

# HORNE

Horne Engineering Ltd  
 PO Box 7, Rankine Street  
 Johnstone, Renfrewshire  
 Scotland. PA5 8BD  
 Tel 01505 321 455  
 Fax 01505 336 287  
 Email [technical@horne.co.uk](mailto:technical@horne.co.uk)  
 Web [www.horne.co.uk](http://www.horne.co.uk)

**HORNE TSV1-3 THERMOSTATIC SHOWER VALVE  
 FOR CONCEALED MOUNTING  
 INSTALLATION OPERATION & MAINTENANCE INSTRUCTIONS  
 Installation Requirements & Specification**

**Approvals**

The TSV1-3 Thermostatic Shower Valve has been independently tested by the WRc and approved to all the requirements of *NHS Model Engineering Specifications D 08 Thermostatic Mixing Valves Healthcare Premises*) to the following designations and for the following applications:

<b>HP-S</b>	Shower with supply pressures of 1 - 5 Bar
<b>LP-S</b>	Shower with supply pressures of 0.2 - 1 Bar

**Supply Water Pressure Requirements**

The minimum water pressure required to achieve a spray at the shower head is a dynamic head of 2m (3 psi, 0.2 bar). Note that the dynamic head is the pressure measured with the water running.

Where one supply is tank fed and the other pressurised, (e.g. mains cold and tank fed hot, or pressurised hot and tank fed cold), a pressure reducing valve on the higher pressure side is not required provided the lower of the two pressures is equivalent to at least a 2m (3psi, 0.2 Bar) dynamic head at the spray head.

The maximum recommended supply pressure is 6 bar (90psi, 60m head) for the hot, and 10 bar (150psi, 100m head) for the cold.

**Supply Water temperature Requirements**

Max. Hot water temperature \* 85°C

Min. Hot water temperature # 55°C

Max. Cold water temp # 20°C

A minimum temperature differential of 5°C should exist between the mixed water temperature and each inlet temperature.

Note that requirements marked \* originate from WRAS approval of non metallic components, and those marked # originate from HTM 2027.

**Temperature Adjustment Range**

The mixed water temperature can be adjusted from cold through to a top limit (which can be pre-set during installation - factory set at approx 39°C), with full anti-scald protection throughout the range.

**General**

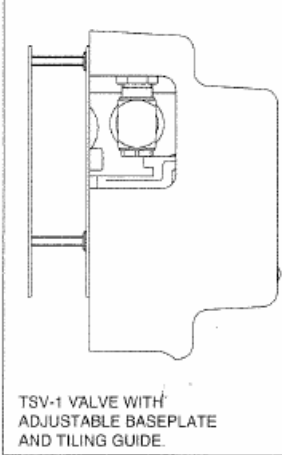
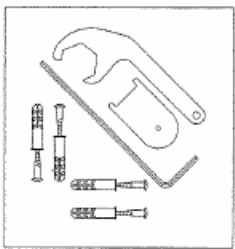

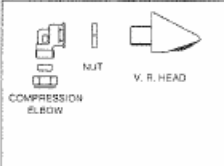
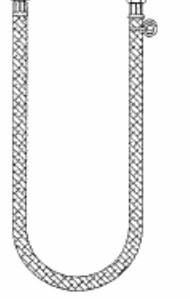

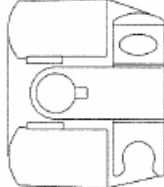
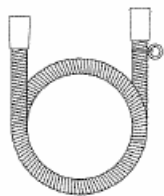
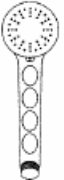







Every HORNE TSV1-3 is supplied with an integral WRAS approved single check valve and integral large area strainer on each inlet. Inlet connections are by compression fittings for 15mm copper pipe. Isolating valves must be fitted to the hot and cold water supply pipes.

Contents Checklist

The complete Horne TSV1-3 valve comes in 3 separately available cartons

- 1) The TSV1-3 body and "behind the wall" accessories
- 2) The shower spray accessories
- 3) The decorative faceplate & knobs

The detailed contents of each carton is as follows:

<p><b>CARTON 1</b></p>  <p>TSV-1 VALVE WITH ADJUSTABLE BASEPLATE AND TILING GUIDE.</p> <p>ABOVE EQUIPMENT COMMON TO ALL OPTIONS</p>					 <p>SHOWER FITTING KIT (ON CARD)</p>		 <p>BSP ELBOW NUT WALL OUTLET</p>		 <p>COMPRESSION ELBOW NUT V. R. HEAD</p> <p>ABOVE EQUIPMENT ONLY SUPPLIED FOR VANDAL RESISTANT OPTION</p>					
					 <p>BRAIDED HOSE + 2 SEALING WASHERS</p> <p>ABOVE EQUIPMENT ONLY SUPPLIED FOR RISER BAR AND HANDSET OPTION</p>		 <p>FIXED SHOWER HEAD</p> <p>ABOVE EQUIPMENT ONLY SUPPLIED FOR FIXED SHOWER HEAD OPTION</p>							
<p><b>CARTON 2 - ONLY APPLICABLE TO RISER BAR AND HANDSET OPTION</b></p>					 <p>PACK CONTAINING RISER BAR BRACKETS, INCLUDING FIXINGS</p>		 <p>SHOWER HOSE (WITH SINGLE WASHER FOR WALL OUTLET)</p>		 <p>SHOWER HANDSET</p>		 <p>HOSE RETAINING RING</p>		 <p>RISER BAR</p>	
<p><b>CARTON 3</b></p> <p>COMMON TO ALL OPTIONS</p>					 <p>ON/OFF KNOB CAP</p>		 <p>TEMP KNOB CAP</p>		 <p>ON/OFF KNOB</p>		 <p>TEMPERATURE KNOB</p>		 <p>FACEPLATE</p>	

## Installation Instructions

### General

See the contents checklist to ensure all parts are present.

The TSV1-3 shower valve is supplied on a baseplate, which is adjustable for both depth and alignment to suit mounting in a dry-lined wall, a stud partition wall or in a chased out cavity in a solid wall. It is also supplied with an attached tiling guide, which provides protection for the TSV1-3 both during transit and on-site, and should be left attached to the TSV1-3 at all times, except when actually installing the valve (See Fig. 1).

The TSV1-3 shower valve with adjustable baseplate can be installed where the depth of recess is more than 75mm from the finished surface. The adjustable baseplate can be jacked to any reasonable angle and eliminates the need for the back fixing surface to be in alignment with the finished wall surface. The hot and cold water pipes should not be permanently attached to the wall closer than 2m from the TSV1-3 prior to installation to allow for final adjustment of the TSV1-3 position (See fig 2).

### Installation

#### 1) Check Installation Conditions and Familiarising Yourself with the TSV1-3 Valve.

Before starting, ensure that the available depth of recess or cavity is a least 75mm, measured from the face of the tiles or outer surface of the finished wall to a solid fixing base capable of taking the mounting screws. The Home TSV1-3 valve can be fitted in any orientation. However, please take care to ensure correction of the hot and cold supplies in the chosen orientation. The hot water inlet is identified with the RED mark, the Cold water inlet with the BLUE mark. The swivel inlets allow for either rising or falling hot and cold water services, and have compression fittings for 15mm copper pipe. Note that the swivel inlets have "O" ring seals to the TSV1-3 body and **do not require PTFE tape or any other sealing means**. Gently screw the swivel inlets into the body of the TSV1-3 and stop as soon as resistance is felt, then back off by up to 1½ turns to align the inlets with the hot and cold supply pipes. The swivel inlets must not be tightened against the TSV1-3 body to make a seal (See fig 3.) **Use only the compression fittings supplied, and do not solder in the vicinity of the TSV1-3 valve; the seals and thermostatic mechanism may be damaged by the heat.** The mixed water outlet is adjacent to the on/off knob. A flexible stainless steel braided hose is supplied which permits the TSV1-3 valve outlet to be easily connected to the wall outlet fitting. If the TSV1-3 valve is to be fitted behind an existing wall panel, use the supplied self-adhesive template as a guide when cutting the aperture.

#### 2) Installing the TSV1-3 Valve

Remove the tiling guide, which is retained by one hex socket screw (use a 2.5mm hex key). Replace the screw in the valve immediately to avoid losing it – this screw is required later. Identify a suitable position for the TSV1-3 valve and mark holes for the adjustable baseplate. This mounting position should be between 75 and 100mm deep from the finished surface of the wall (i.e. allowing for adhesive and tiles if appropriate). Ensure that the TSV1-3 outlet can be connected to the wall outlet fitting in such a position that the

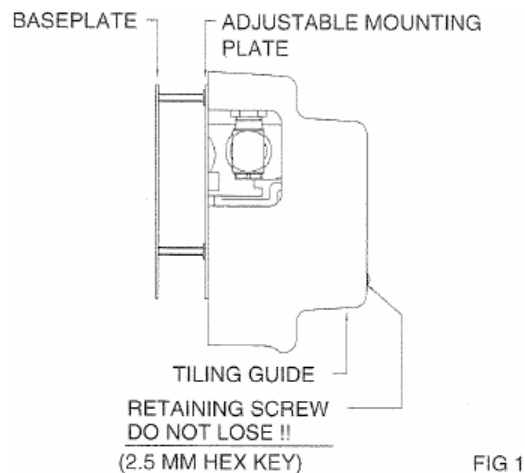


FIG 1

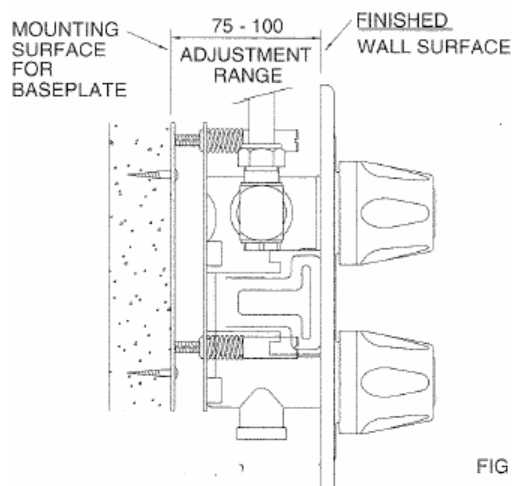


FIG 2

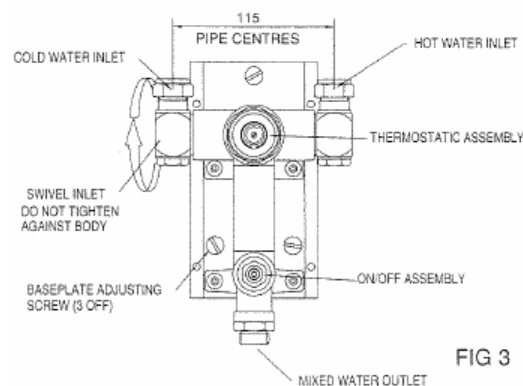
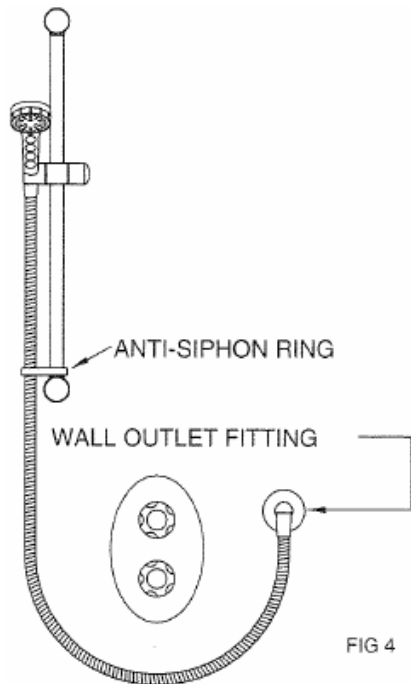


FIG 3

shower hose going to the shower head can hang below the faceplate without interfering with the knobs (See fig 4).



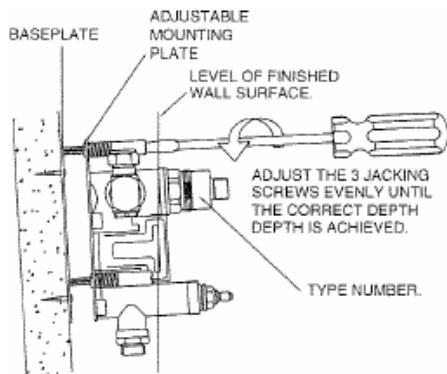
Attach battens to the wall if required to obtain the required mounting depth and attachment point for mounting screws (supplied). Wall plugs are also supplied for use in masonry walls. The swivel inlets on the TSV1-3 show where each inlet pipe must be located (See also Fig 3).

In some installations it may be preferable to fix the wall outlet fitting before installing the TSV1-3 if there is restricted access. See "5). Fixing the Wall Outlet Fitting" below if this is appropriate, and connect the braided flexible hose to the wall outlet with one of the sealing washers.

Install the baseplate so that the valve is vertical (or horizontal). The recessed mounting surface does not have to be smooth or true to the finished wall surface; the adjustable mounting plate will compensate for misalignment. It is not necessary to use packing pieces to level the valve. Attach the baseplate in the required position by the 4 mounting screws (provided). Where the baseplate is installed onto a surface that is not flat, avoid over-tightening the 4 mounting screws or the baseplate may distort.

### 3) Adjusting the Mounting Plate

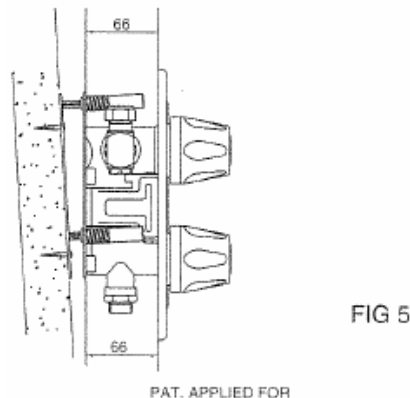
Adjust the TSV1-3 valve to the correct depth and angle in the recess by turning the 3 large adjusting screws on the mounting plate (the surface of the mounting plate which the TSV1-3 body sits on should be 66mm from the finished wall surface). One turn of each screw raises or lowers the TSV1-3 by 1mm. Adjust the 3 screws in relatively even steps. Do not fully adjust one screw before adjusting the others (See fig 5).



### 4) Connecting the Supply Pipes

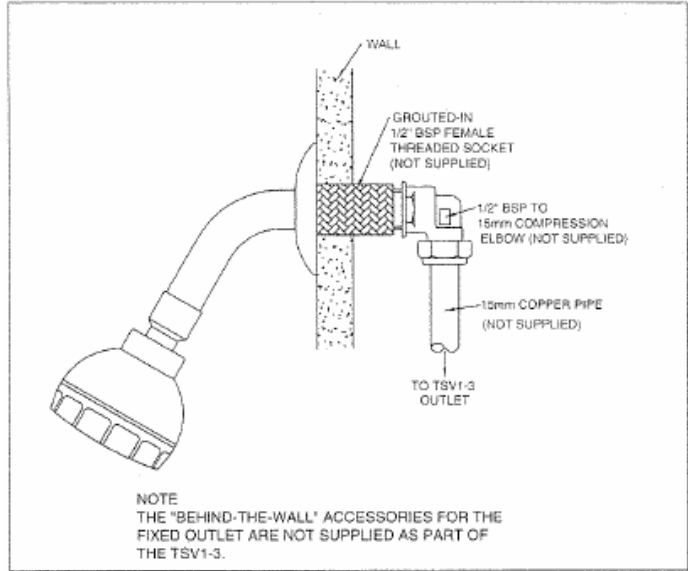
Connect the hot water supply to the inlet with the red mark and cold water to the inlet with the blue mark. Remember that the swivel inlet has an O ring seal and that no other sealing means are required. Note that a cranked spanner is supplied for tightening the compression fitting with the TSV1-3 valve in the installed position if access is restricted.

**Do not open the water supplies at this stage as they have not been flushed out to remove debris in the pipework. Such debris can damage the TSV1-3 valve.**

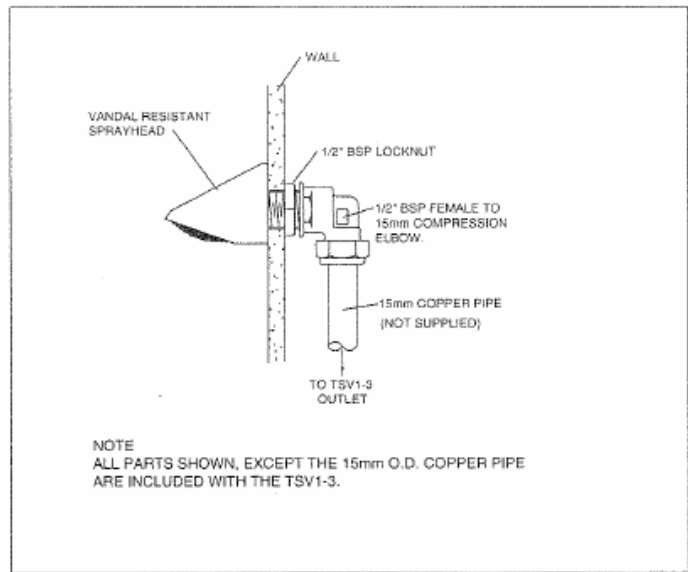


### 5) Fixing the Wall Outlet Fitting or Fixed Sprayhead

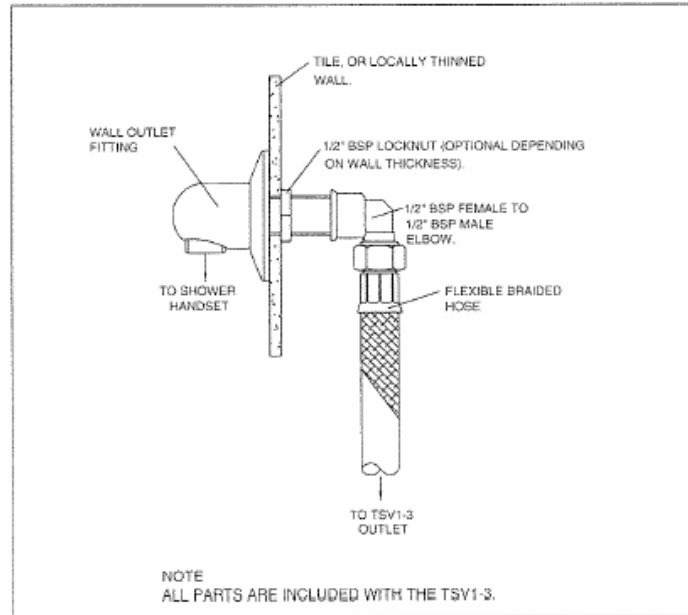
Identify a suitable position for the wall outlet fitting (such that the shower hose from the outlet fitting to the handset will not interfere with the controls when connected to the shower head) or fixed sprayhead (so that the spray is not directed onto the faceplate). Drill a 22mm diameter hole and secure the wall outlet or the fixed sprayhead with the 1/2" BSP nut provided. Connect the TSV1-3 to the wall outlet by means of the flexible braided hose and sealing washers provided, or to the fixed sprayhead by copper pipe, noting that the adapter on the outlet of the TSV1-3 body is reversible with one side suitable for connection to the braided hose, and the other a 15mm compression fitting (See Fig 6 overleaf). Note that the outlet adapter should be sealed to the TSV1-3 using PTFE tape or other sealing means.



FIXED OUTLET SHOWER HEAD



VANDAL RESISTANT SHOWER HEAD



HANDSET & RISER BAR

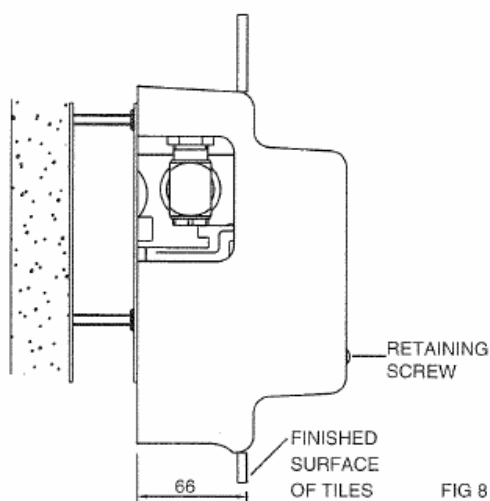
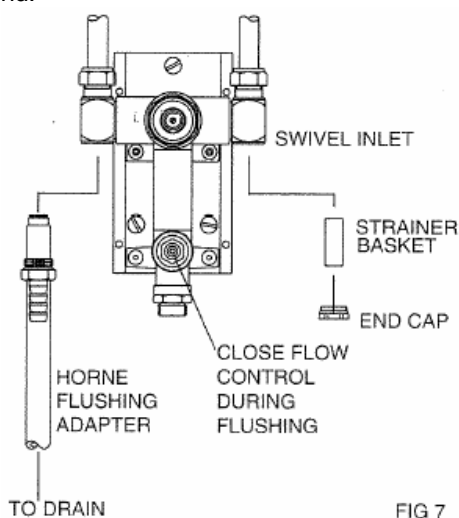
FIG 6

### 6) Flushing the pipework

Flush out the pipework in accordance with current Water Supply Byelaws. The use of a Horne flushing kit is strongly recommended because this connects directly to the swivel inlet (See Fig 7). Simply remove the end cap and strainer basket and connect the flushing adaptor. Place the end of the flushing hose in an appropriate drain or container and turn on the supply to flush as required. Repeat for both hot and cold supplies. Note that if there is a danger of freezing then the pipes and TSV1-3 must be drained to avoid damage.

### 7) Testing for Leaks in Pipework

Ensure the TSV1-3 on/off control is closed (i.e. turned fully clockwise) and open the supplies and check for any water leaks upstream of the TSV1-3 valve. Then open the on/off control and blank off the hose at the handset and check for any water leaks downstream of the TSV1-3 valve. Make good any leaks found.



### 8) Fitting the Tiles

Ensure that the TSV1-3 is at the correct 66 mm depth (see fig 8) and **replace the tiling guide**. Plaster or tile up to the edge of the guide. Note that if the tiles are accurately cut to match the profile of the guide, then the decorative faceplate will seal around the hole in the tiles, and the TSV1-3 will be able to be removed from the wall without the need to break any tiles. Ensure that the grout lines around the TSV1-3 are flush with the tiles to provide a smooth sealing surface for the faceplate.

### 9) Fitting Faceplate & Knobs

Remove the tiling guide and unscrew the faceplate retaining rings from the TSV1-3.

Check that the surface of the adjustable mounting plate is still true to the finished wall at a depth of 66mm (as per Fig 5). See Fig 9 for the assembly order of the remaining parts. Position the faceplate and attach to the TSV1-3 by the two retaining rings. Gently tighten the rings by hand until the face plate clamps gently against the wall. Do not over-tighten or the face plate may distort. The faceplate incorporates a silicon sponge seal, which will satisfactorily seal against a smooth wall. If the wall surface is uneven, or has deep grout lines or other imperfections, then either fill these or, preferably, use a bead of silicon sealant around the joint between the faceplate and the wall to provide a seal. Do not apply this until the knobs have been assembled onto the TSV1-3 and the assembly has been completed.

Screw the temperature adjustment knob onto the threaded spindle, screwing it fully down onto the shoulder. **Ensure that the knob does not foul on the faceplate** (if it does then immediately remove the knob and faceplate and re-adjust the screws on the baseplate). Tighten the knob firmly against the shoulder, but do not over-tighten. Screw the temperature knob locknut down against the knob and tighten using the key supplied. Do not fit the temperature adjustment knob cap at this stage if the TSV1-3 is to be commissioned as it will have to be removed to adjust the setting of the maximum mixed water temperature.

Place the splined on/off knob on the splined shank. Put the spacer over the shank and secure with the hex socket headed button screw. Ensure that the knob does not foul on the faceplate (if it does then remove the knob and faceplate and re-adjust the screws on the baseplate).

Attach the on/off cap to the on/off knob - it is a push fit. Note that the cap with the red and blue arrows fits on the temperature control knob and the plain cap fits on the on/off knob. The caps are not interchangeable. Note that if the knobs and faceplate require cleaning then care must be taken not to scratch them in the process. Wash off any surface dust with the shower spray before cleaning with soapy water.

**Do not use any abrasive cleaners or solvents or the surfaces may be damaged.**

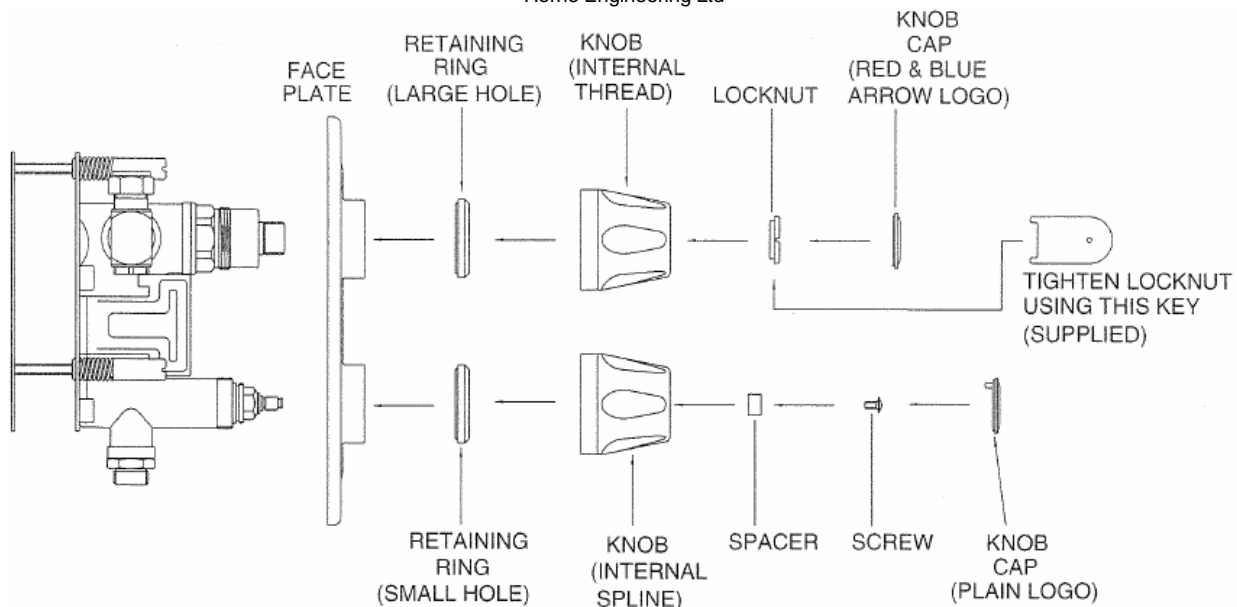


FIG 9

**10) Installing the Handset & Riser Bar**

Identify a suitable position for the riser rail. The shower head should not discharge directly onto the shower controls. Note that the riser rail is supplied with an anti-siphon ring. The position of the riser rail should be selected such that with the shower hose routed through the anti-siphon ring, the handset cannot enter the shower tray, and must be at least 25mm clear of the spill level (see Fig 10). Soap the ends of the riser bar and insert into the support brackets, ensuring that the anti-siphon ring and the shower handset support bracket are placed on the riser bar between the two support brackets. This ring prevents the possibility of back siphonage of water through the shower head. Mark out and drill holes for the screws and/or plugs as appropriate. Note that tiles can be drilled using a masonry drill bit, and that masking tape on the tiles can assist in preventing the drill from “wandering” when starting the hole. Install the riser bar and end brackets, and slip over the covers. Note that the covers are slotted to engage with the brackets, and that they click into position. Attach the shower hose to the wall outlet using the washer supplied, and to the shower handset.

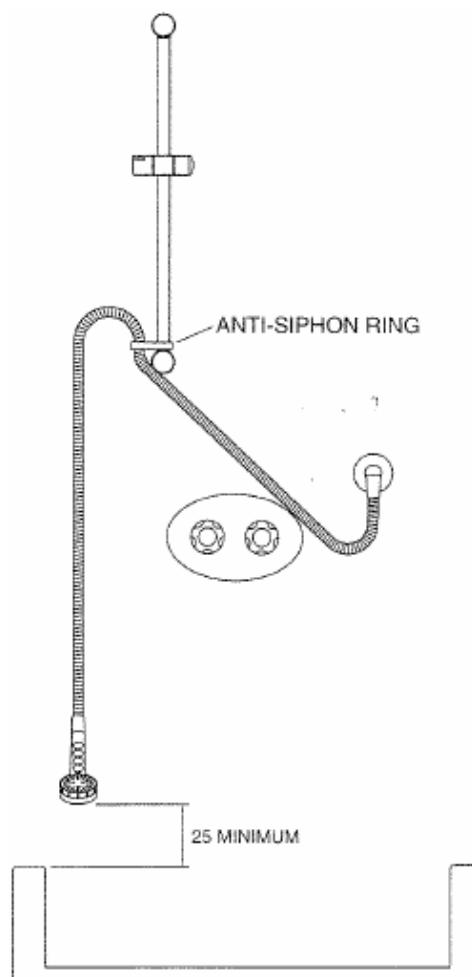


FIG 10

## COMMISSIONING

**Ensure that the pipework has been flushed out before commissioning the TSV1-3. See installation instructions.**

Ensure that both hot and cold water supplies are open and at, or near, the design temperatures and pressures and that they are within the requirements of the valve as outlined on page 1. The NHS designation of the valve should match the intended application.

Set the temperature control to the maximum temperature setting (i.e. rotate the knob anti-clockwise until it stops).

Open the on-off control by turning it anti-clockwise. For installations with a fixed shower head, putting a burst polythene bag over the shower head will help catch and deflect the spray during commissioning.

Allow the shower to run at maximum temperature setting until the water temperature has stabilised. Should the temperature rise in an uncontrolled fashion, then the hot and cold supplies are probably reversed. Correct this before proceeding.

The TSV1-3 is set at the factory to provide a maximum outlet temperature of 39°C but this should be checked on site to ensure that the setting has not been altered and to ensure user safety.

If the maximum temperature requires adjustment, remove the temperature knob cap using a sharp blade or the tip of a pen knife, and adjust the small slotted screw in the centre of the spindle. Adjusting the screw anti-clockwise will increase the temperature, clockwise will decrease the temperature (See Fig 11).

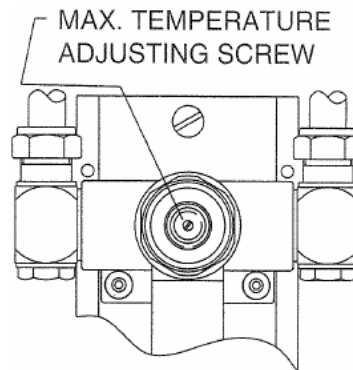


FIG 11

After setting the maximum temperature, turn the shower on and off a few times and check that the maximum setting is correct. Record the commissioning information on the attached maintenance sheet to permit the in-service performance of the valve to be assessed.

Finally check the thermal shut-off facility of the TSV1-3 by performing a thermal shut-off test. Shut off the cold supply. The flow from the shower should immediately stop or reduce to a trickle, in which case the water temperature should be less than 43°C. In either case there is no scalding risk. If the temperature is above 43°C then it is likely that there is contamination in the TSV1-3, which is preventing it from shutting off the hot supply. Refer to the maintenance section of this booklet or phone the factory for advice.

## MAINTENANCE

Maintenance of the TSV1-3 shower valve is essential to ensure the product continues to perform to specification after installation, and continues to afford scald prevention. Record all maintenance carried out on the attached commissioning and maintenance record.

When cleaning the external faceplates and knobs, never use cleaners containing abrasives or solvents as they may damage the chrome plating. Use only a soft cloth and soap.

The frequency of routine maintenance of the TSV1-3 internals (i.e. cleaning, descaling etc.) depends largely on the condition of the water supplies, and local knowledge will dictate suitable intervals. In addition to this the following precautions should be observed:

Initially check the strainer baskets for debris every 3 months and clean if required. This period can be increased if appropriate once the general condition and cleanliness of the water is established. Where the water supplies come up from beneath the TSV1-3, lifting out the strainer basket may not remove all trapped debris, and flushing may be required if debris is found, or suspected.

Perform a thermal shut-off test every 3 months, and check the maximum temperature setting. See the last paragraph in the Commissioning Instructions for details of the thermal shut-off test and re-adjustment of maximum temperature setting, if required.

If the maximum water temperature varies by more than 2°C from the commissioned setting then ensure that the strainers are clean and that the isolating valves are fully open. Test the non-return valves as described below. If these tests do not highlight the reason for the temperature rise then follow the procedure below for investigating failure of the thermal shut-off test.

If the TSV1-3 fails the thermal shut-off test then remove the knobs, faceplate (see installation instructions section 9 on page 6) and the thermostatic cover (see Fig 3 on page 3) and check the internal surfaces for scaling. If the TSV1-3 body requires descaling then it should be removed from the pipework to do this (the valve can be removed through the hole in the wall without breaking tiles - see installation instructions). All rubber parts must be removed prior to descaling.

Do not forget the slide valve seal located inside the TSV1-3 body, which should always be replaced with a new seal after removal. Maintenance kits are available which contain O rings and/or the thermostatic element. Smear all O rings with silicon grease prior to installing them. Torque the TSV1-3 cover to 13 Nm (10 lbft). This is to prevent the user from inadvertently unscrewing the cover during temperature adjustment. Do not over-tighten the cover or the mounting arrangement may be damaged.

Replace the O rings every 3 years. (Maintenance kit with spare O rings available). Smear silicon grease on all O rings prior to installation. At the same time, replace the slide valve assembly. Lightly smear the outside diameter with silicon grease prior to installation.

Replace the thermostatic element at least once every 6 years in all TSV1-3 valves, or more often if problems are experienced or in installations where the water is aggressive.

The on-off mechanism uses a ½" tap washer which should be replaced when it leaks. Remove the cosmetic trim and unscrew the On/Off assembly. The washer is retained by a small nut. Do not overtighten this nut (torque to 25Ncm). Ensure the on-off assembly is torqued down to 13 Nm (10lb.ft) to prevent the user from inadvertently unscrewing the assembly during flow control. Do not over-tighten the assembly or the mounting arrangement may be damaged.

The Non Return Valves (NRVs) prevent cross-flow between hot and cold water supplies under unequal pressure conditions, and are designed for long life with no maintenance. Their function can be tested as follows:

-To test the NRV on the hot side, shut off the hot supply and ensure the cold supply is open. Be prepared for leakage of trapped water from the pipe and remove the strainer basket on the hot side. Any continuing leakage evident from the strainer body is coming through the hot supply NRV.

To test the NRV on the cold side, shut off the cold supply and ensure the hot supply is open. Be prepared for leakage of trapped water from the pipe and remove the strainer basket on the cold side. Any continuing leakage evident from the strainer body is coming through the cold supply NRV.

If either NRV is leaking then the inlet elbow (complete with NRV and strainer basket) should be replaced. It is not possible to satisfactorily remove the NRV itself from the inlet elbow and this should not be attempted.

To remove the sprayplates from the handset or fixed shower head, rotate the lockring through 30 degrees anti-clockwise to release the bayonet fitting, and then ease out the sprayplates by the lockring. Note that for the fixed shower head a tool is supplied with the shower head to engage the lockring as shown in fig 12.

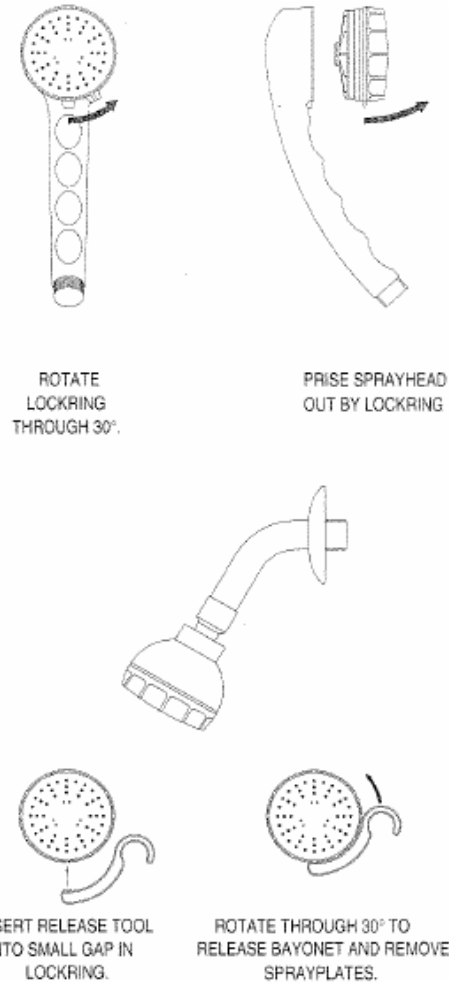


FIG 12

See attached drawing for a complete parts list for ordering spares.

### In-Service Testing

Periodic testing should be carried out to check whether or not any deterioration has occurred in the performance of the TSV1-3. A thermal shut-off test, as described under maintenance above, should be carried out. If the water coming from the shower head is at a temperature of more than 2°C above the maximum mixed water temperature setting then the TSV1-3 is due for maintenance. **Note: A Thermostatic Mixing Valve in need of maintenance can be undetectable in normal use and only become apparent when a disruption occurs in the hot or cold water temperatures or pressures.** The frequency of in-service testing depends upon the condition of the water passing through the TSV1-3. 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 intervals somewhere between six months and 12 months. In-service testing should be carried out at least every 12 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.

