

## Commissioning instructions

### Domestic heating systems with TRVs

**IMPORTANT: Read all instructions before commencing work. All work should be carried out by a competent person.**

This commissioning procedure should be carried out on any wet central heating system fitted with thermostatic radiator valves (TRVs). Failure to correctly balance a system can lead to complaints of inefficient operation and criticism of the operational abilities of thermostatic radiator valves, when in fact the valves are not the source of the problem. Common complaints raised by home owners include:

- Rooms are slow to reach temperature even though radiators are sized correctly
- Some rooms with correctly sized radiators never reach temperature during cold periods
- Room temperatures fluctuate particularly if the TRV is on a low setting

It must be remembered that no amount of commissioning and adjustment will compensate for a poorly designed or installed system. There is no substitute for good design. Drayton thermostatic radiator valves are designed, tested and certified to meet with the stringent European standard EN215 and are manufactured in factories assessed and certified to the quality standard ISO9001

*To commission your heating system you will need two contact thermometers and a presetting tool (07 35 162).*

#### Step 1 - System cleansing

Before filling a heating system and switching it on, it is imperative that a thorough flushing procedure is carried out to BS7593. Residues frequently found in new heating systems include grit, metal chippings, unused flux, solder residues, hemp and mineral oil. In existing systems rust and magnetite can also be present.

Whilst BS7593 and CIBSE Code W refer to flushing as part of their codes on water treatment and commissioning, the most practical advice is to use a proprietary cleanser and follow the manufacturers' instructions. Ensure that TRV heads are either set to

the maximum setting or removed altogether during flushing as full flow through the system is required.

#### Step 2 - Refilling

Having flushed the system thoroughly *it is recommended that a proprietary inhibitor is added when the system is refilled.* The inhibitor manufacturers' instructions should be adhered to.

#### Step 3 - System balancing

For a radiator to give the heat output it is capable of it must have water at the right temperature and flow rate. The flow temperature is obviously determined by the boiler thermostat but the flow rate is determined by a combination of the pump size/setting and the resistance through each and every loop of the heating circuit (ie. each and every radiator). In order to get equal flow rates through each radiator the system must be correctly balanced. This is usually achieved through adjustment of the lockshield valves on each radiator to achieve optimum flow. However it is recommended to balance the system using the TRV valve body and the presetting tool. This has the advantage that, once balanced, the system cannot be altered without the use of the presetting tool, even if radiators are removed. The lockshield valve then remains fully open and can be shut to isolate the radiator without interfering with the balancing in the TRV valve.

Standards and codes covering balancing do exist but these generally call for sophisticated temperature measuring equipment and the provision of pressure tappings throughout the heating system. This is obviously not practical in the normal domestic installation so it is recommended you use the two contact thermometers for measuring pipe temperatures and take the following steps:

**1.** The boiler should be commissioned in accordance with the appliance manufacturer's instructions. Then the whole system should be brought up to design flow temperature with the pump running, all TRVs, lockshield valves and manual wheelhead valves should be fully open and the primary to the hot

water cylinder closed.

**2.** Open and adjust the bypass, if fitted, in accordance with the boiler manufacturer's instructions. This normally involves closing all radiator valves and, with the boiler and pump running, adjusting the bypass to ensure minimum system noise at all flow temperatures, until the boiler thermostat switches off. The bypass should NEVER be left fully closed.

If more than 50% of the radiators have TRVs fitted, we recommend using an auto by-pass valve (such as the Drayton DTB) and following instructions supplied.

Before balancing the radiators check that water is not pumping over from, nor air being drawn into the open vent with the system in this condition.

**3.** Switch off the boiler and pump. Check all lockshield valves are fully open. Put the contact thermometers to the flow and return pipes adjacent to the valves, switch on the boiler and pump, then wait for the temperature readings to stabilise. The TRV valve needs adjusting to achieve the design temperature drop between flow and return (usually 11C). To increase the temperature drop the flow rate should be reduced by using the presetting tool on the TRV valve.

**4. i.** Remove the thermostatic or wheelhead and loosen the locking ring.

**WARNING: DO NOT LOOSEN MORE THAN A QUARTER TURN (90°),**

using the end of the adjusting key with the four equal width pegs.

**ii.** The valve insert can now be rotated using the end of the adjusting key with the two unequal width pegs.

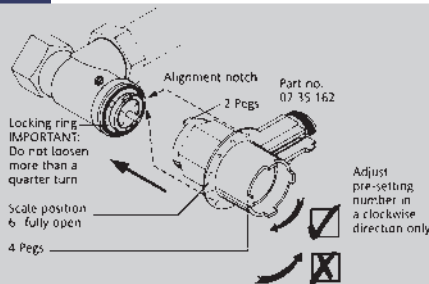
**IMPORTANT: Adjust in a clockwise direction only.**

**Note: The numbers on the key correspond with the numbers on the top rim of the valve insert.**

**iii.** Line up required setting number with the semi-circular notch on the top of the valve body and then re-tighten the locking ring. DO NOT OVER TIGHTEN. Never set at in-between or half numbers.



Fig.4



- i. Remove the thermostatic or wheelhead and loosen the locking ring. **WARNING: DO NOT LOOSEN MORE THAN A QUARTER TURN (90°)**, using the end of the adjusting key with the four equal width pegs.
- ii. The valve insert can now be rotated using the end of the adjusting key with the two unequal width pegs. **IMPORTANT: Adjust in a clockwise direction only.**  
**Note: The numbers on the key correspond with the numbers on the top rim of the valve insert.**
- iii. Line up required setting number with the semi-circular notch on the top of the valve body and then re-tighten the locking ring. **DO NOT OVER TIGHTEN.** Never set at in-between or half numbers.  
Presetting keys are available in packs of two, part number 07 35 162.

Pre-setting keys are available in packs of two, part number 07 35 162 from all leading plumbing merchants.

5. Repeat this procedure for all radiators working away from the pump.
6. Gradually open the primary flow to the hot water cylinder again using the contact thermometers to obtain 11°C drop between flow and return.
7. Fit the thermostatic heads to the radiator valves and set them to the desired temperature. Allow two hours for the room temperatures to stabilise

**Notes**

1. If excessive noise is heard at any time during the system balancing routine this may indicate the pump 'head' is set too high or the pipework has been incorrectly sized causing the water to flow at an excessively high speed. It is strongly recommended that the differential pressure across the thermostatic valves should not exceed 0.2 bar to avoid flow related noise. A differential pressure regulating device, e.g. the Drayton DTB Automatic by-pass valve should be used.

2. If a separate bypass has not been fitted, we would recommend a final check after the system has been balanced. Set all the TRVs to frost or off, with only the heating circuit "On" the open vent should be checked for pumping over or ingress of air.

3. B.S. 5449 states that TRVs should not be the sole means of controlling a heating circuit. They must be used in conjunction with other controls, such as a room thermostat which will switch off the boiler when there is no demand for heating. TRVs must not be fitted in the same room or area as the room thermostat.

**Replacement of Gland seal**

1. Gland seal can be replaced without draining the system. However there may be a slight seepage of water when the old seal is removed. It is recommended that dust sheets/small bowl is used to catch any drips.
2. Use the presetting key to remove the old gland seal.
3. Fit new Gland Seal and Re-tighten until the top of the Gland Seal is level with the top lip of the valve insert. **DO NOT OVER TIGHTEN**

**Kv values**      $Q = \frac{\sqrt{\Delta p}}{Kv}$       $Q = M^3/h$       $\Delta p = \text{Differential pressure bar}$

	Pre-setting Nr.	Kv (1K)	Kv (2K)	Kvs (max)	Max. Δp against which valve will shut	(2K)
EB 3/8	1	0.10	0.10	0.10	1 bar	-
	2	0.14	0.14	0.14	1 bar	-
	3	0.19	0.22	0.22	1 bar	-
	4	0.25	0.35	0.38	1 bar	0.16
	5	0.28	0.47	0.66	1 bar	0.48
	6	0.28	0.47	0.79	1 bar	0.64
EB 15 & 1/2	1	0.10	0.10	0.10	1 bar	-
	2	0.14	0.14	0.14	1 bar	-
	3	0.19	0.22	0.22	1 bar	-
	4	0.25	0.35	0.38	1 bar	0.16
	5	0.28	0.47	0.66	1 bar	0.48
	6	0.32	0.57	1.01	1 bar	0.68
EB 3/4	1	0.10	0.10	0.10	1 bar	-
	2	0.14	0.14	0.14	1 bar	-
	3	0.19	0.22	0.22	1 bar	-
	4	0.25	0.35	0.38	1 bar	0.16
	5	0.28	0.47	0.66	1 bar	0.48
	6	0.35	0.66	1.50	1 bar	0.80
EB 1	-	-	1.40	5.00	0.5	0.92

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