

ADJUSTER

Digital and Wireless Wall Adjuster



Models: **ADJ-D** Digital wall adjuster
ADJ-W Wireless wall adjuster



ADJUSTER: Product Overview
FORM 040.101 REV 1011

BENEFITS AT A GLANCE.

EASY ADJUSTMENT OF THERMA-FUSER™ DIFFUSER SET POINT

Acutherm's Wall Adjusters provide Therma-Fuser™ diffusers with a remotely adjustable temperature control set point. The Wall Adjuster allows the occupant to easily adjust the temperature set point of the thermostat(s) located in the Therma-Fuser diffuser.

WIRELESS COMMUNICATION

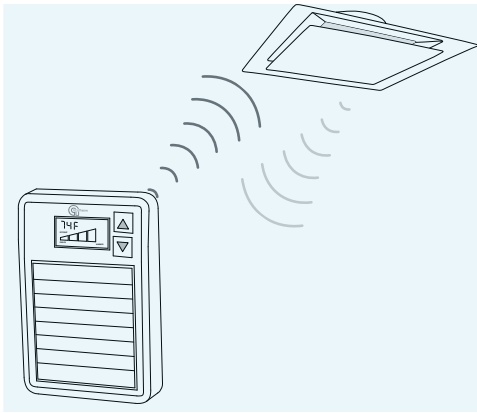
The Wireless Wall Adjuster is battery-less using power harvesting technology to run the wall unit and a wireless digital protocol to communicate with the diffuser. A wired version, the Digital Wall Adjuster, is also available and comes complete with a cable for connection between the Adjuster and the diffuser.

SIMPLE INTERFACE WITH BUILDING MANAGEMENT SYSTEMS

Integration with building automation systems (BAS) is simple because a protocol independent interface is built in. A scaled analog output of the set point and an analog input to change the set point are available.

ADJUSTER Wireless Wall Adjuster

WIRELESS



HOW IT WORKS

The temperature control level (set point) of the Therma-Fuser diffuser is lowered by adding heat to the thermostat/ actuator. A small resistance heater attached to the thermostat warms it and adds just enough heat to create a precise thermal differential between the temperature sensed at the Therma-Fuser diffuser thermostat and actual temperature in the space. This bias heat causes the thermostat to control at the lower temperature selected at the Wall Adjuster.

For example, with the thermostat set at 76°F/24°C, if 0° bias heat is added, the actual control temperature is 76°F/24°C. If 2°F /1°C of bias heat is added, the actual control temperature is 74°F /23°C and if 4°F/2°C of bias heat is added the actual control temperature is 72°F/22°C.

The thermostat(s) in the Therma-Fuser diffuser are factory adjusted to 76°F/24°C and should remain at 76°F/24°C for the Wall Adjuster to function correctly. Changing the thermostat adjustment will cause the temperature control in the space to deviate from the control temperature selected at the Wall Adjuster.

When using the Wall Adjuster with Type -HC diffusers, both the heating and cooling thermostats are adjusted simultaneously.

The Wireless Wall Adjuster is powered by the room lighting through a photovoltaic cell and does not require batteries.

Energy is stored in a super capacitor allowing the Wireless Wall Adjuster to operate for days in total darkness (*starting from fully charged). Natural and/or artificial light instantly powers the Adjuster and recharges the capacitor.

24VAC power must be supplied (by others) to a control board mounted on the diffuser in the ceiling. This allows communication with a range of over 100ft / 30m through a low power IEEE 802.15.4 wireless protocol. The control board outputs an DC signal to the heater(s) on the diffuser thermostat(s).

OPTIONS

• Secondary Diffusers

The Wireless Wall Adjuster communicates to a control board that is mounted on a Therma-Fuser diffuser designated as the master diffuser. The master diffuser may be connected using a simple pair of wires to up to four (4) secondary diffusers. Adjustment of the set point will adjust the temperature control level of the master diffuser and any secondary diffusers simultaneously. The secondary diffusers are not 'slaved' to the master diffuser. The secondary diffusers will have the same set point as the master, but each secondary still has its own thermostat and can independently adjust the damper position to meet the requirements of the space served.

• Numeric Display

The Wireless Wall Adjuster uses a warmer/cooler display to indicate the set point of the diffuser. A numeric display of the set point may be switched on and off with a dip switch.

• Units of Measure

Another dip switch may be used to select between a numerical display in °F or °C.

• BAS Communication

A protocol independent Building Automation System (BAS) interface is available. The Wireless Wall Adjuster uses a 0-10 VDC output signal to transmit the set point and a 0-10 VDC input signal to change the set point. An input signal of 0 VDC disables the interface.

• Room Temperature

Sensors may be added to the master diffuser to provide a measurement of the room temperature. The room temperature is displayed on the Wireless Wall Adjuster. When either button is pressed the display shows the set point and reverts to the room temperature 10 sec after the last button press.

• Acu-Zone Heater Control

In conjunction with the room temperature sensors an auxiliary control to switch on and off an Acu-Zone Duct Heater may be added. The thermostat wiring from the Acu-Zone Heater is connected to the master diffuser and the heating set point adjusted (68-73°F / 20-23°C) on the master diffuser control board. If the room temperature (measured by the sensors) drops below the heating set point then the Acu-Zone Heater is energized.

GUIDE SPECIFICATION WIRELESS WALL ADJUSTER

(Addition to guide specification for standard Therma-Fuser diffuser.)

Where letters WA follow the model and type designation (e.g. TF-HC-WA2) the Therma-Fuser VAV diffuser shall be equipped for adjustment of room temperature control level by a remote adjust unit. This shall include resistance heater(s) attached to the room thermostat(s). The heater(s) shall be wired to a NEMA 1 terminal box mounted on the exterior of the Therma-Fuser diffuser housing. The thermostat(s) in the Therma-Fuser diffuser shall be factory set at 76°F/24°C.

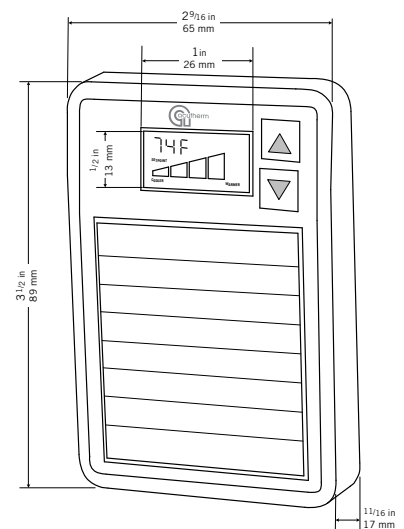
The remote adjust unit shall also be supplied by Acutherm and shall require no batteries and be capable of wirelessly adjusting the control level of one master and up to four secondary diffusers. Two push buttons on the unit shall allow adjustment of the room temperature control level set point between 68°F/20°C and 76°F/24°C. Display shall be digital with 'warmer/cooler' indicators and optional numeric set point readout.

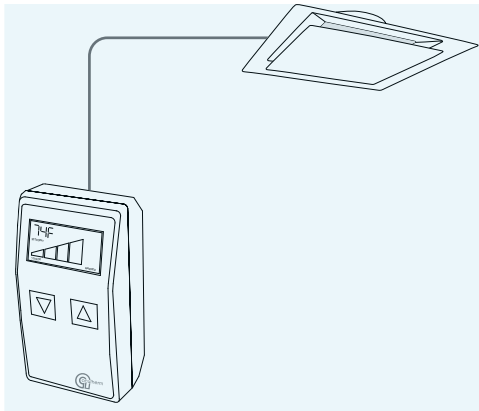
The remote adjust unit shall be suitable for mounting directly onto the wall or onto a standard 2"x4" electrical box (by others).

A protocol independent analog 0-10 VDC signal shall make available the set point for both input and output to a building automation system.

The master diffuser shall be supplied with 24 VAC ±2 VAC power. Wiring including power wiring to the 24 volt transformer, the 24 volt transformer, wiring from the transformer to the master diffuser, wiring from the master diffuser to the building automation system, and wiring between the master diffuser and any secondary diffuser(s) shall be furnished and installed (by others) as part of the electrical specifications.

WIRELESS DIMENSIONS





HOW IT WORKS

The temperature control level (set point) of the Therma-Fuser diffuser is lowered by adding heat to the thermostat/actuator. A small resistance heater attached to the thermostat warms it and adds just enough heat to create a precise thermal differential between the temperature sensed at the Therma-Fuser diffuser thermostat and actual temperature in the space. This bias heat causes the thermostat to control at the lower temperature selected at the Wall Adjuster.

For example, with the thermostat set at 76°F/24°C, if 0° bias heat is added, the actual control temperature is 76°F/24°C. If 2°F /1°C of bias heat is added, the actual control temperature is 74°F /23°C and if 4°F/2°C of bias heat is added the actual control temperature is 72°F/22°C.

The thermostat(s) in the Therma-Fuser diffuser are factory adjusted to 76°F/24°C and should remain at 76°F/24°C for the Wall Adjuster to function correctly. Changing the thermostat adjustment will cause the temperature control in the space to deviate from the control temperature selected at the Wall Adjuster.

When using the Wall Adjuster with Type -HC diffusers, both the heating and cooling thermostats are adjusted simultaneously.

The Digital Wall Adjuster is connected to the diffuser with a plenum rated, 35ft, ten conductor cable with a 10-pin quick connector. 24VAC power must be supplied (by others) to the diffuser in the ceiling. The power is passed down the 35ft cable to the wall-mounted Digital Wall Adjuster and a DC output signal, to control the set point, is passed back up the cable to the heater(s) on the diffuser thermostat(s).

OPTIONS

• Secondary Diffusers

The Digital Wall Adjuster is connected to a Therma-Fuser diffuser designated as the master diffuser. The master diffuser may be connected using a simple pair of wires to up to four (4) secondary diffusers. Adjustment of the set point will adjust the temperature control level of the master diffuser and any secondary diffusers simultaneously. The secondary diffusers are not 'slaved' to the master diffuser. The secondary diffusers will have the same set point as the master, but each secondary still has its own thermostat and can independently adjust the damper position to meet the requirements of the space served.

• Numeric Display

The Digital Wall Adjuster uses a warmer/cooler display to indicate the set point of the diffuser. A numeric display of the set point may be switched on and off with a dip switch.

• Units of Measure

Another dip switch may be used to select between a numerical display in °F or °C.

• BAS Communication

A protocol independent Building Automation System (BAS) interface is available. The Digital Wall Adjuster uses a 0-2 VDC output signal to transmit the set point and a 0-2 VDC input signal to change the set point. The interface is activated by switching a dip switch.

GUIDE SPECIFICATION DIGITAL WALL ADJUSTER

(Addition to guide specification for standard Therma-Fuser diffuser.)

Where letters DA follow the model and type designation (e.g. TF-HC-DA2) the Therma-Fuser VAV diffuser shall be equipped for adjustment of room temperature control level by a remote adjust unit. This shall include resistance heater(s) attached to the room thermostat(s). The heater(s) shall be wired to a NEMA 1 terminal box mounted on the exterior of the Therma-Fuser diffuser housing. The thermostat(s) in the Therma-Fuser diffuser shall be factory set at 76°F/24°C.

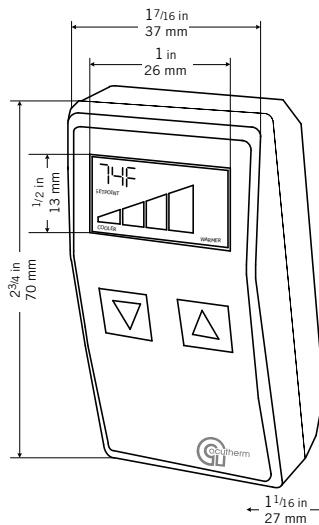
The remote adjust unit shall also be supplied by Acutherm and shall be capable of adjusting the control level of one master and up to four secondary diffusers. Two push buttons on the unit shall allow adjustment of the room temperature control level set point between 68°F/20°C and 76°F/24°C. Display shall be digital with 'warmer/cooler' indicators and optional numeric set point readout.

The remote adjust unit shall be suitable for mounting directly onto the wall or onto a standard 2"x4" electrical box (by others).

A protocol independent analog 0-2 VDC signal shall make available the set point for both input and output to a building automation system.

The master diffuser shall be supplied with 24 VAC ±2 VAC power. Wiring between the master diffuser and the Digital Wall Adjuster shall be supplied by Acutherm. All other wiring including power wiring to the 24 volt transformer, the 24 volt transformer, wiring from the transformer to the master diffuser, wiring from the master diffuser to the building automation system, and wiring between the master diffuser and any secondary diffuser(s) shall be furnished and installed (by others) as part of the electrical specifications.

DIGITAL DIMENSIONS





ADJUSTER Digital and Wireless Wall Adjuster

TWO YEAR WARRANTY

Acutherm warrants that its Wall Adjuster, exclusive of any options and accessories (whether factory or field installed) shall be free from defective material or workmanship for a period of two (2) years from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said two (2) year period due to any such defects which would not have occurred had reasonable care and proper usage and all parts and controls remain unaltered. Acutherm makes NO WARRANTY OF MERCHANTABILITY OF PRODUCTS OR OF THEIR FITNESS FOR ANY PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY WHICH EXTENDS BEYOND THE LIMITED WARRANTY ABOVE. ACUTHERM'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM DEFECTS SHALL IN NO EVENT EXCEED THE COST OF REPAIR OR REPLACEMENT OF PARTS FOUND DEFECTIVE UPON EXAMINATION BY ACUTHERM. IN NO EVENT SHALL ACUTHERM BE LIABLE FOR INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY. Acutherm shall not be responsible for freight to or from its plant in connection with the inspection, repair or replacement of parts under the terms of this limited warranty nor for cost of removal or installation.

ACUTHERM PRODUCT GUIDE



PRODUCT INFORMATION DESCRIPTION

Use the following model number nomenclature to order digital or wireless wall adjuster

Product

(1) Model	(2) Type	(3) Display
▶ ADJ		
(4) Unit Display	(5) Application	(6) Diffuser
▶		

Product

1. Model: **ADJ** – Wall Adjuster
2. Type: **D** Digital, **W** Wireless
3. Display: **W** Warmer/Cooler, **N** Numeric
4. Unit Display: **F** °Fahrenheit, **C** °Celsius
5. Application: **S** Standalone, **BAS** Building Automation System
6. Diffuser: **ST, TF, TB, TK, TN, TL**

Digital Options

(✓) Wall Plate
▶

Wireless Options

(✓) Room Sensor	(✓) Auxiliary Heat
▶	

Options

Digital: **Wall Plate** for installation into a 2x4 electrical box

Wireless: **Room Sensor** for display of room temperature, **Auxiliary Heat** for control of Acu-Zone heater (room sensor required)

Digital Accessories

(1) Adapter Cable
▶

Accessories

Digital: Adapter Cable: **6 Pin** Adapter, **4 Wire** Adapter for analog adjuster replacement

AVAILABLE ONLINE

Access digital brochures, CAD files, performance data and more!

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THERMA-FUSER™ SYSTEMS
 OPTIONS & ACCESSORIES - PRESSURE CONTROL



BYPASS R-RINGS

Available for: **ST-HC** **TF-HC** **TF-C**
 ST-C **TF-CW** **TB-CW**

Bypass R-Rings are used to bypass supply air into the ceiling plenum when Therma-Fuser VAV diffusers turn down. The purpose of the bypass is to limit diffuser noise by limiting inlet static pressure. A Therma-Fuser diffuser with a bypass R-Ring has a constant volume air flow to it and, therefore, also over the balancing damper. This results in a constant pressure drop over the balancing damper which, in turn, limits the static pressure at the diffuser at both full flow and turn down.

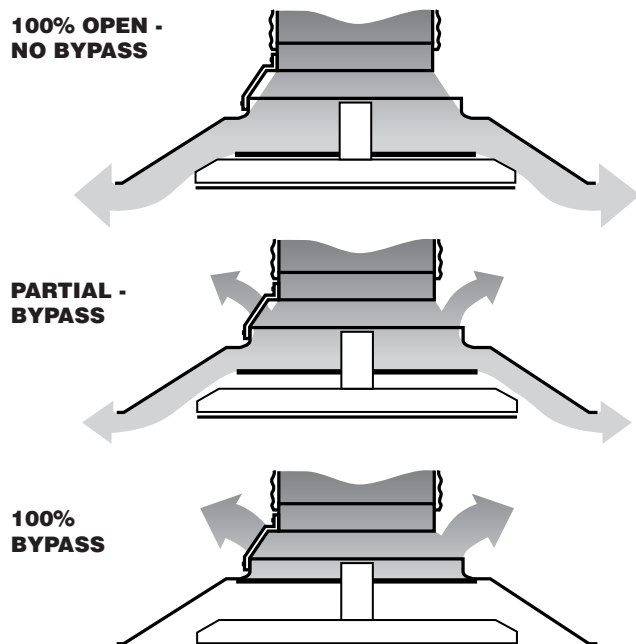
Because supply air is bypassed into the ceiling plenum, R-Rings can not be used with a ducted return. They also require a four way blow pattern as three, two or one way patterns upset the bypass.

R-Rings are available in three nominal inlet sizes of 6 in./150mm, 8 in./200 mm and 10 in./250mm. There is no 12 in./300mm inlet R-Ring.

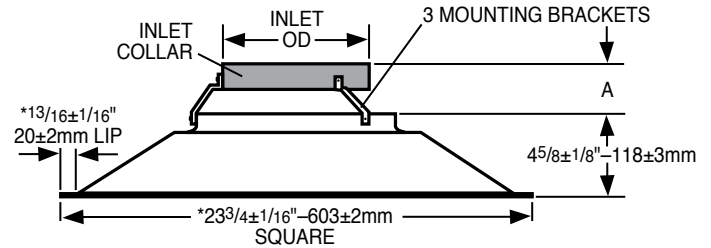
HOW THEY WORK

Therma-Fuser diffusers can be factory or field fitted with an R-Ring which is a smaller inlet collar mounted above the original diffuser neck. The supply duct is connected to the smaller inlet collar. The open space between the inlet collar and the original neck is used to bypass air into the ceiling plenum when the Therma-Fuser diffuser closes.

With the Therma-Fuser diffuser open at the zero bypass point, the geometry is such that the rated amount of air flows into the room and no air is bypassed. As the Therma-Fuser diffuser closes, less air enters the room and more air is bypassed. With the Therma-Fuser diffuser fully closed, except for normal leakage all air is bypassed into the ceiling plenum.



DIMENSIONS



*595±2mm Square with 16±2mm lip available
 - specify 595mm square

SIZE	INLET OD	A
R6	5 7/8 in. / 150 mm	3 in. / 76 mm
R8	7 7/8 in. / 200 mm	3 1/8 in. / 79 mm
R10	9 7/8 in. / 250 mm	3 1/4 in. / 82 mm

APPLICATION AND INSTALLATION

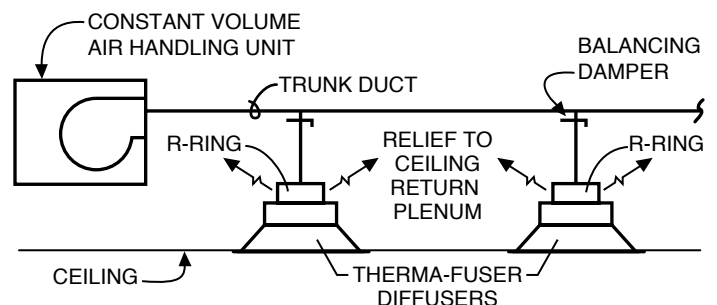
Select R-Rings using the standard performance guide for the appropriate model. Use the same inlet size as the R-Ring inlet. The geometry of the Acutherm R-Ring is designed for the same air volumes at the same static pressure shown in the performance guide. When R-Rings are used, throws may be as low as 90% of the throw shown in the performance guide and NC may be 2db higher. Inlet height also increases by 3 in./76mm to 3 1/4 in./82mm.

Only use R-Rings with ceiling plenum returns. Do not use them with ducted returns. Use only four way blow patterns. Do not use three, two or one way blow patterns.

Proper return air design is important to achieve a negative plenum pressure relative to the room. Otherwise the radiant effect of the ceiling and leakage through the ceiling could result in poor control of the room temperature.

Install the duct no lower than the shoulder on the R-Ring bracket. Do not install the duct below the bottom of the inlet collar.

A manual balancing damper should be installed at the takeoff for each Therma-Fuser diffuser. Use this balancing damper to adjust for design air flow from the Therma-Fuser diffuser. See *System Balancing*.

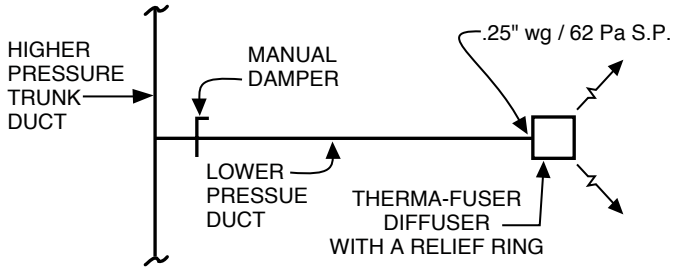


R-RINGS ON HIGHER PRESSURE TRUNK DUCT

R-Rings can be used when there is a need to supply air to Therma-Fuser diffusers from a medium pressure duct system, and the use of a modulating zone damper is not justified because of cost or other reasons. (For more on static pressure control, see Forms 5.2 and 6.3.)

Therma-Fuser diffusers with relief rings receive a constant volume of air from the higher pressure duct. The Therma-Fuser diffusers supply air to the conditioned space and/or relieve air through the R-Rings. This is a pressure dependent system. If pressure in the higher pressure duct changes, flow through the lower pressure duct will change.

Sound attenuation should be considered when taking pressure drops higher than 1 in. wg / 240 Pa. over the manual balancing damper to counteract both radiated and duct born noise.



SYSTEM BALANCING

VAV systems are balanced for design air volume at maximum air flow and systems using Therma-Fuser VAV diffusers are no exception. When all the Therma-Fuser diffusers are set for maximum air flow by fully opening them, the system is really a constant air volume system and is balanced as a constant volume system. Balancing dampers are best located at the takeoff before the runout to the Therma-Fuser diffuser.

1. Prepare system for balancing. Make necessary checks for diversity, fan capacities, fan rotation, minimum outside air requirements and duct leaks. Set outside air control damper for minimum air and return air control damper for maximum air.
2. Open Therma-Fuser diffusers.
 - A. Models ST-HC and ST-C
Note: When field fitting R-Rings to ST diffusers, the maximum flow stops must be changed before balancing. See instructions with the field installation kit. Locate the side of the ST diffuser with the thermostat and the balancing lever. Push the balancing lever to the right and up.
 - B. Models TF-HC, TF-CW and TF-C
Open the appearance panel. Do not disconnect the spring. Use temporary balancing stops made of wood supplied with the diffuser to hold the blades open the proper distance for balancing. Thickness of the stop will depend on the size of the R-Ring used. See Table 1. Close the appearance panel.

Model R-ring	TF-R6	TF-R8	TF-R10
Nominal Duct Size	6 in. / 150 mm	8 in. / 200 mm	10 in. / 250 mm
Stop Thickness— Correct Dimension For Blade Opening When Balancing	3/8 in. / 9.5 mm	5/8 in. / 16 mm	7/8 in. / 22 mm

Table 1

C. Models TB-C and TB-CW

Note: When field fitting R-Rings to TB diffusers, a spacer must be added above the existing maximum flow stop before balancing. See instructions with the field installation kit.

The TB-C and TB-CW model Therma-Fuser diffuser is kept fully open by holding down the control arm and allowing the diffusion disc to drop down against the stop. The easiest way of holding down the control arm is to insert either a 4" nail, a rod, some heavy wire, a screwdriver, or even a lollipop stick through the matching holes in the control arm and channel. See brochure for model TB.

3. Start fans, adjust system for 100% air flow and make system checks. (Measure static pressure across filters and coils and at sensor for static pressure controller. Measure supply, return and branch duct air flow.)
4. Measure air flow from each Therma-Fuser diffuser and adjust the damper at the duct takeoff to obtain maximum design air flow. Air flow measurement may be with a direct reading diffuser balancing hood or air velocity meter. In either case, static pressure is measured with all appearance panels in place. This is because the appearance panel affects pressure drop through the diffuser. When a velocity meter is used to measure the discharge velocity, the velocity is measured at the top edge of the housing.

Ak factors when the Therma-Fuser diffuser is open are as follows:

R-RING	Ak ft ²		
	ST-HC, ST-C	TF-HC, TF-CW, TF-C	TB-CW, TB-C
R6	0.12	0.14	0.12
R8	0.21	0.22	0.21
R10	0.28	0.28	0.28

Table 2

5. Return Therma-Fuser diffusers to operating condition.
 - A. Model ST-HC and ST-C
Pull the balancing lever down until it latches
 - B. Model TF-HC, TF-CW and TF-C
Open the appearance panel, remove the balancing stops and close the appearance panel
 - C. Model TB-CW and TB-C
Remove whatever is used to hold down the control arm (inserted in step 2) and close the appearance panel.
6. Return the remainder of the system to operating condition.



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