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HORNE 15 THERMOSTATIC MIXING VALVE – TYPE H-1503
INSTALLATION, COMMISSIONING AND MAINTENANCE INSTRUCTIONS

0.1 Approval

The Horne 15 Type H1503 Thermostatic Mixing Valve has been independently tested by an ISO 17025 Approved Test House and approved to all the requirements of NHS Model Engineering Specifications D08 Thermostatic Mixing Valves (Healthcare Premises) to the following designations and applications.

APPLICATION	DESIGNATION	HOT & COLD WATER PRESSURES	WATER TEMPERATURES
BIDET	LP-B HP-B	0.2 to 1Bar 1 to 5Bar	HOT: 55°C - 65°C COLD: 5°C - 20°C
SHOWER	LP-S HP-S	0.2 to 1Bar 1 to 5Bar	
WASHBASIN	LP-W HP-W	0.2 to 1Bar 1 to 5Bar	

The HORNE 15 TMV Type H-1503 is a Type 3 Thermostatic Mixing Valve according to NHS Estates Health Guidance Note "Safe" hot water and surface temperatures.

It also complies with Regulation 4 of the Water Supply (Water Fittings) Regulations 1999.

0.2 Backflow Prevention

The hot and cold swivel inlets to the Horne-15 valve each include a single in-line Reg 4 approved DN15 Check Valve.

0.3 Supply Pressure Requirements

The minimum water pressure required 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 the Horne 15 is fed by supplies with differing pressures, a pressure-reducing valve (PRV) may be required on the higher-pressure supply – this is dependent on the restriction of the downstream fittings. Typically, if the downstream fittings are non-restrictive, such as those intended to work with gravity supply from a tank (say, less than 1Bar), then usually PRVs will not be required: this should be determined by experiment on-site. If supply pressures are substantially unbalanced, and flow at the outlet is constricted (such as with spray or sensor taps), then pulsing may occur. Although thermostatic performance is unaffected by this, the flow pulsing is often considered undesirable.

Note that output flowrate is always determined by the lower of the two inlet pressures.

0.4 Operating Conditions Required for TMV Type 3 Compliant Installations

	High Pressure	Low Pressure
Maximum Static Pressure	10Bar	10Bar
Flow Pressure, Hot & Cold	1 to 5Bar	0.2 to 1Bar
Hot Water Supply Temperature	55 – 65°C	55 – 65°C
Cold Water Supply Temperature	5 – 20°C	5 – 20°C
Minimum Temperature Differential (Hot/Mixed, Mixed/Cold)	5°C	5°C

NOTE THAT VALVES OPERATING OUTSIDE THESE CONDITIONS OF USE CANNOT BE EXPECTED TO OPERATE AS TYPE 3 VALVES.

0.5 Temperature Adjustment Range

The range of temperature adjustment is 35 - 46°C for the standard product. Extended adjustment range can be had with the optional low or high range elements. Note the correct temperatures for NHS applications in section 2.3.3.

SECTION 1: INSTALLATION

The HORNE 15 TMV can be fitted in any attitude with the mixed water outlet pointing upwards, downwards, horizontally or any angle between these planes.

If the particular model of Horne-15 being installed does not include isolation valves, there must be some means of isolating the hot and cold supplies individually for in-service testing purposes. See section 3.1.

1.1 Installation Procedure

1.1.1 Check that the HORNE 15 TMV is approved for the intended application – see section 0.1.

1.1.2 Install the HORNE 15 TMV as close as possible to the outlet to comply with HTM 04-01. The dead leg from the HORNE 15 TMV to the outlet should not exceed 2 metres. 500mm of table Y copper pipe between the TMV and the outlet is beneficial for smoothing start transients, especially with sensor taps.

1.1.3 Check that the supply pressures are within the ranges given in section 0.4. Additionally, note the comment regarding pressure reducing valves, in section 0.3.

1.1.4 Check that the supply temperatures are within the ranges stated in section 0.4.

1.1.5 Connect the hot water supply to the port on the valve with the RED dot, and the cold-water supply to the port with the blue dot.

IT IS VERY IMPORTANT THAT NO WATER IS ALLOWED TO PASS THROUGH THE VALVE UNTIL THE FLUSHING PROCEDURE DETAILED IN SECTION 1.3 IS CARRIED OUT.

1.2 Flow Regulator Fitting

1.2.1 To avoid unnecessary wastage of hot water, the optional flow regulator supplied with the HORNE 15 TMV can be fitted at the mixed water outlet. The small disc flow-regulator supplied, white in colour, will control flow to 8l/min ±10% at pressure-drops of between 2 and 5Bar.

1.2.2 The flow regulator (item 22 on drawing 6353 below) fits between the outlet pipe and the compression fitting. It is not recommended to fit flow regulators to the inlet connections.

1.3 Flushing of Pipework (see diagram overleaf)

Flushing is required by Water Fittings Regulations 1999, schedule 2 G13.1, and is also essential for the function of the TMV. The most common cause for complaint regarding the performance of any Thermostatic Mixing Valve is traced to dirt or debris in the TMV or check valves.

The hot and cold-water pipework should be thoroughly flushed using the Flushing Kit shown in the diagram below. The Flushing Kit comprises a screwed adaptor to fit the strainer body and a plastic pipe to enable water to be flushed to drain. Only one or two kits are required on each site. The kit must be ordered separately.

DO NOT OPEN THE HOT WATER TAP BEFORE FLUSHING THE HOT AND COLD-WATER PIPEWORK.

The flushing procedure is as follows. During this procedure, keep the hot and cold-water taps closed.

1.3.1 Close the hot and cold-water Isolating Valves.

1.3.2 Unscrew the End Cap (21) and remove the Strainer Basket (19) from the strainer at the hot inlet.

1.3.3 Screw the Flushing Kit into the Strainer Body (18).

1.3.4 Place the outlet of the flushing pipe where it can drain freely. If draining into a wash basin or bath, make sure that the drain plug is NOT in place and that water passing through the flushing pipe is free to drain.

1.3.5 Open the hot water Isolating Valve and allow any air in the pipework to escape until water begins to flow to drain. Allow water to flow to drain AT FULL BORE until any pipework which has been worked on has been cleared

1.3.6 Close hot water Isolating Valve.

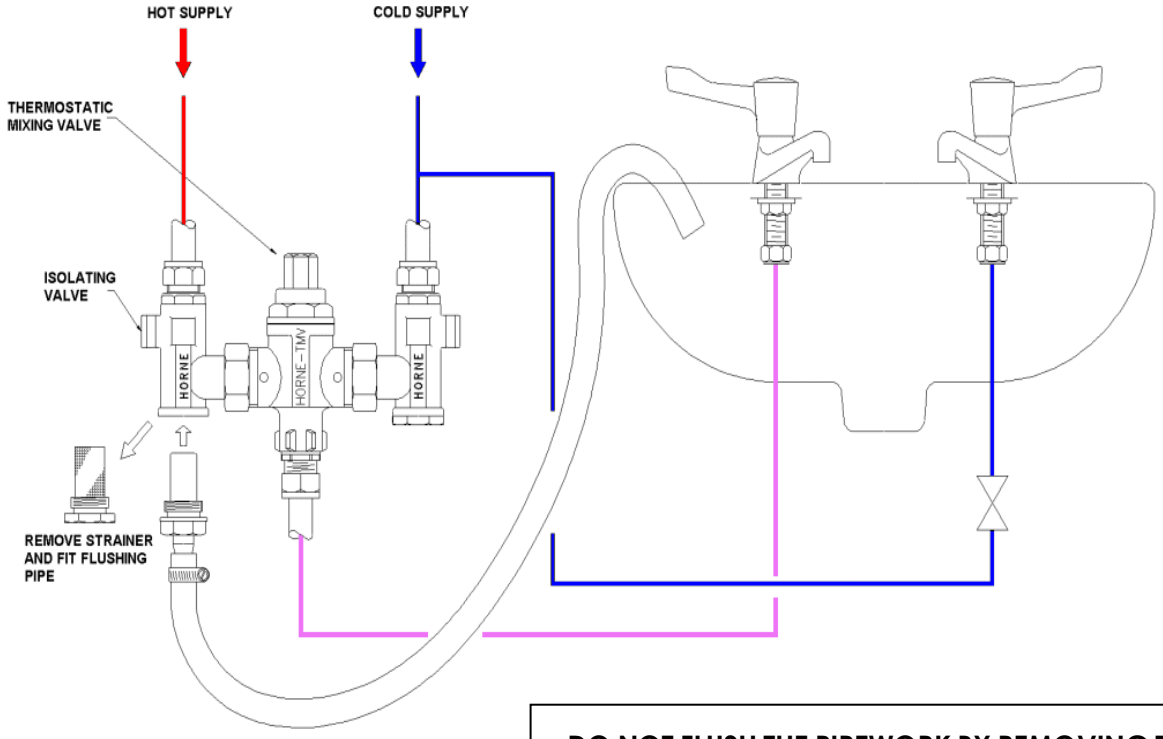
1.3.7 Remove the Flushing Kit and replace the strainer basket and end cap.

1.3.8 Repeat 2.1.2 to 2.1.7 at the cold-water inlet with the cold-water Isolating Valve.

1.3.9 Re-open both Isolating Valves.

1.3.10 The flushing procedure has now been completed.

NOTE THAT IF THE SYSTEM IS NOT TO BE COMMISSIONED IMMEDIATELY AND/OR THERE IS ANY DANGER OF FREEZING THEN THE VALVE MUST BE DRAINED TO AVOID DAMAGE. OPEN THE STRAINER CAPS TO DRAIN THE VALVE.



DO NOT FLUSH THE PIPEWORK BY REMOVING THE STRAINER BASKETS AND OPENING THE TAPS.

SECTION 2: COMMISSIONING

Commissioning the valve involves flushing the water supply; setting the temperature; and finally performing a cold-water isolation test to confirm the safe operation of the valve as fitted. Flushing is included in the Installation section to ensure it is done as soon as possible after installation but should be considered vital to the commissioning process. Commissioning the valve is essential to establish a reference point for future in-service tests, and to ensure the valve works correctly under site conditions.

2.1 Flushing of Pipework

2.1.1 Unless you are absolutely certain that this has been done, flush the pipework per section 1.3.

2.2 Pre-Checks

Ensure that the NHS designation of the valve matches the intended application, and that the requirements of section 0.4 above have been met. Ensure that the water supplies to the valve are open.

2.3 Setting the Temperature

2.3.1 Open the hot water tap and allow water to run through the HORNE 15 TMV.

2.3.2 Check that hot and cold-water supplies stabilise at or near to their designated temperatures and pressures.

2.3.3 Measure the temperature at the hot water tap. This is the temperature of the mixed water. For healthcare applications set the Mixed Water Temperature as in the table below:

Application	Mixed Water Temp.	Notes
Bidet	38°C	For washbasins, washing under running water is assumed. A TMV with multiple designations should be reset on site to suit the appropriate designation.
Shower	41°C	
Washbasin	41°C	

2.3.4 During commissioning, the valve MUST be adjusted DOWN to temperature. This is to ensure that the hot water system is capable of supplying water, *at the working flowrate*, in excess of the required outlet temperature by a margin of at least 5°C. Note that not all instantaneous water heaters will be capable of this. Start by setting the valve to 5°C higher than required by adjustment of the 4mm hex screw on top of the valve (see 2.3.5 below); measure and confirm the elevated temperature, and then reduce the temperature to the required level. If the valve cannot be set to 5°C higher than required, then the outlet

temperature is being controlled by the inlet conditions and not by the valve, therefore the commissioning is not complete, and VULNERABLE USERS SHOULD NOT BE ALLOWED TO OPERATE THE TAPS.

2.3.5 Using a 4mm hex key, turn the adjusting screw clockwise to reduce the mixed water temperature or anti-clockwise to increase it. Adjust not more than half-a-turn at a time, allowing temperature to stabilise between adjustments. To confirm that the temperature has been properly set, isolate the hot supply briefly before opening again to check the set-temperature.

2.3.6 Record the commissioning information, including equipment used, on the attached commissioning sheet to permit the in-service performance of the valve to be assessed in the future.

2.4 Cold Isolation Test

2.4.1 Finally, check the thermal shut-off facility of the TMV by performing a Cold Isolation Test (sometimes colloquially called a "fail-safe" test) as follows. With the water running at a normal flowrate, isolate the cold-water supply to the valve. If there is any flow after 5 seconds, this must amount to no more than 120ml in 60 seconds of collecting. If there is more than this amount, find possible corrective actions in the "Maintenance" section below. If the Cold Isolation Test is satisfactory, restore the supply and note the final stabilised temperature in the commissioning log. This should be within 2°C of the original temperature. Generally, the mixed water temperature should not rise by more than 2.9°C during this cold-water isolation test. Record the result of this on the attached commissioning sheet.

2.4.2 Failure of the Cold Isolation Test at commissioning is usually due to dirt particles which have migrated into the valve from the pipework. This is why flushing is essential.

NOTE THAT INCOMING HOT-WATER TEMPERATURE MUST BE MAINTAINED IN THE RANGE DESCRIBED IN SECTION 0.4 FOR THIS TEST TO BE VALID. REFER TO THE MAINTENANCE SECTION OF THIS BOOKLET OR PHONE THE FACTORY FOR ADVICE, IF NECESSARY.

2.5 Test the Check-Valves

2.5.1 Although check-valve failures are rare, verifying their operation at commissioning time in a large installation can give peace of mind later. Refer to section 3.8.

SECTION 3: MAINTENANCE

Maintenance of all Thermostatic Mixing Valves is essential to ensure they continue to operate to specification after installation and continue to offer scald protection. Record all maintenance carried out on the attached Commissioning & Maintenance Record sheet at the back of these instructions.

3.1 In Service Testing

3.1.1 Periodic testing should be carried out to check whether any deterioration has occurred in the performance of the valve. Note that instrumentation to the same specification should be used each time when measurements are taken to ensure consistency of results. Record all the information on the In-Service Testing sheet at the back of these instructions.

3.1.2 Also record any requirement to adjust the Mixed Water Temperature on the in-service testing record.

NOTE: A THERMOSTATIC MIXING VALVE IN NEED OF MAINTENANCE CAN BE UNDETECTABLE IN NORMAL USE AND ONLY BECOME APPARENT WHEN DISRUPTION OCCURS IN THE HOT OR COLD-WATER SUPPLY TEMPERATURES OR PRESSURES. IN SERVICE TESTING SHOULD BE CARRIED OUT AT A FREQUENCY DETERMINED BY LOCAL RISK ASSESSMENT TO DETECT ANY SUCH DETERIORATION.

3.2 Routine Servicing Schedule

3.2.1 Replace the "O" rings **every three years** (Maintenance kit with spare "O" rings available). It is especially important to replace the slide-valve seal, located in a groove in the valve body. Horne tool 4411 is helpful for this job. See the Horne website "maintenance" section for further instruction and videos.

3.2.2 Replace the Thermostat Element **every 6 years**, or more often if problems are experienced or in installations where the water is aggressive.

3.2.3 Replace the slide-valve assembly if it becomes damaged. This may happen due to scale or grit in the water.

3.3 Strainer Baskets

3.3.1 Initially check the strainer baskets for debris every three months and clean if required. This period can perhaps be increased later if it is established that the water is generally clean and free of debris.

3.4 Cold Isolation Test – Corrective Actions for Failure

3.4.1 Regularly perform a Cold Isolation Test and check the maximum temperature setting as described in the section 2.4 above. If the valve fails this test then consider the following:

- ◊ Perform an Isolation Test as section 2.4 but shut the hot instead of the cold. If this results in a similar rate of flow as when shutting the cold, then consider that there may be a problem with the slide-valve seal. See section 3.2.1.
- ◊ Opening and cleaning the valve can cure problems caused by dirt in the pipework which has migrated into the valve, but note that if water cleanliness is poor, or flushing is not carried out, then dirt can damage the slide-valve knife-edge faces. Damage will necessitate replacement of the slidevalve.
- ◊ Cleaning/dressing of the hot valve seat may be necessary if the valve is old and/or scaled. This can be done with Horne tool 5395, and some toothpaste or fine grinding paste.
- ◊ Failure of the Cold Isolation Test can be caused by hot water in the cold supply: test the check-valves.
- ◊ In the water supply is 'hard', then de-scaling of the valve may be necessary. See section 3.6.

3.5 Notes on Dismantling

3.5.1 If removing the valve from pipework, do not grip the valve body in a vice, as this could distort the body and jam the internal parts.

3.5.2 Treat all parts with care when removing from the valve body. Note especially that the slidevalve is a precision component and can easily be damaged.

3.5.3 Do not forget the slide-valve seal, partially hidden in a groove in the valve-body. Horne tool 4411 can be used to remove it. Be careful not to scratch the groove sides whilst removing the seal. This and all other plastic/rubber parts must be removed before de-scaling.

3.6 Notes on Descaling

3.6.1 If the valve body requires de-scaling, first remove all o-Ring seals and internal parts, then use a proprietary de-scaling fluid. Do not put the thermostat element or any plastic/rubber parts in de-scaling fluid.

3.6.2 Inspect the condition of the "Hot Valve Face" and "Cold Valve Face". If the valve faces show signs of deterioration, they can be resurfaced as follows.

- ◊ Re-surface the Hot Valve Face using a mandrel (Horne part no. 5395) and a water-soluble scouring paste (toothpaste works quite well).
- ◊ Use P800 Grade wet abrasive paper on a flat surface to smooth the "Cold Valve Face".

3.6.3 Prior to re-assembly of the valve, ensure it is clean and all debris is removed.

3.7 Notes on Re-assembly

3.7.1 Make sure all components are clean before re-assembly. It is recommended to fit new o-rings.

3.7.2 Ensure the slide-valve seal is fitted in the body and is in good condition.

3.7.3 Smear silicon oil (not grease) on all "O" rings prior to installation. Also lightly smear the outside diameter of the slide valve with silicon oil before fitting.

3.7.4 Fit the components into the valve body using drawing 6353 (below) as a guide.

3.7.5 For optimal thermostatic performance, orient the visible tail end of the return spring towards the hot inlet side before inserting the slidevalve. Then turn the thermostatic adjustment to the cold position (until the thread almost releases) *before* screwing on the cover. This will prevent components turning as the cover is screwed on.

3.7.6 After any dismantling of the valve, perform a Cold Isolation Test per section 2.4 to verify correct re-assembly.

3.8 Testing of Check-Valves

3.8.1 The Check Valves prevent crossflow 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:

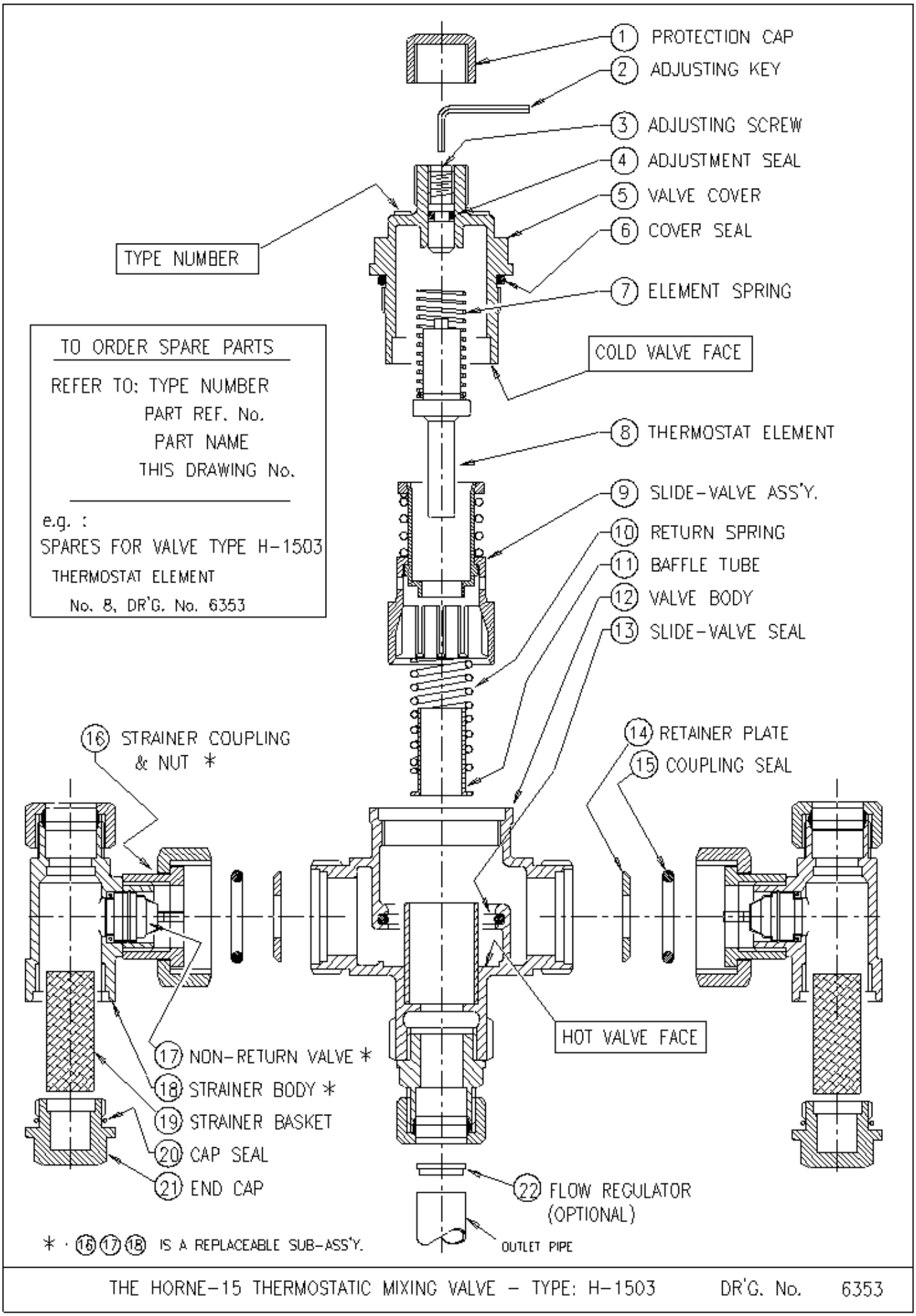
3.8.2 Start with the outlet to the valve closed and both hot and cold isolating valves open.

3.8.3 To test the Check Valve 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 likely to be coming through the hot supply Check Valve (N.B. Ensure the hot isolating valve shuts off tightly, or it may cause leakage here). Testing of the cold-side check valve is a mirror of this process.

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

3.9 Periodicity of In-Service Testing

3.9.1 The frequency of in-service testing depends upon the condition of the water passing through the TMV. In-service testing must be carried out more frequently in hard water areas than in soft water areas. Generally, in-service testing should be carried out at intervals somewhere between 6 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 6 months. Experience of local conditions and the in-service testing record will dictate the required frequency of in-service testing. In the absence of practical experience of this, a first check 6 – 8 weeks after commissioning should be performed. If no problems are detected (and mixed water temp is within 1°C of the commissioning temp) then checking again 12 – 15 weeks after commissioning to help build up a history. The results should be recorded on the attached sheet. Any requirement to reset the mixed water temperature should be noted. If no such adjustments are required, then the next in-service tests can be scheduled for 24 – 28 weeks after commissioning. If small adjustments (1 to 2 K) are required then check the strainers for cleanliness, make sure the isolating valves are fully open and verify the check valves are operating correctly (see Maintenance Section). The next in-service test should be conducted 18 - 21 weeks after commissioning. If larger adjustments are required (>2K), then service work is required, and the in-service tests should be repeated 18 – 21 weeks after commissioning. Note that the pressure and temperatures of the supplies must be identical to those during commissioning for the in-service tests to be meaningful.



THE HORNE-15 THERMOSTATIC MIXING VALVE – TYPE: H-1503 DR'G. No. 6353

SYMPTOM	POSSIBLE CAUSE	ACTION	REFER TO SECTION
Mixed water temperature too high	Temperature setting too high. Temperature has been set when the hot water temperature is too low	Re-adjust temperature setting	2.3
	Hot water has migrated into cold water supply	Inspect Check Valve at cold inlet If the check valve leaks replace the strainer body and check valve sub-assembly	2.5 Drg.6355
	Thermostat Element has failed. This can be checked by carrying out a hot or cold-water failure test.	Replace element (8)	3.2.2
Mixed water temperature too low	Temperature Setting too low	Re-adjust temperature setting	2.3
	Hot water supply temperature has fallen	Check hot water supply system	0.4
	Cold-water has migrated into hot supply	Inspect Check Valve at hot inlet If the check valve leaks replace the strainer body and check valve sub- assembly.	3.8 Drg 6355
	Cold valve face requires cleaning	Remove valve Cover (5) and service valve face	3.6.2
Mixed water flow rate too low.	Partly blocked strainers	Clean strainers	3.3
	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	Slide-Valve (9) is seized	Valve requires de-scaling	3.6
	Hot and cold inlets reversed	Remove HORNE 15 TMV from pipes and reverse connections. Connect inlet with red dot to hot pipe	
Mixed water temp changes and is not steady	Slide-Valve (9) is seized	Valve requires De-Scaling	3.6
	Thermostat element has failed (This can be checked by carrying out a hot or cold-water failure test)	Replace element (8)	3.2.2
Water at outlet runs full hot or full cold	Hot and cold inlets are reversed	Hot inlet is marked with Red dot Cold inlet is marked with Blue dot	
Valve continues to pass cold-water when hot supply is isolated	Cold valve face requires cleaning	Remove valve cover (5) and service cold valve face	3.6.2
	Fouling at hot valve seat	Clean hot valve face	3.6.2
Valve continues to pass hot water when cold supply is isolated	Slide-Valve seal is damaged	Replace Slide-Valve Seal (13)	3.2.1
	Element has failed	Replace Element (8)	3.2.2

Establishment:					
Type of Valve: HORNE 15 Thermostatic Mixing Valve		Date Installed:		Installed by:	
Location of Valve:					

Commissioning Details

Note: Fill in ALL information during commissioning.

Hot Water Supply :	HW Temp °C	HW Pressure	Bar	Instrumentation: Temp: 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 Note: MWT should return within 2 degrees of set temp, and be no greater than temp shown below* for this test.				
Comments:					

In-Service Testing Record
Date:

Hot Water Supply :	HW Temp °C	HW Pressure	Bar	Instrumentation: Temp: 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 Note: MWT should return within 2 degrees of set temp, and be no greater than temp shown below* for this test.				
Comments:					
Recommended Date of Next In-Service Test:					

*<u>*Max*</u> stabilised Mixed Water Temperatures: Bath (44°C fill) = 46°C, Bath (46°C fill) = 48°C, Washbasin = 43°C, Shower = 43°C

(Note: Photocopy this page)

In-Service Testing Record	Establishment:				Location of Valve:
Date:	Type of Valve : HORNE 15 Thermostatic Mixing Valve				
Hot Water Supply :	HW Temp °C	HW Pressure	Bar	Instrumentation:	Temp:
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 temp, and be no greater than temp shown below* for this test.				
Comments:					
Recommended Date of Next In-Service Test:					

In-Service Testing Record	Establishment:				Location of Valve:
Date:	Type of Valve : HORNE 15 Thermostatic Mixing Valve				
Hot Water Supply:	HW Temp °C	HW Pressure	Bar	Instrumentation:	Temp:
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 temp, and be no greater than temp shown below* for this test.				
Comments:					
Recommended Date of Next In-Service Test:					

*Max stabilised Mixed Water Temperatures: Bath (44°C fill) = 46°C, Bath (46°C fill) = 48°C, Washbasin = 43°C, Shower = 43°C

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