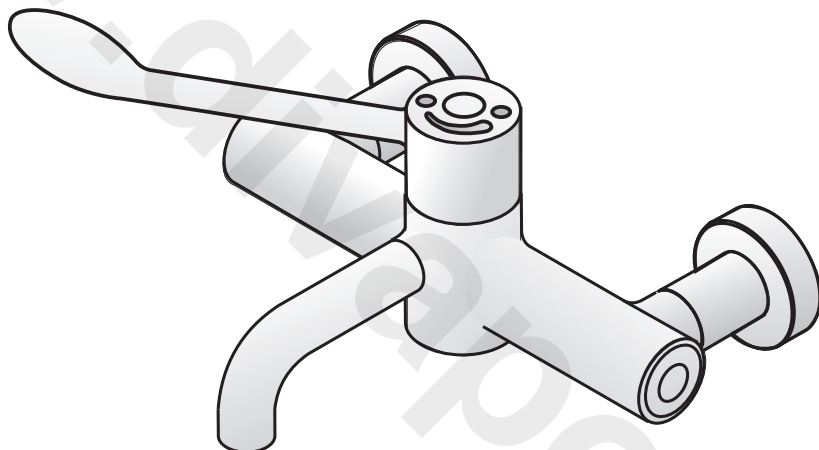




MARKWIK

SEQUENTIAL LEVER OPERATED THERMOSTATIC MIXERS



A4553AA

Markwik Lever Operated Sequential Thermostatic
Panel Mounted Mixer Tap

*Armitage
Shanks*

INSTALLER: After installation please pass this instruction booklet to user

The fittings covered by this installation and maintenance instruction should be installed in accordance with the water regulations published in 1999*, therefore Armitage Shanks would strongly recommend that these fittings are installed by a professional installer

*A guide to the Water Supply (Water Fittings) Regulations 1999 and the Water Byelaws 2000, Scotland is published by WRAS (Water Regulations Advisory Scheme) Fern Close, Pen-y-Fan Industrial Estate, Oakdale, Newport, NP11 3EH. ISBN 0-9539708-0-9

2 DESCRIPTION

This manual covers the A4553AA panel mounted, thermostatically controlled, sequential, lever operated mixer. This is designed to provide water from ambient cold up to a safe maximum temperature for hand washing.

It is intended to be installed on duct panel walls.

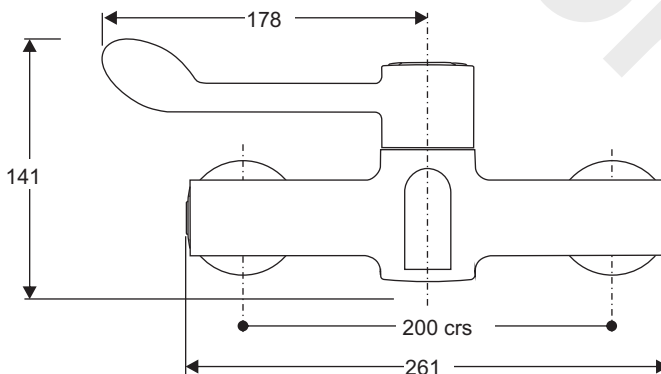
The panel thickness should be in the range 13 - 19 mm. Two holes, of diameter 30mm nominal, will be required to be cut in the panel at centres of 200mm.

This mixing valve is supplied with integral isolating valves, strainers, check valves and flow regulators and is provided with a facility for thermal disinfecting of the cold inlet side and mixed water outlet.

The hot side of the body and the inlet is insulated to ensure the body surface is maintained at a safe temperature when the fitting is in operation.

Avoid using heat for soldering near the mixer inlets to prevent damage to internal components.

3 DIMENSIONS



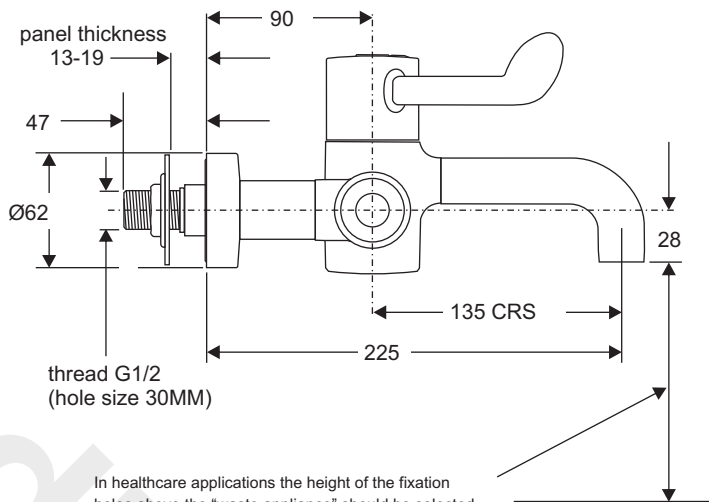


Figure 1 A4553AA

4 WATER SUPPLY CONDITIONS

4.1 INTRODUCTION

This sequential thermostatic lever operated mixer is manufactured to the highest standards and has approval to TMV3 which permits it to be installed in healthcare establishments such as hospitals, nursing homes and residential care homes. When installed in healthcare establishments the supply conditions detailed in Table 1 must be observed and the commissioning and servicing requirements detailed on section 7 & 8 must be followed.

For other installations this is not a requirement.

4.2 SUPPLY PRESSURE REQUIREMENTS

This mixer is designed to be installed on all types of plumbing systems.

Hot and cold water supply pressures should be reasonably balanced, however, the mixer will function within specification on unequal pressures up to 5 :1.

The mixer has integral isolating valves which permit servicing of the strainer, check valve/flow regulator & thermostatic cartridge. They are also used for thermal disinfection.

The minimum pressure for the correct thermal operation is 0.2 bar. However, in order to achieve an acceptable flow performance at very low pressures it may be necessary to remove the combined check valve and flow regulators (10) and replace them with simple check valves (19) to facilitate thermal disinfection. - **see figure 13.**

4.3 HEALTHCARE ESTABLISHMENTS

In accordance with the NHS model engineering specifications DO8 this valve has approval for the following applications:-

High pressure	- HP	- WE
Low pressure	- LP	- WE

For this type of application the following supply conditions must apply:

Operating pressure range	High pressure	Low pressure
Maximum static pressure - Bar	10	10
Flow pressure hot and cold - Bar	1 to 5	0.2 to 1
Hot supply temperature *	55°C to 65°C	55°C to 65°C
Cold supply temperature	5°C to 20°C	5°C to 20°C

Note:
Fittings operating outside these conditions cannot be guaranteed by the scheme to operate as TMV3.

← *52°C absolute minimum can be used but not recommended

Table 1 Supply conditions for healthcare establishments

Effectively this means:

Differential between HOT and COLD inlet temperatures (Δt) must be 32°C min and 60°C max

Differential between HOT inlet temperature and MIXED temperature (Δt)

must be 11°C absolute minimum but > 14°C preferred

See 7.3 Audit checks on TMV's.

5 INSTALLATION

The A4553 is designed to be panel mounted on a duct wall of maximum panel thickness 19mm. For thicker panels the rear of the panel will require a counter bore of 62mm or greater.

Cut two holes of 30mm diameter, horizontally aligned to 200mm centres in the wall. See figure 1 for height positioning of A4553 over a "waste appliance".)

Loosen the chrome shrouds and insert the fitting as shown above with the wall plates and seals to the front of the wall.

Fit the slip washers and do up the backnuts to a torque of 25 Nm. Screw the shrouds onto the wall plates.

Connect the plumbing using G½ swivel couplers.

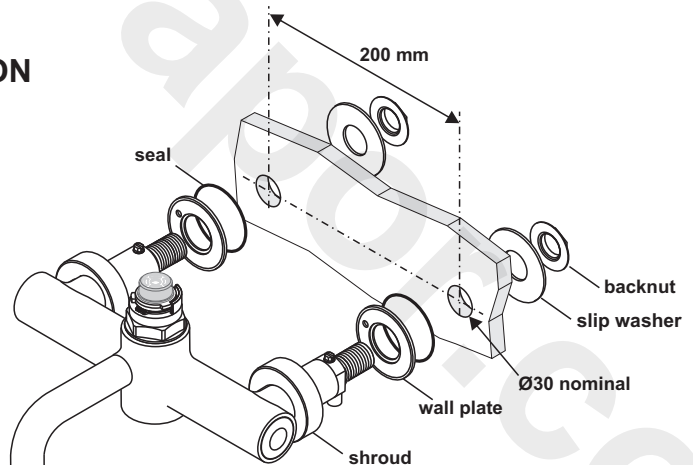


Figure 2 Installation - panel mounting

FLUSHING USING THE PURGING KIT

IMPORTANT NOTE:

Before operating the product, it is strongly recommended to flush the pipe work to remove any residues or debris remaining after installation. A purge kit is available for this purpose. Fig 3

A purging kit - A4556AA (not included) designed to flush out debris from the pipe-work after installation is available from Customer Care (**see section 12**)

The following procedure should be used to flush the pipe work:

1. Unscrew and slide back shrouds, close both isolating valves.
2. Remove both maintenance carriers as described in section 11.
3. Screw the purge kit bodies into both sides of product. Screw elbows onto the ends of the purge kit bodies.
4. Open isolating valves and allow water to discharge into a vessel.

Note: suitable tubing can be push fitted onto elbows if required.

5. Once system has been purged, reverse this procedure.

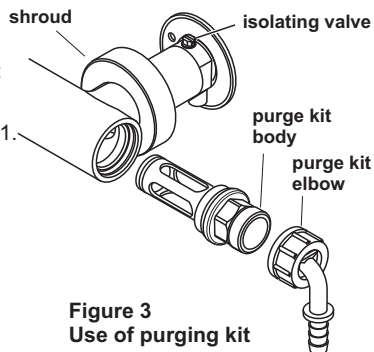


Figure 3
Use of purging kit

FIXATION OF HANDLE

- 1 To prevent damage, mixers are supplied without the handle fitted. To fit the handle first carefully prise off plastic protective cover from cartridge spindle & discard. (Use a small flat bladed screwdriver if necessary).
- 2 The two rotational stop rings fitted to the spindle are factory set & should only be removed when adjustment proves to be necessary. (Cartridge orientation may differ from that shown in this diagram).
- 3 Ensure tab of upper stop ring is firmly against anticlockwise rotation stop. If not rotate the spindle anticlockwise until it is. The cartridge is now in the fully open position. (If necessary, use the spline drive in the handle to rotate the spindle).

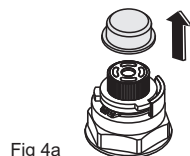


Fig 4a

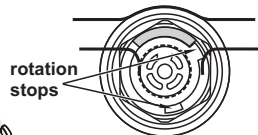


Fig 4b

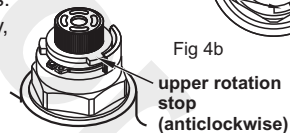


Fig 4c

- 4 Fit handle to cartridge spindle as shown.
- 5 Fit handle screw & tighten with a 4mm Allen Key. Finally, fit cover cap to handle.

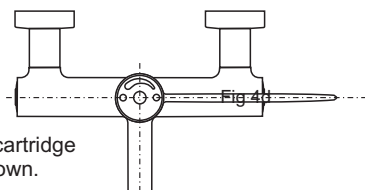


Fig 4d

- 6 Rotate handle clockwise to closed position. Handle should stop in approximate position shown.

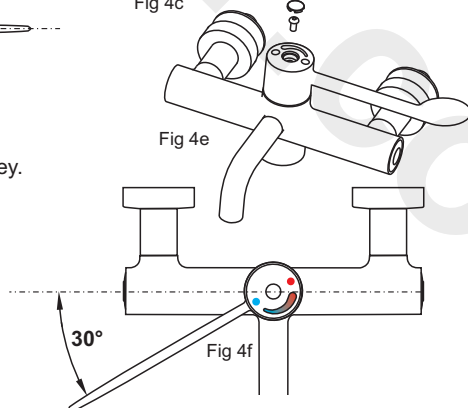


Fig 4f

6 OPERATION

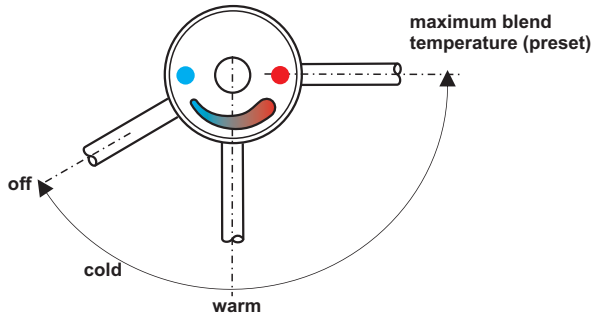


Figure 5 Showing the handle control positions.

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

7 COMMISSIONING AND AUDITS

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

7.1 The 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 - 41°C with supplies of circa; 3 bar balanced pressure and temperatures of 17°C cold & 57°C hot (i.e. an inlet Δt of 40C° & a hot / mix Δt of 17C°)

For supply requirements, see 4.0 Water Supply Conditions.

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 41°C + / - 2°C, if not (probably due to $\Delta t > 5C^\circ$ 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.

7.2 cont. Commissioning process (decision tree FC1)

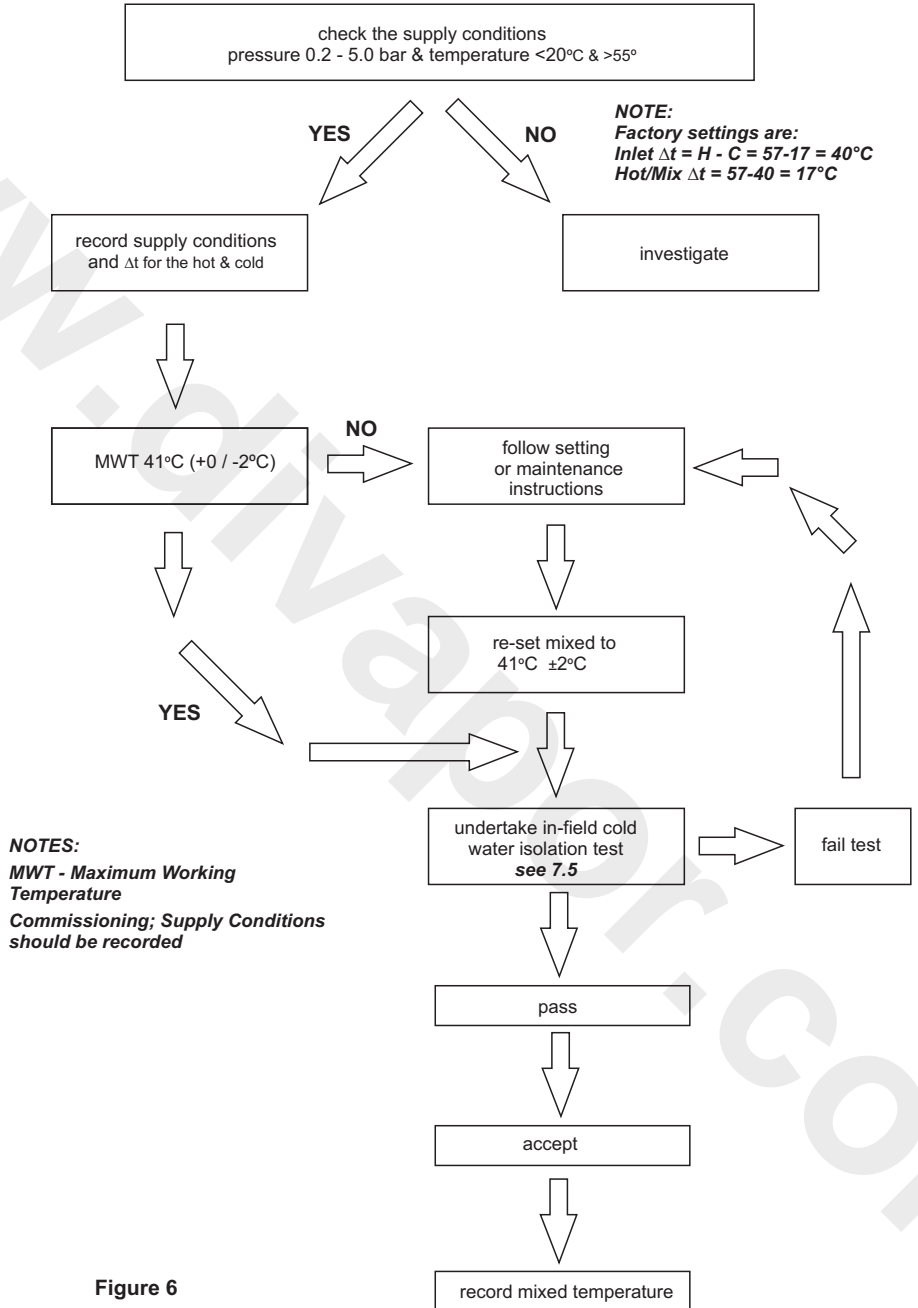


Figure 6

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 in accordance with HTM 04 requirements. (See decision tree FC3)

Audit of Supplies To Fittings (FC3)

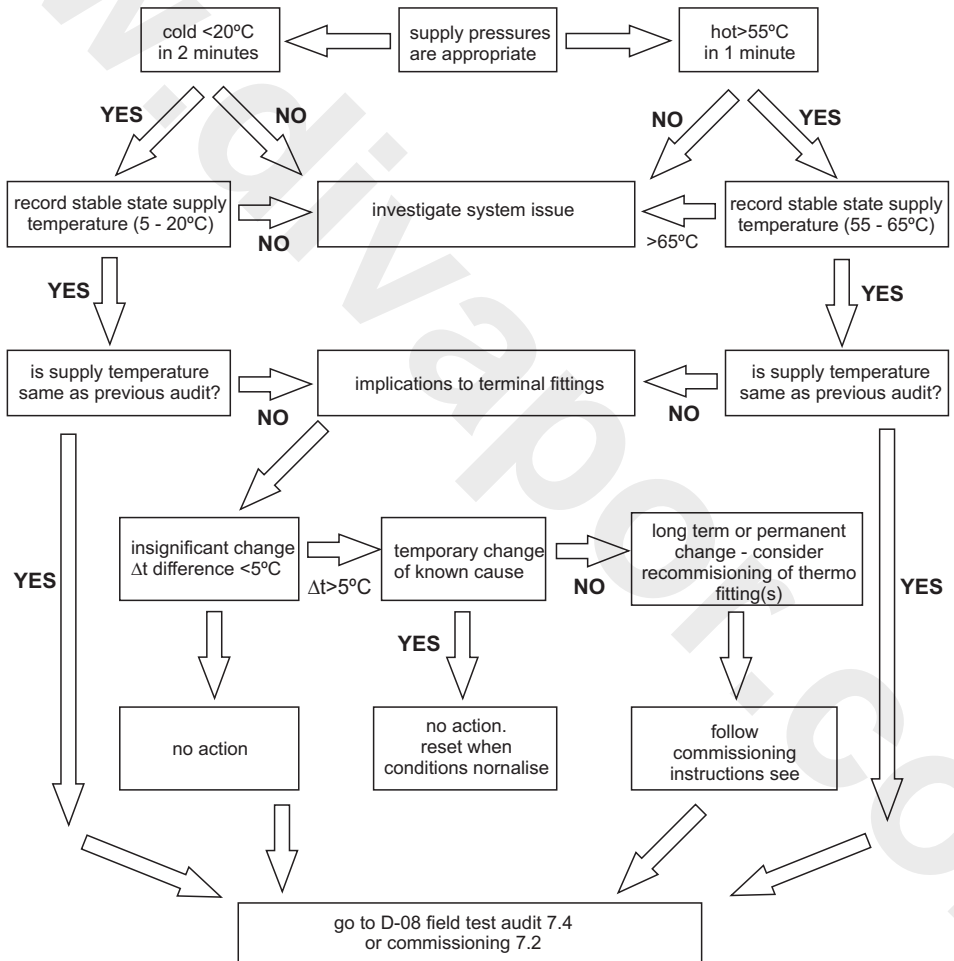


Figure 7

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 + / - $5C^{\circ}$

Note: If inlet Δt change is $> 5C^{\circ}$ 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 $< 5C^{\circ}$ carry out field 'cold water isolation' (CWI) test as D-08: 2009. (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 $\pm 2C^{\circ}$, Accept and record the temperature.

Note: If mixed Deviation $> \pm 2C^{\circ}$ (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.

Note: To gain access to the cold water isolating valve, unscrew the right hand shroud (42) & slide forward to expose the isolating screw on top of the cold inlet leg (see fig 13a, section 12).

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 (see table 1, section 4).
 - Or the inlet Δt is within $\pm 5C^{\circ}$ to when the product was commissioned (see 7.4).

NOTE It is important that the hot temperature is greater than $55C^{\circ}$

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

Fitting Field Test Audit (FC2)

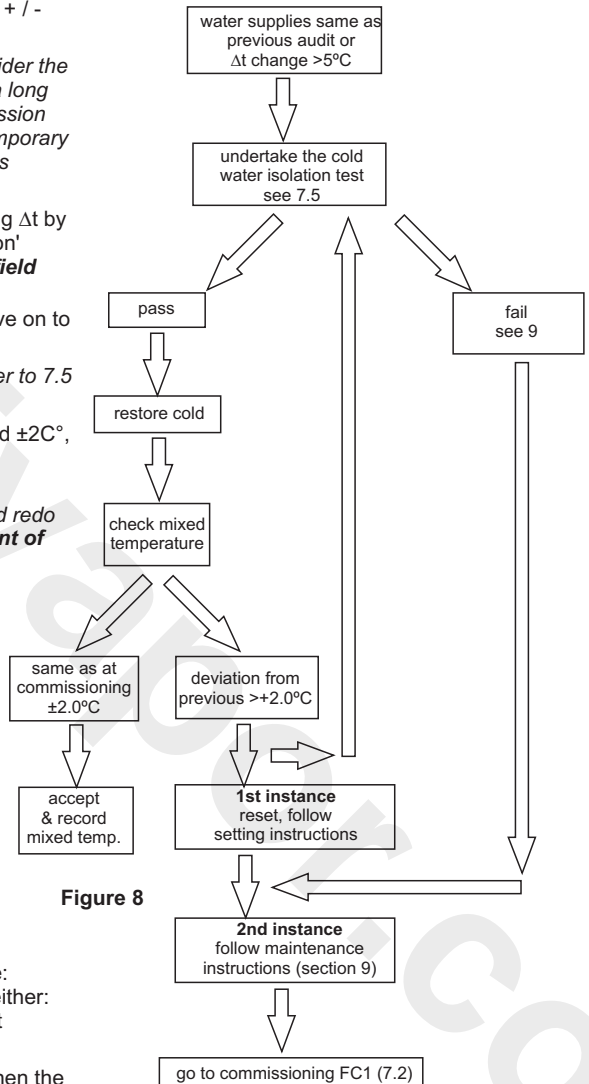


Figure 8

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. Slide the shroud back & screw onto the wall plate.
3. 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**). Follow product maintenance (**see section 9**) and servicing (**see section 8**) instructions.

8 SERVICING - TVM3 SCHEME

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 temperature rise recorded during site testing
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 valves, 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.

9 MAINTENANCE

When installed as a TMV3 application it is a requirement 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 - 41°C.**

1. Move the lever to the fully on (max) position.
2. Remove the lever by prising out the cover button and unscrewing the retaining screw using a 4mm Allen key.
3. Remove the upper Anti clockwise stop ring (slide off spindle).
4. Rotate spindle (using lever handle) to achieve correct mix temperature. (40 - 41°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°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 lever and record the mix temperature.

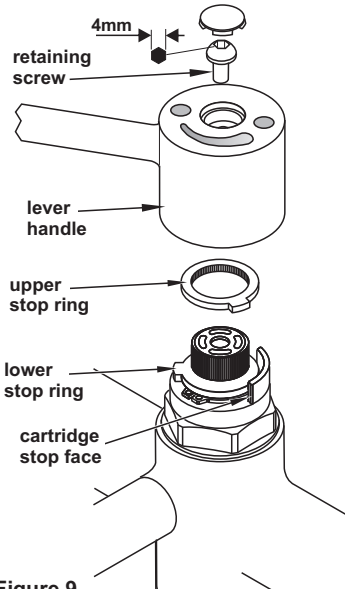


Figure 9
Adjusting the pre-set temperature

9.2 Removal and inspection of cartridge

After checking that supply conditions are within the specified parameters (see table 1), 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.**

Isolate the fitting by turning the isolating valves 90° anti-clockwise (viewed facing the iso-valve).

Remove the lever handle as described in 9.1. Unscrew the cartridge from the body with a 36mm a/f deep socket. Inspect cartridge for damage.

Replace cartridge if necessary and reassemble cartridge into body.

The replacement cartridge should be tightened to a torque of 15Nm. (To re-secure the cartridge we recommend the use of Permabond A011 or equivalent applied to the thread of the cartridge)

Replace lever handle (**see sect 5**) and reinstate the supplies.

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 (**See 9.1**).
- ♦ Record the mix temperature.

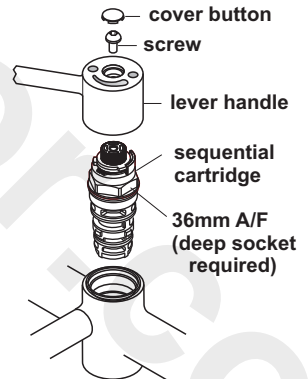


Figure 10
Exploded view showing sequential cartridge

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.

9.5 Maintenance cleaning

On a regular basis the anti-splash nozzle should be inspected and cleaned if necessary. This should be done immediately before sterilising is carried out.

In areas where lime scale build-up is prevalent this will have to be removed. An inhibited proprietary scale solvent can be used such a kettle descaling solvent but it is important to follow the manufacturer's guidelines. After descaling it is important to rinse the parts thoroughly in clean water. Clean carefully and do not use abrasive materials or scrapers.

10 DISINFECTION

This fitting is equipped with a disinfecting feature, which allows an engineer to feed water from the hot inlet via a temporary by-pass hose* into the cold inlet. This hot water then passes through the cold inlet, the thermostatic mixing chamber and out through the mixed water outlet. The temporary bypass hose is inserted into special valve connectors in the inlet tails normally concealed by the shrouds.

Safety Note: Care should be taken when carrying out the following procedure to avoid contact with hot water and hot surfaces. We recommend the use of protective hand wear.

To disinfect the fitting proceed as follows:

1. Unscrew the wall shrouds and slide forward
2. Isolate both inlets by turning the isolation valves through 90° anti-clockwise.
3. Remove dust covers from the exposed nipples and push-fit the temporary flexible hose inserting the cold side first and then the hot.
4. Operate the fitting lever in line with the spout position.
5. Now turn the hot isolation valve clockwise. Hot water will now pass from the hot inlet, through the by-pass hose into the cold inlet and thence into the thermostatic mixing chamber and spout. Here by the nature of the thermostatic element it will fully open the cold port. The hot water will then discharge to waste via the fitting's outlet.

See table 3 below for a guide to disinfection temperatures v/s time:

**The temporary bypass hose is available as an optional extra Part No. S8239NU)*

Table 3

Temperature	Disinfection time
60°C	20 minutes
65°C	10 minutes
70°C	5 minutes

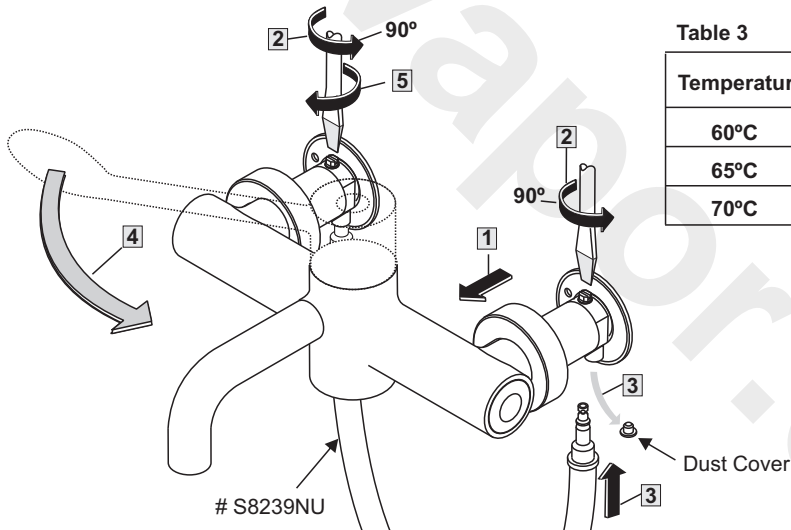


Figure 11 Fitting the Temporary by-pass hose

Following the recommended disinfection period, turn the hot isolation valve back to the isolation position, turn off the fitting and remove the bypass hose - hot side first then the cold. Turn both isolation valves back to the normal flow position. Check for normal operation of the fitting and replace dust caps and shrouds.

11 ISOLATING VALVES

Isolation valves facilitate 4 activities:

- 1) Cleaning strainers & check valves
- 2) Servicing the cartridge
- 3) Disinfection
- 4) Audit cold water isolation test

Strainers

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, first unscrew and slide back the shrouds and close the isolation valves. Prise out the cover cap then unscrew the end cap using a 10 mm Allen key and withdraw the maintenance carrier. The strainer element should be washed with clean water and refitted.

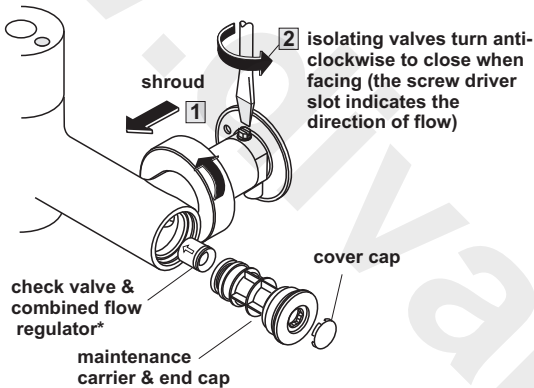


Figure 12 Exploded view showing strainers check valve and flow regulator

*To achieve a suitable flow rate where supply pressures are very low it may be necessary to remove the combined flow regulator (**item 10 figure 13**) and replace with a single check valve (**Item 19 figure 13**) to facilitate thermal disinfection.

12 SPARE PARTS

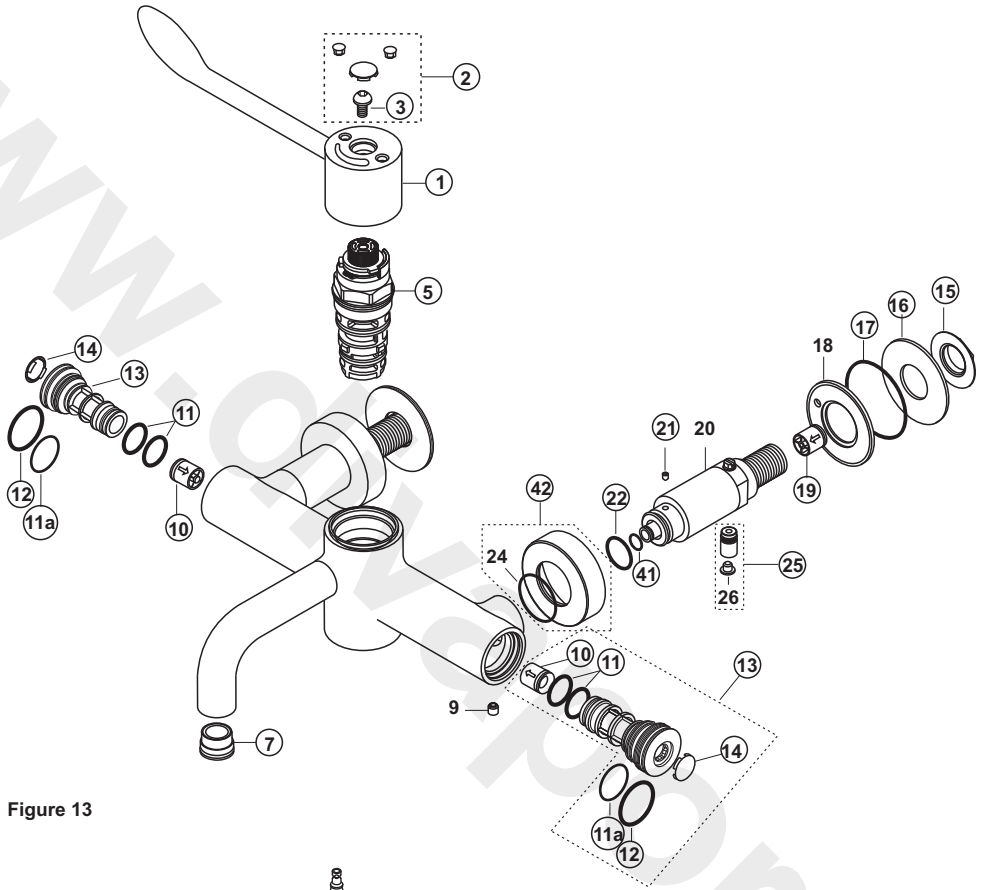


Figure 13

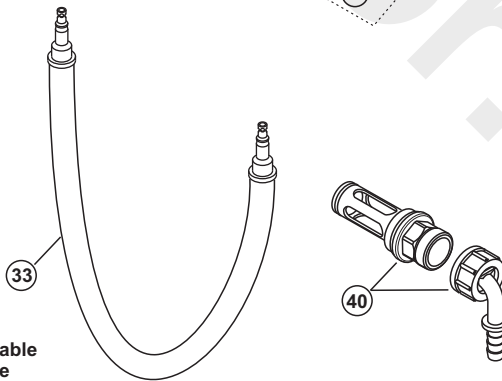


Figure 13a Service Kits available from customer care

12 SPARE PARTS - continued from page 15

Ref.	Description	Part No.
1	Lever Handle	E960668AA
2	Index kit	E960615AA
3	Handle screw	A961950NU
5	Sequential, thermostatic cartridge	A962280NU
7	Anti-splash	A960191NU
9	Grub screw M6 x 6	-
10	Combined check valve & flow regulator CV15FR	A962689NU
11	O-ring dia 17.6 x 2.4	A962497NU
11a	O-ring 25.0 x 1.5	A962496NU
12	O-ring dia 34.0 x 2.0	A960183NU
13	End cap, maintenance carrier & filter (complete with o-rings)	A962343AA
14	Index button	E960641AA
15	Backnut	E960112NU
16	Slip washer dia 60 x 25 x 2	E960631NU
17	O-ring 51.6 x 2.4	E960632NU
18	Wall plate	E960633NU
19	Check valve DW15	A962594NU
20	Straight inlet tail with maintenance / disinfecting valve	-
21	Grub screw M4 x 6	A963667NU
22	O-ring dia 17 x 2.5 (set of 4)	A963143NU
24	O-ring dia 34.1 x 1.6	-
25	Sterilising nipple assembly (fit hand tight only)	A962498AA
26	Dust cover	-
33	Disinfection kit (available separately)	S8239NU
40	Purging kit (available separately)	A4556AA
41	O-ring dia 8.1 x 1.6 (single)	A962345NU
42	Shroud	A962346AA

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