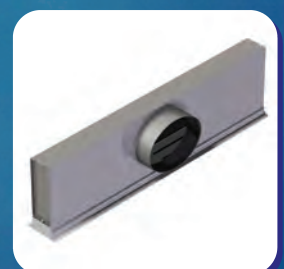
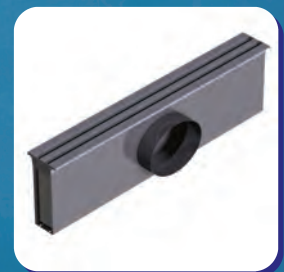


CONSTANT VOLUME LINEAR CEILING DIFFUSER

12

CLN 3

- ☼ ATTRACTIVE JOINABLE LINEAR PROFILE
- ☼ UP TO 8 SLOT TRACKS AVAILABLE
- ☼ HEATING AND COOLING
- ☼ TERMINAL REHEAT AVAILABLE
- ☼ CONTROL THE PERIMETER EFFECTIVELY
- ☼ HORIZONTAL/VERTICAL FLOW PATTERN
- ☼ EXCELLENT THROW & FLOW
- ☼ NO MAINTENANCE



FEATURES

Rickard Constant Volume Linear Diffuser (CLN) can be used to shield the load transmitted through a buildings windows or as an attractive diffuser alternative in internal zones. Their pattern controllers can be adjusted to create a vertical curtain of conditioned air that acts as a barrier to constant thermal loads or create a horizontal flow pattern that creates good mixing without drafts.

Rickard CLN diffuser tracks are designed to be joined end-to-end to create uninterrupted lengths of attractive linear track.



PERFORMANCE

Aerodynamically shaped diffuser components reduce noise and improve air flow characteristics.

OPERATION

The airflow pattern is adjustable from below the ceiling, being changeable from one-way blow in either direction or to vertical down blow.

INSTALLATION SAVINGS

Optional Jubilee Clamp saves time and material when attaching the flex.

CAPITAL & OPERATING COST

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

AESTHETICS

Rickard CLN Diffuser tracks are designed to be joined end-to-end to create uninterrupted lengths of attractive linear track. CLN Tracks are compatible with other Rickard CLN tracks, Dummy tracks (inactive sections of track often used for return air) or VLN tracks (Variable Volume Linear Diffusers).

Tracks are finished in a wide range of high quality epoxy powder coated finishes. Matt White comes as standard.

MAINTENANCE

Surface mount CLN diffuser tracks are accessible from below the ceiling. No skilled labour or special tools are required for fitment or removal.

The CLN's plenum is constructed from corrosion resistant mill galvanized sheet steel. The diffuser tracks are constructed from aluminium extrusion and are coated with epoxy powder coating.

No regular maintenance is required.

APPLICATIONS

ZONES WITH A CONSTANT LOAD

COOLING AND HEATING

PROPORTIONAL TERMINAL RE-HEAT

HEATING WITH STAND ALONE OR BMS CONTROLS

HEATING WITH REMOTE SETPOINT

RICKARD Constant Volume Linear Diffusers are intended for zones where load fluctuations are limited. The Constant Volume Linear Diffuser, as its name implies, do not automatically regulate the air volume entering the conditioned space - they are constant volume devices. Consequently, room temperatures will vary with room loads (assuming the duct air temperature and pressure remain constant).

Should this method be decided upon, care should be taken in selection of the CLN diffuser to ensure dumping does not take place at minimum air flow status.

The Rickard CLN diffusers can be used to supply spaces that require heating or cooling. To ensure that dumping does not occur in cooling and stratification in heating care must be taken to supply the diffuser with adequate pressure.

Constant Volume Diffusers can be used to supply top up heating when required. This is achieved by fitting them with a Rickard Neck Heater.

OPERATION

A useful feature of the RICKARD CLN is the ease with which the direction of airflow may be adjusted. Although airflow direction is not normally changed once the system is operational, it does simplify the ordering procedure. All linear air diffusion track is identical and the choice of one-way or two-way blow is easily implemented on site by simply flipping the flow directional vane to the preferred side. Single slot CLN's are only available in horizontal blow.

It is possible to direct air vertically downwards for better room penetration, especially when the CLN is in the heating mode.

COMMISSIONING

Optional manually adjustable volume control is available should system balancing be required. The volume control mechanism is accessible from the face of the CLN.

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 7.5/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. Coning occurs when two airstreams travelling in opposite directions meet and result in a downward moving cone of air (applies to pattern controller in the horizontal position). 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.

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 ($\pm 10\text{Pa}$ 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. Although the tables reflect diffuser performance for neck total pressures ranging from $30\text{-}70\text{Pa}$ ($0.12\text{-}0.28\text{ins Wg}$), caution should be exercised when selecting diffuser outside the $30\text{-}50\text{Pa}$ ($0.12\text{-}0.20\text{ins Wg}$). 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 $30\text{-}40\text{Pa}$ ($0.12\text{-}0.16\text{ins Wg}$).

TYPES

TRACK LENGTHS

The standard CLN is available in unit lengths of:

600mm

900mm

1200mm

1500mm

TRACK TYPES

CLN Linear Diffusers are available with 1 - 8 Slot tracks. 2 to 8 slot variants are available with adjustable pattern controllers (vertical to horizontal), single slot tracks are available with a horizontal blow pattern controller as standard.

CLN Linear Tracks are designed to fit Plastered Ceilings (Surface Mount) and most Ceiling Grid (Drop-in) variants.

Rickard CLN Diffuser tracks are designed to be joined end-to-end to create uninterrupted lengths of attractive linear track. CLN Tracks are compatible with other Rickard CLN tracks, Dummy tracks (inactive sections of track often used for return air) or VLN tracks (Variable Volume Linear Diffusers).

Tracks are finished in a wide range of high quality epoxy powder coated finishes. Matt White comes as standard.



SPIGOT SIZE AND QUANTITY

CLN Linear Diffusers with multiple slots require larger and/or more spigots. Please see the CLN Spigot Detail table for more detail.

VLN1 SPIGOT DETAILS (mm)				
No. of SLOTS	VLN1 600	VLN1 900	VLN1 1200	VLN1 1500
1	150	200	250	300
2	150	200	250	300
3	200	250	2x200	2x250
4	250	2 x 200	2 x 250	2 x 300

HEATING OPTION

CLN's are also available with built in heaters. Please see Electric Section for more Information on this option.

SENSING OPTIONS

If fitted with Heating, CLN's can get their signal from another Master Diffuser or by attaching a remote Wall Thermostat. Onboard Sensing is not available on CLN's.

COMMISSIONING

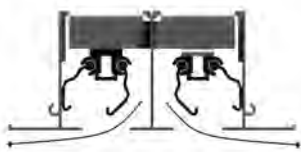
Optional manually adjustable volume control is available should system balancing be required. The volume control mechanism is accessible from the face of the CLN.

CLN 600 - FULLY OPEN					
NECK TOTAL PRESSURE (Pa)	30	40	50	60	70
2 SLOT (19mm each)					
FLOW (l/s) PATTERN A	47	55	61	67	73
FLOW (l/s) PATTERN B	62	72	79	87	94
FLOW (l/s) PATTERN C	47	55	60	67	73
THROW (m) PATTERN A	4.5	4.8	5.1	5.4	5.6
THROW (m) PATTERN B	3.2	3.4	3.6	3.8	3.9
THROW (m) PATTERN C	6.4	6.9	7.3	7.6	7.9
NOISE - NC LEVEL	30	33	35	37	39
3 SLOT (19mm each)					
FLOW (l/s) PATTERN B	93	108	115	130	141
FLOW (l/s) PATTERN C	70	82	90	100	109
THROW (m) PATTERN B	3.8	4.1	4	4.6	4.7
THROW (m) PATTERN C	7.7	8.3	8.8	9.1	9.5
NOISE - NC LEVEL	30	33	35	37	39
4 SLOT (19mm each)					
FLOW (l/s) PATTERN A	94	110	120	134	146
FLOW (l/s) PATTERN B	124	144	158	174	188
FLOW (l/s) PATTERN C	94	110	120	134	146
THROW (m) PATTERN A	6.3	6.7	7.1	7.6	7.8
THROW (m) PATTERN B	4.5	4.8	4.6	5.3	5.5
THROW (m) PATTERN C	9	9.7	10.2	10.6	11.1
NOISE - NC LEVEL	31	34	36	39	41

CLN 900 - FULLY OPEN					
NECK TOTAL PRESSURE (Pa)	30	40	50	60	70
2 SLOT (19mm each)					
FLOW (l/s) PATTERN A	81	94	105	114	125
FLOW (l/s) PATTERN B	98	113	126	139	149
FLOW (l/s) PATTERN C	81	94	105	114	125
THROW (m) PATTERN A	5.5	5.9	6.3	6.6	6.8
THROW (m) PATTERN B	3.9	4.2	4.4	4.6	4.8
THROW (m) PATTERN C	7.8	8.4	8.9	9.3	9.7
NOISE - NC LEVEL	32	35	37	39	41
3 SLOT (19mm each)					
FLOW (l/s) PATTERN B	132	169	189	208	223
FLOW (l/s) PATTERN C	121	141	157	171	187
THROW (m) PATTERN B	4.7	5	5.3	5.5	5.8
THROW (m) PATTERN C	9.4	10.1	10.7	11.2	11.6
NOISE - NC LEVEL	32	36	39	41	43
4 SLOT (19mm each)					
FLOW (l/s) PATTERN A	162	188	210	228	250
FLOW (l/s) PATTERN B	176	226	252	278	298
FLOW (l/s) PATTERN C	162	188	210	228	250
THROW (m) PATTERN A	7.7	8.3	8.8	9.2	9.7
THROW (m) PATTERN B	5.5	5.9	6.2	6.4	6.7
THROW (m) PATTERN C	10.9	11.8	12.5	13	13.6
NOISE - NC LEVEL	33	36	39	42	44

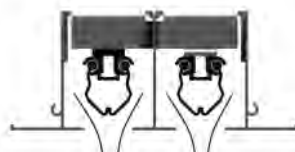
CLN 1200 - FULLY OPEN					
NECK TOTAL PRESSURE (Pa)	30	40	50	60	70
2 SLOT (19mm each)					
FLOW (l/s) PATTERN A	110	127	142	156	168
FLOW (l/s) PATTERN B	136	157	176	193	208
FLOW (l/s) PATTERN C	110	127	142	156	168
THROW (m) PATTERN A	6.4	6.9	7.3	7.6	7.9
THROW (m) PATTERN B	4.5	4.8	5.1	5.4	5.6
THROW (m) PATTERN C	9	9.7	10.3	10.7	11.2
NOISE - NC LEVEL	33	36	38	40	42
3 SLOT (19mm each)					
FLOW (l/s) PATTERN B	204	235	264	289	312
FLOW (l/s) PATTERN C	165	190	213	234	252
THROW (m) PATTERN B	5.4	5.8	6.1	6.5	6.7
THROW (m) PATTERN C	10.8	11.6	12.4	12.8	13.4
NOISE - NC LEVEL	34	38	40	42	43
4 SLOT (19mm each)					
FLOW (l/s) PATTERN A	220	254	284	312	336
FLOW (l/s) PATTERN B	272	314	352	386	416
FLOW (l/s) PATTERN C	220	254	284	312	336
THROW (m) PATTERN A	9	9.7	10.2	10.6	11.1
THROW (m) PATTERN B	6.3	6.7	7.1	7.6	7.8
THROW (m) PATTERN C	12.6	13.6	14.4	15	15.7

CLN 1500 - FULLY OPEN					
NECK TOTAL PRESSURE (Pa)	30	40	50	60	70
2 SLOT (19mm each)					
FLOW (l/s) PATTERN A	135	156	174	191	205
FLOW (l/s) PATTERN B	178	204	228	250	271
FLOW (l/s) PATTERN C	135	156	174	191	205
THROW (m) PATTERN A	7.1	7.7	8.1	8.5	8.8
THROW (m) PATTERN B	5	5.4	5.7	6	6.2
THROW (m) PATTERN C	10	10.8	11.5	12	12.5
NOISE - NC LEVEL	34	37	39	41	43
3 SLOT (19mm each)					
FLOW (l/s) PATTERN B	267	306	342	375	406
FLOW (l/s) PATTERN C	202	234	261	286	307
THROW (m) PATTERN B	6	6.5	6.8	7.2	7.4
THROW (m) PATTERN C	12	13	13.8	14.4	15
NOISE - NC LEVEL	35	39	41	43	44
4 SLOT (19mm each)					
FLOW (l/s) PATTERN A	270	312	348	382	410
FLOW (l/s) PATTERN B	356	408	456	500	542
FLOW (l/s) PATTERN C	270	312	348	382	410
THROW (m) PATTERN A	9.9	10.8	11.3	11.9	12.3
THROW (m) PATTERN B	7	7.6	8	8.4	8.7
THROW (m) PATTERN C	14	15.1	16.1	16.8	17.5

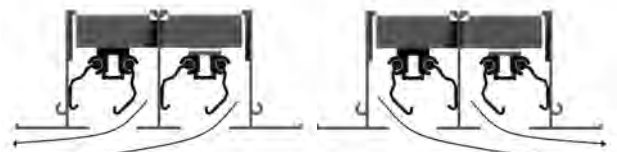


THROW PATTERN A

(EVEN NO. SLOTS ONLY)



THROW PATTERN B



THROW PATTERN C

Throw is measured 25mm below the ceiling following a line through the centre of the diffuser at the point at which the air 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: 2×10^{-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.

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

OPTIONS

The Rickard Constant Volume Linear Diffuser Range supports the following diffusion unit styles.

EXPOSED TEE CEILING GRID

1. DROP-IN MOUNTING

The Drop-in linear diffuser is designed to lay-in a standard ceiling grid. The linear track has a flange along its length to hide the ceiling boards edge from below. The Drop-in linear diffuser has flat ends to fit neatly inside the tees. Rickard recommends additional support to give the diffuser additional stability and support. Attach wire or threaded rod between the ceiling and the support holes provided in the top of the diffusers plenum. Linear diffusers of 595 and 1195mm are available to fit 600 and 1200mm ceiling grids respectively.

PLASTERED CEILING

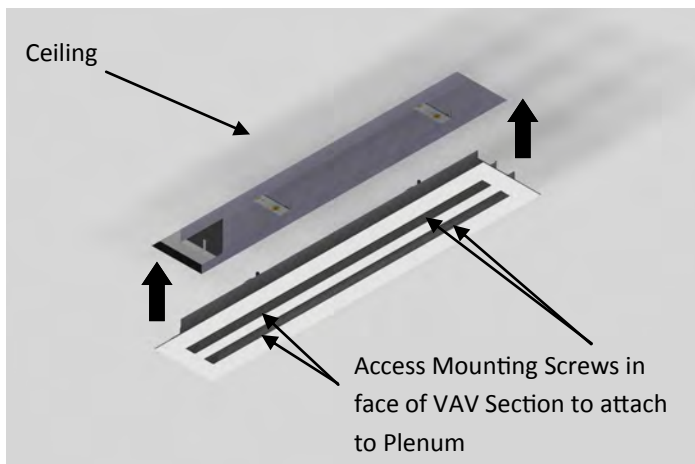
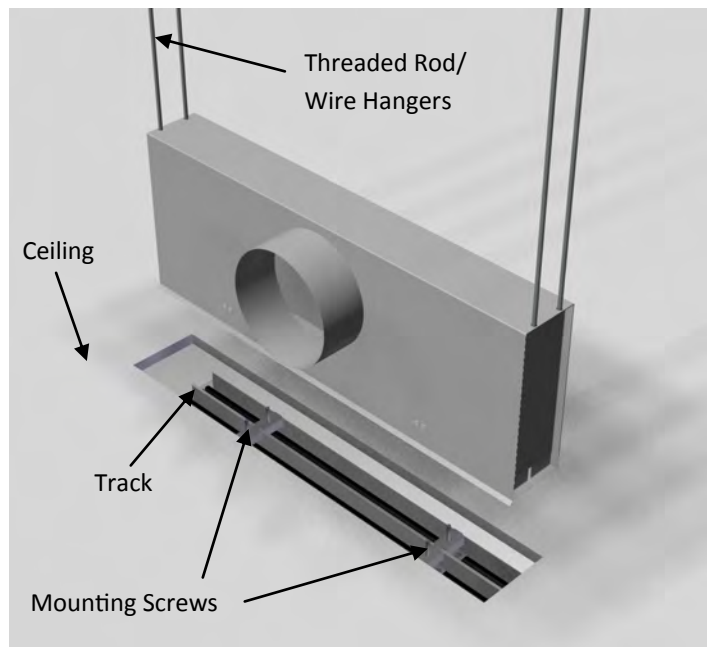
1. SURFACE MOUNTING

a. Individual Surface Mounting

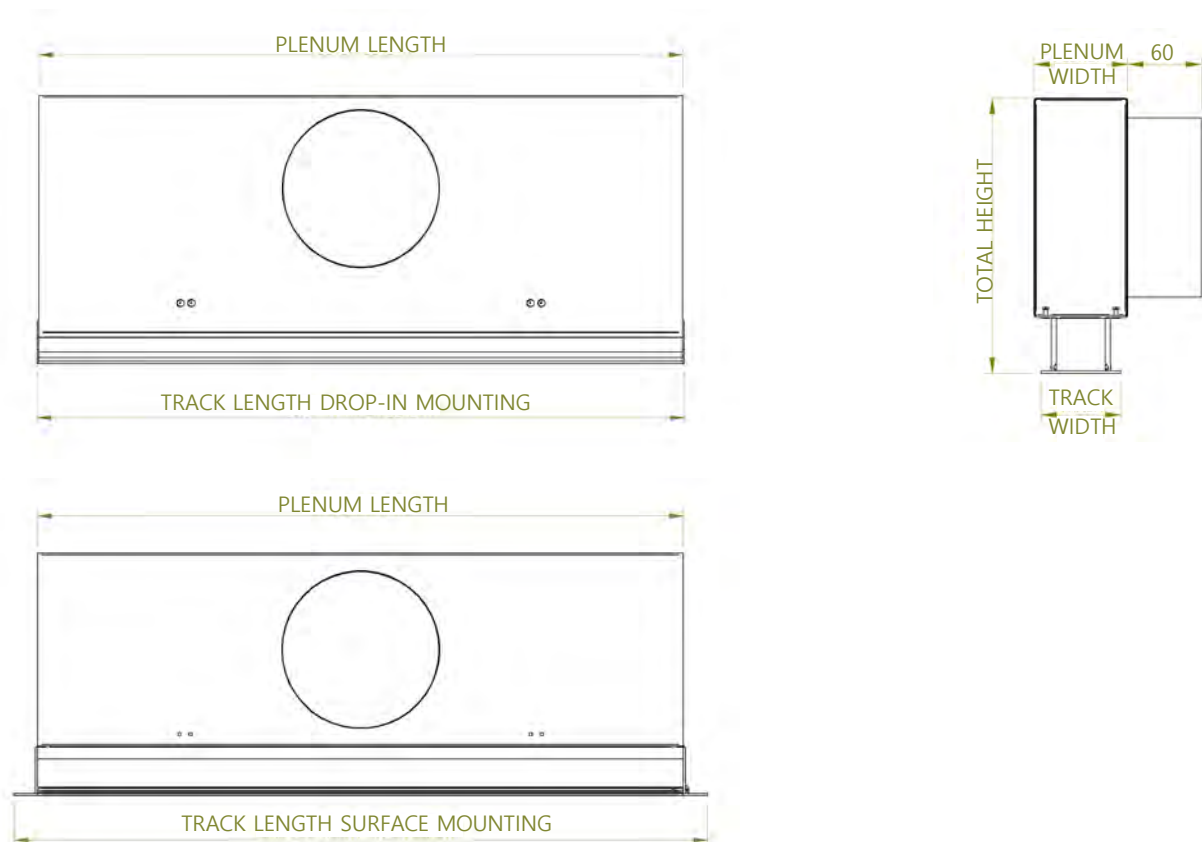
The Surface mount CLN diffuser is designed to fit a plastered ceiling from below. The linear track has a flange along its length and end to hide the rough cut edges of plastered ceiling.

b. Butt-joined Surface Mounting

Surface mount CLN diffusers can be joined together with other CLN linear diffusers, VAV linear diffuser or inactive track to provide long lengths of uninterrupted linear track. VAV linear diffusers, CAV linear diffuser or inactive track that are to be butt joined should be ordered without angle end borders (the flange on the end of the track). Sey-lock pins will be provided with every diffuser to join the tracks together. Special VAV, CAV or inactive track lengths are available on request.



CLN3 GENERAL DIMENSIONS

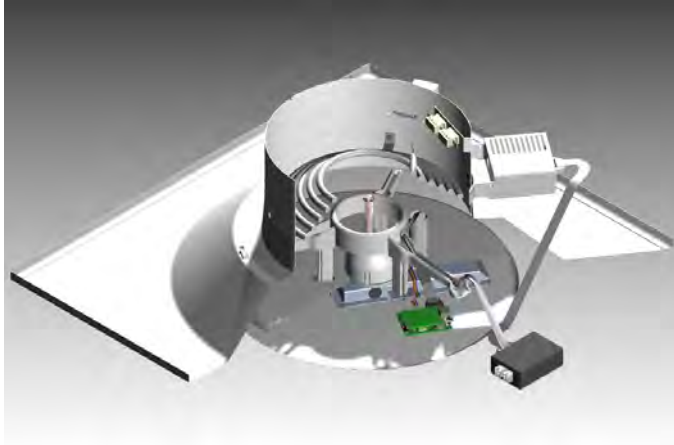


CLN GENERAL DIMENSIONS (mm)								
NOMINAL LENGTH	PLENUM LENGTH	TRACK LENGTH BUTT-JOIN MOUNTING	T-BAR CEILING CENTRES	TRACK LENGTH DROP-IN MOUNTING (T-BAR CEILING)	TRACK LENGTH SINGLE SLOT SURFACE MOUNTING (PLASTERED CEILING)	TRACK LENGTH MULTIPLE SLOT SURFACE MOUNTING (PLASTERED CEILING)	CEILING CUT-OUT LENGTH SURFACE MOUNTING (PLASTERED)	SPIGOT SIZE
600	590	590	600	595	636	656	600	150 ø
900	890	890	900	895	936	956	900	200 ø
1200	1190	1190	1200	1195	1236	1256	1200	250 ø
1500	1490	1490	1500	1495	1536	1556	1500	300 ø

UNIT WIDTHS/LENGTH (600, 900, 1200, 1500mm)								
SLOT NUMBER	1	2	3	4	5	6	7	8
TRACK WIDTH	65	115	152	188	225	262	299	336
PLENUM WIDTH	76	76	112	149	186	222	259	296
PLENUM HEIGHT	262	246	246	246	246	246	246	246

FORM FACTOR

RICKARD ceiling diffusers may be fitted with electric re-heaters that are housed within a sleeve which slides into the diffuser neck. This applies to ceiling diffuser types VCD1, VSD1, CCD3, CSD3, VSW1 and CSW3's. The heaters are energised when additional heating is required in a room. Heaters fitted into WBD's and VLN's are not modular and are fitted to the diffusers casing or spigot respectively.



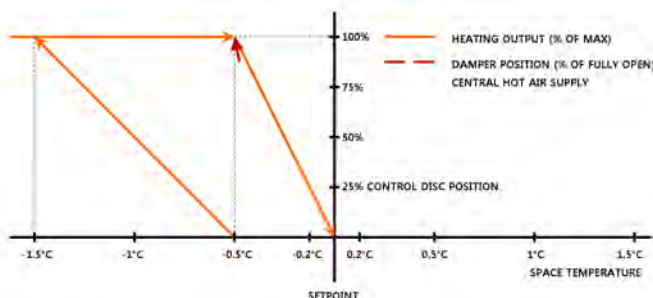
VAV PLATE DIFFUSER FITTED WITH MODULAR HEATER SPIGOT



WBD WITH DEDICATED HEATER FITTED

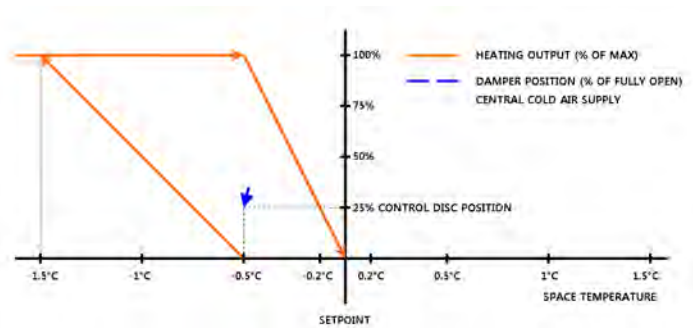
If used correctly, electric heating in VAV diffusers can be considered to be an energy saving device. By using them in offices that are typically colder than the building average allows the central plant to produce less heating in winter than is otherwise possible.

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 topped 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.



Integration of the Rickard VAV diffuser system with the central plant BMS is possible by using our MLM Interoperable 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 Master controller. The heating signal transmitted by the controller is a 9 Volt DC signal.

From the table "Maximum Recommended Heater Output (Watts)", it will be noted that for each neck total pressure there is a specific heater output quoted and for each diffuser size a standard heater capacity is referenced. For example, in the case of a VCD 250 diffuser, the re-heater sleeve would be factory fitted with a 1500 watt heater, which by utilizing the RICKARD MLM or MLM Interoperable BMS Compatible Controls, can be electronically set for any output from as little as 100 watts to 1500 watts to match the design engineer's requirements for minimum cooling mode supply air flow and desired leaving air temperature. Therefore, if the diffuser neck total pressure were to be set at 50Pa and the minimum desired air flow was 30% of maximum with 17°C air temperature rise, the heater output for a VCD 250 should be set to 1350 watts. Kindly refer to the help section in the MLM software program for more detailed information.

IMPORTANT ELECTRICAL INFORMATION: Electrical reticulation should be designed to have the capacity to manage the heaters full capacity e.g. when a heater is set to 50%, the heater element draws the same current as it would when set to 100% but it is drawn 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 and care must therefore be taken to ensure that an excessive temperature rise in the diffuser is 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 actual room temperature. Kindly refer to the appropriate products table giving the "Maximum Recommended Heater Output (Watts)" on page 3 for each diffuser size. These heater output ratings have been computed on the basis that minimum air flow is 30% of maximum and the maximum capacity of the fitted re-heater are set electronically for an air temperature rise of no more than 17°C, a standard feature of the RICKARD MLM and Interoperable BMS Compatible Controls.

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

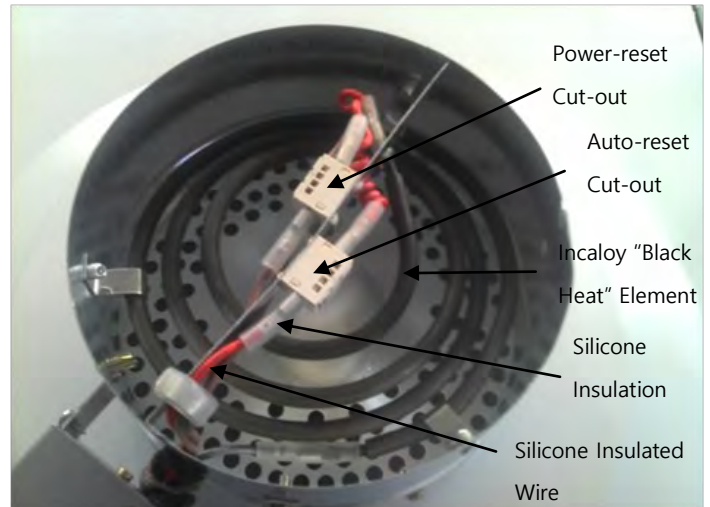
Every Heater Module is fitted with a coiled Electrical Element inside a Mill Galvanised Sheet metal enclosure. The Heater Elements are "black heat" having a heat density of 3.2W/cm² and are constructed from an Incaloy material that does not glow red when energised. This element is selected to reduce 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 uses a high spec flame retardant, self extinguishing polycarbonate plastic that is chlorine and bromine free and has a UL94 V-0 rating at 1.5mm in its ceiling diffusers. The Heater modules are fitted with their own Triac or Heater driver and receive a proportional signal from the diffuser controls when additional heating is required to bring the room into control. The Triac receives its power from a separate power circuit. Dedicated plug tops can be fitted to the heater module on request.

The Heater Modules Triacs are 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 safety 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 after a voltage surge has occurred.

In all cases an auto-reset 65°C ± 5°C (10 000 cycles) and power-reset 85°C ± 5°C (300 cycles) overheat safety cut-out is fitted as standard. The reset temperatures indicate the air temperature inside the over-heat 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 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. The power reset cut-out is reset by turning the power supply off momentarily. If a power reset is required, an investigation into the cause should be made. Push-button type manual reset safeties are not recommended in conjunction with diffuser re-heaters.

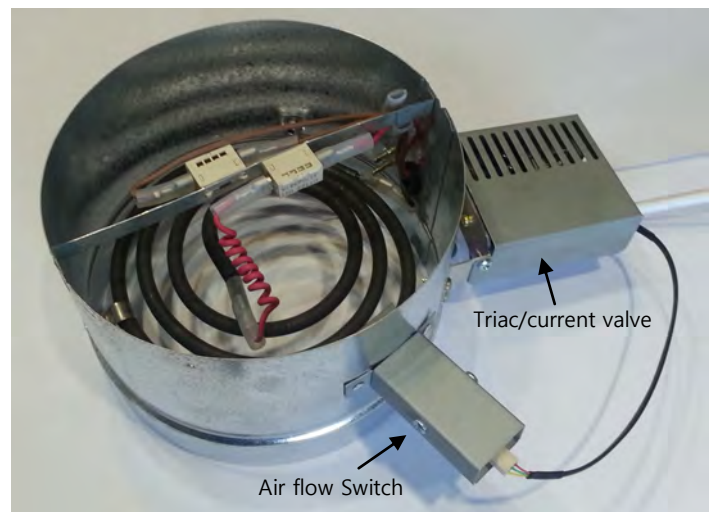
STANDARD SAFETIES FITTED TO ALL VAV DIFFUSER TYPES

(VCD1, VSD1, CCD3, CSD3, VSW1, WBD's and VLN's)



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.

OPTIONAL AIRFLOW CUT-OUT/SWITCH



TESTING

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

OPTIONS

Heaters are available in various capacities, ranging from 0.5kW to 2.5kW.

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.

VCD	Recommended Heater settings & sizing for a 15 Degree C Heat Rise @ 30% Open																		
	Pa	20			30			40			50			60			70		
	Neck Size (mm)	kW			kW			kW			kW			kW			kW		
		Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set
	150	0.35	0.50	70%	0.34	0.50	68%	0.50	0.50	100%	0.50	0.50	100%	0.60	0.75	80%	0.65	0.75	87%
	200	0.60	0.75	80%	0.70	0.75	93%	0.75	0.75	100%	0.90	1.00	90%	1.00	1.00	100%	1.00	1.00	100%
	250	0.85	1.00	85%	1.00	1.00	100%	1.15	1.25	92%	1.30	1.50	87%	1.40	1.50	93%	1.50	1.50	100%
	300	1.00	1.00	100%	1.25	1.25	100%	1.50	1.50	100%	1.65	2.00	83%	1.75	2.00	88%	2.00	2.00	100%
	350	1.30	1.50	87%	1.50	1.50	100%	1.85	2.00	93%	1.85	2.00	93%	2.25	2.50	90%	2.50	2.50	100%
VSW	Recommended Heater settings & sizing for a 15 Degree C Heat Rise @ 30% Open																		
	Pa	30			40			50			60			70					
	Neck Size (mm)	kW			kW			kW			kW			kW			kW		
		Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set
	150	0,35	0,5	70%	0,4	0,5	80%	0,45	0,5	90%	0,5	0,5	100%	0,55	0,75	73%			
	200	0,6	0,75	80%	0,7	0,75	93%	0,8	1	80%	0,85	1	85%	0,9	1	90%			
	250	0,85	1	85%	1	1,25	80%	1,1	1,5	73%	1,2	1,25	96%	1,3	1,5	87%			
	300	1	1	100%	1,2	1,5	80%	1,35	1,5	90%	1,5	1,5	100%	1,6	2	80%			
VLN1 2 Slot Pattern C	Recommended Heater settings & sizing for a 15 Degree C Heat Rise @ 30% Open																		
	Pa	30			40			50			60			70					
	Length (mm)	kW			kW			kW			kW			kW			kW		
		Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set
	600	0,3	0,5	60%	0,35	0,5	70%	0,35	0,5	70%	0,4	0,5	80%	0,45	0,5	90%			
	900	0,45	0,5	90%	0,55	0,55	100%	0,6	0,75	80%	0,65	0,75	87%	0,7	0,75	93%			
	1200	0,65	0,75	87%	0,75	0,75	100%	0,8	1	80%	0,9	0,9	100%	1	1	100%			
	1500	0,85	0,85	100%	1	1	100%	1,1	1,25	88%	1,2	1,2	100%	1,3	1,5	87%			
WBD	Recommended Heater settings & sizing for a 15 Degree C Heat Rise @ 30% Open																		
	Pa	20			30			40			50								
	Size (mm)	kW			kW			kW			kW			kW			kW		
		Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set
	300/100	0,4	0,5	80%	0,5	0,5	100%	0,55	0,75	73%	0,6	0,75	80%						
	350/100	0,55	0,75	73%	0,65	0,75	87%	0,7	0,75	93%	0,75	0,75	100%						
	400/100	0,6	0,75	80%	0,75	0,75	100%	0,8	1	80%	0,9	1	90%						
	450/100	0,7	0,75	93%	0,8	1	80%	0,9	1	90%	1	1	100%						
	500/100	0,7	0,75	93%	0,85	1	85%	0,95	1	95%	1,1	1,25	88%						
	550/100	0,75	0,75	100%	0,95	1	95%	1,1	1,25	88%	1,2	1,25	96%						
	600/100	0,9	1	90%	1	1	100%	1,2	1,25	96%	1,25	1,25	100%						
	650/100	0,95	1	95%	1,15	1,25	92%	1,25	1,25	100%	1,45	1,5	97%						
	500/150	1	1	100%	1,25	1,25	100%	1,6	2	80%	1,8	2	90%						
	550/150	1,2	1,25	96%	1,4	1,5	93%	1,65	2	83%	1,85	2	93%						
	600/150	1,4	1,5	93%	1,6	2	80%	1,9	2	95%	2	2	100%						
	650/150	1,4	1,5	93%	1,7	2	85%	2	2	100%	2,2	2,5	88%						
	700/150	1,5	1,5	100%	1,85	2	93%	2,2	2,5	88%	2,4	2,5	96%						
	800/150	1,75	2	88%	2,1	2,5	84%	2,5	2,5	100%	2,5	2,5	100%						
CCD	Recommended Heater settings & sizing for a 10 Degree C Heat Rise @ 100% Open																		
	Pa	20			30			40			50			60			70		
	Neck Size	kW			kW			kW			kW			kW			kW		
		Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set
	150	1.30	1.50	87%	1.50	1.50	60%	1.75	2.00	88%	2.00	2.00	100%	2.25	2.50	90%	2.40	2.50	96%
	200	1.80	2.00	90%	2.25	2.50	90%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%
	250	2.30	2.50	92%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%
	300	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%
CSW	Recommended Heater settings & sizing for a 10 Degree C Heat Rise @ 100% Open																		
	Pa	20			30			40			50			60			70		
	Neck Size	kW			kW			kW			kW			kW			kW		
		Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set	Adjust	Fit	Set
	150	0.70	0.75	93%	0.80	1.00	80%	1.00	1.00	100%	1.00	1.00	100%	1.15	1.25	92%	1.25	1.25	100%
	200	1.20	1.25	96%	1.30	1.50	87%	1.50	1.50	100%	1.75	2.00	88%	1.90	2.00	95%	2.00	2.00	100%
	250	1.80	2.00	90%	2.00	2.00	100%	2.25	2.50	90%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%
	300	2.00	2.00	100%	2.40	2.50	96%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%	2.50	2.50	100%

To limit stratification in heating Rickard recommends that the heater outputs be limited to the values published in the tables above. The calculated values will 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. By adjusting the diffuser damper position down, a smaller volume will create a larger heat rise and therefore increase the likelihood of stratification. The Fit column indicates the maximum fitted heater size recommended, the Adjust value indicates the maximum heater setting recommended to achieve a 15°C (VAV) or 10°C (CAV) heat rise and the Set column is the MLM Heater Output % value required to achieve a 15°C (VAV) or 10°C (CAV) heat rise.