

## 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 (BS5750 Part 1).

*To commission your heating system you will need two contact thermometers and a manual cap for each TRV fitted. If you require extra caps telephone our Sales Office.*

#### 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. A white wheelhead cap is now available to fit on the Drayton range of valve bodies, once the cap is fitted to the body it can be used as a standard wheelhead/lockshield valve. If Drayton valves are use on both ends, see paragraph 4b overleaf.

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 the boiler and pump off. Close all lockshield valves and using the manual caps also close any TRVs fitted on the system, (manual wheelhead valves must be left open) see Fig. 1.

#### 4a. Using standard lockshields

Starting with the radiator nearest to the pump, open the manual cap on the TRV body by four divisions (see Fig. 2). Open the lockshield valve by a 1/4 turn, fit the contact thermometers to the flow and return pipes adjacent to the valves, switch on the boiler and pump and wait for the temperature readings to stabilise. The lockshield valve needs adjusting to achieve the design temperature drop between flow and return (usually 11°C). Remember that to increase the temperature drop you need to slow the flow rate by closing the lockshield valve and vice versa.

#### 4b. Using Drayton valves both ends

If a Drayton valve body with the white manual wheelhead cap (part no. 07 35 123) is being used in place of a lockshield (see Fig. 3), balance the radiator in one of the following ways:

i. if the flow rates and pressure differentials have been calculated for each radiator, set the valve with the thermostatic head fitted to the required pre-setting number, see Fig. 4 and table Fig. 5 to achieve the required Kv. Leave the isolating/balancing valve with the white wheelhead cap fully open.

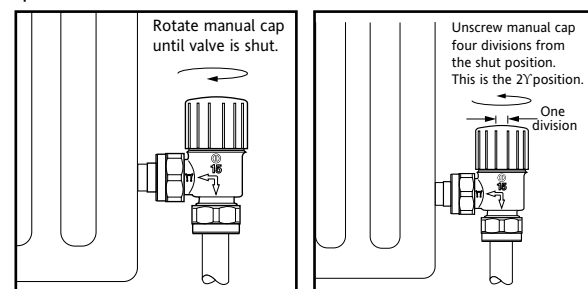
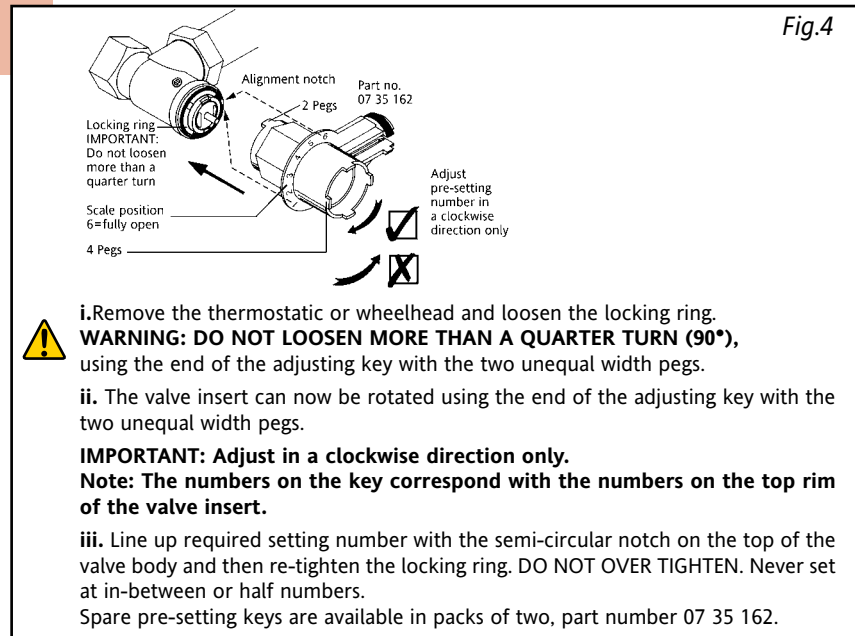


Fig.1

Fig.2

Fig.4



ii. if the flow rates etc. are unknown, follow the instructions in 4a Using standard lockshields, above, but instead of opening the lockshield  $\frac{1}{4}$  of a turn, set the valve to which the white wheelhead cap is fitted, to pre-setting number 4, see Fig. 4. If, after the radiator temperature has stabilised, it is necessary to reduce the flow (increase temperature drop), set the valve to a lower pre-setting number. If the flow needs to be increased, select a higher number.

Note: Never set at in between or half numbers. Once the isolating/balancing valve has been set, fit the white wheelhead cap and leave it in the fully open position.

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

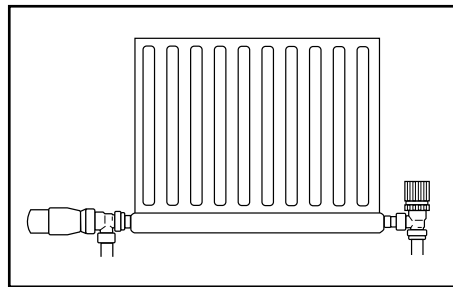


Fig.3

**Notes**

i. 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. Please refer to our data sheet D30.

ii. 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.

iii. B.S. 5449 states that TRV's 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. TRV's must not be fitted in the same room or area as the room thermostat.

Kv values	$Kv = \sqrt{\frac{Q}{\Delta p}}$		$Q = M^3/h$		$\Delta p =$ Differential pressure bar	$a$
	Pre-setting Nr.	Kv (1K)	Kv (2K)	Kvs (max)		
EB $\frac{3}{8}$	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 & $\frac{1}{2}$	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 $\frac{3}{4}$	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

**Invensys Controls Europe**  
 Customer Service Tel: 0845 130 5522  
 Customer Service Fax: 0845 130 0622  
 Technical Helpline Tel: 0845 130 7722  
 Email: customer.care@invensys.com  
 Website: www.draytoncontrols.co.uk

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