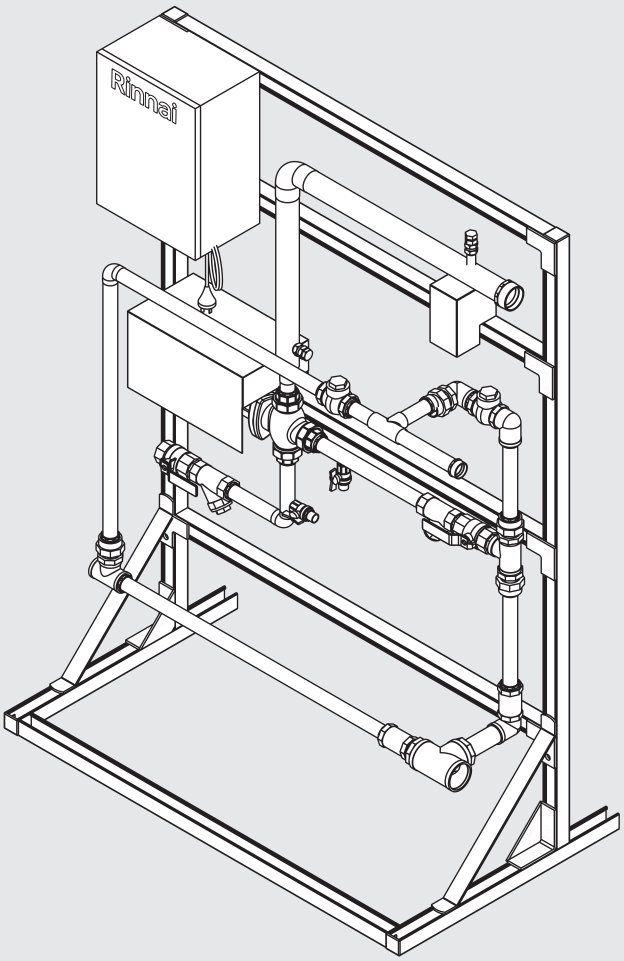
Models:

DDWW32
DDWW50
DDWW80



Demand Duo Warm Water Valve

Operation & Installation Manual

Rinnai

Congratulations on the purchase of your Rinnai Demand Duo warm water valve system. We trust you will have many years of comfort and enjoyment from your appliance.

IMPORTANT

BEFORE USING THIS APPLIANCE

Before proceeding with the operation or installation read this manual thoroughly and gain a full understanding of the appliance, to ensure safe and correct use.

IMPORTANT NOTICE FOR INSTALLERS

Please leave these instructions with the end user after commissioning of the system and alert the end user of the content sections "Warnings and "Periodic Inspection" and "Maintenance".

This manual must be read and understood before installation, commissioning and operation are attempted. The information contained in other Operating / Installation instructions supplied with Demand Duo warm water valve applies in full, unless otherwise dictated in this manual.

This appliance must be installed in accordance with:

- Manufacturer's Installation Instructions
- Current AS/NZS 3500.4, AS/NZS 3000, AS/NZS 4032.3
- Local Regulations and Municipal Building Codes including local OH&S requirements

This appliance must be installed, maintained and removed ONLY by an Authorised Person.

For continued safety of this appliance it must be installed and maintained in accordance with the manufacturer's instructions.

Certified Product

WaterMark

AS4032.1 Lic No. 60059
AGA

TABLE OF CONTENTS

SAFETY

APPLICATION

The outlet of the Demand Duo warm water valve delivers warm water by blending hot water from a separate storage water heating system with cold water by means of an electronically controlled thermostatic mixing valve across a wide range of flow rates with minimal pressure drop.

FOR YOUR SAFETY

The delivery temperature of the Demand Duo warm water valve must be set in accordance with local authority requirements for the intended application.

The risks associated with legionella bacteria must be controlled in accordance with local authority requirements. Ultraviolet Disinfection (UV) units are available from Rinnai as an optional extra to form part of a maintenance regime to safeguard against legionella bacteria.

Warm water system design must be carried out by persons competent to do so.

Installation, commissioning, operation, maintenance and servicing must be performed by persons competent and permitted by law to do so in accordance with the manufacturers instructions and the relevant requirements of:

- AS/NZS 3500.4
- AS/NZS 3000
- AS/NZS 4032.3
- Local codes and regulatory authorities

For the Demand Duo warm water valve to operate safely, the operating parameters must be in accordance with those detailed in the '"SPECIFICATIONS" on page 2' section of this document. There are also important design parameters detailed in this manual that must be considered.

Periodic performance checking and maintenance are recommended. Guidelines for performance checking and maintenance are given in the section "CHECKING AND MAINTENANCE" on page 18.

The person or organisation responsible for the warm water valve and associated plumbing infrastructure in a premises must exercise due diligence to ensure that the delivery temperature does not exceed the allowable temperature for a particular application and that the risks associated with legionella bacteria are effectively managed.

WARNING

- **DO NOT** operate this system before reading these instructions
- **DO NOT** place articles on or against this appliance
- **DO NOT** store chemicals or flammable materials near this appliance

REGULATORY MATTERS

The Rinnai Demand Duo warm water valve is certified as meeting the requirements of AS/NZS 4032.1 when set at temperatures not exceeding 45°C. AS/NZ 4032.1 applies to thermostatic mixing valves.

The Rinnai Demand Duo warm water valve is certified as meeting the requirements of AS/NZS 4032.2 when set at temperatures not exceeding 50°C. AS/NZS 4032.2 applies to tempering valves.

Details of certification are shown on the dataplate of the appliance.

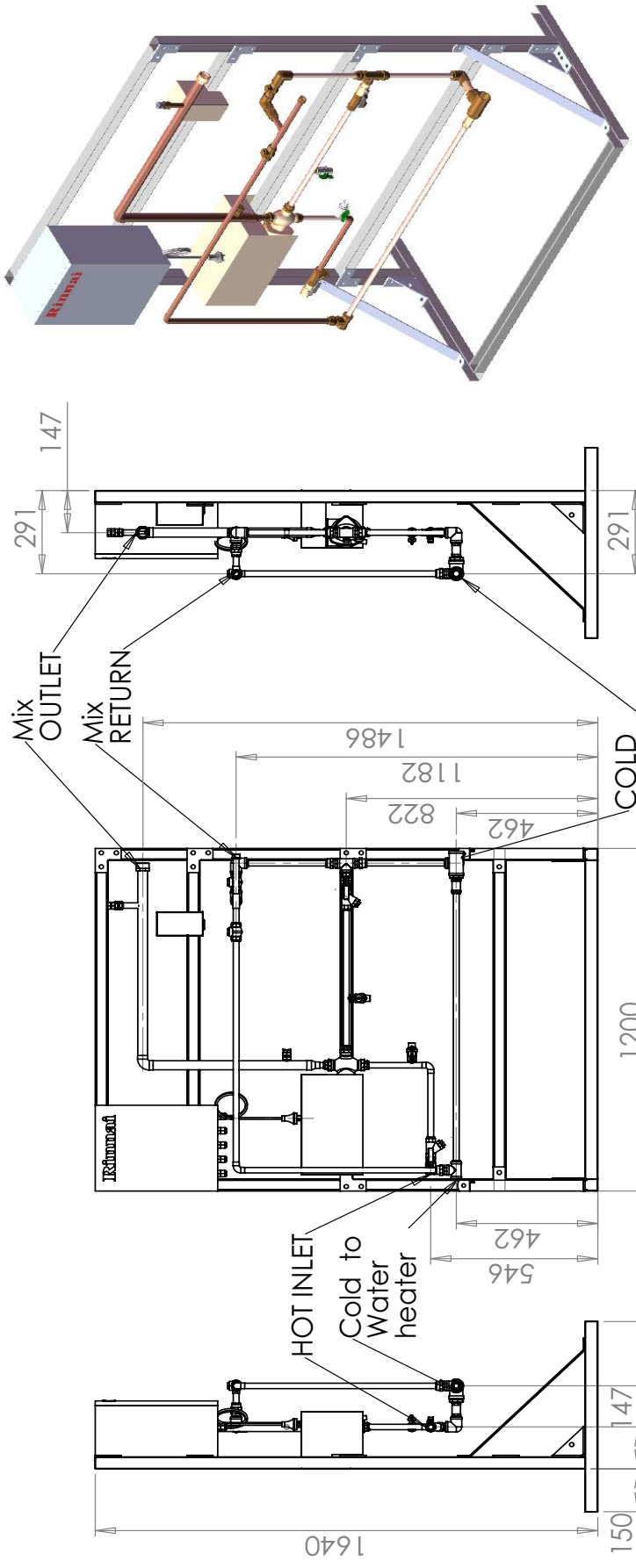
It is a requirement in New South Wales that warm water system installations are registered with the local council or other relevant regulatory authority. There may be similar requirements in other States or jurisdictions.

SPECIFICATIONS

TABLE 1 - SPECIFICATIONS			
Models	DDWW80	DDWW50	DDWW32
Mixed outlet flow rate at corresponding pressure loss through system	360 l/min at 60 kPa	165 l/min at 60 kPa	61 l/min at 60 kPa
	500 l/min at 100 kPa	200 l/min at 100 kPa	83 l/min at 100 kPa
	667 l/min at 200 kPa	267 l/min at 200 kPa	117 l/min at 200 kPa
Maximum static and dynamic working pressures	1000 kPa **IMPORTANT:** The pressure limitations of the Storage Water Heater must also be considered. When installed with Rinnai Demand Duo observe the pressure limitations specified.		
Maximum dynamic differential pressure between hot and cold supplies to mixing port.	50 kPa		
Hot inlet temperature range	60° to 70° C		
Cold inlet temperature	To be less than mixed outlet temperature setting		
Minimum 'mixed return' flow rate	54 l/min	24 l/min	14 l/min
Electrical power supply	240 Volts, 50 Hz		
Average power consumption	24 W	20 W	15 W
Dimensions: (mm) Width Height: Depth:	 1200 1640 666		
Weight:	135 kg	90 kg	70 kg
Cold inlet connection *	3” RP	2” RP	1 1/4” RP
Hot inlet connection *	2” RP	1 1/4” RP	3/4” RP
Mixed outlet connection *	3” R	2” R	1 1/4” R
Mixed return connection *	2” R	1 1/4” R	3/4” R
Cold to Storage Water Heater connection *	2” RP	1 1/4”RP	34” RP
* All connections are pipe threads of Whitworth form.			

SPECIFICATIONS

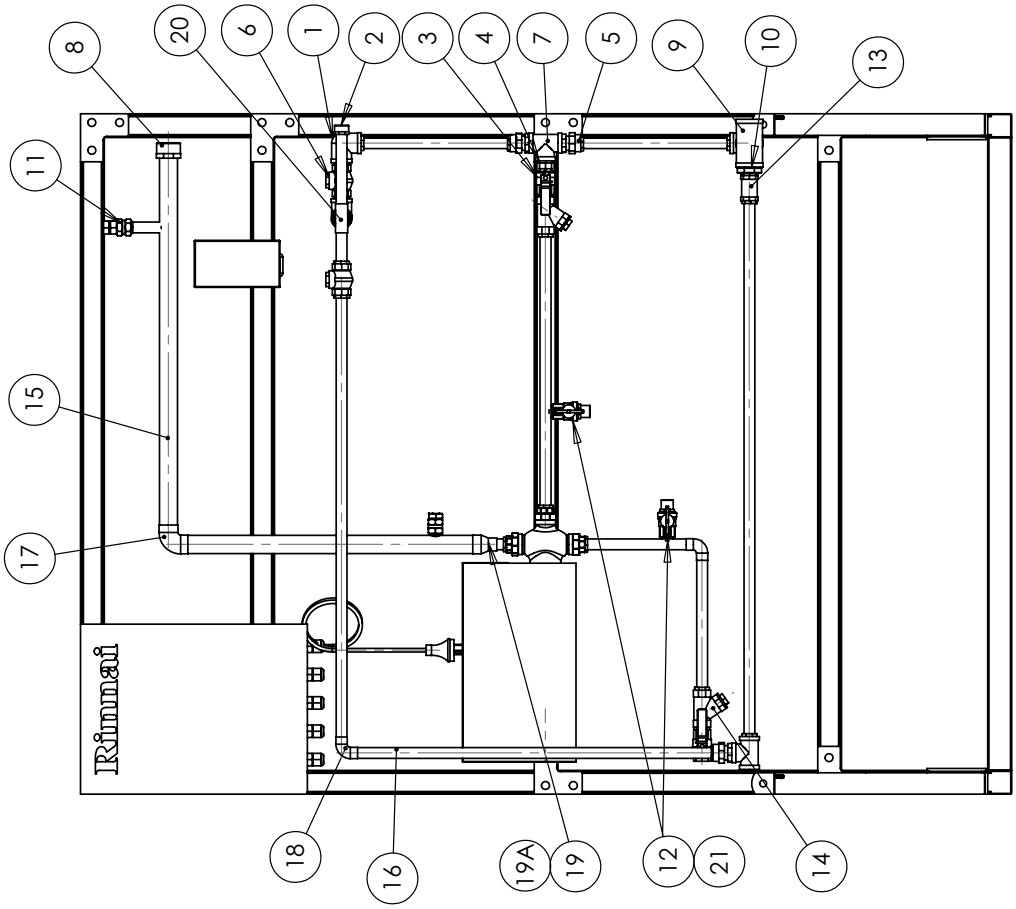
MODEL: DDWW32



SPECIFICATIONS

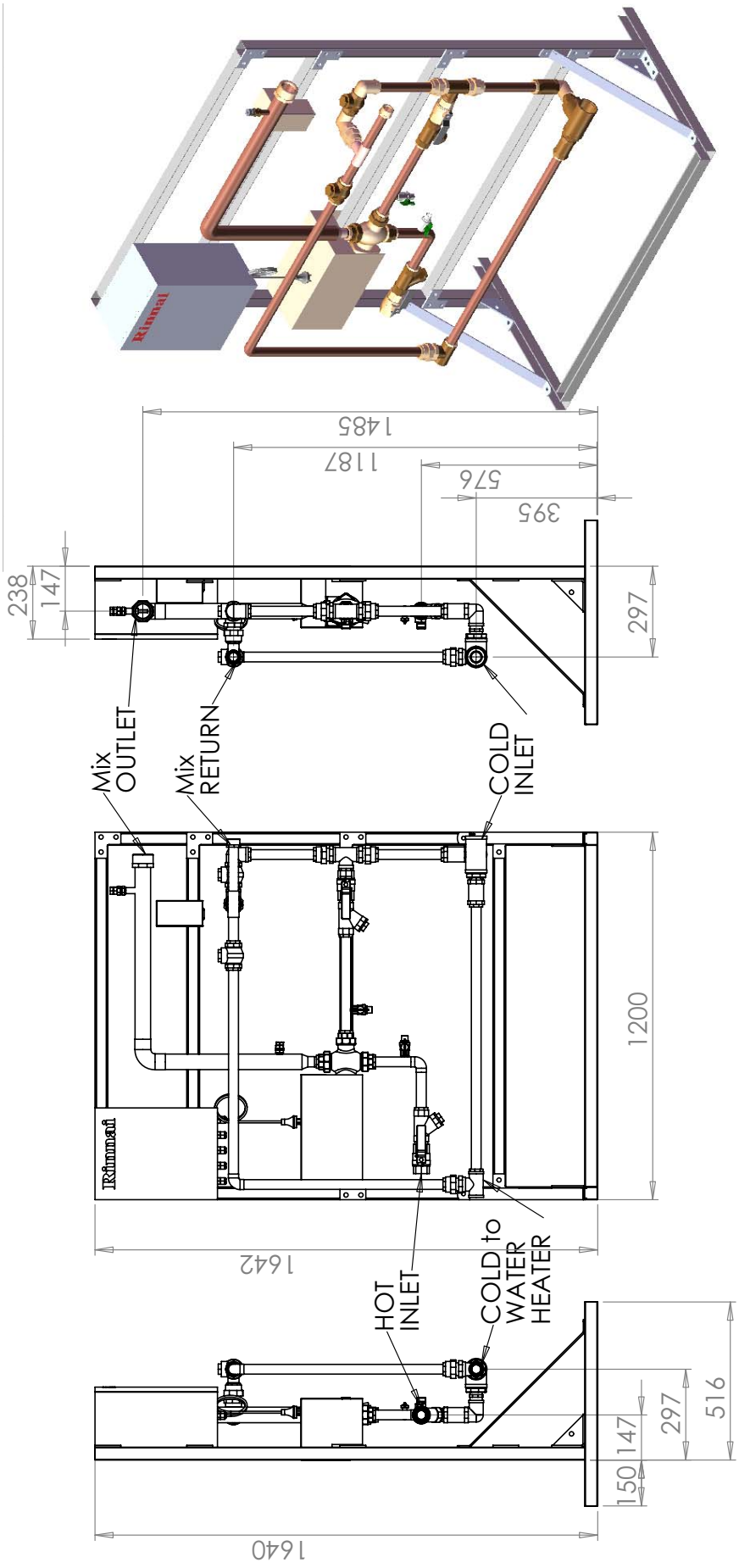
MODEL: DDWW32

ITEM NO.	DESCRIPTION
1	ELBOW BR 3/4" F
2	BUSH TUBE BRS 20 C x 20 MI
3	BALL VALVE LEVER
4	NIPPLE HEX BRS 3/4"
5	UNION BARREL M&F LIGHT
6	CHECK VALVE SWING BRZ
7	TEE BR 3/4"
8	BUSH TUBE BRS 32 C x 32MI
9	TEE BRASS 32 mm
10	BUSH RED 11/4 M x 3/4 F
11	1/2" SOCKET
12	NIPPLE 1/2"
13	VALVE NON RET SPRING
14	STRAINER BR20 mm
15	DN32 TYPE B
16	DN20 TYPE B
17	ELBOW CU 3/4"
18	CU ELBOW 32 mm
19	REDUCER CON CU
19A	REDUCER CON CU
20	TEE CU-3/4" x 3/" x 3/4"
21	VALVE BALL BR 15 mm M-F



SPECIFICATIONS

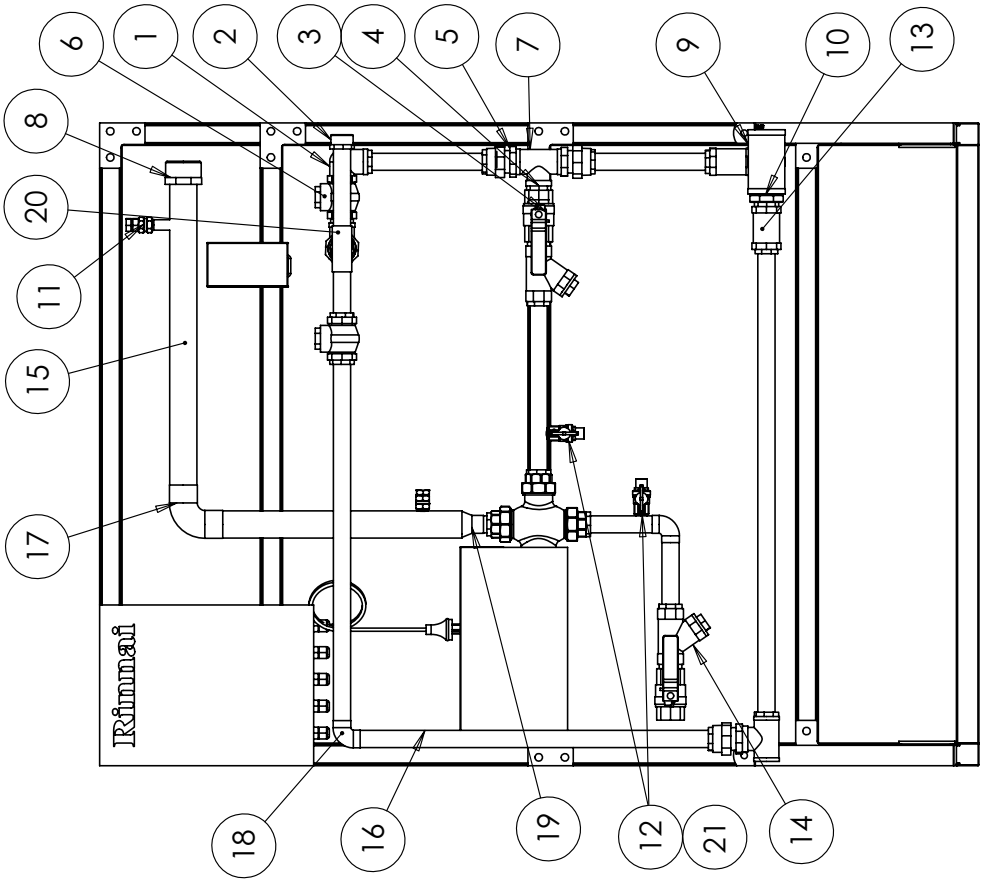
MODEL: DDWW50



SPECIFICATIONS

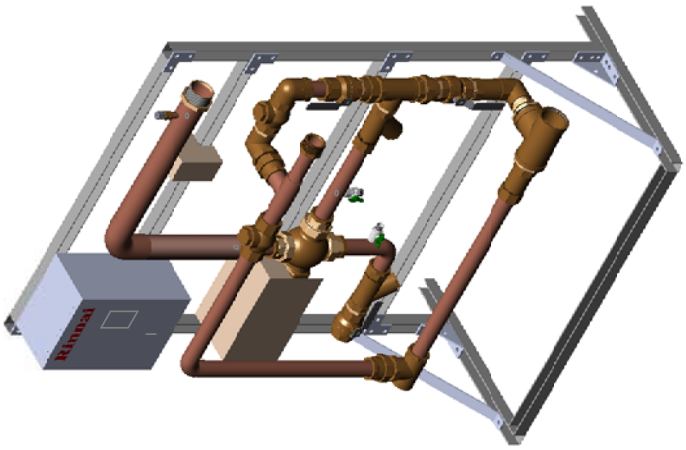
MODEL: DDWW50

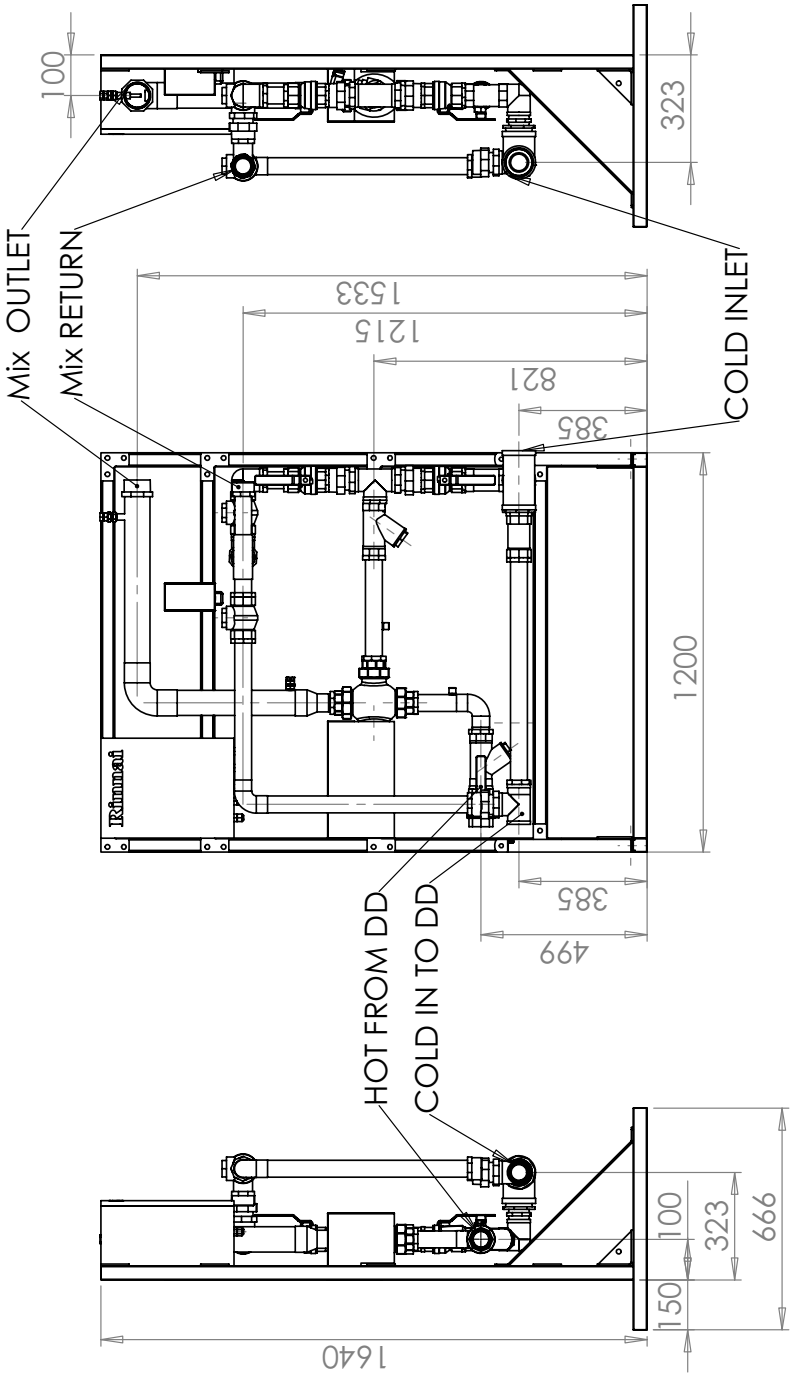
ITEM NO.	DESCRIPTION
1	32 mm BRS M x F ELBOW
2	32 mm BRS BRAZING BUSH
3	32 mm BALL VALVE
4	BRS HEX NIPPLE
5	32 mm M x F BARREL UNION
6	32 mm SWING CHECK VALVE
7	BRS TEE
8	50 mm BUSH TUBE
9	50 mm BRS TEE
10	50 ~ 32 MM BRS RED
11	1/2" SOCKET
12	NIPPLE 1/2"
13	32 MM SPRING CHECK VALVE
14	STRAINER
15	DDN50 TYPE B
16	DN 32 TYPE B
17	CU ELBOW 2"
18	CU ELBOW 32 mm
19	CU RED 50 x 32 mm
20	CU TEE 32 mm
21	VALVE BALL BR 15 mm M-F



SPECIFICATIONS

MODEL: DDWW80

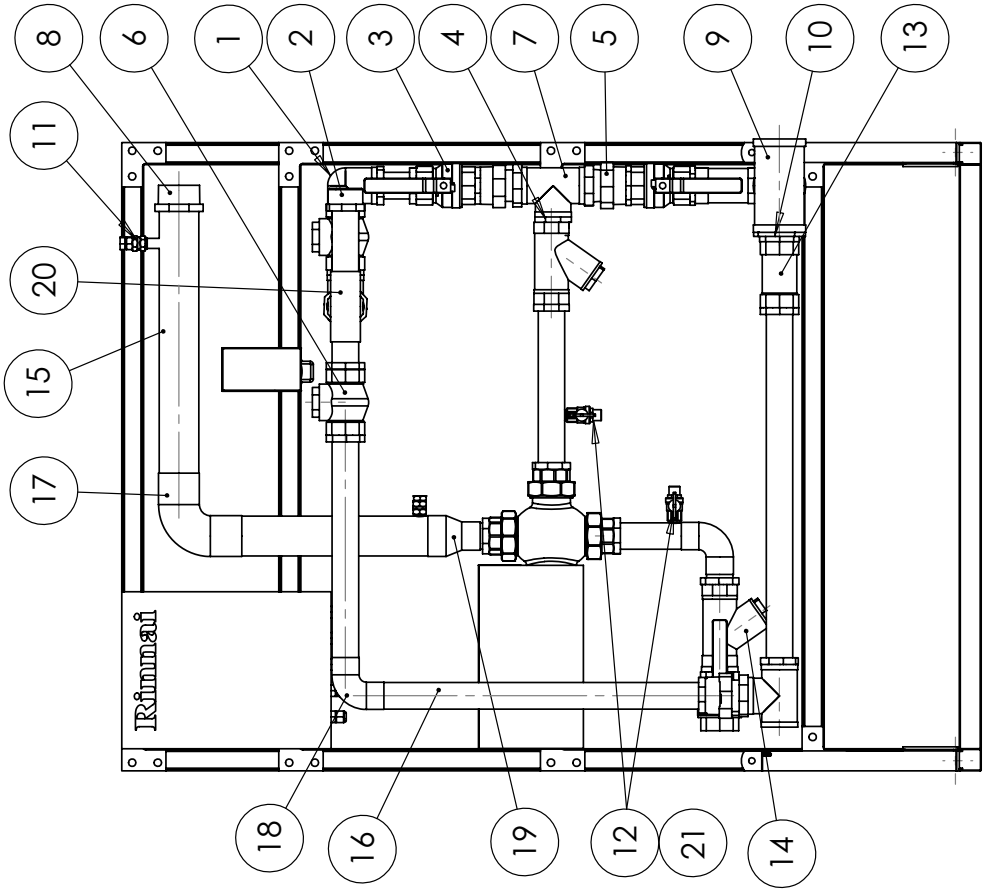




SPECIFICATIONS

MODEL: DDWW80

ITEM NO.	DESCRIPTION
1	ELBOW BRS 50 MM M&F
2	BUSH TUBE BRS 50 C X 50 MI
3	VALVE BALL WATER BR 50 mm - F-F
4	NIPPLE HEX BRS 50 MM
5	UNION BARREL M&F LIGHT 50 mm
6	VALVE NON RET 50 mm
7	TEE BRS 50 mm
8	TUBE BUSH 80 C x 80 MI
9	TEE BRS 80 mm
10	BUSH RED BR 80 mm - 50 mm
11	1/2"SOCKET
12	NIPPLE 1/2"
13	VALVE NON RET SPRING 50 mm
14	STRAINER BR 50 mm
15	DN80 TYPE B
16	DN50 TYPE B
17	ELBOW FXF PRESS CU80 mm
18	ELBOW CU 2" TO AS 3688
19	REDUCER CONCENTRIC CU
20	TEE HIGH PRESS CU 50 mm
21	VALVE BALL BR 15 mm M-F



PRINCIPLE OF OPERATION

PRINCIPLE OF OPERATION (Figure 1)

The Demand Duo warm water valve (i) connections comprise the 'cold supply' (11), the 'hot supply' (13), 'mixed delivery' (10) and 'mixed return' (9). For maximum safety, the 'cold supply' (11) to the warm water valve and the storage water heating system (ii) are connected to the same source via the 'cold to storage water heater' connection (12). Warm water is delivered to the warm water outlets (16) via a pumped flow and return system. The design of the 'flow and return' loop (iii) and the flow and return pump system (15) must result in the minimum 'mixed return' (9) flow rate specified being achieved (See “SPECIFICATIONS” on page 2.). The Demand Duo warm water valve is unsuitable for installation as part of plumbing systems that do not incorporate a 'flow and return' loop and pump system.

An electronic temperature sensor (1) measures the warm outlet temperature and sends an electronic signal to the system controller (2). The system controller sends an operating voltage (3) to a magnetic actuator (4) directly coupled to a three way water mixing port (5). The three way water mixing port mixes 'hot inlet' (6) and 'cold inlet' (7) water to achieve 'mixed outlet' (8) water at a set temperature. The positioning of the three way mixing port (5) controls the ratio of 'hot inlet' (6) and 'cold inlet' (7) water and therefore the temperature of 'mixed outlet' (8) water. This positioning in turn depends upon the voltage sent by the system controller (2) to the magnetic actuator (4).

Warm water returning to the system via the system 'mixed return' connection (9) can flow to the 'cold inlet' (7) and/or to the storage water heating system (ii) via the 'cold to storage water heater' connection (12) and then to the 'hot supply' (13) and 'hot inlet' (6) in any proportion determined by the system controller (2) and positioning of three way mixing port (5). In this way, the system controls the mixed water temperature under all specified conditions.

An ultraviolet disinfection system (14) is available as an optional extra.

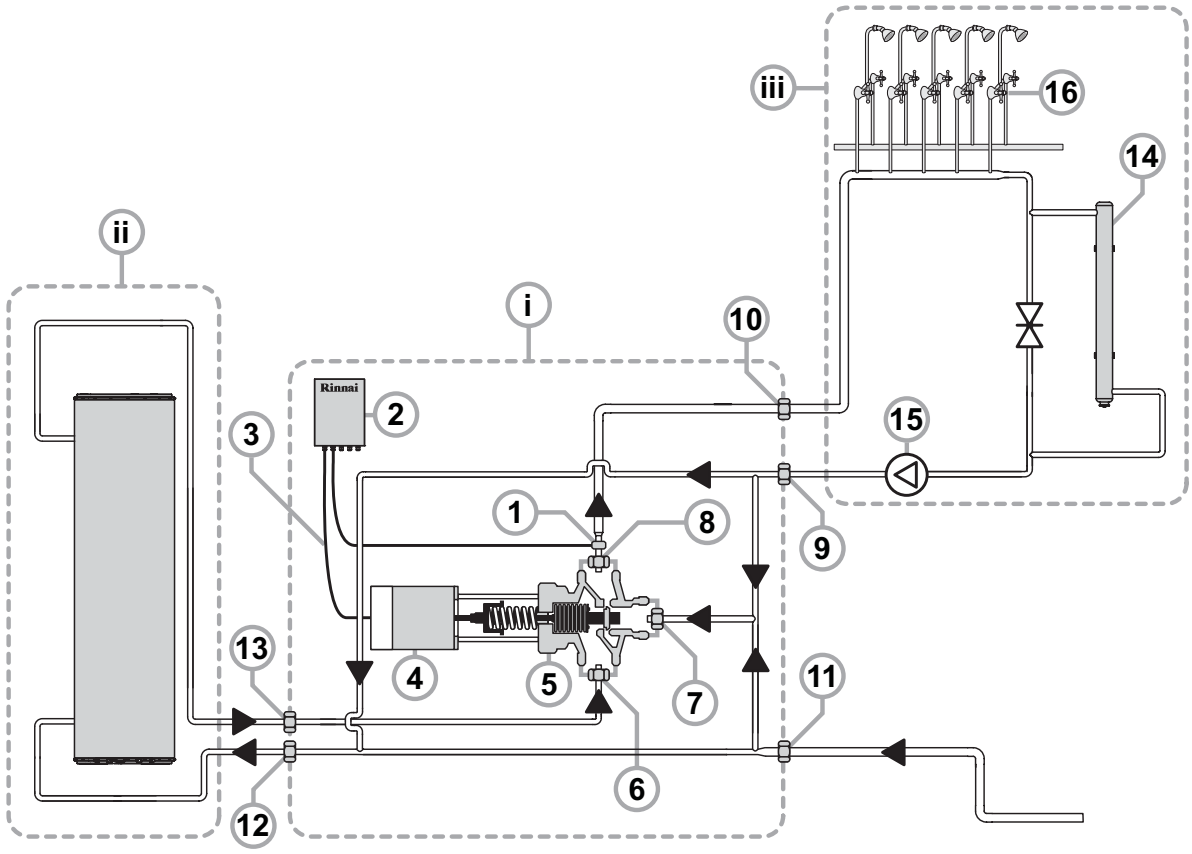


Figure 1 - Principle of Operation

WATER QUALITY

Warranty applies to Demand Duo warm water valves connected to a water supply from a water utility. It does not apply if supplied from any alternative water supplies if the water chemistry and impurity levels of alternative water supplies exceed the limits specified in the separate warranty booklet. Examples of alternative water supplies include private bore water, water from private dams and water supplied from a water utility but where the water chemistry is deliberately altered by parties other than the water utility before supplying the warm water valve.

WARRANTY

Warranty terms and conditions are detailed in the separate warranty booklet.

FAULT FINDING DURING NORMAL OPERATION

The Table below applies when the warm water system is in normal operation and a fault is apparent.

TABLE 2 - FAULT FINDING DURING NORMAL OPERATION

FAULT	POSSIBLE CAUSES	REMEDY
Delivery temperature not hot enough	Warm water valve system power supply switched off	Check and turn on the power supply
	No electrical or gas supplies to the hot water system	Check and turn on the gas and electricity supplies
	Power supply to circulating pumps switched off	Check and turn on circulating pump power supplies
	Other	Arrange for a service person to check and rectify. This work must be performed by persons permitted by law to do so.
No water flowing from warm water outlets	The mains cold supply to the warm water valve and/or storage water heating system is isolated. Note: For maximum safety it is recommended that the cold water supply to the warm water valve and the storage water heating system are connected to the same source.	Check position of 'mains cold supply' to warm water system (See Figures 2 & 3). Important: Do not alter the position of any other valves in the system
	Other	Arrange for a service person to check and rectify. This work must be performed by persons permitted by law to do so.
Delivery temperature too hot		**To prevent scald injury, immediately isolate mains supply to the warm water valve and/or water heating system.** Arrange for a service person to check and rectify. This work must be performed by persons permitted by law to do so.
Other		Arrange for a service person to check and rectify. This work must be performed by persons permitted by law to do so.

SYSTEM DESIGN

SYSTEM DESIGN

Figures 2 and 3 show a typical installation of a Demand Duo warm water valve with a Demand Duo mains pressure gas storage water heating system and associated hot and warm water 'flow and return' loops and components. The system consists of the Demand Duo warm water valve ③, storage water heating system ②, flow and return system piping for warm water ④, flow and return piping for hot water (if required) ①, Ultraviolet disinfection system ⑤ (optional) interconnection piping and all associated fittings such as valves, unions and pumps.

System design must be carried out by persons competent to do so and must ultimately be such that the water temperature at all points is acceptable for the intended application and that legionella bacteria growth can be effectively managed. These considerations are critical.

Important design considerations include the following:

1. The maximum dynamic differential pressure between the 'cold inlet' and 'hot inlet' connections to the three way mixing port must not exceed the limit of 50 kPa under all flow conditions (see “SPECIFICATIONS” on page 2). To achieve this, a water heating system with a constant hot water delivery pressure MUST be used. A common example is a water heater connected to the mains supply. Instantaneous water heaters and continuous flow water heaters (such as the Rinnai INFINITY and Rinnai HD series water heaters) are not suitable as the hot water delivery pressure from these appliances is not constant. Devices such as balancing valves must not be used to help achieve the differential pressure requirement. The length, size and path of the pipework between the warm water valve and the storage water heating system will also influence the differential pressure achieved.
2. For maximum safety it is recommended that the cold water supply to the warm water valve and the storage water heating system are connected to the same source. To facilitate this, the warm water valve has a 'cold to water heater' connection. The 'mains cold' supply pipe for both the warm water valve and storage water heating system is connected to the 'cold inlet' connection of the warm water valve. The cold water supply to the storage heated water system is then provided via the 'cold to water heater' connection of the warm water valve.
3. To facilitate continuing the warm water supply whilst servicing the Ultraviolet Disinfection unit, a warm water by-pass should be installed as shown. It is recommended to remove the handle from the by-pass isolating valve and keep it in a safe place during normal operation to prevent unauthorised opening.
4. The number and location of isolating valves in Figures 2 and 3 have been determined so servicing and system checking activities can be carried out efficiently and with minimal disruption.
5. The mains cold supply pipe contains a main isolating valve and pressure limiting valve (if required). The pressure limiting valve must not be located in any other position as this will result in different hot and cold water supply pressures to the three way mixing port. A 'non return' valve is not required to be fitted in the mains cold supply pipe as the warm water valve already contains all 'non return' valves required for the warm water system to prevent backflow into the cold supply.
6. It is a mandatory requirement that an expansion control valve is fitted. The expansion control valve must be located in the pipework between the 'cold supply connection to storage water heater' from the warm water valve and 'hot inlet’ connection of the storage water heater. It must not be located in any other position.
7. The warm water valve and storage water heater must both be sized for the intended application.
8. Flow and return pipe sizing and configuration and flow and return pump specification must be such that the following requirements are met:
   i. The 'mixed return' flow rate to the warm water valve is equal to or greater than the minimum flow rate specified for the system selected (see “SPECIFICATIONS” on page 2), and
   ii. The desired delivery temperature is obtained at any warm water outlet.
9. The Ultraviolet Disinfection system (optional) must be sized for the flow rate through the flow and return system.
10. Isolating valves supplied by the installer must be full flow ball or gate valves.

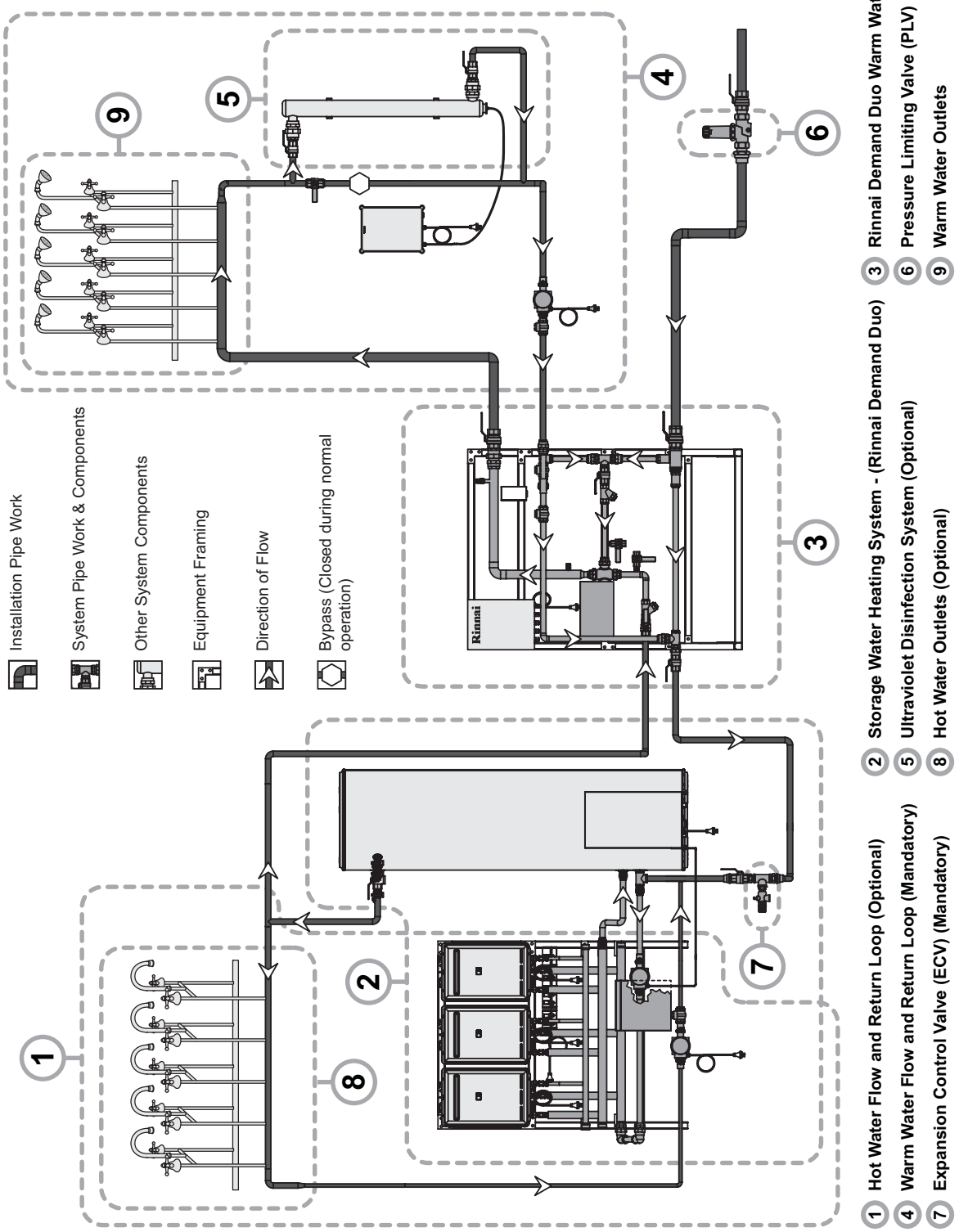


Figure 2 - Demand Duo Warm Water Valve - Typical Installation

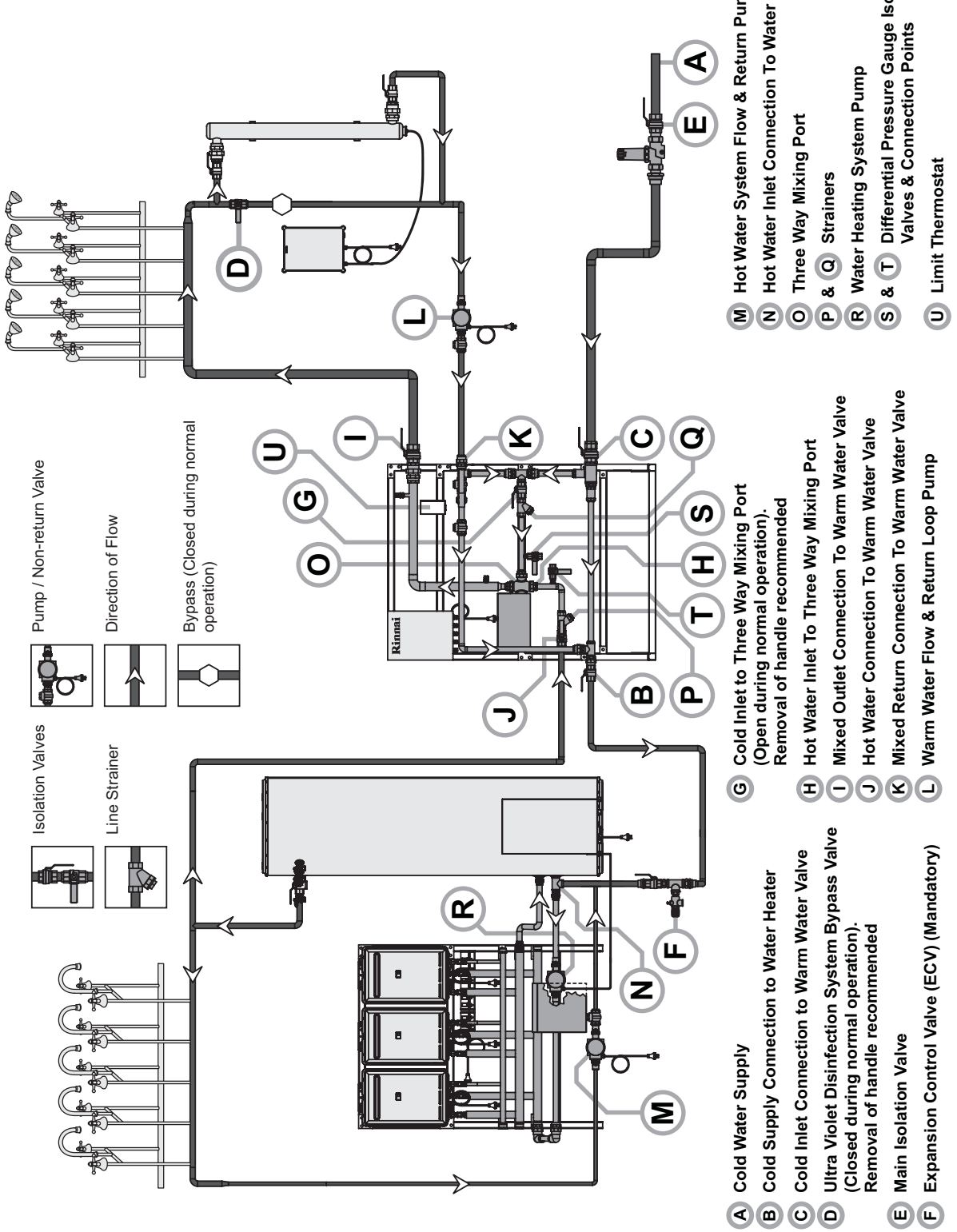


Figure 3 - Demand Duo Water Valve Component Identification

INSTALLATION

GENERAL INFORMATION

Installation, commissioning, operation, maintenance and service must be performed by persons competent and permitted by law to do so in accordance with the manufacturers instructions and the relevant requirements of:

- AS/NZS 3500.4
- AS/NZS 3000
- AS/NZS 4032.3
- Local codes and regulatory authorities

The Demand Duo must be installed in accordance with the 'Rinnai Demand Duo Installation Manual'.

It is important that the Installer understands the operational principles of the system before commencing installation.

The Demand Duo warm water valve is unsuitable for use in pool heating applications.

For external installations of the Demand Duo warm water valve adequate provisions against ingress of water, wind and sunlight must be made.

Access by unauthorised persons must be prevented.

The Ultraviolet Disinfection system (if fitted) must be installed in accordance with manufacturer instructions.

LOCATION

The Demand Duo warm water valve should be located in close proximity to the water heater system to minimise dynamic pressure differences between the hot and cold water inlets to the three way mixing port.

Locate all system components to allow the cold water supply to the warm water valve and the water heating system to come from the same source. The warm water valve has a 'cold to water heater' connection to facilitate this.

It is recommended that the warm water valve, water heating system and Ultraviolet Disinfection system (if fitted) are installed at ground or floor level. They must be accessible without the use of a ladder or scaffold. All components must be accessible for service and removal. With this in mind it is recommended that a clearance of at least 900 mm is maintained around the perimeter of these systems. Installation in roof spaces is not recommended and may contravene local authority regulations.

The warm water valve control box requires electrical power from a switched AC 240V, 50 Hz, earthed mains power outlet rated at 10 A or higher. The system will not operate without electrical power. The power supply cord supplied is 2 metres long.

The Ultraviolet Disinfection system also requires electrical power. Locate the UV system components in accordance with manufacturers instructions.

Plan the installation layout of the warm water valve in relation to the water heating system and plumbing infrastructure. Use suitable anchors to secure the warm water valve assembly base to the floor.

Locate all system components to prevent access by unauthorised persons.

INSTALLATION

Connection sizes are shown in the “SPECIFICATIONS” on page 2. Connections can be made directly to the warm water valve without the need for disconnection unions as all warm water valve connection points contain wrenching flats. Connections to all other system components must incorporate disconnection unions.

Flush and clean all water supply pipes before connection.

Install the Demand Duo warm water valve, water heater, flow and return system piping for warm water, flow and return piping for hot water (if required), Ultraviolet disinfection system (if fitted) interconnection piping and associated valves, unions and pump system components.

IMPORTANT

- **Ensure the mains cold water inlet remains closed until commissioning commences.**
- **DO NOT fill any components with water at this stage.**
- **DO NOT connect the Demand Duo warm water valve, Ultraviolet Disinfection system (if fitted) and any of the circulating pumps to the electrical power supplies at this stage.**
- **DO NOT connect the electric and/or gas supply to the water heating system at this stage.**

COMMISSIONING

GENERAL INFORMATION

Commissioning must be performed by persons competent and permitted by law to do so in accordance with the manufacturers instructions and the relevant requirements of:

- AS/NZS 3500.4
- AS/NZS 3000
- AS/NZS 4032.3
- Local codes and regulatory authorities

IMPORTANT

Ensure building occupants DO NOT have access to any heated water outlets during the commissioning process due to a risk of scald injury.

During commissioning the system is filled with water and switched on so that water heating commences. Commissioning checks are then carried out to set and confirm system performance parameters under various operating conditions.

FILLING THE SYSTEM

To fill the system, follow the steps below (Refer to Figure 2 page 12 and Figure 3 page 13):

Step 1. Open every warm water tap in the building (do not forget the showers).

Step 2. Close the 'cold inlet' ⑨ to the three way mixing port Ⓖ.

Step 3. Progressively open all other remaining system isolation valves including those on the water heating system and flow and return pumps.

Step 4. Air will begin to be forced out of the warm water taps. As water flows freely from each tap, close it.

Step 5. Open the 'cold inlet' to the three way mixing port Ⓖ.

Step 6. Open the nearest warm water tap ⑨. Any remaining air will be forced out. Once water flows freely from the tap, close it.

Step 7. Check the pipe work for leaks.

Step 8. Open the PTR valve on each hot water system storage cylinder, in turn, to check that each is filled with water.

Step 9. Ensure that the inlet and outlet isolating valves to the Ultraviolet Disinfection unit are opened and that the 'bypass' valve Ⓓ is closed.

Step 10. Prime all circulating pumps Ⓛ, Ⓜ and Ⓡ in accordance with the manufacturers instructions. This will usually involve removal of the brass or chrome 'bleeding' screw and allowing a small quantity of water to drip out in the vicinity of the end of the pump shaft.

Step 11. Activate the power supplies to the circulating pumps and Ultraviolet Disinfection system ⑤ (if fitted) in accordance with manufacturers instructions.

Step 12. Activate the power supply to the Demand Duo warm water valve ③.

Start the storage water heating system in accordance with manufacturers instructions to commence water heating.

COMMISSIONING

COMMISSIONING CHECKS

Pre-commissioning Checklist

Before carrying out any commissioning checks, confirm the following:

1. Has it been ensured that building occupants do not have access to any heated water outlets during the commissioning process?
2. Is the Demand Duo warm water valve installed in accordance with these installation Instructions?
3. Is the water heating system installed and commissioned in accordance with the relevant instructions?
4. Is the Ultraviolet Disinfection system installed in accordance with the relevant instructions?
5. Has the system been filled with water and has all air been expelled?
6. Has the installation been checked for leaks and have all leaks been rectified?
7. Have the water supply lines been flushed and cleaned?
8. Have the line strainers been cleared?
9. Has the water heating system been switched on and has the hot water temperature reached at least 60°C?
10. Are system valves and taps opened or closed as required (see “FILLING THE SYSTEM” on page 15).
11. Is the power supply to the Demand Duo warm water valve switched on?
12. Is the power supply to the Ultraviolet Disinfection system switched on?
13. Are all circulating pumps primed and switched on?

Setting and checking Warm Water Delivery Temperature

The warm water delivery temperature obtainable by the end users must be compatible with the intended application and comply with AS 3500.4 and applicable local regulations and requirements. During commissioning the warm water delivery temperature must be set, checked and adjusted (if required) for every installation as applications and site conditions vary.

The Demand Duo warm water valve is factory pre-set to deliver warm water at a temperature of 43° C. It can be adjusted on site to deliver water at a temperature in the range of 35°C to 55°C. Delivery temperatures must always be checked using a calibrated thermometer with suitable accuracy and recorded. The “COMMISSIONING LOG” on page 23 of these instructions can be used for recording purposes.

During commissioning set, check and adjust warm water delivery temperature in accordance with the procedure '“Checking Water Temperature - Full Test” on page 18. The procedure “Checking Water Temperature - Partial Test” on page 19 is not suitable for commissioning purposes.

Checking the warm water delivery temperature obtainable by the end users also forms part of the performance checking and maintenance procedures outlined in the section “CHECKING AND MAINTENANCE” on page 18 and should be performed at least once every 12 months.

Differential Pressure Check

The maximum pressure difference between the hot and cold water inlets to the three way mixing port under flow conditions (dynamic differential pressure) must not exceed 50 kPa for the system to perform as specified (see “SPECIFICATIONS” on page 2). This is checked by connecting a suitable differential pressure gauge. Perform the ‘differential pressure check’ procedure as described in the section “PERFORMANCE CHECKING PROCEDURES” on page 18.

COMMISSIONING

Cold and Hot Water Supply Failure Tests

The cold water supply failure test simulates the failure of cold water supply to the warm water installation whilst a hot water supply still exists. Under these conditions, the system is designed such that the three way mixing port closes against the 'hot supply', resulting in stopping the flow to warm water outlets.

The hot water supply test simulates the failure of hot water supply to the warm water installation whilst a cold water supply still exists. Under these conditions, the system is designed such that the three way mixing port closes against the 'cold supply', resulting in stopping the flow to warm water outlets.

Perform the ‘cold supply failure test’ and ‘hot supply failure test’ as described in the section “PERFORMANCE CHECKING PROCEDURES” on page 18.

Management of Legionella Bacteria Risk during Commissioning

Local regulations and requirements may require that specific activities associated with the risk management of legionella bacteria be carried out before the warm water system is made available for use. These activities may include disinfecting warm water system pipework, collecting water samples and having them analysed for legionella bacteria content and the person(s) responsible for the warm water valve and associated plumbing infrastructure granting permission for the system to be made available for use.

HAND-OVER TO CUSTOMER

After commissioning, the system is ready to be handed over to the customer. Confirm the items on the checklist below:

1. Confirm that the warm water system and all associated components been commissioned in accordance with these instructions.
2. Confirm that measurements taken during commissioning have been appropriately recorded (the “COMMISSIONING LOG” on page 23 of these instructions can be used for recording purposes).
3. Remind the customer that the person or organisation responsible for the warm water valve and associated plumbing infrastructure in a premises must exercise due diligence to ensure that the delivery temperature does not exceed the allowable temperature for a particular application and that the risks associated with legionella bacteria are effectively managed. They may need to conform with specific local regulations and requirements in relation to warm water systems and may require management and maintenance plans to achieve and maintain conformance.
4. Remind the customer of the periodic performance checking and maintenance requirements in these instructions and that these must be carried out by competent persons who are permitted by law to do so.
5. After commissioning it is recommended that the handles for the following valves be removed and kept in a safe place by the person responsible for the warm water valve and associated plumbing infrastructure in the premises to prevent unauthorised opening or closing:
   - Ultraviolet Disinfection System bypass valve
   - Cold supply to the three way mixing port
6. It is recommended that the special key for opening the mixing valve controller box is kept away from the warm water valve in a safe place by the person responsible for the warm water valve and associated plumbing infrastructure to prevent unauthorised opening and adjustment.
7. Leave this manual and a copy of the commissioning log behind the control box door of the Demand Duo Warm Water Valve System. Keep a copy of the commissioning log and forward to Rinnai.
8. Hand this manual to the customer and remind them to put it in a safe and accessible place for future reference.

CHECKING AND MAINTENANCE

GENERAL INFORMATION

It is a requirement in New South Wales that warm water system installations are registered with the local council or other relevant regulatory authority. There may be similar requirements in other States.

The Demand Duo Warm Water Valve contains sophisticated and precision engineered components and should provide many years of safe and reliable service provided it is installed, commissioned, operated and maintained in accordance with these instructions.

It is recommended that the performance checking and maintenance procedures in these instructions are carried out and recorded at least once every 12 months. This frequency is intended as a guide only and may need to be varied depending on site specific operational conditions and any local regulations and requirements. As an example, in healthcare installations the risks to users are generally higher than those in non healthcare installations and this would warrant more frequent performance checking and maintenance in healthcare installations.

For specific information regarding checking and maintenance of the Ultraviolet Disinfection system refer to the manufacturers instructions.

Performance checking and maintenance must be performed by competent personnel.
The “MAINTENANCE LOG” on page 24 of these instructions can be used for recording purposes.

PERFORMANCE CHECKING PROCEDURES

Checking Water Temperature - Full Test

This test must be performed during commissioning for every installation. If carrying out this test as part of commissioning ensure you have read and fully understood the section “Setting and checking Warm Water Delivery Temperature” on page 16.

This test is also recommended for routine checking of water temperature as part of the performance checking and maintenance regime.

This test is carried out at both full and partial flow rates.

Step 1. **NOTE**: This step is carried out during commissioning only. It is not carried out during routine checking and maintenance. Set the delivery temperature of the warm water valve in accordance with the procedure “Delivery Temperature Adjustment” on page 19.

Step 2. Open sufficient warm water outlets ⑨ within the warm water flow and return loop to achieve the design ‘peak flow rate’ of the warm water installation. This is usually 20-30% of the total number of warm water outlets. If in doubt consult the system designer.

Step 3. Check and record the temperature at the outlet nearest to the mixed outlet connection of the warm water valve.

Step 4. Close all warm water outlets.

Step 5. Open the warm water outlet furthest from the mixed outlet connection of the warm water valve. **DO NOT** open any other warm water outlets. Check and record the temperature.

Step 6. Adjust delivery temperature in accordance with the section “Delivery Temperature Adjustment” on page 19.

Step 7. Repeat steps 2 to 6 as required.

Step 8. If the delivery temperature cannot be adjusted to achieve the desired temperature at outlets refer to the section “Fault Finding During Performance Checking” on page 22.

Checking the Limit Thermostat and probe bellows

The Limit Thermostat is shown as item Ⓤ on Figure 3, page 13. The temperature probe for the limit thermostat is located in the ‘mixed outlet. The limit thermostat and temperature probe perform a critical safety function. When activated, it results in the 3 way mixing port being closed against the hot supply and therefore a ‘safe’ warm outlet temperature. It activates only when the mixed outlet temperature reaches the ‘set point’ of the limit thermostat. This set point is reached only when the deliver temperature exceeds the normal operating range which occurs only during operator error or severe failure of critical components in the warm water installation.

IMPORTANT

The ‘set point’ of the limit thermostat is factory set. It must not be altered during commissioning.
Ensure that the bellows (copper tube) between the limit thermostat housing and temperature probe is connected and undamaged.

CHECKING AND MAINTENANCE

Checking Water Temperature - Partial Test

This test is not suitable for commissioning purposes. It is carried out at low flow rate only. It is suitable for use only during routine checking of water temperature when it is impracticable to open all warm water outlets and achieve full flow through the system. The 'Full Test' described above is always the preferred method for checking water temperature.

Step 1. Open the warm water outlet nearest to the mixed outlet connection of the warm water valve and check and record the temperature. Close this outlet.

Step 2. Open the warm water outlet furthest from the mixed outlet connection of the warm water valve. Check and record the temperature. Close this outlet.

Step 3. If the delivery temperature is incorrect, the 'Checking water temperature - full test' must be performed and the delivery temperature adjusted accordingly.

Delivery Temperature Adjustment

The delivery temperature obtainable by the end users must be compatible with the intended application and comply with AS/NZS 3500.4 and applicable local regulations and requirements. The warm water valve controller is factory pre-set to deliver warm water at a temperature of 43°C. It can be adjusted on site to deliver water at a temperature in the range of 35°C to 55°C in accordance with this procedure.

Delivery temperature adjustment should only be necessary during commissioning or after major repairs or alterations to the warm water installation. It should not be necessary during routine checking and maintenance as there should not be significant changes whilst the warm water system is in normal service. The cause(s) of any unacceptable delivery temperature change(s) during normal service must be investigated and rectified prior to performing delivery temperature adjustments. Procedure as follows (Refer to Figure 4):

Step 1. Open the access door to the three way mixing valve controller box using the special key supplied.

Step 2. Press the Enter (Enter) button three times, “SP 1” should be flashing green .

Step 3. Press the UP (▲) or DOWN (▼) buttons as required to change the delivery temperature setpoint.

Step 4. Press the Enter (Enter) button to accept the new delivery set point.

Step 5. Press the ESC (ESC) button twice to return to the normal display.

Step 6. Re-check delivery temperatures in accordance with the procedure “Checking Water Temperature - Full Test” on page 18.

IMPORTANT

It is recommended that the special key for opening the controller box is kept away from the warm water valve in a safe place by the person responsible for the warm water valve and associated plumbing infrastructure to prevent unauthorised opening and adjustment.

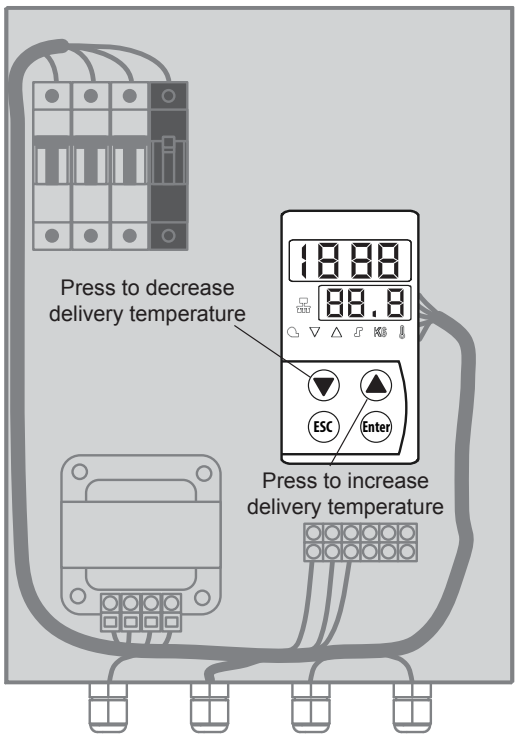


Figure 4 - Delivery temperature adjustment

CHECKING AND MAINTENANCE

Differential Pressure Check

The maximum pressure difference between the hot and cold inlets of the three way mixing port under flow conditions (referred to as the dynamic differential pressure) must not exceed 50 kPa for the system to perform as specified (see “SPECIFICATIONS” on page 2). This is checked by using a suitable differential pressure gauge and connecting it across the 'cold supply' and 'hot supply' connections to the three way mixing port (Figure 3 - Items Ⓖ and Ⓗ) and reading the maximum differential pressure at full flow conditions. A suitable differential pressure gauge is Ambit Instruments, Model CZ 300 DGC with display range of – 100 kPa to + 100 kPa. This gauge operates via a magnetic coupling with a convoluted diaphragm sensor. Gauges by other manufacturers with equivalent specifications are also suitable).

NOTE

It is recommended that the handles for the cold and hot supply valves to the three way mixing port are removed during normal operation and kept in a safe place by the person responsible for the warm water valve and associated plumbing infrastructure to prevent unauthorised adjustment. These handles will need to be retrieved and temporarily fitted for this test.

To carry out the Differential Pressure Check follow the steps below (Refer to Figure 2 page 12 and Figure 3 page 13 for valve and connection locations).

Step 1. Close the mains cold water Ⓒ and hot water Ⓙ to the warm water valve system

Step 2. Open any warm water outlet ⑨ until the flow of warm water reduces to a minimum or stops completely to relieve any residual pressure in the installation. Close this warm water outlet.

Step 3. Close the cold supply Ⓖ to the three way mixing port Ⓞ.

Step 4. Ensure the differential pressure gauge isolating valves Ⓢ and Ⓣ are closed. Connect the differential pressure gauge across the connection points

Step 5. Open the cold supply Ⓖ to the three way mixing port Ⓞ.

Step 6. Restore the mains cold water Ⓒ and hot water Ⓙ to the warm water valve system.

Step 7. Simultaneously open the differential pressure gauge isolating valves Ⓢ and Ⓣ.

Step 8. Open all warm water outlets ⑨ to achieve maximum flow through the warm water installation.

Step 9. Check and record the differential pressure.

Step 10. If the differential pressure is outside the limit in the “SPECIFICATIONS” on page 2 refer to the section “Fault Finding During Performance Checking” on page 22.

Cold Water Supply Failure Test

(Refer to Figure 2 page 12 and Figure 3 page 13 for valve and connection locations)

This test simulates the failure of cold water supply to the warm water installation whilst a hot water supply still exists. Under these conditions, the system is designed such that the three way mixing port closes against the 'hot supply', resulting in stopping the flow to warm water outlets.

The simulation is carried out by closing the 'cold supply' Ⓖ to the three way mixing port Ⓞ within the Demand Duo warm water valve system. If the flow to warm water outlets ⑨ stops the system operation is correct.

NOTE

It is recommended that the handle for the cold supply valve to the three way mixing port Ⓖ is removed and kept in a safe place by the person responsible for the warm water valve and associated plumbing infrastructure in the premises to prevent unauthorised opening or closing. This handle will need to be retrieved and temporarily fitted for this test.

To carry out the cold water supply failure test follow the steps below:

Step 1. Open sufficient warm water outlets ⑨ within the warm water flow and return loop to achieve the design ‘peak flow rate’ of the warm water installation. This is usually 20-30% of the total number of warm water outlets. If in doubt consult the system designer.

Step 2. Check and record the temperature at the warm water outlet ⑨ nearest to the mixed outlet connection Ⓘ of the warm water valve.

Step 3. Close the 'cold supply' Ⓖ to the three way mixing port Ⓞ.

Step 4. Record the maximum temperature at the warm water outlet ⑨ nearest to the mixed outlet connection of the warm water valve and whether the water flow stops.

Step 5. Open the 'cold supply' Ⓖ to the three way mixing port Ⓞ.

Step 6. Record whether water flow recommences at the outlet ⑨ nearest to the mixed outlet connection of the warm water valve Ⓘ and record the maximum and stabilised temperatures.

Step 7. If the flow to warm water outlets ⑨ does not stop refer to the section “Fault Finding During Performance Checking” on page 22.

Step 8. Remove the handle of the cold supply valve Ⓖ to the three way mixing port Ⓞ for safe keeping by the person responsible for the warm water valve and associated plumbing infrastructure in the premises to prevent unauthorised opening or closing.

Hot Water Supply Failure Test

(Refer to Figure 2 page 12 and Figure 3 page 13 for valve and connection locations)

This test simulates the failure of hot water supply to the warm water installation whilst a cold water supply still exists. Under these conditions, the system is designed such that the three way mixing port Ⓞ closes against the 'cold supply' Ⓖ, resulting in stopping the flow to warm water outlets ⑨.

The simulation is carried out by closing the 'hot supply' Ⓙ to the Warm Water Valve System ③. If the flow to warm water outlets ⑨ stops system operation is correct.

NOTE

It is recommended that the handle for the hot supply valve Ⓙ to the Warm Water Valve System ③ is removed and kept in a safe place by the person responsible for the warm water valve and associated plumbing infrastructure in the premises to prevent unauthorised opening or closing. This handle will need to be retrieved and temporarily fitted for this test.

To carry out the hot water supply failure test follow the steps below:

Step 1. Open sufficient warm water outlets ⑨ within the warm water flow and return loop to achieve the design ‘peak flow rate’ of the warm water installation. This is usually 20-30% of the total number of warm water outlets. If in doubt consult the system designer.

Step 2. Check and record the temperature at the warm water outlet ⑨ nearest to the mixed outlet connection Ⓘ of the Warm Water Valve System ③.

Step 3. Close the 'hot supply' Ⓙ to the Warm Water Valve System ③.

Step 4. Record the maximum temperature at the warm water outlet ⑨ nearest to the mixed outlet connection of the warm water valve Ⓘ and whether the water flow stops.

Step 5. Open the 'hot supply' Ⓙ to the Warm Water Valve System ③.

Step 6. Record whether water flow recommences at the warm water outlet ⑨ nearest to the mixed outlet connection of the warm water valve Ⓘ and record the maximum and stabilised temperatures.

Step 7. If the flow to warm water outlets ⑨ does not stop refer to the section “Fault Finding During Performance Checking” on page 22.

CHECKING AND MAINTENANCE

Testing Associated With The Management Of Legionella Bacteria Risk

Carry out periodic testing of the Ultraviolet Disinfection system in accordance with manufacturers instructions and any local regulations and requirements.

Local regulations and requirements may also require that specific testing activities associated with the risk management of legionella bacteria are carried out on the warm water system. These activities may include the collection of water samples and having them analysed for legionella bacteria content and keeping appropriate records.

Fault Finding During Performance Checking

The table below applies when performance checking of the warm water valve is being carried out and a fault is apparent.

TABLE 3 - FAULT FINDING

FAULT	POSSIBLE CAUSES
Delivery temperature not hot enough or goes hot and cold.	• Warm water valve system power supply switched off. • Warm water valve system thermostat adjusted incorrectly. • No electrical or gas supplies to the hot water system • Incorrectly adjusted hot water system thermostat. • Power supply to circulating pumps switched off. • Circulating pumps not operating correctly (check priming and flow through pumps). • System valves that are meant to be open are shut and vice versa. • Faults in the plumbing pipework (check for cross connections between hot/cold/warm pipework, non return valves installed the wrong way around etc.) • Blocked strainers. • Design flaws (undersized pumps, undersized hot water system, incorrectly sized or configured pipework). • Defective three way mixing port or control system. • Defective hot water system.
Dynamic differential pressure exceeds 50 kPa.	• Blocked strainers. • System valves that are meant to be open are shut and vice versa. • Faults in plumbing pipework (check for non return valves installed the wrong way around, incorrect positioning of pressure limiting valves). • Incorrectly designed pipework between warm water valve and (length, size and path).
Flow from warm water outlets continues during hot water supply failure tests.	• Warm water valve system power supply switched off • System valves that are meant to be open are shut and vice versa. • Faults in the plumbing pipework (check for cross connections between hot/cold/warm pipework, non return valves installed the wrong way around etc.) • Defective three way mixing valve or control system.

MAINTENANCE PROCEDURES

Three way mixing port

The three way mixing port and controller require no periodic maintenance. If the mixing port or controller are faulty they must be returned to Rinnai.

The port contains sophisticated and precision engineered components and are individually checked and calibrated during manufacture. Any unauthorised disassembly and reassembly will void the factory checks and calibration and may result in a dangerous situation if re-used.

System strainers

System strainers will require periodic cleaning to maintain optimum system operation. Figure 3 shows the likely locations of strainers. The number of strainers and their location may vary from installation to installation.

Maintenance associated with the management of Legionella bacteria risk

Carry out maintenance of the Ultraviolet Disinfection system in accordance with manufacturers instructions and any local regulations and requirements.

Local regulations and requirements may also require that specific maintenance activities associated with the risk management of legionella bacteria are carried out on the warm water system. These activities may include flushing and disinfection of warm water system pipework and keeping appropriate records.

COMMISSIONING LOG

Model / Serial Number			
Date Of Manufacture / /		Date Of Commissioning / /	
Hot Water System Details	Manufacturer		
	Model/serial Number		
Commissioning Address Details	Name Of Organisation		
	Address		
	Phone Number		
	Contact Person		

ITEM	RESULT		COMMENTS
Water Supply Lines Flushed And Cleaned			
Line Strainers Cleared			
System Checked For Leaks			
Cold Water - Maximum Supply Pressure			
Hot Water	Maximum Supply Pressure	kPa	
	Temperature	°C	
Confirmation Of Warm Water Delivery Temperature	At Furthest Outlet & Max Flow	°C	
	At Nearest Outlet And Minimum Flow	°C	
Delivery Temperature Set-Point on Controller			
Differential Pressure Check	Max Differential	kPa	
Cold Water Supply Failure Test	Max Temp After Cold Shut	°C	
	Confirm Flow Stops	Yes / No	
	Max Temp After Cold Opened	°C	
	Stabilised Temp After Cold Opened	°C	
Hot Water Supply Failure Test	Max Temp After Hot Shut	°C	
	Confirm Flow Stops	Yes / No	
	Max Temp After Hot Opened	°C	
	Stabilised Temp After Hot Opened	°C	
Management Of Legionella Bacteria Risk During Commissioning			
Ultraviolet Disinfection System Operational			
Removal Of Ultraviolet Disinfection Bypass Valve Handle After Commissioning			
Removal Of Cold Supply To Three Way Mixing Port Handle			
Special Key For Opening Mixing Port Controller Box Kept In Safe Place			

Commissioning Officer Details	Name		
	Organisation		
	Phone Number		
	Signature	Date / /	

MAINTENANCE LOG

PERFORMANCE CHECKING AND MAINTENANCE LOG										
DATE	WARM WATER TEMP CHECK		DIFFERENTIAL PRESSURE CHECK	COLD WATER SUPPLY FAILURE TEST	HOT WATER SUPPLY FAILURE TEST	STRAINERS CLEANED	UV HOURS RUN	UV TUBE(S) CLEANED/ REPLACED	OTHER CHECKS / COMMENTS	NAME & SIGNATURE
	At furthest outlet and max flow	At nearest outlet and min flow								
				Max Temp after cold shut	Max Temp after hot shut					
				Confirm flow stops	Confirm flow stops					
				Max Temp after cold opened	Max Temp after hot opened					
				Stabilised Temp after cold opened	Stabilised Temp after hot opened					

PERFORMANCE CHECKING AND MAINTENANCE LOG										
DATE	WARM WATER TEMP CHECK		DIFFERENTIAL PRESSURE CHECK	COLD WATER SUPPLY FAILURE TEST	HOT WATER SUPPLY FAILURE TEST	STRAINERS CLEANED	UV HOURS RUN	UV TUBE(S) CLEANED/ REPLACED	OTHER CHECKS / COMMENTS	NAME & SIGNATURE
	At furthest outlet and max flow	At nearest outlet and min flow								
				Max Temp after cold shut	Max Temp after hot shut					
				Confirm flow stops	Confirm flow stops					
				Max Temp after cold opened	Max Temp after hot opened					
				Stabilised Temp after cold opened	Stabilised Temp after hot opened					

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Monday to Friday, 8.00 am to 5.00 pm EST.

After Hours Hot Water Service Line
Tel: 1800 000 340*

**Cost of a local call higher from mobile or public phones.*

For further information visit **www.rinnai.com.au**
or email **enquiry@rinnai.com.au**

Rinnai has a Service and Spare Parts network with personnel who are fully trained and equipped to give the best service on your Rinnai appliance. If your appliance requires service, please call our National Help Line.

With our policy of continuous improvement, we reserve the right to change, or discontinue at any time, specifications or designs without notice.