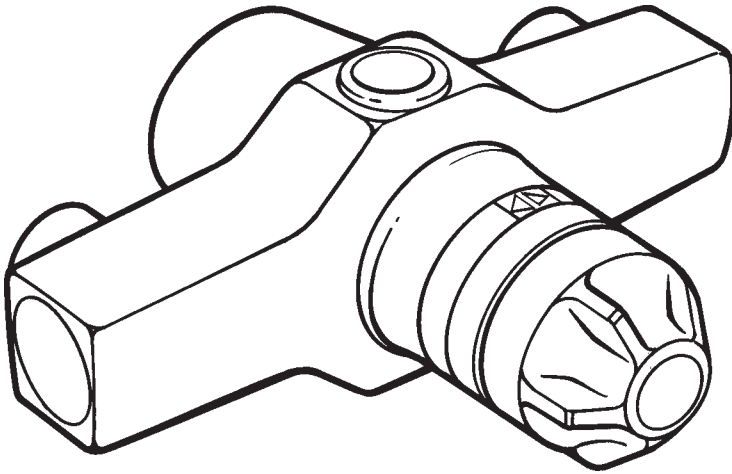




**15 SERIES
THERMOSTATIC
MIXING VALVE**



PRODUCT MANUAL

IMPORTANT

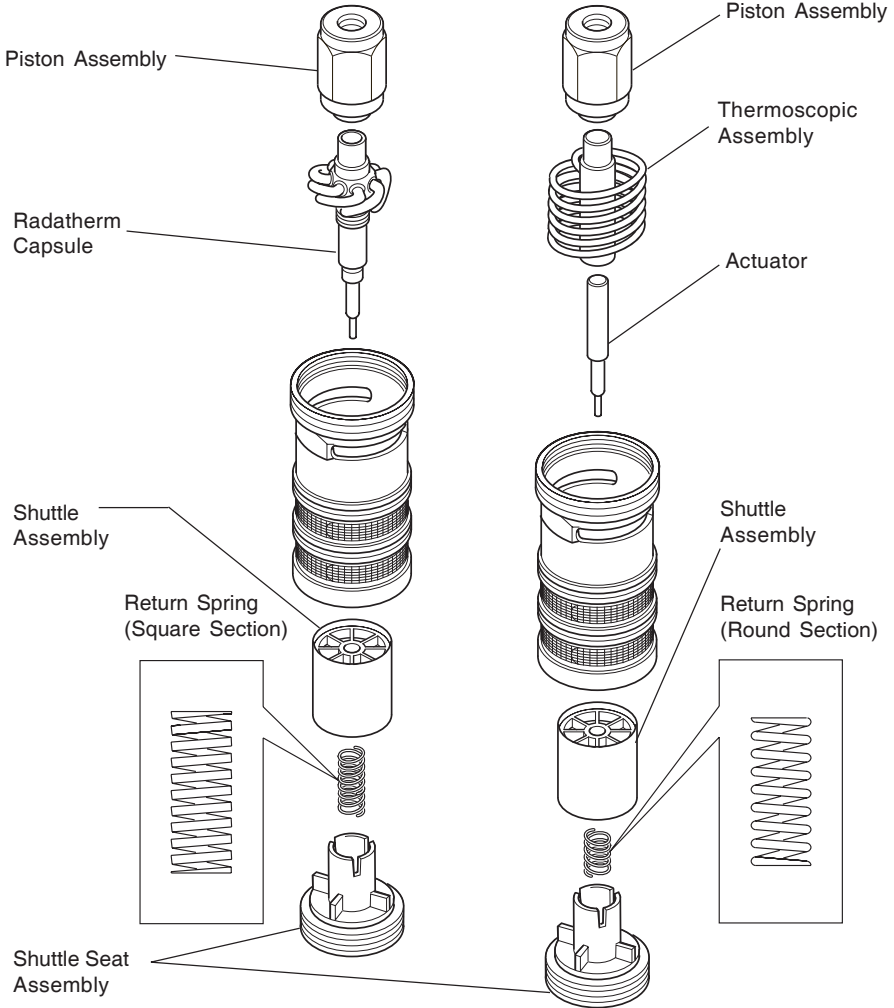
Installer: This manual is the property of the customer and must be retained with the product for maintenance and operational purposes.

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IMPORTANT INFORMATION

Important! The **Radatherm Assembly** detailed in this manual replaces an older design thermoscopic assembly (illustrated below). Therefore, the illustrations and descriptions that follow may differ from your product.



New

Part of Radatherm Cartridge Assembly.

Old

Part of Thermoscopic Cartridge Assembly.

All three new components (piston assembly, radatherm capsule and return spring) **must** be fitted together if replacing the old design (piston assembly, thermoscopic assembly, actuator and return spring).

INTRODUCTION

Rada Thermostatic mixing valves are specified to meet the highest standards of safety, comfort and economy as demanded by today's users. All Rada products are designed, manufactured and supported in accordance with accredited BS EN ISO 9001:1994 Quality Systems.

DESCRIPTION

A 1/2" thermostatic mixing valve to provide water at safe, accurate temperatures for ablutionary or process requirements. The mixing valve inlets incorporate strainers and checkvalves, housed within readily accessible cartridges for easy maintenance.

Product Range

- Rada 15** - Exposed model, surface mounted, 15 mm compression connections / 1/2" BSP unions.
- Rada 15z** - Exposed model, pipework mounted, inlets 3/4 " BSP union, outlet 15 mm compression / 1/2" BSP connection.
- Rada 15dk** - Concealed model, duct/cupboard mounting, 1/2" BSP internal unions.
- Rada 15b** - Concealed model, built-in mounting, 1/2" BSP internal unions.

All models are provided with optional temperature-locking facility (standard on dk model).

Lever-operated (H) knobs are available separately.

SAFETY WARNINGS

The function of this valve is to deliver water consistently at a desired temperature. This requires that:

1. It is installed, commissioned, operated and maintained in accordance with the recommendations given in this Manual.
2. Periodic attention is given, as necessary, to maintain the product in good functional order. Recommended guidelines are given in the **PLANNED MAINTENANCE** section.
3. Using this product outside the specification limits given in this Manual can present potential risk to users.

Anyone who may have difficulty in understanding or operating the controls of any shower should be attended whilst showering. Particular consideration should be given to the young, the elderly, the infirm, or anyone inexperienced in the correct operation of the controls.

Ultimately, the user or attendant must exercise due diligence to ensure that the delivery of warm water is at a stable, safe temperature. This is particularly important in such health care procedures as supervised bathing involving patients unable to respond immediately to unsafe temperatures.

The use of the word ‘failsafe’ to describe the function of any mixing valve is both incorrect and misleading. In keeping with every other mechanism it cannot be considered as being functionally infallible.

Provided that the thermostatic mixing valve is installed, commissioned, operated within the specification limits and maintained according to this manual, the risk of malfunction, if not eliminated, is considerably reduced.

Malfunction of thermostatic mixing valves is almost always progressive in nature and will be detected by the use of proper temperature checking and maintenance routines. Certain types of system can result in the thermostatic mixing valve having excessive ‘dead legs’ of pipework. Others allow an auxilliary cold water supply to be added to the mixed water from the mixing valve. Such systems can disguise the onset of thermostatic mixing valve malfunction.

SPECIFICATIONS

Important Points:

1. The installation, commissioning and maintenance of this product must be carried out in accordance with instructions given in this Manual, and must be conducted by designated, qualified and competent personnel.
2. The installation must comply with the “Water Supply Regulations 1999 (Water Fittings)” or any particular regulations and practices, specified by the local water company or water undertakers.
3. Suitable for use with most modulating Instantaneous Gas Water Heaters. For information on Multipoint Electric Water Heaters, refer to Data Sheet P1992. For information on other specific applications or suitability, refer to Kohler Mira Limited, or Local Agent.
4. Where chlorine disinfection is practised, **DO NOT** exceed a chlorine concentration of 50 mg/l (ppm) in water, per one hour dwell time. Such procedures must be conducted strictly in accordance with the information supplied with the disinfectant and with all relevant Guidelines/Approved Codes of Practice.
If in any doubt as to the suitability of chemical solutions, contact Kohler Mira Ltd, or your Local Agent.

Normal Operating Conditions are considered as:

1. Inlet dynamic pressures nominally balanced to within 10% of each other during flow.
2. Differential of approximately 50°C between the hot and cold inlet temperatures, and with differentials of 15-35°C between the blend setting and either supply.
3. Daily usage of 1-6 hours.
4. Installation and usage environment not subject to extremes of temperature, unauthorised tampering or wilful abuse.

Operating Parameters: Pressures/Flow Rates

For **optimum** performance, dynamic supply pressures should be nominally equal.

Recommended Minimum Flow Rate: 5 litres/minute at mid-blend with equal dynamic supply pressures.

Recommended Maximum Flow Rate: 56 litres/min at mid-blend (which equates to a maximum pressure loss of 5.0 bar).

Maximum Pressure Loss Ratio*: should not exceed **10:1**, in favour of either supply, during flow.

Recommended Minimum Dynamic Supply Pressure: 0.2 bar.

Recommended Maximum Dynamic Supply Pressure: 8.5 bar.

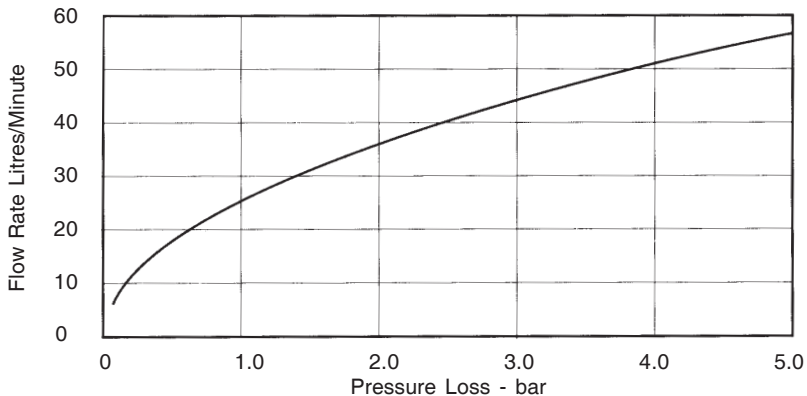
Maximum Static Supply Pressure: 10 bar.

Recommended maximum flow velocity in pipelines is 2 metre/second.

*Pressure Loss Ratio is determined by subtracting the resistance to flow of the outlet pipework and outlet fittings (generally known as “back pressure”, and measured at the outlet of the mixing valve) from the dynamic pressures of the hot and cold water at each inlet of the mixing valve. This is at its extreme when the mixing valve is being used at its lowest flow rate and when the maximum inequality occurs in the pressure of the hot and cold water supplies.

Hydraulic restriction: Flow Rate/Pressure Loss Graph - all models

(Mixing valve only, equal dynamic supply pressures, unrestricted outlet and mid-blend temperature setting)



Operating Parameters: Temperatures

Optimum performance is obtained when **temperature differentials** of **20°C** or more exist between blend and either supply. Blend control accuracy will begin to diminish at temperature differentials below **12°C**.

Blend Temperature Range: between ambient cold and hot water supply temperatures.

Thermostatic Control Range: (for thermostats fitted as standard from May 1993): **30-70°C**.

Recommended Minimum Cold Water Supply Temperature: 1°C.

Recommended Maximum Hot Water Supply Temperature: 85°C.

Note! Thermostats fitted as standard or supplied as spares from May 1993 can accept temporary temperature excursions above 85°C without damage, however operation of the mixing valve at such elevated temperatures is not recommended. For reasons of general safety, hot water storage temperatures should ideally be maintained at between 60-65°C where serving ablutionary applications.

Flow Control:

Rada 15 series mixing valves do not have integral flow control; appropriate provision must be made for this in the outlet pipework.

This can be in the form of basin tap, stop-cock, mechanical timed-flow controller or solenoid.

The device chosen should be non-concussive in operation.

Connections: Inlets and Outlet

- Rada 15** - **Inlets:** 15 mm compression connections to accept rising, falling or horizontal supplies. Alternatively, a 1/2" BSP internal horizontal union (rear-facing) is available.
- **Outlet:** 15 mm compression/ 1/2" BSP external/internal union.
- Rada 15z** - **Inlets:** 3/4" BSP internal unions to accept optional 1/2" BSP external offset unions. 115-165 mm variable inlet centres (using offset connectors), to accept rear-fed parallel or taper sockets.
- **Outlet:** 1/2" BSP internal union.
- Rada 15dk** - **Inlets and Outlet:** 1/2" BSP internal union.
- Rada 15b** - **Inlets and Outlet:** 1/2" BSP internal union.

Standard Connections are:

hot - left (marked **red**)

cold - right (marked **blue**)

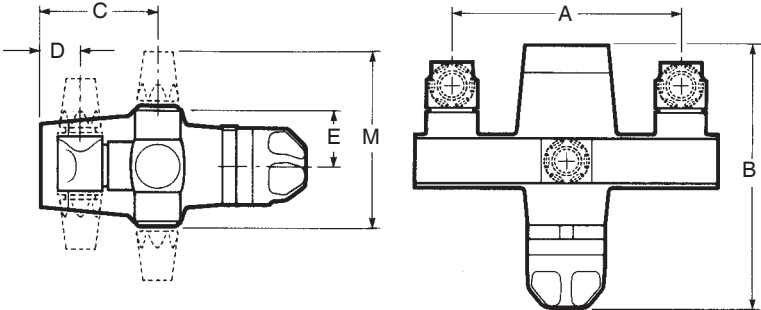
Note! Should the supplies be reversed then the mixing valve will not be able to control temperature.

All models can operate in any plane, and may be inverted if necessary for supply pipework layout convenience, provided hot and cold pipework are connected to the appropriate inlets (hot - red, cold - blue).

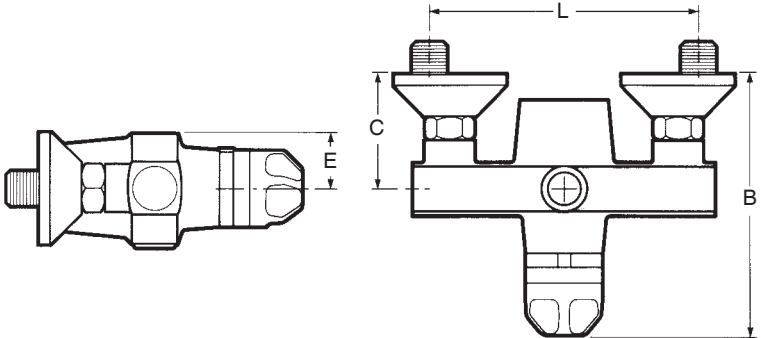
DIMENSIONS

	mm		mm
A	140	I	146
B	160	J	70-85
C	70	K	142
D	23 (nominal)	L	115-165
E	34	M	106
F	36	N	104
G	47	P	144
H	152	O	120

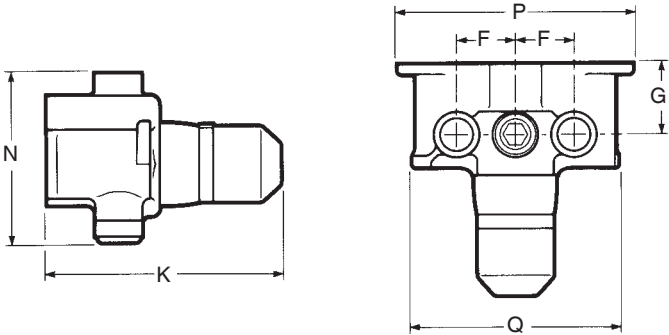
Rada 15



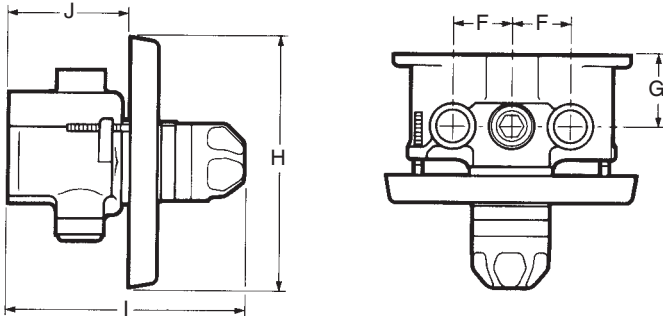
Rada 15z



Rada 15dk



Rada 15b



INSTALLATION

General

Installation must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel.

1. Before commencing, make sure that the installation conditions comply with the information given in the **SPECIFICATION** section.
2. Care must be taken during installation to prevent any risk of injury or damage.
3. The mixing valve should be positioned for easy access during use and maintenance. All routine maintenance procedures can be conducted with the mixing valve body in place. For all models, allow a minimum 150 mm frontal clearance to enable removal of the Thermostatic Cartridge assembly (412 01) from the mixing valve body during maintenance. With exposed models make sure that there is sufficient side clearance (minimum 75 mm) for removal of checkvalve cartridge.
4. Conveniently situated isolating valves **must** be provided for maintenance.
5. The use of supply-line or zone strainers will reduce the need to remove debris at each mixing valve point. The recommended maximum mesh aperture dimension for such strainers is 0.5 mm.
6. Pipework must be rigidly supported.
7. Pipework dead-legs should be kept to a minimum.
8. Supply pipework layout should be arranged to minimise the effect of other outlet usage upon the dynamic pressures at the mixing valve inlets.
9. Inlet and outlet threaded joint connections should be made with PTFE tape or liquid sealant. Do not use oil-based, non-setting jointing compounds.
10. To eliminate pipe debris it is essential that supply pipes are thoroughly flushed through before connection to the mixing valve.

Rada 15

1. Loosen backplate grub screw (619 30) using 3 mm hexagon key provided, and pull off backplate (807 29).
2. - For 15 mm compression pipework/inlet connections: remove compression nuts/olives from inlet elbows (030 35). Suitably joint and tighten the flat-faced external union elbow connector into the valve inlets to suit direction of inlet supplies.
- For ½" BSP union inlet connections (inlet elbow 030 35 is not used): suitably joint and tighten the selected external union inlet connector into the valve inlets. Make sure that adequate access will be available for connection to inlet supplies when valve is mounted on wall.
3. Fix backplate to wall, with grub screw at bottom, using wall screws/plugs provided if appropriate. Replace valve onto backplate and tighten grub screw.
4. Connect inlet and outlet pipework, make sure that the hot and cold supplies have been piped to the correct inlets, and check all connections are watertight.

Note! For models supplied with 15 mm compression connections where ½" BSP outlet connection is required, remove outlet nipple (552 01) using 15 mm hexagon wrench, and reverse with gasket (641 19) to provide flat-faced external union, or discard for internal union.

Refer to **COMMISSIONING**.

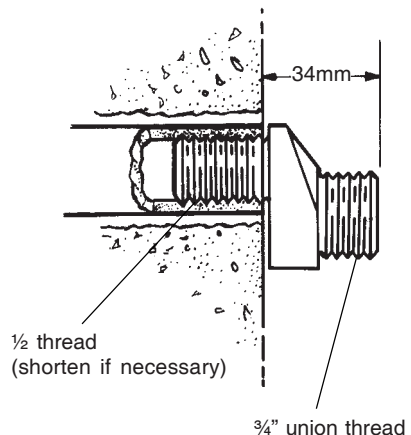
Rada 15z (with optional offset adaptors)

1. Make sure that the hot and cold supplies are piped to the correct inlet positions. Supplies (pipe centres between 115-165 mm) must terminate in ½" BSP internal sockets to within 3 mm, above or below, the final wall surface.

Note! It is essential that the inlet supply sockets are parallel, and square with wall surface.

2. Joint offset connectors (555 14) and screw into sockets so that faced edge is 34 mm proud of final wall surface (refer to illustration). Shorten ½" BSP external thread, if necessary.
3. Screw pipe concealing plates (076 59) onto offset connectors.
4. With union gaskets (634 61) in position, offer up mixing valve and tighten union nuts onto offset connectors.
5. Connect outlet pipework, and check all connections are watertight.

Refer to **COMMISSIONING**.

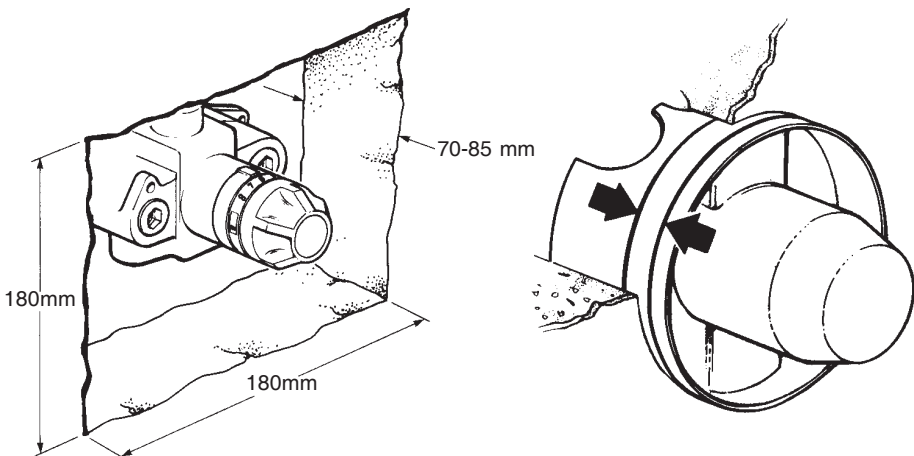


Rada 15dk

1. Fix the valve into position, using wall screws/plugs provided, if appropriate.
2. Run inlet and outlet pipework to the mixing valve, make sure that the hot and cold supplies have been piped to the correct inlets.
3. Connect inlet and outlet pipework, and check all connections are watertight.
Refer to **COMMISSIONING** .

Rada 15b - wall recess

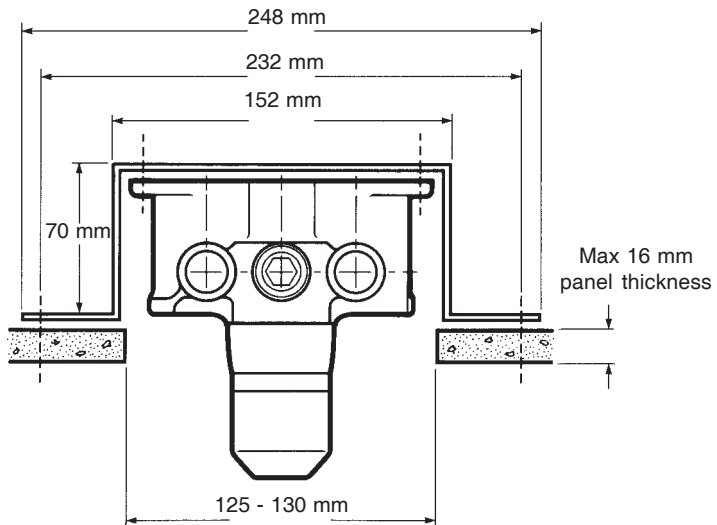
1. To allow for connection of pipework, the recess in the wall should be approximately 180 mm x 180 mm x 70-85 mm (refer to illustration). The depth of concealment is critical.
2. Remove building-in shroud (079 15) and fix valve into recess, using wall screws/plugs provided if appropriate.
3. Connect inlet and outlet pipework, make sure that the hot and cold supplies are piped to the correct inlets, and check all connections are watertight.
4. Replace building-in shroud over mixing valve and secure into correct position with bracket screws (618 35).
5. Plaster and tile, or finish as appropriate, up to edge of shroud. **Final wall surface must fall between 2 lines on building-in shroud** (refer to illustration).
6. When wall surface is finished, remove the building-in shroud and, with bracket seal (641 47) in place, fasten concealing plate bracket (117 15) with flat side against wall surface, to valve body using bracket (shroud) screws (618 35).
7. Place spacer seal (641 48) over mixing valve and push concealing plate (076 55) firmly into position.
Refer to **COMMISSIONING**.



Rada 15b - panel

1. An optional Support Bracket assembly (805 40) is available to assist mounting of the Rada 15 to the rear face of panels, fascia, etc.
2. The maximum thickness of the mounting panel must not exceed 16 mm including surface finishing, tiles, etc. (refer to illustration).
The minimum rear clearance required is 75 mm
3. Provide a circular hole 125- 130 mm diameter in the mounting panel.
4. If access is available it may be preferable to make the initial inlet/pipework connections prior to securing the valve to the panel.
5. Select suitable method of securing bracket to panel, mark and prepare bracket fixing holes at 232 mm centres.
6. Secure valve to bracket with screws provided, and fix assembly to panel.
7. Connect inlet and outlet pipework as appropriate, ensuring that the hot and cold supplies are piped to the correct inlets, and check all connections are watertight.
8. With bracket seal (641 47) in place, fasten concealing plate bracket (117 15), with flat side against panel surface, to valve body using bracket screws (618 35).
9. Place spacer seal (641 48) over mixing valve and push concealing plate (076 55) firmly into position.

Refer to **COMMISSIONING**.



COMMISSIONING

Commissioning must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel.

Maximum Temperature

The maximum blend temperature obtainable by the user should be limited, to prevent accidental selection of a temperature that is too hot.

All Rada Thermostatic mixing valves are fully performance tested individually and the maximum temperature is pre-set to approximately 45°C under ideal installation conditions at the factory.

Site conditions and personal preference may dictate that the maximum temperature has to be reset following installation.

This mixing valve is provided with two methods of temperature setting, a (fluted) temperature knob which allows the user to select the blend temperature between ambient cold up to a pre-set maximum, or if considered more appropriate, a locked (unfluted) temperature knob allowing no user adjustment.

Maximum Temperature Setting

Make sure that an adequate supply of hot water is available at the hot inlet of the mixing valve. Whilst the minimum temperature of the hot water must be at least 12°C above the desired blend, during resetting this should be close to the typical storage maximum to offset the possibility of any blend shift due to fluctuating supply temperatures.

Make sure that both inlet isolating valves are fully open.

Temperatures should always be recorded using a thermometer with proven accuracy.

For Adjustable Temperature;

1. Prise off concealing cap (106 46). Remove temperature knob screw (615 40) and lockwasher (642 42), and pull off temperature knob (916 67). Refer to illustration.
2. Remove circlip (573 27) and pull off hub (237 20).

Note! Leave pressure washer (639 67) in place on spindle.

3. Use inverted hub (secured with circlip) to rotate the spindle until required maximum blend temperature is obtained at discharge point; turn clockwise to increase, anti-clockwise to decrease temperature.

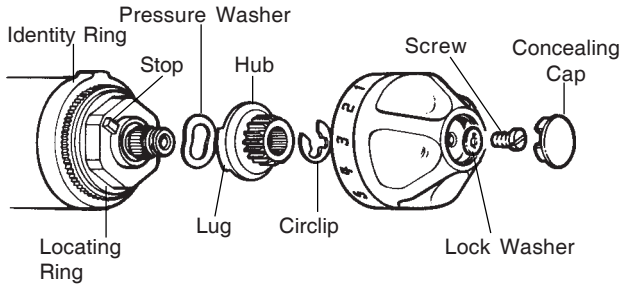
When resistance is felt do not use force to turn any further, as this can damage the internal parts.

4. Once the desired maximum blend temperature is achieved, gently remove the hub and, without disturbing the spindle, reposition it so that the lug is against the brass stop on body head nut, so preventing further clockwise rotation.

Make sure that pressure washer is in place on spindle behind hub.

Check that blend temperature has not altered.

- Replace circlip. Rotate spindle clockwise so lug is against stop, and replace temperature knob ensuring that number 9 on indicator ring is positioned in line with arrow at top of identity ring.
- Replace temperature knob screw and concealing cap.



For Locked Temperature;

- (Initial setting)** Prise off concealing cap (106 46), remove temperature knob screw (615 40) and temperature knob (916 67), and discard.
(Resetting) Remove locking screw (616 01) using 2.5 mm hexagon key, and locking shroud (085 26). Refer to illustration.

- Remove circlip (573 27) and pull off hub (237 20).

Note! Leave pressure washer (639 67) in place on spindle.

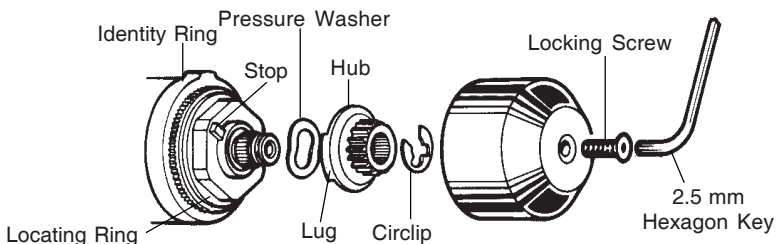
- Use inverted hub (secured with circlip) to rotate the spindle until required blend temperature is obtained at discharge point: turn clockwise to increase, anti-clockwise to decrease temperature.

When resistance is felt do not use force to turn any further, as this can damage the internal parts.

- Once the desired maximum blend temperature is achieved, gently remove the hub and, without disturbing the spindle, reposition it so that the lug is against the brass stop on body head nut, so preventing further clockwise rotation.

Ensure that pressure washer is in place on spindle behind hub. Check that blend temperature has not altered.

- Replace circlip. Rotate spindle clockwise so lug is against stop.
- Replace the locking shroud over the hexagon of the headnut and tighten the locking screw firmly.



Commissioning Checks

The following checks should be carried out following a cartridge replacement and whenever a valve is introduced to, or returned to service.

(Temperatures should always be recorded with a thermometer with proven accuracy).

1. Check inlet pipework temperatures for correct function of checkvalves.
2. Check that the supply pressures are within the range of operating pressures for the valve
3. Adjust the temperature of the mixed water in accordance with the instructions (refer to section: '**Maximum Temperature Setting**').
4. Operate the outlet flow control and check:
 - (a) Flow rate is sufficient for purpose.
 - (b) Temperature(s) obtainable are acceptable.
5. It is advisable to establish a performance check at this time, which should be noted for future reference as part of a Planned Maintenance Programme.
6. Do the following check:
 - (a) the supply temperatures are within the range permitted for the valve and by guidance information on the prevention of legionella etc.
7. Carry out the following sequence:
 - (a) record the temperature and pressure of the hot and cold water supplies.
 - (b) record the temperature and flow rate of the mixed water at the largest draw-off flow rate.
 - (c) record the temperature and flow rate of the mixed water at about the smallest draw-off flow rate.
 - (d) isolate the cold water supply to the mixing valve and monitor the mixed water temperature.
 - (e) record the maximum temperature achieved as a result of (d) and the final temperature.
 - (f) record the date, equipment, thermometer etc. used for the measurements.

OPERATION

For models with standard temperature knob fitted, adjustment of blend temperature from cool to preset maximum is achieved by rotation of the knob; clockwise to increase, anti-clockwise to decrease.

For models with locked temperature control, no user adjustment is intended.

Control of flow is via separate outlet valve(s)

Refer to section: '**Specifications, Flow Control**'.

MAINTENANCE

Rada products are precision-engineered and should give continued superior and safe performance, provided:

1. They are installed, commissioned, operated and maintained in accordance with these recommendations, and
2. Periodic attention is given as necessary to maintain the product in good functional order. Guidelines for maintenance frequency are given below.

Note! This range of mixing valves has been designed to be readily maintained, most particularly with regard to their Cartridge construction. In larger installations with a number of mixing valves, it is good policy to maintain a small stock of spare Cartridges so that a rolling programme of replacement can be undertaken as part of a planned maintenance procedure. The advantages here are that, firstly, no mixing valve or facility need be out of commission for more than the time it takes to exchange the Cartridge, and secondly, Cartridge refurbishment can be undertaken in the convenience of a workshop.

Planned Maintenance Programmes (Preventative/Precautionary Maintenance)

The frequency and extent of attention required will vary according to prevailing site and operational conditions however, the following guideline schedule is suggested to cover average duty and site conditions:

1. It is recommended that a routine of preventative maintenance be employed which is based upon assessment of the risks to the user. The following practices are intended to support such a routine:
 - In-service tests
 - Regular temperature checking in between In-service tests
 - Maintenance of a log of In-service tests and temperature checks together with details of critical component replacements and any other service work.
2. Thermostatic mixing valves only operate correctly when all components have been serviced and have been tested for correct performance. If any component is faulty, including the thermostat the valve will not operate correctly and could allow full hot water to pass through the valve.
3. As with all other thermostatic mixing valves, the critical sensing element in the Rada 15 (part number 412 02 Rada 15 Radatherm Capsule) together with other "critical components" (Para 4) will exhibit wear over a period of time and usage. The designed minimum service life of all these "critical components" is 5 years providing the Rada 15 is operated with the recommended operating conditions and within the recommended operating parameters. However, when supply conditions and/or usage patterns do not conform to the recommended operating parameters and/or the recommended operating conditions, the thermoscopic unit and other critical parts may need to be replaced more frequently ('recommended operating conditions' and 'recommended parameters' are defined in section: '**Specifications**'.)

Important! In health care applications such as hospitals, aged persons facilities, residential care homes, etc. and in any other applications where the user is similarly at risk, irrespective of supply and usage conditions or the evidence of in-service tests, the critical components should be replaced at intervals of no more than 3 years.

4. Rada 15 "Critical components" are defined as follows:

Part Number	Description
412 02	Radatherm Capsule
631 07	Seal - separator
925 25	Shuttle assembly
547 94	Shuttle seat assembly
412 04	Return spring
412 09	Piston assembly

During the fitting of critical components listed in the table above it may be necessary to replace other non-critical components.

5. In-service test for Rada 15 Thermostatic Mixing Valves

The principal means for determining the continuing satisfactory performance of the mixing valve is the In-service test. The In-service test procedure is shown in Graph 1. This should be carried out at both 6 to 8 weeks and 12 to 15 weeks after commissioning the valve. The results of these tests are used to determine when, after initial commissioning, the in-service test is next repeated.

6. Frequency of In-service tests

The 'Guide to in-service test frequency' is shown in Graph 2. The in-service test results over the first 28 weeks after commissioning determine the ongoing frequency of testing shown in the right hand boxes of the Guide.

Whenever a Thermostatic Unit and/or critical components are replaced, the in-service test frequency should be reassessed as if it was a new valve.

NOTE: In-service tests should be carried out with a frequency, which identifies a need for service work before an unsafe water temperature can result. The general principal to be observed after the first 2 or 3 in-service tests is that, intervals of future tests should be set to those which previous tests have shown can be achieved with no more than a small change in mixed water temperature. But in no case longer than 12 months.

7. Temperature Testing (In between In-Service Tests)

Check and record warm water temperature regularly to confirm correct operating performance of the valve. In health care applications such as hospitals, aged persons facility, nursing homes etc. such checks must be made at least every month. 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 the contact with the water. Records of warm water temperature checks should be included in a log book.

8. Thermostatic Mixing Valve Performance Records (Log Book)

It is recommended that the user maintains a log of the in-service tests described herein, together with a record of any service work carried out and the replacement of critical components. It is also recommended that any maintenance personnel sign the user log in respect of all thermostatic mixing valves examined on each attendance at the user's premises. Refer to section: '**Recommended content of Maintenance Log**'.

9. Training

Maintenance personnel should also ensure that the user's staff are aware of the importance of reporting temperature variations and that when detected, these should be recorded in the log.

FAULT DIAGNOSIS

Symptom	Cause/Rectification
1. Only hot or cold water from outlet.	<p>a. Inlet supplies reversed (i.e. hot supply to cold inlet). Check.</p> <p>b. No hot water reaching mixing valve. Check.</p> <p>c. Check strainers and inlet/outlet fittings for blockage.</p> <p>d. Refer symptom 5 below.</p> <p>e. Installation conditions continuously outside of operating parameters: refer to SPECIFICATION, and undertake performance check; maintain as necessary.</p>
2. Fluctuating or reduced flow rate.	<p>Normal function of mixing valve when operating conditions are unsatisfactory;</p> <p>a. Check strainers and inlet/outlet fittings for flow restriction.</p> <p>b. Ensure that minimum flow rate is sufficient for supply conditions.</p> <p>c. Ensure that dynamic inlet pressures are nominally balanced.</p> <p>d. Ensure that inlet temp. differentials are sufficient.</p> <p>e. (subsequent to correction of above conditions) Undertake performance check; maintain as necessary.</p>
3. No flow from mixing valve outlet.	<p>a. Check strainers and inlet/outlet fittings for blockage.</p> <p>b. Hot or cold supply failure; thermostat holding correct shut-down function: Rectify immediately to avoid thermostat damage.</p>
4. Blend temperature drift.	<p>Indicates operating conditions changed.</p> <p>a. Refer to symptom 2. above.</p> <p>b. Hot supply temperature fluctuation.</p> <p>c. Supply pressure fluctuation.</p>
5. Hot water in cold supply or vice versa.	<p>Indicates checkvalves require maintenance, refer to MAINTENANCE.</p>
6. Maximum blend temperature setting too hot or too cool.	<p>a. Indicates incorrect maximum temperature setting; refer to COMMISSIONING.</p> <p>b. As symptom 4. above.</p> <p>c. symptom 5. above.</p>
7. Temperature control knob stiff to operate.	<p>Indicates dry threads and/or seals; maintain as necessary.</p>
8. Water leaking from behind temperature knob.	<p>Seal(s) worn or damaged. Renew all seals; maintain as necessary.</p>

General

Maintenance must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel.

Rada Service Engineers/Agents will call by prior arrangement, if required. Service Contracts may be undertaken, subject to survey - details upon request.

It is also recommended that at the time the Thermostatic Mixing Valve is installed, the maintenance personnel review the plumbing system layout. The review will be carried out at the user premises and, the user informed of any recommended alterations that would ensure that the plumbing system was best suited for use of thermostatic mixing valves. Any subsequent alteration to the plumbing system should also be reviewed by the plumber for its effect on the performance of the thermostatic mixing valve.

The use of supply-line or zone strainers will reduce the need to remove debris at each mixing valve point. The recommended maximum mesh aperture dimension for such strainers is 0.5 mm

Components are precision-made, so care must be taken during servicing to avoid damage.

External surfaces may be wiped clean with a soft cloth, and if necessary a mild washing-up type detergent or soap solution can be used.

Warning: many household and industrial cleaning products contain mild abrasives and chemical concentrates, and should not be used on polished, chromed or plastic surfaces.

When ordering spare parts, please state product type, i.e. Rada 15, and identify part name and number (refer to Parts List). A Service pack is available, containing all seals and strainer screens that may be necessary for renewal during maintenance or servicing (part no.935 40).

For Rada 15 series Mixing Valves manufactured prior to May 1 993, refer to publication P2087 (available upon request).

Lubricants

Important! Use silicone-only based lubricants on this product. Do not use oil-based or other lubricant types as these may cause rapid deterioration of seals.

Standard silicone-only based lubricants may be used on all static seals, and threads, to assist re-fitting (e.g. Rocol MX22).

Higher performance silicone-only based lubricants, typically containing molybdenum (e.g. Rocol MX66), are recommended for use on dynamic seals and components). A sachet of this lubricant type is provided with each service pack (935 40).

Maintenance Procedures - Cartridge

Dismantling

1. Isolate the supplies to the mixing valve, and open an outlet fitting to release pressure and to assist the draining of remaining water.

2. **(Adjustable temp. models)** Remove concealing cap (106 46), temperature knob screw (615 40) and lock-washer (642 42), temperature knob (916 67), and identity ring assembly (936 87).

(Locked temp. models) Remove locking screw (616 01) using 2.5mm hexagon key, locking shroud (085 26), and identity ring assembly (936 96).

Rada 15b: if checkvalve maintenance is necessary, prise off concealing plate (076 55) with screwdriver under outer edge, and remove spacer seal (641 48). Undo bracket screws (618 35) and remove concealing plate bracket (117 15) and bracket seal (641 47).

3. Unscrew cartridge head nut from body using 28 mm spanner/adjustable, and withdraw complete Thermostatic Cartridge assembly (412 01).

Warning! some water may be released at this point.

4. Remove both port sleeve screens (098 16) by releasing the folded tabs.

5. Hold (34 mm) spanner across flats of port sleeve assembly and unscrew head nut assembly (928 39).

Note! This is a LEFT HAND THREAD.

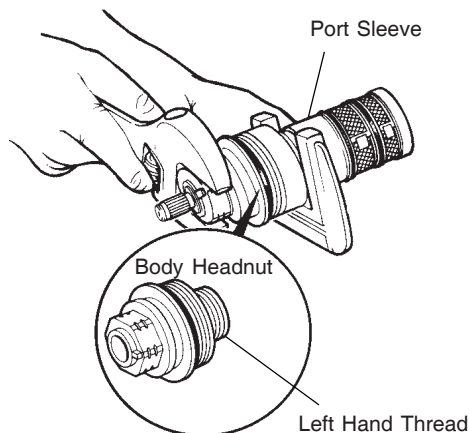
6. Carefully pull the Radatherm Capsule (412 02), free from the head nut assembly.

7. Remove circlip, hub and pressure washer from head nut and push out piston assembly (412 09), and separate this from temperature spindle assembly (911 34).

8. **Loosen only** the shuttle seat assembly (547 94) using large-bladed screw-driver. There is spring tension behind the seat, so complete the unscrewing and removal by hand.

9. Remove return spring (412 04) from shuttle seat assembly (547 94).

10. Carefully push out shuttle assembly (925 25).

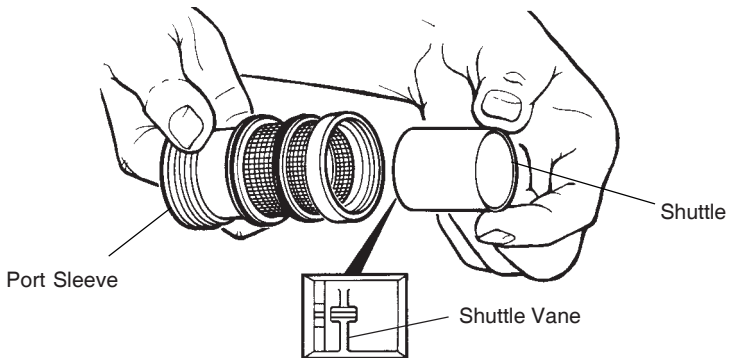


Cleaning/Renewal of Parts

11. Internal parts (with the exception of the Radatherm Capsule) can be cleaned using a mild proprietary inhibited scale solvent, e.g. domestic kettle descaler. After descaling, always rinse parts thoroughly in clean water before refitting.
Note! Make sure components are cleaned carefully and not damaged in any way. Do not use any abrasive material on component surfaces.
12. Examine all seals (particularly the separator seal 631 07) for signs of wear, deformation or damage, and renew as necessary, taking care not to damage seal grooves. A Service pack is available, containing all seals and strainer screens which may be necessary for renewal during maintenance or servicing (935 40).
13. Lightly coat all seals and threads with a **silicone-only based lubricant** to assist re-assembling (see **Lubricants**).
14. Inspect the Radatherm Capsule for signs of damage. Check for any evidence of leakage of thermally responsive compound (polyeutectic) and replace the Capsule if there is any evidence of a white/opaque or brown waxy substance. If there is any doubt as to the unit's condition, the unit should be renewed.
Note! This component cannot be tested individually, its service condition should be assessed as part of the performance check; refer **In-Service Test** (page 19).
15. Examine shuttle seat assembly (547 94), shuttle assembly (925 25), and port sleeve assembly for signs of damage or corrosion: renew as necessary. Check overload spring operation (within piston assembly 412 09) by depressing end sleeve several times: renew assembly if sticking.

Re-assembly

16. Screw temperature spindle fully into piston assembly, insert into bead nut aligning the flats of the hexagons. Rotate temperature spindle fully clockwise, then replace pressure washer, hub and circlip.
17. Position the Radatherm Capsule into the piston assembly and place this assembly into head nut. Tighten body head nut assembly firmly into port sleeve.
Note! This is a LEFT HAND THREAD.
18. Insert shuttle into port sleeve with shuttle vane end toward head nut, make sure that the separator seal remains in place and is not damaged (refer to illustration).
19. Insert return spring into spring retainer and place onto shuttle seat, then offer up these parts into end of port sleeve (ensuring that cut-outs in spring retainer locate over shuttle vanes), and screw in firmly.
20. Replace port sleeve screens, positioning joint against one of the two solid sections, to prevent debris entering through slot in screen.



21. Insert Thermostatic Cartridge assembly into valve, make sure push rod locates correctly into shuttle and tighten body head **nut firmly**.
22. **Restore the** water supplies and check for leaks.
23. Replace identity ring assembly (936 87/96) on body headnut with red arrow to the right, ensuring that arrow indicators are at top centre. (Alternatively, the arrows can be at bottom centre if the mixing valve is positioned at high level and the temperature indication can only be read from below).
24. If appropriate, proceed to next section; **Maintenance - Checkvalves**, then, to complete re-assembly and re-set temperature, refer to section: '**Commissioning**'. (Rada 15b models; replace the concealing fittings, as appropriate).

Maintenance Procedure- Checkvalves

Hot water entering the cold supply, or vice versa, indicates that immediate attention is necessary. This is carried out by removing and cleaning, or renewing as necessary, the two Checkvalve Cartridge assemblies (902 51).

Note: Rada 15 models supplied prior to May 1993 were fitted with an earlier, superseded Checkvalve Cartridge (with isolation facility, part no. 902 81, and separate headnut assembly 928 36) which did not have a strainer attachment facility. These may be directly replaced with the current Cartridge (902 51). Ensure that adequate supply isolation remains.

1. Isolate the supplies to mixing valve, and open an outlet fitting to release pressure and to assist the draining of remaining water.
2. Location and removal of Checkvalve Cartridges varies according to mixing valve model:

Exposed Models: The Checkvalves are located at each end of the mixing valve body, facing outwards. Prise off endcaps (196 69) using small screwdriver

**Concealed Models:
(inc. 15dk)** The Checkvalves are located on either side of the Thermostatic Cartridge, facing forward.

(Rada 15b only) Remove concealing plate (076 55) and spacer seal (641 48). Undo bracket screws (618 35) and remove concealing plate bracket (117 15) and bracket seal (641 47).

3. Unscrew, using 12 mm hexagon key, and withdraw complete Checkvalve Cartridge assembly (902 51).

Warning!: some water may be released at this point

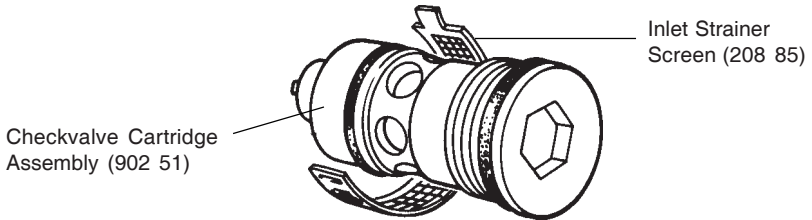
4. The Cartridge assembly may be cleaned by removal of the inlet strainer screens and flushing through under a jet of water to remove lodged particles.
5. The Checkvalve is not a serviceable item, so any apparent wear or damage will necessitate renewal of the complete Checkvalve Cartridge assembly (902 51).
6. Lightly coat the two external seals and thread with a **silicone-only based lubricant** to assist refitting.
7. Re-assembly into the mixing valve is a reversal of the above procedure.
8. Restore the water supplies and check for leaks.

Maintenance - Inlet Strainers

Blockage of the inlet strainer screens (208 85) can lead to poor flow performance and reduced temperature control. It is essential that the inlet strainer screens are cleaned or, if necessary, renewed as required by the In-Service test.

Access to the inlet strainer screens is by removal of the **Checkvalve Cartridges** as described in the section above.

The strainer screens are secured by folding tabs, and may be cleaned under a jet of water, or renewed. When replacing the screens, position the joint over one of the solid housing sections, to prevent debris entering through the screen slots.



Recommended Content of Maintenance Log

It is recommended that the Maintenance Log should record the following:

Details of valve, location and use, risk level and instructions

Valve make and model

Valve unique identification number

Valve location

Date installed

Application i.e. type of discharge: bath, shower etc.

Risk assessment report number

Risk level found (e.g. vulnerability of patient)

Frequency of critical component replacement

Frequency of temperature monitoring

Responsibility for temperature monitoring

Location of temperature monitoring records

Source of spares and advice

Issue number of Product Manual (Installation, operating and maintenance instructions).

Details of in-service testing and maintenance

Initial commissioning test data (Supply pressures and temperatures, mixed water temperature, flow rate, result of cold water isolation test, date carried out, signature of maintenance person).

First in-service test due date

First in-service test data (As for initial commissioning)

Details of any remedial work carried out to valve or supply system

Second in-service test due date

Second in-service test data (As for initial commissioning)

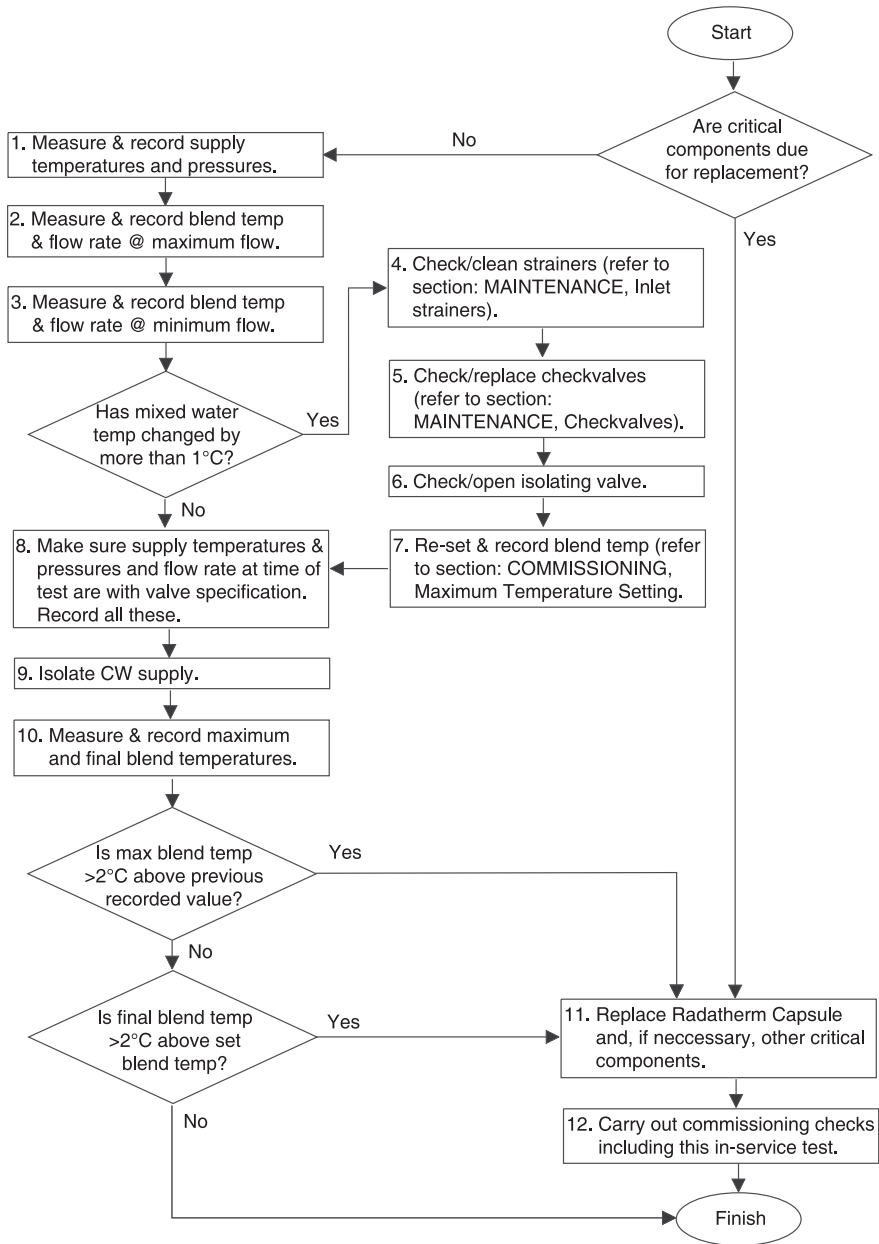
Details of any remedial work, including part replacement, carried out to valve or supply system

Next in-service test due date

Next in-service test data (As for initial commissioning)

Details of any remedial work, including part replacement, carried out to valve or supply system

Note! Local requirements may demand that additional information be recorded e.g. date of critical component replacement.



Note! All measurements should be recorded in the Thermostatic Mixing Valve Performance Record (Log Book)

In-service Test Procedure

Graph 1

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SPARE PARTS

Recommended Spares Minimum Stock List

Component Spares per quantity mixing valves installed

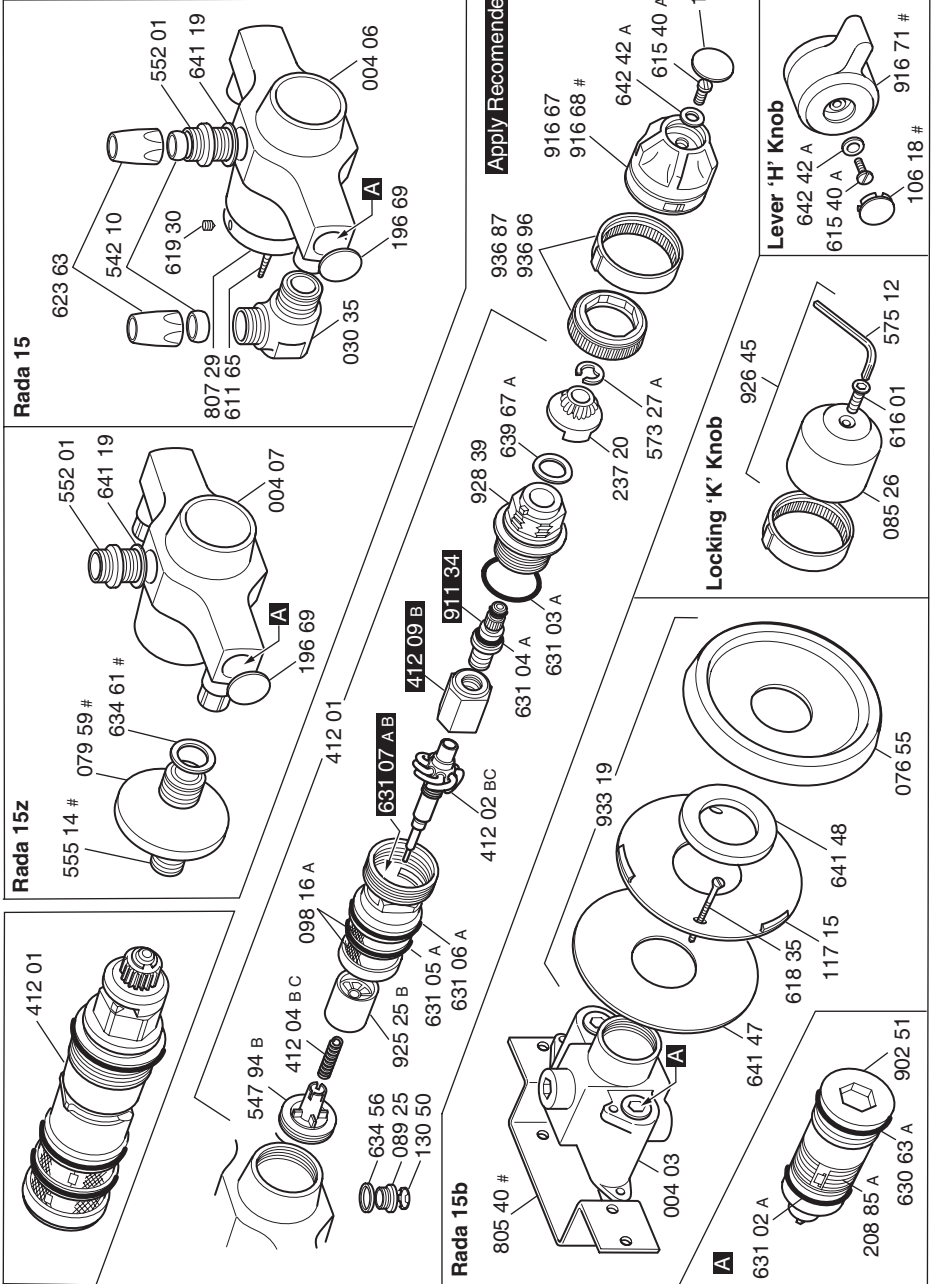
		1-5	6-20	21-50	51+	
412 01	Thermostatic Cartridge assembly	2	4	6	8	*
902 51	CV Cartridge assembly	2	4	6	8	*
935 40	Service pack	2	4	6	8	*
903.35	Critical Component Pack	2	4	6	8	*
Thermostatic cartridge components:						
573 27	Circlip	2	4	6	8	
237 20	Hub	1	2	3	4	
412 02	Radatherm Capsule	2	4	6	8	
412 04	Return spring	1	2	3	4	
412 09	Piston assembly	1	2	3	4	
639 67	Pressure washer	2	4	6	8	
928 39	Head nut/port sleeve assembly	1	1	2	2	*
911 34	Temperature spindle assembly	1	2	3	4	
925 25	Shuttle assembly	1	2	3	4	
547 94	Shuttle seat assembly	1	2	3	4	
Checkvalve Cartridge components:						
208 85	Inlet strainer screen (2) - CV	4	8	12	16	
External components (adj. temp.):						
106 46	Concealing cap (temp. knob)	1	2	3	4	
615 40	Temperature knob screw	2	4	6	8	
External components (locked temp.):						
926 45	Locking set ('k' knob)	1	1	2	2	
61601	Locking screw ('k' knob)	2	4	6	8	
Exposed models only:						
19669	CV Endcap (2)	2	4	6	8	
Concealed models only:						
618 35	Bracket screw (Rada 1 Sb)	2	2	4	4	

* These quantities may be increased as appropriate to the programme of (refurbished cartridge) replacement undertaken as part of a planned maintenance procedure.

Spare Parts List (Post 1993)

004 03	Body (Rada 15b/15dk)	A	631 02	Seal - CV Housing (2)
004 06	Body (Rada 15)		631 03	Seal - body head nut
004 07	Body (Rada 15z)		631 04	Seal - temperature spindle
014 04	Body sleeve (Rada 15b/15dk)	A	631 05	Seal - port sleeve inlet
030 35	Inlet elbow - 15mm (2) (Rada 15)	A	631 06	Seal - port sleeve body
076 55	Concealing plate (Rada 15b)	A	631 07	Seal - separator
076 59	Pipe concealing plate (2) (Rada 15z)		634 56	Gasket - drain plug
079 15	Building-in shroud (Rada 15b)	#	634 61	Gasket - union (2)(Rada 15z)
085 26	Locking shroud (k)	A	639 67	Washer - pressure
089 25	Drain plug		641 19	Gasket - outlet (Rada 15/15z)
A 098 16	Port sleeve screen (2)		641 47	Bracket seal (Rada 15b)
# 106 18	Concealing cap ('H' knob)		641 48	Spacer seal (Rada 15b)
106 46	Concealing cap - temperature knob	A	642 42	Lock washer - temperature knob
117 15	Concealing plate bracket (Rada 15b)	#	805 40	Support bracket assembly (Rada 15b)
130 50	Drain plug trim (Rada 15/15z)		807 29	Backplate assembly (Rada 15)
196 69	CV End cap (2) (Rada 15/15z)		902 51	CV Cartridge assembly (2) (supplied from April 1993, all models)
A 208 85	Inlet strainer screen (2) - CV	B	903 35	Critical Component Pack
222 82	Retainer - spring		911 34	Temperature spindle assembly
237 20	Hub		916 67	Temperature knob (standard)
412 01	Thermostatic Cartridge Assembly	#	916 68	Temperature knob (acrylic)
C 412 02	Radatherm Capsule	#	916 71	Temperature knob ('H' lever)
C 412 04	Return Spring		925 25	Shuttle assembly
412 09	Piston Assembly		926 45	Locking set (k)
542 10	Olive - 15mm (3) (Rada 15)		928 39	Headnut/port sleeve assembly
547 94	Shuttle seat assembly		933 19	Concealing plate pack (Rada 1 Sb)
552 01	Nipple - 1/2" (Rada 15/15z)		935 40	Service pack
# 555 14	Offset connector (Rada 15z)		936 87	Identity ring assembly
A 573 27	Circlip		936 96	Identity ring assembly (k)
575 09	Wrench key 3.0mm AF (Rada 15)			
575 12	Wrench key 2.5mm AF (k)	A		Items in service pack 935 40
611 34	Wall screw (2) (Rada 15b)	B		Reference Page 19 for Critical Components Included.
611 65	Wall screw (2) (Rada 15)	C		Items in Radatherm Capsule and Return Spring Pack 412 11
615 40	Screw - temperature knob	#		Optional items.
616 01	Screw - locking knob (k)			Abbreviations used:
618 35	Screw - bracket (2) (Rada 1 Sb)			k = Locking facility.
619 30	Grubscrew - Backplate (Rada 15)			CV = Checkvalve.
623 63	Compression nut - 15mm (3) (Rada 15)			Kohler Mira has a policy of continual product development and parts illustrated may not be identical to those supplied.
A 630 63	Seal - CV Headnut assembly (2)			

Spare Parts Diagram (Post 1993)



A Items in Service Pack 935 40 B Items in Critical Components Pack 903 35 C Items in Capsule and Return Spring Pack 412 11 # Optional

Spare Parts List (Pre 1993)

All Models

008.81 Port Sleeve
011.01 Shuttle
014.03 Spring Sleeve
017.17 Temperature Spindle
046.08 Identity Ring
046.13 Identity Ring (K Models)
050.42 Return Spring
086.02 Blanking Plug
098.16 Screen (2)
106.46 Concealing Cap - Rada 15
106.48 Concealing Cap - Rada 15A
130.50 Trim
146.77 Isolator
201.01 Head Nut
201.02 Body Head Nut
237.20 Hub
412 01 Thermostatic Cartridge Assembly
412 02 Radatherm Capsule
412 09 Piston Assembly
547.59 Shuttle Seat
573.27 Circlip
575.12 Wrench Key
615.40 Screw - Temperature Knob
615.99 Grub Screw
616.01 Screw - Locking (K)
630.63 Seal - Head
631.01 Seal - Isolator
631.03 Seal - Body Head Nut
631.04 Seal - Temperature Spindle
631.05 Seal - Hot
631.06 Seal - Cold
631.07 Seal - Shuttle
634.56 Gasket
639.67 Pressure Washer
902.81 Check Valve Cartridge Ass'y (2)
916.68 Temperature Knob (Crystal)
935.40 Set of Seals

Rada 15 Only

004.06 Body
030.35 Inlet Elbow (2)
056.15 Backplate
196.69 End Cap (2)
542.10 Olive (3)
552.01 Nipple
611.65 Screw - Wall (2)
619.30 Screw - Backplate
623.63 Compression Nut (3)
641.19 Gasket

Rada 15B Only

004.03 Body
076.55 Concealing Plate
079.15 Building In Shroud
117.15 Concealing Plate Bracket
611.34 Screw - Wall (2)
618.35 Screw Bracket (2)
636.02 Foam Seal

Rada 15Z Only

004.07 Body
076.56 Pipe Concealing Plate (2)
196.69 End Cap (2)
555.14 Offset Connector (2)
634.61 Connector Joint (2)

H Models Only

SK 1146 Temperature Knob

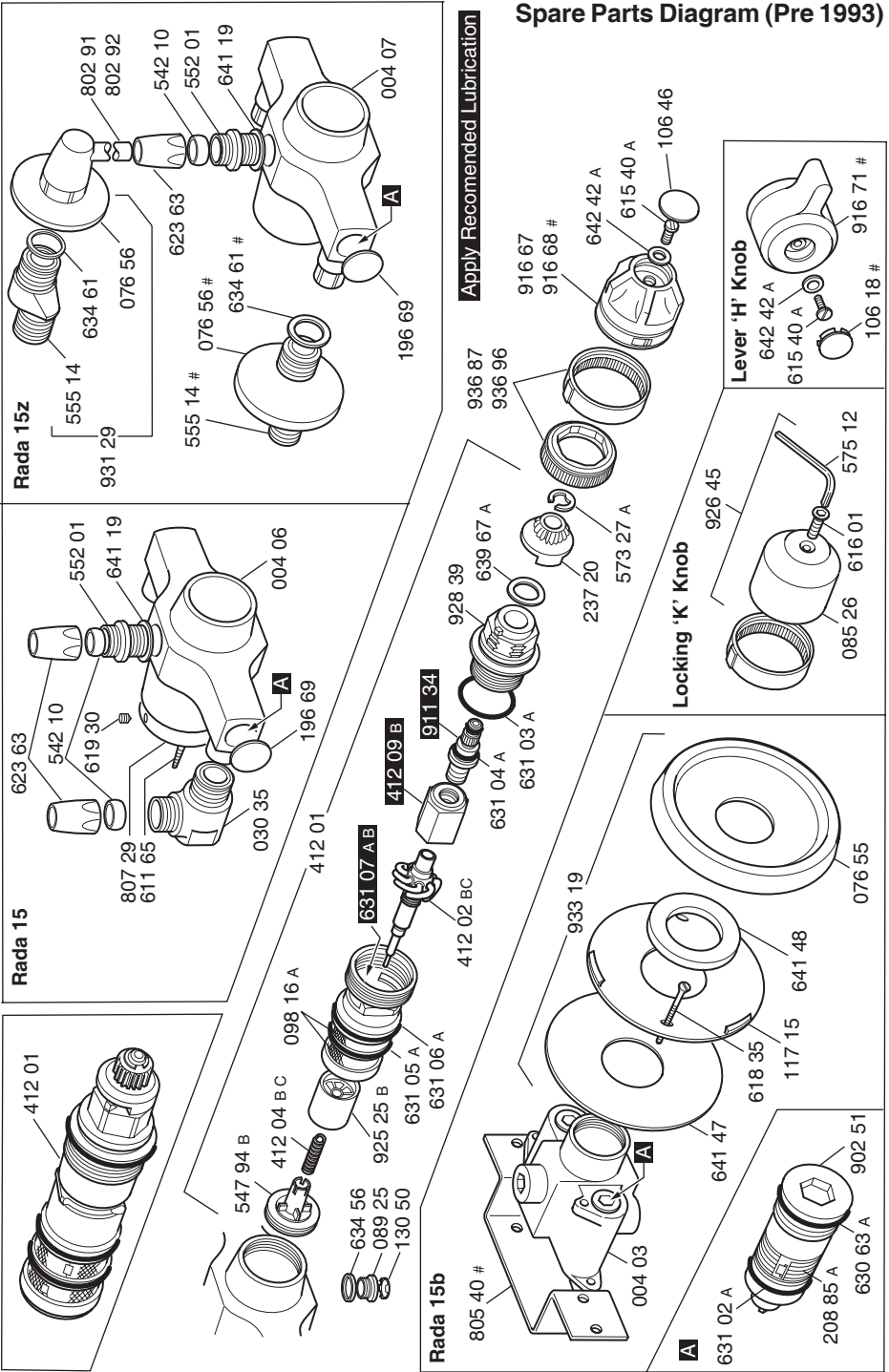
K Models Only

085.26 Locking Shroud
575.12 Wrench Key
616.01 Locking Screw

Outlet Elbow (Optional Extra)

076.56 Pipe Concealing Plate
555.14 Offset Connector
634.61 Connector Joint
802.91 Outlet Coupling Assembly

Spare Parts Diagram (Pre 1993)



A Items in Service Pack 935 40 B Items in Critical Components Pack 903 35 C Items in Capsule and Return Spring Pack 412 11 # Optional

CUSTOMER CARE

Guarantee

Kohler Mira Ltd. guarantee this product against any defects in materials or workmanship for a period of one year from the date of purchase.

To be covered by this guarantee, service work must only be undertaken by Kohler Mira Ltd. or approved agents.

Not covered by this guarantee

Defects or damage arising from incorrect installation, improper use or failure to maintain in accordance with the instructions in the product manual, including the build-up of limescale.

Defects or damage if the product is taken apart, repaired or modified by a person not authorised by Kohler Mira Ltd. or approved agents.

After Sales Service - how we can help you

We have a network of fully trained staff ready to provide assistance, should you experience any difficulty operating your Rada equipment.

Spare Parts

All functional parts of Rada products are kept for up to ten years from the date of final manufacture.

If during that period, our stock of a particular part is exhausted we will, as an alternative, provide an equivalent new product or part at a price equating to the cost of repair to the old, bearing in mind the age of the product.

Customer Care Policy

If within a short time of installation the product does not function correctly, first check with the operation and maintenance advice provided in this Manual to see if the difficulty can be overcome.

Failing this, contact your installer to make sure that the product has been installed and commissioned in full accord with our detailed installation instructions.

If this does not resolve the difficulty, please ring your nearest Rada contact who will give every assistance and, if appropriate, arrange for the local Service Engineer or Agent to call on a mutually agreeable date.

Contact:

Rada Controls

Cromwell Road,
Cheltenham, England,
GL52 5EP, UK.

Tel.: + 44 (0)1242 221221

Fax.: + 44 (0)1242 221925

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FM 14648

