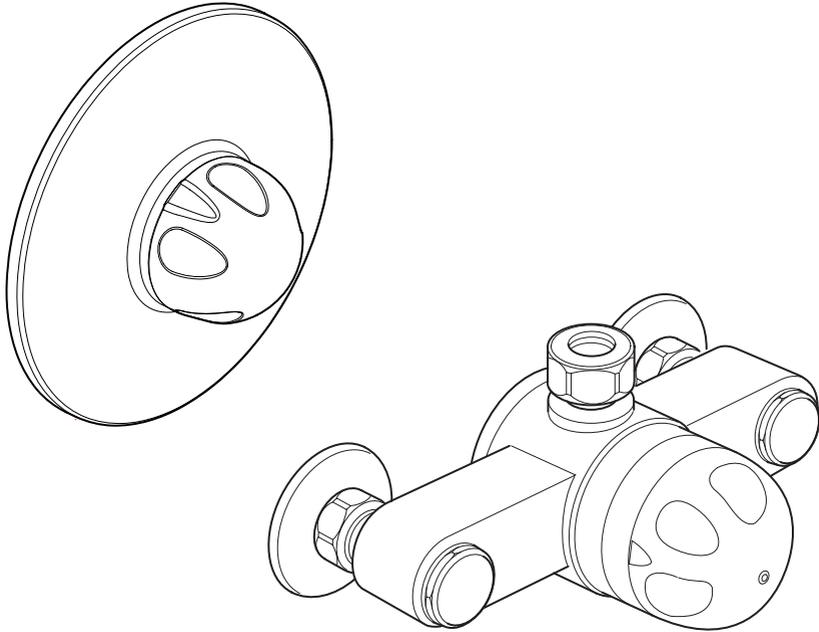


215 and 222 Series



Important! This Manual is the property of the customer and must be retained with the product for maintenance and operational purposes.

Product Manual

rada

INTRODUCTION

Thank you for purchasing a quality Rada product. To enjoy the full potential of your new product, please take time to read this guide thoroughly, having done so, keep it handy for future reference.

This manual covers all Rada 215 and 222 thermostatic mixing valves manufactured from May 2008. A range of ½" and ¾" mixing valves suitable for a wide diversity of applications and installations providing water at safe, accurate temperatures for ablutionary or process requirements.

Model Range References:

- c all chrome finish
- b built-into wall recess or panel, temperature control protrudes through concealing plate.
- d duct or fully concealed mounting, no user access required.
- k locked temperature control, requires hexagonal key to adjust.
- oem** concealed model, duct/box installation

The suffix '3' indicates that the thermostatic mixer has been certified for use in UK Healthcare premises as a Type 3 valve under the BUILDCERT TMV3 scheme. For Healthcare Installations refer to the TMV Requirements Manual. The approved designations for Type 3 Valves are as follows:

Models	Designation
215-t3 c, 215-t3 bc, 215-t3 dk, 215-t3 oem, 215-t3 zc	HP-S, LP-S, HP-W, LP-W, HP-T44
222-t3	HP-T44, LP-T44

These products also comply with the Water Supply (water fittings) Regulations 1999.

Patents and Design Registration

Patents

- GB: 2 291 693, 2 340 210, 2 392 225,
2 421 297
- France: 0 694 721(E)
- Germany: 695 13 455.8
- USA: 7 240 850
- Euro: 1 672 257 DE, FR, GB, IT, NL, SE

Patent Applications

- Euro: 03254070.0
- USA: US-2006-0124758-A1,
US-2007-0221740-A1

Design Registration

000578463-003,006

GENERAL

1. Make sure that the product is installed and maintained by a competent installer.
2. Make sure that they are installed, commissioned, operated and maintained in accordance with the recommendations in this guide.
3. The installation must comply with all current regulations and practices specified by the local water supply regulations and building codes.
4. The function of a thermostatic mixing valve is to deliver water consistently at a safe temperature. Provided that the thermostatic mixing valve is installed, commissioned and operated within the specification limits and maintained regularly according to this guide, the risk of malfunction, if not eliminated, is considerably reduced.
5. Follow all warnings, cautions and instructions contained in this guide.
6. For Type 2 and 3 installations, TMV valves are only to be used for applications covered by their approved designations, refer to the TMV 2 and TMV 3 Requirements Manuals

SAFETY

1. The use of the word 'failsafe' to describe the function of a thermostatic mixing valve is both incorrect and misleading. In keeping with every other mechanism it cannot be considered as being functionally infallible.
2. 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.

If you experience any difficulty with the installation or operation of your new thermostatic mixer, please refer to '**Fault Diagnosis**', before contacting Kohler Mira Ltd. Our contact details can be found on the back cover of this guide.

3. Certain types of system can result in the thermostatic mixing valve having excessive 'dead-legs' of pipework. Others allow an auxiliary 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.
4. 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 healthcare procedures as supervised bathing of patients unable to respond immediately to unsafe temperatures.
5. Care is required when making any adjustments to flow or temperature. Make sure that the temperature is suitable and has stabilised.
6. To ensure continued safe operation of this product, all '**Critical Components**' should be changed every **5 years**.
7. The designed service life of all critical components used in this product is 5 years providing it is operated within the recommended operating conditions and parameters. However, when supply conditions and/or usage patterns do not conform to the recommended operating parameters and/or conditions the critical components may need to be replaced frequently in line with the appropriate risk assessments.
8. Continued use of this product in conditions outside the specification limits given in this manual can present potential risk to users.
9. **Important!** In healthcare applications such as hospitals, aged person 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 **MUST** be replaced at intervals of no more than 5 years.
10. Critical Components are considered as:

407.67	Thermostatic Cartridge (215)
1578.046	Thermostatic Cartridge (222)
408.72	Filter and Non-return Valve Assy (215-t3c)
1624.110	Filter and Non-return Valve Assy (215-t3bc)
408.81	Filter and Non-return Valve Assy (215-dk - t3dk - t3oem)
407.84	Filter and Non-return Valve Assy (222-dk -t3dk)
408.80	Filter and Non-return Valve Assy (215-t3zc)

SPECIFICATIONS

For applications which may be outside the operating parameters which follow, refer to Kohler Mira Ltd, or Local Agent.

For Type 3 installations, the supply conditions specified in the '**TMV3 Requirements Manual**' take precedence over the operating parameters which follow.

Pressures

- Max Static Pressure: **10 Bar** (1000 kPa)
- Max Maintained Pressure: **5 Bar** (500 kPa)
- Min Maintained Pressure (Gravity System): **0.15 Bar** (15 kPa) - 0.15 bar = 1.5 Metre head from cold tank base to outlet.
- For optimum performance supplies should be nominally equal.

Temperatures

- Factory Pre-set (Blend): 215 models: **41°C**, 222 models: **44°C** (bath fill applications, under ideal installation conditions).
- Optimum Thermostatic Control Range: **35°C to 50°C** (achieved with supplies of 15°C cold, 65°C hot and nominally equal pressures).
- Maximum Hot Water Temperature: 70°C*

***Note!** For optimum performance reasons it is recommended that the maximum hot water temperature is limited to 65°C.

Caution! During thermal disinfection the mixing valve can operate up to 85°C for short periods. Ensure safety precautions are followed during discharge. Chemical disinfection agents e.g. chlorine/chloramines combined with higher temperatures will affect the life of the product adversely and could detrimentally affect the thermostatic performance.

- Cold Water: up to **1°C- 25°C** (5°C-20°C for Type 3 installations).
- Minimum Recommended Differential between Hot Supply and Outlet Temperature: **12°C**.

Thermostatic Shut-down

- For safety and comfort the thermostat will shut off the mixing valve **within 2 Seconds** if either supply fails (achieved only if the blend temperature has a minimum differential of 12°C from either supply temperature).

Flow Rates

- Minimum Flow Rate: 3 L/Min at mid-blend with equal dynamic supply pressures.
- Maximum Flow Rate: 215 models: 40 L/Min at mid-blend (which equates to maximum pressure loss of 3.5 bar), 222 models: 60 L/Min at mid-blend (which equates to maximum pressure loss of 3.0 bar).
- Maximum Recommended Flow Velocity in pipelines: 2 metres/second.
- Maximum Pressure Loss Ratio* should not exceed 10:1, in favour of either supply, during flow.

* Pressure Loss Ratio (PLR) is the ratio between the hot and cold supply pressures after the back pressure from outlet pipes, flow controls and fittings have been deducted from each inlet supply pressure.

For example, if the back pressure (measured immediately at the outlet of the mixing valve, and before any flow controls or fittings) is 1 bar, the cold water pressure is 3 bar and the hot water pressure is 2 bar then the pressure loss ratio will be:

$(3-1):(2-1) = 2:1$ in favour of the cold supply.

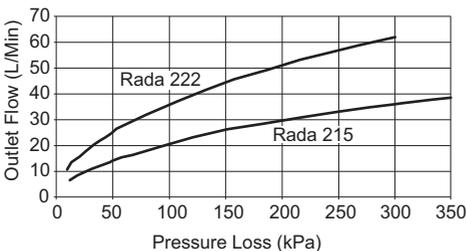
The pressure loss ratio for Rada 215 and 222 thermostatic mixing valves should ideally be 1:1 (i.e. nominally equal inlet pressures). To achieve this a suitable pressure regulating device should be fitted to either inlet as necessary.

Pressure loss ratio should not be confused with pressure ratio, which is the ratio of the inlet pressures only and takes no account of the back pressure.

Note! High back pressures make it more difficult for a valve to control correctly.

Flow Rate vs Pressure Loss Graph

(Mixing Valve only, equal dynamic supply pressures and mid-blend temperature setting). There will be additional pressure losses through the outlet fittings.



Flow Control

Rada 215 and 222 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/bath tap, stopcock, mechanical timed-flow controller or solenoid.

The device chosen must be non-concussive in operation.

Connections

Rada 215-t3 c: Inlets and Outlet: 1/2" BSP external union or 15 mm compression.

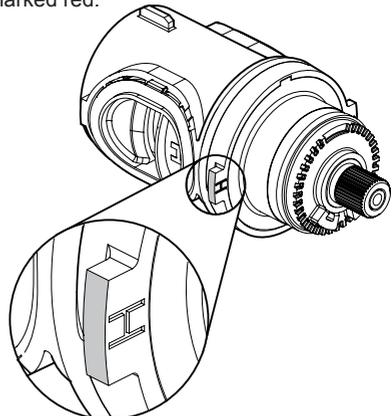
Rada 215-t3 bc: Inlets and Outlet: 1/2" BSP external union or 15 mm compression.

Rada 215-t3 dk and 215 dk: Inlets and Outlet: 1/2" BSP flat-faced external union (additionally, on t3 models, 2 elbows and 1 straight union connector are supplied, terminating in 15 mm compression connections).

Rada 222-t3 dk and 222 dk: Inlets and Outlet: 3/4" BSP flat-faced external union (additionally, on t3 models, 2 elbows and 1 straight union connector are supplied, terminating in 22 mm compression connections).

Rada 215-t3 oem: Inlets: 1/2" BSP flat-faced external union. Outlet: 1/2" BSP external union or 15 mm compression (nut and olive **not** supplied). It is important that the mixing valve is connected to the hot and cold supplies correctly, standard connections are: **Hot - Left, Cold - Right, Outlet - Bottom**.

The mixing valve body is identified with a red and/or blue sticker (hot - red, cold - blue). The thermostatic cartridge is also identified with a 'H' stamped on the cartridge lug which is also marked red.



Note! Should the supplies be reversed then the mixing valve will not be able to control temperature. This can be corrected by rotating the thermostatic cartridge within the valve body, refer to section: '**Installation, Outlet Position/ Reversed Inlet Supplies**'.

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

Inlet/Outlet Options:

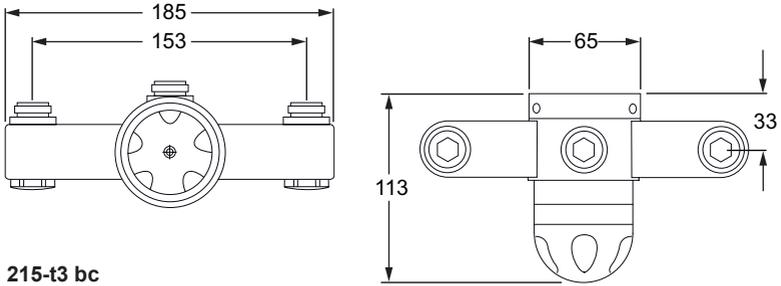
	inlets*	outlet*
215-t3 c	top , bottom, rear-fed	top , bottom
215-t3 bc	side	top , bottom
215-t3 dk 222-t3 dk	any configuration	any configuration
215-t3 oem	side	bottom,top
215-t3 zc	rear-fed	top , bottom

*Products are supplied in the configuration shown in bold.

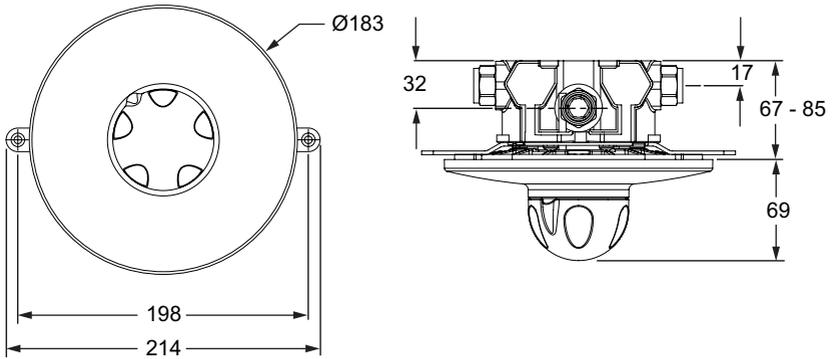
Dimensions

All dimensions are nominal and in mm

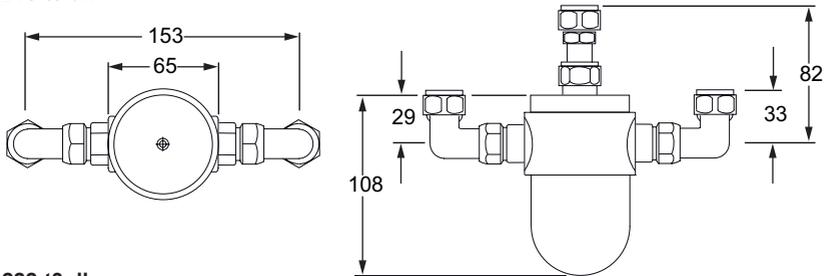
Rada 215-t3 c



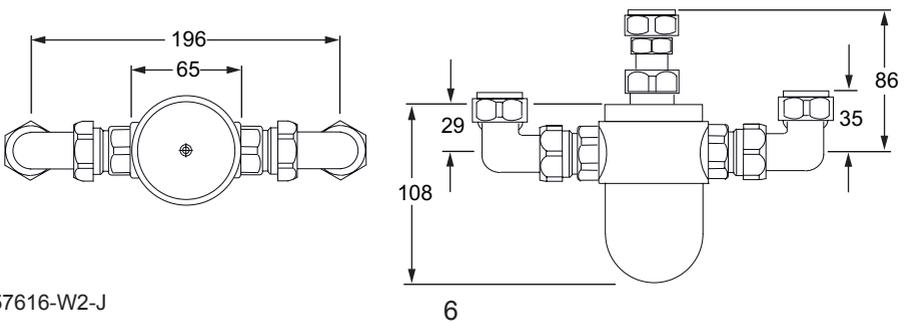
Rada 215-t3 bc



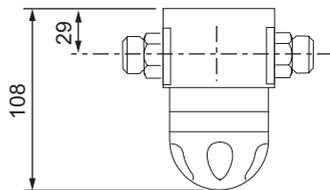
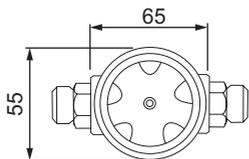
Rada 215-t3 dk



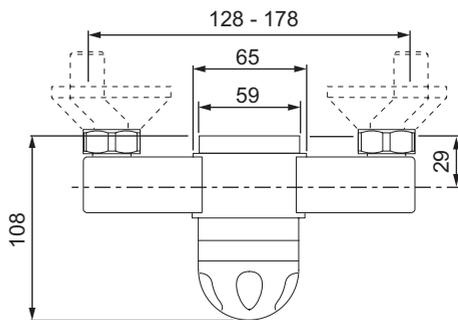
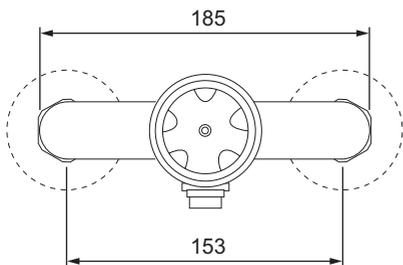
Rada 222-t3 dk



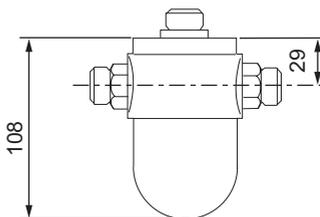
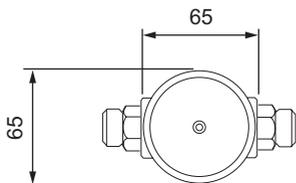
Rada 215-t3 oem



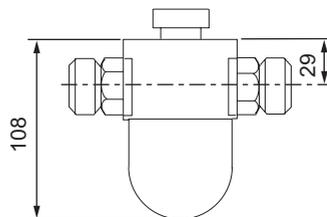
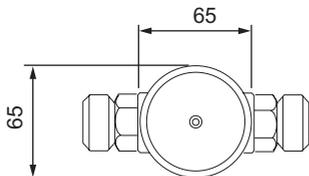
Rada 215-t3 zc



Rada 215 dk



Rada 222 dk



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 section: '**Specifications**'. For Type 3 valves. See also installation conditions in the '**TMV3 Requirements Manual**'.
2. 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 (except for strainer and non return valve access on dk and oem models). For all models, allow a minimum of 80 mm clearance in front of the temperature control to enable removal of the Thermostatic Cartridge during maintenance.
3. Conveniently situated 'full bore' isolating valves must be provided for maintenance purposes.
4. 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 0.3 mm.
5. Inlet pressure tapplings which allow measurement of the inlet pressures to the mixing valve under operating conditions are particularly recommended for healthcare applications with Type 3 valves.
6. Pipework must be rigidly supported.
7. Certain types of system can result in the thermostatic mixing valve having excessive 'dead-legs' of pipework, or auxiliary cold water supply added to the mixed water from the thermostatic mixing valve. Such systems can disguise the onset of thermostatic mixing valve malfunction and should not be used.
8. Supply pipework layout should be arranged to minimise the effect of other outlet usage upon the 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.

Outlet Position / Reversed Inlet Supplies

Rada 215-t3 oem, 215 dk, 215-t3 dk, 222 dk and 222-t3 dk models only:

These models are readily adaptable for rising or falling pipework; flat-faced union connectors (not supplied on all models) allow the valve body to accept a variety of pipework configurations, and to be reversed or inverted as appropriate.

215-t3 c and 215-t3 zc models only:

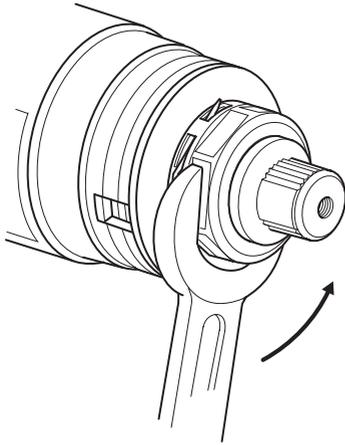
These models are supplied with inlet connections configured hot - left, cold - right, and top outlet as standard. It is essential that the inlet supplies correspond with the markings on the thermostatic cartridge. Should the existing hot and cold pipework make this configuration inconvenient, or a bottom outlet position be required, the valve inlets or outlet can be reversed, as detailed below. If both the outlet and inlet positions require reversing, it is easier to simply rotate the complete mixing valve 180°, and then reposition the temperature knob or cap.

Outlet Reversal should be done **prior** to installation of the mixing valve body. Rotate the body 180° so that the outlet is in the opposite direction, then follow the procedure for reversing the cartridge .

Reversed connections can be altered before or after mixing valve installation.

Reversing the Cartridge

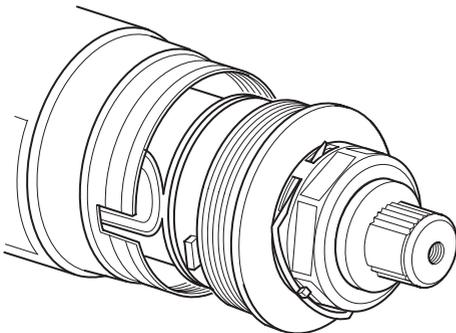
1. If the mixing valve has already been installed, isolate the supplies and open an outlet fitting to release pressure and to assist the draining of residual water.
2. Remove the temperature knob or locking cap, using a 3 mm hexagonal key.
Note! Do not remove the temperature hub.
3. With the removal clip in place, unscrew the head nut using a 35 mm wrench, this will begin to draw the thermostatic cartridge out of the body and release the indicator trim (adjustable models).



4. Remove the indicator trim (adjustable models) and pull the thermostatic cartridge free of the valve body.
5. Rotate the thermostatic cartridge 180°, which reverses the position of the cartridge hot and cold inlets.
6. Carefully push the thermostatic cartridge back into the valve body, checking that the two cartridge inlet port seals remain in place, and locate the cartridge lugs into the body slots.

Important! Make sure that the markings on the cartridge correspond with the hot and cold inlet pipework.

Note! The red and blue markings on the cartridge will now not correspond with the body markings, so to avoid future confusion remove the red and blue stickers from the valve body.



7. Carefully align and then tighten the head nut, do not over-tighten (max torque 2.5 N/m - 1.85 lbf ft).
8. Complete the installation, or, if the mixing valve body has already been installed, restore the hot and cold supplies and check for any leaks.
9. If the temperature hub has been removed or if the maximum temperature needs resetting, check, and if necessary refer to section: '**Commissioning**'.
10. Align and refit the indicator trim (adjustable models) and refit and secure the temperature knob or locking cap so that the markings will be visible to the user.

Rada 215-t3 bc models only:

This model is supplied with inlet connections configured hot - left, cold - right, and top outlet as standard. It is essential that the inlet supplies correspond with the markings on the thermostatic cartridge. Should the existing hot and cold pipework make this configuration inconvenient, or a bottom outlet position be required, the valve inlets or outlet can be reversed, as detailed below.

Outlet Reversal should be done **prior** to installation of the mixing valve body.

Reversed connections can be altered before or after mixing valve installation.

Reversing the Outlet Position

1. Remove the outlet nipple using a 12 mm hexagonal wrench.
2. Remove the outlet blanking plug using a 12 mm hexagonal wrench.
3. Screw the outlet nipple, complete with 'O' seal into the bottom hole previously blanked and tighten.
4. Screw the outlet blanking plug, complete with 'O' seal, into the top hole and tighten.

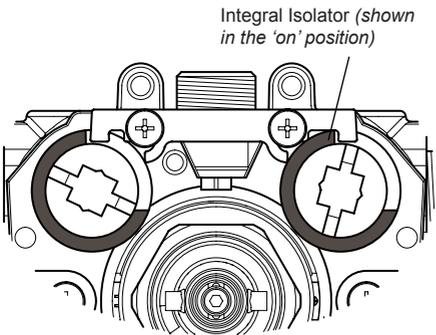
Reversing the Cartridge

If the mixing valve has **not** yet been installed follow instructions 5 to 10, otherwise follow instructions 1 to 15.

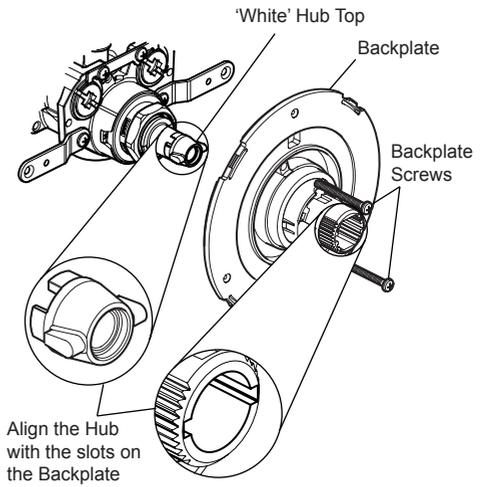
1. Unscrew the grubscrew using a 2.5 mm hexagonal key and pull off the temperature knob.
2. Carefully unclip the concealing plate from the backplate.

Note! Use a screwdriver in the bottom cutout to assist separation.

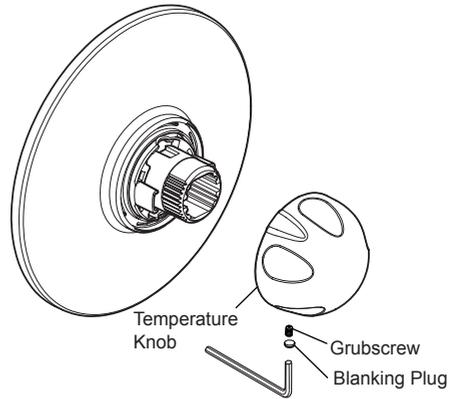
3. Unscrew the two backplate screws and remove the backplate from the mixer.
4. Using a 10 mm hexagonal key turn the integral isolators 90° anti-clockwise to shut off the hot and cold water supplies, and open an outlet fitting to release pressure and to assist the draining of residual water.
5. With the removal clip in place, unscrew the head nut using a 35 mm wrench, this will begin to draw the thermostatic cartridge out of the body.
6. Pull the thermostatic cartridge free of the valve body.
Caution! Some residual water may be released.
7. Rotate the thermostatic cartridge 180°, which reverses the position of the cartridge hot and cold inlets.
8. Carefully push the thermostatic cartridge back into the valve body, checking that the two cartridge inlet port seals remain in place, and locate the cartridge lugs into the body slots.
Important! Make sure that the red and blue markings on the cartridge correspond with the hot and cold inlet pipework.
Note! The red and blue markings on the cartridge will now not correspond with the body markings, so to avoid future confusion remove the red and blue stickers from the valve body.
9. Carefully align and then tighten the head nut, do not over-tighten (max torque 2.5 N/m - 1.85 lbf ft).
10. Complete the installation, or, if the mixing valve body has already been installed, continue with instructions 11 to 15.
11. Turn the integral isolators 90° clockwise to turn on the hot and cold water supplies.



12. Align the slots in the 'black' knob retainer with the lugs on the 'white' hub top and secure the backplate to the mixing valve with the two backplate screws.



13. The maximum temperature may need to be reset, check, and if necessary refer to section: **'Commissioning'**.
14. Clip the concealing plate onto the backplate with the cutout at the bottom.
15. Refit and secure the temperature knob so that the markings will be visible to the user.

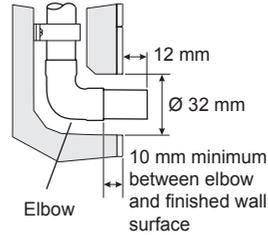


Rada 215-t3 c

- The inlet elbows are positioned to accept falling supplies. Should the installation require rising or rear entry supplies then the elbows will need rotating:

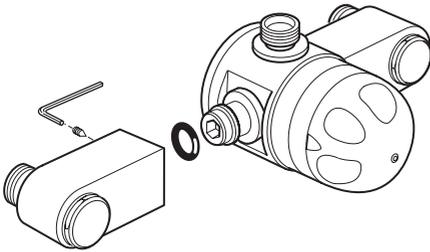
- Loosen the elbow grub screws using a 2.5 mm hexagonal key.
- Pull the elbow away from the valve body and refit in the desired position, re-tighten the grub screw.

Note! Make sure that the 'O' seal is correctly fitted.



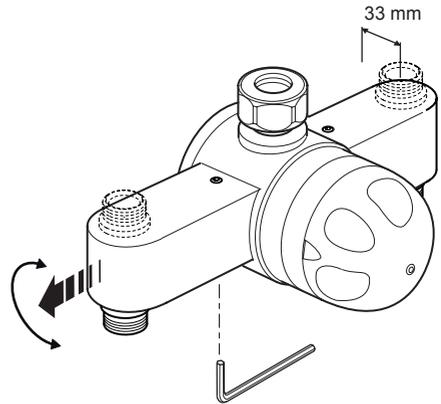
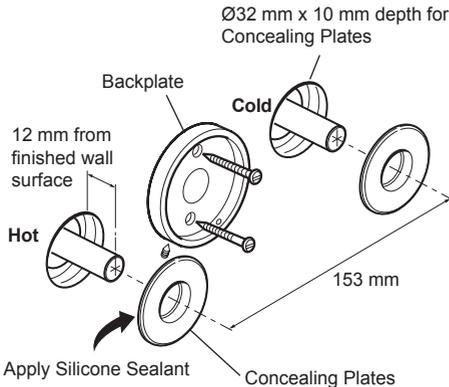
- For falling supplies:** Mark the pipe positions on the ceiling and set the 33 mm centres from the finished wall.

For rising supplies: Mark the pipe positions and set the 33 mm centres from the finished wall.



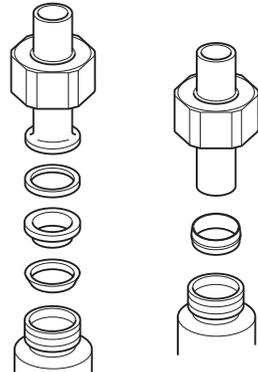
- Loosen the backplate grub screws using a 2.5 mm hexagonal key and pull off the backplate.
- For solid walls drill the holes for the backplate with a 6 mm drill and insert the wall plugs. For other types of wall structure alternative fixings may be required (not supplied).
- For rear entry supplies:** drill the holes for the supply pipes at 153 mm centres and recess the wall to allow for the concealing plates, $\text{Ø}32 \text{ mm} \times 10 \text{ mm}$ deep.

Note! Depth must be sufficient to prevent the concealing plates fouling on the plumbing elbows.



- Fit the supply pipework (**Hot - Left, Cold - Right**).
- For 15 mm compression inlet or outlet connections: fit the compression nuts and olives to the pipework.

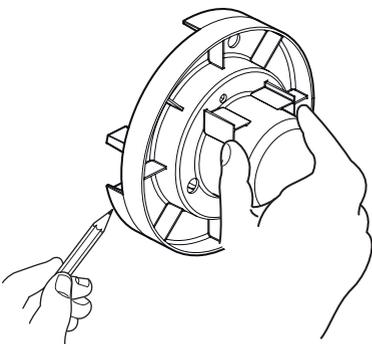
For $\frac{1}{2}$ " BSP union inlet or outlet connections: fit the flat-faced inserts, press in firmly.



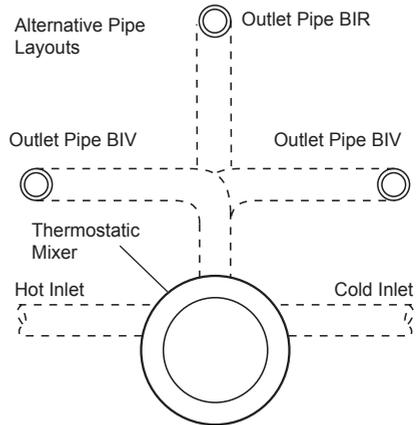
8. Mount the backplate securely to the wall surface, with the grub screws positioned at the bottom, using the screws provided if appropriate.
9. **Caution! It is essential at this point that the supply pipework is thoroughly flushed through before connection to the mixer.** Failure to do so may result in product malfunction and will not be covered under the guarantee.
10. Refit the valve onto the backplate and tighten the grub screws.
11. Connect the hot and cold supply pipes and tighten the compression nuts.
12. Connect the outlet pipework, leaving enough pipe through the wall to temporarily cap off.
13. Refer to section: '**Commissioning**'.

Rada 215-t3 bc (Rear Fixing into Solid Walls or Stud Partitions)

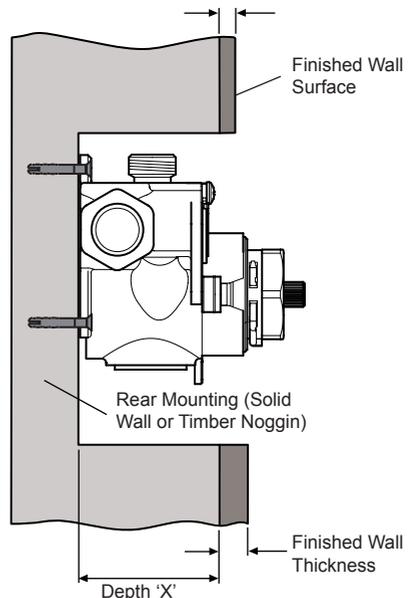
1. Determine the route for the hot and cold supply pipework and for the outlet pipework. When connecting to BIV Shower Fittings it is recommended that the outlet be positioned above and to one side of the mixer. This is to prevent the flexible hose from obstructing the shower controls.
2. Remove the two shroud screws (retain for later use) and remove the building-in shroud from the mixer.
3. Determine the position of the mixer and draw around the building-in Shroud.



4. Mark the routes for the hot and cold supply pipework (**Hot - Left, Cold - Right**) and for the outlet pipework.
Note! (if applicable) The outlet elbow should be sited above and on the right or left, as site dictates.

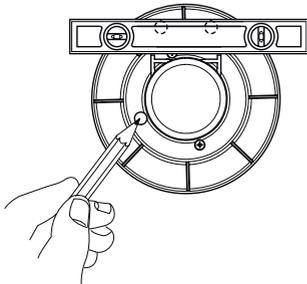


5. Cut away the plasterboard and/or brick work to the required depth.
Important! This depth 'X' will depend on the finished wall thickness e.g. tiles or fascia board. Refer to the table for this measurement.
 For stud partitions depth 'X' refers to the distance from the rear mounting e.g. timber noggin, to the front of the wall (before tiling).



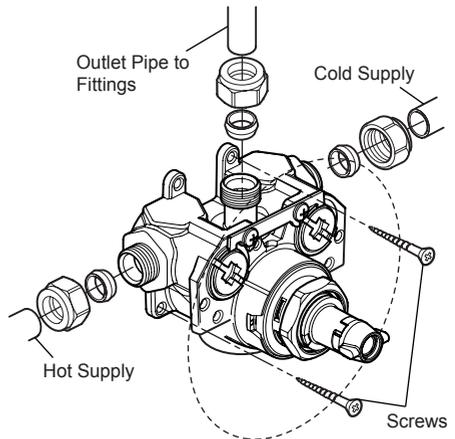
Finished Wall Thickness (e.g. tile and adhesive)	Wall Cutout Depth 'X'
4 mm	81 - 63 mm
6 mm	79 - 61 mm
8 mm	77 - 59 mm
10 mm	75 - 57 mm
12 mm	73 - 55 mm
14 mm	71 - 55 mm
16 mm	69 - 55 mm
18 mm	67 - 55 mm
20 mm	65 - 55 mm
22 mm	63 - 55 mm
24 mm	61 - 55 mm

- Refit the building-in shroud to the mixer.
- Make sure that the mixer is level and central in the hole, and square to the finished wall surface (or the control components will not fit correctly), then mark the positions of the three fixing screw holes on the wall.



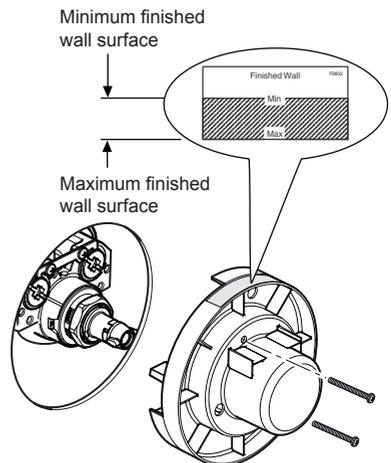
- For solid walls drill three 6 mm holes for the wall plugs.
- Fit the hot and cold supply pipework (**Hot - Left, Cold - Right**).
- Caution! It is essential at this point that the supply pipework is thoroughly flushed through before connection to the mixer.** Failure to do so may result in product malfunction and will not be covered under the guarantee.
- Insert the wall plugs and attach the mixer to the wall with the screws provided.

Note! For stud partition installations alternative fixings may be required (not supplied) to fix the mixer to the rear face of the wall cavity or to a timber noggin.



- Remove the two shroud screws (retain for later use) and remove the building-in shroud from the mixer.
- Make sure that the olives are fitted, connect the hot and cold supply pipes and tighten the compression nuts.
- Connect the outlet pipework, leaving enough pipe through the wall to temporarily cap off.
- Turn on the water supplies and check for leaks.
- Attach the building-in shroud to the mixer using the two shroud screws removed earlier.
- Using the 'Finished Wall Indicator' on the building-in shroud as a guide, finish the wall, e.g. tiles.

Caution! Make sure that the finished wall is within the maximum and minimum limits and to an even depth (no greater than 2 mm variation) or the control components will not fit correctly.



18. Remove the two shroud screws (retain for later use) and remove the building-in shroud.
19. Fit the concealing plate and control assembly, refer to section: 'Control Assembly'.

Rada 215-t3 bc (Panel Fixing using Securing Brackets)

Note! For laminated panels the mixer must be positioned from the rear of the panel.

Panel thickness must be between 4 and 12 mm (if a thicker panel is used, it will be necessary to recess the securing brackets into the rear of the panel).

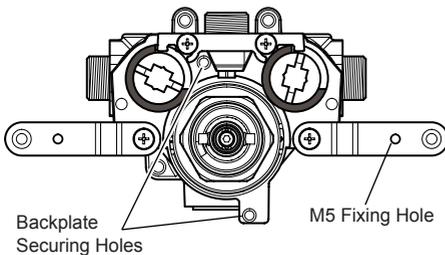
Important! Make sure that there is a minimum clearance of 64 mm behind the laminated panel to house the mixer.

1. Refer to section: 'Rada 215-t3 bc (Rear Fixing into Solid Walls or Stud Partitions)' and follow instructions 1 to 4.
2. Carefully cut out the laminated panel.
3. Fit the securing brackets to the mixer.

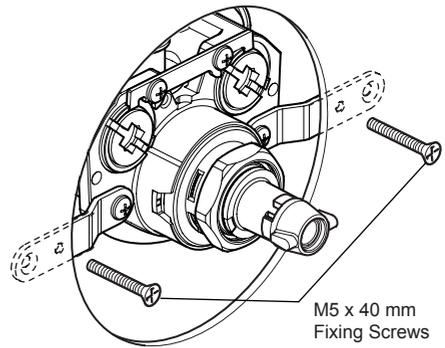
Important! Make sure that the correct holes are used, otherwise the backplate cannot be fitted.

4. Position the mixer on the front of the panel, make sure that it is level and central in the hole, then mark the position of the M5 fixing holes.

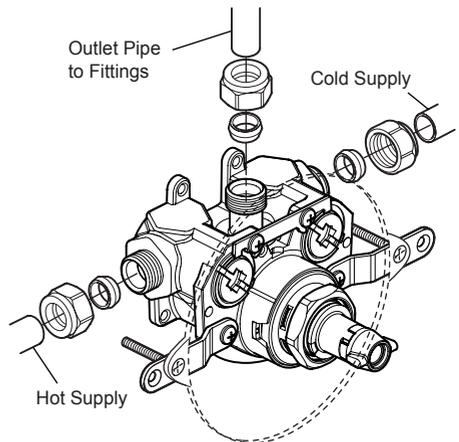
Important! Make sure that the correct holes are used (refer to illustration).



5. Drill the two 5.5 mm holes for the fixing positions (countersink the holes at the front).
6. Fit the hot and cold supply pipework (**Hot - Left, Cold - Right**).
7. **Caution! It is essential at this point that the supply pipework is thoroughly flushed through before connection to the mixer.** Failure to do so may result in product malfunction and will not be covered under the guarantee.
8. Secure the mixer with the M5 x 40 screws as shown.



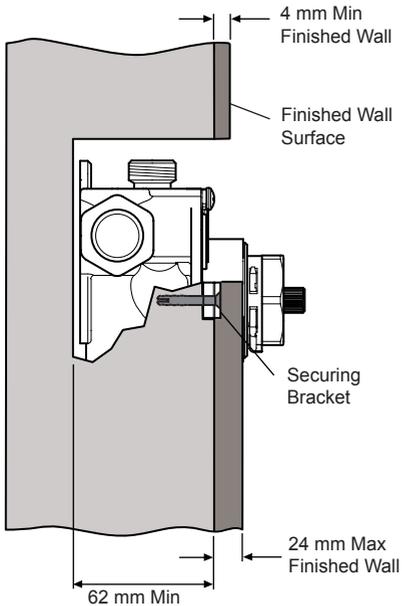
9. Make sure that the olives are fitted, connect the hot and cold supply pipes and tighten the compression nuts.
10. Connect the outlet pipework, leaving enough pipe through the wall to temporarily cap off.



11. Turn on the water supplies and check for leaks.
12. Fit the concealing plate and control assembly, refer to section: 'Control Assembly'.

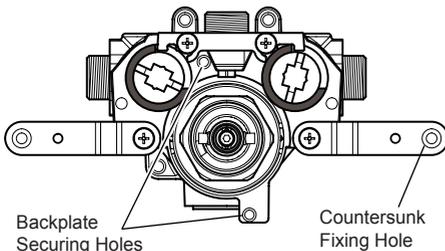
Rada 215-t3 bc (Solid Wall or Stud Partitions using Securing Brackets)

1. Refer to section: 'Rada 215-t3 bc (Rear Fixing into Solid Walls or Stud Partitions)' and follow instructions 1 to 4.
2. Remove the plasterboard and/or brick work to a minimum depth of 62 mm.



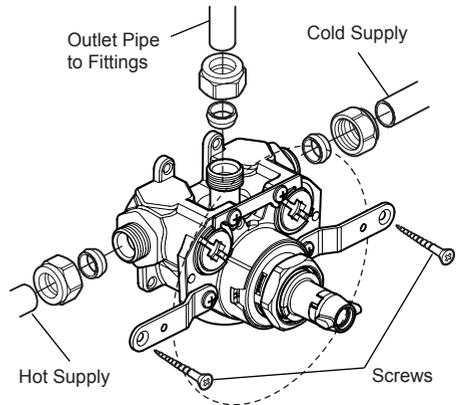
3. Fit the securing brackets to the mixer with the bracket securing screws.

Important! Make sure that the correct holes are used, otherwise the backplate cannot be fitted.

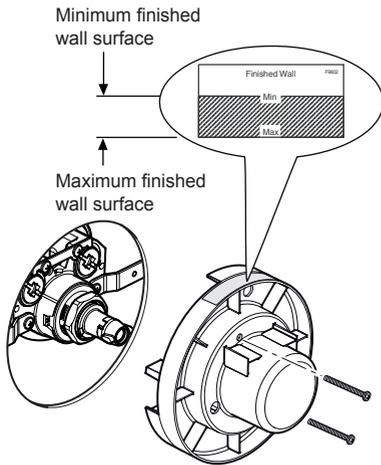


4. Make sure that the mixer is level and mark the positions for the countersunk fixing holes on the wall.
5. For solid walls drill two 6 mm holes for the wall plugs.

6. Fit the hot and cold supply pipework (Hot - Left, Cold - Right).
 7. **Caution! It is essential at this point that the supply pipework is thoroughly flushed through before connection to the mixer.** Failure to do so may result in product malfunction and will not be covered under the guarantee.
 8. Remove the wall brackets from the mixer.
 9. Make sure that the olives are fitted, connect the hot and cold supply pipes and tighten the compression nuts.
 10. Refit the wall brackets to the mixer, fit the wall plugs and fix the mixer to the wall with the screws provided.
- Note!** For stud partition installations alternative fixings may be required (not supplied).
11. Connect the outlet pipework, leaving enough pipe through the wall to temporarily cap off.



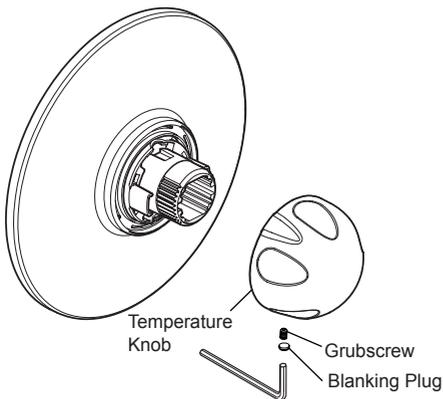
12. Turn on the water supplies and check for leaks.
 13. Attach the building-in shroud to the mixer using the two shroud screws removed earlier.
 14. Using the 'Finished Wall Indicator' on the building-in shroud as a guide, finish the wall, e.g. tiles.
- Caution!** Make sure that the finished wall is within the maximum and minimum limits and to an even depth (no greater than 2 mm variation) or the control components will not fit correctly.



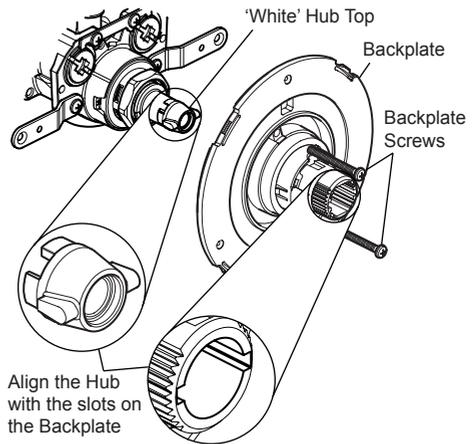
15. Remove the two shroud screws (retain for later use) and remove the building-in shroud.
16. Fit the concealing plate and control assembly, refer to section: **'Control Assembly'**.

215-t3 bc Control Assembly

1. Remove the blanking plug, unscrew the grub screw using a 2.5 mm hexagonal key and pull off the temperature knob.



2. Carefully unclip the concealing plate from the backplate.
Note! Use a screwdriver in the bottom cutout to assist separation.
3. Align the slots in the 'black' knob retainer with the lugs on the 'white' hub top and secure the backplate to the mixing valve with the two backplate screws.



4. Clip the concealing plate onto the backplate with the cutout at the bottom.
5. Refit the temperature knob with the grub screw at the bottom and secure, refit the blanking plug.
6. Before using the shower, refer to section: **'Commissioning'**.

Rada 215 dk, 215-t3 dk, 222 dk, 222-t3 dk and 215-t3 oem

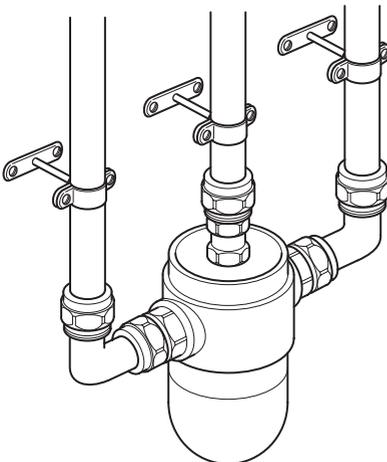
The mixing valve is supported by the inlet and outlet pipework only, which must be suitably and securely fastened.

Inlets and outlet are external BSP union, intended to accept flat-faced connectors (see note). It is recommended that such union connections are used, so that the mixing valve body can be readily removed from its pipework for maintenance purposes.

Note! Flat faced connectors are **not** supplied with 215-t3 oem, 215 dk or 222 dk models.

1. Three additional connectors (see note above) are supplied (2 elbows, 1 straight, terminating in compression connections), which are interchangeable to the inlets and outlet. Select the most appropriate configuration for the intended installation, and, with the nylon washers in place, secure to the mixing valve body.
2. Fit and secure the supply pipework.
3. **Important!** Flush through the hot and cold supplies thoroughly before connection to mixing valve.
4. Connect the inlet and outlet pipework to the valve.

Note! Make sure that the hot and cold supplies have been connected to the correct inlets, and that all connections are watertight.



5. Refer to section: **'Commissioning'**.

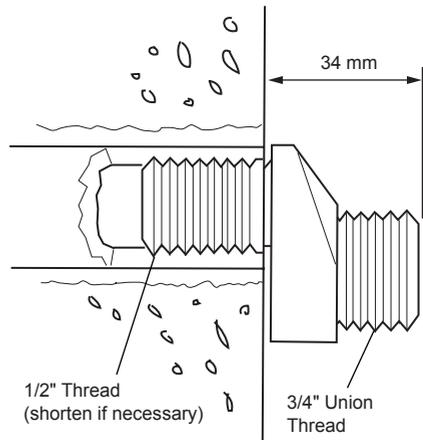
Rada 215-t3 zc

Note! Rada offset connectors and offset pipe concealing plates are not supplied with this mixing valve, but are available separately as optional accessories.

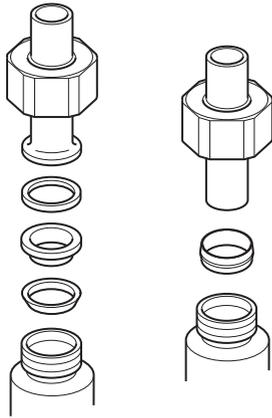
1. Check that the hot and cold supplies are piped to the correct inlet positions. Supplies (pipe centres between 128-178 mm) must terminate in 1/2" BSP internal sockets to within 3 mm, above or below, the final wall surface.

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

2. Join offset connectors and screw into sockets so that faced edge is 34 mm proud of **final** wall surface (refer to illustration). Shorten 1/2" BSP external thread, if necessary.



3. Screw pipe concealing plates onto offset connectors.
4. **Caution! It is essential at this point that the supply pipework is thoroughly flushed through before connection to the mixer.** Failure to do so may result in product malfunction and will not be covered under the guarantee.
5. With the nylon washers in position, offer up the mixing valve and tighten the union nuts onto the offset connectors.
6. Connect the outlet pipework:
 - 6.1 for 15 mm compression pipework outlet connection: fit the compression nut and olive (refer to illustration).
 - 6.2 for 1/2" BSP union outlet connection: fit flat-faced insert, press in firmly (refer to illustration).



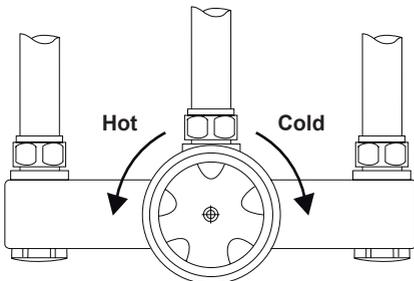
7. Make sure that the hot and cold supplies have been connected to the correct inlets, and that all connections are watertight.
8. Refer to section: '**Commissioning**'.

OPERATION

For adjustable temperature models adjustment of the blend temperature from the preset maximum to cold is achieved by clockwise rotation of the temperature knob.

For locked temperature models no user adjustment is intended.

Control of flow is via a separate outlet valve(s), refer to section: '**Specifications**'.



Adjustable Temperature Models Only

COMMISSIONING

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

Exercising the Thermostat

Thermostatic mixing valves with wax thermostats are inclined to lose their responsiveness if not used. Valves which have been in storage, installed but not commissioned, or simply not used for some time should be exercised before setting the maximum temperature or carrying out any tests.

A simple way to provide this exercise is:

- (a) Make sure that the hot and cold water are available at the valve inlets, and the outlet is open.
- (b) Move the temperature control rapidly from cold to hot and back to cold several times, pausing at each extreme.

Maximum Temperature

Note! For Type 3 healthcare installations the maximum blend temperature is determined by the application, refer to the '**TMV3 Requirements Manual**'.

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 and the maximum temperature is preset to approximately 41°C (222 models - 44°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, an adjustable temperature control knob which allows the user to select the blend temperature between ambient cold up to a preset maximum, or if considered more appropriate, a locked cap can be fitted, allowing no user adjustment.

Maximum Temperature Setting

Check that an adequate supply of hot water is available at the hot inlet of the mixing valve.

The minimum temperature of the hot water must be at least 12°C above the desired blend, however during resetting this should be close to the typical storage maximum to offset the possibility of any blend shift due to fluctuating supply temperatures.

Check that both inlet isolating valves are fully open and the inlet filters are clean.

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

All models except Rada 215-t3 bc:

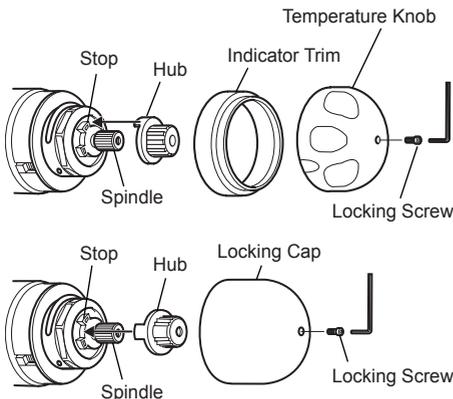
1. Remove the temperature knob and indicator trim or locking cap using a 3 mm hexagonal key.
2. Pull off the temperature hub.
3. Using the temperature hub, rotate the spindle until the required maximum blend temperature is obtained at the discharge point (**rotate clockwise to decrease temperature**).

If 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 has been achieved, refit the hub without disturbing the spindle.

For adjustable temperature position the hub such that the lug is against the side of the stop on the cartridge face, thus preventing anticlockwise rotation past the maximum temperature stop.

For locked temperature position the hub such that the lug is between the stops on cartridge face, thus preventing any rotation.

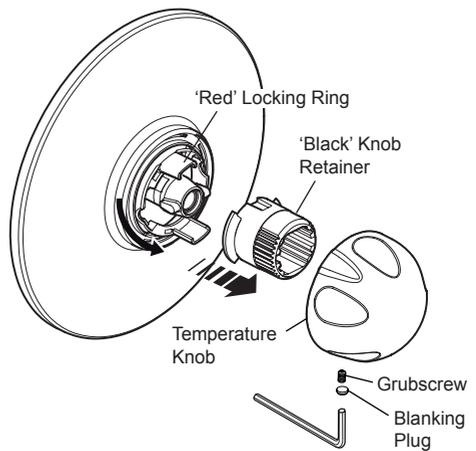


5. Check that blend temperature has not altered.
6. **For adjustable temperature** refit the indicator trim and temperature knob and secure with the locking screw.

For locked temperature refit the locking cap, engaging the cap guides into the body slots and secure with the locking screw.

Rada 215-t3 bc models only:

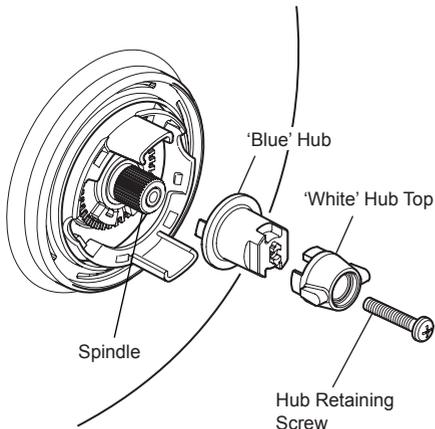
1. Remove the blanking plug, unscrew the grub screw using a 2.5 mm hexagonal key and pull off the temperature knob.
2. Rotate the 'red' locking ring anti-clockwise until the 'black' knob retainer is released.
3. Remove the 'black' knob retainer.



4. Unscrew the hub retaining screw and remove the 'white' hub top and 'blue' hub.
5. Rotate the spindle until required maximum blend temperature is obtained at discharge point (**clockwise = decrease temperature**).

Note! Use the 'blue' hub to assist.

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



6. Once the desired maximum blend temperature has been achieved, refit the 'blue' hub without disturbing the spindle.

For adjustable temperature position the 'blue' hub such that the lug is against the side of the stop on the cartridge face, thus preventing anticlockwise rotation past the maximum temperature stop.

For locked temperature position the 'blue' hub such that the lug is between the stops on cartridge face, thus preventing any rotation.

7. Check that blend temperature has not altered.
8. Refit the 'white' hub top and secure with the hub retaining screw.
9. Turn the 'red' locking ring so that the lugs are in the vertical position.
10. Align the slots in the 'black' knob retainer with the lugs on the 'white' hub top and refit into the 'red' locking ring.
11. Hold the 'black' knob retainer still and rotate the 'red' locking ring clockwise to lock in position.
12. Refit the temperature knob with the grub screw at the bottom and secure, refit the blanking plug.

MAINTENANCE

General

This Product is precision engineered and should give continued safe and controlled performance, provided:

1. It is installed, commissioned, operated and maintained in accordance with manufacturers recommendations.

2. Periodic attention is given, when necessary, to maintain the product in good functional order.

The Rada 215 and 222 range of thermostatic mixing valves are designed for the minimum of maintenance in normal use. The only serviceable parts are the inlet filters which should be checked and cleaned every 12 months. If a malfunction occurs with the thermostatic cartridge then this will necessitate a complete cartridge replacement.

Note! The cartridge contains no internally serviceable parts.

If you require a Rada trained engineer or agent, refer to section: '**Customer Care**'.

Disinfection

In applications where system chemical disinfection is practised, chlorine can be used (calculated chlorine concentration of 50 mg/l (ppm) maximum in water, per one hour dwell time, at service interval frequency). 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, refer to Kohler Mira Ltd, or Local Agent.

Lubricants

Silicone based lubricants must only be used on the rubber seals.

Caution! Oil based or other lubricant types may cause rapid deterioration of seals.

Planned Maintenance

Important! For Type 3 Valves use the In-Service tests given in the TMV3 Requirements Manual. In the absence of any other instruction or guidance on the means of determining the appropriate frequency of in-service testing, the procedure contained within this guide (taken from Annex F of D08) should be used.

For other commercial installations it is recommended that the correct blend setting is checked every 6 months and that the In-Service Test procedure is followed every 12 months.

Fault Diagnosis

Read the section: **Important Safety Information** first.

Provided that the thermostatic mixing valve has been correctly installed and is operated in accordance with the instructions contained in this guide, difficulties should not arise. If any maintenance is required then it must be carried out by a competent tradesperson for whom the fault diagnosis chart and maintenance instructions are provided. Before replacing any parts make sure that the underlying cause of the malfunction has been identified.

Symptom 1:

- Only hot or cold water from the mixer outlet.
- Outlet temperature too hot / too cold.

Cause Rectification:

- Inlets reversed (hot supply to cold supply). Check.
 - No hot water reaching mixer. Check.
 - Check the strainers for any blockage.
 - Refer to symptom 5.
 - Installation conditions outside operating parameters, refer to symptom 2 and section: '**Specifications**'.
-

Symptom 2:

- Fluctuating or reduced flow rate.

Cause Rectification:

Normal function of mixing valve when operating conditions are unsatisfactory

- Check strainers and inlet/outlet fittings for flow restriction.
 - Make sure that the minimum flow rate is sufficient for the supply conditions.
 - Make sure that the dynamic inlet pressures are nominally balanced.
 - Make sure that the inlet temperature differentials are sufficient.
 - Check thermostatic performance; renew thermostatic cartridge if necessary.
-

Symptom 3:

- No flow from mixing valve outlet.

Cause Rectification:

- Check strainers and inlet/outlet fittings for blockage.
 - Hot or cold supply failure; thermostat holding correct shutdown function: rectify then check thermostatic performance; renew thermostatic cartridge if necessary.
-

Symptom 4:

- Blend temperature drift.

Cause Rectification:

Indicates operating conditions changed.

- Refer to symptom 2.
 - Hot supply temperature fluctuation.
 - Supply pressure fluctuation.
-

Symptom 5:

- Hot water in cold supply or vice versa.

Cause Rectification:

- Non return valves require maintenance, refer to section: '**Maintenance**'.
-

Symptom 6:

- Maximum blend temperature setting too hot or too cool.

Cause Rectification:

- Indicates incorrect maximum temperature setting; refer to section: '**Commissioning**'
 - As symptom 4.
 - As symptom 5.
-

Symptom 7:

- Water leaking from valve body.

Cause Rectification:

- Seal(s) worn or damaged, obtain service pack, and renew all seals. If leak persists from around the temperature spindle, renew the thermostatic cartridge

Non Return Valves / Inlet Strainers

General

Hot water entering the cold supply, or vice versa, indicates that immediate attention of the non return valve is necessary.

The non return valve cartridge may be cleaned by removal of the inlet strainers, and flushing through under a jet of water to remove lodged particles.

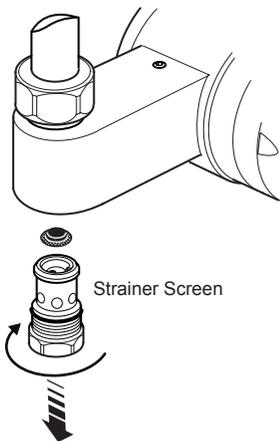
Non return valve cartridges are not serviceable items, so any apparent wear or damage will require renewal.

Blockage of the inlet strainer screens 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 part of the six-monthly maintenance operations. A strainer pack is available for all 215 and 222 models (except bc models), refer to section: 'Spare Parts'.

Rada 215-t3 c models only:

1. Isolate the supplies to mixing valve, and open an outlet fitting to release pressure and to assist the draining of residual water.
2. Using a 24 mm wrench unscrew the non return valve cartridge head hexagon and remove the non return valve cartridge assembly.

Caution! Some residual water may be released.



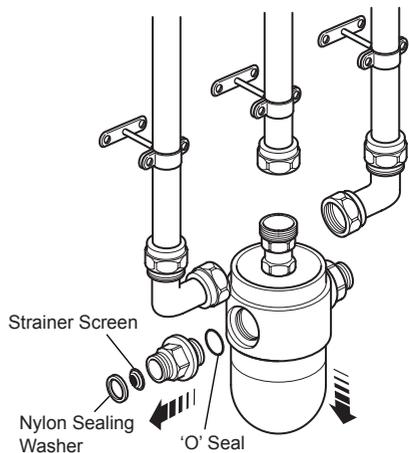
3. The non return valve cartridge and/or strainer screens can be cleaned or replaced as necessary.

Note! The strainer screens are dished outwards and are a push fit into the housing. If necessary, remove carefully, using a sharp pointed implement.

4. Re assembly is the reversal of the above procedure. Do not overtighten when re-inserting cartridges.
5. Restore the hot and cold water supplies and check for leaks.

Rada 215 dk, 215-t3 dk, 222 dk, 222-t3 dk and 215-t3 oem models only:

1. Isolate the supplies to mixing valve, and open an outlet fitting to release pressure and to assist the draining of residual water.
2. Unscrew the inlet and outlet flat faced connectors and remove the mixing valve.
Caution! Some residual water may be released.
3. Using a 22 mm wrench (30 mm for 222 models) unscrew the non return valve cartridge head hexagon and remove the non return valve cartridge assembly.



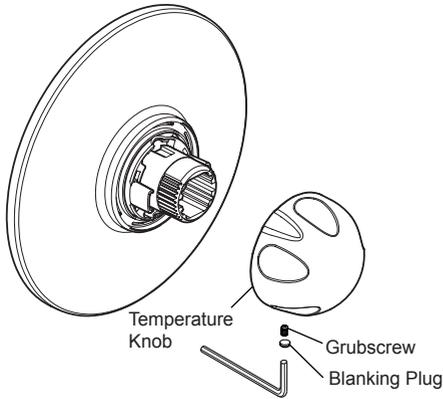
4. The non return valve cartridge and/or strainer screens can be cleaned or replaced as necessary.

Note! The strainer screens are dished outwards and are a push fit into the housing. If necessary, remove carefully, using a sharp pointed implement.

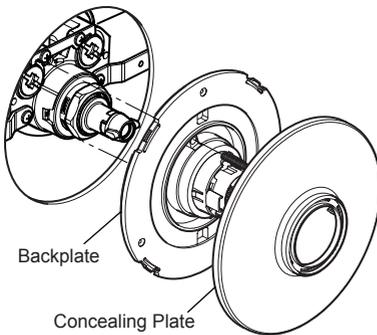
5. Re assembly is the reversal of the above procedure. Do not overtighten when re-inserting cartridges.
6. Restore the hot and cold water supplies and check for leaks.

Rada 215-t3 bc models only:

1. Remove the blanking plug, unscrew the grub screw using a 2.5 mm hexagonal key and pull off the temperature knob.

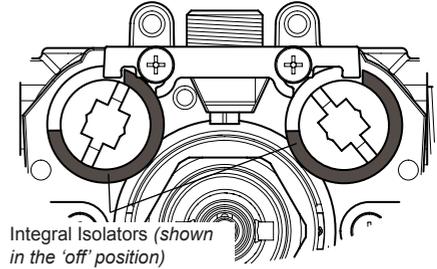


2. Carefully unclip the concealing plate from the backplate.
- Note!** Use a screwdriver in the bottom cutout to assist separation.
3. Unscrew the two backplate screws and remove the backplate from the mixer.



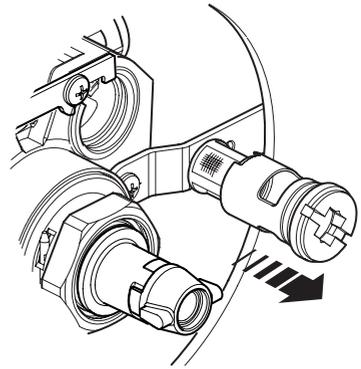
4. Using a 10 mm hexagonal key turn the integral isolators 90° anti-clockwise to shut off the hot and cold water supplies.

Important! You **MUST** isolate both the hot and cold isolators.



5. Open an outlet fitting to release pressure and to assist the draining of residual water.
6. Continue to unscrew and remove the non return valve assembly.

Caution! Some residual water may be released.



7. The non return valve assembly and/or strainer screens can be cleaned or replaced as necessary.
8. Re assemble the non return valve assembly and screw into the integral isolator. Continue to tighten until resistance is felt and the integral isolator tries to turn.
9. Turn the integral isolators 90° clockwise to turn on the hot and cold water supplies.
10. Refit the backplate and concealing plate assemblies and check for leaks.

Thermostatic Cartridge

Removal

1. To remove the thermostatic cartridge refer to the appropriate instructions in section: '**Installation, Outlet Position / Reversed Inlet Supplies**'.

Cleaning / Renewal of Parts

2. The interior surface of the mixing valve body must be clean before refitting the cartridge. If scale or deposition is present clean (without thermostatic and non return valve cartridges fitted) using a mild proprietary inhibited scale solvent, e.g. domestic kettle descaler. After descaling, rinse the valve body interior thoroughly in clean water before refitting the cartridges.

Note! The body interior must be cleaned carefully and not damaged in any way. Do not use any abrasive material.

3. Cartridges may only be cleaned by flushing through under a jet of clean water to remove lodged particles.

Do not descale. Cartridges are not serviceable, and must not be dismantled.

Cartridges cannot be tested individually, service condition should be assessed as part of the performance check.

4. When renewing the thermostatic cartridge, retain the removal clip and head nut off the displaced unit and refit.
5. Examine all accessible seals for signs of deformation or damage, and renew as necessary, taking care not to damage the seal grooves (a Service Pack is available, containing all seals and strainer screens that may be necessary for renewal during maintenance or servicing, refer to section: '**Spare Parts**').
6. Lightly coat all seals with a silicone-only based lubricant to assist reassembling, refer to section: '**Maintenance, Lubricants**'.

Re-assembly

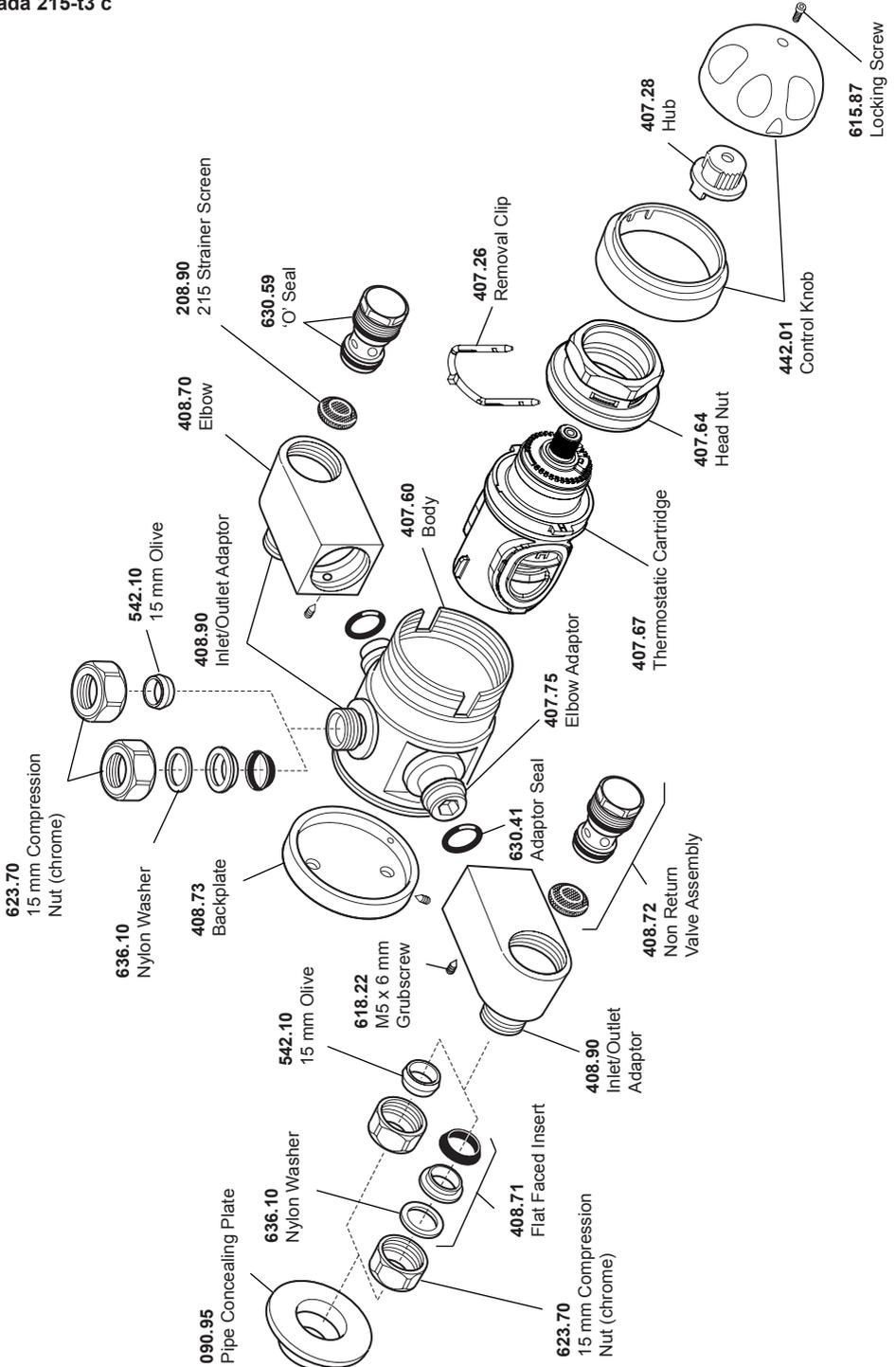
7. To replace the thermostatic cartridge refer to the appropriate instructions in section: '**Installation, Outlet Position / Reversed Inlet Supplies**'.
8. To commission the thermostatic cartridge refer to section: '**Commissioning**'.

SPARE PARTS

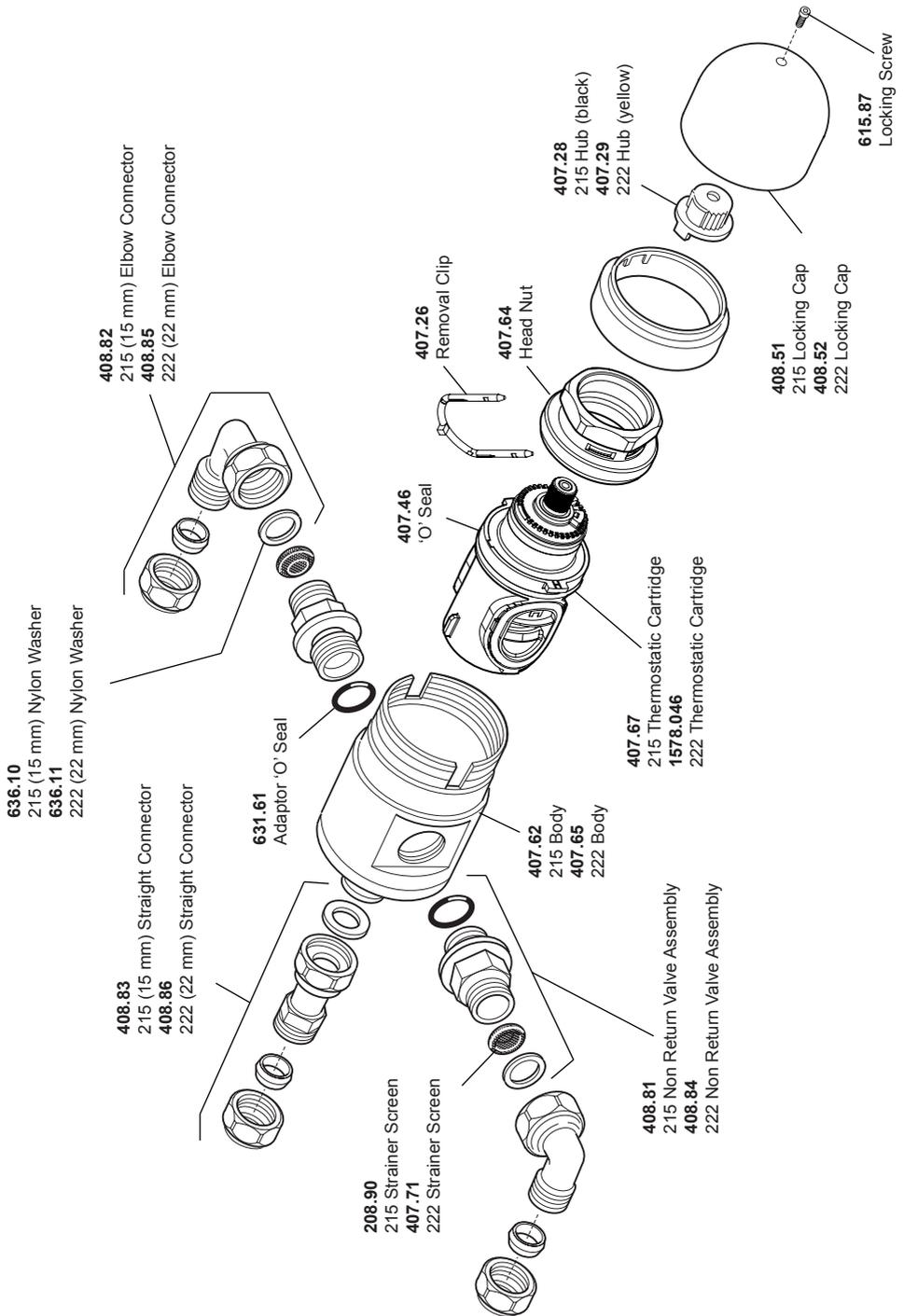
All spare parts listed are supplied individually (unless stated). Kohler Mira has a policy of continual product development and parts illustrated may not be identical to those supplied.

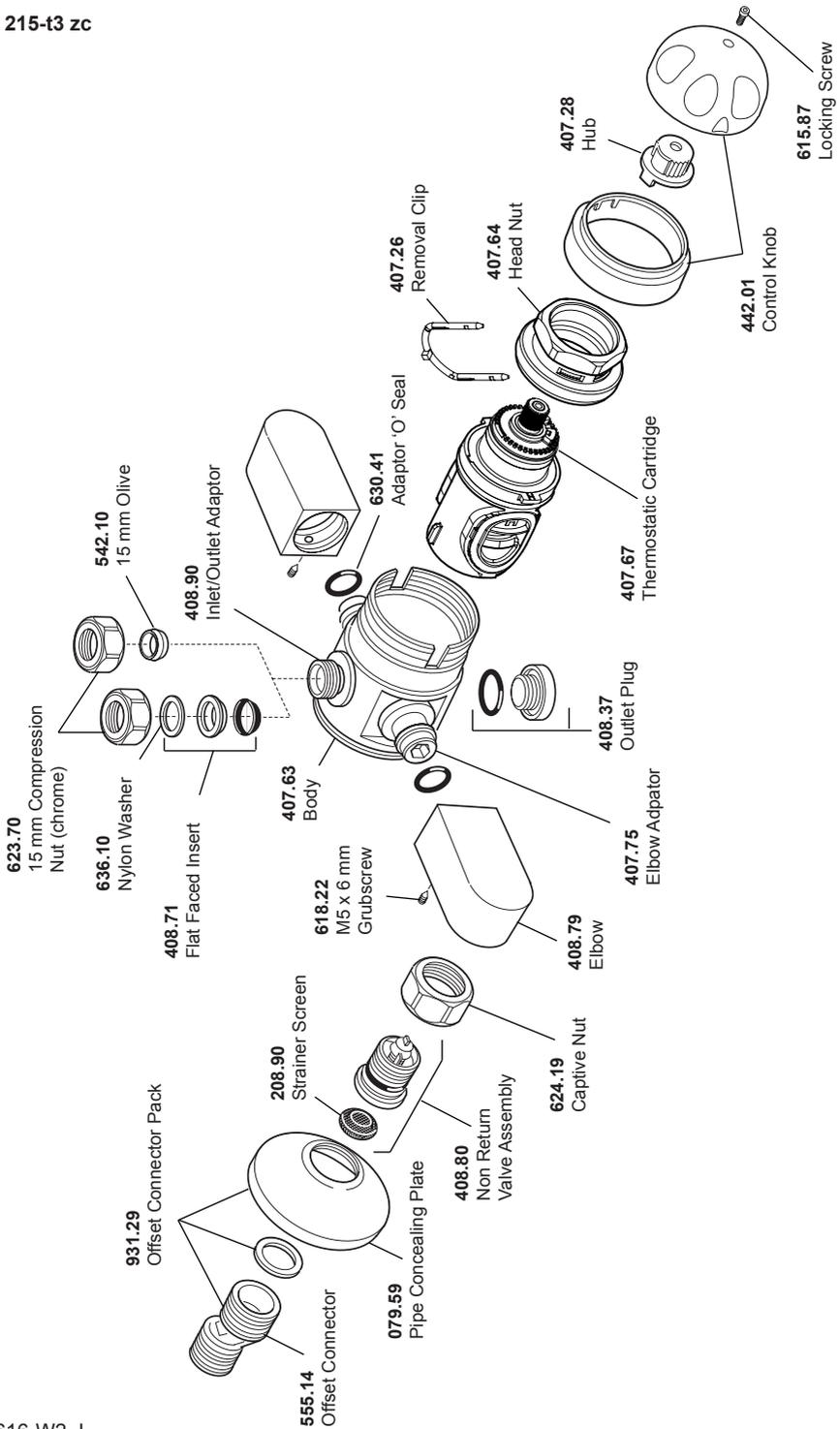
Strainer and Service Pack Spares

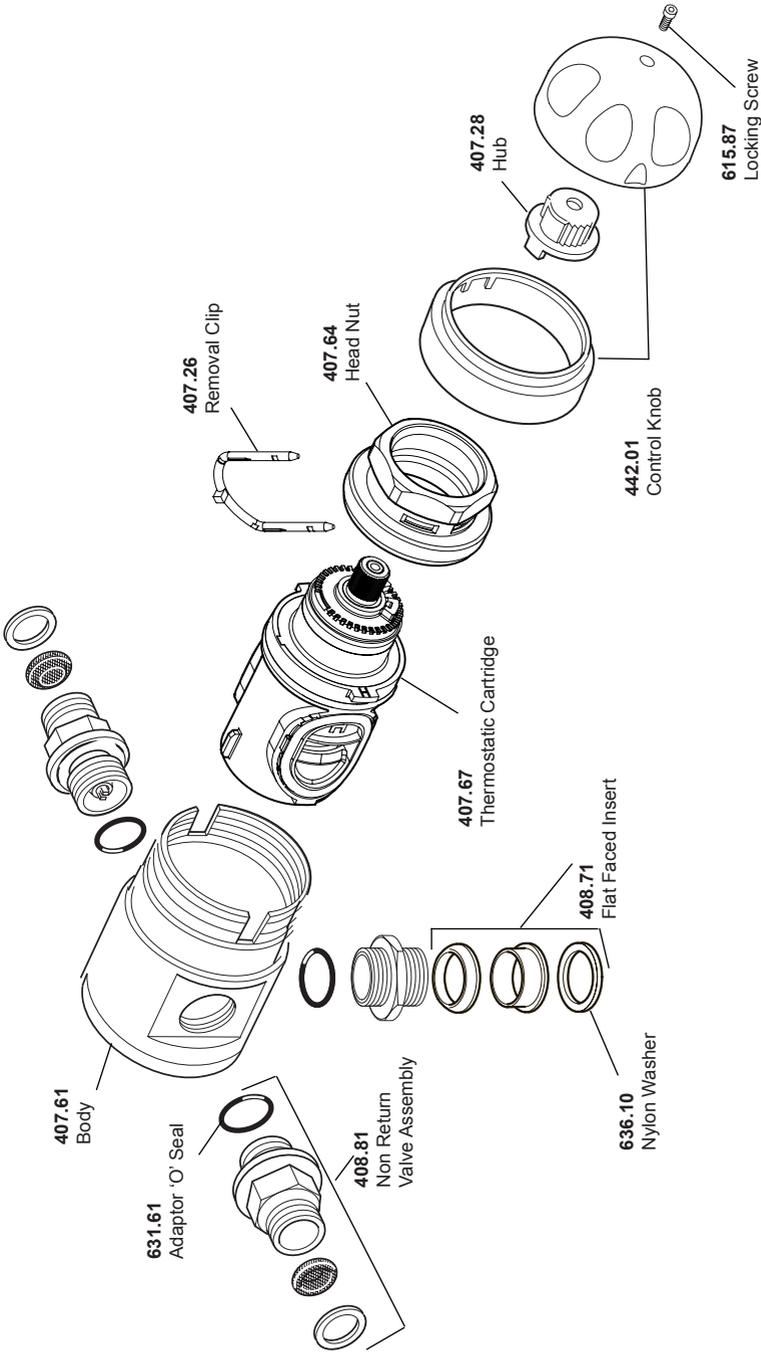
408.91	215 Strainer Pack (not bc models)
	208.90 Strainer Screen (x 2)
	630.59 'O' Seal (x 4)
	636.10 15 mm Nylon Washer (x 3)
	636.11 22 mm Nylon Washer (x 2)
983.07 Lubricant (x 1)	
408.92	215 Service Pack (not bc models)
	208.90 Strainer Screen (x 2)
	407.11 Cartridge Inlet Seal (x 2)
	407.46 Cartridge Seal (x 1)
	618.22 M5 x 6 mm Grubscrew (x 2)
	630.41 Adaptor 'O' Seal (x 2)
	630.59 'O' Seal (x 4)
	631.61 Adaptor 'O' Seal (x 5)
	636.10 15 mm Nylon Washer (x 3)
636.11 22 mm Nylon Washer (x 2)	
983.07 Lubricant (x 1)	
408.87	222 Service and Strainer Pack
	407.11 Cartridge Inlet Seal (x 2)
	407.46 Cartridge Seal (x 1)
	407.71 Strainer Screen (x 2)
	631.61 Adaptor 'O' Seal (x 2)
	636.11 22 mm Nylon Washer (x 3)
983.07 Lubricant (x 1)	



Rada 215 dk, 215-t3 dk, 222 dk and 222-t3 dk







NOTES

CUSTOMER CARE

Your product has the benefit of our manufacturer's guarantee which commences from date of purchase or from the date of commissioning when product commissioning has been conducted by the UK Rada Commercial Field Team (available UK Only).

Please visit www.radacontrols.com or contact your local agent for all terms and conditions including details of the Rada commissioning service for the UK

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