



MANUAL – INSTALLATION, OPERATION + MAINTENANCE

Round VAV Diffuser

VRD - Varitherm Series

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PRICE | VAV
DIFFUSERS

VARITHERM ROUND VAV DIFFUSER

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INSTALLATION INSTRUCTIONS

Damaged Freight Claim Procedure

When the diffusers are received, inspect for damage which may have occurred during shipment. If damage is evident, it should be noted on the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once.

Storage

Cartons should always be stacked on end with the arrows on the cartons pointing up. Do not stack cartons flat on the sides. Excessive weight may cause damage to the diffusers. Do not store for prolonged times at temperatures exceeding 130°F/56°C.

Identification

Diffusers are factory shipped one per carton. The model designation is on the diffuser and on the carton.

Installation Precautions

When installing diffusers, make sure construction debris does not enter the diffuser or duct system.

Because the models VRD-C and VRD-HC control room temperature by sensing the room air induced up the center of the room, care should be taken not to disturb room air induction and entrainment. For example, location next to walls or dropped lights results in the reflection of primary air back at the Varitherm Round VAV diffuser and should be avoided. Either the light or the Varitherm Round VAV diffuser should be relocated.

Installation Instructions

1. Inspect the carton for damage before opening. Notify carrier if external damage exists. Submit all claims for shipping damage to the carrier.
2. Move diffusers (in cartons) to installation area. Note unit identification.
3. Remove cardboard box and cardboard insert. Discard packing material.
4. Attach the neck of the diffuser to the duct by screwing through the duct into the diffuser. A minimum of four (4) screws is recommended. Use wire hangers where required by code.

NOTE: Air Lifter, if used, must be installed before attaching the diffuser to the duct.

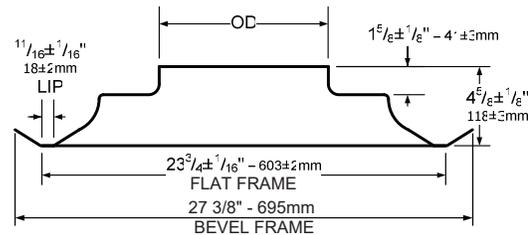
5. Flexible duct should NOT be formed in a centerline radius of less than 1½ times the duct diameter.
6. Do NOT reset the temperature set point on the VRD-C and VRD-HC models until the space is occupied. The set point is factory preset for average conditions (74°F/23°C).
7. Balance the system. See **System Balancing**.
8. After the air conditioning system is started and after the space is occupied, where necessary adjust the temperature set point on VRD-C and VRD-HC models to suit the occupant. See **Adjusting Temperature**.

Operating Instructions

Operating instructions for models VRD-C and VRD-HC are located on the back of the appearance panel. See **Fig. 2**.

FIG. 1 DIMENSIONS ▼

Inlet Designation	OD	
	Inches ±1/16	mm ±3
6	5 ¹⁵ / ₁₆	150
8	7 ¹⁵ / ₁₆	200
10	9 ¹⁵ / ₁₆	250
12	11 ¹⁵ / ₁₆	300



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INSTALLATION INSTRUCTIONS

Opening the Appearance Panel

The appearance panel is attached with two latch clips on one side and hinges on the opposite side.

To open the appearance panel (on a Varitherm Round VAV diffuser installed in the ceiling):

1. Locate the side of the Varitherm Round VAV diffuser with the thermostat. Using two hands, one on each side of the channel, place your fingers above the appearance panel and firmly pull down to disengage the clips. The appearance panel will rotate and hang down vertically on the hinges. See **Fig. 2**.

To close the appearance panel:

1. Rotate the panel upward.
2. Latch the panel by pushing the clips into the small square holes in the channel.

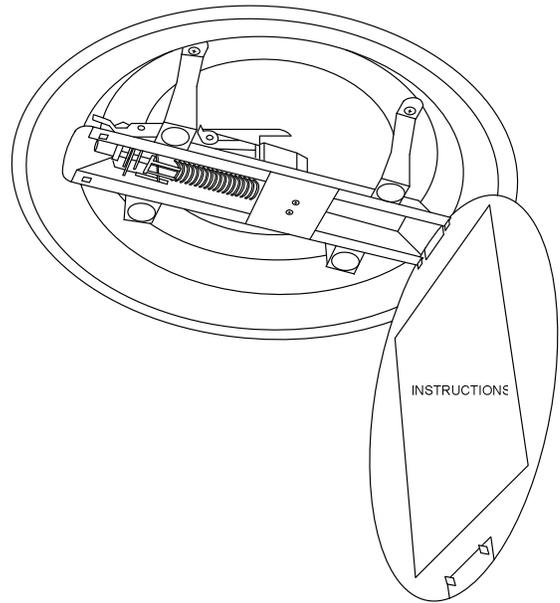
To remove the appearance panel:

1. Open appearance panel as described above.
2. Rotate the appearance panel away from the latch clip bracket to force the hinge hooks open on the panel.
3. Slightly lift the panel to remove from the hinges.

To reattach the appearance panel:

1. Hang the appearance panel on the hinges.
2. Press the hinge hooks against the panel to close around the hinge brackets.
3. Close panel as describe above.

FIG. 2 OPEN APPEARANCE PANEL ▼



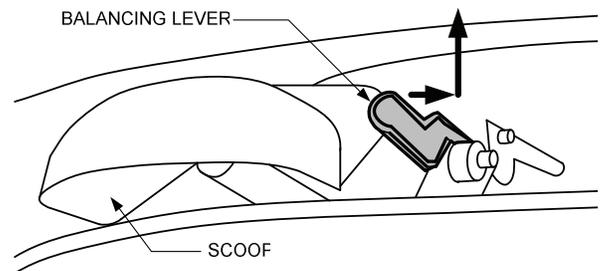
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SYSTEM BALANCING

VAV systems are balanced for design air volume at maximum air flow and systems using Varitherm Round VAV VAV diffusers are no exception. When all the 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 Varitherm Round VAV diffuser.

1. Prepare system for balancing. (Make necessary checks for diversity, fan capacities, fan rotation, minimum outside air requirements, duct leaks and static pressure controller design setting. Set outside air control damper for minimum air and return air control damper for maximum air.)
2. Open Varitherm Round VAV diffusers. VRD-C and VRDHC.
 - a. Locate the side of the VRD diffuser with the thermostat and the balancing lever.
 - b. Push the balancing lever to the right and up. See **Fig. 3**.
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 Varitherm Round VAV diffuser and adjust the damper at the duct takeoff to obtain maximum design air flow. Air flow measurement may be taken with a direct reading diffuser balancing hood. Measurements are made with all appearance panels in place. This is because the appearance panel affects pressure drop through the diffuser.
5. Return Varitherm Round VAV diffusers to operating condition by pushing the balancing lever down until it latches.
6. Return the remainder of the system to operating condition.

FIG. 3 OPEN FOR BALANCING ▼



*TO OPEN, PUSH THE LEVER TO THE RIGHT AND UP.
TO CLOSE, PULL LEVER DOWN.*

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ADJUSTING MIMINUM FLOW & TEMPERATURE SETPOINTS

Adjusting Minimum Flow

Turn dial until desired minimum flow on the scale intersects with the lower metal piece. See **Fig. 5**.

Adjusting Temperature Setpoints

The VRD Varitherm Round VAV diffuser is factory set at 74°F/23°C. Because heat loads in various rooms differ and individual occupants prefer different temperatures, it is recommended that the thermostat not be adjusted until after a few days of operation.

Room temperature setpoints for heating and cooling are separately adjusted by turning the heating and cooling thumbwheels. Align the outside of each thumbwheel with its respective temperature scale. See **Fig. 6**. Each setpoint can be anywhere between 70° and 78°F/21° and 25°C. Both are factory set at 74°F/23°C. (The model VRD-C has only one thumbwheel).

If the cooling thumbwheel is tight when the room is cool, continue to turn the thumbwheel and pull the changeover close rod outward to relieve the tightness. See **Fig. 6**.

FIG. 5 ADJUSTING MIMINUM FLOW ▼

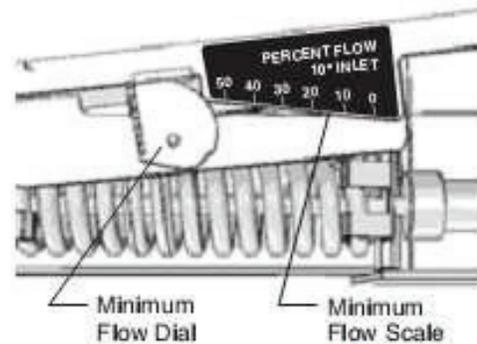
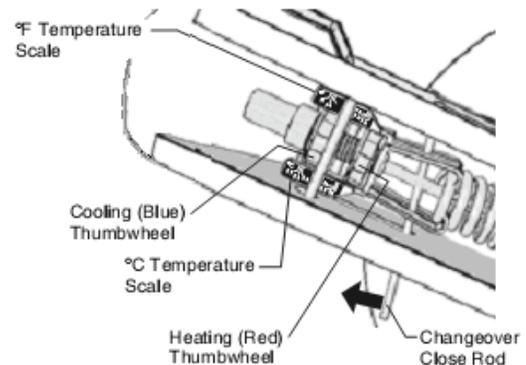


FIG. 6 ADJUSTING TEMPERATURE ▼



VARITHERM ROUND VAV DIFFUSER

ADJUSTING MINIMUM FLOW & TEMPERATURE SETPOINTS

Recommended Adjustments for Various Conditions

	ACH	SF	CFM
Cooling Mode VRD-C VRD-HC	Too Cold	open	Adjust cooling for higher room temperature set point. (Turn cooling thumbwheel out.)
		closed	Varitherm Round VAV diffuser is correct. Check if cooling is still required, and if not, turn cooling unit off.
	Too Warm	open	Varitherm Round VAV diffuser is correct. Check for lack of air or for too warm air temperature.
		closed	Adjust cooling for lower room temperature set point. (Turn cooling thumbwheel in.)
Heating Mode VPD-HC	Too Cold	open	Varitherm Round VAV diffuser is correct. Check for lack of air or too low air temperature.
		closed	Adjust heating for higher room temperature set point. (Turn heating thumbwheel out.)
	Too Warm	open	Adjust heating for lower room temperature set point. (Turn heating thumbwheel in.)
		closed	Varitherm Round VAV diffuser is correct. Check if heating is still required, and if not, turn it off.
Too Noisy VPD-C VPD-HC	Any	Any	Reduce static pressure. Recommended static pressure is .05 to .25 wg / 10 to 62 Pa at the inlet of the diffuser. If lower noise level does not result from lower static pressure, check for and correct noise generating restrictions in the duct up stream such as large pressure drops over dampers, heaters, etc.

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MAINTENANCE & CONTROLLING THE SYSTEM

Maintenance

The moving parts of the VRD Varitherm Round VAV diffuser have no maintenance or lubrication requirements. We are often asked to recommend periodic maintenance procedures and a spare parts stock. Recommended maintenance is to clean the outer surfaces of the Varitherm Round VAV diffuser—nothing else. We do not recommend stocking any spare parts. Our customers also confirm that stocking is unnecessary.

Controlling the System

References:

- System Design, VRD brochure, Form 046.101.
- Chapters 2.2, 3.1 and 3.2, pp 6, 7 and 8, Designing Modular VAV Systems Form 5.2.
- Air Handling and Fan Coil Units Subzoned with Varitherm Round VAV VAV diffusers, Form 6.7.
- DX Equipment Zoned with Varitherm Round VAV VAV diffusers, Form 6.5.

Supply Air Temperature

The sources of cooling and heating are controlled from supply air temperature. As with all VAV systems, the goals are to achieve a constant supply air temperature (may be reset to another constant supply air temperature) and to limit the supply air temperature. Limits for supply air temperature should be between 50°F/10°C and 68°F/20°C when cooling and between 80°F/26.5°C and 120°F/49°C when heating. The heating temperature limit should be as low as possible. These objectives are best achieved by modulating chilled water valves, hot water valves and other variable equipment from supply air temperature. On/off equipment such as DX compressors and electric heat are cycled from supply air temperature. Use a discharge air sensor for the supply air temperature signal.

Mode change between heating, recirculation and cooling is controlled from room temperature. Signals from one or more room temperature sensors may be used for mode change. When using more than one sensor, either a “majority rules” or a “cooling dominant” approach is recommended.

Static Air Pressure

As with all VAV systems, the fan must run continuously during occupied times. Goals of static pressure control are to provide enough static pressure to obtain the required air volume especially at the diffuser farthest from the fan, to avoid diffuser noise by limiting static pressure at both full flow and turndown and to provide pressure independence or consistent operation as the system flow changes.

These objectives can be achieved with the usual methods of automatic static pressure control: bypass dampers, discharge dampers, zone dampers, and fan control (variable speed drives, inlet dampers, etc.). Locate the static pressure sensor as far down the duct as possible—at least 2/3 down the duct from the first takeoff.

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TROUBLE SHOOTING

Trouble shooting Varitherm Round VAV diffusers requires looking at the system as a whole. Before examining the Varitherm Round VAV diffuser for failure, it is worth the time to be sure the system is functioning properly and that something has not been overlooked.

System Check

The system should be:

1. Delivering 50° - 68°F / 10° - 20°C supply air when in the cooling mode.
2. Delivering 80° - 120°F / 26.5° - 49°C supply air when in the heating mode.
3. Maintaining static pressure at the inlet to each Varitherm Round VAV diffuser between .05 and .25"wg / 12 Pa and 62 Pa.
4. Maintaining continuous fan operation during occupied hours.

Diffuser Check List

Once the above checks have been completed, examine and record the following (Conditions may vary over time; several measurements at different times may be required):

1. Room temperature 4ft / 1.2m above the floor directly under the Varitherm Round VAV diffuser.
2. Supply air temperature at the inlet of the Varitherm Round VAV diffuser.
3. Static pressure at the inlet of the Varitherm Round VAV diffuser.
4. Damper disc opening from the edge of the disc, measured vertically to the housing. See **Fig. 7**.
5. Changeover close rod position—inward or outward. See **Fig. 8**.
6. Cooling and heating setpoints. See **Fig 6**.
7. Room thermostat position measured to the inside edge of the induction air inlet. See **Fig 9**.
8. Min. flow stop setting—percent flow. See **Fig. 5**.
9. Balancing lever position—open or closed. **Fig. 3**.
10. Is the Varitherm Round VAV diffuser located within 2ft / 600mm of a vertical protrusion such as a wall or dropped beam which could disturb induction air flow?

FIG. 7 MEASURE DISC OPENING ▼

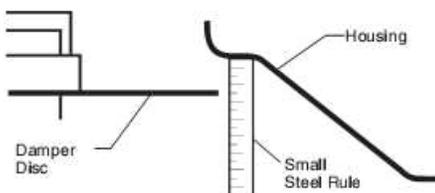


FIG. 8 CHANGEOVER ROD ▼

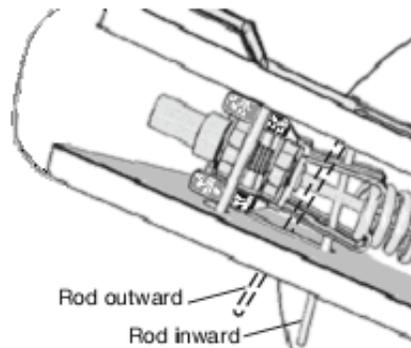
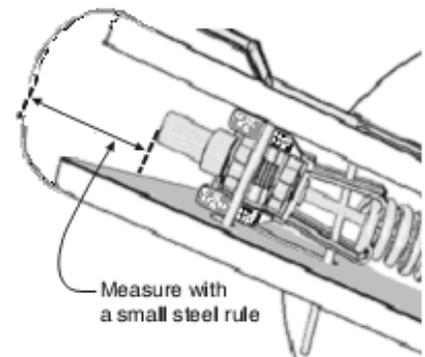


FIG. 9 MEASURE THERMOSTAT POSITION ▼



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TROUBLE SHOOTING

Trouble Shooting Data Log

Location	Date	Time	Room /Temp	S.A. Temp	Duct S.P.	Disc Opening	Changeover Close Rod Position

Set Points		Room Thermostat Position	Min. Flow Stop Setting	Balance Lever Position	Location By Wall Etc?
Cooling	Heating				

VARITHERM ROUND VAV DIFFUSER

TEN YEAR WARRANTY

Price Industries warrants that its Model VRD Varitherm Round VAV diffusers, exclusive of any options and accessories (whether factory or field installed) shall be free from defects in material or workmanship for a period of ten (10) years from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said ten (10) year period due to any such defects which would not have occurred had reasonable care been taken, provided that such parts have been inspected by Price and found defective and provided the diffusers have been given normal and proper usage and all parts and controls remain unaltered.

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