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HORNE TBT-3 OPTITHERM THERMOSTATIC BIB TAP INSTALLATION, COMMISSIONING & MAINTENANCE INSTRUCTIONS

These instructions (L-183) cover the HORNE TBT-3 OPTITHERM Thermostatic Bib Tap.

0.1 Approvals

The TBT-3 is independently tested & approved by an ISO 17025 Accredited Test House to all the requirements of Department of Health - HTM 04-01: Supplement *Performance Specification D 08: Thermostatic Mixing Valves (Healthcare Premises)*, to the following designations and for the following applications:

HP-WE	Washbasin with supply pressures of 1 – 5 Bar and flow rate restricted to < 8 L/min
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The TBT-3 is therefore classified as a Type 3 Thermostatic Mixing Valve according to HTM 04-01 Part A, and Health and Safety Executive HSI6, 2012, document: *Managing the risks from hot water and surfaces in health and social care.*

The TBT-3 also complies with Regulation 4 (non-metallic materials in contact with potable water for human consumption) of the Water Supply (Water Fittings) Regulations and Water Bylaws (Scotland).

0.2 Backflow Prevention

The hot and cold inlets to the TBT-3 valve are fitted with single in-line UK Water Reg. 4 Approved DN15 Check Valves.

0.3 Supply Water Pressure Requirements

If the water supplies are gravity fed, the supply pressure should be verified to ensure the conditions are appropriate as per Table 1. Note that although a wide range of inlet pressures are tolerated by the Optitherm, certain extreme pressure imbalances may cause a pulsing of the output. Temperature control will not be compromised, but pulsing may be considered undesirable. If in doubt pressure reducing valve(s) should be fitted.

0.4 Operating Conditions Required for TMV Type 3 Compliant Installations

Table 1 - TMV Type 3 Compliant Installations

	High Pressure
Maximum Static Pressure	10 Bar
Flow Pressure, Hot & Cold	1 to 5 Bar
Hot Water Supply Temperature	55 – 65°C
Cold Water Supply Temperature	5 – 20°C
Minimum Temperature Differential (Hot/Mixed, Mixed/Cold)	5K (=5°C)

OUTSIDE OF THESE CONDITIONS THE TBT-3 CANNOT BE EXPECTED TO OPERATE AS A TYPE 3 VALVE.

0.5 Water and Energy Conservation

The TBT-3 is fitted with a combined flow regulator and conditioner on the outlet, that restricts the flow rate to 6L/min (nominal). This fitting also straightens the flow regime to produce laminar flow and minimise splashing.

SECTION 1: INSTALLATION

The Horne OPTITHERM Thermostatic Bib Tap must be installed in accordance with the Water Supply (Water Fittings) Regulations 1999, BS 806, and BS 8558.

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 BS 6920 compliant 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 IPS panel above a clinical hand wash basin or surgical/slucice trough.

1.2.1 Before installation, 2 holes must be bored in the panel in the configuration shown in Figure 1.

Table 2 - Basin Layout Key

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

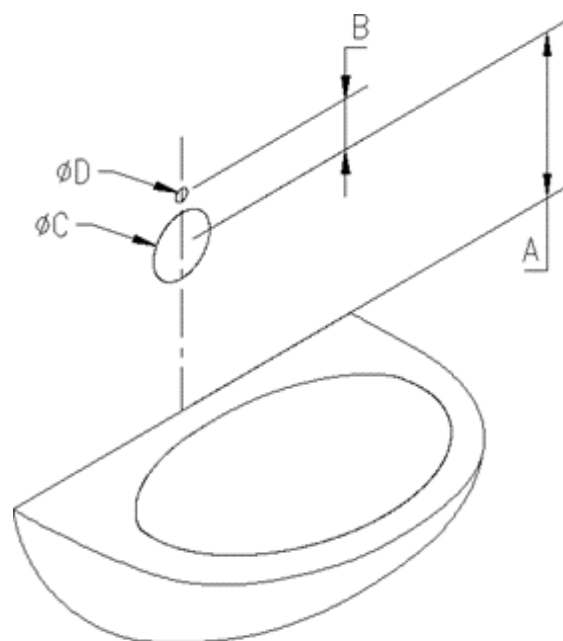


Figure 1 - Basin Layout

All item numbers are consistent throughout this document. Exploded views can be found in Figure 6, and the associated key in Table 3. These can be found in Section 5 (page 10).

1.2.2 Install the spigot (18) to the IPS panel. Ensure that the chrome bezel (19) is located around the spigot first, and that its locating pin engages in the small hole previously bored in the panel. The bezel should be retained between the spigot and the panel. Tighten to the panel using the 1½ BSP bulkhead nut (18b) supplied. Put this nut on tightly. If it works loose the tap will not be secure and the nut may be difficult to tighten later, after the panel has been fixed.

1.2.3 Connect the water supplies to the spigot using 10mm copper pipe. The Hot Water Supply should be 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). Be very careful with the connections here, as any leaks may go undetected for some time and cause damage.

1.2.4 At this stage, the screw on the spigot can be used to attach an electrical earth, if required.

1.2.5 Close the ball valves (X,Y; Figure 3, page 3) 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 connected correctly

(see section 2.2 , page 4), all further work on the Horne OPTITHERM Thermostatic Bib Tap can be done with the panel in place. Flushing the pipework with only the spigot in place is recommended, skip to section 1.3 (below) and complete before returning to section 1.2.6.

1.2.6 Ensure that the 2 no. interconnects (17) are still present in the rear orifice of the tap body. If these are dry, they should be lubricated with some water or preferably BS 6920 approved silicone oil.

1.2.7 Offer the main tap body up to the spigot ensuring alignment of interconnects. Push straight with firm pressure. If tap does not slide on, *do not* force and/or rotate the tap. Tighten the retaining screw (15) from below to secure the tap in place. 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, firm tightening with the 4mm hex key supplied should be adequate for this purpose).

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 at elevated velocity in accordance with BS 806-4, BS 8558, and BSI PD 855468:2015 before commissioning the Horne OPTITHERM Thermostatic Bib Tap.

The pipework should be flushed before fitting the Optitherm to the spigot using Horne part no. 5684.

1.3.1 Connect adapter to spigot with jubilee clip around the large end.

1.3.2 Tighten the jubilee clip.

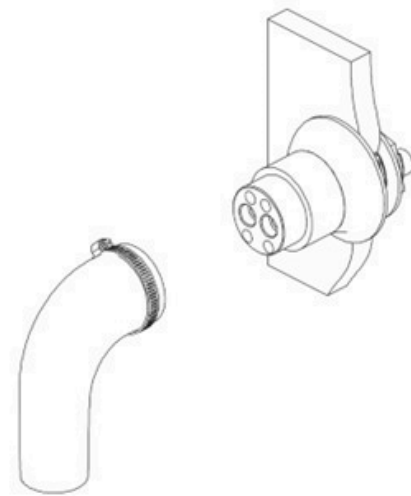


Figure 2 - Pipe Flushing (Spigot)

1.3.3 Open the Cold water supply isolating valve under the spigot and allow water to flow at full bore into the basin. Continue flushing until the water runs absolutely clean. Repeat the Elevated velocity Flushing of the hot water supply.

1.4 Flushing of Pipework (Method 2) – tap body in-situ

Pipework must be flushed in accordance with BS 806-4, BS 8558 and BSI PD 855468:2015 before commissioning 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.

1.4.1 Do not open either tap lever before flushing the hot and cold-water pipework.

1.4.2 A flushing kit (Horne part no: 5492) is available to provide means of flushing the pipework with the tap body in situ.

1.4.3 Unscrew the main bottom cover (1) using a strap wrench.

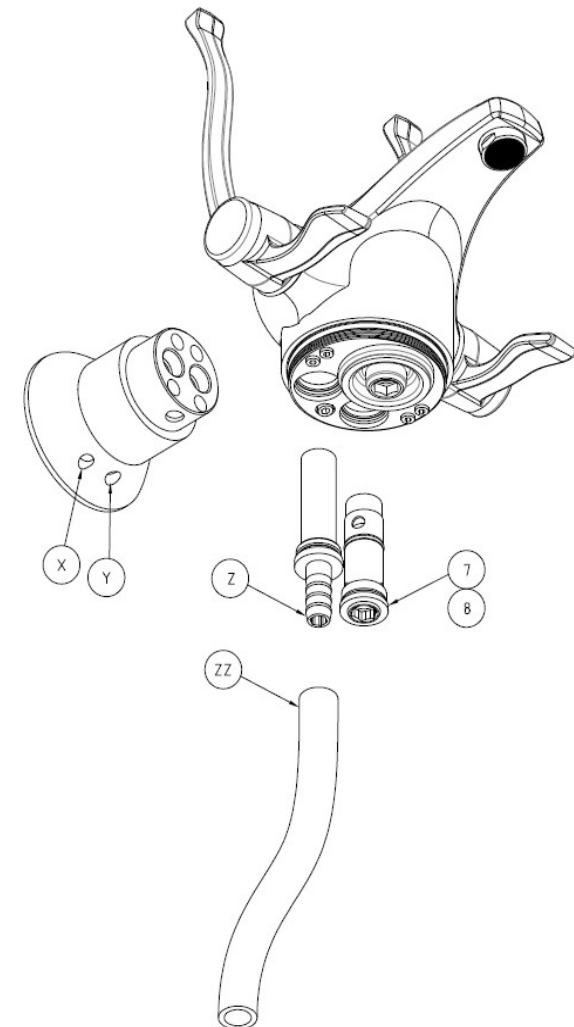


Figure 3 - Pipe Flushing (Tap In-Situ)

- 1.4.4 Remove an inlet cartridge assembly (7,8) using a 12mm hex key.
- 1.4.5 Using an 8mm hex key, screw the flushing adaptor (Z) into the space vacated by the strainer/check valve cartridge (20,21).
- 1.4.6 Ensure that the hose (ZZ) 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.
- 1.4.7 Open the relevant ball valve (X,Y) using a 4mm hex key from under the spigot, and allow the water to flow at full bore into the sink until the water flows absolutely clean.
- 1.4.8 Repeat on the other side so that both hot and cold supplies to the tap are flushed.

SECTION 2: COMMISSIONING

The commissioning process comprises sections 2.1 to 2.7 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 Elevated Velocity Flushing of the pipework has been carried out in accordance with section 1.3 or 1.4 (page 3) above.

2.2 Temperature Check (cold water)

2.2.1 Open the cold water isolating valve (Y) and cold lever (13), 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 reversed and should be swapped over). Ensure that the tap runs long enough, to draw off any deadleg, to be absolutely sure. Getting this right will save frustration later. Revisit section 1.2 (page 2), refitting the spigot, if necessary.

2.2.2 Measure the temperature after 30 seconds. This should be within the range on Table 1, page 1.

2.3 Temperature Check (hot water)

2.3.1 To check the temperature of the incoming hot water, ensure supplies are isolated using ball valves (X, Y) located underneath the tap spigot and follow steps 1.4.3 and 1.4.4 (page 3) for removal of the strainer/check valve cartridge on the hot side only (see also Figure 3, page 3).

2.3.2 Screw the flushing adaptor (Z, Figure 3) into the space vacated by the hot inlet cartridge assembly (8).

2.3.3 Ensure that the hose 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 (X) and allow the water to run for long enough to draw off the entire dead leg. Measure the temperature of water that flows out from the tube; it should be within the range on Table 1, page 1.

2.3.5 Close the hot ball valve and re-fit the hot inlet cartridge assembly (8) and the bottom cover (1).

2.4 Thermal Disinfection

2.4.1 Horne recommends thermal treatment as the most effective means of outlet disinfection. The Horne Inline Thermal Disinfection Unit (ILTDU) is designed specifically for this purpose and should be used in conjunction with the Optitherm tap. Thermal disinfection should be conducted as part of the commissioning procedure. Instructions for the thermal disinfection procedure are supplied with the ILTDU.

2.5 Temperature Check (mixed water)

2.5.1 First perform the tests in sections 2.2, and 2.3 (page 4), and confirm that the supply temperatures are acceptable.

2.5.2 Open the red (safe hot) lever only and allow water to run through the TMV until the temperature has stabilised.

2.5.3 Measure the temperature at the spout; ensure that the mixed water temperature is set appropriately. For Type 3 TMV (healthcare) applications, the mixed water at the terminal fitting should never be set to exceed 41°C. If necessary, make minor adjustments to the temperature setting as described in section 2.6.

2.6 Mixed Water Temperature Adjustment

2.6.1 The Horne OPTITHERM Thermostatic Bib Tap is approximately set at the factory to check for correct function. However, the 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.

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

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

2.6.3 Unscrew the main bottom cover (1) using a strap wrench.

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

2.6.5 Open the red/safe-hot lever (30) 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.

2.6.6 Using a 4mm hex key, turn the adjusting screw (3a) clockwise as viewed from below † 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.

† **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 (30) for ten seconds, then re-open it and measure the mixed water temperature again. If a further adjustment is required, repeat the procedure.

2.7 Cold Water Failure Test

2.7.1 Close the cold water isolating valve (Y) and observe the mixed water outlet. The flow of mixed water should immediately stop and then a drip or trickle may or may not be seen. If there is flow after 5 seconds, then the total discharge should be collected in a measuring vessel for 1 minute; if the collected volume is greater than 120 ml, the valve should be recommissioned or serviced. If there has been no flow or the total collected volume is equal or less than 120ml, then restore the cold water supply by opening the isolating valve (Y). The outlet water temperature from the tap, measured after 15 seconds should not be more than 2°C from the initial mixed water temperature measured after setting (section 2.6 above).

2.7.2 If the Horne OPTITHERM Thermostatic Bib Tap performs satisfactorily during the above procedure, it has passed the cold water failure test.

2.7.3 If the Horne OPTITHERM is not shutting off the hot water supply properly, and the commissioning procedure has been followed correctly, the thermostatic cartridge is likely to be contaminated with dirt, or damaged. Replace the cartridge according to section 4.5 (page 7).

N.B. 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 (page 4).

SECTION 3: OPERATION

Operation of the Horne OPTITHERM Thermostatic Bib Tap is similar to 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 Levers

The dual levers on the Horne OPTITHERM Thermostatic Bib Tap are a unique feature to help 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 down and backwards, thus rotating the long lever forwards.

After washing, the long lever should be returned to its original upright position with an elbow, thus avoiding re-contamination (by touching the short lever again).

3.2 Lever Clutch

The Horne OPTITHERM is fitted with a clutch on each lever to prevent breakage in the event of it being forced, either accidentally or intentionally. If the tap lever is found to be at an unexpected angle, simply push the lever in the opposite direction, beyond the normal 'stop'. One or two clunks should restore the lever to its correct, long lever in a near-vertical, position.

3.3 Potable Water Supply

When cold water is drawn (via the right-hand, 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.

N.B: 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 pipework.

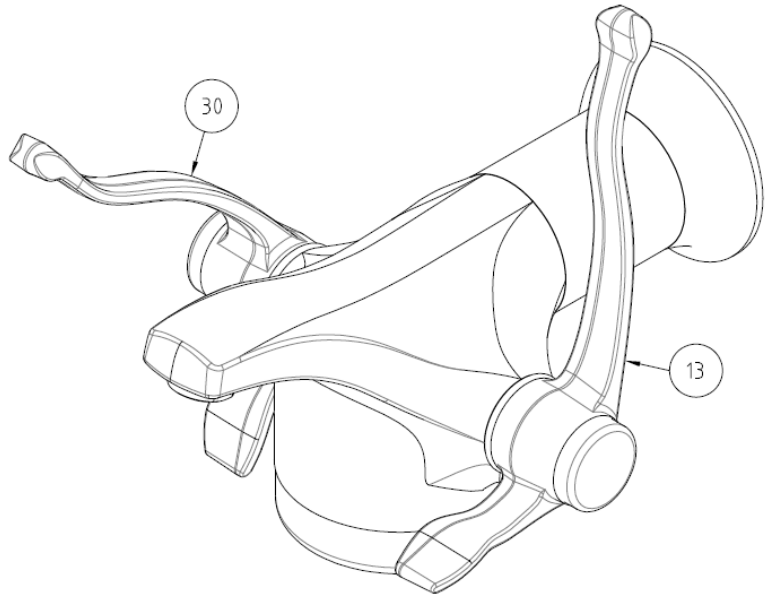


Figure 4 - Tap Levers

SECTION 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 4.1.3 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 In-Service Testing

4.1.1 The purpose of in-service testing is to maintain assured performance and to provide a record of thermal performance of the TMV. Periodic testing should be carried out to check whether any deterioration has occurred in the performance of the Horne OPTITHERM Thermostatic Bib Tap.

4.1.2 A COLD WATER FAILURE TEST should be carried out as described in paragraph 2.7 (page 5). If the Horne OPTITHERM Thermostatic Bib Tap does not pass the test described, maintenance and/or recommissioning is required.

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

4.1.3 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. This should be dictated by local risk assessment, experience of local conditions and the in-service testing records.

4.2 Flushing and Thermal Disinfection

4.2.1 Horne recommends periodic thermal disinfection in conjunction with elevated velocity flushing to mechanically remove biofilm, scale and corrosion products from the inner pipe walls. Ideally this will be carried out in conjunction with thermal disinfection via the Horne In-line Thermal Disinfection Unit (ILTDU). See paragraphs 1.3 and 1.4 (page 3) for instructions on flushing. The periodicity of this maintenance will be determined by a local risk assessment.

4.3 Cleaning and Replacement of Strainers

4.3.1 Close the isolating valves (X,Y) located underneath the tap spigot; open the levers and allow the residual pressure to be relieved.

4.3.2 Unscrew the main bottom cover (1) using a strap wrench.

4.3.3 Remove the strainer/check-valve cartridges (7,8) using a 12mm hex key.

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 (X,Y) located underneath the tap spigot; open the levers and allow the residual pressure to be relieved.

4.4.2 Unscrew the main bottom cover (1) using a strap wrench.

4.4.3 Remove a strainer/check-valve cartridge (7,8)

Remove the strainer basket from the top. Inspect the white plastic check valve for signs of obvious damage. Carefully insert a clean probe down the strainer hole to ensure that the check valve element can move freely. It should spring back into the closed position when released. 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 (X,Y) located underneath the tap spigot; open the levers and allow the residual pressure to be relieved.

4.5.2 Unscrew the main bottom cover (1) using a strap wrench

4.5.3 To remove the thermostatic cartridge, first remove the thermostatic cover (3) using a 12mm hex key. The thermostatic cartridge (4) 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 (3a) 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 BS 6920 compliant silicone oil before re-assembly (see 1.1 , page 2).

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 BS 6920 compliant 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 2.6 and 2.7 (page 5).

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 inlet strainers are maintained in a clean condition. If replacement is necessary, a kit should be purchased from Horne for this purpose (part no. 71-5489). The kit will comprise:

- Endcap removal tool – (Part no. 23-5459)
- Pair of ceramic disc cartridges (11,24) – (Part nos. 44-6637 & 44-6638)
- Pair of torque control members (28) – (Part no. 23-5410)
- 2no. O-rings (29) (Part no. 42-3452)
- 4no. O-rings (31) (Part no. 42-5416)
- 2no. M4 screw (33) (Part no. 41-5414)
- 2no. Actuator Sleeve O-Ring (26) (Part no. 42-5409)

4.6.2 Unscrew and remove the coloured aluminium endcap using the special Horne tool (P/N. 23-5459)

4.6.3 Unscrew and remove the screw and washer (33,32). Torx T20 key needed.

4.6.4 Pull the lever outwards to remove.

4.6.5 Remove the spline adaptor and torque control member (27,28). These may come out as one piece.

4.6.6 Unscrew the actuator sleeve (25), using a 26mm ring spanner or Horne tool no. 23-5459.

4.6.7 Using a 17mm spanner, unscrew the ceramic disc cartridge (11,24). This will be tight.

4.6.8 Fit the replacement cartridge and tighten to 25Nm. 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 BS 6920 compliant 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 the plastic thread- only light torque is needed. Horne tool no. 23-5459 can be used.

4.6.10 Remove the old torque control member (28) 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 align neatly with each other. Contact Horne technical for pictorial instructions on this, if required.

4.6.12 Re-fit the levers, replacing O-rings, if necessary. The large O-ring (29) goes on the in-board side and the two small ones (31) go immediately under the penny washer on the out-board side.

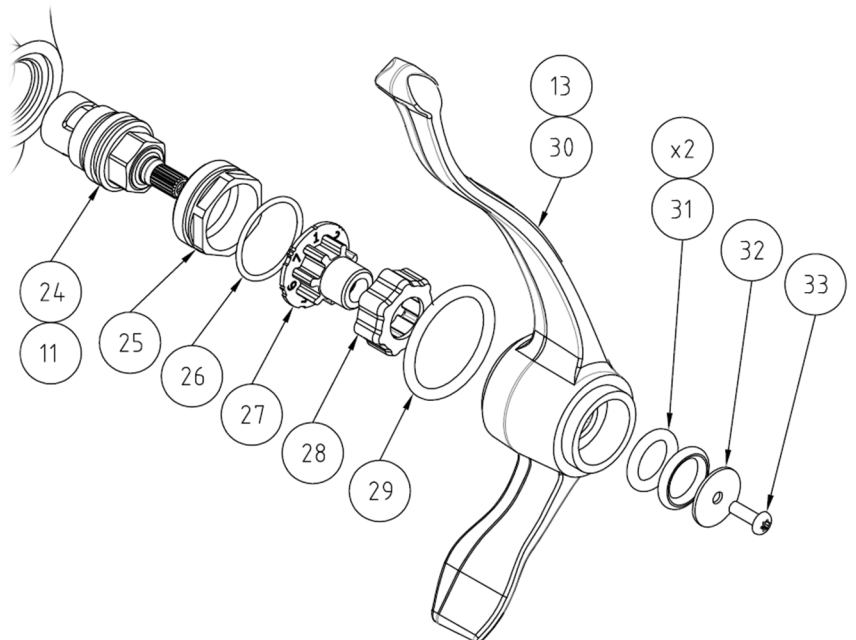


Figure 5 - Lever Exploded Diagram

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. 23-5459 to tighten the endcap. This will prevent unauthorized removal.

4.7 Replacement of Outlet Fitting

4.7.1 The outlet fitting, or flow conditioner (14) performs a number of important functions, namely:

- Inducing a straight, laminar stream, and thus reduces splashing.
- Regulating the flow to 6 litres per minute.
- Preventing water in the spout cavity from draining out under gravity, upon cessation of normal flow; displacement of this water volume would otherwise result in an exchange of air from the clinical environment adjacent to the spout, into the spout cavity.

4.7.2 As the outlet fitting is located at, and forms, the interface between the water service and the clinical environment, there may be, from time to time, a build-up of bacteria on the fitting itself. A regular Elevated Velocity pipework cleansing Flush (1.4) regime, along with thermal disinfection using the Horne ILTDU will help to manage retrograde contamination from pathogens. Further, regular removal for cleaning, or substitution, is advisable.

4.7.3 Exchanging the outlet fitting can be conducted using part no. 44-6667. The outlet fitting unscrews with a conventional right-handed thread and is inserted with a reversal of this procedure.

4.8 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.

4.8.1 Close the isolating valves (X,Y) located underneath the tap spigot; open the levers and allow the residual pressure to be relieved.

4.8.2 Unscrew the main bottom cover (1) using a strap wrench.

4.8.3 Loosen the tap retaining screw (5) until the head is flush or slightly proud of the bottom of the tap body.

4.8.4 Pull the tap away from the panel horizontally, without rotation, until it is free of the spigot. Pay careful attention not to drop it as it is rather heavy and may cause damage.

4.8.5 Rotate the tap to allow the residual water to pour out into the sink.

4.8.6 If a replacement tap body is to be fitted, follow the procedure in 1.2.7 (page 3) and following sections. The commissioning procedures in Section 2: (page 4) should be followed for the new or returning tap body.

SECTION 5: DIAGRAMS

Table 3 - Diagram Key

Item	Name	Item	Name	Item	Name
X	Hot Isolating Valve	8	Inlet Cartridge Assy. (H)	22	M5 Screws
Y	Cold Isolating Valve	11/24	Ceramic Disc Cartridge	25	Actuator Sleeve
Z/ZZ	Flushing Adaptor/Hose	15	Key to Diagrams on Page 16	26	Act. Sleeve O-Ring
1	Main Bottom Cover	17	Interconnect Nozzles	27	Spline Adaptor
3	Thermostatic Cover	18	Spigot	28	Torque Control Member
3a	Adjusting Screw	18a	Earth Screw & Washer	29	Lever Interface O-Ring
4	Thermostatic Cartridge	18b	Bulkhead Nut	31	Hub cushioning O-Ring
5	Tap Securing Screw	19	Bezel	32	Lever Retaining Washer
7	Inlet Cartridge Assy. (C)	21	Extension Piece	33	Lever Retaining Screw

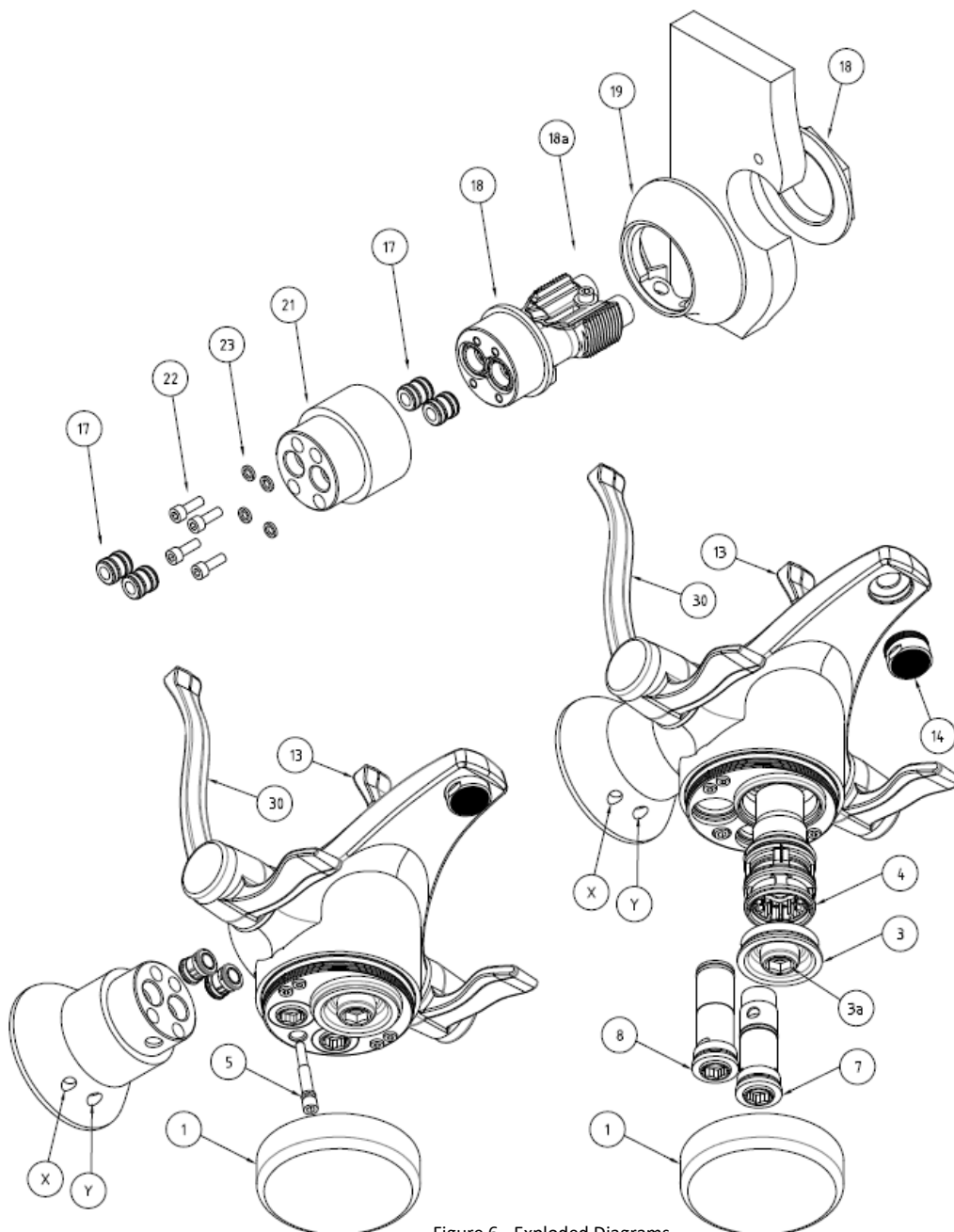


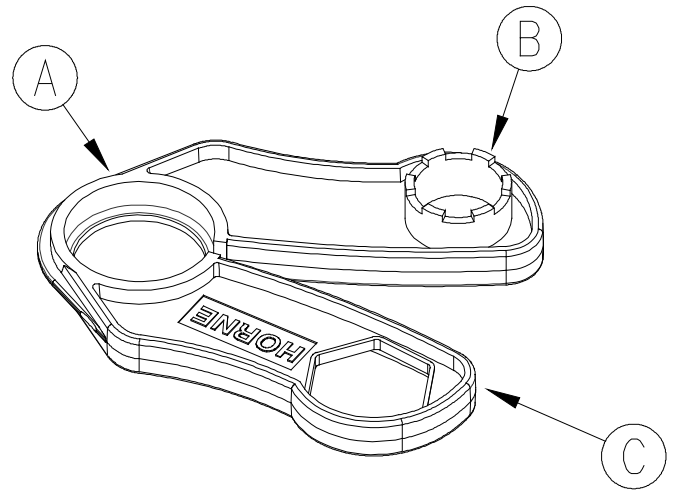
Figure 6 - Exploded Diagrams

SECTION 6: ACCESSORIES & SPARES

6.1. Multi-tool

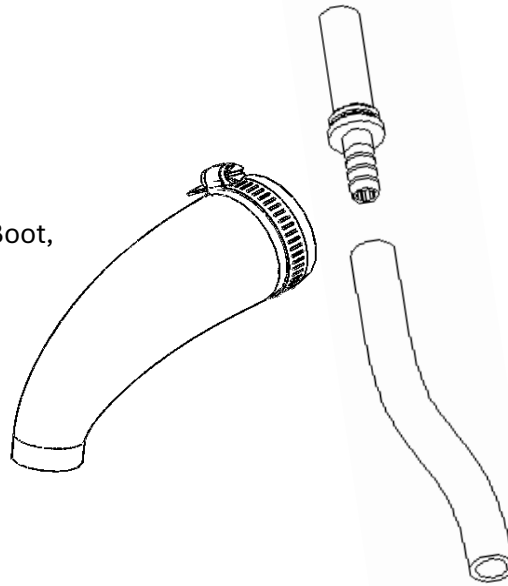
A,B,C = Optitherm Multi Tool (Part No. 5459). Also available as part of Optitherm full toolkit (part no. 5491).

A	Endcap Gripper
B	Legacy Outlet Fitting Tool (24mm)
C	26mm Ring Spanner



6.2. Outlet Fitting Tool

Universal outlet cache key - fits current and all legacy outlet designs. Part No. 44-6667. Also available as part of Optitherm full toolkit (part no. 5491).



6.3 Flushing Kits

Part Nos. 5684 (left) – Spigot Flushing Boot, & 5492 (right) tap-in-situ Flushing Kit.

To order spare parts consult drawing 10321 – available at
<https://www.horne.co.uk/products/water-products/spare-parts/tap-spares/>

SECTION 7: TROUBLESHOOTING

Table 4 - Troubleshooting part 1

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 design temperature.	2.2
	Hot water supply has migrated into cold water supply	Inspect/replace cold inlet cartridge assembly (7)	4.3
	Thermostat Element has failed. This can be checked by carrying out a hot or cold-water failure test.	Replace Thermostatic cartridge (4) and cover assembly (3)	2.7 / 4.5
Mixed water temperature too low	Temperature Setting too low	Re-adjust temperature setting	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 inlet cartridge assembly (8)	4.4
	Cold valve face requires cleaning	Remove thermostatic cover (3) 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 fully 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 (4) and its cover assembly (3)	4.5
	Hot and cold inlets reversed	Reverse inlet connections.	2.2
	Hot water supply temperature is too low	Check hot water supply	-

Table 5 - Troubleshooting part 2

Mixed water temp changes and is not steady	Thermostatic cartridge is seized	Replace Thermostatic cartridge (4) and cover assembly (3)	4.5
	Thermostat element has failed. (This can be checked by carrying out a hot or cold-water failure test)	Replace Thermostatic cartridge (4) and cover assembly (3)	2.7 / 4.5
Water at outlet runs full hot or full cold	Hot and cold inlets are reversed	Reverse inlet connections.	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 (4) and cover assembly (3). Or replace (4) and (3) if damaged or 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 (4) and cover assembly (3)	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.	Section 2:
	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 / 2.7
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 thermostatically controlled constant temperature.	This is not a fault condition and is normal. See note at bottom of page 1.	-
Tap does not shut-off when levers are in the closed position	Interconnect nozzles (17) are damaged or may not have been fitted.	Remove tap body from spigot and check/replace interconnect nozzles.	1.2.6
	Lever clutch at incorrect 'notch' - lever in contact with wall panel prevents valve closure	Rotate levers forward one or more 'notches' to align in near-vertical position when flow is closed / off	3.2

COMMISSIONING, MAINTENANCE & IN-SERVICE TESTING RECORD

Establishment:					
Type of Valve: Horne TBT-3 Optitherm Tap		Date Installed:		Installed by:	
Location of Valve:					
Commissioning Details [Fill in ALL information during commissioning]					
Hot Water Supply:	HW Temp. °C	HW Pressure	Bar	Temp: Instrumentation:	
Cold Water Supply:	CW Temp. °C	CW Pressure	Bar	Pressure:	
Mixed Temp. at max draw-off:	Mixed Temp: °C	Flowrate at max draw-off: l/min			
Mixed Temp. at low draw-off:	Mixed Temp: °C	Flowrate at low draw-off: l/min			
Instrumentation Used:	Temp:	Press:	Flow:		
Cold Water Isolation Test	Max Mixed Water Temp. during CW Isolation test: °C Mixed Water Temp. on restoration of CW Supply: °C Note: MWT should return within 2 degrees of set temperature and be no greater than 43°C after this test.				
Comments:					

In-Service Testing Record		Establishment:		Location of Valve:	
Date:		Type of Valve: <i>TBT-3 Optitherm Tap</i>			
Hot Water Supply:	HW Temp. °C	HW Pressure	Bar	Instrument used (temp): Instrument used (pressure):	
Cold Water Supply:	CW Temp. °C	CW Pressure	Bar		
Mixed Temp. at max draw-off:	Mixed Temp: °C	Flowrate at max draw-off:		l/min	
Mixed Temp. at low draw-off:	Mixed Temp: °C	Flowrate at low draw-off:		l/min	
Instrumentation Used:	Temp:	Press:		Flow:	
Cold Water Isolation Test	Max Mixed Water Temp. during CW Isolation test: °C		Mixed Water Temp. on restoration of CW Supply: °C		
MWT should return within 2 degrees of set temperature and be no greater than 43°C after this test.					
Comments:				Recommended Date of Next In-Service Test:	

In-Service Testing Record		Establishment:		Location of Valve:	
Date:		Type of Valve: <i>TBT-3 Optitherm Tap</i>			
Hot Water Supply:	HW Temp. °C	HW Pressure	Bar	Instrument used (temp): Instrument used (pressure):	
Cold Water Supply:	CW Temp. °C	CW Pressure	Bar		
Mixed Temp at max draw-off:	Mixed Temp: °C	Flowrate at max draw-off:		l/min	
Mixed Temp at low draw-off:	Mixed Temp: °C	Flowrate at low draw-off:		l/min	
Instrumentation Used:	Temp:	Press:		Flow:	
Cold Water Isolation Test	Max Mixed Water Temp. during CW Isolation test: °C		Mixed Water Temp. on restoration of CW Supply: °C		
MWT should return within 2 degrees of set temperature and be no greater than 43°C after this test.					
Comments:				Recommended Date of Next In-Service Test:	