RICKARD

INTELLIGENT COMFORT CONTROL

3

ELECTRONIC VARIABLE VOLUME SWIRL DIFFUSER

VSW/VRW1

- EXCELLENT MIXING
- HIGH INDUCTION RATES
- ACCURATE ONBOARD SENSING
- EXCELLENT THROW & FLOW
- LOW PRESSURE LOSS
- LOW NOISE
- NO MAINTENANCE
- 2 YEAR WARRANTY

FEATURES

Rickard VAV Diffusers control Room Temperature by adjusting the volume of air very close to the swirl diffusers outlet. By changing the diffusers exit geometry, Coanda, Air Velocity and Throw is maintained at minimum and maximum volume. This technology prevents cold air from dumping at minimum, ensures excellent ventilation, air mixing, Air Change Effectiveness (ACE) and therefore thermal comfort (ADPI). Rickard VAV Swirl diffusers reduce pressure loss in the system due to their aerodynamic design and the absence of restrictions in the duct work.

PERFORMANCE

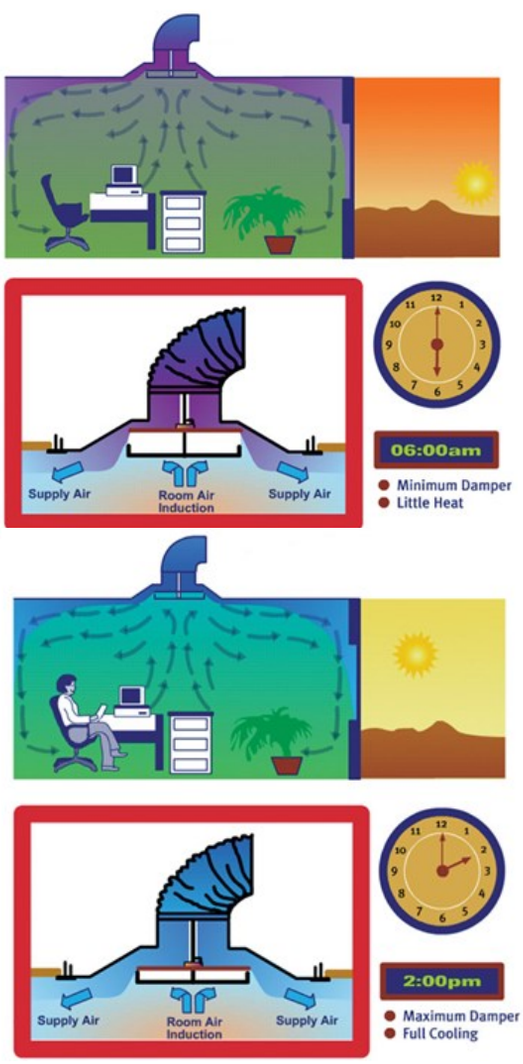
Swirl diffusion pattern creates excellent mixing.

Rickard VAV Swirl Diffusers control Room Temperature by adjusting the volume of air at the diffuser outlet.

By positioning the damper close to the outlet and using an aerodynamically shaped back-pan instead of a plenum the diffusers exit geometry, Coanda, Air Velocity and Throw is maintained at minimum and maximum volume.

This technology prevents cold air from dumping at minimum, ensures excellent ventilation, air mixing, Air Change Effectiveness (ACE) and therefore thermal comfort (ADPI).

Rickard VAV Swirl diffusers reduce pressure loss in the system due to their aerodynamic design and the absence of restrictions in the duct work.



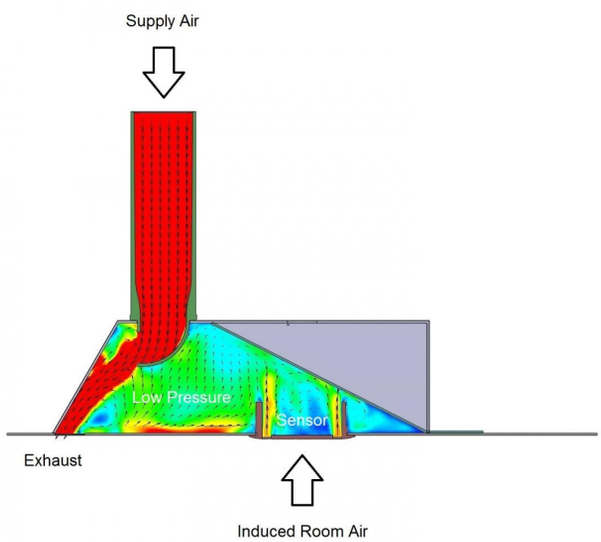
ENERGY SAVINGS

Green Building Benefits. Receive Management, Indoor Environmental Quality and Energy Efficiency Credits by using Rickard VAV Diffusers.

Rickard MLM+ controls use energy efficiently. Rickard MLM+ Diffusers use - 2.4VA (24VDC 100mA) only when the motor is running. MLM24 Power Supply Units use – 40VA (220VAC .2A) or (115VAC .35A) max and can supply up to 15 diffusers. MLM Master Communications Units (MCU2) use – 10VA (24VAC .4A) max and can connect to 60 diffusers.

SENSING ACCURACY

Rickard Swirl Diffusers use innovative forced induction technology resulting in accurate room sensing and flexible zoning.



CONTROLS

STANDARD MLM+ CONTROLLER CAPABILITIES

Every VAV Swirl diffuser is fitted as **standard with on-board sensing and temperature controlling** functionality.

Fifteen diffusers can be daisy chained, using the supplied **INTER DIFFUSER CONNECTING CABLE,** to a PSU power Supply unit (purchased separately), ensure power and communication signal to each diffuser.

Every VAV Swirl diffuser will **AUTO COMMISSION** when powered up and will then operate as a stand-alone primary diffuser. Primary diffusers can be changed to Secondary diffusers, using the MLM+ application, when uniform control is required in one zone.

Every VAV Swirl diffuser is fitted as standard with an **OCCUPANCY SENSOR**. This sensor will automatically take the diffuser to minimum air when the room is not occupied after 15 minutes. The delay can be changed or switched off using the MLM+ application. It is also possible to program a secondary backup profile, taking the diffuser to fully closed after a further delay.

Electronically **adjusted maximum and minimum control disc limits** allow designed airflow volumes to be achieved.

Global manual commands (all diffusers can be driven open) reduce commissioning costs.

MLM+ OPTIONS

WALL THERMOSTATS can be added as an option to every VAV diffuser. When plugged into the diffuser interface on the back of the diffuser, the controls will automatically override the on-board master to provide sensing and setpoint adjustment on the wall.

INFRARED SENSOR AND ADJUSTER can be provided for setpoint adjustment.

REVERSE CHANGE OVER sensor can be provided as an option to ensure correct diffuser control when supply air changes from cooling to heating.

ELECTRIC HEATING can be provided as an option on each diffuser. The heater spigot can simply be plugged into the diffuser neck spigot and the control cable can be plugged into the heater socket on the diffuser interface module.

AIRFLOW MEASUREMENT module allows for simplified electronic commissioning and controlling of flow maximum & minimum volumes, independent of neck pressure.

Cost effective **BACnet BMS integration** is possible using the MCU interface. This module can connect to four power supplies, providing a cost effective BACnet link for up to 60 diffusers at a time.

CAPITAL & OPERATING COST

Low diffuser height (125mm) can reduce a buildings overall cost by reducing the height of the ceiling void.

AESTHETICS

Available in Round (VRW) for skimmed ceilings and Square (VSW) for drop-in ceiling Tee applications. High Quality Epoxy Powder Coated Finish available in a wide range of colours. Matt White comes as standard.

MAINTENANCE

No regular maintenance is required.

Diffuser life cycle testing gives peace of mind far beyond our two year warranty period (Electronic diffuser range). Life cycle testing is based on 3000 operating hours and 4000 control cycles per year and is the equivalent of 30 years of service.

WARRANTY

Rickard offers a 2 year manufacturer's warranty on it's Electronic VAV swirl diffusers. Please see Terms and Conditions below for a full description of our warranty.

APPLICATION

VAV COOLING AND HEATING

VAV COOLING WITH TERMINAL REHEAT

The RICKARD VARIABLE GEOMETRY SWIRL DIFFUSER is designed for general building zones where uniform swirl discharge is the most suitable and desirable supply air distribution pattern. The basic diffuser is available in a wide range of options to suit every individual requirement.

Optimum performance in terms of uniform air distribution and low noise levels have been combined with simple construction and aesthetically pleasing appearance to provide a unit which is both functional and reliable. All diffusers are of steel construction and are finished in a chip resistant baked epoxy coating which is available in a wide range of colours to suit architectural requirements.

OPERATION

Room temperature is controlled by varying the supply volume according to demand. Volume control is achieved by moving a disc, known as a control disc, vertically up and down within the swirl diffuser. The aperture through which the air passes is adjusted very close to the swirls outlet. This is what constitutes the "VARIABLE GEOMETRY" concept. By directing air through the inside third of the swirl plate at minimum and using the entire swirl plate area at maximum, Air Velocity and Throw is maintained throughout the control range.
The position of the control disc is varied by means of an electric actuator which drives the control disc in response to a signal received from a temperature controller. When used in conjunction with one of the RICKARD controllers, the diffuser will control room temperature on a proportional/integral basis. Air is discharged in a horizontal 360º swirl pattern. Used in conjunction with our MLM controls, maximum and minimum supply air volumes may be adjusted to suit the particular design conditions. Diffusers are factory set to deliver 30% volume at the motors minimum position. Please note that the relationship between percentage motor position and percentage volume flow is not perfectly linear.

This Intelligent VAV technology combined with the swirls flow pattern, prevents cold air from dumping at minimum, ensures excellent ventilation, air mixing, Air Change Effectiveness (ACE) and therefore thermal comfort (ADPI). Rickard VAV Swirl diffusers reduce pressure loss in the system due to their aerodynamic design and the absence of restrictions in the duct work.

SELECTION

The first consideration when designing a system is to calculate the required supply air volume and temperature to satisfy room conditions at maximum heat loads. It is recommended that ducting is sized using static regain design principles. Supply air velocities in branch ducts should be between 3.5 and 7m/s (650 and 1500ft/min).

THROW

This is the distance from the centre of the diffuser to the point at which the supply air velocity has reduced to 0.25m/s (50ft/min) when measured 25mm (1 inch) below the ceiling and the control disc is in the fully open position. Coning occurs when two airstreams travelling in opposite directions meet and result in a downward moving cone of air. A similar effect is experienced should a diffuser be positioned at a distance from the wall that is less than its throw. The air will strike the wall and flow in a downward direction such that the point at which the air reaches a velocity of 0.25m/s (50ft/min), the sum of the horizontal and vertical travel of the air is equal to the diffuser throw. Throw remains at acceptable levels throughout the range of air flows, a feature of the variable geometry VAV diffuser concept.

NOISE LEVEL REQUIREMENTS

The published diffuser noise level must be checked to ensure it is within the project specification. Published diffuser noise levels represent only the noise generated by the diffuser and do not take

into consideration any duct-borne noise.

DUCT STATIC PRESSURE

Diffuser performance has been established using diffuser neck TOTAL pressure, although that which is normally known or measured is duct STATIC pressure. What happens between the duct and the diffuser depends on the length and type of flexible duct being used. For simplicity, it can be assumed that the duct STATIC pressure is approximately equal to the diffuser neck total pressure. This is a valid assumption for systems where flexible duct lengths are not excessive and can be explained briefly as follows:

The static pressure loss due to friction in the flexible duct (±10Pa or 0.04ins wg) would normally be about the same as the velocity pressure in the neck of the diffuser and since total pressure is the sum of static and velocity pressure, we can say that neck total pressure is numerically approximately the same as duct static pressure. Although the tables reflect diffuser performance for neck total pressures ranging from 20-100Pa (0.04-0.40ins wg), caution should be exercised when selecting diffusers outside the 40-80Pa (0.08-0.32ins wg). At lower pressures air movement and induction may be insufficient and at higher pressures draughts and excessive noise may result. Best results are obtained when diffusers are selected at pressures of 50-70Pa (0.20-0.28ins wg). Bear in mind that all diffusers served by a common duct will all operate at the same static pressure as controlled by the pressure control damper. Therefore diffusers which are able to supply more air than is necessary will be driven partially closed by the temperature controller and hence the system becomes self-balancing.

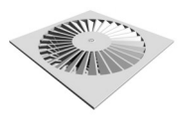
NOTE: Avoid upstream restrictions such as manually adjusted dampers or squashed flexible ducting. The reason being that at maximum flow any restriction will result in a significant static pressure loss (which for some cases may be desirable) whereas at minimum flow conditions offer virtually no restriction, which will result in the static pressure at the diffuser being too high at minimum flow conditions causing over-cooling/heating.

SENSING OPTIONS

Electronic VAV Swirl Diffusers are available with the following sensing options:

SENSING OPTIONS	***SENSOR POPULATED***	***UPGRADEABLE***
On-board Primary	On-board Sensor	Wall thermostat
Dedicated Secondary	None	Wall thermostat

TYPES

VSW 150 to 300mm S595 & 603mm	***VRW 150 to 300mm S595 & 603mm***
	

OPTIONS

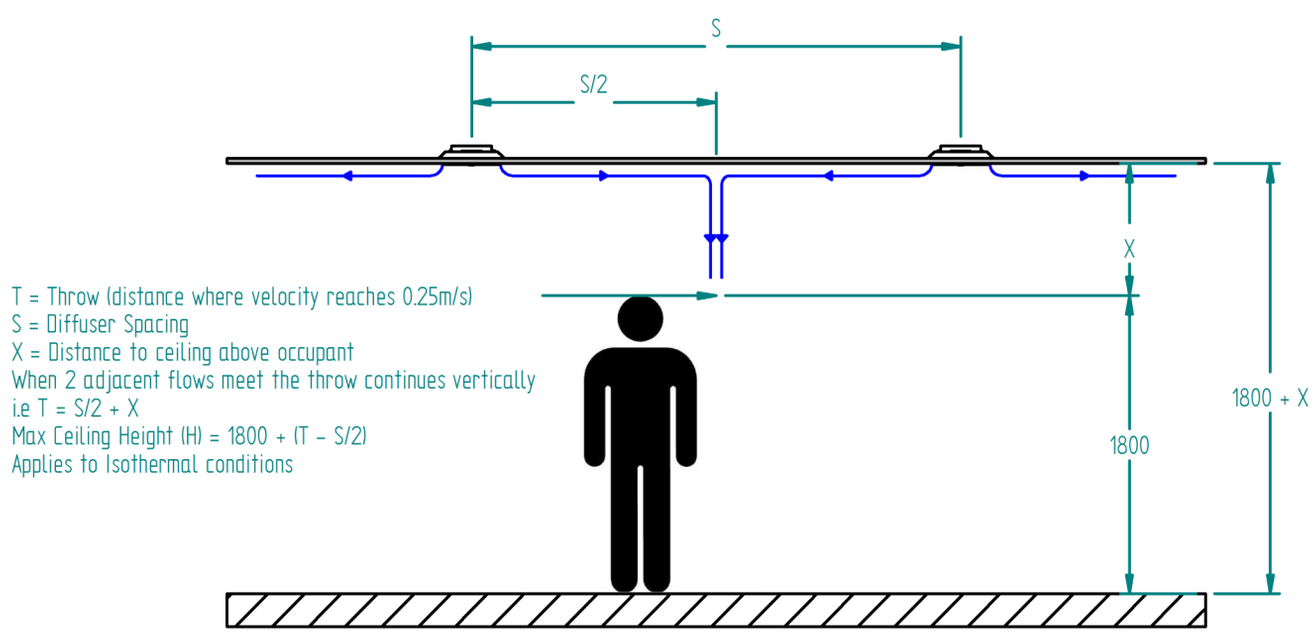
Blanking Plates: 90, 180 or 270 degrees.

A range of colours and finishes. See the Colour and Finish Selection Guide.

A range of Mounting Methods. See Swirl Mounting Methods Section.

Foam Insulation

DETERMINING MAXIMUM CEILING HEIGHT



VSW1 & VRW1						
SIZE	READING	NECK TOTAL PRESSURE (Pa)				
		30	40	50	60	70
150	FLOW l/s	68	79	88	96	104
	THROW m	1.8	2.1	2.3	2.5	2.7
	NC LEVEL	27	29	31	33	35
200	FLOW l/s	112	130	145	159	172
	THROW m	2.2	2.5	2.8	3.1	3.3
	NC LEVEL	28	31	33	35	37
250	FLOW l/s	159	183	205	225	243
	THROW m	2.9	3.3	3.7	4.1	4.4
	NC LEVEL	29	33	35	37	39
300	FLOW l/s	194	224	250	274	296
	THROW m	2.9	3.3	3.7	4.1	4.4
	NC LEVEL	30	33	36	38	40

Throw is measured with the diffusers control disc fully open, 25mm below the ceiling following a line through the centre of the diffuser at the point at which the airs velocity reaches 0.25m/s.

Noise Criteria levels apply to a single diffuser mounted in a room having a Sound Absorption of 10dB in octave bands having centre frequencies from 125Hz to 8000Hz (i.e. the difference between Sound Pressure Level (dB re:2 x 10^{-5} Pa) and Sound Power Level (dBW re: 10^{-12} watts) is equal to 10dB). These levels represent only the noise generated by the diffuser and do not take into account any duct-borne noise.

Diffusers are shipped fully open.

Performance Data applies to Standard Air having a density of 1.2 kg/m3.

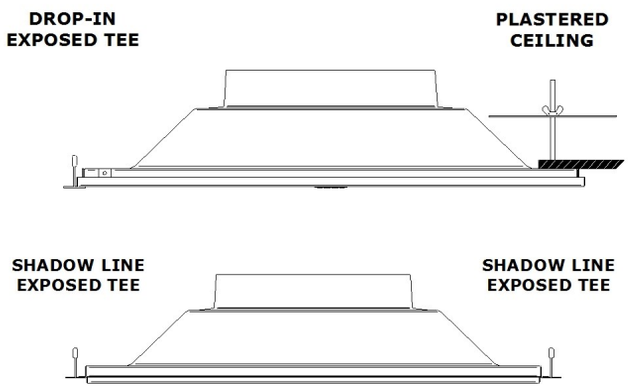
OPTIONS

The Rickard Swirl Diffuser Range supports a wide range of diffusion unit styles.

EXPOSED TEE CEILING GRID

1. SQUARE SWIRL DIFFUSER
   - i. Drop-in Flush Mounting
   - ii. Drop-in Shadow Line

The standard swirl drops into a square opening between ceiling tees. Flush Mounting and Shadow Line styles are available. These can be supplied with the following mounting plate sizes, 595x595mm & 23¾ x23¾" to suit 600x600mm & 24x24" ceiling grids respectively. Specials sizes are available on request.



BAFFLED CEILING

1. SQUARE SWIRL
   - i. 4 Point Fixing (4 Brackets for threaded rod connection)
2. ROUND DIFFUSER
   - i. 3 Point Fixing (3 Brackets for threaded rod connection)
   - ii. Hard Duct Connection (no accessories required)

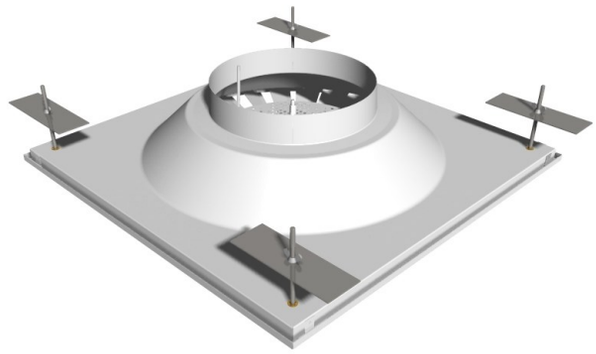
Baffled ceilings require an unusual treatment which is not illustrated. Normally this ceiling requires a square tile with suspension points fitted at each corner thereby enabling support from the top edges of the baffles. Large diffuser mounting plates are particularly beneficial in the baffled ceiling as there is otherwise little opportunity for the Coanda effect to help distribute conditioned air across the ceiling. This may result in inadequate throws and poor room air movement.

PLASTERED CEILING

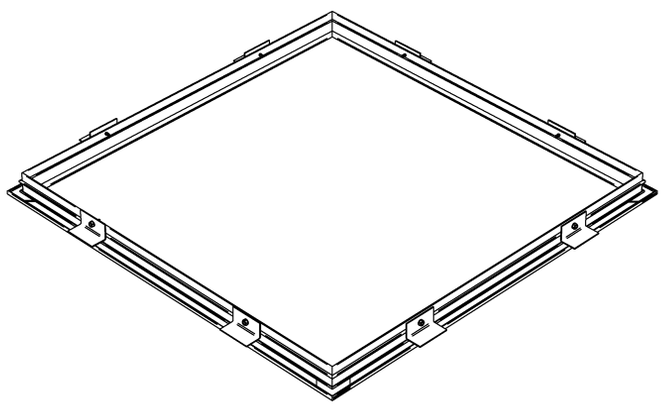
1. SQUARE SWIRL
   - i. 4 Point Fixing (4 Brackets with Backing Plates)
   - ii. T-Frame (To allow Drop-in Flush Mounting)

In the case of mounting square diffusers into plastered ceilings, two methods of fixing may be used. Concealed fixing is achieved by four fixing studs secured in the corners of the mounting plate. These pass through the ceiling and, with the use of backing plates, are used to secure the diffuser to the ceiling. A further option for fixing into a plastered ceiling is with the use of a T-frame which is an optional extra. This is fixed to the ceiling and the diffuser then drops into it.

4 POINT FIXING (4 BRACKETS WITH BACKING PLATES)



T-FRAME (DROP-IN MOUNTING FOR PLASTERED CEILINGS)

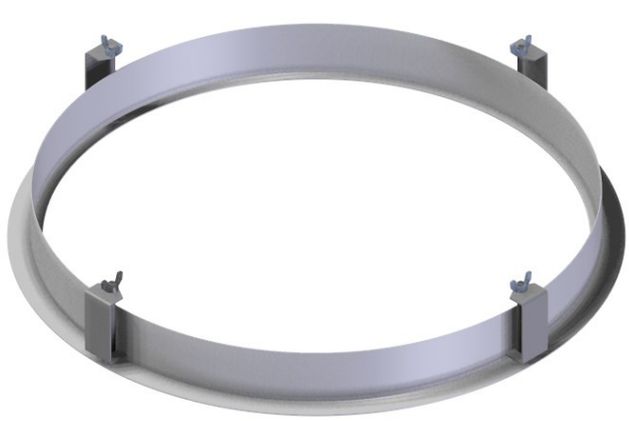


2. ROUND DIFFUSER
   - i. T-Ring (Frame to allow Drop-in Flush Mounting)

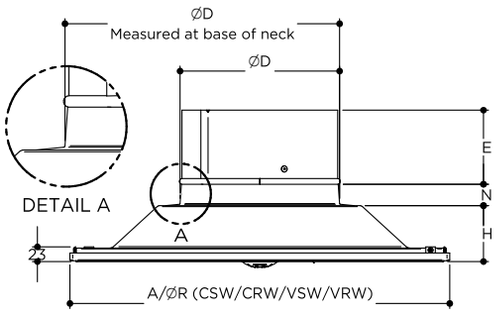
Apart from the usual four-corner style, the Rickard Swirl Diffuser is also available in a circular format. This model is most often combined with round down-lighters to preserve the circular pattern, and in particular with plastered ceilings. It also offers the absolute minimum interruption to the ceiling for those who prefer to have its unbroken regularity maintained.

Fixing of round diffusers in a plastered ceiling often presents a problem because of restricted access to the ceiling void. This problem is overcome with a T-Ring to allow Drop-in Flush Mounting of a standard Round Swirl Diffuser. The T-Ring is mounted flush with the ceiling after a round hole with a diameter of 590-600mm is cut into the plaster board. Four threaded brackets draw the T-Ring flush against the ceiling to ensure a neat finish.

T-RING (DROP-IN MOUNTING FOR PLASTERED CEILINGS)



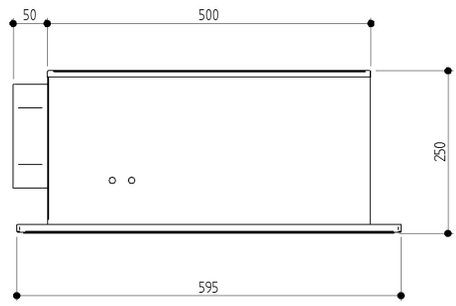
SWIRL DIFFUSER: GENERAL DIMENSIONS

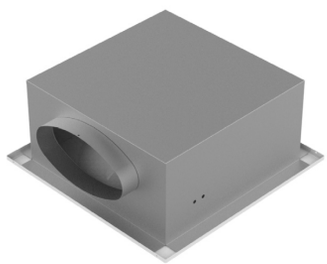


Nominal Size	Dimensions (mm)							
	Ø D	A	H	N	Ø R	E		
						Heater Neck	Airflow Sensor	Airflow Switch
150	153	595 x 595	95	28	580	90	115	125
200	200	595 x 595	92	33				
250	250	595 x 595	89	34				
300	293	595 x 595	86	35				

SWIRL DIFFUSER WITH PLENUM: GENERAL DIMENSIONS

(Use when ceiling space is limited)





Note: Plenums create a significant pressure drop

(Performance data will not apply)

Swirl Diffuser Style			**Swirl Diffuser Mounting Types**						
			Exposed Tee		Baffled Ceiling		Plastered Ceiling Surface Mounting		
Model	Swirl Diffuser Shape	Swirl Diffuser Size	Drop-in Flush Mounting	Drop-in Shadow Line	4 Point Fixing Brackets	3 Point Fixing Brackets	4 Point Fixing & Backing Plate	T-Frame	T-Ring
CSW3 or VSW1	Square	595x595	•	•	•	o	•	•	o
	Square	23¾"x23¾"	•	•	•	o	•	•	o
CRW3 or VRW1	Round	580	o	o	o	•	o	o	•

GENERAL

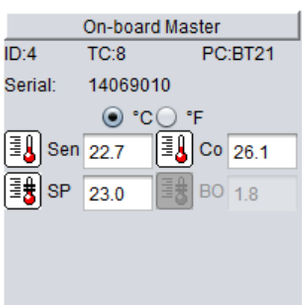
The RICKARD Reversing Changeover facility ensures that the VAV diffuser controls the temperature accurately when the central system is supplying either warm or cold air.

OPERATION

When the system switches from cooling to heating, the changeover sensor detects the increase in supply air temperature and switches the direction in which the actuator operates. This means that when the system is in cooling mode, the diffuser will drive open as the room temperature increases, whereas in the heating mode the diffuser will close as the room temperature increases.

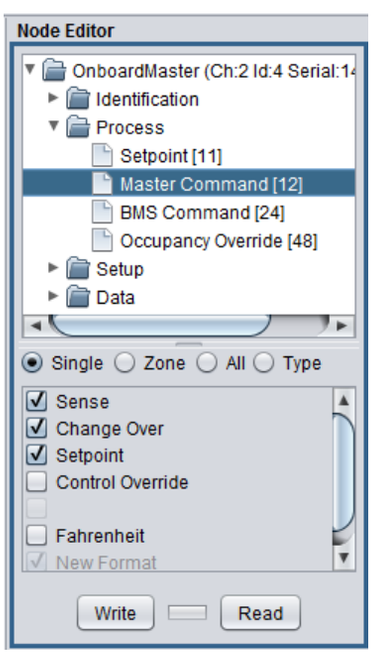
INSTALLATION

Converting a standard RICKARD master diffuser to incorporate changeover functionality is as simple as plugging in the supply air/ changeover temperature sensor and activating it using the software. Every master controller is pre-activated. This temperature sensor must be fitted in such a way that it senses the primary air temperature being supplied to the diffuser.

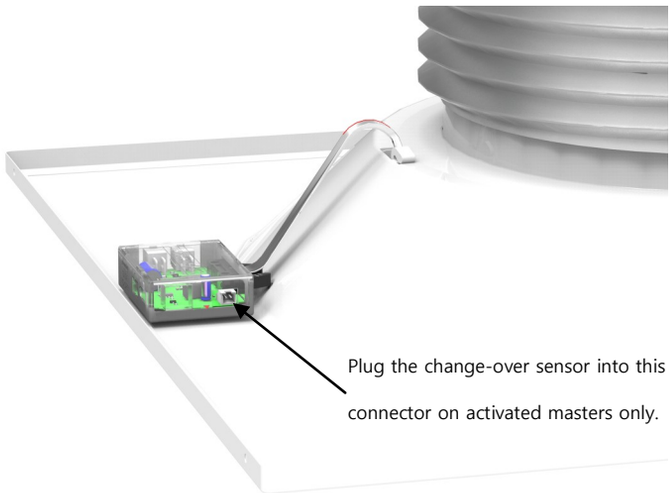


TYPICAL MASTER SETTINGS

Change-over sensing, room sensing and set-point is activated.

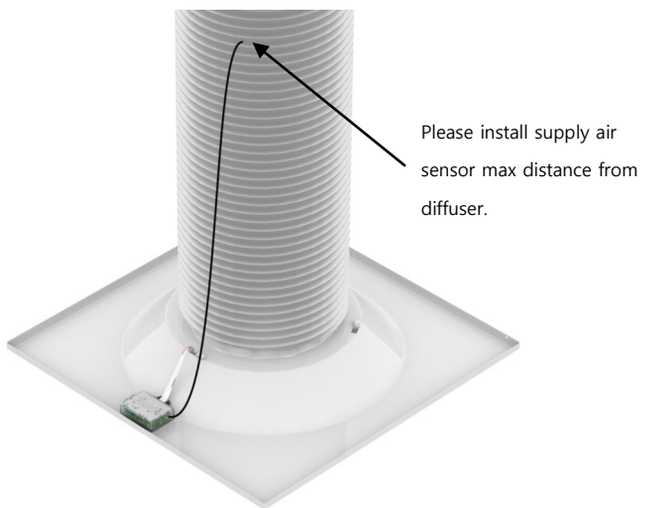


NOTE: Slave diffusers receive a control signal from the master diffuser and therefore do not require nor should they be fitted with a changeover sensor. It is also important that a slaves changeover sensing is turned off on the MLM application. Failure to do so will result in a zone not operating correctly. Only one changeover sensor should be activated per zone i.e. the master.



VCD1 Shown. Use the same connector on other models.

If a re-heater is fitted to the neck of the diffuser, care must be taken to ensure that, the changeover sensor is installed in such a way that it is not affected by radiant heat from the heater. Every changeover sensor is labeled "Please install supply air sensor max distance from diffuser" to ensure this.



VCD1 Shown. Always locate sensor away from heater when fitting to other models.

The controller compares the primary air and room temperature. Whenever the supply air temperature exceeds the room temperature by one degree Celsius, the control action is reversed and switches to heating mode. Cooling mode is re-instated when the primary air temperature falls one degree Celsius below room temperature.

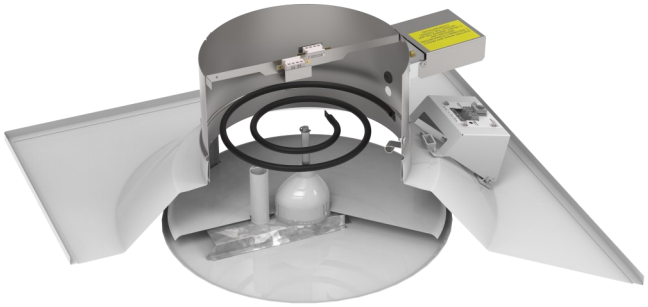
ENERGY EFFICIENCY

Should a VAV air diffusion unit be fitted with a re-heater, the heater will be proportionally energized between 0.5°C and 1.5°C below set-point temperature, regardless of which mode the controller is in. Effectively, a re-heater will only be energized at Minimum Supply Air Status in the cooling mode and at Maximum Supply Air Status when in the heating mode. This control logic is extremely energy efficient from a Green Building perspective.

FEATURES

FORM FACTOR

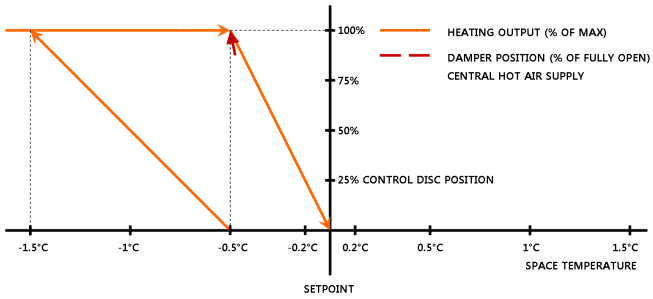
RICKARD diffusers are fitted with electric re-heaters that are either housed in a modular sleeve (VCD1, VSD1, CCD3, CSD3, VSW1, CSW, WBD's , CLN's and VLN's) or fitted directly to the unit (WBD, VLN). The heaters are energised when additional heating is required in a room.



VAV PLATE DIFFUSER FITTED WITH MODULAR HEATER SPIGOT

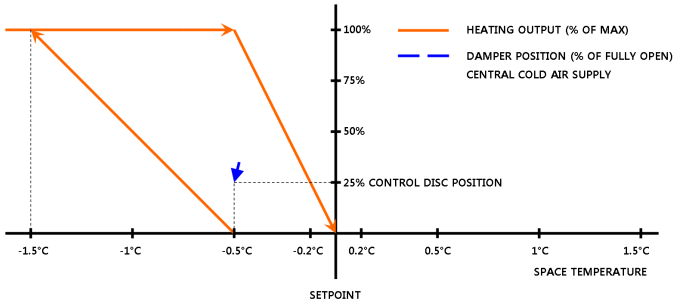
WBD WITH DEDICATED HEATER FITTED

Electric heating can be considered to save energy when they are used to heat isolated offices that wouldn't be efficiently heated by raising the central plants temperature. The most efficient scenario in heating is for the central plant to supply sufficient heated air to allow most of the zones to be in control when the diffusers damper is close to minimum position. Zones that are colder are controlled by the diffuser opening further. Zones that cannot be satisfied by the diffuser supplying warm air at full volume are toped up with supplementary heating.



The most efficient scenario in cooling is for the central plant to supply sufficient cool air to allow most of the zones to be in control when the diffuser dampers are close to minimum position. Zones that are warmer can be controlled by the diffuser opening further. Zones that cannot be warmed sufficiently by reducing the cold air supply can be controlled by heating this reduced volume of air.

If the room temperature were to fall by 0.5°C below set point, the triac controller will commence energizing the heater proportionally and will fully energize the heater when the room temperature is approximately 1.5°C below set point.



To ensure a building is efficiently heated it is necessary to integrate the Rickard VAV diffuser system with the central plant BMS. This is possible by using Rickard's MLM BMS Compatible Controls.

PROPORTIONAL HEATING

For accurate control of room temperature, the electric re-heater is controlled on a step-less, proportional basis. In addition to having a proportional output signal for cooling control, the temperature controller also has a proportional output signal for heating.

This is done by means of a triac switching set (current valve) which varies the heater output capacity by cycling the power supply to the heater on and off – Pulse Width Modulation (PWM). This switching takes place over a cycle of approximately 2 seconds and always occurs at zero voltage to avoid radio frequency interference and voltage spikes. The "on" and "off" periods are varied in proportion to the amount of heating required, i.e. a required heating capacity of 75% will result in an "on" period of 1.5 seconds and an "off" period of 0.5 seconds.

CONTROLS

In a situation where multiple diffusers are controlled from a single controller, each diffuser will be fitted with its own triac that will receive a heating signal from the Primary controller. From the table "Maximum Recommended Heater Output (Watts)" at the end of this section, notice that for each neck total pressure there is a specific heater output quoted. For each diffuser size a standard heater capacity is referenced e.g. in the case of a VCD 250 diffuser, the re-heater sleeve would be factory fitted with a 1500 watt heater. By utilizing the RICKARD MLM or MLM Interoperable BMS Compatible Controls, the heater can be electronically set for an output from 100 to 1500W to match the design engineer's requirements. If the diffuser neck total pressure were to be set to 50Pa and the minimum desired air flow was 30% of maximum with a 17°C temperature rise, the heater output for a VCD 250 should be set to 1350 watts. Please refer to the MLM software help section for setup information.

IMPORTANT ELECTRICAL INFORMATION: Electrical reticulation should be designed to manage the heaters full capacity i.e. when a heater is set to 50%, the heater element draws the same current as it would when set to 100% but only draws it for 50% of the time.

SELECTION GUIDELINES

When calculating heater capacities for VAV diffusers, please keep in mind that heating in the cooling mode takes place when the diffuser is supplying minimum air flow. Care must therefore be taken to ensure that excessive supply air temperature rises are avoided. Discharge temperatures in excess of 32°C are likely to cause stratification within the room. As a guide-line, the temperature of the air leaving the diffuser should not be more than 10°C above room temperature. Please refer to the "Maximum Recommended Heater Output (Watts)" table on page 3 for each diffuser size. These heater output ratings calculated to ensure that the heat rise is no more than 15°C in VAV diffusers and 10°C in CAV diffusers. Please note that these values are a guide and are calculated at 30% volume for VAV diffusers and 100% volume for CAV diffusers.

IMPORTANT: These maximum capacities do not take into account limitations of the triac which are rated at 12A maximum. This reduces the capacity of the triac at low voltage supply.

ELECTRICAL AND OVERHEAT SAFETIES

NOTE: The following safeties should not exclude duct airflow safeties and a dedicated heater electrical circuit. Please see the following Installation guidelines section.

Every Heater Module is fitted with a coiled electrical element inside a galvanised sheet metal enclosure. The heater elements is constructed from an incaloy material that does not glow when energised. This element is selected to reduce the risk of combustible materials igniting should they come into contact with the heater element itself. No combustible materials are used in the construction of a Rickard Diffuser or Heater Module. Rickard diffusers use a high spec flame retardant, self extinguishing polycarbonate plastic that is chlorine and bromine free with a UL94 V-0 rating at 1.5mm. The Heater modules are fitted with their own triac/heater driver and receive a proportional signal from the diffuser controls when heating is required. The triac receives its power from a separate power circuit. Dedicated plug tops can be fitted to the heater module on request.

Each heater modules is fitted with a number of safeties to reduce the risk of failure. The triac is fitted inside an electrically grounded metal enclosure that is physically attached to the heater module enclosure. This increases the electrical safety of the device should a short circuit occur. A fuse offers additional protection against large current surges and shorts. A Transient suppressor prevents the Triac from failing closed and therefore driving the heater permanently if a voltage surge occurred.

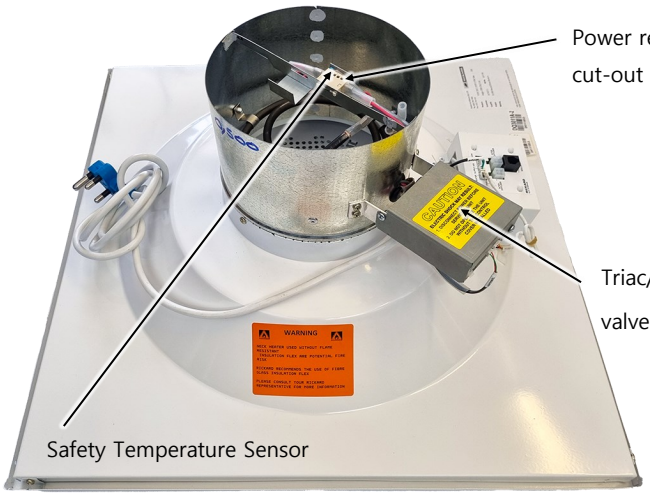
In some cases when no flow or very low flows occur in the ducting, it is necessary to limit the heaters output to avoid excessive heat build up in the diffuser. For this reason the triac is fitted with a temperature sensor and controls to limit the triac so that the supply air exiting the diffuser never rises above 50°C or 122°F.

As an added safety a power-reset 85°±5°C or 185±9°F (3000 cycles) safety cut-out is fitted as standard. The reset temperatures indicates the air temperature inside the overheat safety cut-out casing at which it operates. Rickard heater modules are designed so that the overheat safety cut-outs trigger when the neck Total pressure is approximately 30Pa or below. The trigger point can vary depending on a number of factors namely, excessively squashed or bent flex, neck size, heater size and damper position. Rickard controls do not activate its heaters below 20% flow damper position, thereby reducing the likelihood of the overheat safeties not triggering in the range described. Push-button type manual reset safeties are not recommended in conjunction with diffuser re-heaters.

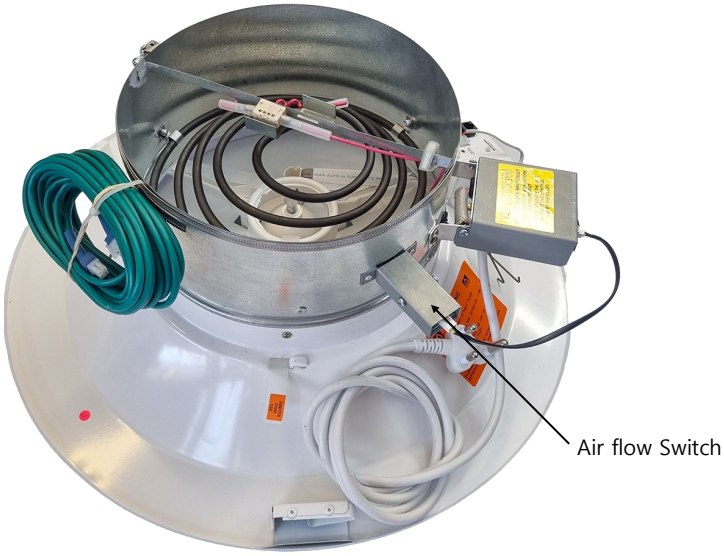
For additional safety, RICKARD offer an Airflow Switch to interrupt power to the re-heater controls when there is insufficient airflow across the heater element. The switch is calibrated to disable the heater current valve below a static pressure of 12Pa (+/- 5Pa).

The switch operates as a dead man switch i.e. if the cable between the switch and the heater controls is unplugged, the heater will not operate.

STANDARD SAFETIES FITTED TO ALL VAV DIFFUSER TYPE (VCD1, VSD1, CCD3, CSD3, VSW1, CSW, WBD's , CLN's and VLN's)



OPTIONAL AIRFLOW CUT-OUT/SWITCH



TESTING

All electrical wiring associated with the re-heater is carried out in the factory and all units are carefully tested for correct operation.

OPTIONS

- Heaters are available in various capacities, ranging from 0.5kW to 2.5kW.
- Airflow Switch to interrupt power to the re-heater controls when there is insufficient airflow across the heater element.

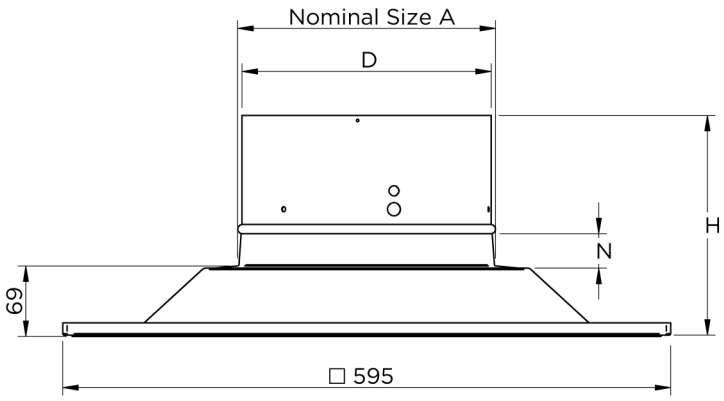
INSTALLATION GUIDELINES

Your duct design should supply between 30 and 60Pa total pressure at each diffuser to ensure adequate flow across the heaters.

Please ensure the ducting is fitted with an airflow interlock/paddle switch that cuts the power to the electrical reticulation serving the diffusers in the event of a loss of flow. This will ensure that the diffusers heaters are not energised when the AHU is off.

Rickard recommends a dedicated electrical outlet be fitted to the building heater reticulation and dedicated plug top be fitted to the diffusers . This will ensure that the airflow interlock always cuts power to the diffusers heaters and not other equipment plugged into the same circuit. This will also ensure that heaters are always plugged into a protected circuit.

Please see the "Electric Plug Ordering" Document for more details to order the correct plug top for your installation.



NOMINAL SIZE A	NECK DIAMETRE Ø D (mm)	NECK HEIGHT Ø N (mm)	OVERALL HEIGHT Ø H (mm)
150	148	26	211
200	195	32	217
250	244	32	217
300	287	35	220
350	337	40	225

		Max Heater Size for each neck extension height or heater type *																	
Pa		20			30			40			50			60			70		
Diffuser Neck Extension Height/ Type *		145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *
Heater Size		kW			kW			kW			kW			kW			kW		
VCD	150	0.25	n/a	0.25	0.25	n/a	0.25	0.5	n/a	0.5	0.5	n/a	0.5	0.5	n/a	0.5	0.5	n/a	0.5
VCD Neck Size (mm)	200	0.5	n/a	0.5	0.75	n/a	0.75	0.75	n/a	0.75	0.75	n/a	0.75	1	n/a	1	1	n/a	1
	250	0.75	n/a	0.75	1	n/a	1	1	n/a	1	1.25	n/a	1.25	1.25	n/a	1.25	1.25	n/a	1.25
	300	1	n/a	1	1.25	n/a	1.25	1.5	n/a	1.5	1.5	n/a	1.5	1.5	n/a	1.5	2	n/a	2
	350	1.25	n/a	1.25	1.5	n/a	1.5	1.5	n/a	1.5	1.5	n/a	1.5	2	n/a	2	2.5	n/a	2.5

		Max Heater Size for each neck extension height or heater type *														
Pa		30			40			50			60			70		
Diffuser Neck Extension Height/Type *		145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *
Heater Size		kW			kW			kW			kW			kW		
VSW	150	0.25	n/a	0.25	0.25	n/a	0.25	0.5	n/a	0.5	0,5	n/a	0,5	0.5	n/a	0.5
VSW Neck Size (mm)	200	0.5	n/a	0.5	0.75	n/a	0.75	0.75	n/a	0.75	0.75	n/a	0.75	0.75	n/a	0.75
	250	0.75	n/a	0.75	1	n/a	1	1	n/a	1	1.25	n/a	1.25	1,25	n/a	1,25
	300	1	n/a	1	1.25	n/a	1.25	1.25	n/a	1.25	1,5	n/a	1,5	1.5	n/a	1.5

* Other: In-line Heater/Side Entry Plenum.

The largest heater shown for each neck size creates a heat rise of +/- 15°C when the damper closes down to minimum position i.e. the diffusers default minimum position is set to supply 30% air volume when the heaters are activated. If the diffusers minimum is reduced a larger heat rise will result.

	Max Heater Size				
	Pa	20	30	40	50
	Size (mm)	kW			
WBD	300/100	0.25	0,5	0.5	0.5
	350/100	0.5	0.5	0.75	0,75
	400/100	0.5	0,75	0.75	0.75
	450/100	0.75	0.75	0.75	1
	500/100	0.75	0.75	1	1
	550/100	0,75	1	1	1.25
	600/100	0.75	1	1.25	1,25
	650/100	1	1	1,25	1.5
	500/150	1	1,25	1.5	1.5
	550/150	1.25	1.25	1.5	1.5
	600/150	1.25	1.5	1.5	2
	650/150	1.25	1.5	2	2
	700/150	1.25	1.5	2	2.5
	800/150	1,75	2	2,5	2,5

	Max Heater Size					
	Pa		30	40	50	60	70
	Heater Size		kW				
VLN1 2 Slot	Track Length	600mm	0.25	0.25	0.5	0,5	0.5
		900mm	0.5	0.75	0.75	0.75	0.75
		1200mm	0.5	1	1	1.25	1,25
		1500mm	0.75	1.25	1.25	1,5	1.5

The largest heater shown for each neck size creates a heat rise of +/- 15°C when the damper closes down to minimum position i.e. the diffusers default minimum position is set to supply 30% air volume when the heaters are activated. If the diffusers minimum is reduced a larger heat rise will result.

	Max Heater Size for each neck extension height or heater type																		
	Pa		20			30			40			50			60			70		
	Diffuser Neck Extension Height/ Other Type *		145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *
	Heater Size		kW			kW			kW			kW			kW			kW		
CCD	CCD Neck Size (mm)	150	0.5	1	1.25	0.5	1	1.5	0.5	1	1.5	0.5	1	2	0.5	1	2	0.5	1	2
		200	1	1.5	1.5	1	1.5	2	1	1.5	2.5	1	1.5	2.5	1	1.5	2.5	1	1.5	2.5
		250	1	1.5	2	1	1.5	2.5	1	1.5	2.5	1	1.5	2.5	1	1.5	2.5	1	1.5	2.5
		300	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
		350	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

	Max Heater Size for each neck extension height or heater type																		
	Pa		20			30			40			50			60			70		
	Diffuser Neck Extension Height/ Other Type *		145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *	145 mm	200 mm	Other *
	Heater Size		kW			kW			kW			kW			kW			kW		
CSW	CSW Neck Size (mm)	150	0.5	0.75	0.75	0.5	0.75	0.75	0.5	0.75	1	0.5	0.75	1	0.5	0.75	1	0.5	0.75	1.25
		200	1	1.25	1.25	1	1.25	1.25	1	1.25	1.5	1	1.25	1.5	1	1.25	2	1	1.25	2
		250	1.25	1.5	1.5	1.25	2	2	1.25	2	2	1.25	2	2.5	1.25	2	2.5	1.25	2	2.5
		300	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

* Other: In-line Heater/Side Entry Plenum.

Orange cells indicate In-line Heaters/Side Entry Plenums that require 2 heater elements and 2 triacs.

The largest heater shown for each neck size creates a heat rise of +/- 10°C when the damper is 100% open. A heat rise of >10°C will occur when damper positions are less 100% open.