DOĞU
İKLİMLENDİRME | HVAC SYSTEMS

DMO
Perforated Grille

FOUR SEASONS®

Venues Breathe with DOGU HVAC Systems!

DOGU HVAC founded in 1999, and ever since has been manufacturing Energy-and Cost-Efficient products as Air Handling Units, Air Distribution & Management & Movement Systems [HVAC Components] and constantly enhancing to provide an integrated solution for well-being. DOGU HVAC's core business products which are subsumed under four major groups as Air Handling Units, Heat/Energy Recovery Units, Air Distribution & Management Products and Kitchen Ventilation Equipment are all produced under the compliance with EU standarts. Particularly AHU and HRU-ER units are entitled under the "FOUR SEASONS" brand name for domestic and foreign markets. DOGU HVAC's, headquarter in Izmir/Turkey, operates in a large-sized plant spread over two factories, in total area of 45.000 sqm in which 25.000 sqm indoor space that enables DOGU HVAC manufactures 140 various type of products. Additionally, DOGU HVAC has a powerful sales network with three sales offices located in Istanbul, Ankara and Antalya in Turkey as well as authorized dealers in many other countries for sales and after sales operations. DOGU HVAC has been exporting to more than 50 countries.

Thanks to our "Customer Satisfaction","Zero-Defect Policy" motto and reinforced by complete certified products, more than 250 employees. DOGU HVAC R&D center developed exclusive products, such as Double Skin Make-Up Kitchen Hood, Recirculated Laminar Airflow Unit, Single Piece Square Ceiling Diffuser and Ecology Units, for the first time have brought to the sector. DOGU HVAC R&D has the ability to make customized production which can meet the requirement of the customers by means of special software such as "ANSYS FLUENT". DOGU HVAC guaranteed its quality of management by having advantages of ISO 9001, ISO 14001, ISO 18001 certifications. Air Handling Units have EUROVENT, TUV Hygiene [in accordance with DIN1946-4, VDI 6022-1, DIN EN 13053 standarts], CE, TSEK, GOST-R certifications; Fire Dampers have EN 1366-2 and EN 13501-3 CE certifications; Smoke Control Dampers have EN 1366-10 and 12101-8 CE certifications; Kitchen Ventilation Products have TSE, CE and GOST-R quality certifications.

- DMO - Perforated Grill provides homogeneous air distribution with its decorative appearance, used in supply and suction lines in ventilation systems.

MATERIAL

- The frame is made of 6063 extruded aluminum, the perforated part is made of galvanized sheet. It can also be produced from optional AISI 304 quality stainless steel.

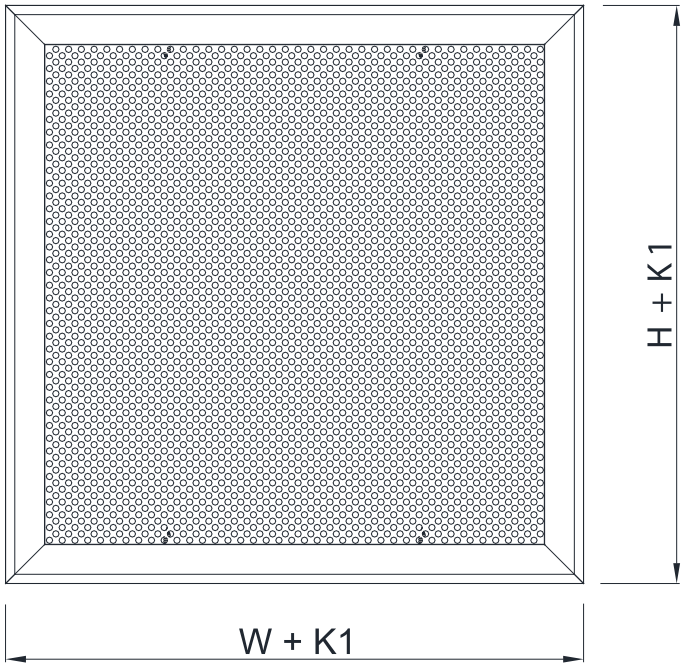
SURFACE COATING

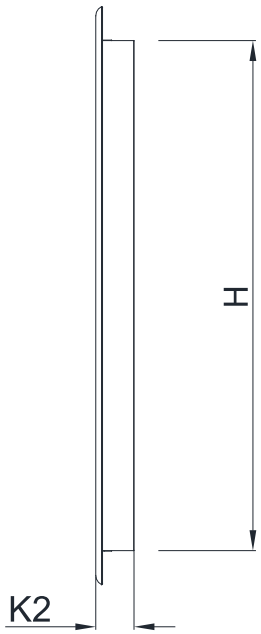
- RAL 9010 or RAL 9016 Electrostatic powder paint as standard
- Optional
  - Different RAL color codes
  - Matt aluminum anodized finish for a matt and metallic look in the aluminum frame
  - Unpainted manufacturing
  - Stainless product

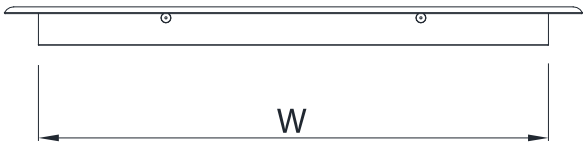
MOUNTING OPTIONS

- Screw System
- Without Mounting Hole
- Clip-in
- Suspended Ceiling

STANDARD DIMENSIONS







	K1 (mm)	K2 (mm)
31 mm Frame	54	30
Clip-in Frame	60	30
Stainless Frame	58	30

Table 1. Standard Dimensions

W [mm] (Width)	200 - 300 - 400 - 500 - 600 - 700 - 800 - 900 - 1000 - 1100 - 1200 1300 - 1400 - 1500 - 1600 - 1800 - 2000
H [mm] (Height)	100 - 200 - 300 - 400 - 500 - 600 - 700 - 800 - 900 - 1000

PERFORMANCE DATA

EFFECTIVE AREA TABLE

Table 2. Effective Area Table

Effective Area [m²]		H (Height) [mm]									
		100	200	300	400	500	600	700	800	900	1000
W (Width) [mm]	200	0.003	0.006	0.008	0.011	0.014	0.017	0.020	0.022	0.025	0.028
	300	0.004	0.008	0.013	0.017	0.021	0.025	0.029	0.034	0.038	0.042
	400	0.006	0.011	0.017	0.022	0.028	0.034	0.039	0.045	0.050	0.056
	500	0.007	0.014	0.021	0.028	0.035	0.042	0.049	0.056	0.063	0.070
	600	0.008	0.017	0.025	0.034	0.042	0.050	0.059	0.067	0.076	0.084
	700	0.010	0.020	0.029	0.039	0.049	0.059	0.069	0.078	0.088	0.098
	800	0.011	0.022	0.034	0.045	0.056	0.067	0.078	0.090	0.101	0.112
	900	0.013	0.025	0.038	0.050	0.063	0.076	0.088	0.101	0.113	0.126
	1000	0.014	0.028	0.042	0.056	0.070	0.084	0.098	0.112	0.126	0.140
	1100	0.015	0.031	0.046	0.062	0.077	0.092	0.108	0.123	0.139	0.154
	1200	0.017	0.034	0.050	0.067	0.084	0.101	0.118	0.134	0.151	0.168
	1300	0.018	0.036	0.055	0.073	0.091	0.109	0.127	0.146	0.164	0.182
	1400	0.020	0.039	0.059	0.078	0.098	0.118	0.137	0.157	0.176	0.196
	1500	0.021	0.042	0.063	0.084	0.105	0.126	0.147	0.168	0.189	0.210
	1600	0.022	0.045	0.067	0.090	0.112	0.134	0.157	0.179	0.202	0.224
	1700	0.024	0.048	0.071	0.095	0.119	0.143	0.167	0.190	0.214	0.238
	1800	0.025	0.050	0.076	0.101	0.126	0.151	0.176	0.202	0.227	0.252
	2000	0.028	0.056	0.084	0.112	0.140	0.168	0.196	0.224	0.252	0.280

SUPPLY AIR DATA

Table 3. Supply Air Data

Flow Rate (m3/h)		Effective Velocity (m/s)															
		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10.0	12.5
50	Effective Area [m²]	0.02778	0.01389	0.00926	0.00694	0.00556	0.00463	0.00397	0.00347	0.00309	0.00278	0.00231	0.00198	0.00174	0.00154		
	Pressure Drop [Pa]	<1	<1	<1	<1	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5		
	Sound Power Level [dB(A)]	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	19.1	23.5	27.3	30.7		
100	Effective Area [m²]	0.05556	0.02778	0.01852	0.01389	0.01111	0.00926	0.00794	0.00694	0.00617	0.00556	0.00463	0.00397	0.00347	0.00309	0.00278	0.00222
	Pressure Drop [Pa]	<1	<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]	<15	<15	<15	<15	<15	<15	<15	<15	<15	16.9	22.1	26.5	30.3	33.7	36.7	43.1
200	Effective Area [m²]	0.11111	0.05556	0.03704	0.02778	0.02222	0.01852	<1587	0.01389	0.01235	0.01111	0.00926	0.00794	0.00694	0.00617	0.00556	0.00444
	Pressure Drop [Pa]	<1	<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]	<15	<15	<15	<15	<15	<15	<15	<15	16.9	19.9	25.1	29.5	33.3	36.7	39.7	46.1
300	Effective Area [m²]	0.16667	0.08333	0.05556	0.04167	0.03333	0.02778	0.02381	0.02083	0.0182	0.01667	0.01389	0.0119	0.01042	0.00926	0.00833	0.00667
	Pressure Drop [Pa]	<1	<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]	<15	<15	<15	<15	<15	<15	<15	15.3	18.6	21.7	26.9	31.3	35.1	38.4	41.4	47.8
400	Effective Area [m²]	0.22222	0.11111	0.07407	0.05556	0.04444	0.03704	0.03175	0.02778	0.02469	0.02222	0.01852	0.01587	0.01389	0.01235	0.01111	0.00889
	Pressure Drop [Pa]	<1	<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]	<15	<15	<15	<15	<15	<15	<15	16.5	19.9	22.9	28.1	32.5	36.3	39.7	42.7	49.1
500	Effective Area [m²]	0.27778	0.13889	0.09259	0.06944	0.05556	0.0463	0.03968	0.03472	0.03086	0.02778	0.02315	0.01984	0.01736	0.01543	0.01389	0.01111
	Pressure Drop [Pa]	<1	<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]	<15	<15	<15	<15	<15	<15	<15	17.5	20.9	23.9	29.1	33.5	37.3	40.7	43.7	50.0
600	Effective Area [m²]		0.16667	0.11111	0.08333	0.06667	0.05556	0.04762	0.04167	0.03704	0.03333	0.02778	0.02381	0.02083	0.01852	0.01667	0.01333
	Pressure Drop [Pa]		<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]		<15	<15	<15	<15	<15	<15	18.3	21.7	24.7	29.9	34.3	38.1	41.5	44.5	50.8
700	Effective Area [m²]		0.19444	0.12963	0.9722	0.07778	0.06481	0.05556	0.04861	0.04321	0.03889	0.03241	0.02778	0.02431	0.0216	0.01944	0.01556
	Pressure Drop [Pa]		<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]		<15	<15	<15	<15	<15	15.1	19.0	22.3	25.3	30.5	34.9	38.8	42.1	45.1	51.5
800	Effective Area [m²]		0.22222	0.14815	0.11111	0.08889	0.07407	0.06349	0.05556	0.04938	0.04444	0.03704	0.03175	0.02778	0.02469	0.02222	0.01778
	Pressure Drop [Pa]		<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]		<15	<15	<15	<15	<15	15.7	19.5	22.9	25.9	31.1	35.5	39.3	42.7	45.7	52.1
900	Effective Area [m²]		0.25	0.16667	0.125	0.1	0.08333	0.07143	0.0625	0.0556	0.05	0.04167	0.03571	0.03125	0.02778	0.025	0.02
	Pressure Drop [Pa]		<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]		<15	<15	<15	<15	<15	16.2	20.1	23.4	26.4	31.6	36.0	39.8	43.2	46.2	52.6
1000	Effective Area [m²]		0.27778	0.18519	0.13889	0.111	0.09259	0.07937	0.06944	0.06173	0.05556	0.0463	0.03968	0.03472	0.03086	0.02778	0.02222
	Pressure Drop [Pa]		<1	<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]		<15	<15	<15	<15	<15	16.7	20.5	23.9	26.9	32.1	36.5	40.3	43.7	46.7	53.1
1250	Effective Area [m²]			0.23148	0.17361	0.13889	0.11574	0.09921	0.08681	0.07716	0.06944	0.05787	0.0496	0.0434	0.03858	0.03472	0.02778
	Pressure Drop [Pa]			<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]			<15	<15	<15	<15	17.7	21.5	24.8	27.9	33.1	37.5	41.3	44.6	47.6	54.0
1500	Effective Area [m²]			0.27778	0.20833	0.16667	0.13889	0.11905	0.10417	0.09259	0.08333	0.06944	0.05952	0.05208	0.0463	0.04167	0.03333
	Pressure Drop [Pa]			<1	1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]			<15	<15	<15	<15	18.5	22.3	25.6	28.6	33.9	38.3	42.1	45.4	48.4	54.8
1750	Effective Area [m²]				0.24306	0.19444	0.16204	0.13889	0.12153	0.10802	0.09722	0.08102	0.06944	0.0676	0.05401	0.04861	0.03889
	Pressure Drop [Pa]				1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]				<15	<15	<15	19.1	22.9	26.3	29.3	34.5	38.9	42.7	46.1	49.1	55.5
2000	Effective Area [m²]				0.27778	0.22222	0.18519	0.15873	0.13889	0.12346	0.11111	0.09259	0.07937	0.06944	0.06173	0.5556	0.0444
	Pressure Drop [Pa]				1.8	3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]				<15	<15	15.3	19.7	23.5	26.9	29.9	35.1	39.5	43.3	46.7	49.7	56.1
2500	Effective Area [m²]					0.27778	0.23148	0.19841	0.17361	0.15432	0.13889	0.11574	0.09921	0.08681	0.7716	0.06944	0.05556
	Pressure Drop [Pa]					3.0	4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]					<15	16.3	20.7	24.5	27.9	30.9	36.1	40.5	44.3	47.6	50.7	57.0
3000	Effective Area [m²]						0.27778	0.2381	0.20833	0.18519	0.1667	0.13889	0.11905	0.10417	0.9259	0.8333	0.6667
	Pressure Drop [Pa]						4.4	6.3	8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]						17.1	21.5	25.3	28.6	31.7	36.9	41.3	45.1	48.4	51.4	57.8
4000	Effective Area [m²]								0.27778	0.24691	0.22222	0.18519	0.15873	0.13889	0.12346	0.11111	0.8889
	Pressure Drop [Pa]								8.4	11.0	13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]								26.5	29.9	32.9	38.1	42.5	46.3	49.7	52.7	59.1
5000	Effective Area [m²]										0.27778	0.23148	0.19841	0.17361	0.15432	0.13889	0.11111
	Pressure Drop [Pa]										13.9	20.9	29.4	39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]										33.9	39.1	43.5	47.3	50.7	53.7	60.0
7500	Effective Area [m²]													0.26042	0.23148	0.20833	0.16667
	Pressure Drop [Pa]													39.6	51.5	65.2	107.3
	Sound Power Level [dB(A)]													49.1	52.4	55.4	61.8
10000	Effective Area [m²]															0.27778	0.22222
	Pressure Drop [Pa]															65.2	107.3
	Sound Power Level [dB(A)]															56.7	63.1
12500	Effective Area [m²]																0.27778
	Pressure Drop [Pa]																107.3
	Sound Power Level [dB(A)]																64

Note: The data are obtained with the air distribution equipment where the room air temperature difference is T = 8 K.

Throw Distance: It is the distance between the point where the air velocity is at 0.25 m / s and the air distribution equipment.

THROW DISTANCE CORRECTION TABLE

Table 4. Throw Distance Correction Table

Heating Mode (ΔT)	4	6	8	10	12
Throw Distance Factor	1.07	1.02	1	0.90	0.83
Cooling Mode (ΔT)	4	6	8	10	12
Throw Distance Factor	1.31	1.36	1.42	1.48	1.54

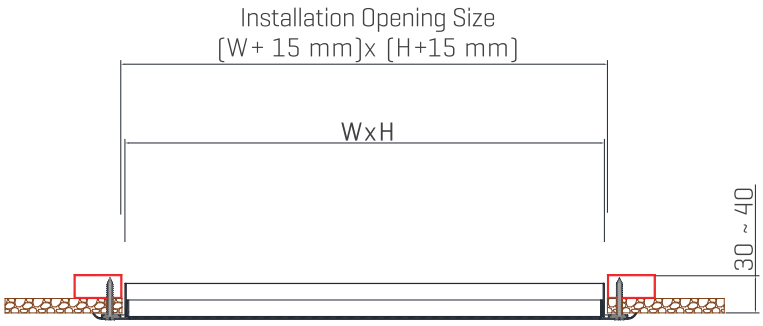
DAMPER PRESSURE DROP TABLE

Table 5. Damper Pressure Correction Table

Damper Position	Pressure Drop Multiplier	Additional Noise (dB(A))
Open	1,1	+1
25% Closed	1,14	+4
50% Closed	2,48	+14
75% Closed	5,11	+29

INSTALLATION OPTIONS

1. SCREW SYSTEM



2. SUSPENDED CEILING

W and H sizes that can be selected according to the frame sizes specified in the product selection are shown in the table on the right.

	W (mm)	H (mm)
31 mm Frame	541	541
Stainless Steel	537	537

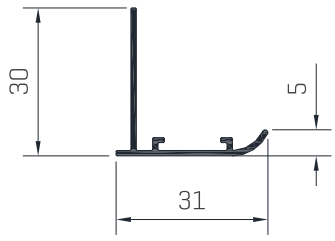
3. WITH CLIP-IN

Note:
W and H sizes that can be selected according to the frame sizes specified in the product selection are shown in the table on the right.

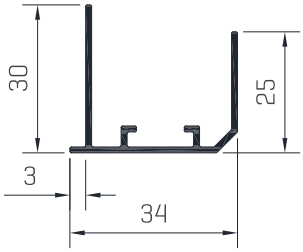
	Clip-in Frame K1 = 60 mm	W (mm)	H (mm)
Standard Dimensions	Option 1	540	540
	Option 2	240	240

FRAME TYPES

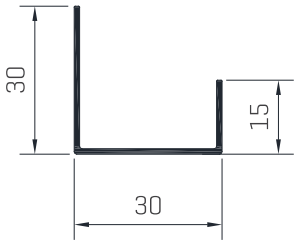
31 mm Frame



Clip-in Frame



Stainless Frame



PRODUCT SELECTION

Example: The supply air flow to the space has been determined as 1500 m³/h. 3 perforated grille will be used.

Solution: 1500/3=500 m³/h air flow rate is calculated for one grille.

For 500 m³/h air flow, the effective areas corresponding to the appropriate pressure loss and flow rate values are selected from the supply data table (Table 3).

For example, in an effective area of 0.0556 m², the effective velocity is 2.5 m/s, the pressure loss is 3 Pa, the throw distance is 5 m, and the sound power level is less than 15 dB (A).

The appropriate grille size is selected from the effective area table as 800 mm x 500 mm corresponding to the value of 0.056 m².

Damper Condition

Damper Pressure Loss Table (Table 5) is referenced for the pressure loss caused by the use of damper. The correction factor for the 45° damper opening is 1.24.

Total pressure loss: 3x1.4=4.2 Pa.

PRODUCT ORDER CODES

You can place your orders according to the following coding format.

ALUMINUM PRODUCT ORDER CODE

DMO.< A > . < B > . < C > . < D > . < E > . < F >

A	Raw Material Type	
	ALM	Aluminum
B	**Frame Type**	
	05	31 mm
	09	Clip-in
C	**Mounting Type**	
	VD	Screw System
	MD	Without Mounting Hole
	KR	Tile
	KM	Assembled From Corners
	KL	Clip-in
D	**Horizontal Size (W) (mm)**	
	0000	You can look at the standard sizes.
E	**Vertical Size (W) (mm)**	
	0000	You can look at the standard sizes.
F	**Paint**	
	00	Unpainted
	S1	Standard Paint - RAL 9010
	S2	Standard Painted - RAL 9016
	XX	Special Painted

Sample Coding; DMO.ALM.01.DZ.VD.0100.0600.S1

STAINLESS PRODUCT ORDER CODE

DMO.PAS.32. < A > . < B > . < C >. 00

A	Mounting Type	
	VD	Screwed System
	MD	Without Mounting Hole
	KR	Suspended Ceiling
B	**Horizontal Size (W) (mm)**	
	0000	You can look at the standard sizes
C	**Vertical Size (W) (mm)**	
	0000	You can look at the standard sizes

Sample Coding; DMO.PAS.32.DZ.VD.0100.0600.00

NOTES

NOTES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