

PRODUCT BROCHURE

SMARTEMP[®]
IN COMFORT



Linear Multistream Ceiling Diffuser **LMC-AD**

LMC-AD : 072021

smartemp.com

DESCRIPTION



The SMARTEMP® **Linear Multistream** Ceiling Diffuser, type LMC-AD (figure 1), is a multi-nozzle linear slot diffuser with adjustable discharge direction that can be flush mounted in a ceiling or freely suspended (ie no Coanda attachment to the ceiling required).

The diffuser's 1-to-6 linear slots house a plurality of barrel nozzles, each with an adjustable guide vane, delivering highly inductive discharge by breaking the supply air stream up into a multitude of alternating air jets.

Each barrel nozzle is made of black polycarbonate located between linear aluminium extrusions that are anodised or powder coated. Each guide vane is readily adjustable to any one of five discharge patterns (figure 2 - three 2-way blow examples shown) to change the discharge angle from horizontal through diagonal to vertical (figures 3 & 4). Two-way discharge is standard (figures 3 & 4); one-way discharge is available as an option (figure 5).

Intense mixing at the diffuser discharge face produces high induction that strongly dilutes the supply air stream with large quantities of room air. Rapid temperature equalisation of the supply air stream with room air

occurs, enhancing warm air penetration down to occupants when heating, and preventing cold air dumping when cooling, thereby ensuring uniform temperature distribution and high comfort levels in the space (no cold and draughty or hot and stagnant spots).

The stable discharge characteristics of the diffuser over a wide range of supply air temperatures and volume flow rates make the LMC-AD suitable both for constant flow and VAV systems, including low temperature air supply.

LMC-AD	Volume flow rate * Supply-to-Room Temperature Differential (Cooling)		
	\dot{V} [L/s/m] $\Delta T = -16$ K	\dot{V} [L/s/m] $\Delta T = -12$ K	\dot{V} [L/s/m] $\Delta T = -8$ K
1	9-36	8-36	6-36
2	19-75	16-75	13-75
3	29-116	25-116	21-116
4	38-150	33-150	27-150
5	47-188	41-188	33-188
6	57-228	49-228	40-228

*Max \dot{V} based on 35 Pa P_i max (including side-entry connection box).



Figure 1

DISCHARGE DIRECTION EXAMPLES
WITH 2-WAY PATTERN



Direction A



Direction C



Direction E

Figure 2

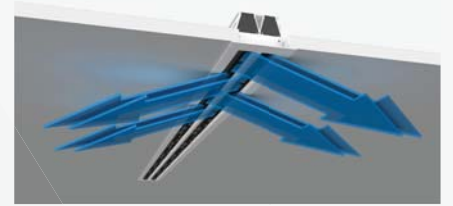


Figure 3

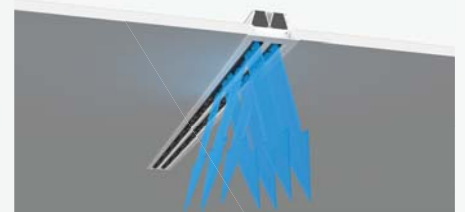


Figure 4

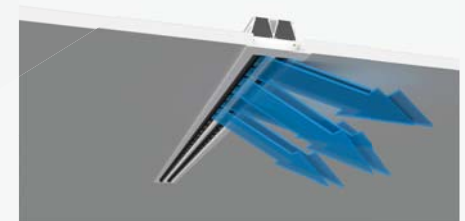


Figure 5

CONSTRUCTION

- 1 - Plenum Box
- 2 - Supply Air Diffuser
- 3 - Return Air Diffuser
- 4 - Expansion Bracket
- 5 - Joining Strip
- 6 - Corner piece
- 7 - End Flange

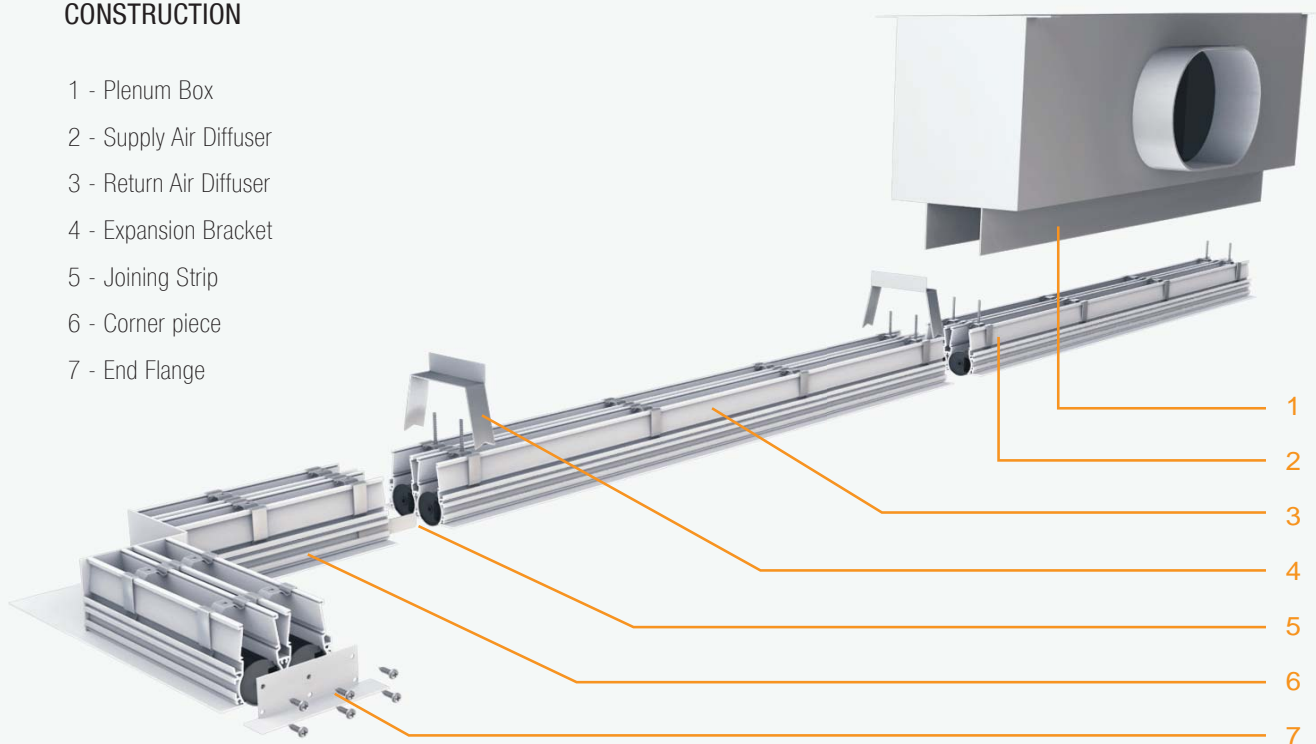
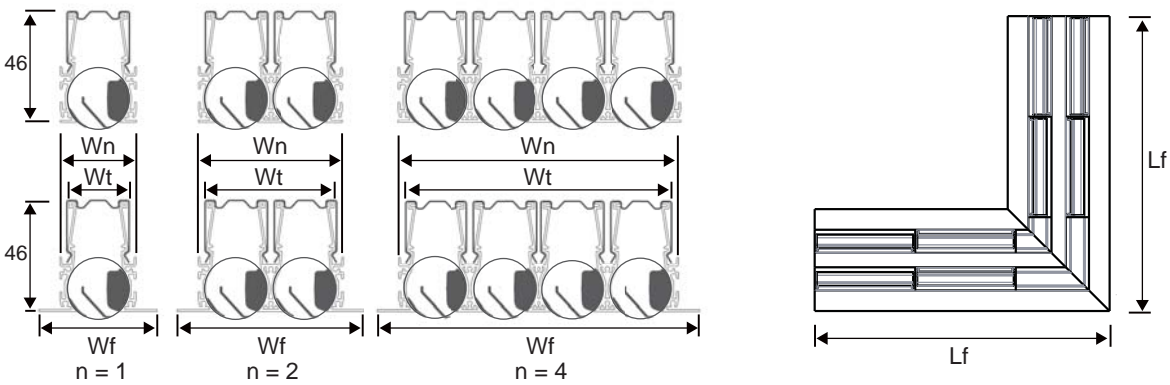
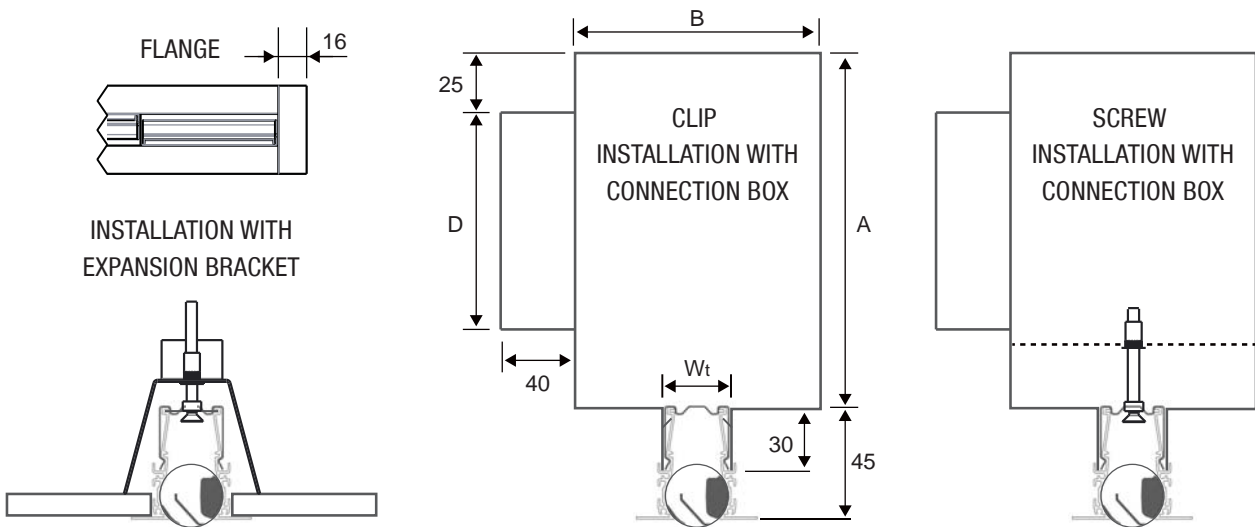


Figure 6

TECHNICAL DATA



DIMENSIONS

Number of Slots (n)	1	2	3	4	5	6	n
Width flangeless face W_n [mm]	31	59	87	115	143	171	$28 \cdot n + 3$
Width flanged face W_f [mm]	48	76	104	132	160	188	$28 \cdot n + 20$
Width of diffuser throat W_t [mm]	27	55	83	111	139	167	$28 \cdot n - 1$
Recommended internal plenum height A [mm]*	D+76						
Recommended internal plenum width B [mm]*	81	109	137	165	193	221	$W_n + 50$
Recommended spigot dimension D [mm]* up to 1200 mm length	149	224	249	299	299	314	<3.6m/s
Recommended spigot dimension D [mm]* up to 1500 mm length	149	224	249	299	314	354	<3.6m/s
Length of corner piece L_f [mm]	192	220	248	276	-	-	-

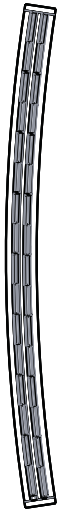
*Check with local supplier. All clear air dimensions. If insulated, then external dimensions need to be increased accordingly.

Standard neck lengths: 1050, 1200, 1350, 1500 mm. Other lengths on request.

Neck length (including screw heads) increases by 3.0 mm per end flange.

Products supplied may differ slightly from those described in this technical brochure due to on-going product development.

TECHNICAL DATA



CURVED LINEAR SLOT DIFFUSER

For curved architectural applications, Smarttemp can supply either a flanged or a flangeless linear slot diffuser. Even in curved configurations, full pattern control is possible. Curved linear slot diffusers are available with factory set air pattern and direction.

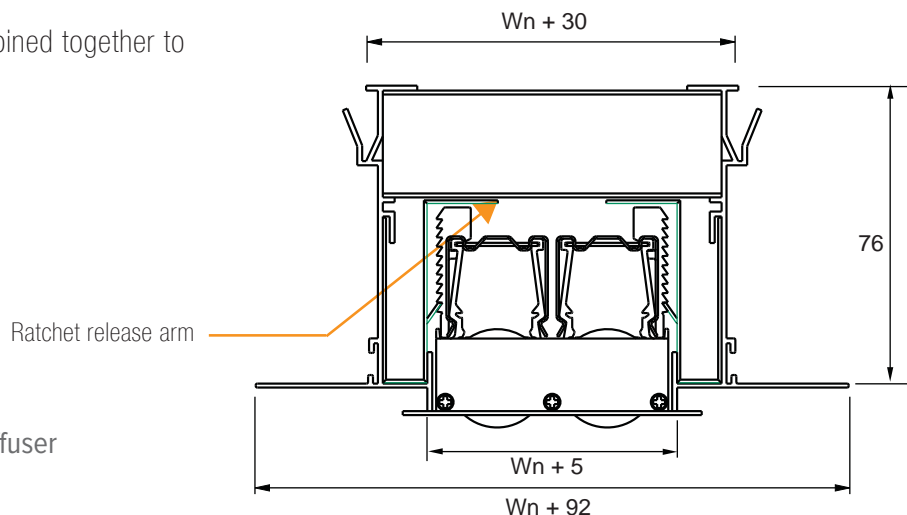
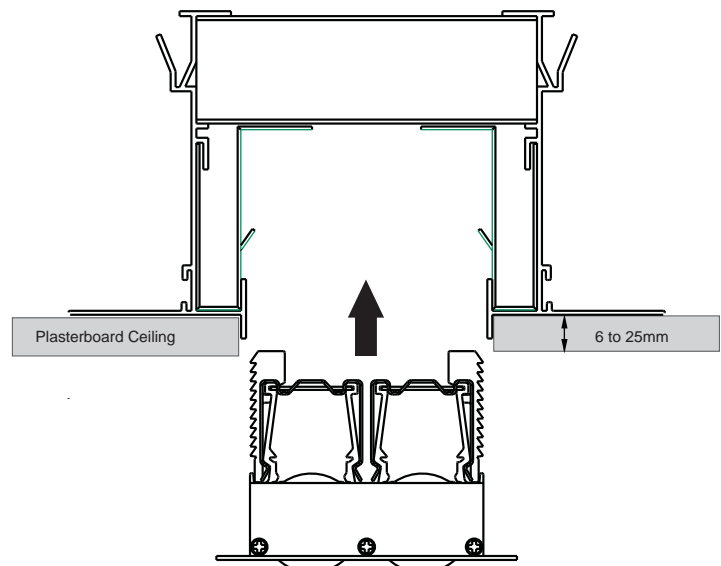
RADIUS

For 1-slot diffusers the minimum radius is 1500 mm;
 2-slot to 4-slot can be made to a minimum radius of 4000 mm.
 The above radii apply to both the flanged and flangeless designs.

MOUNTING FRAME (for flanged LMC only)

The LMC mounting frame type MFP is a base frame suitable for integration into a suspended plasterboard ceiling before the diffuser is installed. Once the ceiling has been painted resp. finished, the flanged LMC may simply be inserted from below to ratchet against the plaster board ceiling, which may be between 6 and 25 mm thick. The diffuser may be released from the mounting frame by the insertion of thin screwdrivers from below pushed against the ratchet release arms.

Numerous segments can be joined together to form a continuous slot.



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NOTES TO NOMOGRAM ON PAGE 6

Comments / Nomogram valid for:

2 Heating valid for 100% high-level return.

Valid for discharge from closed ceiling.



Recommended Air Pattern Settings:

For H = 2 to 2.7 m:

For H = 2.7 to 3 m:

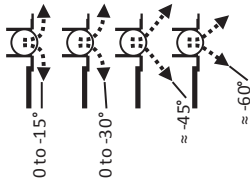
For H = 3 to 4 m:

For H = 4 to 5 m:

Adjustments:

For low-level return:
 $\Delta T_{\text{max, heating}} \approx (1 + (\text{LRA}\%)/100) \bullet \Delta T_{\text{max}}$, where LRA% = % low-level return.

For freely suspended diffuser:
 Heating $\Delta T_{\text{max, freely suspended}} \approx \Delta T_{\text{max, heating}} / 2$



A: 0° to -15° discharge to the horizontal.

B: 0° to -30° discharge to the horizontal.

C: ≈ -45° discharge to the horizontal.

D: ≈ -60° discharge to the horizontal.

3 Total pressure (P_T) is inclusive of side-entry connection box pressure loss.

4 Draw a line vertically down the nomogram for 2-way blow, or correct for 1-way blow.

5 For height ≤ 2.7 m select 2.7; otherwise select height twice (once in the grey zone; once in the white zone).

6 C_{min} is either the minimum spacing between two 2-way blow diffuser rows (halve this value for throw to walls / glazing) or the minimum throw of a 1-way blow diffuser row.

7 C_{max} is either the maximum spacing between two 2-way blow diffuser rows (halve this value for throw to walls / glazing) or the maximum throw of a 1-way blow diffuser row. Active Length Ratio (R_{LA}) is the ratio of the active length L_A relative to the room length L. Determine C_{max} twice (once for cooling ΔT; once for discharge height) then select the lower of the two outputs.

8 Select desired comfort level to determine minimum and maximum spacing or throw (C_{min} & C_{max}) and minimum discharge height (H_{min}).

H_{min} for discharge from closed ceiling.



For freely suspended diffuser:
 H_{min, freely suspended} ≈ H_{min} • 1.1



9 Sound pressure level L_p [NC/m] is valid in a standard commercial office only with 2.7 m to 3 m ceiling.

Thermal Comfort Guide:

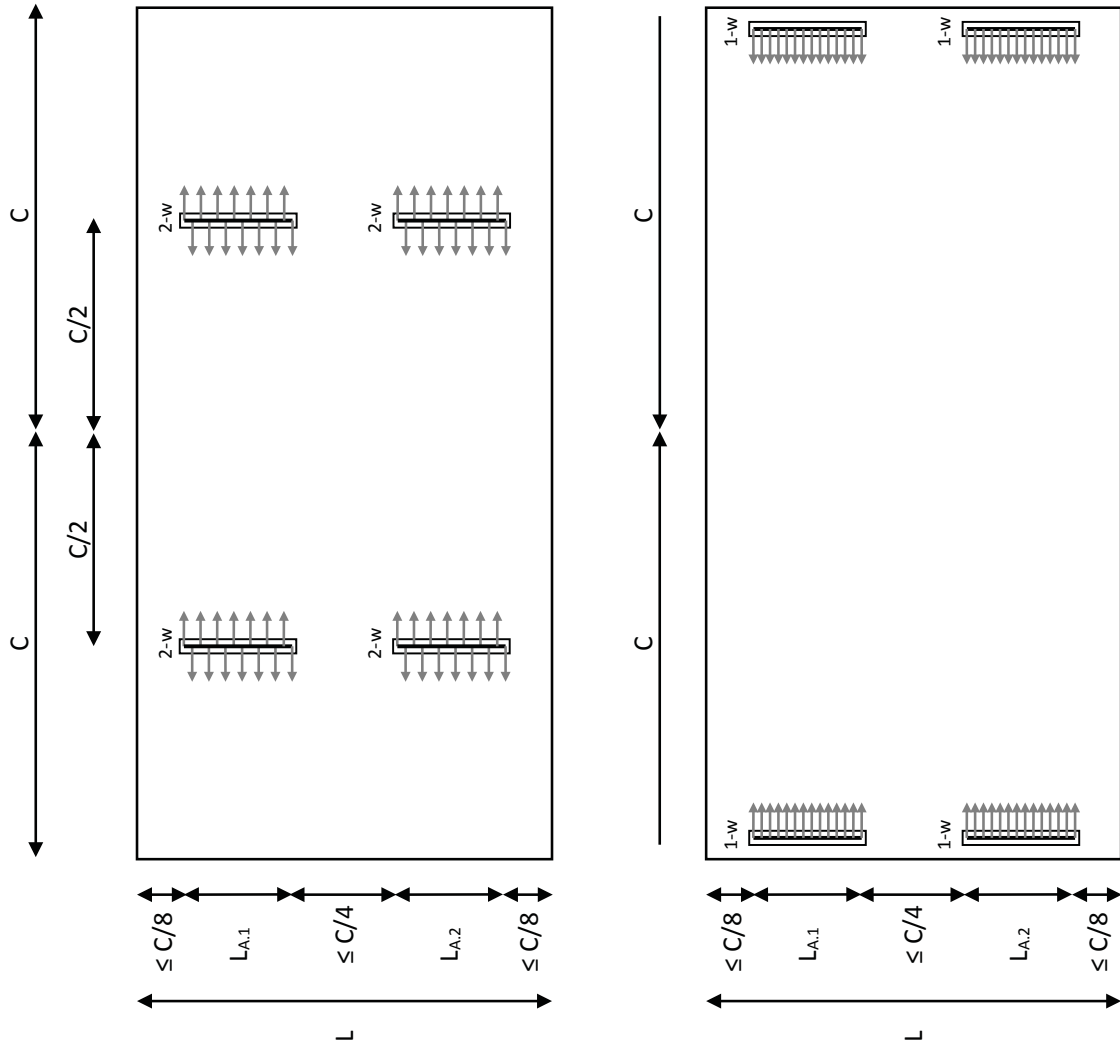
ADPI ≥ 95%: **Premium comfort** sedentary activity, such as in auditoria.

ADPI ≥ 90%: **High comfort** near-sedentary activity, such as in board rooms, high end offices and libraries.

ADPI ≥ 80%: **Good comfort** near-sedentary activity, such as in open-plan offices and meeting rooms.

ADPI ≥ 70%: **Standard comfort** medium activity, such as in transient spaces, retail and lobbies.

Layout Recommendations:



Refer to nomograms for performance data.

Notes:

- Spacing:
 $C_{min} \leq C \leq C_{max}$
 $C_{walls} = C/2$
- Active Length Ratio:

$R_{LA} = L_A / L$, where

$L_A \geq 0.1 \bullet L$, and

$L_A = \sum L_{A,i}$

- Air Pattern:
 2-w: 2-way blow
 1-w: 1-way blow

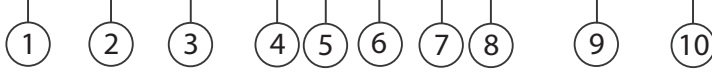
EXAMPLE: LMC-AD-2.1

Determine performance parameters for a row of LMC-AD-2.1 (two-slot; one-way blow) operating at 67 L/s, freely suspended at 5 m height, supplying approximately 2 L/s/m² to a library. The sum of the diffuser lengths spans 70% of the library length. The supply-to-room temperature differential when cooling is -16 K. 100% return air is from a low level.

- 1 Select a double slot (Slots 2).
- 2 5 m discharge height requires the diffuser air pattern to be set to D ($\approx -60^\circ$ from the horizontal).
Select ≤ 2 L/s/m² specific airflow, which gives a maximum heating temperature differential (ΔT_{\max}) of +1 K, valid for discharge from a closed ceiling and 100% high-level return.
For 100% low-level return, $\Delta T_{\max, \text{heating}} \approx (1 + (\text{LRA}\%)/100) \times \Delta T_{\max} \approx (1 + (100/100)) \bullet 1 \text{ K} \approx +2 \text{ K}$.
As the diffuser is freely-suspended, $\Delta T_{\max, \text{freely suspended}} \approx \Delta T_{\max, \text{heating}} / 2 \approx +1 \text{ K}$.
(This is not sufficient for heating. Consider using the Smartemp HSC-AD if heating is required.)
- 3 The total pressure (P_t) is 27 Pa, inclusive of side-entry connection box pressure loss.
- 4 To determine layout recommendations in cooling mode, select 1-w (one-way blow) air pattern.
- 5 Select 5 m discharge height twice (once in the grey zone; once in the white zone).
- 6 Select -16 K cooling.
- 7 Select $R_{\text{LA}} = 0.7$ (ie 70% active length ratio for 70% diffuser span across the library length). Select -16 K cooling and 5 m discharge height.
- 8 For a library, select ADPI = 90%. C_{\min} between two diffuser rows is 16 m (8 m to walls). $H_{\min, \text{freely suspended}} \approx H_{\min} \bullet 1.1 \approx 2.42 \bullet 1.1 \approx 2.7 \text{ m}$.
 C_{\max} between two diffuser rows is 24m (12m to walls for -16 K cooling and 30m for 5m discharge height) or 7.5 m to walls.
- 9 The A-weighted sound power level (L_w) of the diffuser is 33 dB(A). As this is a large volume library (and not a 2.7 to 3 m ceiling height office) the sound pressure level (L_p) should not be used (ie only L_w should be used for acoustical calculations).

ORDER DETAILS

LMC-AD-N1200-2-2A-SF-E2-0-RAL9003-0



① **MODEL:**
- Linear Multistream Ceiling

② **SUPPLY/RETURN:**
- AD* = Adjustable Direction
- RA = Return Air

③ **NOMINAL LENGTH:**
- N1200 - neck length = 1200 mm
- F1195* - face length = 1195 mm
- F_____ - custom face length ≤ 1500 mm

④ **NUMBER OF SLOTS:**
- 1, 2, 3, 4, 5, 6
- Other slots available on request

⑤ **AIR PATTERN & DIRECTION:**
- 2A* - 2-way horizontal, position A (0 to -15°)
- 1A - 1-way horizontal, position A (0 to -15°)
- 2B - 2-way horizontal, position B (0 to -30°)
- 1B - 1-way horizontal, position B (0 to -30°)
- 2C - 2-way diagonal, position C (≈ -45°)
- 1C - 1-way diagonal, position C (≈ -45°)
- 2D - 2-way vertical, position D (≈ -60°)
- 1D - 1-way vertical, position D (≈ -60°)
- 2E - 2-way vertical, position E (vertical)
- 1E - 1-way vertical, position E (vertical)

⑥ **SIDE PROFILE:**
- F* - With side flanges
- N - Flangeless

⑦ **DIFFUSER ENDS:**
- 0 - Without end flanges
- J - Without end flanges + 1 pair of joining strips
- 1 - 1 End flange + 1 pair of joining strips
- 2* - 2 End flanges

⑧ **FIXING :**
- 0* - Without accessories / by others
- EX - Expansion bracket
- MFP - Mounting frame for plasterboard

⑨ **PROFILE COLOUR:**
- RAL9003* (signal white)
- RAL9005 (matte black)
- RAL_____ (RAL colour of choice)

⑩ **ACCESSORIES:**
- 0* - Diffuser only
- Kt - With uninsulated connection box clipped to diffuser neck
- Kn - With uninsulated connection box screwed to diffuser neck
- KIt - With internally insulated connection box clipped to diffuser neck
- KIn - With internally insulated connection box screwed to diffuser neck

Note: * Standard, if no type code entered

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