RICKARD

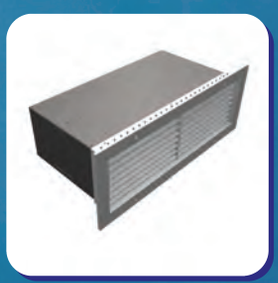
INTELLIGENT COMFORT CONTROL

5

ELECTRONIC VARIABLE VOLUME WALL BULKHEAD DIFFUSER

WBD 1

- VAV PREVENTS DUMPING
- VAV SAVES FAN ENERGY
- EXCELLENT THROW & FLOW
- HEATING AND COOLING
- FOR RESTRICTED CEILING SPACE
- LARGE RANGE OF FINISHES
- NO MAINTENANCE
- 2 YEAR WARRANTY
- NEW STYLE WBD GRILLE AVAILABLE



NEW

FEATURES

The Rickard Wall Bulkhead Diffuser offers all the advantages that you would come to expect from a Rickard VAV diffuser, in a package to suit applications where there are restricted ceiling voids or where fully-covered ceilings are not available. As the name suggests WBDs discharge supply air into the conditioned space from either a side-wall or bulkhead.

Rickard WBDs control Room Temperature by adjusting the volume of air at the diffuser 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 diffusers reduce pressure loss in the system due to their aerodynamic design and the absence of restrictions in the duct work.

PERFORMANCE

Rickard's WBD's have an excellent ability to distribute air across deep rooms.

Rickard VAV Diffusers control Room Temperature by adjusting the volume of air at the diffuser 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 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 - 2.4 VA (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.

CONTROLS

Master/Slave changes are achieved by installing a wall thermostat controller and are activated using Rickard's Free Software.

Electronically adjustable maximum and minimum damper limits allow designed airflow volumes to be achieved.

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

Cost effective standalone, LonWorks and BACnet BMS integration.

Automatic heating and cooling change-over

CAPITAL & OPERATING COST

WBD's are used in areas where restricted ceiling voids exist or where fully-covered ceilings are not available

MAINTENANCE

No regular maintenance is required.

The cartridge design allows easy removal if 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.

AESTHETICS

When installed, the only visible portion of the WBD is the Rickard linear bar grille. The grille is available as natural anodized or epoxy powder coated in a wide range colours to suit architectural requirements.

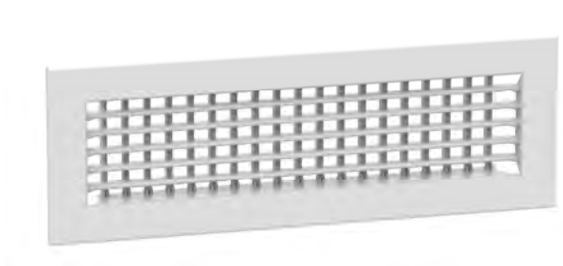
WARRANTY

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

SAFETY

Working plastic components are moulded in glass reinforced Makrolon – Makrolon is flame retardant and chlorine and bromine free when burnt. The Rickard Thermo-Disc and Electronic actuators are moulded in Makrolon and are UL Certified.

NEW STYLE WBD GRILLE



APPLICATION

The Rickard Variable Volume Wall Bulkhead Diffuser (WBD) is normally used in areas where restricted ceiling voids exist or where fully-covered ceilings are not available. The WBD, as the name implies, is intended to discharge supply air into the conditioned space from either a sidewall or bulkhead. Frequently building areas have dividing passage ways with ceiling heights lower than those within the areas requiring air conditioning. In this situation the supply air ducting may be run in the void between the passage ceiling and the slab above, with the WBD terminals regulating the supply air from the ducting. In many instances these ceiling voids may also serve as return air plenums.

The Rickard WBD has an excellent ability to distribute air across deep rooms as reflected by the throw data indicated in the selection tables. There are, however, instances where these throws are too great for a specific area & in which case, the rear horizontal deflection vanes will need to be adjusted.

When installed, the only visible portion of the WBD is the aesthetically pleasing Rickard linear bar grille. This grille may be supplied with a natural anodized finish or epoxy powder coated in a wide range of

colours to suit architectural requirements.

OPERATION

Room temperature is intelligently controlled by varying the supply air volume in accordance with demand. The diffuser controller uses a proportional/integral response to achieve this. Volume control is achieved by opening or closing a set of aerodynamic damper blades using our patented electric stepper motor, so as to vary the aperture through which the supply air passes. This provides true "VARIABLE GEOMETRY VAV" which effectively maintains air discharge velocity throughout the range of volume control from 100% down to as little as 25%. By using our MLM Controls, maximum and minimum supply air volumes may be adjusted to suit the particular design conditions.

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 7.5m/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 with the diffusers damper in the fully open position. A downward moving layer of air 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 know or measured is duct STATIC pressure.

Best results are obtained when diffusers are selected at pressures of 30-40Pa (0.12-0.16ins 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. The reason being that at maximum flow any restrictions 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 causing over-cooling/heating.

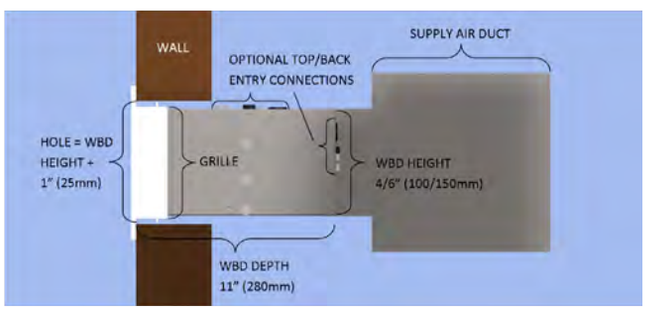
TYPES

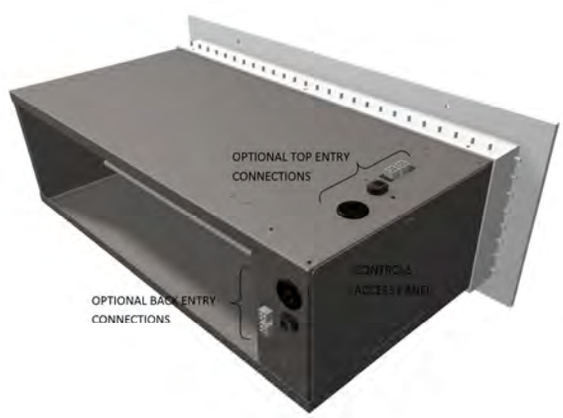
The Rickard Wall Bulkhead Diffuser are available in the following standard sizes:

	Length (mm)										
Height (mm)	300	350	400	450	500	550	600	650	700	750	800
100	x	x	x	x	x	x	x	x	x	.	.
150	.	.	.	.	x	x	x	x	x	x	x

Depending on the installation, WBD's are available with top or back entry cable connections. Top entry is used when there is access between the wall and the duct. Back entry is used when there is only access through the duct.

NOTE: Top Entry and Back Entry connections are separate options.





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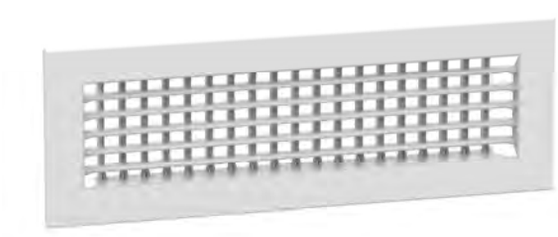
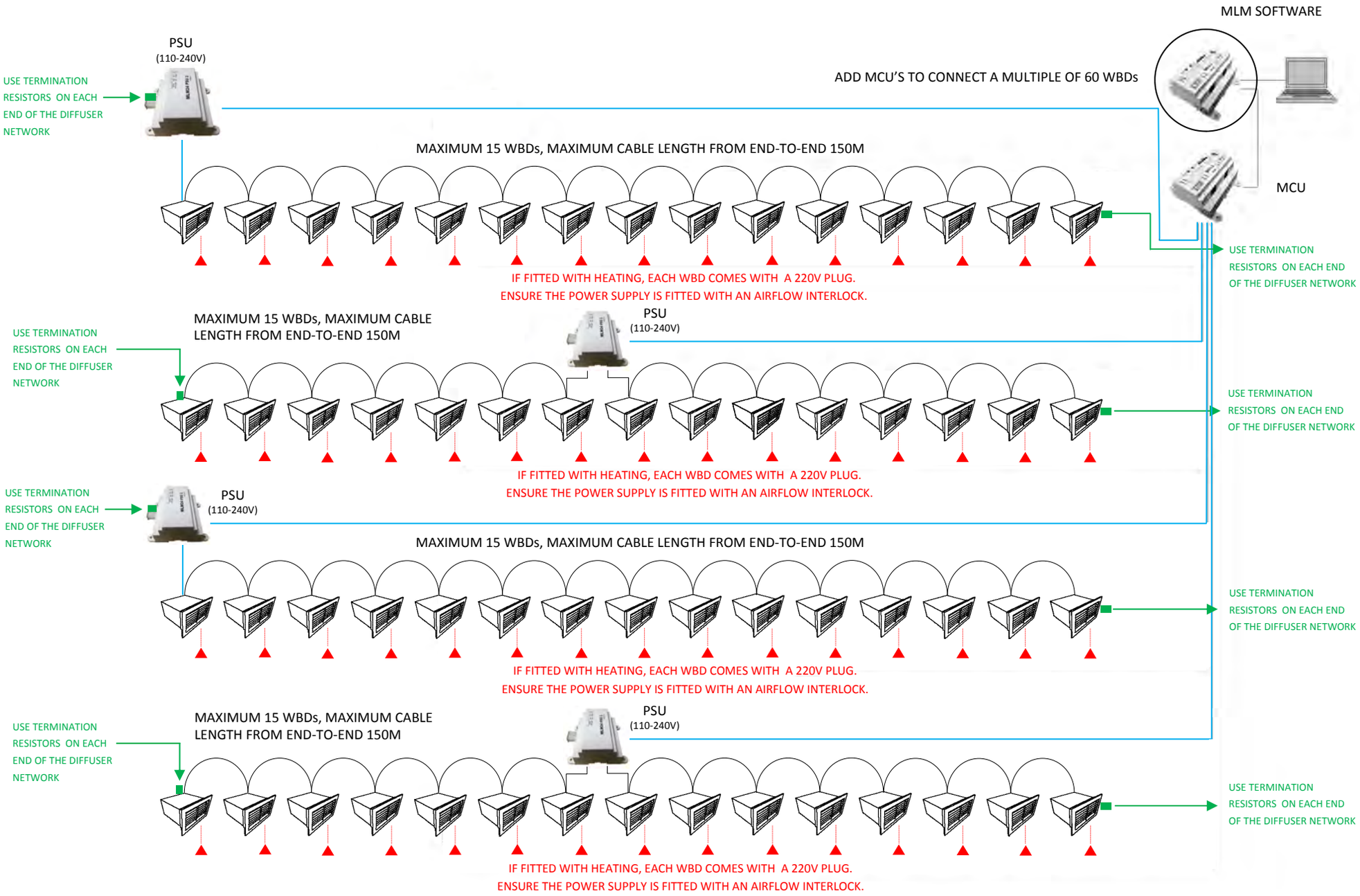
NEW STYLE WBD GRILLE



WALL BULKDEAD DIFFUSER (WBD)



WBD1

SIZE	READING	WBD ONBOARD SENSING STATIC PRESSURE (Pa)				WBD REMOTE SENSING STATIC PRESSURE (Pa)			
		20	30	40	50	20	30	40	50
300/100	FLOW l/s	58	75	90	95	73	90	102	116
	THROW(m) max/min	5.2	6.4	7.2/3.7	8.3/4.1	6.3/3.2	7.3/3.9	8.2/4.1	9.7/4.9
	NC LEVEL	28	32	36	38	29	33	37	39
350/100	FLOW l/s	80	102	113	122	98	117	132	145
	THROW(m) max/min	7.2/3.8	8.2/4.1	9.5/4.7	10.1/5.0	6.9/3.6	8.8/4.7	10.2/5.0	11/5.1
	NC LEVEL	29	33	37	39	29	33	36	38
400/100	FLOW l/s	100	130	149	155	116	138	149	164
	THROW(m) max/min	7.8/4.2	8.6/4.7	10/5.0	11/5.1	8.4/4.5	9.1/5.0	10/5.1	10/5.4
	NC LEVEL	29	33	36	38	29	33	36	39
450/100	FLOW l/s	105	140	153	160	130	153	169	192
	THROW(m) max/min	7.0/3.6	8.4/4.9	9.1/5.2	10.7/5.4	8.2/4.4	9.4/5.2	10.7/5.8	11.4/5.8
	NC LEVEL	29	33	37	39	29	34	36	39
500/100	FLOW l/s	110	144	162	170	132	161	182	208
	THROW(m) max/min	8.4/4.6	9.4/5.1	10/5.5	11/5.4	8.4/4.4	9.7/5.3	11/5.9	12/6.0
	NC LEVEL	29	34	37	39	30	34	38	40
550/100	FLOW l/s	120	156	185	200	149	175	202	219
	THROW(m) max/min	8.2/4.3	9.5/5.1	10.6/5.9	11.7/6.1	8.8/4.9	9.8/5.6	11.1/5.8	12.4/6.9
	NC LEVEL	30	34	38	40	30	34	38	40
600/100	FLOW l/s	135	178	205	229	166	194	219	247
	THROW(m) max/min	8.6/4.7	10/5.6	11/6.4	13/7.0	8.8/4.8	10/6.0	12/6.6	13/7.2
	NC LEVEL	30	34	38	40	30	33	38	41
650/100	FLOW l/s	160	215	252	275	180	218	247	277
	THROW(m) max/min	8.8/4.9	10.3/5.8	11.7/6.6	13/7.2	8.9/4.9	10.1/5.2	11.3/6.3	12.6/6.8
	NC LEVEL	30	33	38	41	30	34	39	41
500/150	FLOW l/s	165	219	258	292	199	240	301	335
	THROW(m) max/min	8.7/4.9	10/5.6	11/6.4	13/7.1	8.8/5.0	10/5.9	12/6.6	13/7.8
	NC LEVEL	30	35	39	41	30	35	39	41
550/150	FLOW l/s	190	250	288	302	223	267	309	346
	THROW(m) max/min	8.8/4.7	10.5/6.1	11.2/6.4	12.8/7.6	9.6/5.1	11.7/6.4	13.1/7.3	15/8.3
	NC LEVEL	30	34	38	41	31	35	39	41
600/150	FLOW l/s	215	263	304	340	260	307	356	390
	THROW(m) max/min	9.2/4.9	12/6.4	13/7.1	16/8.4	9.8/5.2	11/6.6	13/7.5	15/8.8
	NC LEVEL	31	35	38	41	31	35	39	41
650/150	FLOW l/s	230	300	350	370	267	329	378	410
	THROW(m) max/min	9.4/5.0	10.3/6.4	13/7.4	15/8.6	9.7/5.2	10.9/6.7	13.6/7.8	15.4/8.9
	NC LEVEL	32	35	39	42	32	35	39	42
700/150	FLOW l/s	267	329	378	410	288	352	407	455
	THROW(m) max/min	9.7/5.2	11/6.7	14/7.8	15/8.9	10/6.0	13/7.2	15/8.8	16/9.3
	NC LEVEL	32	35	39	42	32	35	39	42
800/150	FLOW l/s	305	373	431	482	329	403	465	520
	THROW(m) max/min	10/5.5	11/7.0	15/8.3	16/9.2	10/5.6	11/7.4	15/8.5	16/9.4
	NC LEVEL	32	35	39	42	32	35	39	42

Throw data is taken 25mm below the ceiling on a line through the centre of the diffuser with the volume control blades fully open & an air velocity of 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 factory set for a minimum of 30% of the maximum flow levels reflected above. It should be noted that minimum diffuser air flow settings are approximate & may require to be reset on site to compensate for actual site system pressures. Performance Data applies to Standard Air having a density of 1.2 kg/m3.

GENERAL

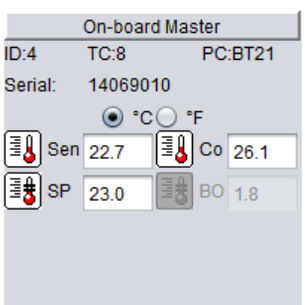
The RICKARD Reversing Changeover facility ensures that the VAV diffuser controls the temperature accurately when the central system is supplying either warm or cold air.

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.

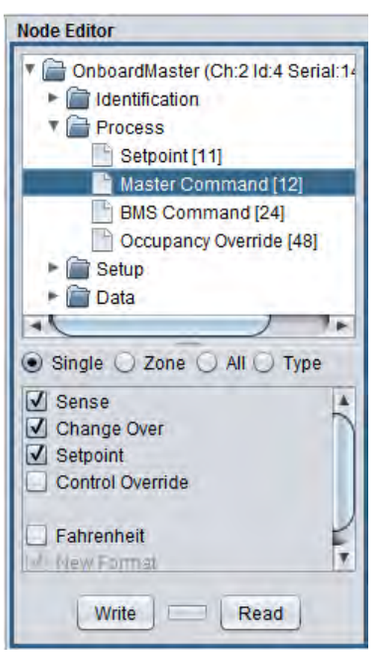
INSTALLATION

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.

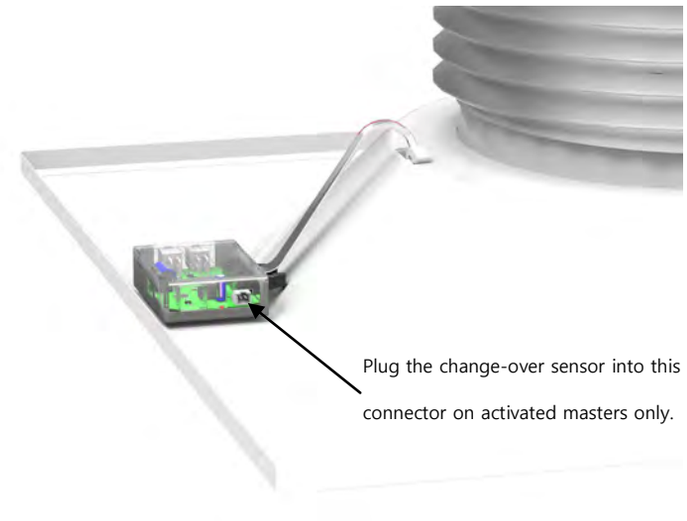


TYPICAL MASTER SETTINGS

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

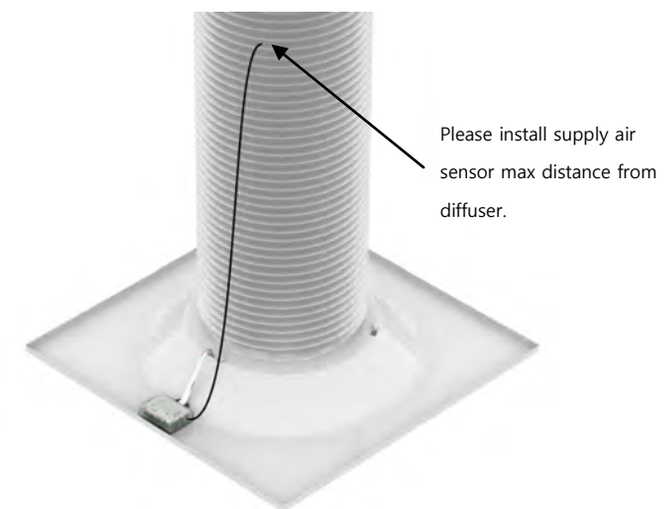


NOTE: Slave diffusers receive a control signal from the master diffuser and therefore do not require nor should they be fitted with a changeover sensor. It is also important that a slaves changeover sensing is turned off on the MLM application. Failure to do so will result in a zone not operating correctly.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

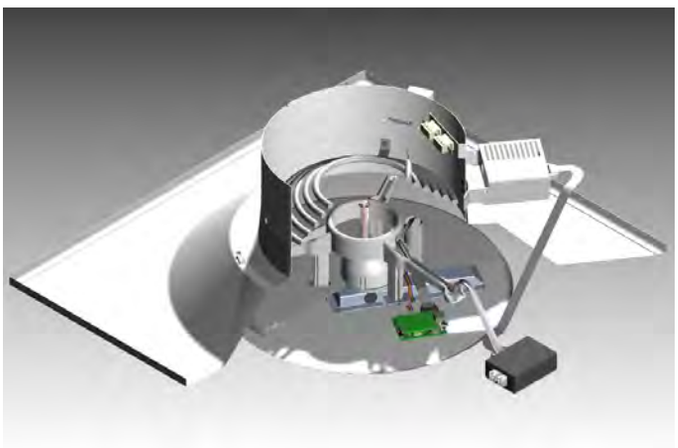
The controller compares the primary air and room temperature. Whenever the supply air temperature exceeds the room temperature by one degree Celsius, the control action is reversed and switches to heating mode. Cooling mode is re-instated when the primary air temperature falls one degree Celsius below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

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.

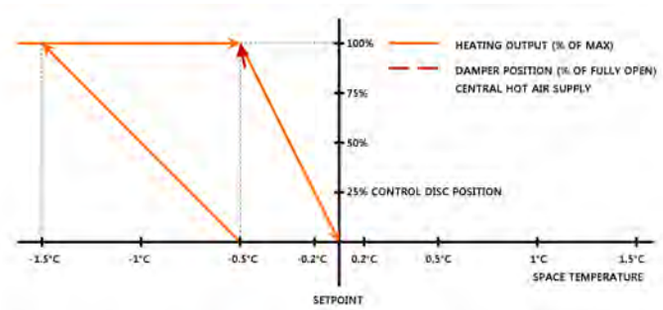


VAV PLATE DIFFUSER FITTED WITH MODULAR HEATER SPIGOT

WBD WITH DEDICATED HEATER FITTED

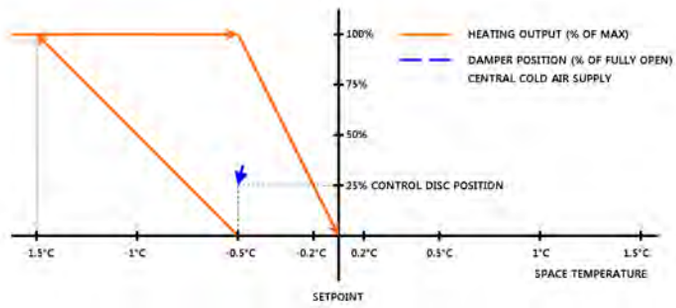
If used correctly, electric heating in VAV diffusers can be considered to be an energy saving device. By using them in offices that are typically colder than the building average allows the central plant to produce less heating in winter than is otherwise possible.

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 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.



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

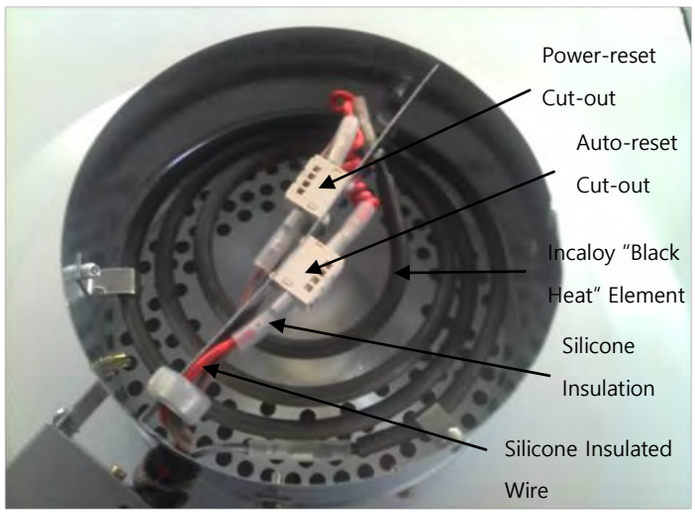
Every Heater Module is fitted with a coiled Electrical Element inside a Mill Galvanised Sheet metal enclosure. The Heater Elements are "black heat" having a heat density of 3.2W/cm² and are constructed from an Incaloy material that does not glow red when energised. This element is selected to reduce 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 seperate 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°±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 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 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.

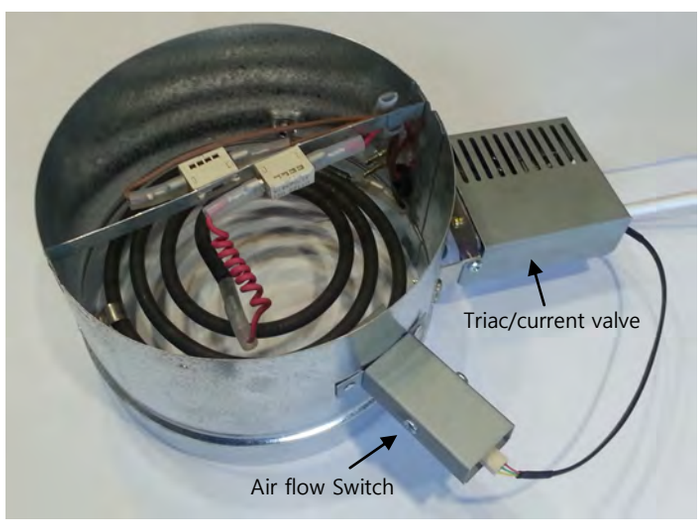
STANDARD SAFETIES FITTED TO ALL VAV DIFFUSER TYPES

(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		
	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		
	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		
	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.