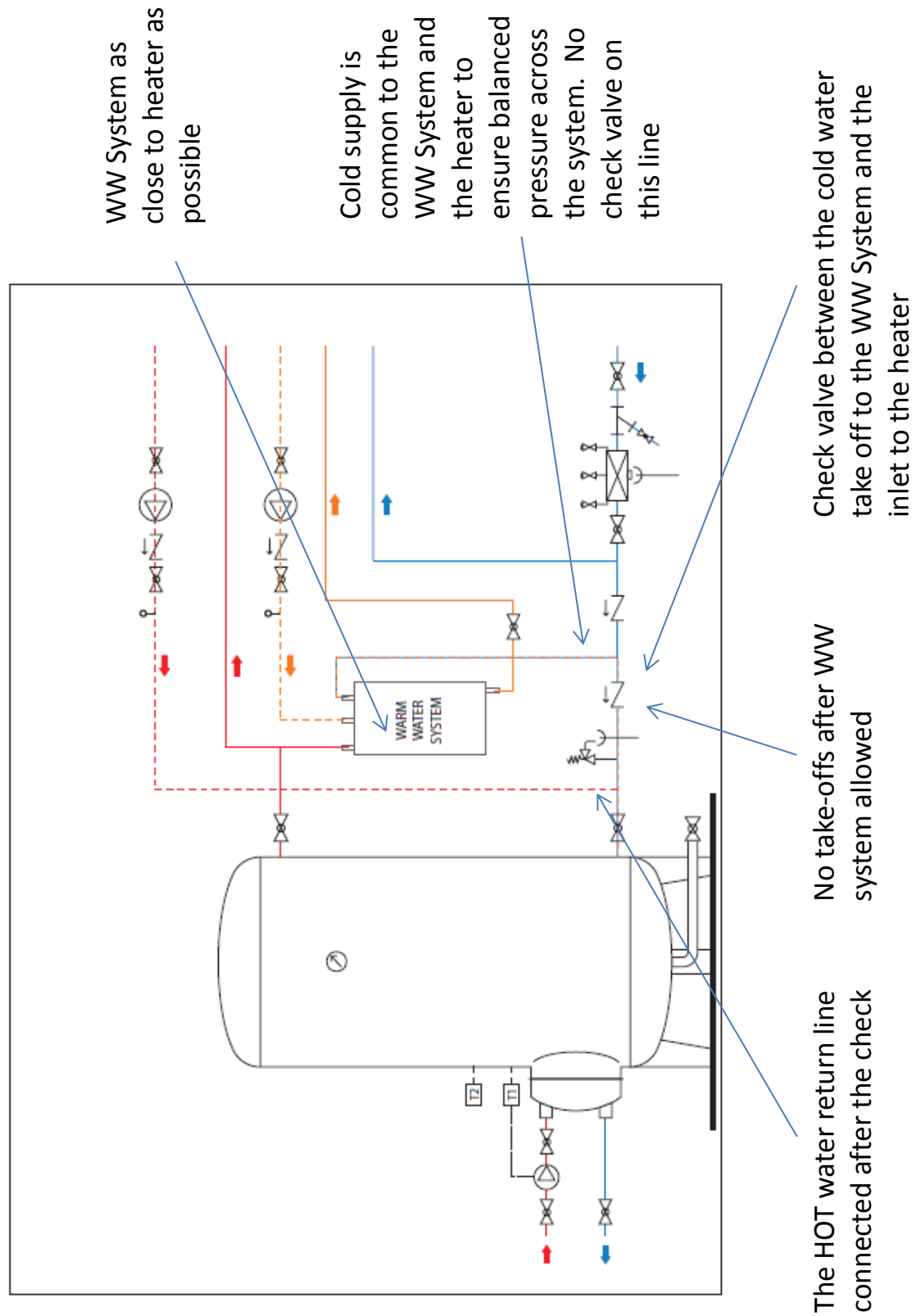
1. The common cold water supply to the Warm Water System and water heating plant.
2. On both sides of the warm water ring main circulator(s).
3. At the inlet and outlet of each water heater (if applicable)

COLD / HOT WATER

Using a digital thermometer check the cold water supply temperature, the temperature must be within 5 to 30°C for the Warm Water System to operate reliably.

Using a digital thermometer check the hot water temperature at the water heating plant, the temperature must be between 55 and 100°C for the Warm Water System to operate correctly.

PLUMBING DIAGRAM



COMMISSIONING THE TMV

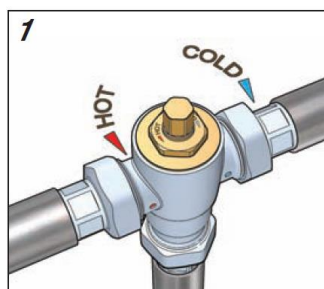
Upon completion of the installation, the valve should be tested and commissioned in accordance with AS 4032.3 as per the procedure outlined below or as specified by the local authority. Use the "Commissioning Report" form at the back of this manual.

The following instructions should be read and understood prior to commissioning the Caleffi 2522TM series valve. If, under any circumstances, there are aspects of the installation/system which do not comply with our requirements or the specifications as laid down, the valve must not be put into service until the installation/system does comply.

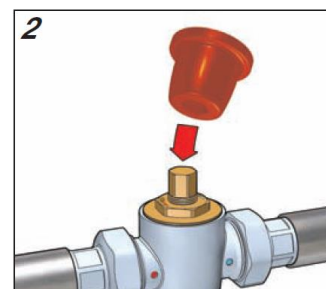
1. Ensure that the system is thoroughly clean and free from debris prior to commissioning the thermostatic mixing valve.
2. We recommend that the commissioning of temperatures are carried out using a suitably calibrated and accurate digital thermometer. The valve is commissioned by measuring the mixed water temperature at the outlet.
3. In accordance with the requirements of AS/NZS 3500, all new water installations shall deliver hot water at the outlet of the sanitary fixtures used primarily for personal hygiene purposes at a temperature not exceeding:
 - a) 45°C for general Health applications;
 - b) 43.5°C advisable for childhood centres, primary and secondary schools and nursing homes or similar facilities for aged, sick or disabled persons and
 - c) 50°C in all other classes of buildings
4. The temperature at the outlet of each valve must be set taking into consideration any fluctuations which may occur within the system due to simultaneous demand.
5. Once the supply temperatures are stabilised and the normal operating conditions are established, the valve can be commissioned.
6. Turn OFF the warm water ring main circulator(s) and close the isolation valve on at least one (1) side of the circulator(s).
7. Close the hot and cold isolation valves on all TMV'S (if applicable) except the one which is to be adjusted.
8. Open the warm water outlet nearest to the Warm Water System so that a flow rate of approximately 8 litres per minute is achieved.
9. We suggest that the following sequence is followed when commissioning the valve.
 - a) Set the mixed water discharge temperature to the required temperature.
 - b) Measure and record the temperature of the water discharging from the warm water outlet and ensure the required blend temperature is achieved.
 - c) Measure and record the temperature of hot and cold water supplies at the connections to the valve.
 - d) Measure and record the temperature at the TMV test point in the warm water unit for the appropriate valve.
 - e) Create a higher flow rate that corresponds to maximum design flows by opening additional outlets. Measure and record the temperature at the TMV test point for the appropriate valve.

- f) Perform the thermal shut-off test. Isolate the cold water supply to the Caleffi valve and monitor the mixed water temperature. The outlet flow should quickly cease flowing. *TIP: to perform the thermal shut off test on each TMV individually without interrupting the warm water supply to the system; close the inlet and mixed outlet isolating valves, then connect a hose to the mixed outlet test point and run to a bucket. The discharge can now be checked with water flowing to the bucket.*
 - g) Measure and record the maximum mixed water temperature. The temperature should not exceed that allowed by the applicable standard or code of practice for each state.
 - h) Restore the cold water supply to the valve and measure and record the outlet temperature after the mixed water temperature has stabilised. The final temperature found during this test should not exceed the permitted values +2°C.
 - i) Once the desired temperature has been reached, the adjustment spindle can be locked in position using the locking nut supplied with the valve and replace the cap to prevent tampering by unauthorised persons.
10. Isolate the adjusted valve and repeat steps a - i for each valve in the warm water unit (AT160, AT240 & AT320 models only).
 11. When each valve is completed open all cold and hot TMV isolation valves. Open sufficient taps to meet the minimum flow rate required for the model (refer to minimum flow rate table under Hydraulic Characteristics).
 12. Measure and record the temperature at the nearest and furthest warm water outlets.
 13. Note: If the final measured temperature with all valves operating at the nearest outlet is higher than the required temperature, then it is necessary to repeat steps 6 to 10.

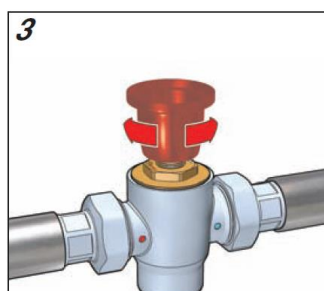
ADJUSTING THE VALVE TEMPERATURE



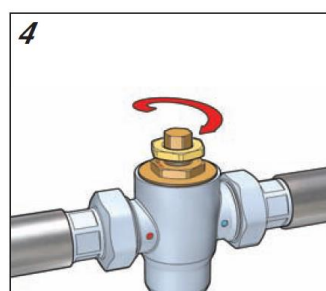
Remove the cap



Fit temperature adjustment cap



Temperature adjustment



Lock spindle with locking nut

SYSTEM RECIRCULATION COMMISSIONING

1. Turn the warm water ring main pumps on and set to the highest speed.
2. Allow time for the system to stabilise. Note: The amount of time will depend on the length of the ring main and the volume of water in it.
3. Monitor the return temperature on the digital thermometer inserted in the cold water inlet connection of the Warm Water temperature.

Note: During recirculation i.e. when water is not being drawn, the Apricus Tempermate Warm Water System requires a flow rate of at least 4 litres per minute per valve and a temperature differential between the outlet and return of at least 3°C to maintain the system temperature accurately.

Depending on the plumbing design it may be necessary to adjust the pump speed to achieve the required temperature drop provided the flow rate can be maintained at 4 litres per minute per valve.

4. Once the system has stabilised with a flow rate of at least 4 litres per minute per valve and the difference between the outlet and return temperatures is at least 3°C, record the return temperature and pump circulator speed in the "Commissioning Report" form.
5. Close and lock the Warm Water Unit and hand over the keys to the system owner.
6. Provide a copy of the completed commissioning form to the system owner.

TMV FAULT FINDING

Symptom	Cause	Corrective action
Hot water at the cold taps	a) Operation of the insert check valve is hindered; check valve is not sealing correctly. b) Check valves not fitted.	<ul style="list-style-type: none"> • Replace faulty check valves
Fluctuating mixed water temperature	a) Erratic supply temperatures at the inlets of the valve. b) Starvation of the water supplies at the inlets of the valve. c) Incorrect commissioning of the valve.	<ul style="list-style-type: none"> • Restore inlet conditions within the limits of the valve.
Erratic flow of water from the valve	a) Insufficient water supplies. b) Fluctuations in supply pressures/temperatures. c) Adverse effect created by other draw off points on the system.	<ul style="list-style-type: none"> • Stabilise inlet supply conditions.
No flow of water from the valve	a) In-line filters blocked. b) Insufficient supply pressures. c) Debris obstructing valve operation.	<ul style="list-style-type: none"> • Clean filters. • Restore inlet supplies. • Clean debris or scale from valve.
Valve does not fail safe when tested	a) Installation not in accordance with our recommendations. b) The minimum temperature differential not achieved. c) Internal mechanism hindered by debris.	<ul style="list-style-type: none"> • Install as outlined in the instructions. • Raise hot water temperature. • Clean debris or scale from valve.

MAINTENANCE AND WATER TESTING REQUIREMENTS

The following table details legislative requirements for the maintenance and water testing of warm water systems by State, as at December 2014.

State	Mandatory Inspections & Maintenance	Mandatory Microbial Water Testing
QLD	TMV's to be cleaned and maintained annually (1)	Not required
ACT	TMV's to be cleaned and maintained annually (1)	Not required
NSW	Monthly temperature check – All installations	Not required unless part of a performance based maintenance program
	Inspected annually & cleaned if found to be dirty	
	TMV's to be cleaned and maintained annually	
VIC	All outlets not in use for 7 days or more to be flushed	Once per month for 12 months after commissioning and then quarterly providing Legionella is not detected. 2 samples per test. Note: Some Health Care facilities may require more frequent testing.
	Disinfection by heat sanitation after commissioning or if the system is down for more than 1 month	
	TMV's to be cleaned and maintained annually	
TAS	TMV's to be cleaned and maintained annually (1)	Every six months
SA	All outlets not in use for 7 days or more should be flushed at full flow for at least 15 seconds and all outlets on individual branches should be flushed simultaneously	Testing is performed annually by local government as part of auditing process; however testing may be performed annually by a third party. 2 samples per test.
	Inspected monthly & cleaned if found to be dirty	
	Disinfection by heat sanitation if the system is down for more than 1 month	
	Disinfection by heat sanitation once every 6 months	
	TMV's to be cleaned and maintained annually	
WA	TMV's to be cleaned and maintained annually (1)	Not required
NT	TMV's to be cleaned and maintained annually (1)	Not required

(1) Not stipulated by the relevant States legislation. Annual cleaning and maintaining of TMV's in these instances is a requirement of AS/NZS 3666.2 and AS/NZS 4032.3.

MONTHLY TEMPERATURE CHECK

A temperature check must be performed monthly for all installations in NSW; however, it is recommended that this check is performed monthly on all installations (Health Care and non Health Care) in all States and Territories.

Check for correct blend temperature setting and/or maximum pre-set temperature and reset if required. The temperature readings and any resultant actions taken should be recorded in a log book.

More regular temperature checks should be made where increased risks are perceived such as where patients are unable to immediately respond to an increase in water temperature by either shutting the water off or removing themselves from contact with the water.

MAINTENANCE OF WARM WATER SYSTEM

In-service tests should be carried out regularly to monitor and record the performance of the Apricus Tempermate in accordance with AS 4032.3. Deterioration in performance can indicate the need for servicing of the valves and/or water supply. If, during these tests, the mixed water temperature has changed significantly from the previous test results, record the change before re-adjusting the mixed water temperature. If the final mixed water temperature is greater than the permitted values, we recommend that the details quoted in Installation and Commissioning sections are verified and that service work is required.

A Maintenance Check Log form is provided at the back of this manual, which can be copied and used as a template for recording purposes.

YEARLY SERVICE

We recommend that at least every 12 months, or more frequently if the need arises, that the following aspects are checked to ensure that the optimum performance level of the valves are maintained.

With reference to the exploded diagram:

1. On the Caleffi 252225TM series valves, the inlet filters (12) on both the hot and cold water supplies can be removed for cleaning by unscrewing the inlet union nuts and carefully pulling apart the connecting pipework.
2. The built-in check valves (11) on the Caleffi 252225TM series valves can be accessed in a similar way to 1) to ensure freedom of operation and correct seating.
3. In case of service work, the internal components of the valve can be disassembled for cleaning and descaling.
 - a) Remove the cap of the valve (1) and the locking nut (2)
 - b) Remove the upper body (3) using a suitable spanner
 - c) Remove parts 5-7 noting the correct orientation
 - d) Remove all signs of scale and dirt from the internal part using a suitable descaling solution.
 - e) Lubricate the o-rings with an approved grease and re-assemble all the components.

For best performance we recommend that all o-rings are lubricated every 6 months.

Once the serviceable items have been dealt with, we recommend that the valve is re-commissioned as described in 'Commissioning the TMV' ensuring that a suitably accurate thermometer is used.

Should the valve still not function correctly, it may be necessary to replace the thermal element or other components. Refer to spare part kits and contact our Agents for details and advice.

5 YEAR SERVICE

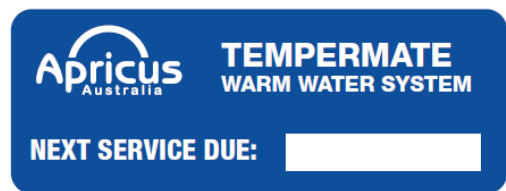
The thermostat and o-rings must be replaced every 5 years, as required by AS4032.3.

The designed minimum service life of these components is 5 years providing the valve is operated within the recommended operating parameters. However when conditions or usage do not conform to the recommended operating parameters or conditions, the thermostat and o-rings may need to be replaced more frequently.

Whenever a thermostat or other parts are replaced, the TMV should be commissioned as if it was a new valve.

MAINTENANCE STICKER

At the completion of any maintenance work, it is recommended that a sticker (such as the one shown) is attached to the front of the warm water cabinet or UV chamber indicating the date the next service is due.

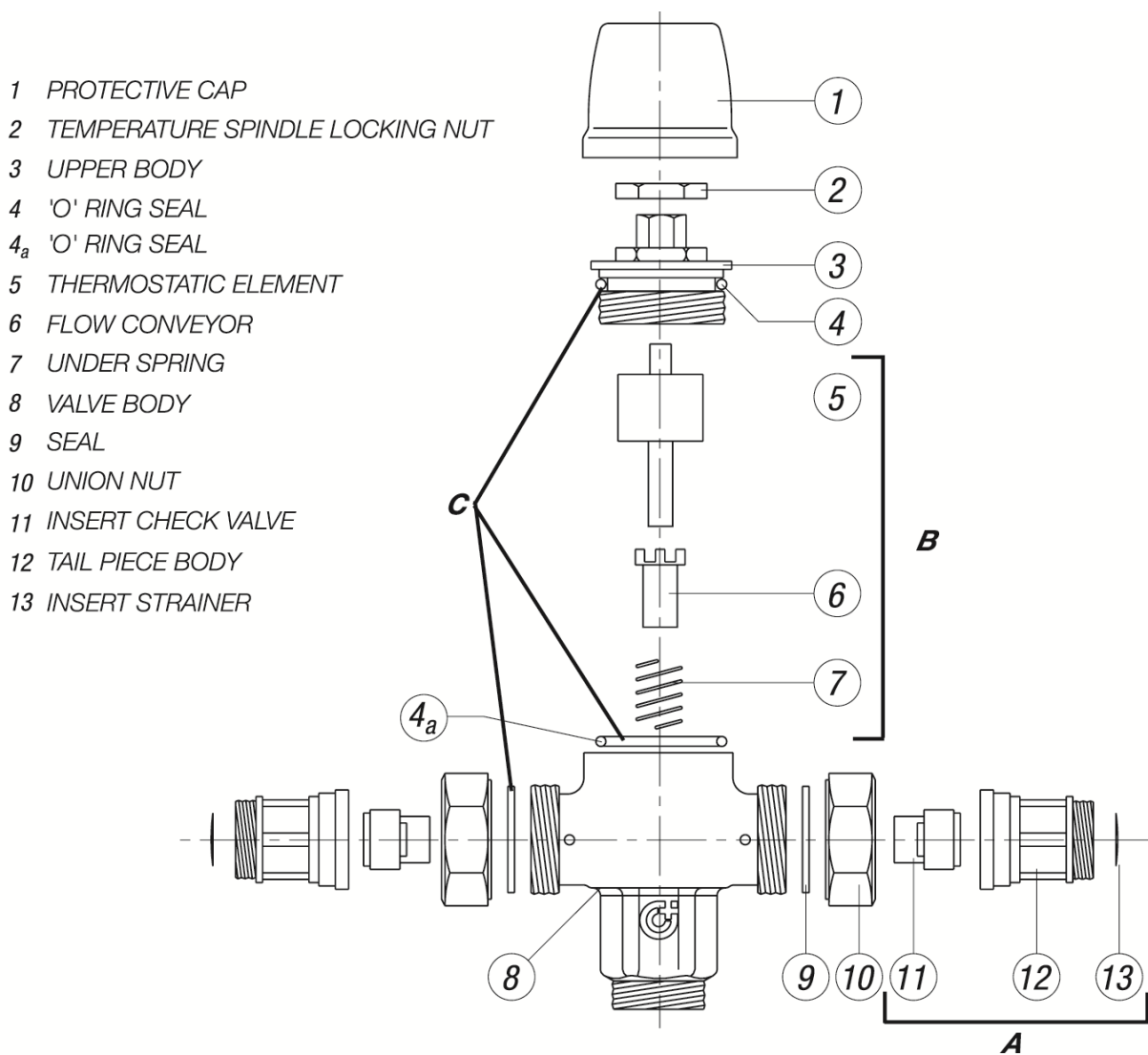


SPARE PARTS

With reference to the exploded diagram, the following spare parts are available on request for Caleffi 2522TM series valves:

- Kit A - Service Kit for the inlet sub-assembly.
- Kit B - Service Kit for the internal components.
- Kit C - Replacement o-rings and seals.

EXPLODED DIAGRAM



MICROBIAL WATER TESTING

Regular maintenance, inspection and cleaning programs are the key to reducing the risk of Legionella transmission. The microbiological monitoring of warm water systems for Legionella should never be used to replace these practices, but may be used in conjunction with them to validate their effectiveness. Microbiological monitoring only provides a snapshot of the water quality at a given time and is never acceptable as a stand-alone measure or as an indicator of on-going water quality, without the continuation of regular inspections, cleaning and maintenance.

The microbial analysis of water samples must be undertaken by a laboratory that is NATA accredited to perform the required testing. Prior to the collection of samples, it is essential that the testing laboratory is contacted to ensure it has the capacity to process the samples within 24 hours as described in Appendix A of AS/NZS 3666.3. A copy of the relevant testing laboratories procedure for collecting and handling water samples should be obtained and followed.

Where Microbial testing is to be conducted it will be necessary to collect 2 water samples from different outlets each visit. To ensure through the course of testing all outlets are eventually tested, a copy of the hydraulic drawing of the warm water system showing all outlets should be obtained if possible. Each time testing is conducted it will be necessary to ensure the 2 water samples are taken from previously untested outlets.

PROCEDURES FOR SAMPLING FOR MICROBIOLOGICAL TESTING

1. Label a sterile container with sample location, date, time and sampling officer's name.
2. Fill out a laboratory request form providing the details required by the testing laboratory.
3. Collect heated water into a sterile sample container from the initial run of water from the outlet of the shower, bath tap or other outlet.

NOTE: Do not run the water and hence flush the outlet prior to collection (contrary to sampling for other microbiological examinations). Separate samples, collected after flushing are required if evaluating heterotrophic colony counts.

LEGIONELLA TESTING

Unless prescribed otherwise by a regulating authority, sampling at the following rates are recommended:

STATE	WATER SAMPLING	FREQUENCY
Victoria	Take water samples from 2 fixtures	Monthly for first 12 months, then every 3 months (see notes)
NSW	Take water samples from 2 fixtures	Monthly for first 3 months, then every 6 months (see notes)
All Other States	Take water samples from 2 fixtures	Monthly for first 3 months, then every 6 months (see notes)

Victoria

3 monthly testing can only be commenced if all samples taken in the first 12 months achieve a reading of less than 10cfu/ml. If at any time a count is 10cfu/ml or more, the water testing frequency is to be recommenced monthly for 12 months and the actions in the “Legionella Detection” section on MUST be implemented.

Note: The above is the minimum requirement for all warm water systems in Victoria. Some Victorian Health Care facilities may require additional testing as determined by the institutions management after conducting a risk assessment and;

- In the case of hospitals with less than 500 beds, a minimum of at least 10 samples is taken over a six-month period, regardless of the method of disinfection.
- In the case of hospitals with more than 500 beds, a minimum of two samples per 100 beds is taken over every six-month period, regardless of the method of disinfection.

NSW

6 monthly testing can only be commenced if all samples taken in the first 3 months achieve a reading of less than 10cfu/ml. The first 6 monthly check occurs at 6 months from the date of commissioning. If at any time a count is 10cfu/ml or more, the water testing frequency is to be recommenced monthly for 3 months and the actions in the “Legionella Detection” section on MUST be implemented.

NSW Health allows monitoring frequency to be reduced to annually once the Legionella profile has been found to be satisfactory, however, it is recommended to continue with 6 monthly testing to ensure system health is closely monitored. The advice of the Public Health Unit could be sought regarding the necessity to monitor a particular system and its sampling frequency. All hospitals are

to have appropriate monitoring programs in place which satisfy Section 19 of the NSW Code of Practice for the Control of Legionnaires' Disease.

Note: The above is the minimum requirement for all warm water systems in NSW. Some NSW Health Care facilities may require additional testing as determined by the institutions management after conducting a risk assessment and;

- In the case of hospitals with less than 500 beds, a minimum of at least 10 samples is taken, regardless of the method of disinfection.
- In the case of hospitals with more than 500 beds, an additional two samples per extra 100 beds is taken, regardless of the method of disinfection.
- In a transplant centre quarterly sampling is required as a minimum.

All Other States

6 monthly testing can only be commenced if all samples taken in the first 3 months achieve a reading of less than 10cfu/ml. The first 6 monthly check occurs at 6 months from the date of commissioning. If at any time a count is 10cfu/ml or more, the water testing frequency is to be recommenced monthly for 3 months and the actions in the "Legionella Detection" section on MUST be implemented.

Note: Where Legionella counts routinely exceed 10cfu/ml it is an indication that the UV sterilisation method, maintenance practices and/or total system design are insufficient to prevent Legionella growth and a review of the installation is required.

LEGIONELLA DETECTION

Legionella Count	Action
< 10 cfu/ml	A count of less than 10cfu/ml is considered satisfactory. No additional action is required other than continuing existing maintenance and testing procedures. <i>Note: Less than 10cfu/ml is considered as “not detected” for the purposes of State legislation and this procedure.</i>
> 10 cfu/ml	Legionella detected – Decontaminate system and perform follow up water testing. Warm water system operation, maintenance program and any water treatment must be reviewed and rectified where necessary. Note: The warm water system must not be used until the decontamination procedure has been implemented.

If a greater than 10 cfu/ml of Legionella is detected in a water sample collected from a warm water system, the system owner must immediately shut down the system or decontaminate the system.

Decontamination of warm water systems must be performed by either:

- (a) pasteurisation (refer to “Thermal Disinfection Procedure”); or
- (b) chlorination (not documented in this procedure); or
- (c) an alternative decontamination procedure approved by the local water authority.

Irrespective of the method used, water testing should be conducted 2-4 days after the system decontamination. The number of samples will depend on the size and complexity of the system.

If a Legionella count of 10cfu/ml or more is still detected, the actions noted in the table above must be repeated until Legionella is not detected (less than 10cfu/ml) in 2 consecutive samples taken one week apart or shut down the system until the problem is remedied.

Notification upon Detection

In all instances where a Legionella count of 10cfu/ml or more has been detected, the system owner or manager MUST be informed immediately and;

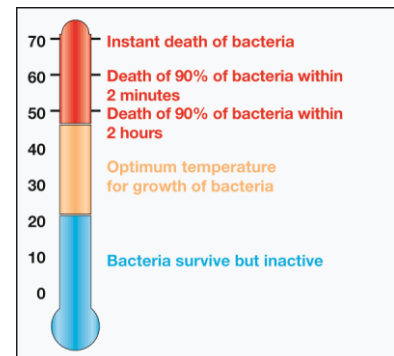
- **All States EXCEPT Tasmania & South Australia:** If Legionella is detected (10 cfu/ml or more) in 3 consecutive samples, the responsible officer of the site MUST Inform the Secretary (of Health) immediately by telephone and in writing within 3 days.
- **Tasmania:** The Communicable Diseases Prevention Unit (a division of the Department of health) MUST be notified upon detection (10 cfu/ml or more) within 1 working day after initial indication of the result by phone and fax or email.
- **South Australia:** The local government authority MUST be notified upon detection (10 cfu/ml or more) within 24 hours after initial indication of the result by phone and fax or email.

THERMAL DISINFECTION

If decontamination of the warm water system is required following detection of Legionella in a water sample, the entire warm water system including all pipes and fittings including TMVs, taps and shower heads must be sanitised by heat. Note: alternatives such as chlorination, chlorine dioxide, ozone and other chemical options may be used for disinfection but are not detailed in this procedure.

The drawing alongside shows the behaviour of Legionella Pneumophila bacteria as the conditions vary in the temperature of the water containing the bacteria, in laboratory cultures. To ensure correct thermal disinfection, it is necessary to go up to values of no less than 60°C, or as specified by local state regulations.

The ability to thermally disinfect the system is built into the unit.



Thermal disinfection is generally performed at times of reduced use of the system, for example at night time; this is to minimize the risk of users getting scalded.

Test points are located in the cold water inlet manifold (also the warm return), hot water inlet manifold and warm water outlet manifold and provide convenient temperature measurement points. Gauges are also available as a guide, however, a digital thermometer complying with AS4032.3 must be used to confirm the measured temperatures.

Note for systems with UV Sterilisation: Before increasing the temperature of the warm water plumbing the UV sterilisation must be turned OFF, or alternatively isolate the UV chamber and use the UV bypass line. Failure to do so can significantly shorten the life of the UV lamp and risk the integrity of the UV sterilisation.

DANGER - During heat sanitation hot water at scalding temperatures will be delivered to the warm water outlets. Warm water outlets must not be used whilst heat sanitation is taking place, except as detailed in this procedure. **It is vitally important that all water outlets are tagged or locked out during thermal sanitation to reduce the risk of scalding.**

Procedure;

1. Increase the temperature of hot water plant and ensure the warm water ring main circulator is turned on.
2. Insert a suitable digital thermometer into the cold water inlet test point and the hot water inlet test point.
3. Open the hot water bypass line and isolate the main cold water inlet supply
4. Monitor the temperature at the warm water return temperature gauge in the warm water unit. When the temperature has reached the sanitation temperature (recommended at least 70°C), allow the water to recirculate for 30 minutes.

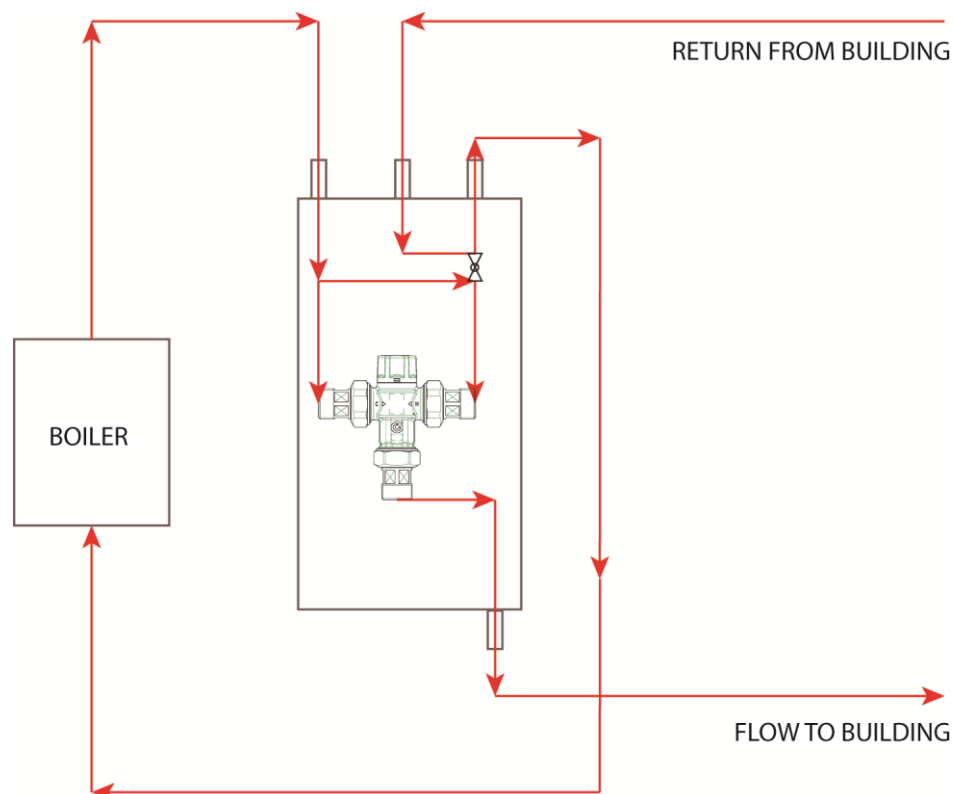
5. Open each outlet connected to the warm water system starting with the most distant point and flush each outlet line for 5 minutes
6. Record the temperature and duration of the sanitation period.
Note: the total sanitation period from when the warm water system reaches the sanitation temperature must be at least one (1) hour.

RESUME NORMAL OPERATING CONDITIONS AFTER THERMAL DISINFECTION

1. Reset the temperature of the hot water plant to the original setting.
2. Insert a suitable digital thermometer into the warm water outlet test point(s).
3. Close the hot water bypass line and open the cold water inlet supply.
NOTE: Ensure the hot water bypass line is locked again.
4. Allow time for the system to stabilise. The amount of time will depend on the volume of water in the system. *NOTE: It may be necessary to open the warm water outlet to remove the high temperature water.*

Note: The thermostatic mixing valves should not need to be re-commissioned following thermal disinfection. Ensure temperature supplied by the TMVs resumes to the original pre-set temperature, or else they will need to be re-commissioned.

FLOW SCHEMATIC DURING THERMAL DISINFECTION



UV DISINFECTION

The Apricus Tempermate can be supplied complete with UV disinfection. UV disinfection is an efficient, low cost and environmentally friendly process. UV light kills pathogenic micro-organisms quickly without leaving any residues, harmful by-products or affecting the smell or taste of the water.

These units use UV lamps which emit UVC radiation at 254nm which disrupts the DNA in the micro-organisms, so they are either killed or their ability to replicate is destroyed. The kill rate depends on the UV dose received by the micro-organisms, i.e. the time that a micro-organism is exposed to a certain intensity of UV radiation (Wm^2). A UV dose of 400 J/m^2 , (40 mJ/cm^2) is recognized internationally as suitable dose requirement to ensure safe disinfection.

The sizing of the UV system has been based on the above UV dose at the maximum nominal flow rates of the Warm Water System as indicated under the 'Hydraulic Characteristics' section. The UV model S80-100 is provided with the 1 or 2 valve systems, and the UV model S160-100 is provided with the 3 or 4 valve systems.

EXTRA FEATURES INCLUDED

- Volt free contacts for remote system status indication
- Lamp fail alarm; alerts user and prevents untreated water from being consumed
- Industrial IP rated outdoor power boxes with hour run time

For further information on the UV system, please refer to the separate Installation and Operation Manual provided with the system.

UV SYSTEM BYPASS LINE

A by-pass line should be plumbed prior to the isolating valve at the inlet of the UV unit and after the isolating valve at the outlet of the UV unit to enable a continuous warm water supply whilst servicing the UV unit. It is recommended to install a lockable ball valve or remove the handle from the by-pass isolating valve and place it in the warm water cabinet during normal operation.

OPTIONAL COMPONENTS FOR UV

AUTOMATIC TEMPERATURE SHUT OFF

A solenoid shutoff control valve may be installed prior to the UV system to automatically shut off the supply of water if the warm water outlet reaches 60°C.

Once the system reaches this temperature limit, switch will activate the solenoid shutoff valve which will stop the supply of warm water. This protects both the users of the system from scalding, as well as the UV System from high temperatures as this will rapidly decrease the longevity of the UV lamp. An over temperature situation could occur either through a TMV failure if they are not properly maintained, or if the hot water bypass in the Warm Water Unit has been unlocked and opened.

If the system shuts down and water needs to be continued in spite of higher temperatures, for example during thermal disinfection, then the bypass line isolation valve can be opened to continue supply temporarily (see UV System Bypass Line below).

Note: the solenoid valve requires a minimum of 50kPa differential pressure in order to obtain a flow rate of 30 l/m. At 70kPa the solenoid valve is fully open and allows full flow through the valve. This 50kPa head pressure must be taken into account when sizing the circulating pump.

UV INTENSITY MONITORING

An optional UV intensity monitoring is able to be installed on the UV chamber. A UV intensity monitor will give the building operator peace of mind as it alerts when:

- Quartz thimble is fouled
- Water quality has deteriorated
- Lamp failure

All power supply alarms can be integrated with a BMS.

MAINTENANCE CHECK LOG

Date	TMV 1 test point temp	TMV 2 test point temp	TMV 3 test point temp	TMV 4 test point temp	Closest outlet temp	Return test point temp	Shut off Test		UV run hours	UV lamp cleaned	Comments	Checked By
							Max	Final				

WATER QUALITY TEST LOG

[illegible]

Job No

**COMMISSIONING REPORT FOR
APRICUS TEMPERMATE WARM WATER UNIT**

Location

Name of Establishment:.....

Address of Establishment:.....

Contact Person:.....Tel:.....Date:.....

Work order No:.....

Installation conditions

Make and Model of hot water unit:.....

Temp of Hot Water..... °C, Pressure.....kPa

Cold water supply via....., Pressure reducing valve fitted: YES/NO

Temperature of Cold Water..... °C, Pressure.....kPa

Temperature of Return Water..... °C, Speed of Circulating Pump;

Make of mixing valve; **Caleffi** Model No **252225TM** Size **25MM**

Valve Location/building:.....

Valve Identification No:.....

Total No of mixing valves on Site/Building:.....

No of Outlets Served by this valve: Baths (), Basins (), Showers ()

Other Outlets-Details:.....

.....

Valve installed to requirements of:

- | | |
|-------------------------------------|--------|
| a) The drawing and specification | YES/NO |
| b) The valve manufacturer/supplier | YES/NO |
| c) The HOSPLAN code for TMV | YES/NO |
| d) The local water supply authority | YES/NO |

If NO, give details and action taken.....

.....

.....

Test Results (complete the attached table)

Valve considered satisfactory for use: YES/NO

If NO, state reason and action taken.....

.....

.....

It is hereby certified that all the commissioning work has been carried out by the undersigned in accordance with the requirements of the HOSPLAN Code of Practice for thermostatic mixing valves.

Valve initial service due:..... (Max 6 months use)

Valve commissioned by:.....

Signature of Licensed Plumber:..... Licence/Cert. No.....

Business name of plumbing contractor:.....

Contractor's authority No:..... Date:.....

NOTE

A duplicate copy of this report is to be retained at the site for any inspection by authorised persons e.g. Department of Health

The following information is to be provided by site manager/owner:

Valve size and installation recommended by (Name):.....

Valve supplied by (Name):.....

Valve installed by (Name):.....

Date of Installation:.....Drawing No:.....

Certificate of Compliance/Inspection No:.....Dated:.....

Service Manual on Site: YES/NO

Report Received by (Name):.....

Position:.....

Signature:.....Date:.....

For and on behalf of the health establishment

Test Results

Valve Location/Building:.....

Room or Area Designation:.....

Work Order No:.....

	Test Point Temperature		Flow rate	
	@ full flow	@ min flow		
TMV 1				
TMV 2				
TMV 3				
TMV 4				

Warm Water Outlet Fixture No.	*Name/Type/Size & Location of Outlet Fixture (Bath, Shower, Basin, Other)	Flow rate of Design Warm Water (l/sec)		Temp. of Warm Water (°C)	
		One Outlet in use	**All req'd Outlets in use	One Outlet in use	**All req'd Outlets in use

*Give details of brand and model designation

**Commensurate with the design flowrate for the mixing valve (see drawing)

NOTE: An accurate digital type thermometer is necessary for the temperature measurements.

Prescribed temperature range for warm water.....°C to°C

Fail safe at both minimum and maximum design flow rates (Passed/Failed)

Signature of Licensed Plumber:..... Licence/Cert. No.....

Business Name of Plumbing Contractor:.....

Contractor's Authority No.....Date:.....

Job No

SERVICE REPORT FOR
APRICUS TEMPERMATE WARM WATER UNIT

Location

Name of Establishment:.....

Address of Establishment:.....

Contact Person:.....Tel:.....Date:.....

Work order No:.....

Installation conditions

Make and Model of hot water unit:.....

Make of mixing valve; **Caleffi** Model No **252225TM** Size **25MM**

Valve Location/building:.....

Valve Identification No:.....

Total No of mixing valves on Site/Building:.....

No of Outlets Served by the valves: Baths (), Basins (), Showers ()

Other Outlets-Details:.....

.....

Valve installed to requirements of:

e) The drawing and specification YES/NO

f) The valve manufacturer/supplier YES/NO

g) The HOSPLAN code for TMV YES/NO

h) The local water supply authority YES/NO

If NO, give details and action taken.....

.....

.....

Any current complaints concerning installation or operation reported by establishment

personnel or stated in previous report:

If YES, give details.....

.....

.....

Particulars of service work carried out during this visit.....

.....

List of items replaced (and part numbers) during this visit.....

.....

Temp. of warm water at outlet.....°C, Fail Safe Test: PASSED/FAILED

Valve considered satisfactory for further use: YES/NO.....

If NO, reason and action taken:.....

.....

Date next service due:.....(12 months maximum)

It is hereby certified that all service work has been carried out by the undersigned in accordance with the requirements of the HOSPLAN Code of Practice for thermostatic mixing valves.

Name of Licensed Plumber (Print):.....

Signature:..... Licence/Certificate No:.....

Business Name of Plumbing Contractor:.....

Contractor's Authority No:..... Date of Service:.....

NOTE

A duplicate copy of this report is to be retained at the site for any inspection by authorised persons e.g. Department of Health

The following information is to be provided by site manager/owner:

Valve size and installation recommended by (Name):.....

Valve supplied by (Name):.....

Valve installed by (Name):.....

Date of Installation:..... Drawing No:.....

Certificate of Compliance/Inspection No:..... Dated:.....

Service Manual on Site: YES/NO

Date of Previous Service:.....

Previous Service Carried Out by:.....

Current Report Received by (Name):.....

Position:.....

Signature:..... Date:.....

For and on behalf of the health establishment

WARM WATER UNIT WARRANTY

1. This product is warranted for **five (5) years** from date of purchase subject to the terms and conditions contained herein.
2. The product will be replaced, repaired or parts replaced free of charge by the manufacturer if, at their sole discretion, it is found to be faulty within the warranty period.
3. This warranty only applies to products sold and distributed within Australia by Apricus Australia and its authorised distributors.
4. This warranty only applies if the product has been used in accordance with the manufacturer's instructions under normal use and with reasonable care (in the opinion of the manufacturer) subject to all terms and conditions set out in this document and in the instruction manuals.
5. This warranty does not cover:
 - (i) Defects or damages resulting from the misuse of this product.
 - (ii) Defects or damages from abnormal use, improper storage or corrosive environments, unauthorised modifications, unauthorised repair, neglect, rough handling, abuse, accident, alteration, improper installation, ingress of dirt, dust, acts of God.
 - (iii) Breakage or damage to parts unless caused directly by defects in materials or workmanship.
 - (iv) The cost of delivery or transportation of the product.
 - (v) Normal wear and tear and reasonable abrasion.
 - (vi) If the product has been modified or repaired by anyone other than a warranty service by Apricus Australia or if it is repaired using unauthorised spare parts
 - (vii) The cost of new installation or complete removal of the product.
 - (viii) Damage to the components due to improper installation or improper use of the product
6. Apricus Australia is not liable for any damages incurred while using this product or if this product becomes faulty during use.

LIMITED WARRANTY

TO THE EXTENT PERMITTED BY APPLICABLE LAW, THIS LIMITED WARRANTY IS YOUR SOLE AND EXCLUSIVE REMEDY AGAINST ALL VALVE INDUSTRIES SOLE AND EXCLUSIVE LIABILITY IN RESPECT OF DEFECTS IN PRODUCT. HOWEVER, THIS LIMITED WARRANTY SHALL NOT EXCLUDE NOR LIMIT ANY OF YOUR LEGAL (STATUTORY) RIGHTS UNDER THE APPLICABLE NATIONAL LAWS. TO THE EXTENT PERMITTED BY APPLICABLE LAW ALL VALVE INDUSTRIES DOES NOT ASSUME ANY LIABILITY FOR LOSS OF OR DAMAGE TO OR CORRUPTION OF DATA, FOR ANY LOSS OF PROFIT, LOSS OF USE OF PRODUCTS OR FUNCTIONALITY, LOSS OF BUSINESS, LOSS OF REVENUES OR LOSS OF ANTICIPATED PROFIT, INCREASED COSTS OR EXPENSES OR FOR ANY INDIRECT, OR SPECIAL OR CONSEQUENTIAL LOSS OR DAMAGE. TO THE EXTENT PERMITTED BY APPLICABLE LAW, ALL VALVE INDUSTRIES' LIABILITY SHALL BE LIMITED TO THE PURCHASE VALUE OF THE PRODUCT. THE ABOVE LIMITATIONS SHALL NOT APPLY TO DEATH OR PERSONAL INJURY CAUSED BY DEFECT OF PRODUCT IN MATERIAL, DESIGN AND WORKMANSHIP.