

# HORNE

Horne OPTITHERM Thermostatic Bib Tap

Type TBT02

INSTALLATION, COMMISSIONING, OPERATING AND MAINTENANCE INSTRUCTIONS  
APPROVAL

The Horne OPTITHERM Thermostatic Bib Tap has been independently tested as a Type 3 TMV by WRc-NSF and approved to the requirements of *NHS Model Engineering Specifications D08: Thermostatic mixing valves (Healthcare premises)*, to the following designations.

APPLICATION	DESIGNATION	HOT & COLD WATER PRESSURES	WATER TEMPERATURES
WASHBASIN	HP-WE	1 to 5 BAR (Hot and cold pressures do not need to be equal)	HOT: 52°C - 65°C  COLD: 5°C - 20°C
		Static Pressure Max. 10 Bar	Differential between mixed and supply temperatures: Min. 11°C

Table 1

If the Horne OPTITHERM Thermostatic Bib Tap is operated outwith these conditions it cannot be guaranteed to operate as a Type 3 TMV.

The Horne OPTITHERM Thermostatic Bib Tap is supplied with WRAS approved integral single check valves (spring-loaded, resilient trim in-line check valve cartridge with plastic guide and stem) located in each of the hot and cold water supply inlets.

The Horne OPTITHERM Thermostatic Bib Tap is a tap containing a thermostatic mixing valve (TMV). All comments made herein regarding TMVs apply equally to thermostatic taps.

NOTES:

MULTI-TOOL:

Optitherm Multi Tool (Part No. 5459) & Screwdriver bit (Part No. 5632). Available as part of full toolkit (part no. 5491).

A	Endcap Gripper
B	Outlet Fitting Tool
C	26mm Ring Spanner
D	8mm Hex Key
E	12mm Hex Key
F	Screwdriver Bit

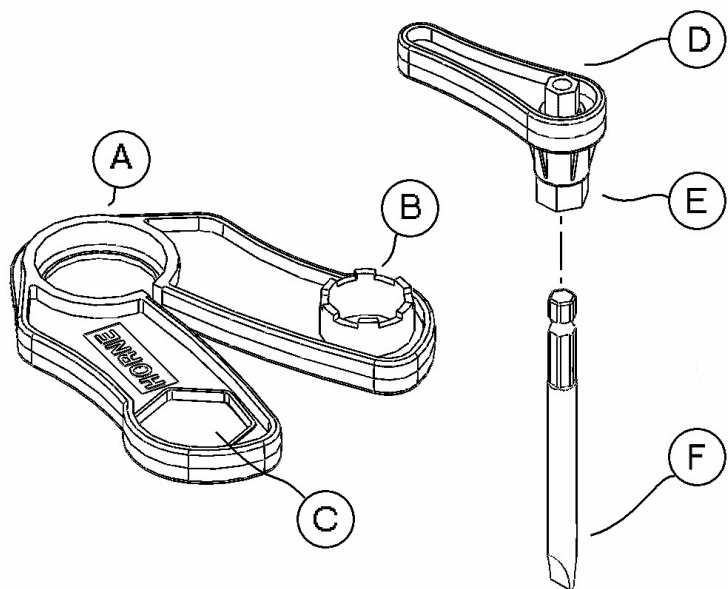


Table of Contents
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<b>[1]</b>	<b>INSTALLATION.....</b>	<b>4</b>
1.1	NOTE ON O-RING FITTING .....	4
1.2	FITTING.....	4
1.3	FLUSHING OF PIPEWORK (METHOD 1) .....	5
1.4	FLUSHING OF PIPEWORK (METHOD 2).....	6
<b>[2]</b>	<b>COMMISSIONING.....</b>	<b>6</b>
2.1	FLUSHING .....	6
2.2	TEMPERATURE CHECK (COLD WATER) .....	6
2.3	TEMPERATURE CHECK (HOT WATER) .....	6
2.4	TEMPERATURE CHECK (MIXED WATER) .....	7
2.5	MIXED WATER TEMPERATURE ADJUSTMENT .....	7
2.6	COLD WATER FAILURE TEST .....	7
<b>[3]</b>	<b>OPERATION .....</b>	<b>8</b>
3.1	DUAL LEVER VERSION .....	8
3.2	SHORT LEVER VERSION .....	8
3.3	POTABLE WATER SUPPLY .....	8
<b>[4]</b>	<b>MAINTENANCE .....</b>	<b>9</b>
4.1	TEMPERATURE ADJUSTMENT.....	9
4.2	IN-SERVICE TESTING .....	9
4.3	CLEANING AND REPLACEMENT OF STRAINERS.....	9
4.4	TESTING AND REPLACEMENT OF CHECK VALVES .....	9
4.5	REPLACEMENT OF THERMOSTATIC CARTRIDGE .....	10
4.6	REPLACEMENT OF CERAMIC DISC CARTRIDGES.....	10
4.7	REMOVAL OF TAP FROM SPIGOT FOR WORKSHOP MAINTENANCE .....	11
	<b>FOLDOUT PAGE – DIAGRAMS.....</b>	<b>12</b>
<b>[5]</b>	<b>FAULT FINDING CHART.....</b>	<b>13</b>
5.1	FAULT FINDING CHART – CONTINUED....	14

## [1] INSTALLATION

The Horne OPTITHERM Thermostatic Bib Tap must be installed in accordance with the Water Supply (Water Fittings) Regulations 1999.

### 1.1 NOTE ON O-RING FITTING

Before fitting o-rings care should be taken that they, and the grooves/bores into which they fit are...

- ◇ Clean
- ◇ Free from damage (nicks, tears, etc.)
- ◇ Lubricated lightly with water or a WRAS approved silicone oil.

Failure to do this may result in leaks and considerable damage.

### 1.2 FITTING

The Horne OPTITHERM Thermostatic Bib Tap is intended for installation on a vertical panel above a surgical basin or bath with no tap holes.

1.2.1 Before installation, 2 holes must be bored in the panel in the configuration shown in the diagram.

A	150mm to 300mm depending on vessels to be filled. Less than 150mm will impede access for servicing. Recommended height 225mm
B	34mm
C	48mm (min 47mm, max 50mm)
D	6mm
Panel thickness	30mm maximum

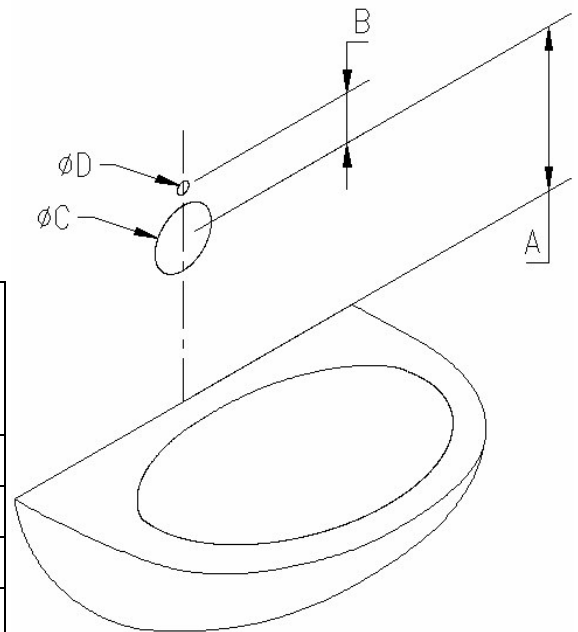


Diagram 1

► Open out the last (fold out) page of this instruction booklet to see the installation diagrams ►

1.2.2 Install the spigot (5) to the panel. Ensure that the chrome bezel (7) is located around the spigot first, and that the locating pin in the bezel engages in the small hole bored previously in the panel. The bezel should be retained between the spigot and the panel. Tighten to the panel using the 1½ BSP bulkhead nut (8) supplied. This nut must be put on tightly, or else the tap will not be secure.

1.2.3 Attach the flexible hoses (9&10) to the spigot with the Hot Water Supply connected to the inlet port nearest the lever with the red endcap (i.e. the left hand side as one faces the basin), and the Cold Water Supply connected to the inlet port nearest the lever with the blue endcap (i.e. the right hand side as one faces the basin). The note in 1.1 regarding o-ring fitting should be especially heeded here, as any leaks in the hose o-rings may go undetected for some time and cause considerable damage.

1.2.4 At this stage, the screw (6) can be used to attach an electrical earth, if required.

1.2.5 Connect the flexible hoses to the water supply behind the panel, close the ball valves (13,14) in the spigot and test for leaks. Once this part of the installation is confirmed to be watertight, and the hot and cold supplies are confirmed to be the right way around (see section 2.2), all further work on the Horne OPTITHERM Thermostatic Bib Tap can be done with the panel in place.

- 1.2.6 If applicable, attach the required extension piece (4) to the spigot using the 4 no. M5 screws (2) and washers (3) supplied. Ensure that the interconnect nozzles (1) are located correctly with their o-rings between the spigot (5) and the extension piece (4). See note in 1.1 regarding o-ring fitting.
- 1.2.7 Offer the main tap body up to the spigot. Locate firmly over the spigot and tighten the retaining screw (15) from below. In order to get a good fit of the tap onto the spigot it is helpful to push the tap against the spigot and slightly upwards as the retaining screw is tightened – this ensures that there is no gap between the spigot and the tap body. Torque the retaining screw to 5Nm (if a torque wrench is not available, tightening fairly tightly with the 4mm hex key supplied should be adequate for this purpose).
- 1.2.8 Do not open the tap yet. Commence with the flushing procedure as detailed in 1.3 below.

**1.3 FLUSHING OF PIPEWORK (METHOD 1)**

Pipework must be flushed in accordance with Water Fittings Regulations 1999, schedule 2 G13.1 before connecting the Horne OPTITHERM Thermostatic Bib Tap.

The most common cause for complaint regarding the performance of any TMV/thermostatic tap is traced to dirt or debris in the TMV or check valves.

- 1.3.1 DO NOT OPEN either tap lever before flushing the hot and cold water pipework.
- 1.3.2 A flushing kit (Horne part no: 5492) is available to provide means of flushing the pipework.
- 1.3.3 Unscrew the main bottom cover (16) using a strap wrench.
- 1.3.4 Remove a strainer/check-valve cartridge (20,21) using a 12mm hex key or Horne tool no. 23-5459.
- 1.3.5 Using an 8mm hex key or Horne tool 23-5459, screw the flushing adaptor (22) into the space occupied by one of the strainer/check valve cartridges (20,21).
- 1.3.6 Ensure that the hose is securely attached to the flushing adaptor and that the open end of the hose is also secure - the hot water could scald badly if the hose 'whips' unexpectedly.
- 1.3.7 Open the ball valve (13,14) using a flat bladed screwdriver from under the spigot, and allow the water to flow at full bore into the sink until the water flows absolutely clean.
- 1.3.8 Repeat on the other side so that both hot and cold supplies to the tap are flushed.

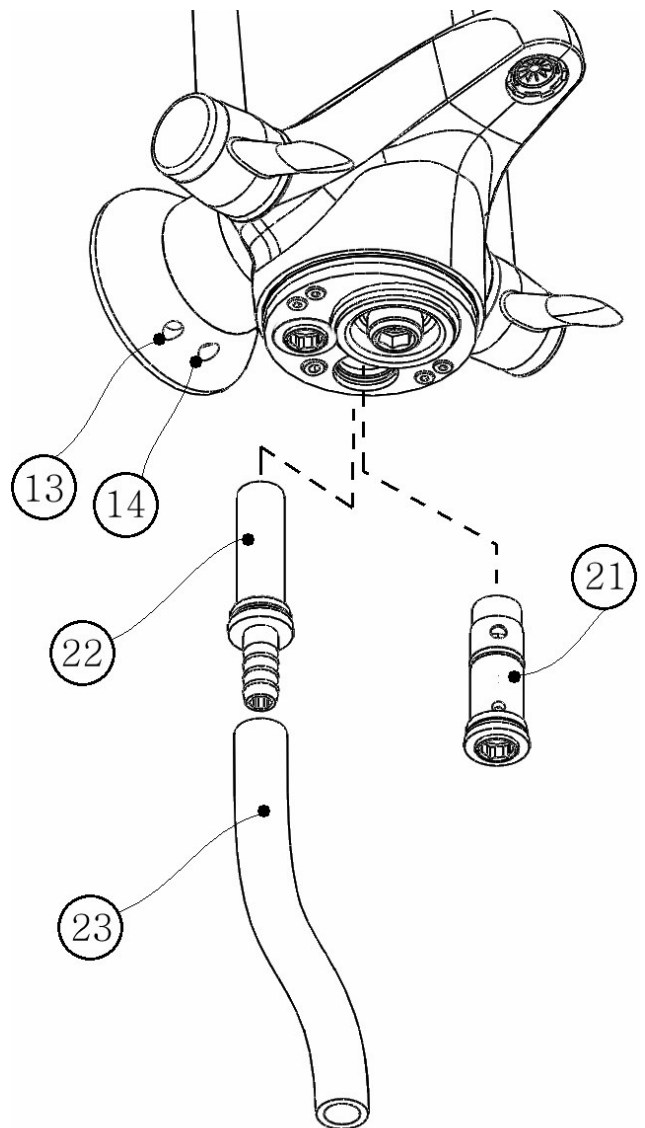


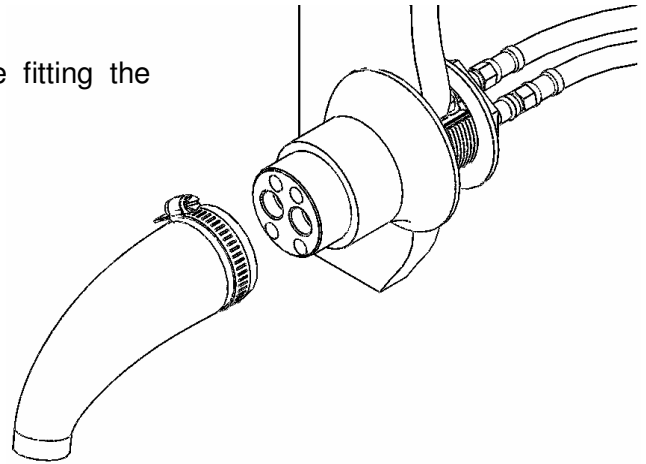
Diagram 2

Key to diagram above			
13	Hot isolating valve	14	Cold isolating valve
21	Strainer/check-valve cartridge	22	Flushing adaptor
23	Flushing hose		

## 1.4 FLUSHING OF PIPEWORK (METHOD 2)

Alternatively the pipework can be flushed before fitting the Optitherm to the spigot using Horne part no.5640.

- 1.4.1 Connect adapter to spigot with jubilee clip around the large end.
- 1.4.2 Tighten the jubilee clip.
- 1.4.3 Open the valves from under the spigot and allow water to flow at full bore into the basin until the water runs absolutely clean.



## [2] **COMMISSIONING**

The commissioning process comprises sections 2.1 to 2.6 below. The tap cannot be considered commissioned until these processes are all carried out.

Note that it is NOT possible to commission the Horne OPTITHERM Thermostatic Bib Tap before the hot water service (boiler) has been commissioned.

### 2.1 FLUSHING

Before commissioning the Horne OPTITHERM Thermostatic Bib Tap, it is imperative that flushing of the pipework has been carried out in accordance with section 1.3 or 1.4.

### 2.2 TEMPERATURE CHECK (COLD WATER)

- 2.2.1 Open the cold water isolating valve (14) and lever (12), allow the water to run for a while and ensure that cold water flows from the spout (if hot water comes out, then the supplies are connected the wrong way around). Ensure that the tap is run for long enough to draw off any deadleg to be absolutely sure. Getting this right will save frustration later.
- 2.2.2 To check the temperature of the incoming cold water, open the blue/cold lever (12) only, and measure the temperature after 30 seconds. This should be within the range on table 1, page 1.
- 2.2.3 If hot water comes out of the spout when the blue lever is turned, the inlet hoses will have to be reversed behind the panel. This necessitates removal of the spigot (section 1.1 describes fitting of the spigot).

### 2.3 TEMPERATURE CHECK (HOT WATER)

- 2.3.1 To check the temperature of the incoming hot water, follow the procedure in section 4.3 for removal of the strainer/check valve cartridge on the hot side only (see also diagram in section 1.3)
- 2.3.2 Screw the flushing adaptor (22: diagram 2) into the space which was occupied by the hot strainer/check valve cartridge (20).
- 2.3.3 Ensure that the hose (23) is securely attached to the flushing adaptor. Take care that the open end of the hose is also secure and pointing down the drain as the hot water could scald badly.
- 2.3.4 Carefully open the hot ball valve (13) from under the spigot and measure the temperature of water that flows out from the tube after 30 seconds; it should be within the range on table 1, page 1.
- 2.3.5 Re-fit the strainer check-valve cartridge (20) and the bottom cover (16).

## **2.4** TEMPERATURE CHECK (MIXED WATER)

2.4.1 Check that hot and cold water supplies are at or near to their designated temperatures and pressures (see sections 2.2 & 2.3 and Table 1 on Page 1 for details).

2.4.2 Open the red (safe hot) lever only and allow water to run through the TMV.

2.4.3 Measure the temperature at the spout. This is the temperature of the mixed water. Ensure that the mixed water temperature is set appropriately. For healthcare applications, basin taps should always be set to 41 °C.

If necessary, make minor adjustments to the temperature setting as described in Section 2.5 below.

N.B. For TMV3 applications the mixed water at the terminal fitting should never be set to exceed 41 °C.

## **2.5** MIXED WATER TEMPERATURE ADJUSTMENT

2.5.1 The Horne OPTITHERM Thermostatic Bib Tap is approximately set at the factory to check for correct function. However temperature must be checked and adjusted on site to ensure correct installation. For healthcare applications, basin taps should always be set to 41 °C.

For other applications, where applicable, the range of temperature adjustment is 35 – 44 °C.

2.5.2 It should be noted that the Horne OPTITHERM Thermostatic Bib Tap requires a temperature differential of at least 11 °C to work correctly (ie. the mixed water temperature must be at least 11 °C lower than the hot water temperature and 11 °C higher than the cold water temperature).

To alter the temperature setting, carry out the following procedure.

2.5.3 Unscrew the main bottom cover (16) using a strap wrench.

2.5.4 Check that hot and cold water supplies are within the designated temperature and pressure ranges (see sections 2.2 & 2.3)

2.5.5 Open the red/safe-hot lever (11) and allow water to flow until the mixed water temperature has stabilised. Make sure that the dead leg from the Hot Water Supply to the Horne OPTITHERM Thermostatic Bib Tap has fully cleared.

2.5.6 Using a 4mm hex key, turn the adjusting screw (19) clockwise as viewed from below <sup>†</sup> to reduce the mixed water temperature or anti-clockwise to increase it. Adjustments of not more than half a turn at a time should be made. The temperature at the outlet should be measured and allowed to stabilise after each adjustment.

<sup>†</sup> Note screwing the adjusting screw inwards towards the cartridge will reduce the set temperature. Screwing it outwards away from the cartridge will increase the set temperature. The screw has a conventional right-hand thread.

After making an adjustment, close the red/safe-hot lever (11) for ten seconds then re-open it and measure the mixed water temperature again. If a further adjustment is required, repeat the procedure.

## **2.6** COLD WATER FAILURE TEST

2.6.1 Close the cold water isolating valve (14) and, after 6 seconds, measure the mixed water temperature. The flow of mixed water should immediately stop and then a drip or trickle may or may not be seen. The temperature, measured after 6 seconds, of any water coming from the tap should not be more than 3 °C above the mixed water set temperature measured in 2.4 above. If no water comes out this is also acceptable.

2.6.2 If the Horne OPTITHERM Thermostatic Bib Tap performs satisfactorily, open the cold water isolating valve (14) – the Horne OPTITHERM has passed the cold water failure test.

2.6.3 However, if the water coming from the tap is at a temperature of more than 3°C above the mixed water temperature setting, then the Horne OPTITHERM is not shutting off the hot water supply properly. The cartridge is likely to be contaminated with dirt or damaged. Replace the cartridge according to section 4.5.

Note that the Horne OPTITHERM may, in some circumstances, fail the cold water failure test if the hot supply temperature is not 11°C above the set mixed water temperature. The hot water temperature can be checked as outlined in section 2.3 above.

**[3] OPERATION**

Operation of the Horne OPTITHERM Thermostatic Bib Tap is the same as that of a conventional tap. Open the red lever to draw hot water at a safe and comfortable temperature (controlled by the thermostatic mechanism). Open the blue lever to draw fresh, cold water. The user may notice a slight pulsing of the water stream if both levers are opened. This is normal and is not a cause for concern. Note that it is not normally necessary to open both levers simultaneously as the water supplied from the hot lever is at a safe and constant temperature.

**3.1 DUAL LEVER VERSION**

The dual levers on the Horne OPTITHERM Thermostatic Bib Tap are a unique feature to prevent the spread of infection.

The intended mode of operation is that the user should open (turn-on) the tap using a thumb to push the short lever (25,26) backwards and downwards.

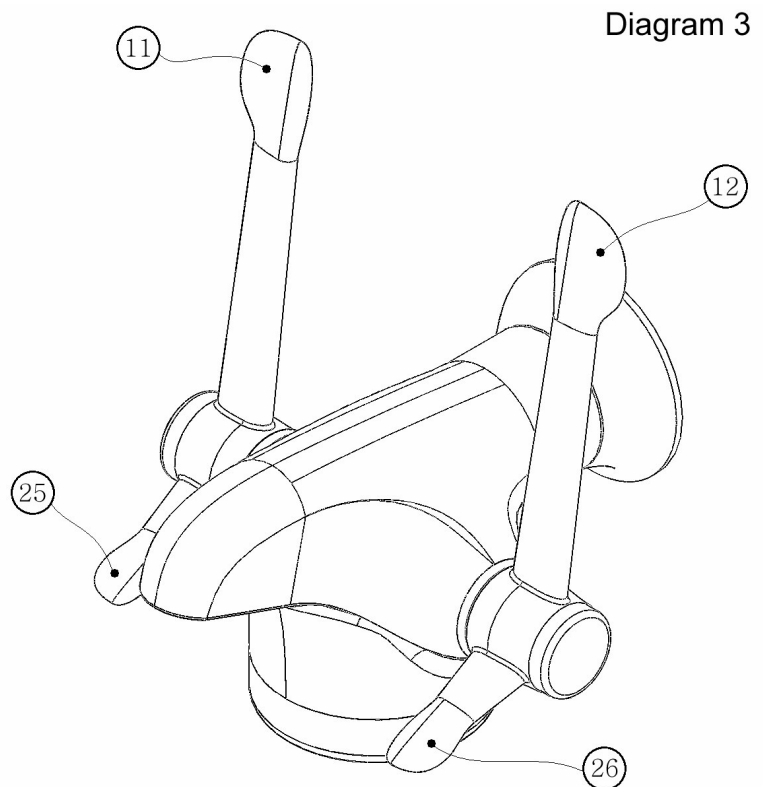
When finished washing, the long lever (11,12) should be returned to the original position with an elbow, thus avoiding re-contamination by touching the short lever again.

**3.2 SHORT LEVER VERSION**

The short levers are pulled forwards to open (turn-on). And pushed backwards to stop the water flow.

**3.3 POTABLE WATER SUPPLY**

When cold water is drawn (via the blue lever) from the Horne OPTITHERM Thermostatic Bib Tap the water completely bypasses the thermostatic mechanism. Hence, if the cold water supply to the Horne OPTITHERM Thermostatic Bib Tap is potable, so is the water drawn via the cold lever. NB: care should be taken to run the tap for at least 20 seconds before drawing water for drinking. This will ensure satisfactory purging of the spout.



Key to diagram above

11	Long lever (safe-hot)	12	Long lever (cold)
25	Short lever (safe-hot)	26	Short lever (cold)

## [4] MAINTENANCE

Maintenance of all TMVs and thermostatic taps is essential. If a TMV does not operate properly, there is a risk of someone being scalded. The frequency of maintenance depends upon the condition of the water passing through the TMV. The remarks in 4.2.3 regarding in-service testing apply equally to maintenance. Generally, the thermostatic cartridge should be replaced after three years. The strainer/check-valve cartridges and ceramic disc cartridges should be replaced as necessary.

### 4.1 TEMPERATURE ADJUSTMENT

For temperature adjustment, see section 2.5.

### 4.2 IN-SERVICE TESTING

4.2.1 Periodic testing should be carried out to check whether or not any deterioration has occurred in the performance of the Horne OPTITHERM Thermostatic Bib Tap.

4.2.2 A COLD WATER FAILURE TEST should be carried out as described in paragraph 2.6 above. If the water coming from the tap is at a temperature of more than 3°C above the mixed water temperature setting then the Horne OPTITHERM Thermostatic Bib Tap is due for maintenance.

NOTE: A TMV in need of maintenance can be undetectable in normal use and only become apparent when a disruption occurs in the hot or cold water supply pressures or temperatures.

4.2.3 The frequency of in-service testing depends upon the condition of the water passing through the tap. In-service testing must be carried out more frequently in hard water areas than in soft water areas. As a general guide, in-service testing should be carried out at least every twelve months and, where the water is hard, the interval may be less than six months. Experience of local conditions and the in-service testing record will dictate the frequency of in-service testing.

### 4.3 CLEANING AND REPLACEMENT OF STRAINERS

4.3.1 Close the isolating valves (13,14) at the back underneath the tap spigot; open the levers and allow the residual water to drain.

4.3.2 Unscrew the main bottom cover (16) using a strap wrench.

4.3.3 Remove the strainer/check-valve cartridges (20,21) using a 12mm hex key or Horne special tool (part no. 23-5459).

4.3.4 The strainer can be removed from the top of the cartridge and cleaned or replaced as necessary.

### 4.4 TESTING AND REPLACEMENT OF CHECK VALVES

4.4.1 Close the isolating valves (13,14) at the back underneath the tap spigot; open the levers and allow the residual water to drain.

4.4.2 Unscrew the main bottom cover (16) using a strap wrench.

4.4.3 Remove a strainer/check-valve cartridge (20,21)

Remove the strainer basket from the top. Inspect the white plastic check valve for signs of obvious damage. Carefully insert a probe (pen or similar) down the strainer hole to ensure that the check valve element can move freely. It should spring back into the closed position when released. It should also be possible to blow through the cartridge from the top to the bottom, but not the other way around. If the check-valve is not in good condition, the whole strainer/check-valve cartridge should be replaced.

#### 4.5 REPLACEMENT OF THERMOSTATIC CARTRIDGE

- 4.5.1 Close the isolating valves (13,14) at the back underneath the tap spigot; open the levers and allow the residual water to drain.
- 4.5.2 Unscrew the main bottom cover (16) using a strap wrench
- 4.5.3 To remove the thermostatic cartridge, first remove the thermostatic cover (18) using a 12mm hex key or Horne tool no. 5459. The thermostatic cartridge (17) can then be removed in one of 2 ways.
- ◇ Screw the Horne cartridge removal tool (part no. 5458) into the cartridge from underneath. This can then be pulled downwards to remove the thermostatic cartridge.
  - ◇ Use a 4mm hex key to turn the adjusting screw (19) clockwise and remove it from the thermostatic cover (the adjusting screw has the same thread on it as the cartridge remover no.5458). This can be used to screw into the cartridge and remove it. Ensure that the adjusting screw o-ring is in good condition; clean; free from debris and lightly lubricated with water or WRAS approved silicone oil before re-assembly (see 1.1).
- 4.5.4 The new cartridge can be inserted into the tap body from below. If the o-rings are dry, they should be lubricated with some water or WRAS approved silicone oil.
- 4.5.5 Screw in the new thermostatic cover, again lubricating the o-ring if necessary.
- 4.5.6 Be sure to adjust the temperature and perform a cold-water failure test after replacing the cartridge. These processes are detailed in sections 2.4; 2.5 & 2.6.

#### 4.6 REPLACEMENT OF CERAMIC DISC CARTRIDGES

4.6.1 The ceramic disc cartridges are reliable and expected to give a very long life provided that the strainers are maintained in a clean condition. If replacement is necessary a kit should be purchased from Horne for this purpose (part no. 5489). The kit will comprise...

- ◇ Endcap removal tool – (part no. 23-5459)
- ◇ Pair of ceramic disc cartridges (27) – (part nos. 44-5406 & 44-5407)
- ◇ Pair of torque control members (31) – (part no. 23-5410)
- ◇ 2 no. o-rings (32) (part no. 42-3452)
- ◇ 4 no. o-rings (33) (part no. 42-5416)
- ◇ 2 no. M4 screw (35) (part no. 41-5414)

4.6.2 Unscrew and remove the aluminium endcap using the special Horne tool (no. 5459)

4.6.3 Unscrew and remove the screw and washer (34,35). 2.5mm hex key needed.

4.6.4 Pull the lever outwards to remove

4.6.5 Remove the spline adaptor and torque control member (30,31). These may come out as one piece.

4.6.6 Unscrew the actuator sleeve (28), using a 26mm ring spanner or Horne tool no. 5459.

4.6.7 Using a 17mm spanner, unscrew the ceramic disc cartridge (27). This will be tight.

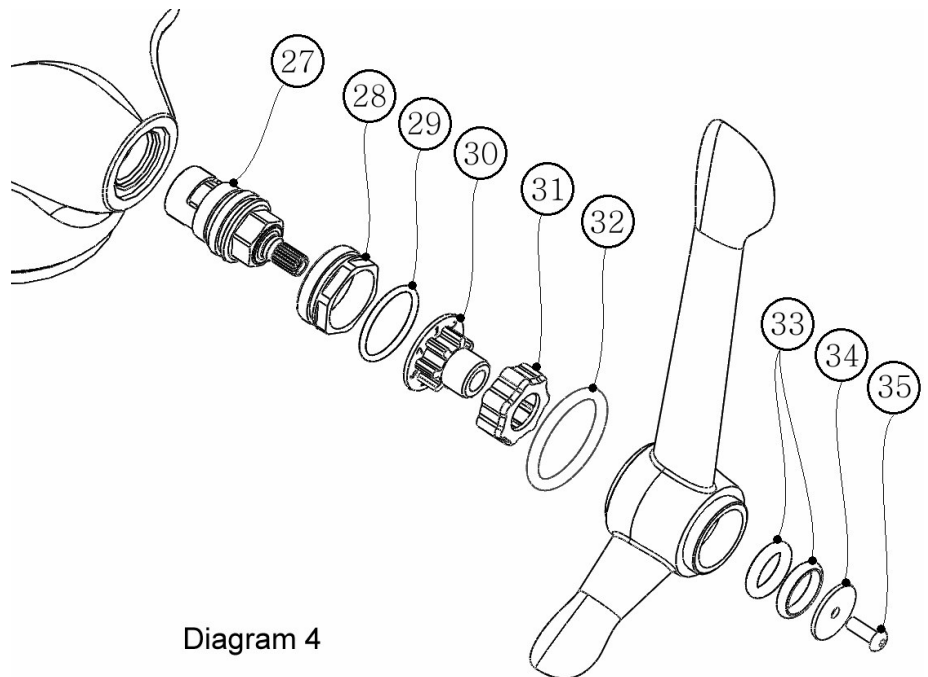


Diagram 4

- 4.6.8 Fit the replacement cartridge and tighten well. Note that the two cartridges are left and right handed. The cartridge with the small nicks around the 17mm spanner hex is for the left (hot) side of the tap. If the o-ring around the cartridge is dry, lubricate it with a little water or WRAS approved silicone oil.
- 4.6.9 Fit the new actuator sleeve and o-ring. If using a spanner for this take care not to over-tighten it as the thread is plastic - only light torque is needed. Horne tool no. 5459 can be used.
- 4.6.10 Remove the old torque control member (31) from the spline adaptor, and push-fit the new one. Lubricate this with a little (silicone) oil around the outside before final assembly.
- 4.6.11 Fit this assembly over the ceramic disc cartridge spline. Note that the spline has 20 teeth and the torque control member has 7 lobes. This allows 140 possible orientations of the lever. The correct orientation will have a lobe as near as possible to the vertical position (with the ceramic discs closed). It may be beneficial to experiment with orientations to ensure that the two levers end up aligned neatly with each other.
- 4.6.12 Re-fit the levers, replacing o-rings if necessary. The large o-ring goes on the in-board side and the two small ones go immediately under the penny washer on the out-board side.
- 4.6.13 Refit the washer and M4 screw tightly. Then fit the endcap (red on the left, blue on the right). Use the tool no. 5459 to tighten the endcap. This will prevent unauthorized removal.

**4.7 REMOVAL OF TAP FROM SPIGOT FOR WORKSHOP MAINTENANCE**

If desired the tap body can be removed from the spigot for off-site maintenance. Furthermore, a substitute tap body can be fitted while the original tap is being maintained. The process for this is as follows.

- 4.7.1 Close the isolating valves (13,14) at the back underneath the tap spigot; open the levers and allow the residual water to drain.
- 4.7.2 Unscrew the main bottom cover (16) using a strap wrench.
- 4.7.3 Loosen the tap retaining screw (15) until the head is flush or slightly proud of the bottom of the tap body.
- 4.7.4 Pull the tap away from the panel horizontally until it is free of the spigot. Pay careful attention not to drop it as it is rather heavy and may cause damage.
- 4.7.5 Rotate the tap to allow the residual water to pour out into the sink.
- 4.7.6 If a replacement tap body is to be fitted, follow the procedure in 1.2.7. The commissioning procedures in 2.4; 2.5 & 2.6 should be followed for the new tap body.

Key to Diagram on Page 10	
27	Ceramic Disc Cartridge
28	Actuator Sleeve
29	Act. Sleeve O-Ring
30	Spline Adaptor
31	Torque Control Member
32	O-Ring
33	O-Ring
34	Washer
35	M4 Screw

Key to Diagram on Page 12			
1	Interconnect Nozzles	2	M4 Screws
3	Fibre Washers	4	Extension Piece
5	Spigot	6	Earth Screw & Washer
7	Bezel	8	Bulkhead Nut
9	Hot Inlet Hose	10	Cold Inlet Hose
11	Long Lever Hot	12	Long Lever Cold
13	Hot Isolating Valve	14	Cold Isolating Valve
15	Tap Retaining Screw	16	Main Bottom Cover
17	Thermostatic Cartridge	18	Thermostatic Cover
19	Adjusting Screw	20	Strainer/Check-Valve (H)
21	Strainer/Check-Valve (C)		

**FOLDOUT PAGE – DIAGRAMS**

Diagram 5

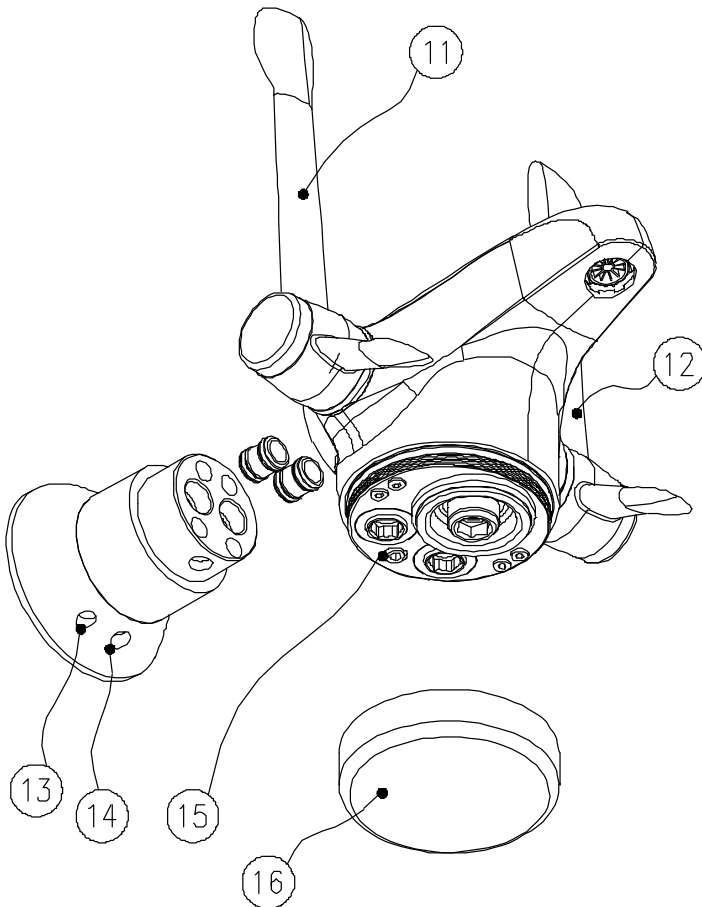
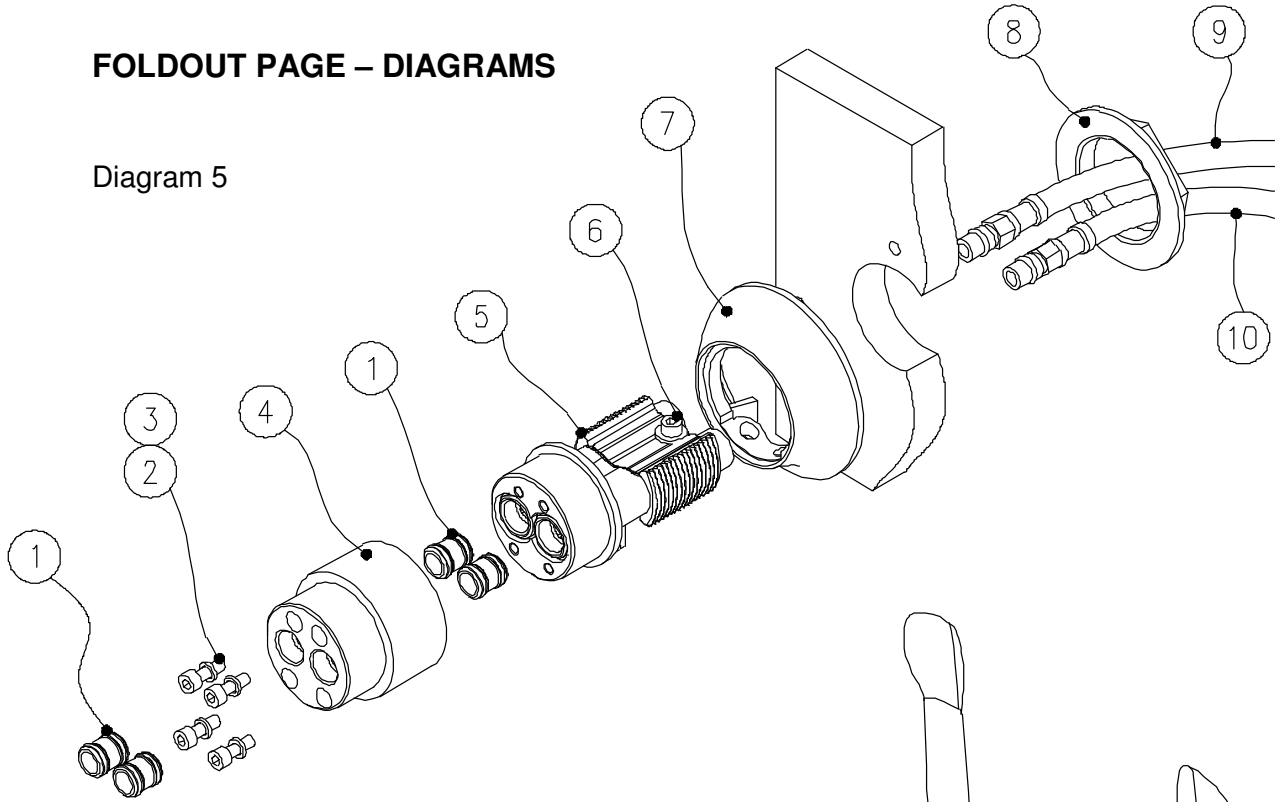


Diagram 6

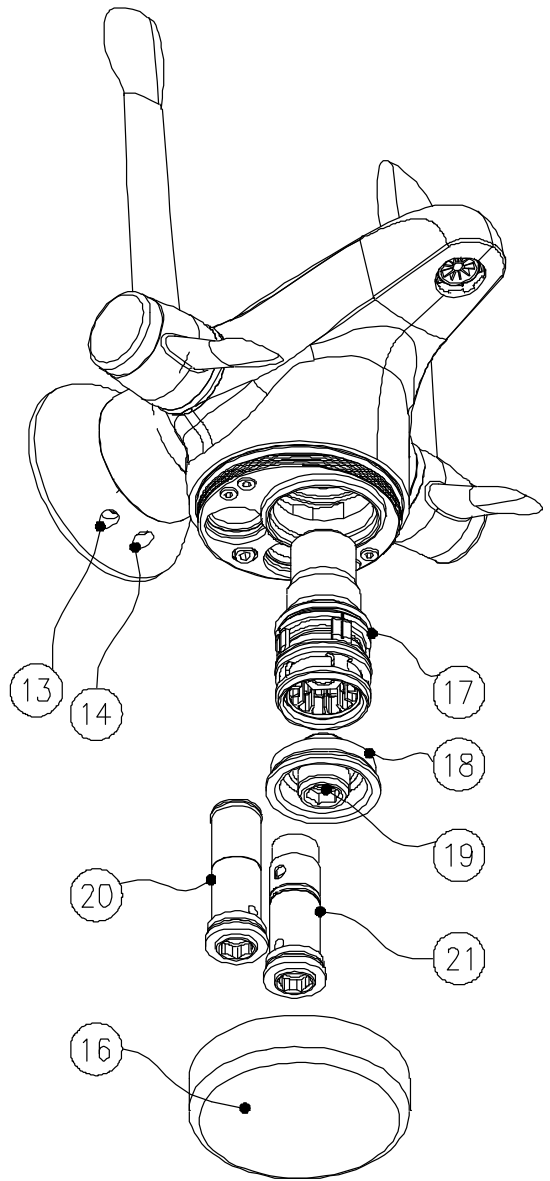


Diagram 7

**[5] FAULT FINDING CHART**

SYMPTOM	POSSIBLE CAUSE	ACTION	REFER TO SECTION
Mixed water temperature too high	Temperature setting too high. Temperature has been set when hot water supply temperature was too low	Re-adjust temperature setting ensuring hot water supply is at correct temperature.	2.4, 2.5
	Hot water supply has migrated into cold water supply	Inspect/replace cold check-valve assembly (21)	4.4
	Thermostat Element has failed. This can be checked by carrying out a hot or cold water failure test.	Replace Thermostatic cartridge (17) and cover assembly (18)	2.6 & 4.5
Mixed water temperature too low	Temperature Setting too low	Re-adjust temperature setting	2.4, 2.5
	Hot water supply temperature has fallen.	Check hot water supply temperature.	2.3
	Cold water has migrated into hot supply	Inspect/replace hot check-valve assembly (20)	4.4
	Cold valve face requires cleaning	Remove thermostatic cover (18) and clean up valve face	4.5
Mixed water flow rate too low.	Partly blocked strainers	Clean strainers	4.3
	Unusually high pressure drop in supply pipework	Check all valves are full open. Check Pressurisation unit. Check mains supply	-
	Extra Demand added to system	Check pipe sizing	-
Mixed water temp does not respond to adjusting screw	Thermostatic cartridge is seized	Replace Thermostatic cartridge (17) and cover assembly (18)	4.5
	Hot and cold inlets reversed	Reverse inlet connections (9,10). Connect hose from hot supply to inlet nearest red endcap	2.2
	Hot water supply temperature is too low	Check hot water supply	-

5.1 FAULT FINDING CHART – CONTINUED...

Mixed water temp changes and is not steady	Thermostatic cartridge is seized	Replace Thermostatic cartridge (17) and cover assembly (18)	4.5
	Thermostat element has failed. (This can be checked by carrying out a hot or cold water failure test)	Replace Thermostatic cartridge (17) and cover assembly (18)	2.6, 4.5
Water at outlet runs full hot or full cold	Hot and cold inlets are reversed	Reverse inlet connections (9,10). Connect hose from hot supply to inlet nearest red endcap	2.2
Valve continues to pass cold water when hot supply is isolated	Cold valve face is contaminated with debris	Remove loose debris from between Thermostatic cartridge (17) and cover assembly (18). Or replace (17) and (18) if no loose debris is found.	4.5
Valve continues to pass hot water when cold supply is isolated.	Element has failed, or Slide-Valve seal is damaged, or Fouling at hot valve seat	Replace Thermostatic cartridge (17) and cover assembly (18)	4.5
	If water flowing is more than 11 °C above required mixed water temperature then valve may not have been commissioned with an adequate hot water supply temperature; or the set temperature may be too high. NB If this is the case the valve may not offer scald protection	Re-commission the valve, closely following the guidance in Section 2.	2.2 thru' 2.6
	If water flowing is less than 11 °C above required mixed water temperature then the hot water supply temperature may not be sufficient to cause thermal shut-off. (N.B. this is possible with combi boilers).	Repeat test with hot water temperature at least 11 °C above required mixed water temp.	2.3, 2.6
Water flow pulses when both levers are opened at once	This can happen when cold water pressure is low relative to the hot water pressure. Note that it is not normally necessary to open both levers simultaneously as the water supplied from the hot lever is at a safe and constant temperature.	This is not a fault condition and is normal	-
Tap does not shut-off when levers are in the closed position	Possible contamination on interconnect nozzle (1) o-rings.	Remove o-rings, clean and re-assemble	-