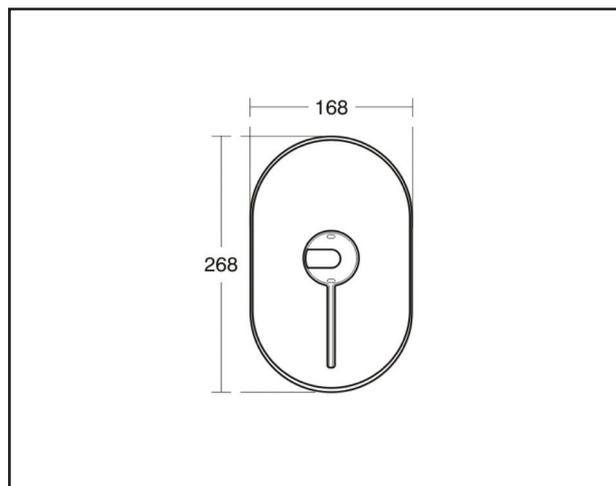
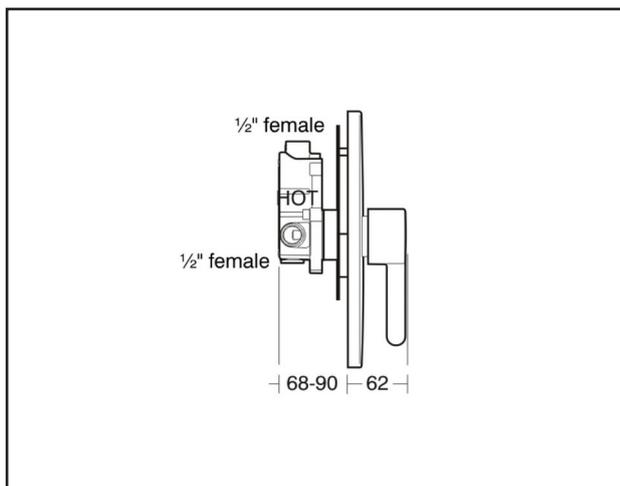


ARMITAGE SHANKS

MARKWIK21 CONCEALED THERMOSTATIC SHOWER MIXER



SPECIFICATIONS

Recommended use	Healthcare
Colour availability	Chrome
Pressure rating	Maximum continuous operating pressure 1000 kPa static, 500 kPa dynamic. For best performance and longer life we recommend 100-500kPa. Balanced hot/cold water pressure is preferred but will work on unbalanced pressure up to a ratio of 5:1
Temperature rating	Maximum continuous working temperature 40-41°C
Suitable Hot Water Units	Storage tank: Yes a 20 kPa minimum pressure Continuous Flow: Yes a 20 kPa minimum pressure Gravity Feed: Yes a 20 kPa minimum pressure
Water Efficiency	WELS approval not applicable for thermostatic products
Standards	AS 4032.1: 2005 Thermostatic Valves

Dimensions are nominal measurements only.

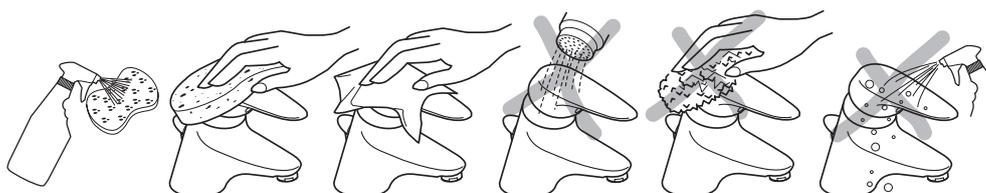


To see the complete Armitage Shanks range go to www.reece.com.au/bathrooms

CLEANING RECOMMENDATIONS

When cleaning chromed products use only a mild detergent, rinse & wipe dry with a soft cloth. Ideally clean after each use to maintain appearance.

Never use abrasive, scouring powders or scrapers. Never use cleaning agents containing alcohol, ammonia, hydrochloric acid, sulphuric acid, nitric acid, phosphoric acid or organic solvents. Use of incorrect cleaning products / methods may result in chrome damage which is not covered by the manufacturer's guarantee.



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MARKWIK21 CONCEALED THERMOSTATIC SHOWER MIXER

Important Note

Mixer must be installed to the requirements of AS/NZS 3500 by a qualified plumber. Your mixer comes to you already factory assembled and tested. We do not recommend the dismantling of any internal part of the mixer. The mixers are factory tested and sealed so as to give the best performance.

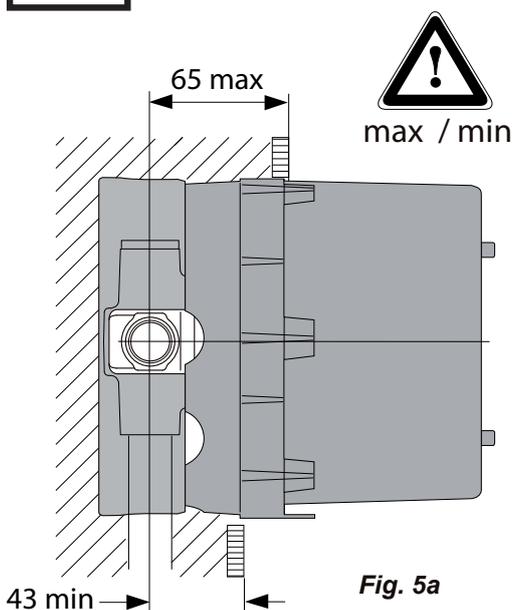
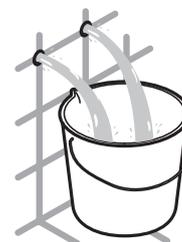
INSTALLATION INSTRUCTIONS

5 INSTALLATION GUIDE



Before connection, flush water through pipe-work to remove all debris etc. to prevent damage to the valve mechanism.

THEN ENSURE WATER SUPPLIES HAVE BEEN ISOLATED.



Mounting location

Decide on a suitable location for mounting the mixing valve on the wall. Give consideration to the mounting depth as shown here.

The plaster guard (blue moulding) is marked at the top end with MINIMUM & MAXIMUM to help the installer achieve the correct depth. The dimensions are shown from the centre line of the outlet pipe to the finished surface (which could be tiles).

The back support (white polystyrene moulding) can be left in position to support the brass valve & act as a levelling guide. Use a spirit level for accuracy.

The profile of either the back support or the large side of the plaster guard can be used as a guide for marking out the size & shape of the aperture required in the finished wall for the sealing of the trim kit.

1. All 4 ports on this valve are threaded 1/2" female.

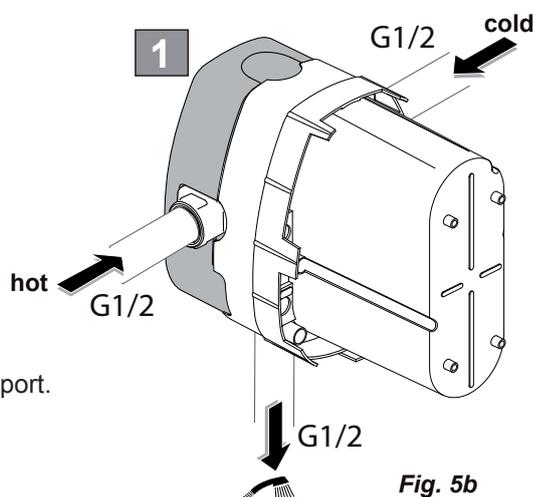
Inlet ports

The HOT water supply to the valve should be on the left & COLD water supply on the right.

Outlet ports

The valve has two outlet ports. The installer can decide which port to use & fit the supplied 1/2" plug into the other port.

Purchase 3x 1/2" male connectors suitable for the type of pipe being used to plumb the installation. Use an appropriate approved thread sealing medium.



Plumbers, please ensure a copy of the installation instructions is left with the end user for future reference

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In-line service valves

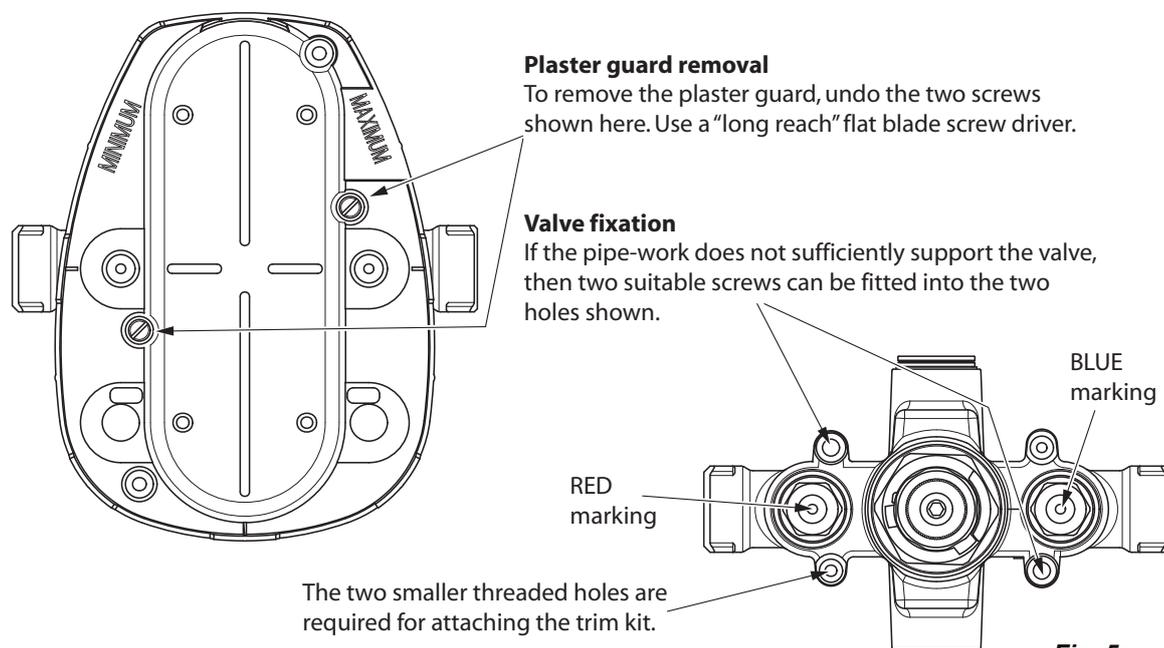
IMPORTANT: The inline service valves supplied with this product must be fitted into the pipe-work. See section 10 for more details.

Consider a suitable location for the service valves. During installation, the service valve can be held with grips or use an adjustable spanner on the flats of the valve body.

Orientate the service valve such that the filter cap & isolating screw are easily accessible for future maintenance.

Fit pipes to both sides of the service valves & make good all the joints.

NOTE: When the isolator screw slot is parallel to the valve body, the valve is open & permits water to flow. To close the valve, rotate the isolator screw 90°. Valves can be left closed until after the trim kit has been fitted.



Blanking plug

A ½" blanking plug is supplied with a copper sealing washer. Blank off the outlet port not being used. Above, the top port is shown with the plug fitted. With the seal in place, use a 10mm hexagonal key to tighten plug into the port being blanked.

Check valve housings

The top surfaces of the check valve housings are marked RED on the left side & BLUE on the right side. The markings signify the HOT & COLD water supply sides respectively.

With the valve secured, pipe-work attached, & blanking plug fitted, the plaster guard can be reattached to the valve to protect it from subsequent decorating tasks.

DO NOT apply heat near this product. Heat generated by soldering could damage plastic parts and seals.

Check that all joints are securely tightened, test for leaks.



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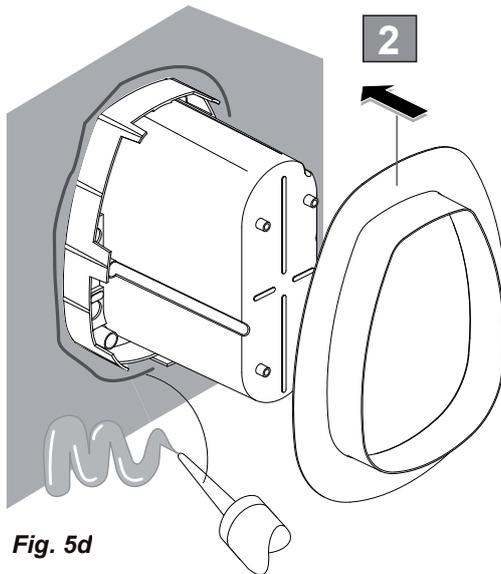


Fig. 5d

Tiling

2. If the finished wall is to be tiled, then the tiling template should be used. Apply a thin layer of silicon sealant on the wall surrounding the plaster guard as shown.

Slide the tiling template over the plaster guard & press it firmly against the wall. Wipe away any excess silicone. Allow silicone time to set.

3. Affix tiles to wall & trim neatly - close to the tiling template.

4. Undo the two screws shown here. Use a "long reach" flat blade screw driver.

5. To remove the plaster guard gently pull it away from the wall. The plaster guard & the two small screws can be discarded.

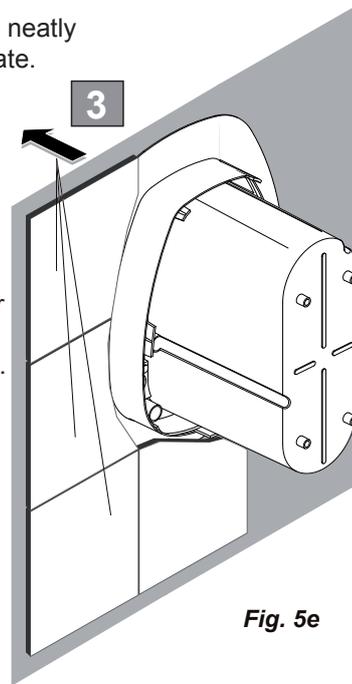


Fig. 5e

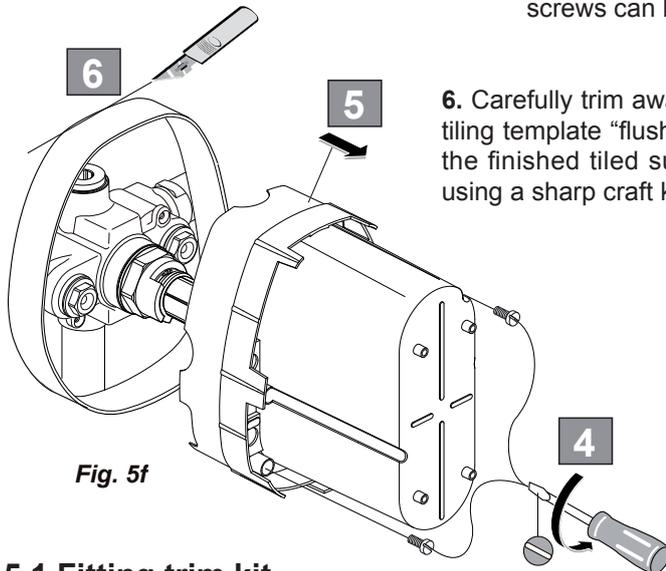


Fig. 5f

6. Carefully trim away the tiling template "flush" with the finished tiled surface using a sharp craft knife.

5.1 Fitting trim kit

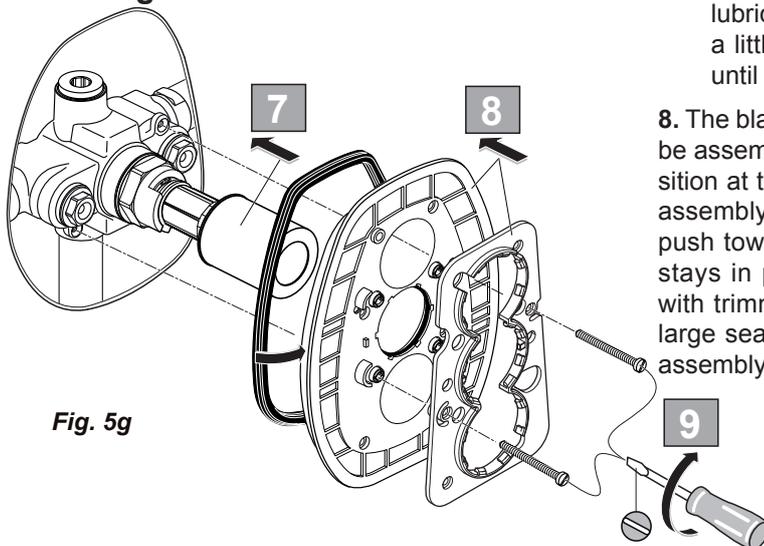


Fig. 5g

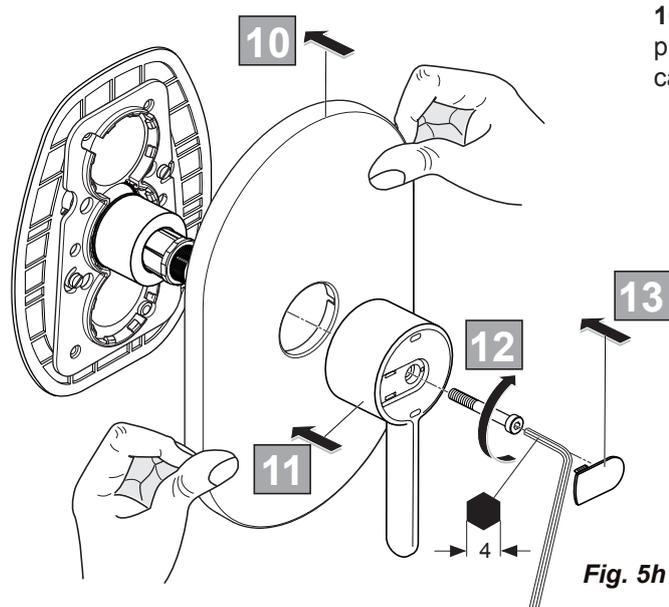
7. Carefully slide the chrome shroud onto the central cartridge boss. If necessary lubricate the o-ring with water containing a little washing-up liquid. Press shroud until it bottoms out on the shoulder.

8. The black mouldings shown should already be assembled. Ensure the large seal is in position at the rear. Align the centre hole of the assembly with the chromed shroud & gently push towards the wall. Ensure centre o-ring stays in position. Next align this assembly with trimmed tiling template. Manipulate the large seal into the tiling template. Press this assembly against the finished tiled wall.

9. Fit the long screws supplied into the holes as shown. Tighten screws using a flat blade screw driver.

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10. Align the hole in the chromed escutcheon plate to the projecting chromed shroud & carefully press it against the finished wall.

11 to 13 see below.

Fig. 5h

5.2 Handle fixation

NOTE: Handle screw is already fitted to the grey spindle-extension on the shower valve. Undo this screw using a 4mm hexagonal key. Ensure spindle-extension remains seated on the thermostatic cartridge.

Fit the handle as follows:

Rotate the spindle-extension fully clockwise until it stops (excessive force is not required).

Handle spline can be engaged onto spindle to assist rotation if necessary. The spindle is now in the "off" position.

11. Orientate the handle as shown above & locate it onto the spindle.

12. Locate fixing screw into the centre of the handle & tighten.

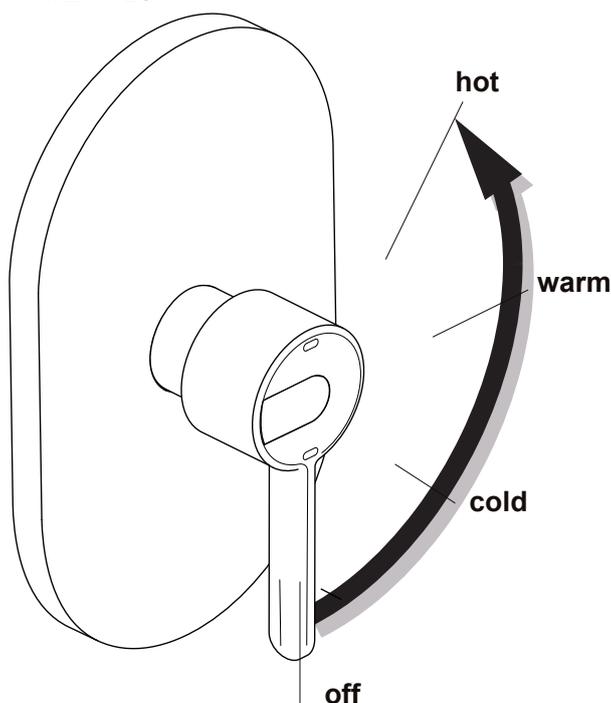
13. Finally snap the index button into the handle.

OPEN THE ISOLATING VALVES & CHECK FOR WATER FLOW.

6 OPERATION

Fig.6 showing the handle control positions.

As the handle is rotated anticlockwise from the off position the delivered water progresses from cold through warm to the preset maximum temperature of approximately 41°C.



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7 COMMISSIONING AND AUDITS

The following procedure should be conducted after installation to ensure the product is functioning correctly.

7.1 Purpose of commissioning

- To confirm the correct designation of product versus application.
- To confirm the correct supply water conditions for the product / installation.
- To adjust the mixed temperature if necessary to suit the water supply conditions of the installation.
- To check the product is performing properly.
- To start an audit log and record appropriate data.

This product is factory set at $40 \pm 1^{\circ}\text{C}$ with supplies of circa; 300 KPa balanced pressure and temperatures of 15°C cold & 65°C hot (i.e. an inlet Δt of 50°C & a hot / mix Δt of 24°C)

7.2 Commissioning Process (see decision tree FC1)

- Establish that the supply conditions are within the requirements outlined above. If not investigate.
- When conditions are acceptable record them, together with hot and cold temperatures. Establish Δt .

Check the outlet mix temperature is within $40 \pm 2^{\circ}\text{C}$, if not (probably due to $\Delta t > 5^{\circ}\text{C}$ difference to factory setting) adjust appropriately. **(see 9.1)**

- If mixed temperature is correct undertake an 'in field' cold water isolation (CWI) test: **(see 7.5)**
 - Pass – restore supply and record mixed temperature,
 - Fail – **See 7.5 in-field 'Cold Water Isolation' test.**

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7.2 cont. Commissioning process (decision tree FC1)

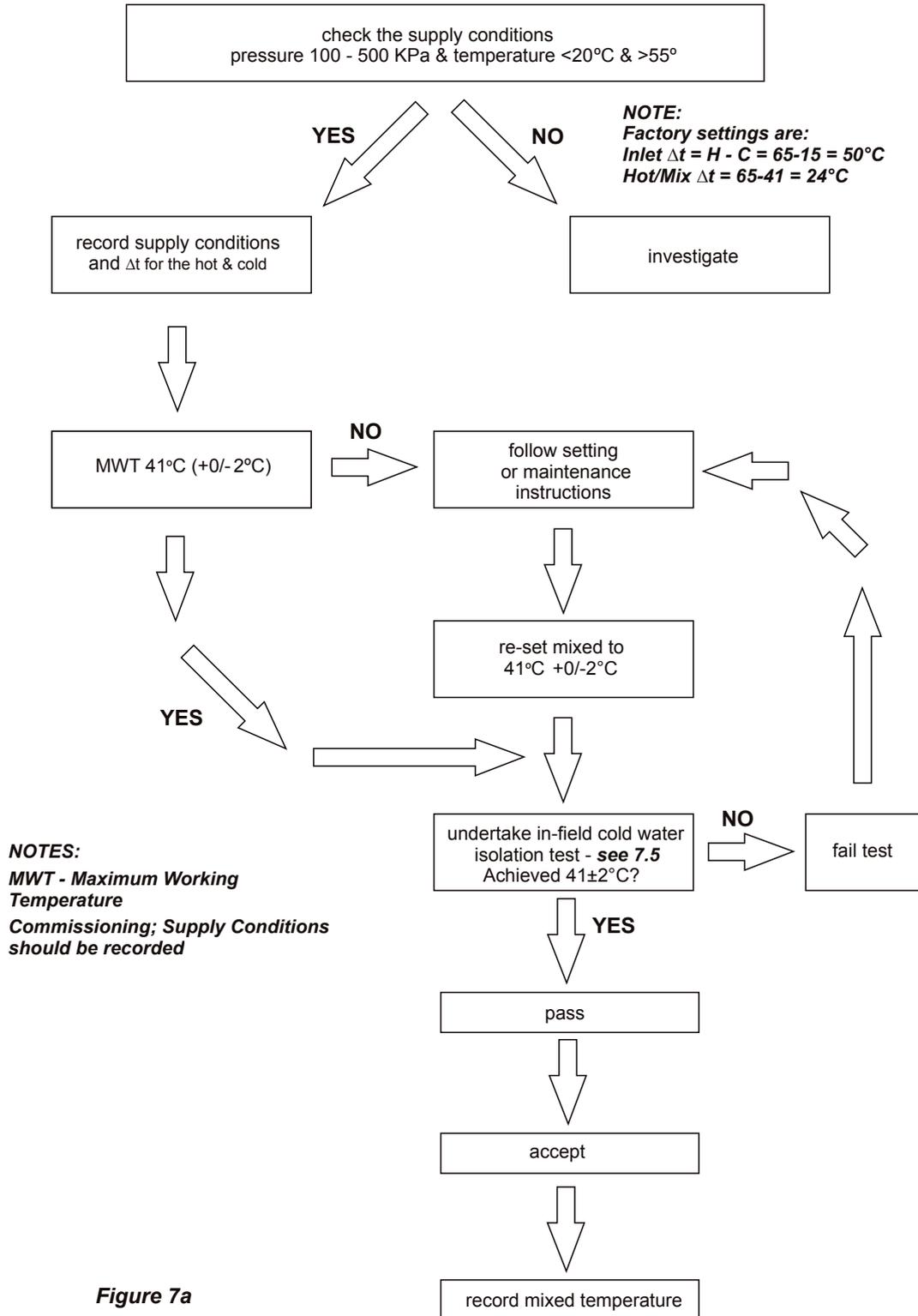


Figure 7a

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7.3 Audit Checks on TMV's

The purpose of a performance audit of a product is:

- ♦ To check the product continues to perform properly.
- ♦ To flag the need for the product to be adjusted due to supply condition changes or mechanism ageing.
- ♦ To ultimately identify the need for product maintenance.

Note - Additionally these audits facilitate regular verification of the supply conditions.
(See decision tree FC3)

Audit of Supplies To Fittings (FC3)

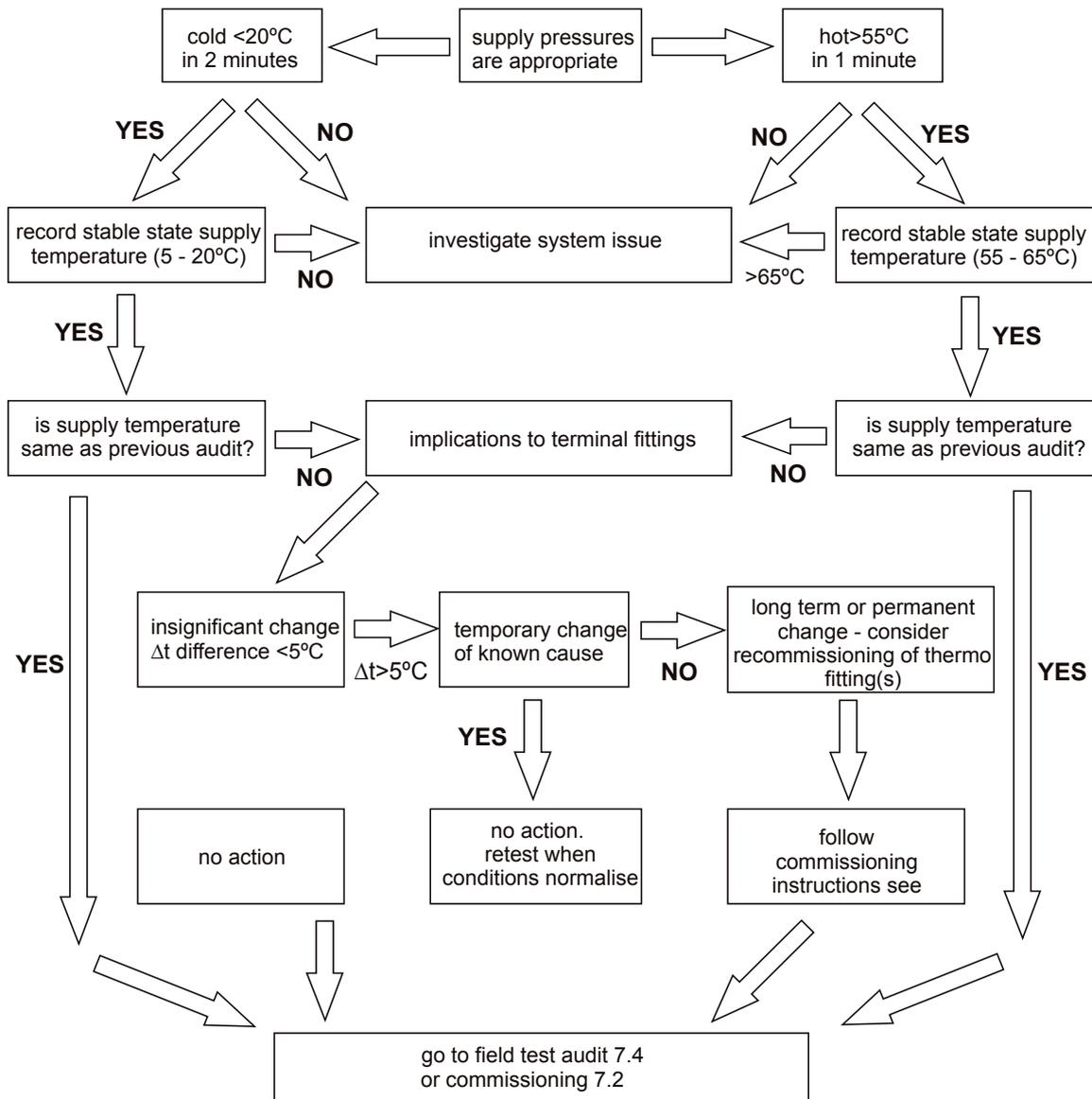


Figure 7b

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7.4 Audit procedure (see decision tree FC2)

- Verify the water supplies conditions are similar to when the product was commissioned i.e. inlet Δt as previous $\pm 5^\circ\text{C}$

Note: If inlet Δt change is $> 5^\circ\text{C}$ consider the cause of the change, if it is seen as a long term or permanent change, re-commission the product. If however, it is only a temporary change, retest when normal conditions resume.

- If inlet Δt differs from the commissioning Δt by $< 5^\circ\text{C}$ carry out field 'cold water isolation' (CWI) test (see 7.5 in field **Cold Water Isolation test failure**).
- Pass - restore the cold supply and move on to check the mix temperature.

Note: If the product fails CWI test, refer to 7.5 and then re-commission the valve.
- Mixed Temperature is as commissioned $\pm 2^\circ\text{C}$, Accept and record the temperature.

Note: If mixed Deviation $> \pm 2^\circ\text{C}$ (1st instance) reset mix as instructions and redo the test from start. See 9.1 Adjustment of the mix temperature.
- 2nd & subsequent instances follow maintenance instructions.

7.5 In-field 'Cold Water Isolation' (CWI) test.

Locate the cold inline isolating valve (see fig 10a, section 10).

Using a flat-blade screw driver, the screw can be rotated 90° anti-clockwise to isolate the cold water supply.

Before commencing the CWI test, ensure:

- The water supply conditions are met either:
 - For commissioning a new product

- Or the inlet Δt is within $\pm 5^\circ\text{C}$ to when the product was commissioned (see 7.4)

NOTE It is important that the hot temperature is greater than 55°C

- Mixed water outlet temperature is correct (see table 2, section 8)

Fitting Field Test Audit (FC2)

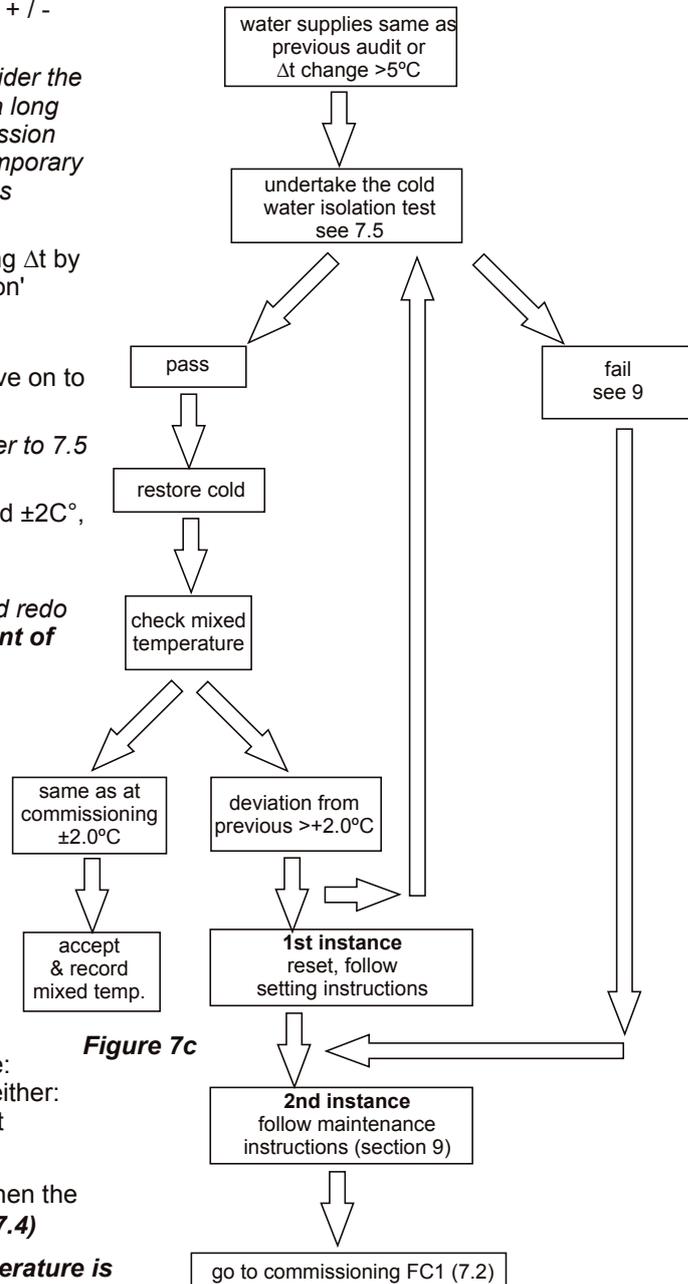


Figure 7c

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To perform a CWI test, operate the product by rotating the lever fully to the right.

Then conduct the following procedure:

1. Record the steady state temperature of both hot and cold water supplies. Note the Δt .
2. Record the temperature of the mixed water at the outlet.
3. Isolate the cold water supply (by rotating the isolating screw 90° & monitor the flow of water from the outlet).

If the flow ceases, CWI test passed:

1. Restore the cold water supply by rotating the isolator screw 90° clockwise.
2. Re-check the temperature of the stabilised mixed water at the outlet to ensure it is still correct.

Accept & record mixed temperature.

If there is an ongoing flow of water from the mixed water outlet, then 5 seconds after CWI collect the discharging water into a measuring vessel for 60 seconds. To pass the CWI test the volume of collected water should be less than 120ml.

If the product fails CWI test, see FC2 (**see section 7.4**) Follow product maintenance (**see section 9**) and servicing (**see section 8**) instructions.

8 SERVICING

The need for servicing is normally identified as a result of the regular performance auditing.

Application	Maximum mixed water temperature during normal operation	Permitted maximum stabilised temperature recorded during site testing – excluding transient spikes
Washbasin	41°C	43°C

Table 2 A guide to maximum temperature sets

8.1 FREQUENCY OF REGULAR SERVICING

The purpose of servicing regularly is to monitor any changes in performance due to changes in either the system or the product. This may highlight the need to adjust either the supply system or the product. These products should be audited 6 to 8 weeks and again 12 to 15 weeks after commissioning. The results are to be compared against original commissioning settings.

If there are no significant changes at the mixed temperature outlet then a 6 monthly servicing cycle may be adopted. Otherwise, servicing checks should be carried out more frequently (e.g. every 4 months).

Follow the recommended auditing and maintenance procedures detailed in sections 7 & 9.

During servicing, note the following:

1. Repeat the procedure of recording and checking supply temperatures. (The same type of measuring equipment should be used)
2. If the temperature has changed significantly from the previously recorded values, the following should be checked:
 - a. All in-line or integral valve filters are clear of obstruction.
 - b. All in-line or integral check valves are clean and working properly to prevent backflow.
 - c. Any isolating valves are fully open.
 - d. The thermostat is free of debris
3. When satisfied with the mixed outlet temperatures re-record the temperatures.

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9 MAINTENANCE

When installed in a healthcare application, we recommend that the commissioning and maintenance procedures, detailed under 7 & 8, be carried out.

9.1 Adjustment of the mix temperature

• **Note: Cartridge is factory pre-set at $40\pm 1^{\circ}\text{C}$ at 300 KPa**

1. Prise out the cover button on the handle & unscrew the retaining screw using a 4mm hexagonal key. Move the lever to the fully on (max) position & then remove the handle. Refer to section 5.2 Handle fixation.
2. Remove the face plate & black mouldings (see section 5.1). Slide off the cylindrical chrome shroud & grey spindle extension to expose the thermostatic cartridge.
3. Remove the upper Anti clockwise stop ring (slide off spindle).
4. Rotate spindle (use lever handle if necessary) to achieve correct mix temperature. ($40\pm 1^{\circ}\text{C}$) Rotate clockwise to reduce and anti-clockwise to increase.
5. Refit the upper stop ring against cartridge stop face.

Note: 1. this is the normal maximum temperature range for the product and as such there is a wide zone of spindle movement that gives this mix temperature. For best performance you should refit the stop at the first point of anticlockwise rotation that achieves the desired setting.

Note: 2. if you are unable to achieve $40 - 41^{\circ}\text{C}$ Max and you have the correct Δt 's it may be due to fine debris. See 9.2 Removal and inspection of cartridge.

6. Upon successful completion of the temperature adjustment, conduct the Cold Water Isolation (CWI) test (See 7.5) to ensure product is working properly.
7. Refit the spindle extension, cylindrical shroud & face plate kit (see section 5.1). Refit the handle (see section 5.2).
8. Record the mix temperature.

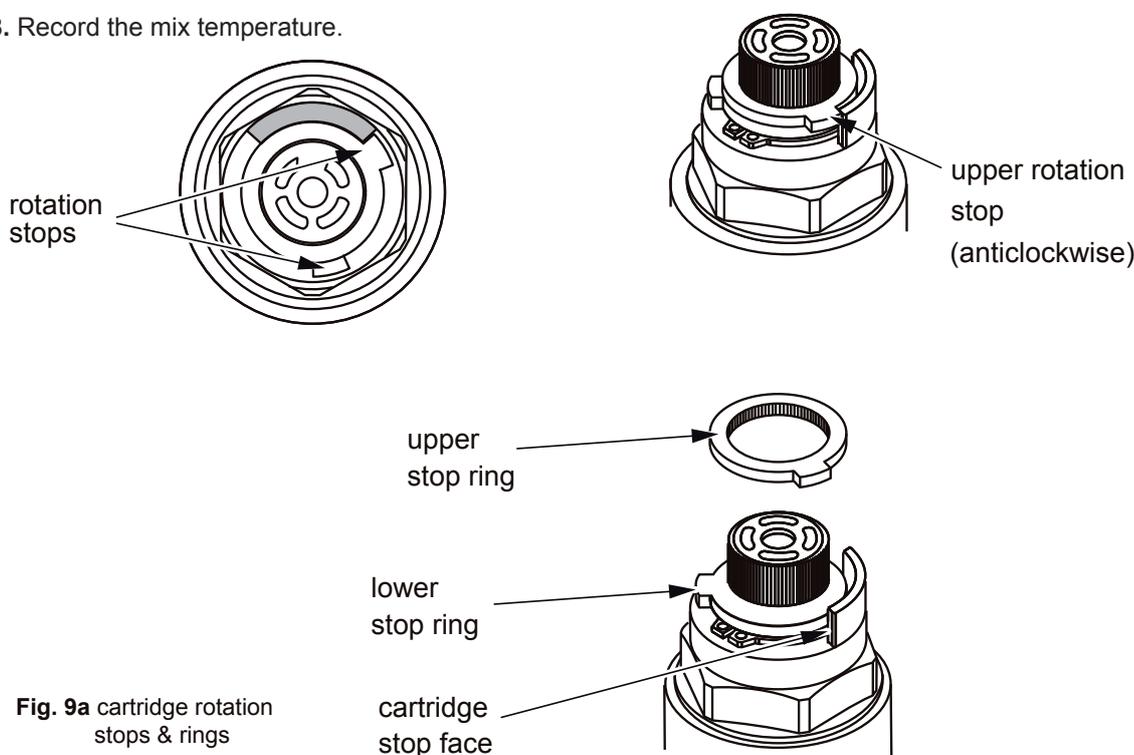


Fig. 9a cartridge rotation stops & rings

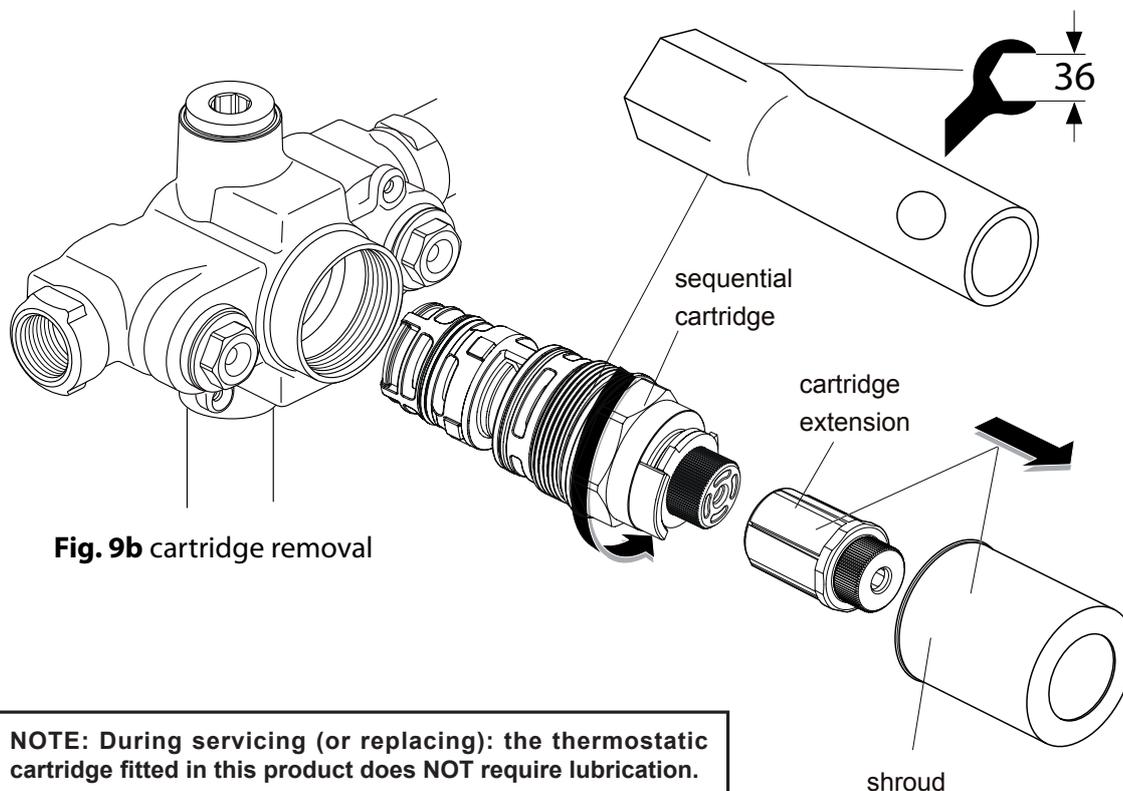
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9.2 Removal and inspection of cartridge

After checking that supply conditions are within the specified parameters, if the fitting malfunctions or should the test results fail to fall within the specified limits consider replacing the cartridge with a new one. **See 9.3 Important notes on debris.**

1. Remove the face plate (see section 5.1 & 5.2). Slide off the cylindrical chrome shroud & grey spindle extension to expose the thermostatic cartridge.
2. Isolate the fitting by closing the isolating valves (see section 10).
3. Unscrew the cartridge from the body with a 36mm A/F deep socket. Inspect cartridge for damage. Expect a small quantity of trapped water to escape when the cartridge is unscrewed.
4. Replace cartridge if necessary and reassemble cartridge into body.
5. The replacement cartridge should be tightened to a torque of 15Nm. (To re-secure the cartridge we recommend the use of Loctite 2400 or equivalent applied to the thread of the cartridge)
6. Reinststate the supplies.
7. After fitting the new cartridge start the test procedure from the section on commissioning.
 - Redo the Cold Water Isolation (CWI) test (See 7.5).
 - Once satisfied with the CWI test, re-check and if necessary, adjust the maximum mix temperature, (See 9.1).
 - Refit the spindle extension, cylindrical shroud & face plate (see section 5.1).
 - Refit the handle (see section 5.2).
 - Record the mix temperature.



ARMITAGE SHANKS

MARKWIK21 CONCEALED THERMOSTATIC SHOWER MIXER

9.3 Important notes on debris

Although this product is protected by built-in filters, debris can still find its way to the thermostat housing area. This can happen during servicing for example. Remove cartridge (see section 9.2) and carry out an inspection.

9.4 Thermostatic Cartridge Ageing

Following many years of normal service you may notice the following:

1. The need to carry out more frequent adjustment of mixed temperature.
2. The thermostatic element may not pass the CWI test.

These issues could be due to the ageing of the thermostat which loses some expansion capability over time.

These are the principle objectives of testing, as they serve to indicate to maintenance staff the declining performance capability of the thermostatic cartridge.

For this reason the audit testing flow chart highlights that 2nd Instance CWI test failure or 2nd instance mixed deviation even with stable 'as commissioned' supply conditions and correct inlet supply Δt 's, is potentially the first indication of the need to replace the cartridge.

10 INLINE SERVICE VALVES

The service valves contain filter & isolating valve functions.

Isolation valves facilitate 4 activities:

- | | |
|--------------------------------------|-------------------------------------|
| 1) Cleaning strainers & check valves | 2) Servicing the cartridge |
| 3) Disinfection | 4) Audit cold water failure testing |

Strainers

Each service valve is fitted with a strainer (filter/mesh) to catch any waterborne debris

To ensure trouble free operation of the fitting, the strainer elements should be checked and cleaned in accordance with the commissioning and servicing guide (see section 8).

To access the strainer element, simply close the isolating valve and unscrew the strainer cap. The strainer element should be washed with clean water and refitted.

Use a 22mm spanner on the strainer cap. Reopen the isolating valves upon completion. Expect a small quantity of trapped water to escape when the strainer cap is opened.

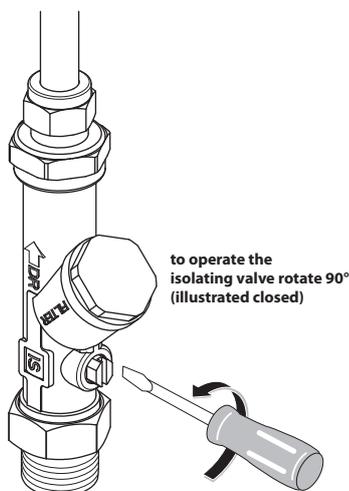


Fig.10a Operating the isolating valve

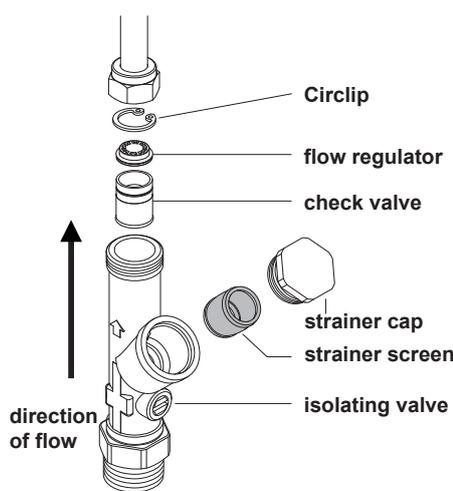


Fig.10b Exploded view of isolating valve

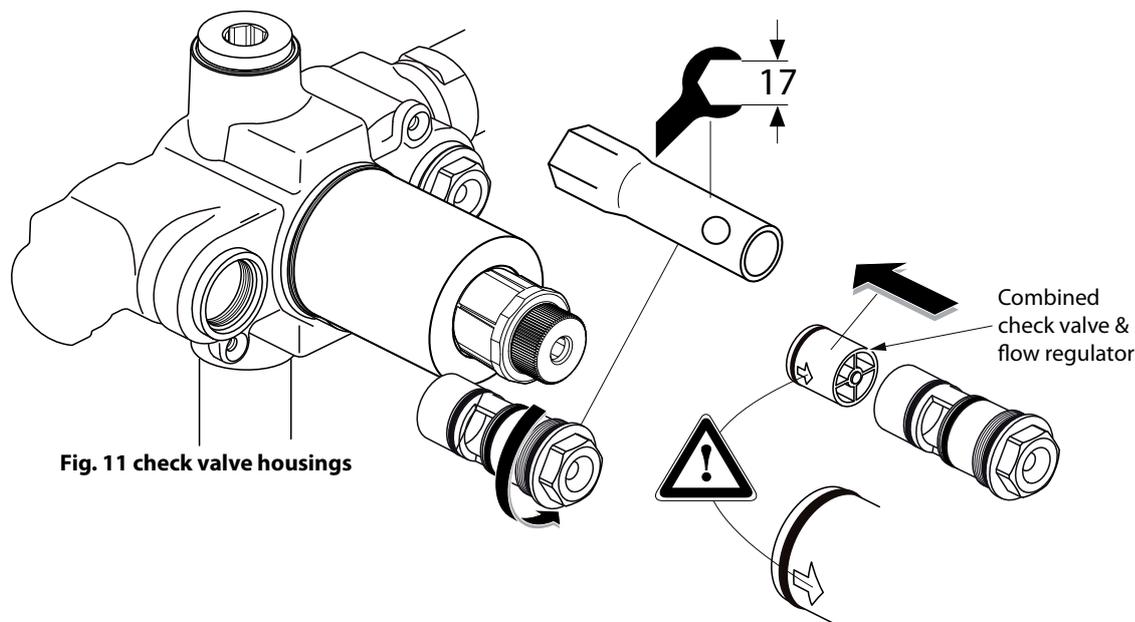
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11 INTEGRAL COMBINED CHECK VALVES & FLOW REGULATORS

To access the combined check valves & flow regulators (CV15FR):

1. Remove the face plate (see section 5.1 & 5.2) to expose the shower valve. The CV15FR valve housings (x2) are integral to the shower valve as shown figure 11.



2. Isolate the product, see section 10.
3. Use a 17mm spanner (or socket) to undo the CV15FR valve housings.
NOTE: Expect a small quantity of trapped water to escape when these housings are opened.
4. Slide the CV15FR valves out from the bottom of the housings.
5. Check/clean/replace the CV15FR valves. OBSERVE ARROW MARKING.
6. Refit the CV15FR valve housings into the shower valve.

Reopen the isolating valves upon completion of task & refit face plate etc...

To achieve a suitable flow rate where supply pressures are very low it may be necessary to remove the combined flow regulator (**item 14a figure 12**) and replace with a single check valve (**item 14b figure 12**).

PRODUCT MUST BE FITTED WITH CHECK VALVES, DO NOT REMOVE THESE.

NOTE: The flow regulator fitted in each maintenance carrier is nominally rated 5L/min. Therefore mixer is flow regulated to max 10L/min

ARMITAGE SHANKS MARKWIK21 CONCEALED THERMOSTATIC SHOWER MIXER

12 SPARE PARTS

Pos.	Part No.
1	A 962 017 AA
2	A 961 456 AA
3	A 961 464 NU
4	A 961 467 AA
5	A 860 967 AA

6	A 962 173 NU
7	A 962 074 NU
8	A 860 321 NU
9	A 963 344 NU
10	A 961 935 NU
11	A 962 280 NU

12	A 860 968 NU
13	A 963 431 NU
14a	F 961 081 NU
14b	A 962 594 NU
17	A 963 510 NU
20	A 860 969 NU

CV-FR
simple check valves

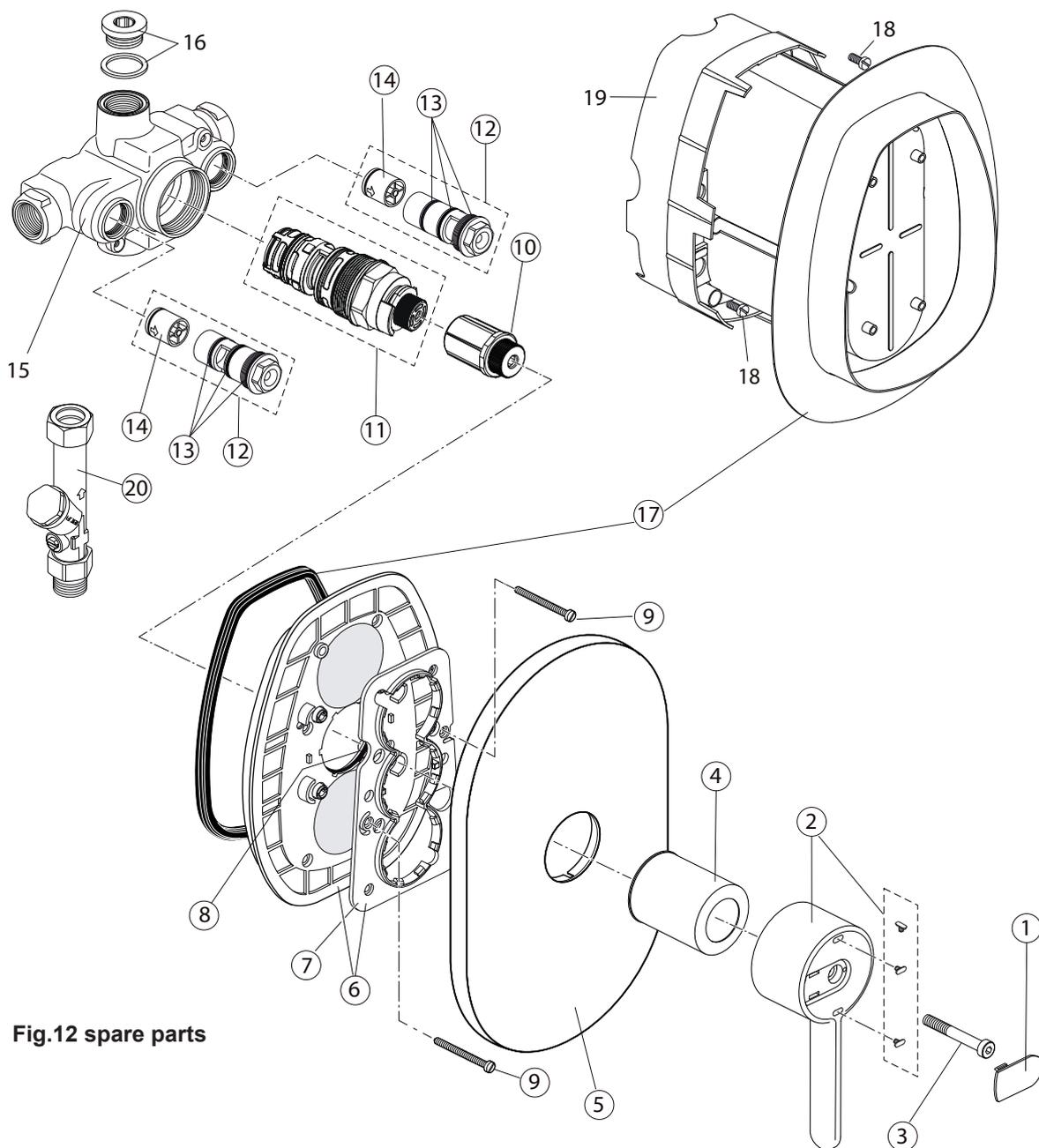


Fig.12 spare parts

Plumbers, please ensure a copy of the installation instructions is left with the end user for future reference