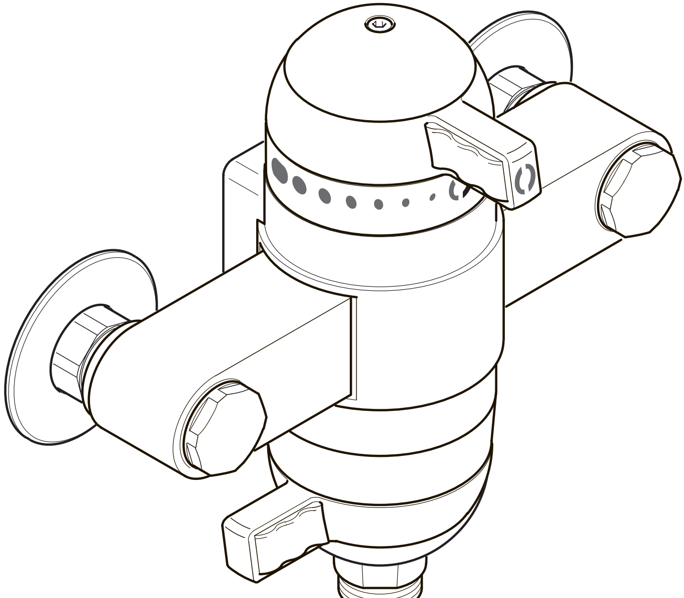
EXACT-3

PRODUCT MANUAL



IMPORTANT

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

INDEX

If you experience any difficulty with the installation or operation of your new mixing valve, then please refer to the **Fault Diagnosis** section, before contacting Kohler Mira Ltd. Our telephone and fax numbers can be found on the back cover of this guide.

SAFETY: WARNINGS

The function of this thermostatic shower control is to deliver water consistently at a safe temperature. This requires that:

1. It is installed, commissioned, operated and maintained in accordance with the recommendations given in this Manual.

2. Type 3 valves are only used for applications covered by their approved designations.

3. Periodic attention is given, as necessary, to maintain the product in good functional order. Recommended guidelines are given in the **MAINTENANCE** section.

4. Continued use of this product in conditions outside the specification limits given in this manual can present potential risk to users.

ADVICE

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

Provided that the thermostatic shower control 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 shower controls are 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 shower control having excessive 'dead-legs' of pipework. Others allow an auxiliary cold water supply to be added to the mixed water from the shower control. Such systems can disguise the onset of thermostatic shower control malfunction.

Ultimately, the user or attendant must exercisedue 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.

INTRODUCTION

The Rada Exact-3 Thermostatic shower control is specified to meet the highest standards of safety, comfort and economy as demanded by today's users. All Rada Exact-3 Thermostatic shower controls are designed, manufactured and supported in accordance with accredited BS EN ISO 9001:1994 Quality Systems.

The manual covers all Rada Exact-3 Thermostatic shower controls manufactured from May 1995.

The suffix 3 indicates that the valve has been certified for use in UK healthcare premises as a Type 3 mixing valve under the TMV3 scheme. Where this product is to be used in such an installation, particular Application, Installation, Commissioning and Maintenance requirements apply. These are given in the section 'TYPE 3 VALVES'.

DESCRIPTION

A range of 1/2" thermostatic shower controls to suit differing exposed installation formats. Incorporates the Thermostatic cartridge, a unique sealed-for-life unit utilising proven durability high-technology materials, for extended service-free reliability.

Also incorporates a sealed-for-life flow cartridge, utilising ceramic technology to provide durable and positive control of flow.

The shower control inlets are fitted with strainers and checkvalves, housed within readily-accessible cartridges for easy maintenance.

Product range

Rada Exact-3 - Exposed model, surface mounted, all chrome finish, 15 mm compression / 1/2" BSP connections.

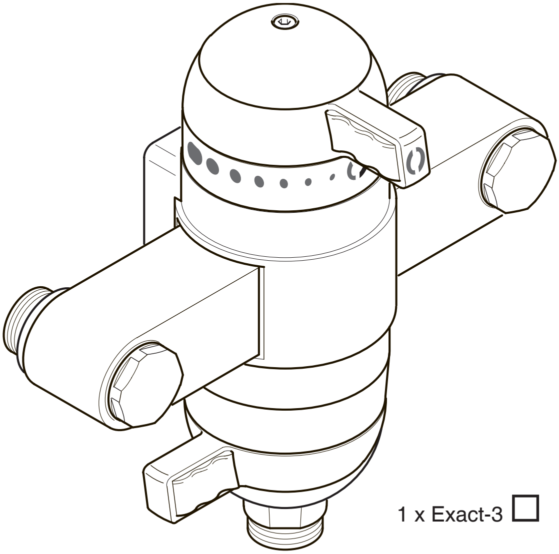
Rada Exact-3 z - Exposed model, pipework mounted, all chrome finish, inlets 3/4" BSP union (optional 3/4" x 1/2" offset adaptors for variable centres and pipe concealing plates are available), outlet 15 mm compression / 1/2" BSP connection.

Both models are provided with adjustable temperature control which allows the user to select blend water temperatures up to a preset safe maximum level. Temperature and flow knobs each incorporate a short lever, with approximately half a turn rotation, to assist those with reduced use of their hands.

PACK CONTENTS

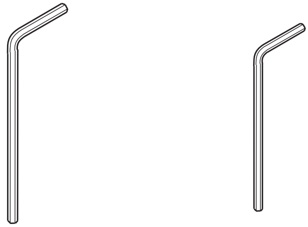
☑ Tick the appropriate boxes to familiarize yourself with the part names and to confirm that the parts are included.

Exact-3

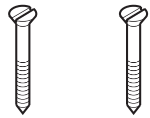


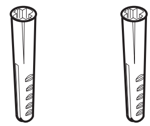
1 x Exact-3 ☐

1 x 2.5 mm A/F Hexagonal Wrench ☐

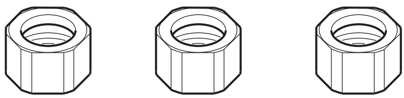


2 x Screws ☐



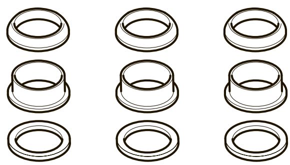


2 x Wall Plugs ☐

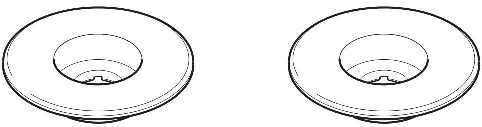


3 x Compression Nuts ☐

3 x Olives ☐



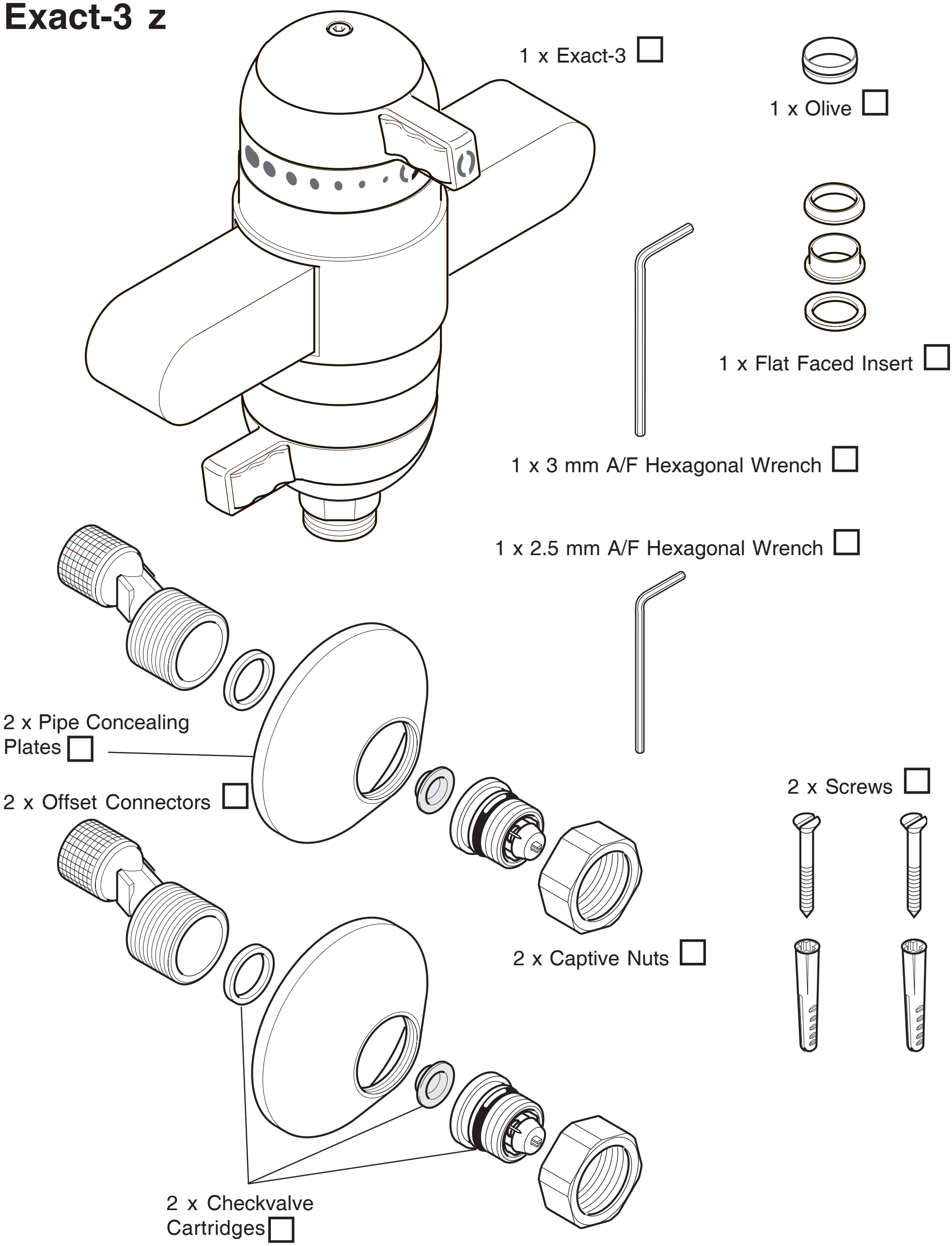
3 x Flat Faced Inserts ☐



2 x Pipe Concealing Plates ☐

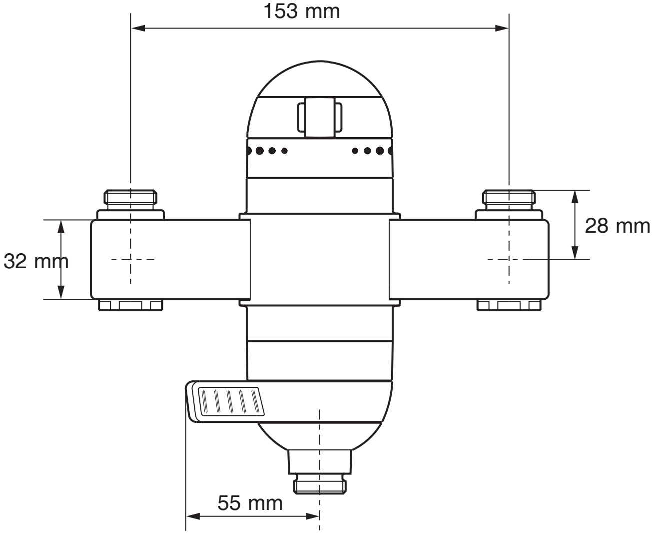
☑ Tick the appropriate boxes to familiarize yourself with the part names and to confirm that the parts are included.

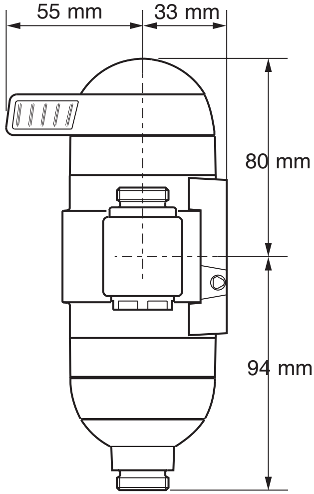
Exact-3 z



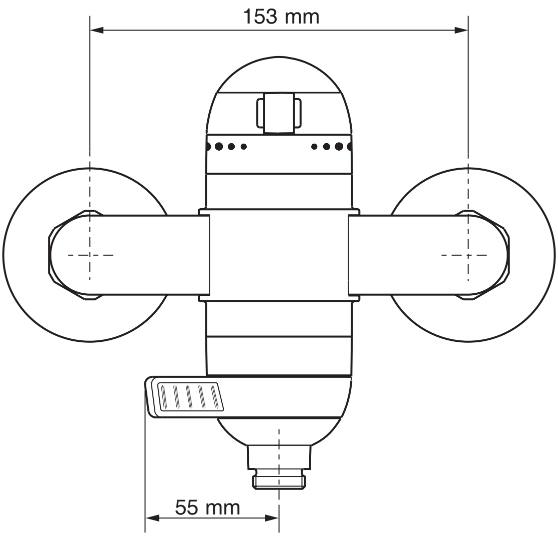
DIMENSIONS

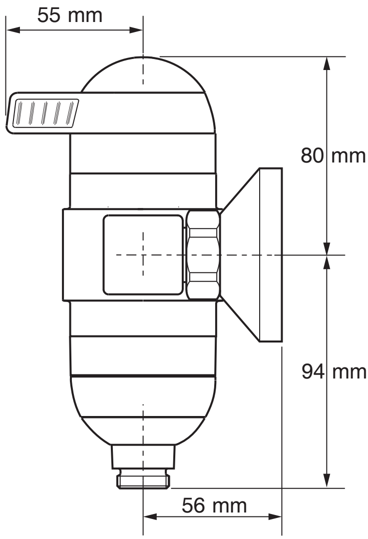
Rada Exact-3





Rada Exact-3 z





SPECIFICATION

Normal Operating Conditions are considered as:

- inlet dynamic pressures nominally balanced to within 10% of each other during flow
- a 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
- daily usage of 1-6 hours
- installation and usage environment not subject to extremes of temperature, unauthorised tampering or wilful abuse.

Other Applications

For information on other specific applications or suitability, refer to Kohler Mira Ltd, or local agent.

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 Limited, or Local Agent.

Operating Parameters

For Type 3 valves the supply conditions specified in **Type 3 Valves - Application** take precedence over the operating parameters which follow.

Pressures/Flow Rates

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

Recommended Minimum Flow Rate: 3 litres/minute at mid-blend with equal dynamic supply pressures**.**

Recommended Maximum Flow Rate: 35 litres/min at mid-blend (which equates to a maximum pressure loss of 1.9 bar).

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

Recommended Minimum Dynamic Supply Pressure: 0.15 bar (0.2 bar healthcare).

Recommended Maximum Dynamic Supply Pressure: 5 bar.

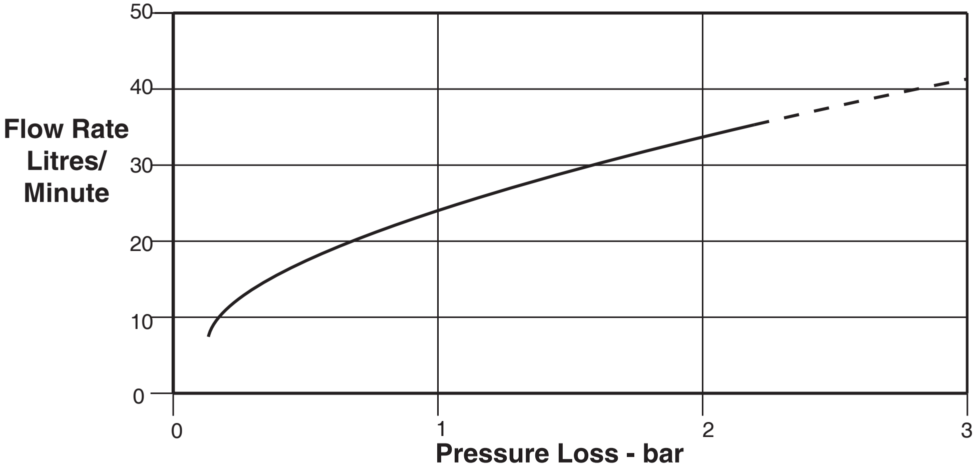
Maximum Static Supply Pressure: **10 bar**.

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

**Pressure Loss Ratio is determined by subtracting the resistance to flow at the outlet (generally known as "back pressure", and measured at the outlet of the mixing tap) from the dynamic pressures of the hot and cold water at each inlet of the mixing tap. This is at its extreme when the mixing tap 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

(Shower control 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 approximately 60°C, according to hot water supply temperature.

Thermostatic Control Range: approximately **25-60°C.**

Optimum Thermostatic Control Range: 30-50°C.

Recommended Minimum Cold Water Supply Temperature: 1°C.

Recommended Maximum Hot Water Supply Temperature: 85°C.

Note! The shower control can accept temporary temperature excursions above 85°C without damage, however operation at such elevated supply 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 Exact-3 series shower controls have integral flow control; no other user-operated flow controller should be used with this shower control.

Connections:

Rada Exact-3 -Inlets and Outlet: 1/2” BSP external union or 15 mm compression (nut and olive provided).

Rada Exact-3 z - Inlets: 3/4” BSP internal captive nuts to accept offset unions (available separately on request, these allow for variable (115-165 mm) rear-fed supply pipework centres via parallel or taper sockets). Outlet: 1/2” BSP external union or 15 mm compression (nut and olive provided).

Standard Connections are;

hot - left (marked **red**)

cold - right (marked **blue**)

Note! Should the supplies be reversed then the shower control will not be able to control temperature. This can be corrected by reversing the position of the Thermostatic cartridge within the control body, as described in **INSTALLATION**.

Outlet - bottom (can be altered to top outlet if required, refer to **INSTALLATION**)

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

Outlet Fittings: The outlet connector is designed to accept:

Rada/standard flexible hose (1/2” BSP) unions and flat-faced/flanged unions (maximum flange diameter 20 mm); use flat-faced insert (408 71)

15 mm pipework; use compression olive (542 10).

Inlet/ Outlet Options:

	INLETS:*	OUTLET:*
Exact-3	**top,** bottom, rear-fed	**bottom,** top
Exact-3 z	**rear-fed**	**bottom,** top

* Products are supplied in the format shown in bold.

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, ensure that the installation conditions comply with the information given in the **SPECIFICATION** section. For type 3 valves see also Installation conditions in **TYPE 3 VALVES**.

2. Care must be taken during installation to prevent any risk of injury or damage.

3. Installations must comply with all Local/National Water Supply Authority Regulations/Bye-Laws, and building and Plumbing Regulations.

4. The shower control should be positioned for easy access during use and maintenance. All routine maintenance procedures can be conducted with the shower control body in place (except for strainer and check valve access on the Exact-3 z). For all models, allow a minimum 150 mm top and bottom clearance to enable removal of the Thermostatic and Flow cartridges from the shower control body during maintenance.

5. Conveniently situated isolating valves must be provided for maintenance.

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

7. Inlet pressure tappings which allow measurement of the inlet pressures to the mixing valve under running conditions are particularly recommended for healthcare applications with Type 3 valves.

8. Pipework must be rigidly supported. The mixed water outlet piping should not exceed 2 m and the overall length from the hot water circuit to the discharge point should not exceed 5 m.

9. Pipework dead-legs should be kept to a minimum.

10. Supply pipework layout should be arranged to minimise the effect of other outlet usage upon the dynamic pressures at the shower control inlets.

11. Inlet threaded joint connections should be made with PTFE tape or liquid sealant. Do not use oil-based, non-setting jointing compounds.

12. To eliminate pipe debris it is essential that supply pipes are thoroughly flushed through before connection to the shower control.

Outlet Position/Reversed Inlets (Refer to Figures 1 to 4)

All Rada Exact-3 series shower controls are supplied with inlet connections configured **hot - left**, **cold - right**, and **bottom outlet** as standard. It is essential that inlet supplies correspond with the red and blue markings on the Thermostatic cartridge.

Should the existing hot and cold pipework make this configuration inconvenient, or a **top outlet** position be required, the inlets or outlet can be reversed.

1. If the shower control body has already been installed, isolate the supplies to the shower control, and open the flow control to release pressure and to assist the draining of residual water.

   Note! If both the outlet and inlet positions require reversing, it is easier to simply rotate the complete shower control by 1/2 turn.

2. **Standard** (Refer to Figure 1)

   - As supplied.

3. **Top outlet** (Refer to Figure 2)

   (a) Remove the temperature knob assembly, using the 3 mm A/F hexagonal wrench (supplied) (Refer to Figure 8). **Do not** remove the temperature hub.

   (b) With removal clip still in place, unscrew the head nut using a 35 mm A/F wrench; this will release the body shroud and also begin to draw the Thermostatic cartridge out of the body (Refer to Figure 8).

   (c) Pull the Thermostatic cartridge free of the shower control.

   (d) Rotate the Thermostatic cartridge 1/2 a turn (this reverses the position of the cartridge hot and cold inlets).

   (e) Carefully push the Thermostatic cartridge back into the shower control body. Make sure that the 2 cartridge inlet port seals remain in place, and locate the cartridge lugs into the body slots.

   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 the blue stickers from the cartridge.

   (f) Carefully align and then tighten the headnut. **Do not** overtighten (maximum torque 2.5 Nm (1.85 lbf ft)).

   (g) Rotate the shower control 1/2 turn.

   Note! The inlet elbows may need repositioning (Refer to Installation).

4. **Reversed inlets** (Refer to Figure 3)

   (a) Remove the temperature knob assembly, using the 3 mm A/F hexagonal wrench (supplied) (Refer to Figure 8). **Do not** remove the temperature hub.

   (b) With removal clip still in place, unscrew the head nut using a 35 mm A/F wrench; this will release the body shroud and also begin to draw the Thermostatic cartridge out of the body (Refer to Figure 8).

(c) Pull the Thermostatic cartridge free of the shower control.

(d) Rotate the Thermostatic cartridge 1/2 a turn (this reverses the position of the cartridge hot and cold inlets).

(e) Carefully push the Thermostatic cartridge back into the shower control body. Make sure that the 2 cartridge inlet port seals remain in place, and locate the cartridge lugs into the body slots.

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 the blue stickers from the cartridge.

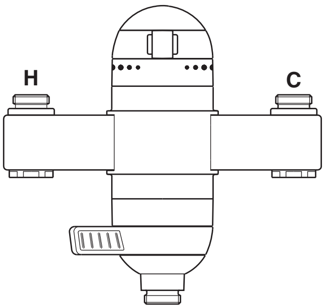
(f) Carefully align and then tighten the headnut. **Do not** overtighten (maximum torque 2.5 Nm (1.85 lbf ft)).

5. Reversed inlets and top outlet (Refer to Figure 4)

(a) Rotate the shower control 1/2 turn.

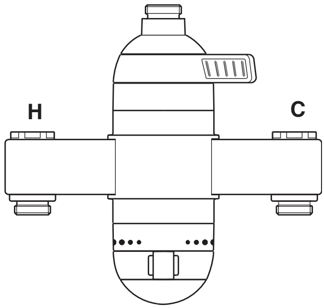
Note! The inlet elbows may need repositioning (Refer to Installation).

6. Complete **INSTALLATION**, if appropriate.



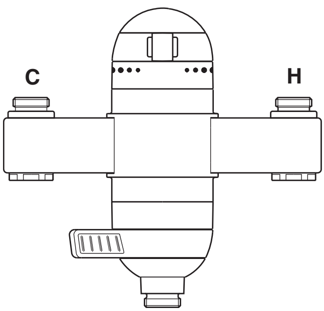
Standard

Figure 1



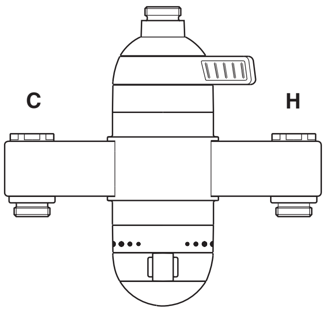
Top Outlet

Figure 2



Reversed Inlets

Figure 3



Reversed Inlets and Top Outlet

Figure 4

7. If the shower control body has already been installed, restore the hot and cold supplies and check for any leaks.

8. Align and refit the body shroud and temperature knob assembly so that the markings will be visible to the user.

9. The maximum temperature may now need resetting; check, and if necessary refer to **COMMISSIONING**.

Installation: Rada Exact-3 (Refer to Figure 5)

1. When unpacked, the inlet elbows are positioned to accept falling supplies.

   Should the installation require rising or rear-fed supplies then the elbows will need adjusting.

   (a) Loosen each elbow grub screw using the 2.5 mm A/F hexagonal wrench (supplied)

   (b) Pull the elbow away from the body and refit in the desired position.

   (c) Tighten the grub screw.

2. Where rear-fed supplies are required, pipe concealing plates are provided which recess into the tiling for a neater finish.

3. Mount the backplate securely to wall surface (with the grub screws pointing downwards) using wall screws/plugs provided.

4. Install the supply pipework to the respective inlets.

Important! Flush through the hot and cold supplies thoroughly before connection to shower control. Failure to do so may result in reduced performance and/or product damage.

5. Refit body onto backplate and tighten the grub screws.

6. Connect inlet pipework, checking that the hot and cold supplies have been piped to the correct inlets.

   (a) For 15 mm compression pipework inlet (or outlet) connections: Use compression nuts and olives supplied.

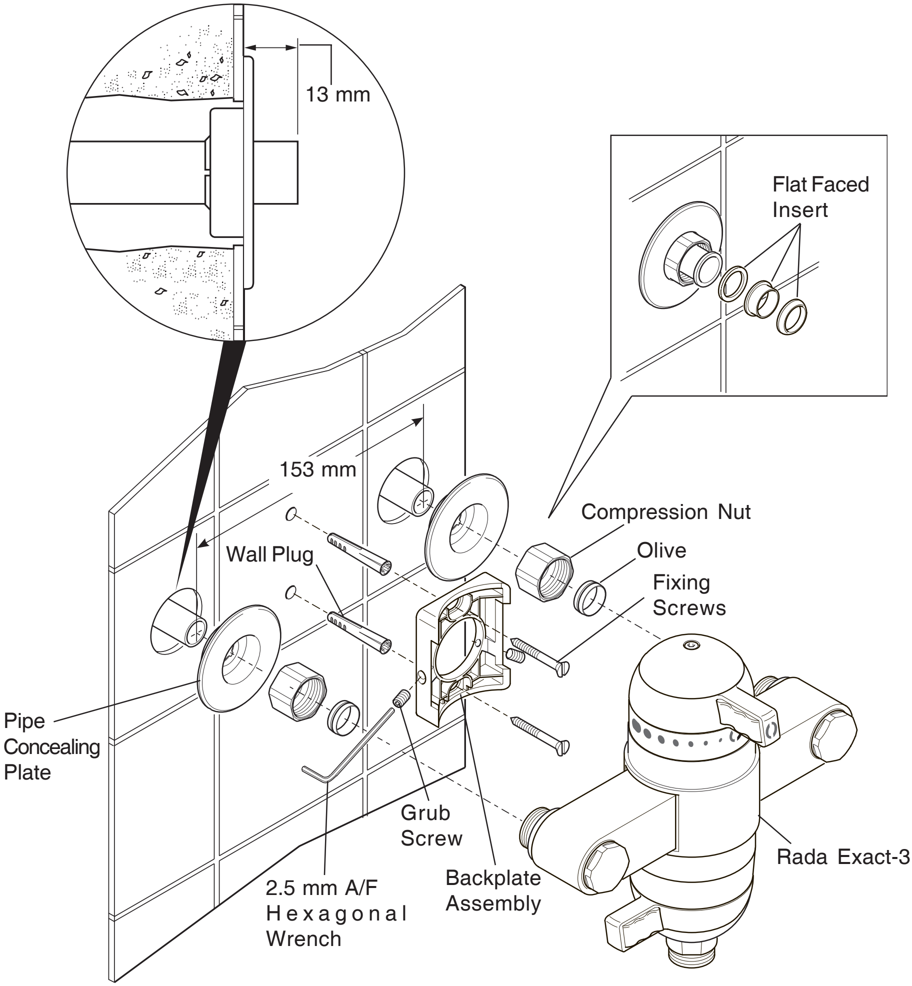
   (b) For 1/2" BSP union inlet (or outlet) connections: Use flat-faced inserts supplied, press in firmly.

7. Connect outlet shower hose or rigid outlet pipework. Check all connections are watertight. Refer to **COMMISSIONING**.

Installation: Rada Exact-3 z (Refer to Figure 6)

Note! Rada Offset connectors and offset Pipe concealing plates are not supplied with this shower control, but are available separately as optional accessories. A backplate is not required for this installation.

1. Check that hot and cold supplies are piped to the correct inlet positions.



Exact-3 - Installation

Figure 5

Supplies (pipe centres between 115-165 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. Joint offset connectors and screw into sockets so that faced edge is 34 mm proud of **final** wall surface. If necessary, shorten 1/2" BSP external thread.
3. Screw pipe concealing plates onto offset connectors.

Important! Flush through the hot and cold supplies thoroughly before connection to shower control. Failure to do so may result in reduced performance and/or product damage.

Note! Ensure that the filters are fitted correctly into the checkvalve cartridge.

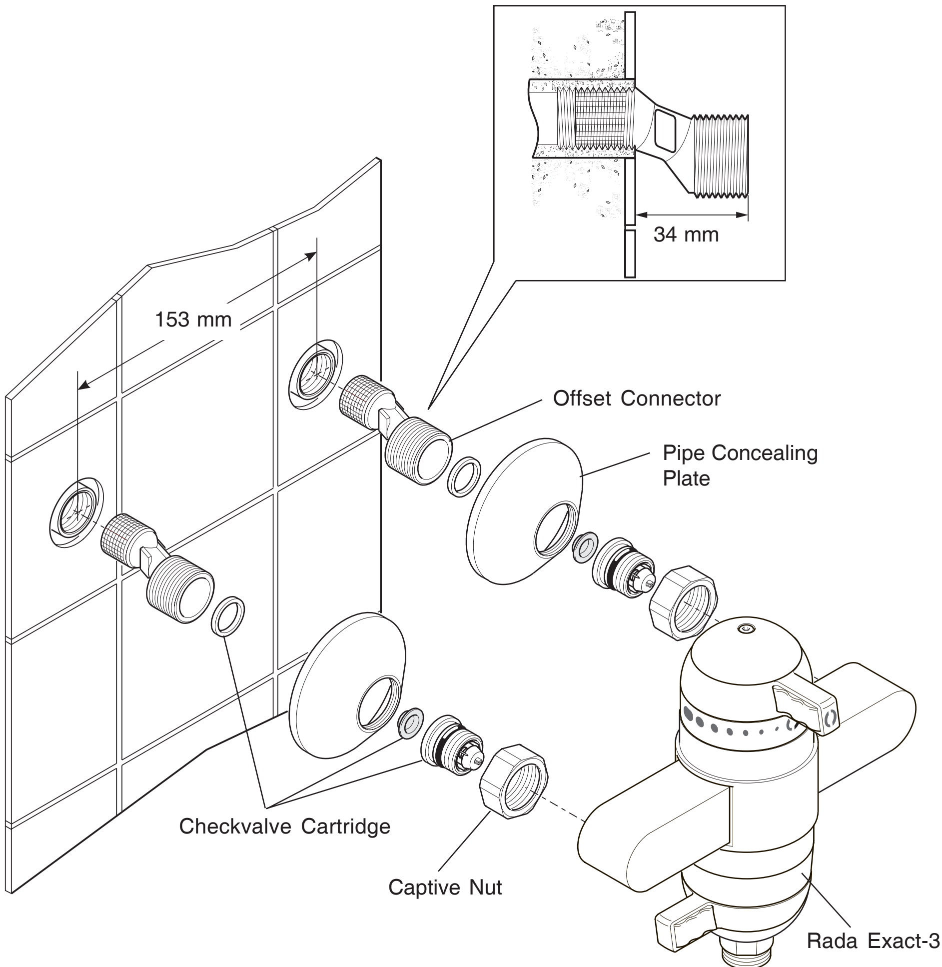
5. With the nylon washers in position, offer up the shower control and tighten the union nuts onto the offset connectors.

6. Connect the shower hose or rigid outlet pipework:

(a) for 15 mm compression pipework outlet connection; fit compression nut and olive supplied.

(b) for 1/2" BSP union outlet connection; fit flat-faced insert supplied, press in firmly (Refer to Figure 6).

7. Check all connections are watertight. Refer to **COMMISSIONING**.



Exact-3 Z - Installation

Figure 6

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 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) ensure 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 hot back to cold several times, pausing at each extreme.

Maximum Temperature

The maximum blend temperature obtainable by the user should be limited, to prevent accidental selection of excessive hot temperatures.

All Rada thermostatic shower controls are fully performance tested, and the maximum temperature is preset to approximately 43°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. For Type 3 valves in healthcare installations the maximum blend temperature is determined by the application - see table under Application and Designation

This shower control is provided with a levered, adjustable temperature control knob, which allows the user to select the blend temperature between ambient cold up to a preset maximum.

Maximum Temperature Setting (Refer to Figure 7)

Check that an adequate supply of **hot** water is available at the hot inlet of the shower control.

During resetting, the hot supply to the shower must be as close to the typical maximum to offset the possibility of any blend shift due to fluctuating supply temperatures. However, the minimum temperature of the hot water **must** be at least 12°C above the desired blend for correct operation.

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

Check that both inlet isolating valves are fully open. Turn the temperature knob to maximum and operate the flow control. Allow the temperature to stabilize and check the outlet temperature.

- If the outlet temperature is set correctly then refer to **Commissioning Checks**.
- If adjustment of the temperature is required, carry out the procedure shown below and refer to Figure 7.

1. Remove the temperature knob, using the 3 mm A/F hexagonal wrench (supplied).

2. Pull off the temperature hub.

3. Rotate the spindle until the required maximum blend temperature is obtained at the discharge point **(clockwise = 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, refit the hub without disturbing the spindle, positioning it so that the lug is against the stop on cartridge face, preventing further rotation. Check that blend temperature has not altered.

5. Refit the temperature knob so that the lever is aligned with the maximum hot position shown on the body shroud.

6. Refit the cap and locking screw.

Commissioning Checks

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

1. Check inlet pipework temperatures for correct function of checkvalves.

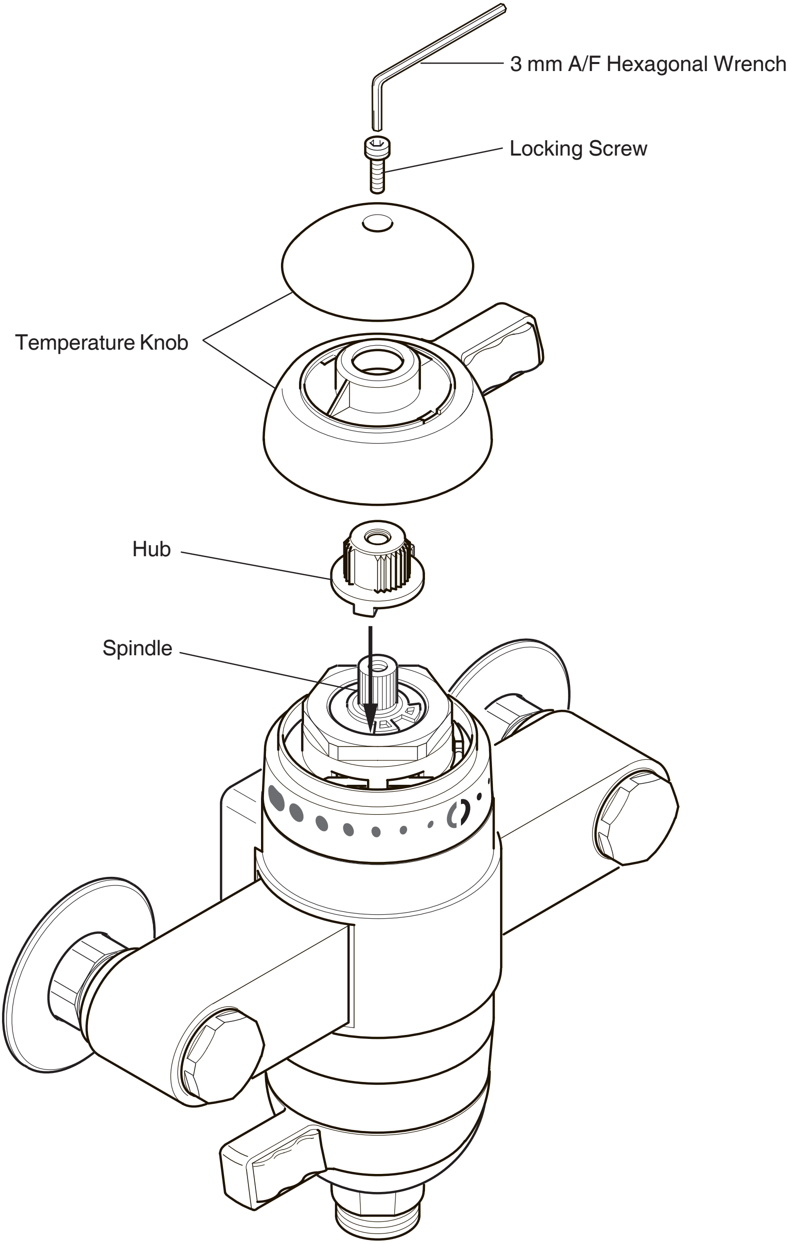
2. Operate the flow control and check:

- Flow-rate is sufficient for purpose.
- Temperatures obtainable are acceptable.
- All connections and control body are watertight.
- Supply pressures are within the range of operating pressures for the valve

3. 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 (a Maintenance Record Card has been provided with this Manual).

The procedure should be chosen to imitate both typical and difficult operating conditions, such as any supply pressure fluctuations that may be likely. An ideal method is to locate another outlet on the common cold water supply close to the shower control (operating this outlet should cause a drop in supply pressure), and note the subsequent effect on blend temperature (should be no more than 2°C change).

Exercise the thermostat as described on page 17.



Maximum Temperature Setting

Figure 7

OPERATION

Adjustment of blend temperature from preset maximum to cold is achieved by clockwise rotation of the temperature knob.

The flow control knob operates through 180° rotation, with full flow when the lever is fully to the right and flow closure when fully to the left for **bottom outlet applications** (this configuration reverses for **top outlet**). The rate of flow can be readily controlled within this rotation.

FAULT DIAGNOSIS

Symptom	Cause/Rectification
1. Only hot or cold water from outlet.	**a.** Inlet supplies reversed (hot supply to cold inlet). Check. **b.** No hot water reaching shower control. Check. **c.** Check strainers and inlet/outlet fittings for blockage. **d**. Refer symptom **5** below. **e.** Installation conditions continuously outside operating parameters: refer to **SPECIFICATION**, and **2e** below.
2. Fluctuating or reduced flow rate.	Normal function of thermostatic control when operating conditions are unsatisfactory; **a.** Check strainers and inlet/outlet fittings for flow restriction. **b.** Make sure that minimum flow rate is sufficient for supply conditions. **c.** Make sure that dynamic inlet pressures are nominally balanced and sufficient. **d.** Make sure that inlet temperature differentials are sufficient. **e.** (Subsequent to rectification of supply conditions) Check thermostatic performance; renew Thermostatic cartridge, if necessary.
3. No flow from shower control outlet.	**a.** Check strainers and inlet/outlet fittings for blockage. **b.** Hot or cold supply failure; thermostat holding correct shutdown function: rectify, and refer to symptom **2.e.** above.
4. Blend temperature drift.	Indicates operating conditions changed. **a.** Refer to symptom **2.** above. **b.** Hot supply temperature fluctuation. **c.** Supply pressure fluctuation.
5. Hot water in cold supply or vice versa.	Indicates checkvalves require maintenance, refer to **MAINTENANCE**.
6. Maximum blend temperature setting too hot or too cool.	**a.** Indicates incorrect **maximum temperature setting;** refer to **COMMISSIONING**. **b.** As symptom **4.** above. **c.** As symptom **5.** above.

Symptom	Cause/Rectification
7. Water leaking from shower control body.	Seal(s) worn or damaged. **a.** Obtain service pack and renew all seals. **b.** (If leak persists from around temperature spindle) Renew Thermostatic cartridge.
8. Flow knob or temperature knob stiff to operate.	**a.** Impaired free movement of internal components. Renew the appropriate cartridge. **b.** Supply pressures too high. Fit pressure reducing valve.

MAINTENANCE

General

The 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. 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 our recommendations

2. Periodic attention is given as necessary to maintain the product in good functional order. Guidelines for frequency are given below.

All the shower controls in this series have all main functional parts contained within service-free cartridges, so any maintenance requirement is reduced to temperature, performance and functional checks and inspection, with cartridge renewal when necessary. In larger installations with a number of shower controls or mixing valves, it is good policy to maintain a small stock of spare cartridges so that no shower control/mixing valve or facility need be out of commission for more than the time it takes to exchange the cartridge, and also, eventually, a rolling programme of cartridge renewal can be undertaken as part of a planned maintenance procedure. The designed minimum service life of all cartridges is five years under normal operating conditions.

The use of main supply-line or zone strainers (recommended maximum mesh aperture dimension is 0.5 mm) will reduce the need to remove debris at each shower control point.

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

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. In all other cases it is recommended that a routine of preventative 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 cartridge replacements

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 Exact-3 together with other "critical components" will exhibit wear over a period of time and usage. All of these parts are contained within the Thermostatic cartridge.

   The designed minimum service life of all cartridges used in Kohler/Mira products is five years providing the Rada Exact-3 is operated with the recommended operating conditions and within the recommended operating parameters. However when supply conditionsand/or usage patterns do not conform to the recommended conditions and/or parameters the cartridge may need to be changed more frequently(for definitions of "recommended operating conditions" and "recommended parameters" see pages 8 and 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 cartridge should be replaced at intervals of no more than three years.

Performance Check

Six-monthly

Exercising the Thermostat: If the control has not been in regular or recent use the thermostat should be exercised before any other checking. Where user adjustment of the blend temperature is available the exercising of the thermostat can be achieved as described in **COMMISIONING.** For shower control units with locked temperature control it is necessary to isolate and restore each supply in turn a few times.

Blend Temperature: check for correct blend setting and maximum preset temperature. Reset as necessary (Refer to **COMMISSIONING**).

Performance: check blend stability against known datum (e.g. commissioning check) for an induced pressure or flow change. Renew the Thermostatic cartridge where necessary.

Function: check inlet pipework temperature for correct function of checkvalves, and maintain/renew as necessary. Check and clean strainer screens as appropriate. Lubricate accessible seals when necessary using **silicone-only based lubricant**.

Service Contracts

To ensure your Rada/Mira products function correctly and give continued safe performance Service Contracts can be undertaken (subject to site survey). All service contract work is carried out by fully trained Rada/Mira Service Engineers who carry a comprehensive range of genuine spares. For details on arranging a Service Contract please contact Aftersales/Service.

In-service Tests

The principle means for determining the continuing stisfactory performance of the shower control is the in-service test.

The in-service test procedure is shown in Figure 4. This should be carried out at both 6 to 8 weeks and 12 to 15 weeks after commissioning the shower control.The results of these testsare used to determine when, after initial commissioning, the in-service test is next repeated.

Frequency of In-service Tests

The 'Guide to in-service test frequency' is shown in Figure 5 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 cartridge is replaced, the in-service test frequency should be reassessed as if it were 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.

Temperature Testing (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.Temperature Testing.

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 'Recommended content of Maintenance Log' on page 31.**

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.

Maintenance Procedures

Maintenance must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel. This mixing valve is designed for minimal maintenance under conditions of normal use. 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.

Should an internal malfunction occur then this will probably require cartridge renewal. The Thermostatic, flow and checkvalve cartridges contain no user-serviceable parts, and must not be dismantled. Components are precision-made, so care must be taken while servicing to avoid damage.

When ordering spare parts, please state product type, i.e. Rada Exact-3 or Exact-3 z, and identify part name and number (refer to the **PARTS LIST**). A Service pack is available, containing all the seals and strainer screens that may be necessary for renewal during maintenance or servicing.

Lubricants

Important! All seals are pre-lubricated. If you need to lubricate the seals, use only a small amount of silicone-only based lubricants on this product. Do not use oil-based or other lubricant types as these may cause rapid deterioration of seals.

Maintenance Procedure - Thermostatic Cartridge (Ref to Fig 8)

Removal

1. Isolate the supplies to the shower control, and open the flow control to release pressure and to assist the draining of residual water.

2. Remove the temperature knob assembly, using the 3 mm A/F hexagonal wrench (supplied). Do not remove the temperature hub.

3. With removal clip still in place, unscrew the head nut using a 35 mm A/F wrench. This will release the body shroud and also begin to draw the Thermostatic cartridge out of the shower control body.

Warning: some residual water may be released.

4. Note which inlet aligns with the **hot** (marked **H** and **red**) lug on cartridge.

5. Pull the Thermostatic cartridge free of the shower control body.

Cleaning/Renewal of Parts

6. The interior surface of the shower control body must be clean before refitting cartridge. If scale or deposition is present, clean **(without Thermostatic, flow and checkvalve cartridges fitted)** using a mild proprietary inhibited scale solvent, e.g. domestic kettle descalent. After descaling, rinse body thoroughly in clean water before refitting cartridges.

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

7. 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; refer to **Commissioning Checks**.

8. When renewing Thermostatic cartridge, retain the removal clip and head nut off the displaced unit and refit.

9. Examine all accessible seals for signs of 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 that may be necessary for renewal during maintenance or servicing.

10. Lightly coat all seals with a **silicone-only based lubricant** to assist reassembling (see **lubricants**).

Re-assembly

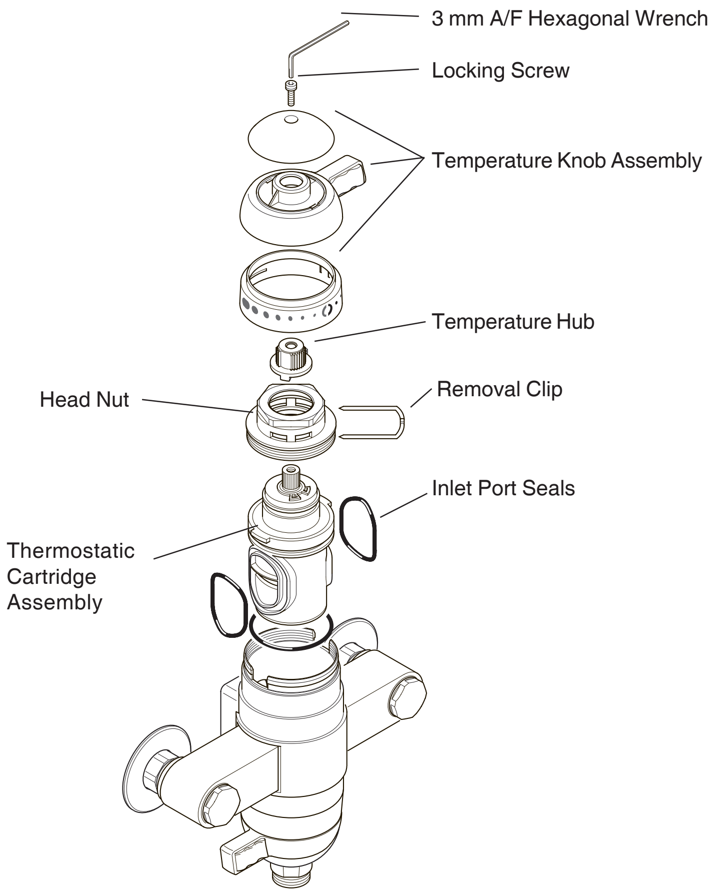
11. Identify which is the hot inlet to the shower control body, and align the Thermostatic cartridge accordingly. Carefully push the Thermostatic cartridge back into the body, checking that the 2 cartridge inlet port seals remain in place, and locate cartridge lugs into body slots.

12. Carefully align and then tighten the head nut; **do not overtighten** (max. torque 2.5 Nm (1.85 lbf ft)).

13. Align and refit the body shroud and temperature knob assembly, so that the markings will be visible to the user.

14. Restore hot and cold supplies and check for any leaks.

15. The maximum temperature will now need resetting; refer to **COMMISSIONING.**



Thermostatic Cartridge Removal

Figure 8

Maintenance Procedure- Flow Cartridge (Refer to Figure 9)

Removal

1. Isolate the supplies to the shower control, and open the flow control to release pressure and to assist the draining of residual water.

2. Release outlet fittings from outlet connector.

3. Locate removal slot, and carefully prise off the flow control cap. Lever out and remove locking pin, and lift off outlet connector and flow control knob. Carefully pull or lever the body shroud free.

4. Release and remove the 4 cartridge retaining screws, and carefully pull the flow cartridge free of the body.

Warning: some residual water may be released.

Cleaning/Renewal of Parts

5. The shower control body surface must be clean before refitting cartridge. If scale or deposition is present, clean **(without Thermostatic, flow and checkvalve cartridges fitted)** using a mild proprietary inhibited scale solvent, e.g. domestic kettle descalent. After descaling, rinse body thoroughly in clean water before refitting cartridges.

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

6. 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; refer to **Commissioning Checks**.

7. When renewing the flow cartridge, retain the locking pin with the outlet connector off the displaced unit and refit.

8. Examine accessible seals for signs of deformation or damage, and renew as necessary, taking care not to damage seal grooves.

Note! The outlet lip seal must be inserted into the outlet connector before assembly onto flow cartridge.

9. Lightly coat all seals with a **silicone-only based lubricant** to assist reassembling.

Re-assembly

10. Check that flow cartridge seal is in place. Align the cartridge rear tab and body lug, push the cartridge firmly onto body, and secure with 4 screws. Check that the outlet retainer is in place on flow cartridge outlet.

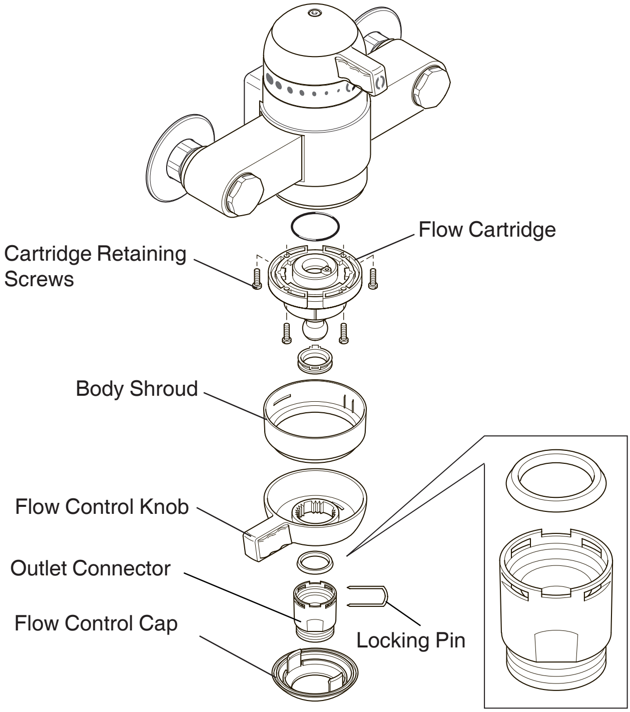
Note! Models prior to August 1995 were fitted with an earlier pattern flow cartridge having a beige coloured housing. These cartridges did not require the outlet retainer and used an earlier design (non-slotted) outlet connector which is not interchangeable with the current flow cartridge (all-black).

11. Align and refit the body shroud and flow knob assembly, so that the markings will be visible to the user.

12. **Check that lip seal is correctly located in outlet connector,** apply a light coat of **silicone-only based lubricant,** and carefully refit outlet connector. Secure with locking pin.

13. Align and refit flow control cap, and reconnect outlet fittings.

14. Restore hot and cold supplies and check for any leaks.



Flow Cartridge Detail

Figure 9

Maintenance Procedure- Checkvalve Cartridges

(Refer to Figure 10)

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 cartridges.

1. Isolate the supplies to the shower control, and open the flow control to release pressure and to assist the draining of residual water.

2. Location and removal of Checkvalve cartridges varies according to shower control model:

Exact-3; The Checkvalve cartridges are located in each inlet elbow, to remove undo the Checkvalve cartridge head hexagon using a 24 mm A/F wrench and pull free.

Exact-3 z; The Checkvalve cartridges are located at the inlet of each elbow. To remove, first release the outlet connection, then release the shower control body from the offset connectors using a 32 mm wrench. Release the Checkvalve cartridges using a 12 mm A/F hexagon wrench.

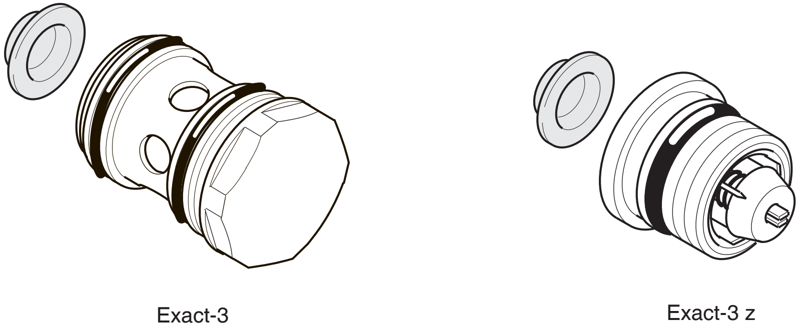
Caution! Some water may be released at this point.

3. The Checkvalve cartridge assembly may be cleaned by removal of the inlet strainers, and flushing through under a jet of water to remove lodged particles. **Do not descale.**

4. Lightly wipe external seals and thread with a **silicone-only based lubricant** to assist refitting.

5. Re-assembly into the shower control is a reversal of the above procedures. **Do not overtighten** when re-inserting cartridges.

6. Restore the water supplies and check for leaks.



Checkvalve Cartridges

Figure 10

Maintenance Procedure - Inlet Strainers

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 Exact-3 and 215 series models, containing 2 strainer screens and all the seals (plus lubricant) and nylon washers that may need to be renewed during Strainer inspection (see **component matrix**).

1. Isolate the supplies to the shower control, and open the flow control to release pressure and to assist the draining of residual water.

2. The strainer screens are located at the inlet of each Checkvalve cartridge.

To access the inlet strainer screens:

Exact-3: remove the **Checkvalve cartridges**.

Exact-3 z: remove the shower control body from its pipework connections.

3. The strainer screens are dished outwards and are a push-fit into the housing. Remove carefully.

4. The strainer screens may be cleaned under a jet of water, or renewed.

5. Re-assembly into the shower control is a reversal of the previous procedures. **Do not overtighten** when re-inserting cartridges.

6. Restore the water supplies, and check for leaks.

Maintenance Procedure - Elbow/Body Seals

Both models have inlet and/or elbow adaptor seals and elbow seals, which are static and should rarely require renewal. These seals are included in the service pack and may be accessed if necessary:

1. Isolate the supplies to the shower control, and open an outlet fitting to release pressure and to assist the draining of residual water.

2. Release inlet and outlet connections.

3. Remove elbows by loosening each elbow grub screw using 2.5 mm A/F hexagonal wrench.

4. Remove the adaptors using a 12 mm hexagonal wrench.

5. Lightly coat seals with a **silicone-only based lubricant** to assist re-assembly.

6. When re-inserting adaptors, **do not overtighten**.

7. Refit and remake pipework connections, restore hot and cold supplies and check for any leaks.

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)

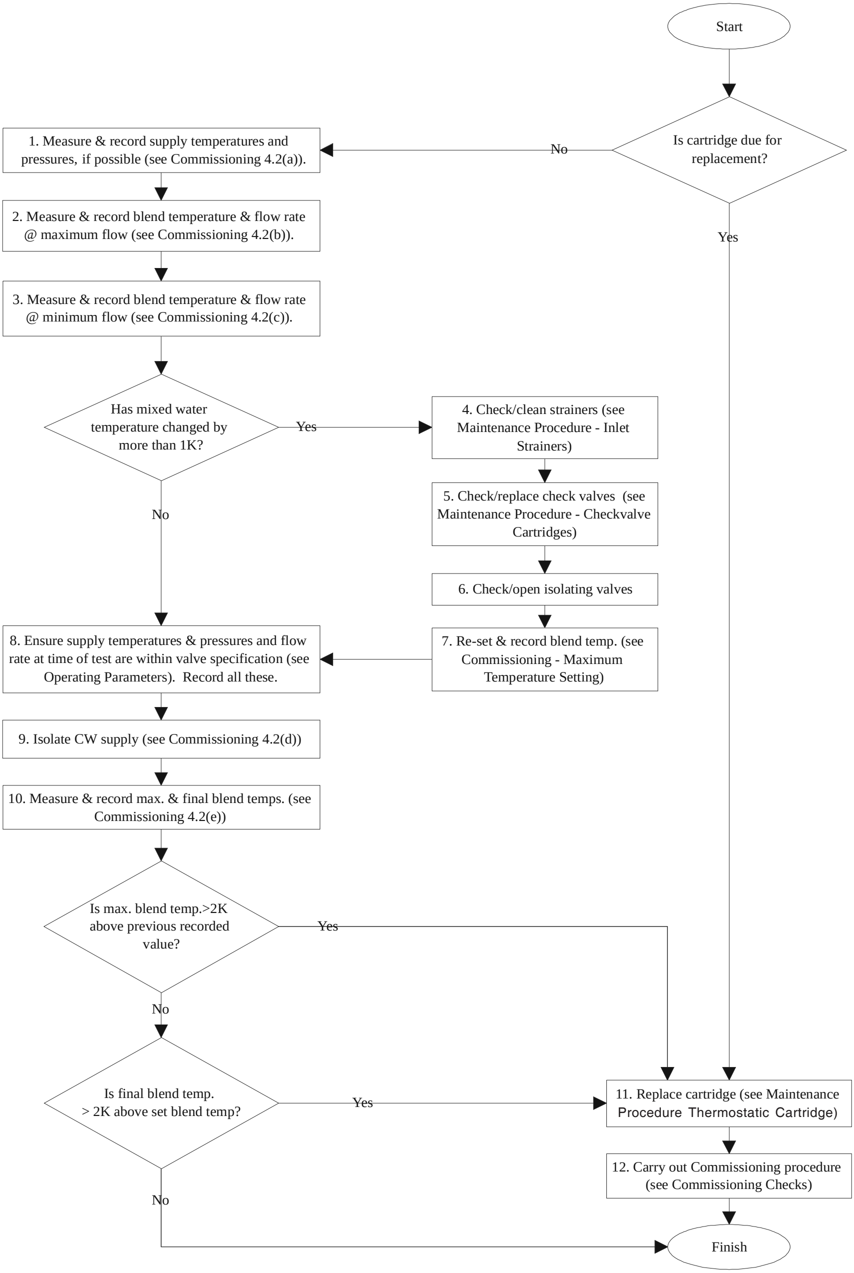
Details of any remedial work, including part replacement, carried out to valve or supply system.

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

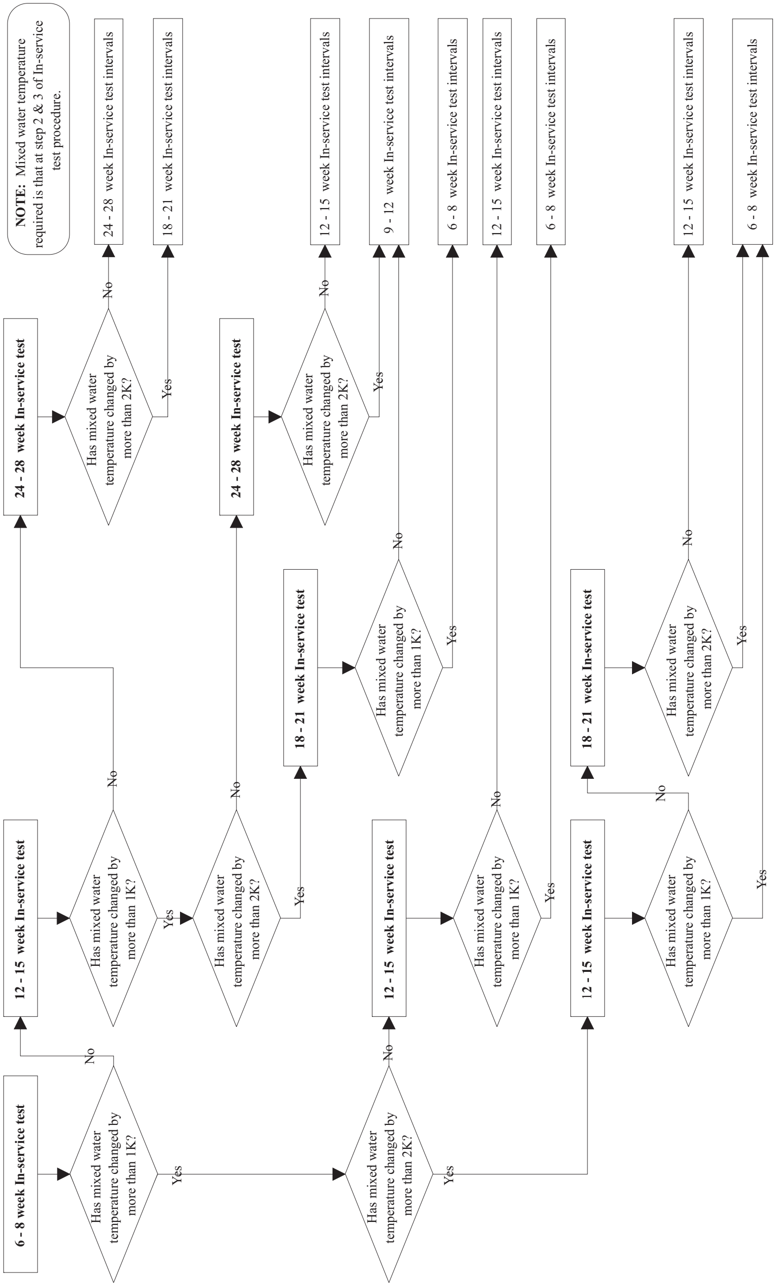
Note! Local requirements may demand that additional information be recorded.



Note! K = Kelvin, the unit of thermodynamic temperature. The unit "Kelvin" is equal to the unit of "Degree Celsius". Kelvin is used for a difference of Celsius temperature.

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

In-service Test Procedure
Figure 4



Note! K = Kelvin, the unit of thermodynamic temperature. The unit "Kelvin" is equal to the unit of "Degree Celsius". Kelvin is used for a difference of Celsius temperature.

Guide to In-service Test Frequency

Figure 5

Type 3 Valves

Application

The approved designations are as follows:

Model	Designation Code
Rada Exact-3	LP-S, HP-S

The permitted application details are:

Designation	Operating PressureRange	Application	Mixed Water Temperature†°C
-HP-B	High Pressure	Bidet	38°C maximum
E -HP-S	High Pressure	Shower	41°C maximum
-HP-W	High Pressure	Washbasin	41°C maximum
-HP-T44	High Pressure	Bath (44°C fill)	44°C maximum
-HP-T46	High Pressure	Bath (46°C fill)	46°C maximum
-LP-B	Low Pressure	Bidet	38°C maximum
E -LP-S	Low Pressure	Shower	41°C maximum
-LP-W	Low Pressure	Washbasin	41°C maximum
-LP-T44	Low Pressure	Bath (44°C fill)	44°C maximum
-LP-T46	Low Pressure	Bath (46°C fill)	46°C maximum
-LP-D44	Low Pressure	Bath (44°C fill) with diverter to shower	44°C maximum
-LP-D46	Low Pressure	Bath (46°C fill) with diverter to shower 41°	46°C maximum (shower 41°C max)
-HP-D44	High Pressure	Bath (44°C fill) with diverter to shower 41°C	44°C maximum
-HP-D46	High Pressure	Bath (46°C fill) with diverter to shower 41°C	46°C maximum

†Mixed water temperature at discharge point.
E = Rada Excel-3 B approved designations.

Note! For washbasins, it is assumed that you are washing under running water.

Note! Bath fill temperatures of more than 44°C should only be available when the bather is always under the supervision of a competent person (e.g. nurse or care assistant).

In order to achieve the safe water temperatures expected of a Type 3 valve it is essential that the valve is used only for the applications covered by its approved designations, with the appropriate water supply pressures and temperatures, and it is commissioned, maintained and serviced in accordance with the recommendations contained in this guide.

Installation Conditions

For healthcare applications where a Type 3 valve is required, the supply conditions must comply with the values in the following table. Note that both supply pressures must lie within the same pressure range.

Operating Pressure Range	High Pressure	Low Pressure
Maximum Static Pressure - bar	10	10
Maintained Pressure, Hot and Cold - Bar	1 to 5	0.2 to 1
Hot Supply Temperature - °C	52 to 65	52 to 65
Cold Supply Temperature - °C	5 to 20	5 to 20

Commissioning

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

1. Check that the designation of the thermostatic mixing valve matches the intended application.
2. Check that the supply pressures are within the range of operating pressures for the designation of the valve.
3. Check that the supply temperatures are within the range permitted for the valve and by guidance information on the prevention of legionella etc.
4. Check inlet pipework temperatures for correct function of checkvalve.
5. All connections and mixer body are water tight.
6. Operate the flow control and check:
   (a) Flow rate is sufficient for purpose.
   (b) Temperature(s) obtained are acceptable.
7. Exercise the thermostat (refer to COMMISSIONING).

8. Adjust the temperature of the mixed water in accordance with the instructions in this manual and the requirement of the application and then carry out the following sequence:

   (a) record the temperature, and pressures if possible, 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 a smaller 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.

   Note! The final mixed water temperature should not exceed the values shown in Table 1 below. Any higher temperatures should only occur briefly.

   (f) record the date, equipment, thermometer etc. used for the measurements.

Application	Mixed Water Temperature °C
Bidet	40
Shower	43
Washbasin	43
Bath (44°C fill)	46
Bath (46°C fill)	48

Guide to Maximum Continuous Temperatures During Site Tests
Table 2

Maintenance

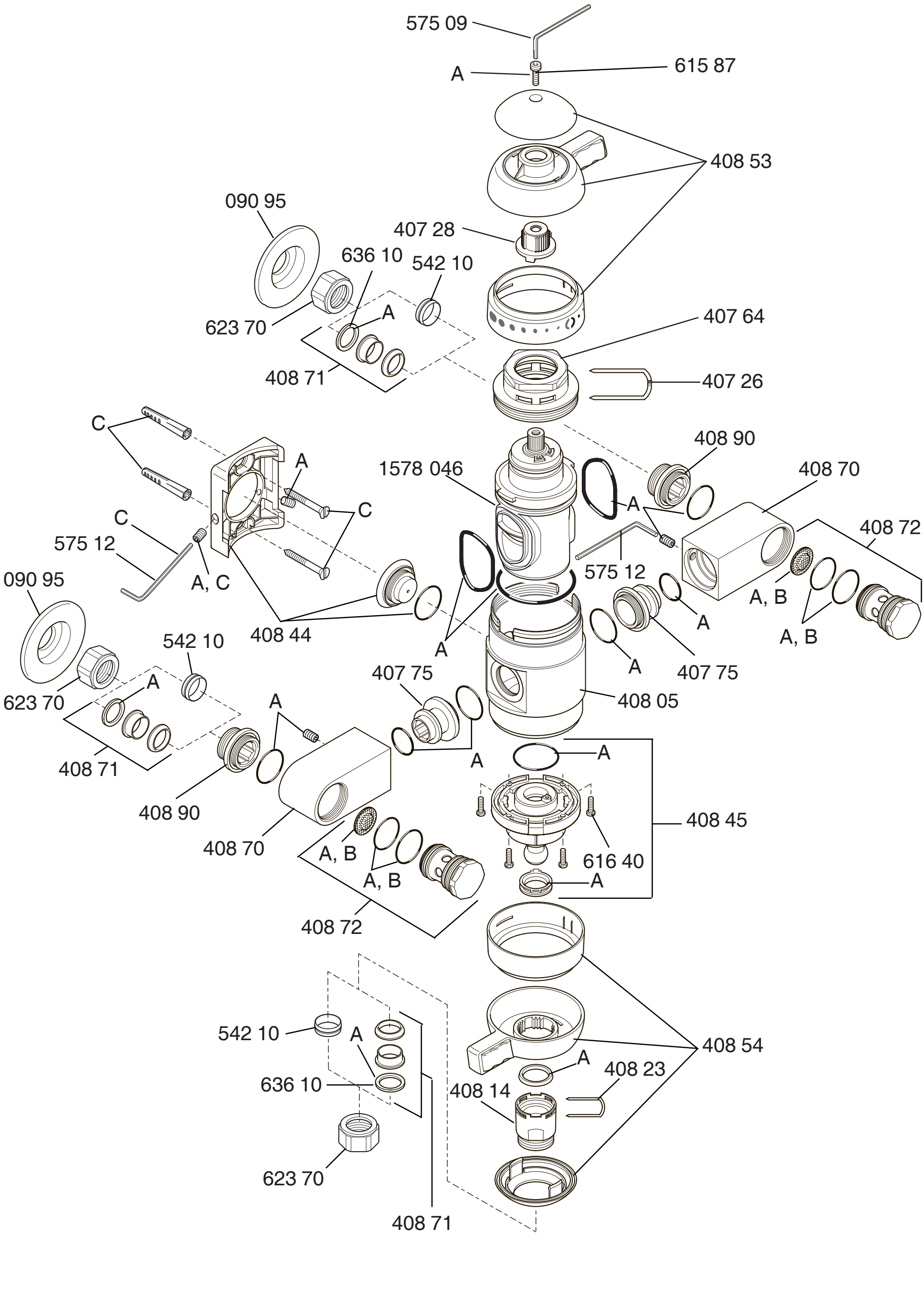
Planned maintenance for Type 3 valves must use the In-service test, at the frequency given in the Guide to In-service test frequency and should employ Temperature Testing, Performance Log books and Training as detailed on pages 21-24.

SPARE PARTS

1. Rada Exact-3 Spare Parts List

Part No.	Description
090 95	Pipe Concealing Plate
407 26	Removal Clip - black
407 28	Hub - black
407 64	Head Nut
407 75	Elbow Adaptor
408 05	Body
408 14	Outlet Connector
408 23	Locking Pin
408 44	Backplate Assembly
408 45	Flow Cartridge
408 46	Component Pack - components identified 'C'
408 53	Temperature Knob Assembly - chrome
408 54	Flow Control Knob Assembly - chrome
408 70	Elbow
408 71	Component Pack, Flat-Faced Insert
408 72	Checkvalve Cartridge Assembly
408 90	Inlet Adaptor
408 91	Strainer Pack - components identified 'B'
408 92	Service Pack - components identified 'A'
542 10	Olive - 15 mm
575 09	3 mm A/F Hexagonal Wrench
575 12	2.5 mm A/F Hexagonal Wrench
615 87	Locking Screw
616 40	Screw
623 70	Compression Nut - 15 mm - chrome
636 10	Nylon Washer
983 07	Lubricant Sachet
1578 046	Thermostatic Cartridge Assembly

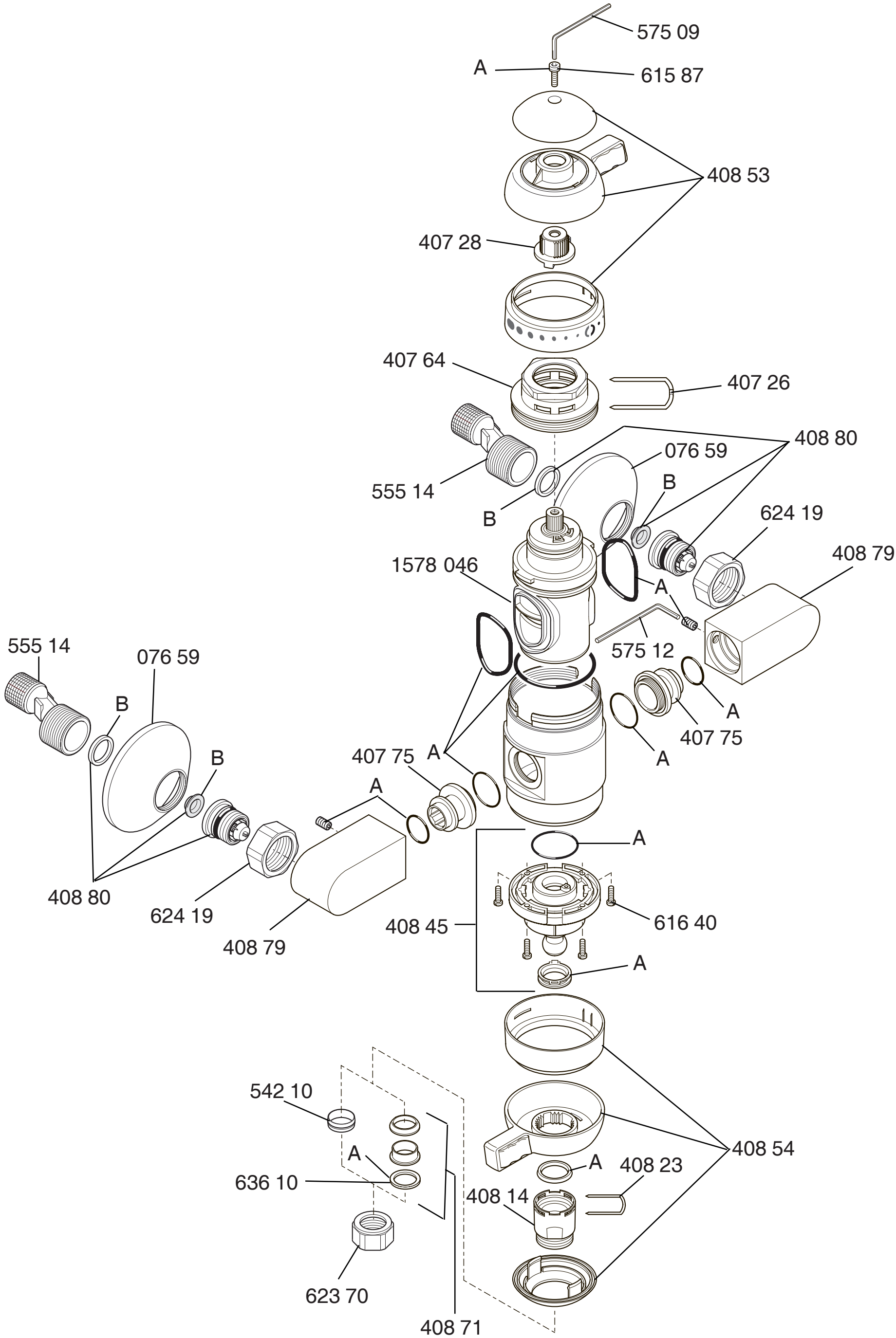
2. Rada Exact-3 Spare Parts Diagram



3. Rada Exact-3 z Spare Parts List

076 59	Pipe Concealing Plate
407 26	Removal Clip, black
407 28	Hub, black
407 64	Head nut
407 75	Elbow Adaptor
408 14	Outlet Connector
408 23	Locking Pin, Flow Cartridge
408 24	Body
408 45	Flow Cartridge
408 53	Temperature Knob Assembly - chrome
408 54	Flow Control Knob Assembly - chrome
408 71	Component Pack, Flat-faced Insert
408 79	Elbow
408 80	Checkvalve Cartridge
408 91	Strainer Pack - components identified 'B'
408 92	Service Pack - components identified 'A'
542 10	Olive, 15 mm
555 14	Offset Connector
575 09	Wrench Key, 3 mm
575 12	Wrench Key, 2.5 mm
615 87	Locking Screw, uses 3 mm wrench key
616 40	Screw, Flow Cartridge (4)
623 70	Compression Nut, 15 mm, chrome
624 19	Captive Nut, chrome
636 10	Nylon Washer
983 07	Lubricant sachet
1578 046	Thermostatic Cartridge Assembly

4. Rada Exact-3 z Spare Parts Diagram



Rada Exact-3; Strainer and Service Packs Component Matrix

Part Ref. Pack	Qty	Part No.	Component	Exact-3	Exact-3 z
408 91 Strainer Pack, Exact-3	2x	208 90	Strainer Screen	2	2
	2x	630 59	Seal	4	
	3x	636 10	Nylon Washer 15 mm		1
	2x	636 11	Nylon Washer 22 mm		2
	1x	983 07	Lubricant	1	1
408 92 Service Pack, Exact-3	2x	208 90	Strainer Screen	2	2
	2x	407 11	Inlet Seal	2	2
	1x	407 46	Seal	1	1
	1x	408 19	Lip Seal - Outlet	1	1
	1x	408 33	Outlet Retainer	1	1
	1x	615 87	Locking Screw	1	1
	2x	618 22	Grub Screw	2	2
	1x	630 13	Seal	1	1
	2x	630 41	Seal	2	2
	2x	630 59	Seal	4	2
	5x	631 61	Seal	4	2
	3x	636 10	Nylon Washer 15 mm	3 *	1 *
	2x	636 11	Nylon Washer 22 mm		2
	1x	983 07	Lubricant	1	1

*Used for 1/2" BSP inlet/outlet connections only

Recommended Spares Minimum Stock List

Component	Spares Per Quantity Of Shower Controls Or Mixing Valves Installed			
	1 - 5	6 - 20	21 - 50	51+
1578 046 Thermostatic Cartridge - Exact-3	1	2	3	4
408 42 Flow Control Knob Assembly - chrome	1	2	3	4
408 43 Temperature Knob Assembly - chrome	1	2	3	4
408 45 Flow Cartridge	1	2	3	4
408 72 Checkvalve Cartridge - Exact-3/215-t3 c/w	2	4	6	8
408 80 Checkvalve Cartridge - Exact-3 z/215-t3 z	2	4	6	8
408 91 Strainer Pack - Exact-3/215-t3 Series	4	8	12	16
408 92 Service Pack - Exact-3/215-t3 Series	2	4	6	8
615 87 Locking Screw - Exact-3/215-t3 Series	2	4	6	8

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,
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