

RA 2000 for use with Stelrad LST Radiators

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General guide lines for the selection and use of radiator thermostats with Stelrad LST radiators

Danfoss RA 2000 radiator thermostats offer a simple non-electric method of controlling all types of radiators including low surface temperature radiators (LST), which are used extensively in institutional buildings. The wide range of valve bodies, available for both 1-pipe and 2-pipe systems, combined with a complete range of built-in and remote sensors, plus remote temperature sensor/adjusters makes Danfoss Randall the obvious choice for new systems and upgrades.

LST radiators are generally used in situations where there is deemed to be a risk of building occupants burning themselves should they come into contact with the surface of the radiator or the pipework systems which deliver heat to the radiator.

To achieve the low surface temperature, the radiator heat emitter and the associated distribution pipework are normally encased.

The challenges which are confronted when applying radiator thermostats to LST radiators fall into three main categories:-

- **Accommodation of Valve Body within Stelrad LST Case.**

Given the fixed distance between radiator tapping and the end case, the solution adopted will vary dependent upon the system type (ie. 1-pipe or 2-pipe), pipe system used (ie. copper or iron), and sensor requirements (ie. built-in or remote). Dependent upon these variables, the type of valve body and method of installation will vary dramatically.

- **How to use Built-in Sensors.**

On the face of it, this should have little influence on the valve installation, but the reality is different if the sensor is to protrude correctly from the LST case and be accessible to the building's users.

- **How to use Remote Sensors or Remote Sensor Adjusters.**

As above, this would seem to be unlikely to affect the valve body installation, but the reality is different if all of the components with the exception of the remote sensor or sensor/adjuster are to be contained within the case of the LST.

This Application Note aims at providing practical solutions to these applications.

Guide Lines for the Selection of Valve Bodies & Sensors

Valve Bodies

The primary consideration when selecting a valve body is to identify the type of heating system into which the valve is to be fitted.

Many institutional buildings still utilize conventional single pipe systems where circulation of water through the radiator depends upon thermo-syphon. Fig. 1. opposite depicts a typical single-pipe system. When selecting a valve for use in such systems ensure that the valve is suitable for one-pipe installations. More details can be found in the "Single-Pipe System" section which follows.

For 2-pipe systems, as depicted in Fig.2, opposite select a suitable 2-pipe valve body. Valve bodies should be mounted in the flow pipework, with water flow as per the direction of arrow. Care should be taken to ensure that the maximum differential pressure across the valve does not exceed 45Kpa. Pressures in excess of this value can lead to velocity noise in the system, particularly under part load conditions. Again details of valve selection can be found later, in the section entitled "Two-Pipe Systems".

Fig.1.

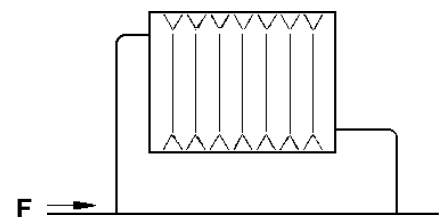
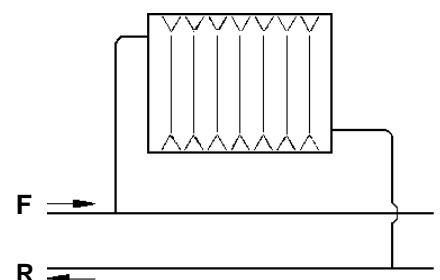


Fig.2.



Sensors

Built-in sensors offer the most convenient and cost effective solution and can be used wherever the sensor is in free air and out of the influence of extraneous heat gains from pipes etc.

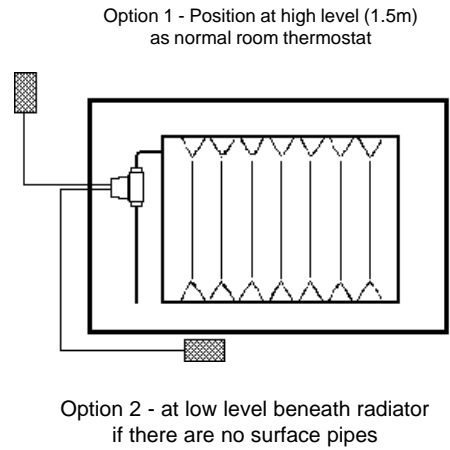
Locking and limiting is featured in all sensors and can be further enhanced by the use of tamperproof models, these being particularly useful in public areas where misuse may occur.

For situations where it proves to be impossible to locate a built-in sensor away from extraneous heat influences, or in situations where for piping reasons or security, it is not possible to use a built-in sensor, remote sensors are available. Further models which provide remote setting and sensing (remote adjusters) are also available.

Remote sensors are available with capillary lengths of up to 2m, remote adjusters are available with capillary lengths of 2,5 or 8m.

As regards the location of remote sensors, Fig.3. opposite gives general guidance. As with the valve bodies, application specific advice can be found later in this document.

Fig.3.



System Type: Two-Pipe
Pipework: Copper
Sensor Type: Exposed, Built-in

TWO-PIPE, SYSTEM 1	
Pipe Work	15mm Copper
Sensor Type	Built-in
Radiator Type	Single or Double panel

Mount Stelrad 40mm extension piece into flow tapping of radiator. Screw tailpiece of RA-FR 15 into extension piece and mount valve body so that the valve spindle is horizontal. Ensure that flow direction through the valve is as per the direction of flow arrow on valve body.

Select specification of built-in sensor to match system needs, mount the unit onto valve body, with sensor handle protruding through aperture in side of LST case.

Two-Pipe, System 1 Ordering Codes

DESCRIPTION	CODE NUMBER
RA-FR 15 Valve body, 15mm, reversible pattern	013G3281 *
RAS-D Sensor, 8-28°C	013G5120 *
RA 2010 Sensor, 5-26°C	013G2010
RA 2020 Sensor, 5-26°C	013G2020
40mm Tailpiece Extension	STELRAD

* Items can be purchased as combi pack code 013G5150

System Type: Two-Pipe
Pipework: Iron
Sensor Type: Exposed, Built-in

TWO-PIPE, SYSTEM 2	
Pipe Work	Iron 1/2 - 3/4"
Sensor Type	Built-in
Radiator Type	Single or Double panel

As above, but use valve body type **RA-N 15** (1/2") or **RA-N 20** (3/4"), observing direction of water flow arrow on the valve body.

IMPORTANT: Do not use standard RA-FN valve bodies, the offset between spindle centre and tailpiece centre prevents sensor from passing through LST end plate.

Two-Pipe, System 2 Ordering Codes

DESCRIPTION	CODE NUMBER
RA-N 15 1/2" Valve Body, horizontal angled	013G0153
RA-N 20 3/4" Valve Body, horizontal angled	013G0155
RAS-D Sensor, 8-28°C	013G5120
RA 2010 Sensor, 5-26°C	013G2010
RA 2020 Tamperproof Sensor, 5-26°C	013G2020
40mm Tailpiece Extension	STELRAD

System Type: Two-Pipe
 Pipework: Iron
 Sensor Type: Remote Sensing

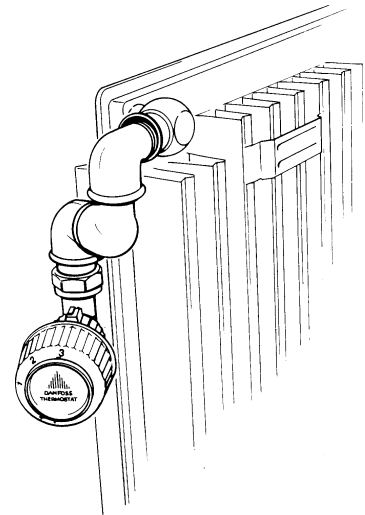
K+ LST RADIATORS

TWO-PIPE, SYSTEM 3	
Pipe Work	Iron 1/2" & 3/4"
Sensor Type	Remote *
Radiator Type	Single panel K+
* Applies also to Remote Adjuster	

Screw three M&F bends as shown on Fig.4. into the flow tapping of the radiator. The assembly should be tightened so that the vertical inlet into the first bend is close to the wall. A straight pattern RA-FN valve can now be mounted into the first bend and rotated in such a way as to allow the temperature adjusting knob of the remote sensor to sit within the space between the emitter and the LST case.

A remote sensor or remote adjuster can now be mounted. Refer to Fig.3. in the sensor section for guidance on where to locate the sensor. Any spare capillary can be coiled up within the LST case.

Fig.4.



Two-Pipe, System 3 Ordering Codes

DESCRIPTION	CODE NUMBER
RA-FN 15 1/2" Valve Body, straight	013G0024
RA-FN 20 3/4" Valve Body, straight	013G0026
RA 2012 Remote Sensor, 2m capillary tube, 5-26°C	013G2012
RA 5062 Remote Adjuster, 2m capillary tube, 6-28°C	013G5062
RA 5065 Remote Adjuster, 5m capillary tube, 6-28°C	013G5065
RA 5068 Remote Adjuster, 8m capillary tube, 6-28°C	013G5068
Also require three 90° Bends/Elbows.	

System Type: Two-Pipe
 Pipework: Iron
 Sensor Type: Remote Sensing

K2 LST RADIATORS

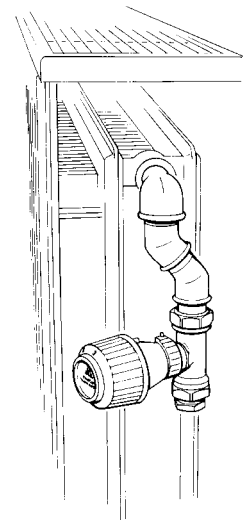
TWO-PIPE, SYSTEM 4	
Pipe Work	Iron 1/2" & 3/4"
Sensor Type	Remote *
Radiator Type	Double panel K2
* Applies also to Remote Adjuster	

Screw together two 45° knuckle bends and a 90° elbow as shown in Fig.5. into the flow tapping of the radiator.

The assembly should be tightened so that the vertical inlet into the open ended 45° knuckle is facing vertically down and is next to the wall. A straight pattern RA-FN valve can now be mounted into the knuckle bend inlet and rotated in such a way as to allow the temperature adjuster handle of the remote sensor to sit within the space between the emitter and the LST case.

A remote sensor or remote adjuster can now be mounted. Refer to Fig.3. in the sensor section for guidance on where to locate the sensor. Any spare capillary can be coiled up within the LST case.

Fig.5.



Two-Pipe, System 4 Ordering Codes

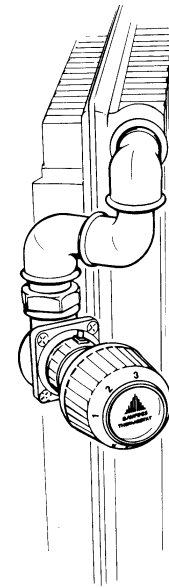
DESCRIPTION	CODE NUMBER
RA-FN 15 1/2" Valve Body, straight	013G0024
RA-FN 20 3/4" Valve Body, straight	013G0026
RA 2012 Remote Sensor, 2m capillary tube, 5-26°C	013G2012
RA 5062 Remote Adjuster, 2m capillary tube, 6-28°C	013G5062
RA 5065 Remote Adjuster, 5m capillary tube, 6-28°C	013G5065
RA 5068 Remote Adjuster, 8m capillary tube, 6-28°C	013G5068
Also require one 90° M&F Elbow and two 45° knuckle bends	

System Type: One-Pipe
 Pipework: Iron
 Sensor Type: Remote Sensing

In order to improve performance of one-pipe systems the following is recommended:-

- Always use TBOE connections
- Use either swept or diversion Tee's in the main one-pipe system.

Fig.6.



K+ LST RADIATORS

ONE-PIPE, SYSTEM 1	
Pipe Work	Iron 1/2" & 3/4"
Sensor Type	Remote *
Radiator Type	Single panel K+
* Applies also to Remote Adjuster	

Screw three M&F bends as shown on Fig.6. into the flow tapping of the radiator. The assembly should be tightened so that the vertical inlet into the first bend is close to the wall. A straight pattern RA-G valve can now be mounted into the first bend and rotated in such a way as to allow the temperature adjusting knob of the remote sensor to sit within the space between the emitter and the LST case.

A remote sensor or remote adjuster can now be mounted. Refer to Fig.3. in the sensor section for guidance on where to locate the sensor. Any spare capillary can be coiled up within the LST case.

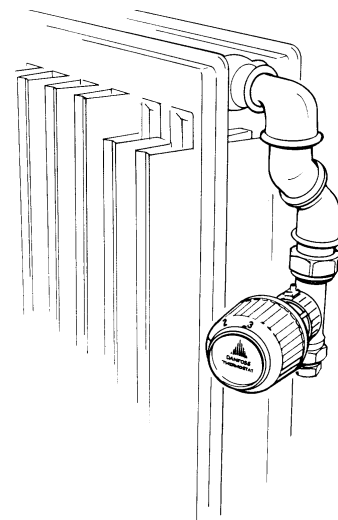
One-Pipe, System 1 Ordering Codes

DESCRIPTION	CODE NUMBER
RA-G 15 1/2" Valve Body, straight	013G0124
RA-G 20 3/4" Valve Body, straight	013G0126
RA 2012 Remote Sensor, 2m capillary tube, 5-26°C	013G2012
RA 5062 Remote Adjuster, 2m capillary tube, 6-28°C	013G5062
RA 5065 Remote Adjuster, 5m capillary tube, 6-28°C	013G5065
RA 5068 Remote Adjuster, 8m capillary tube, 6-28°C	013G5068
Also require three 90° Bends/Elbows.	

System Type: One-Pipe
 Pipework: Iron
 Sensor Type: Remote Sensing

ONE-PIPE, SYSTEM 2	
Pipe Work	Iron 1/2" & 3/4"
Sensor Type	Remote *
Radiator Type	Double panel K2
* Applies also to Remote Adjuster	

Fig.7.



K2 LST RADIATORS

Screw together two 45° knuckle bends and a 90° elbow as shown in Fig.7. into the flow tapping of the radiator.

The assembly should be tightened so that the vertical inlet into the open ended 45° knuckle is facing vertically down and is next to the wall. A straight pattern RA-G valve can now be mounted into the knuckle bend inlet and rotated in such a way as to allow the temperature adjuster handle of the remote sensor to sit within the space between the emitter and the LST case.

A remote sensor or remote adjuster can now be mounted. Refer to Fig.3. in the sensor section for guidance on where to locate the sensor. Any spare capillary can be coiled up within the LST case.

One-Pipe, System 2 Ordering Codes

DESCRIPTION	CODE NUMBER
RA-G 15 1/2" Valve Body, straight	013G0124
RA-G 20 3/4" Valve Body, straight	013G0126
RA 2012 Remote Sensor, 2m capillary tube, 5-26°C	013G2012
RA 5062 Remote Adjuster, 2m capillary tube, 6-28°C	013G5062
RA 5065 Remote Adjuster, 5m capillary tube, 6-28°C	013G5065
RA 5068 Remote Adjuster, 8m capillary tube, 6-28°C	013G5068
Also require one 90° M&F Elbow and two 45° knuckle bends.	