

MANDÍK[®]

WHIRLING ANEMOSTAT
WITH ADJUSTABLE BLADES

VASM



These technical conditions define a series of the manufactured sizes and versions of whirling anemostats with adjustable blades (hereinafter anemostats) VASM 315, 400, 630. They apply to manufacturing, designing, ordering, deliveries, installation and operation.

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II. GENERAL

1. Description

- 1.1.** Adjustable whirling anemostats represent a terminal air-conditioning element used to distribute large amounts of air with high temperature difference (ranged between -10 and $+15$ °C). By adjusting the angle of air outlet (from horizontal outlet for cooling, through deflected outlet for isothermal air, to the vertical outlet used for heating), intensive mixing of inlet air with the existing is provided. Anemostats are supplied with diffusers.

They are suitable for ceiling heights of over 3.8 m.

- 1.2.** Working conditions

Temperature in the place of installation is permitted to range from -20 °C to $+70$ °C. If electrical components are used the temperature range is limited by these components.

Anemostats are designed for macroclimatic areas with mild climate according to EN 60 721-3-3.

Anemostats are suitable for systems without abrasive, chemical and adhesive particles.

2. Design

- 2.1.** Anemostats consist of a round front panel with adjustable blades, diffuser, connection box for either horizontal or vertical connection, and possible the servo actuator. Side or upper connection to piping can be made with round connection sockets via the connection box, or without the connection box from above to the front panel.

- 2.2.** Versions of anemostats are shown in the table Tab. 2.1.1. The version is designated by two digits following the TP mark.

Tab. 2.2.1. Version of VASM

Version of anemostat - type of control	Two digits following the TP mark
Manually controlled	.01
Actuator controlled 230V, position regulation without signalling	.45
Actuator controlled 230V, position regulation with signalling	.46
Actuator controlled 24V, position regulation without signalling	.55
Actuator controlled 24V, position regulation with signalling	.56
Actuator controlled 24V SR, with smooth regulation	.57

- 2.3.** For VAPM connection to the piping is possible as follows:

- horizontal connection (via connection box with circular spigot connections on the part - as required with or without control valve)
- vertical connection (via connection box with circular spigot connections from the top - as required with or without control valve)
- separate front panel (with access to the pipe above).

Adjustment of blades for cold inlet air – horizontal outlet



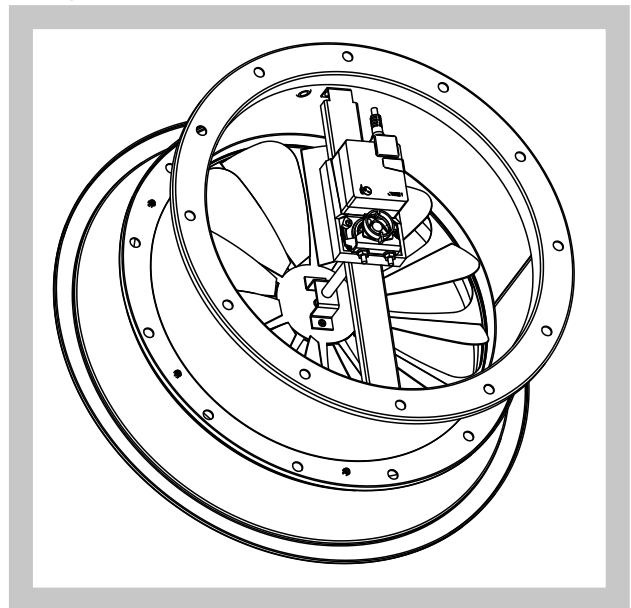
Adjustment of blades for isothermal inlet air – outlet in 45° direction



Adjustment of blades for hot inlet air – vertical outlet



Fig. 1 Placement actuator



3. Dimensions and weights

3.1. Anemostats dimensions

Tab. 3.1.1. Dimensions

Size	øB	øC	øD	□A	H ₁	H ₂	H ₃	H ₄	h	øK _D
315	375	315	248	500	525	215	370	410	63	464
400	480	400	313	600	608	248	428	520	80	567
630	720	630	398	750	850	388	615	755	125	870

Fig. 2 horizontal connection VASM... / V

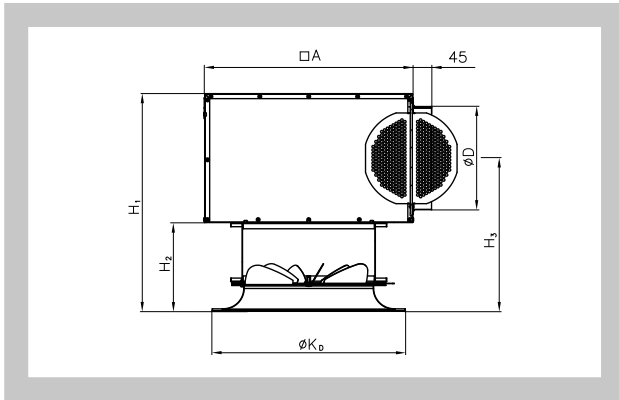


Fig. 3 vertical connection VASM... / S

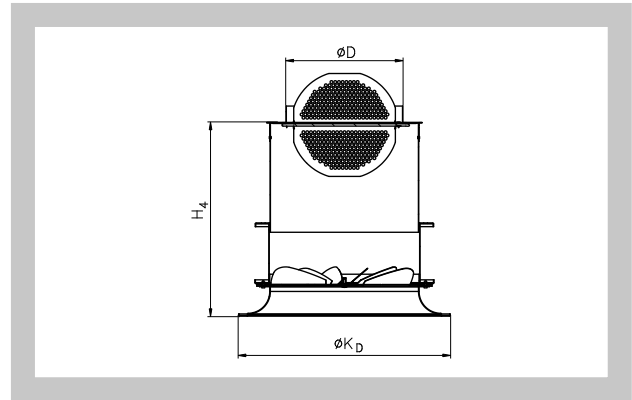
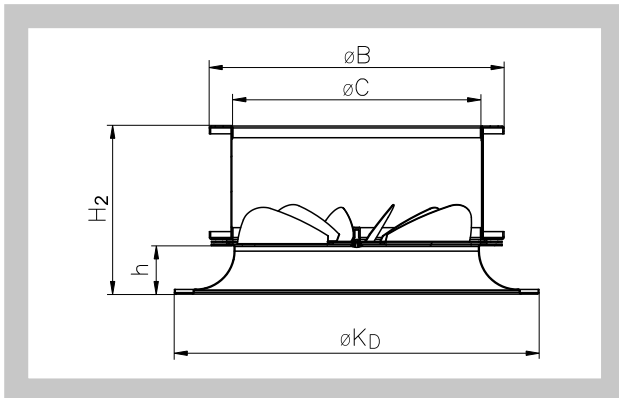


Fig. 4 separate front panel (without connection box)



3.2. Anemostats weights

Tab. 3.2.1. Weights

Size	Connection with connection box		Separate front panel
	horizontal	vertical	
315	9	5,5	3,5
400	16	12	5,5
630	26	22	14

4. Placement and installation

4.1. Front panel is attached to connection box with bolts. Connection boxes are equipped with suspension lugs. Several examples of connection methods are given in the following.

Fig. 5 Horizontal connection

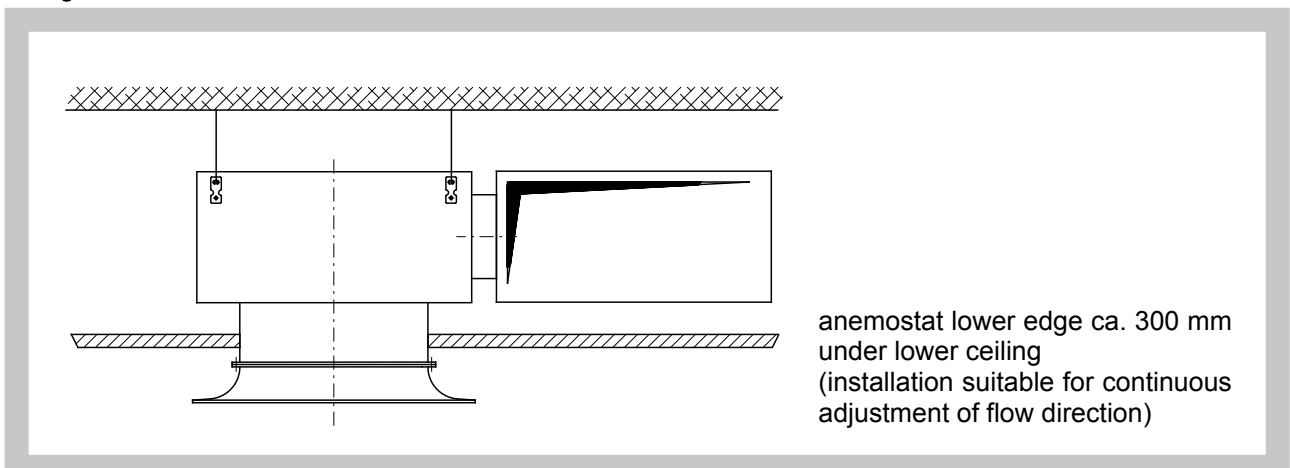


Fig. 6 Installation into lower ceiling

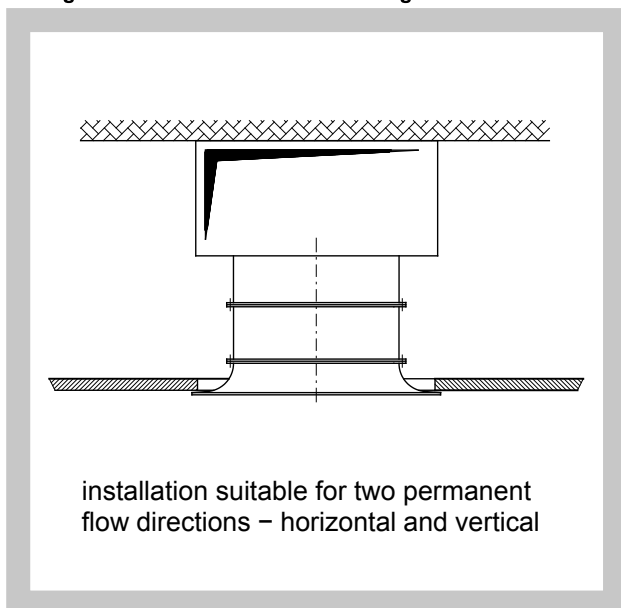
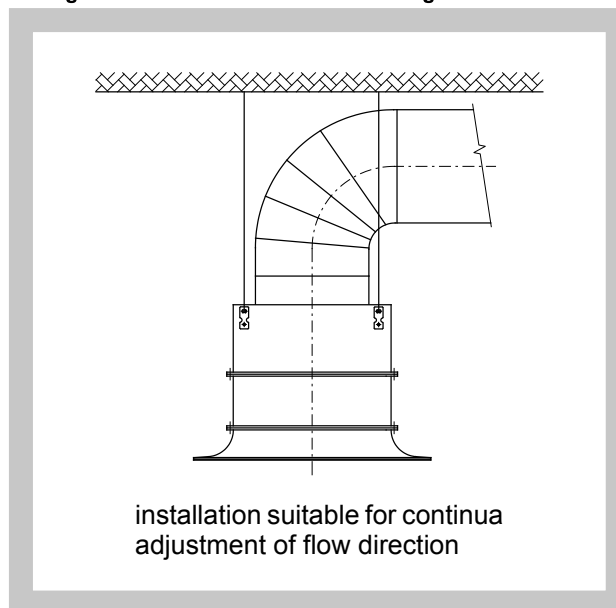


Fig. 7 Installation out of lower ceiling



III. TECHNICAL DATA

5. Electrical elements, wiring diagram

5.1. Type and weights of actuators.

Tab. 5.1.1. Type and weights of actuators

Type	Type of actuator	Positioning signal	Torque	Weight [kg]	Dimensions L x H x W
VASM 315 VASM 400	Belimo LM 230A-S	YES	5 Nm	0,60	116 x 64 x 88
	Belimo LM 230A	NO		0,50	
	Belimo LM 24A-S	YES		0,60	
	Belimo LM 24A	NO		0,50	
	Belimo LM 24A-SR	YES		0,50	
VASM 630	Belimo NM 230A-S	YES	10 Nm	0,85	124 x 62 x 80
	Belimo NM 230A	NO		0,80	
	Belimo NM 24A-S	YES		0,85	
	Belimo NM 24A	NO		0,75	
	Belimo NM 24A-SR	YES		0,80	

5.2. Supply voltage and power inputs.

Tab. 5.2.1. Supply voltage and power input

Type of actuator	Supply voltage	Power input		
		In operation	Resting position	Dimensioning
LM 230A, LM 230A-S	AC 100 ... 240 V, 50/60 Hz	1,5 W	0,4 W	4 VA
LM 24A, LM 24A-S	AC 24 V, 50/60 Hz; DC 24 V	1,0 W	0,2 W	2 VA
LM 24A-SR	AC 24 V, 50/60 Hz; DC 24 V	1,0 W	0,4 W	2 VA
NM 230A, NM 230A-S	AC 100 ... 240 V, 50/60 Hz	2,5 W	0,6 W	6 VA
NM 24A, NM 24A-S	AC 24 V, 50/60 Hz; DC 24 V	1,5 W	0,2 W	3,5 VA
NM 24A-SR	AC 24 V, 50/60 Hz; DC 24 V	2,0 W	0,4 W	4 VA

5.3. Wiring diagram of servo actuators Belimo.

Fig. 8 Wiring diagram of servo actuators Belimo LM 230A, NM 230A

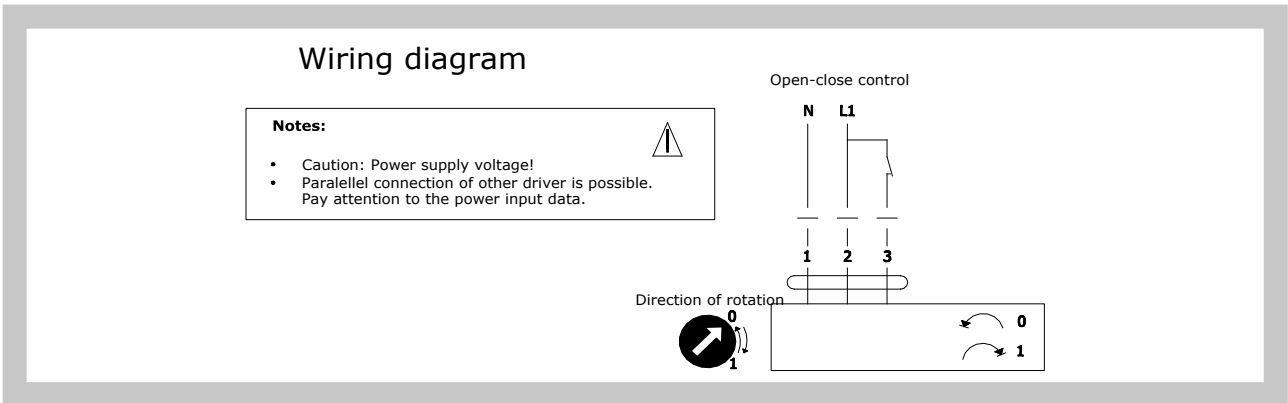


Fig. 9 Wiring diagram of servo actuators Belimo LM 230A-S, NM 230A-S

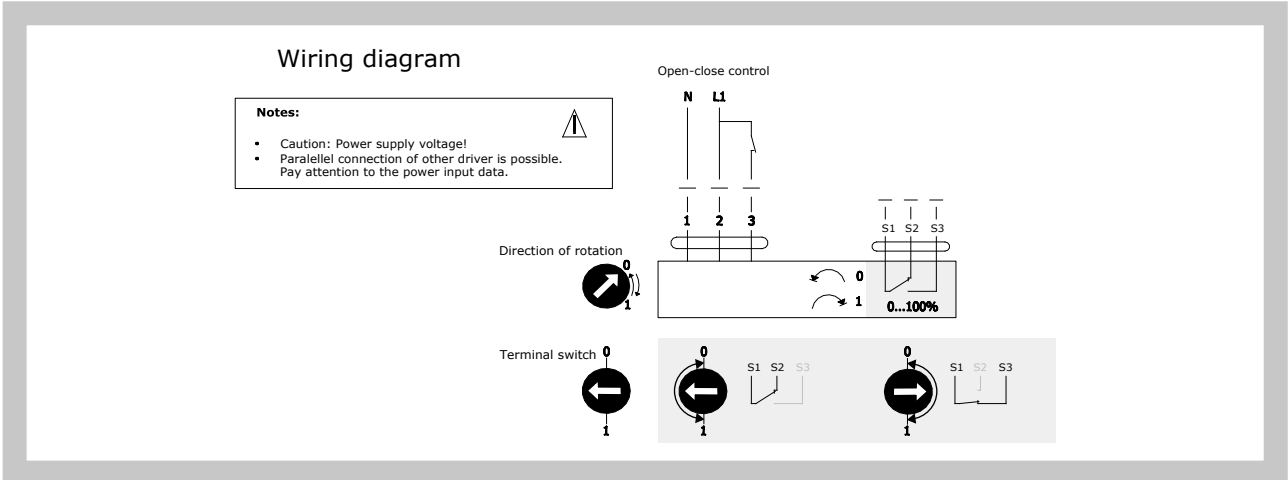


Fig. 10 Wiring diagram of servo actuators Belimo LM 24A, NM 24A

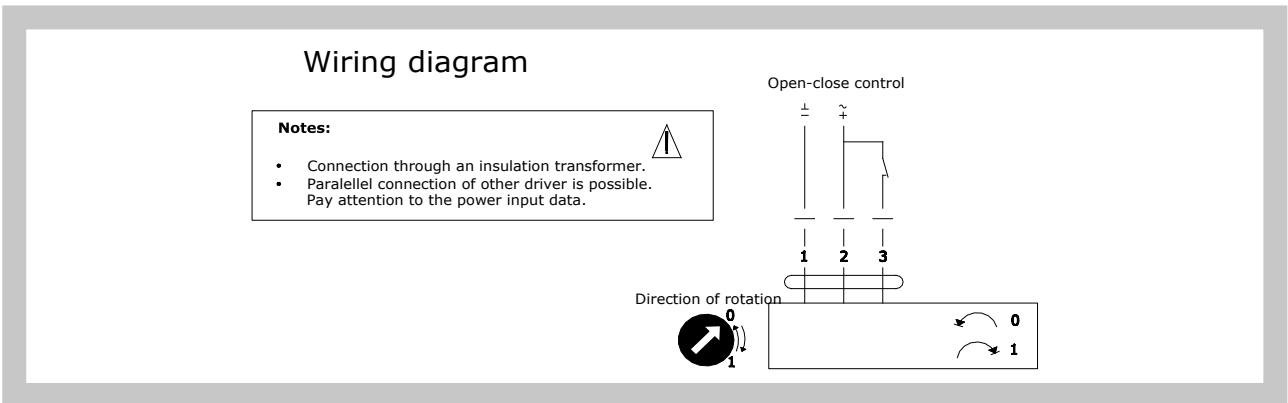


Fig. 11 Wiring diagram of servo actuators Belimo LM 24A-S, NM 24A-S

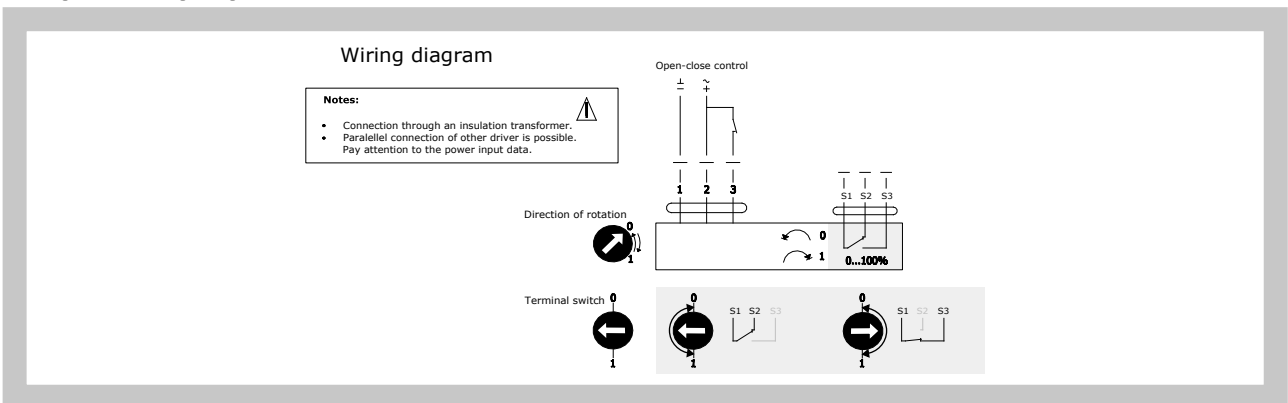
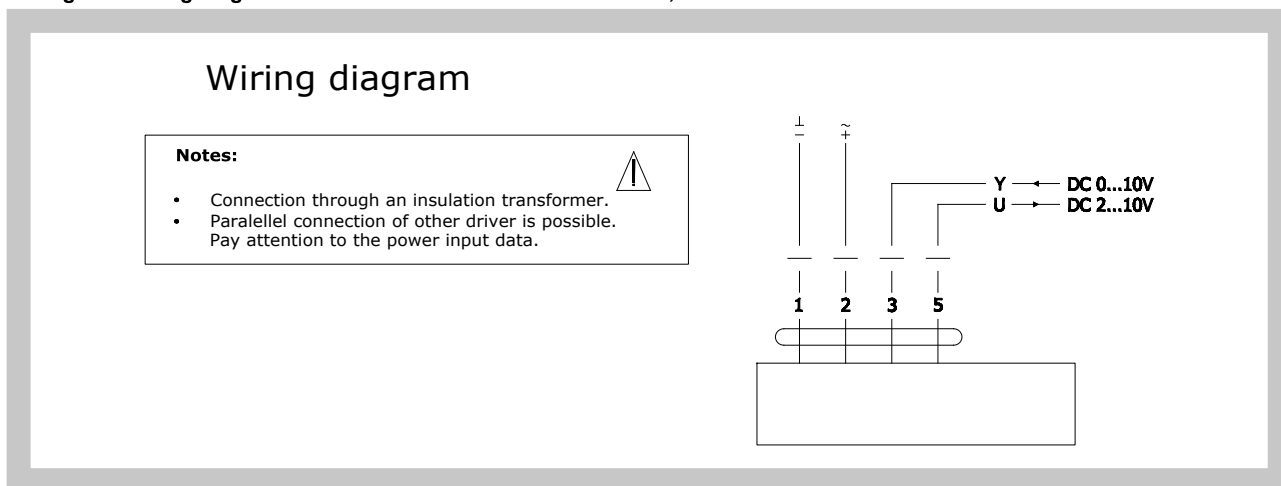


Fig. 12 Wiring diagram of servo actuators Belimo LM 24A-SR, NM 24A-SR



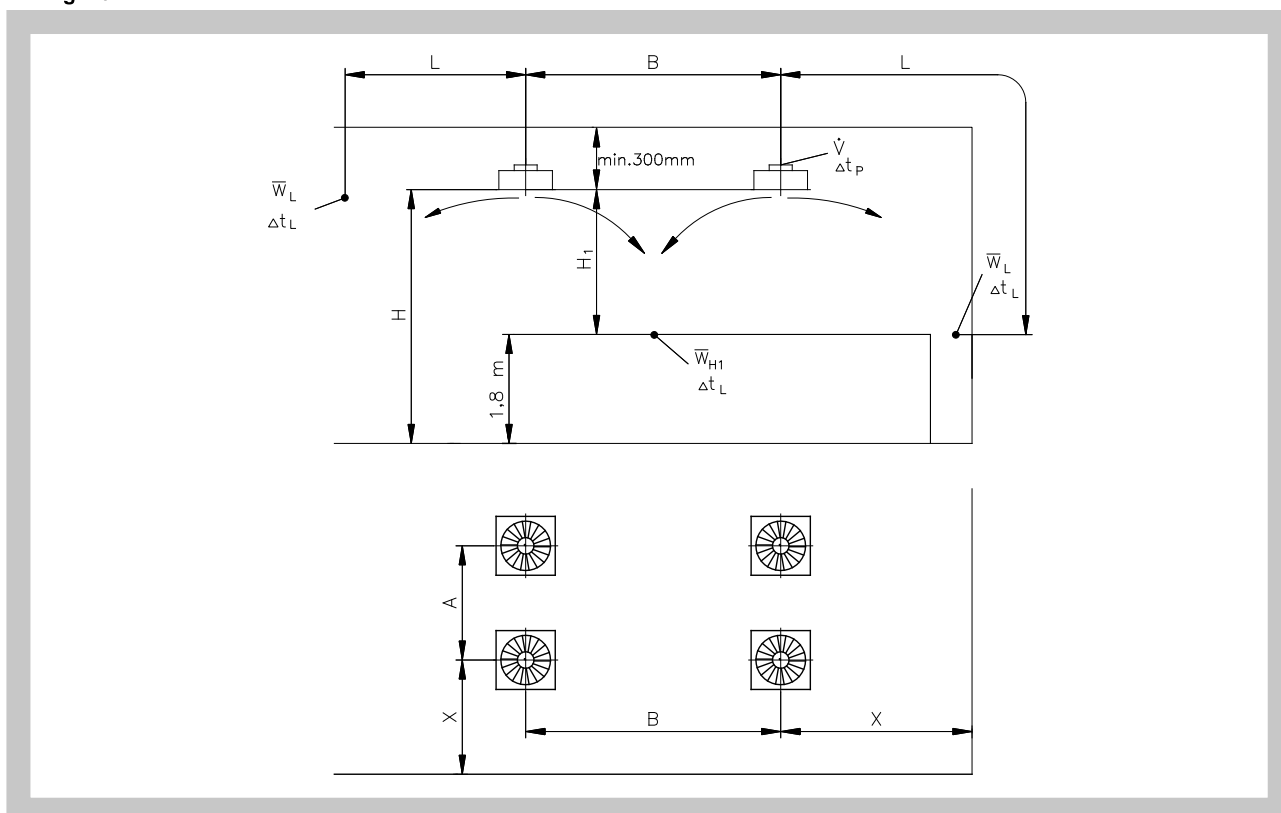
6. Calculation and determination quantities

6.1. Basic parameters

Tab. 6.1.1. Basic parameters

Size	315		400		630	
Version with connection box	Connection					
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
\dot{V}_{max} [m ³ .h ⁻¹]	900	1000	1300	1600	2200	2400
\dot{V}_{min} [m ³ .h ⁻¹]	350	500	500	550	800	1000
LWA max [dB(A)]	53	49	57	56	55	53
LWA min [dB(A)]	27	31	26	27	25	28
S _{ef} [m ²]	0,03		0,05		0,10	

Fig. 13



\dot{V}	[m ³ .h ⁻¹]	volumetric flow rate for one anemostat	L	[m]	horizontal + vertical distance ($X + H_1$)
A, B	[m]	distance between two anemostats	L_p	[m]	depth of air flow reach
L	[m]	horizontal + vertical distance ($X + H_1$)	Δt_p	[K]	difference between inlet air temperature and room air temperature
X	[m]	distance from anemostat centre to wall	Δt_L	[K]	difference between flow air temperature and room air temperature in the distance of: $L = A/2 + H_1$ or $L = B/2 + H_1$ or $L = X + H_1$
H	[m]	distance between anemostat lower edge and floor	Δp_c	[Pa]	total pressure loss at $\rho = 1,2 \text{ kg.m}^3$
H_1	[m]	distance between anemostat lower edge and living zone	L_{WA}	[dB(A)]	acoustic power level
\bar{w}_L	[m.s ⁻¹]	mean flow velocity at wall	S_{ef}	[m ²]	Effective area
w_{ef}	[m.s ⁻¹]	effective velocity			
\bar{w}_{H1}	[m.s ⁻¹]	mean flow velocity between two anemostats in H_1 distance			

6.2. Acoustic powers and pressure losses, temperature coefficient and airflow velocity

Diagram 6.2.1. VASM 315

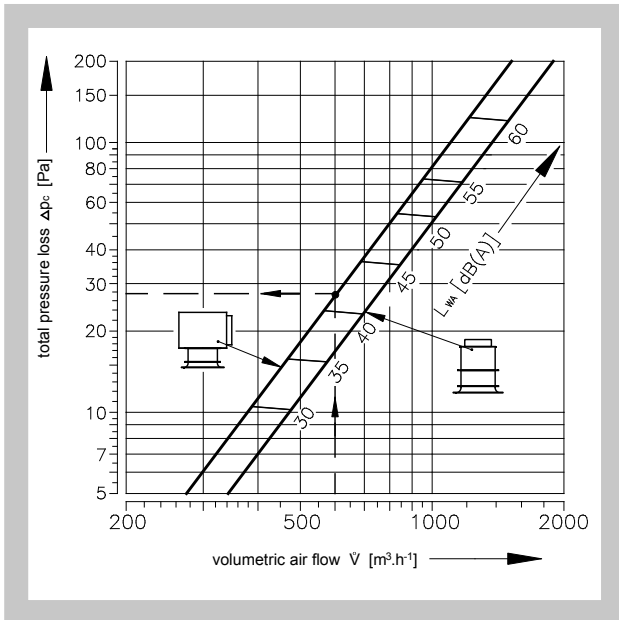


Diagram 6.2.2. VASM 400

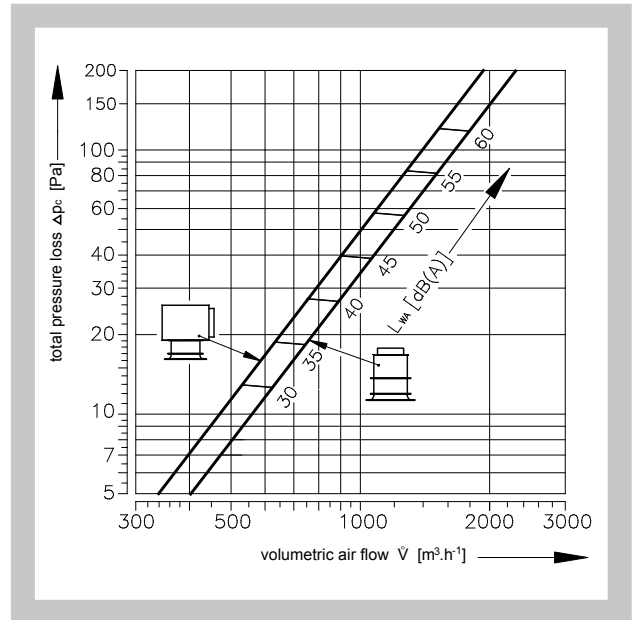


Diagram 6.2.3. VASM 630

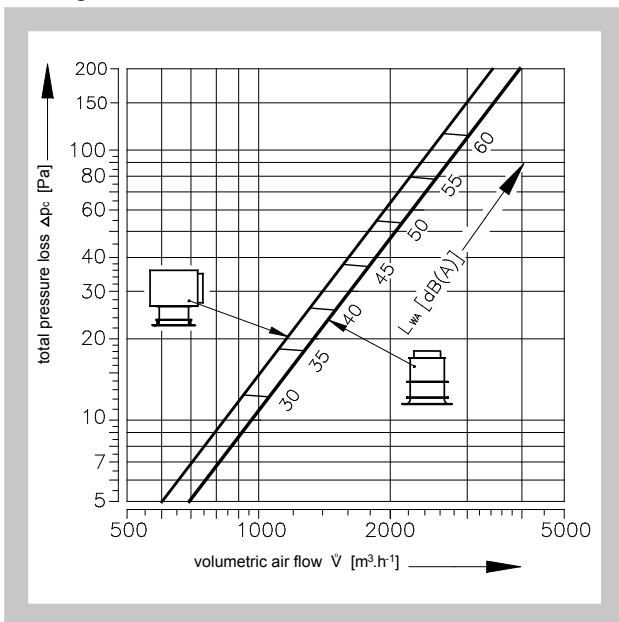


Fig. 14 Effective velocity

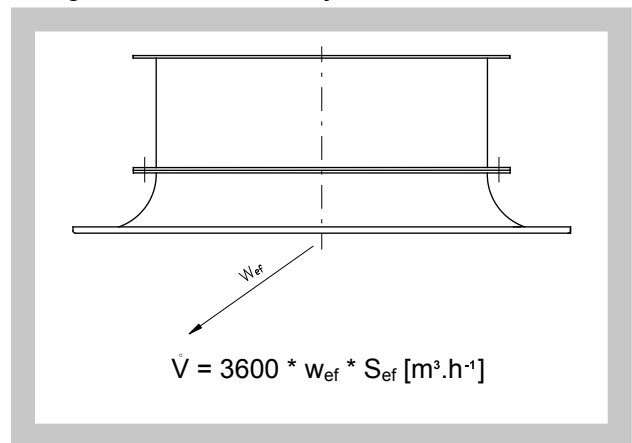


Diagram 6.2.4. Temperature coefficient

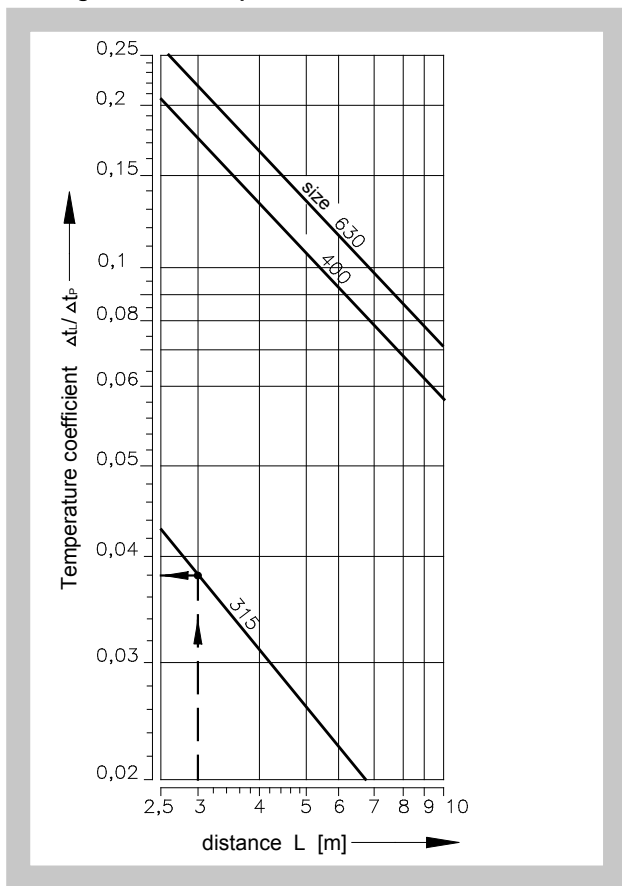


Diagram 6.2.5. Flow velocity VASM 315

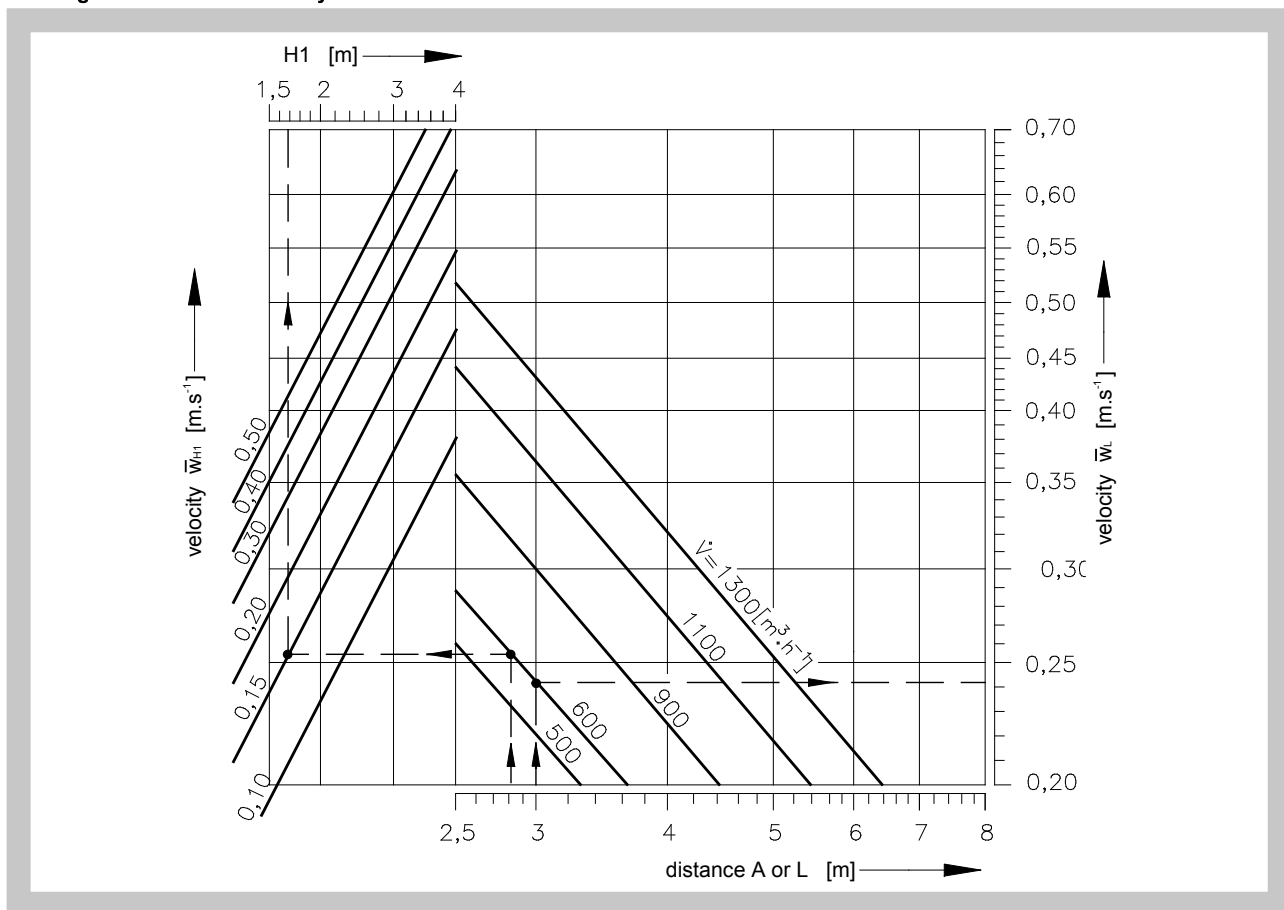


Diagram 6.2.6. Flow velocity VASM 400

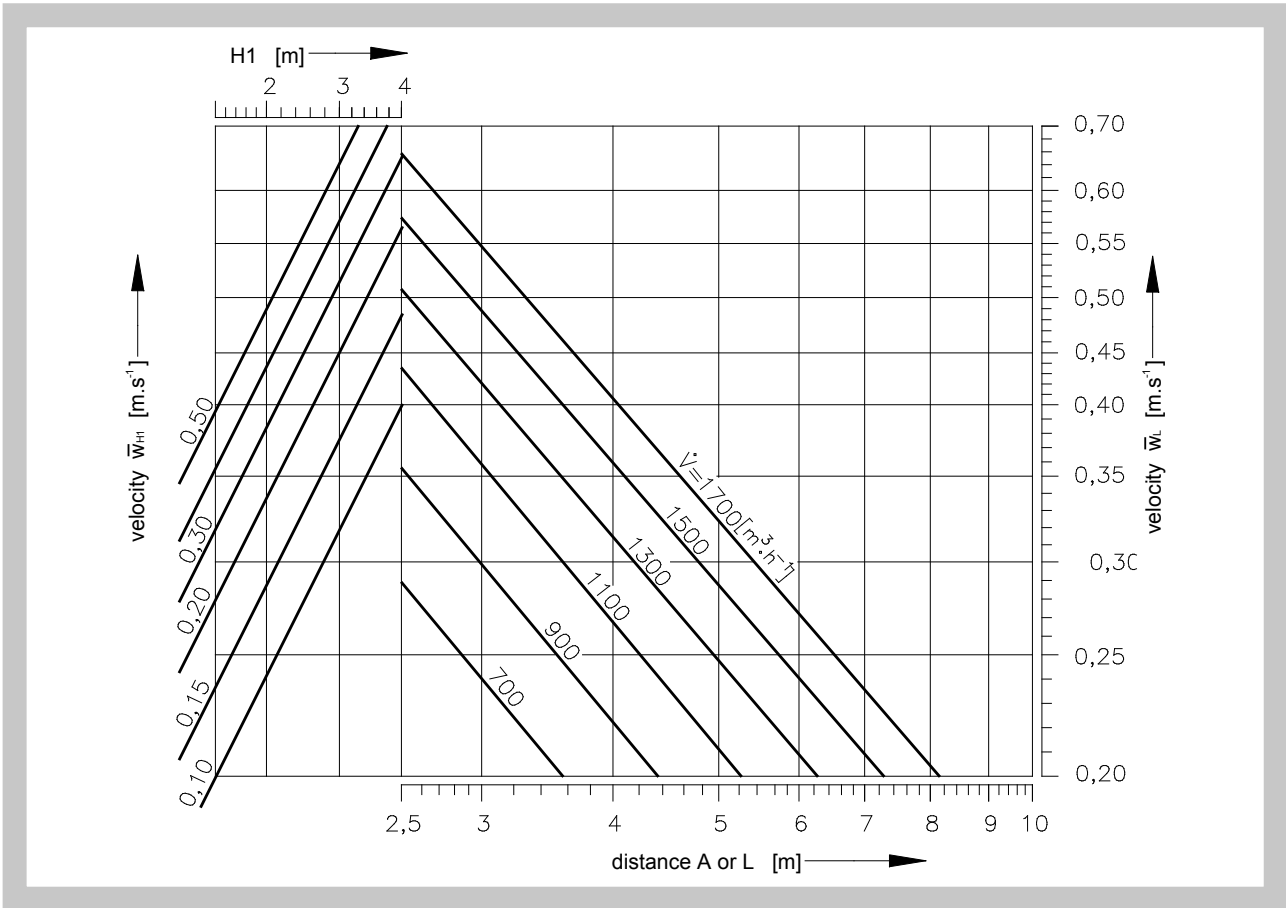
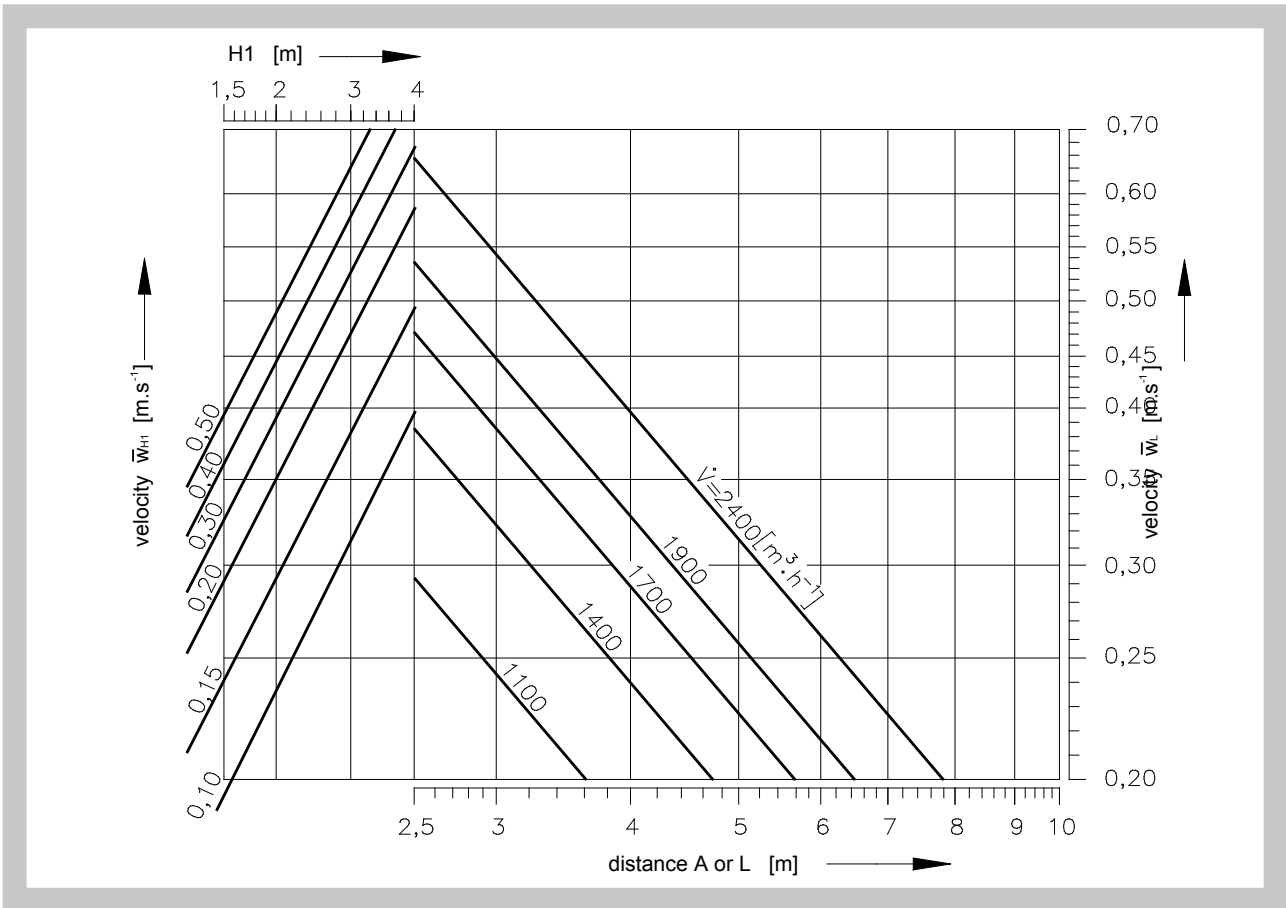


Diagram 6.2.7. Flow velocity VASM 630



6.3. Maximum depth of air flow reach

Diagram 6.3.1. Maximum depth of air flow reach - outlet 45°

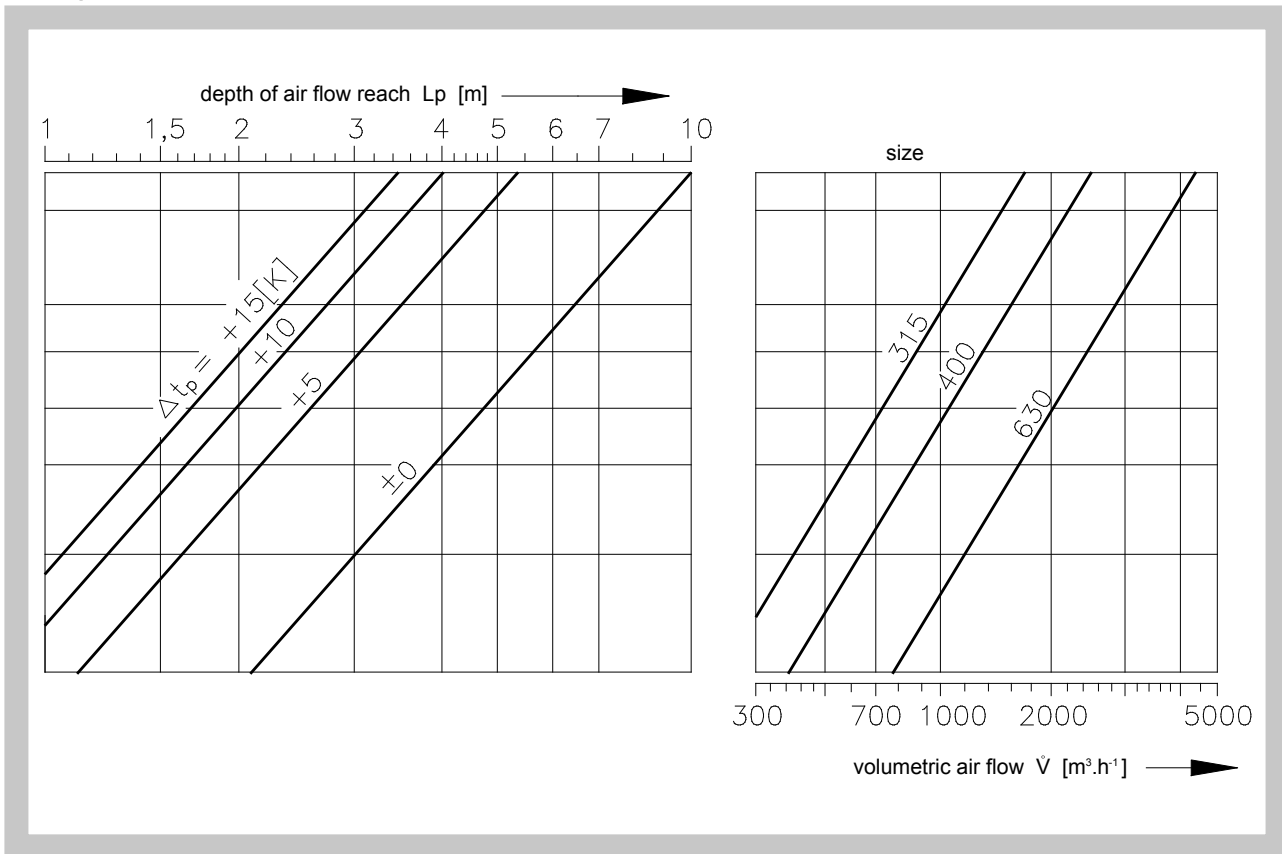


Diagram 6.3.2. Maximum depth of air flow reach - outlet 60°

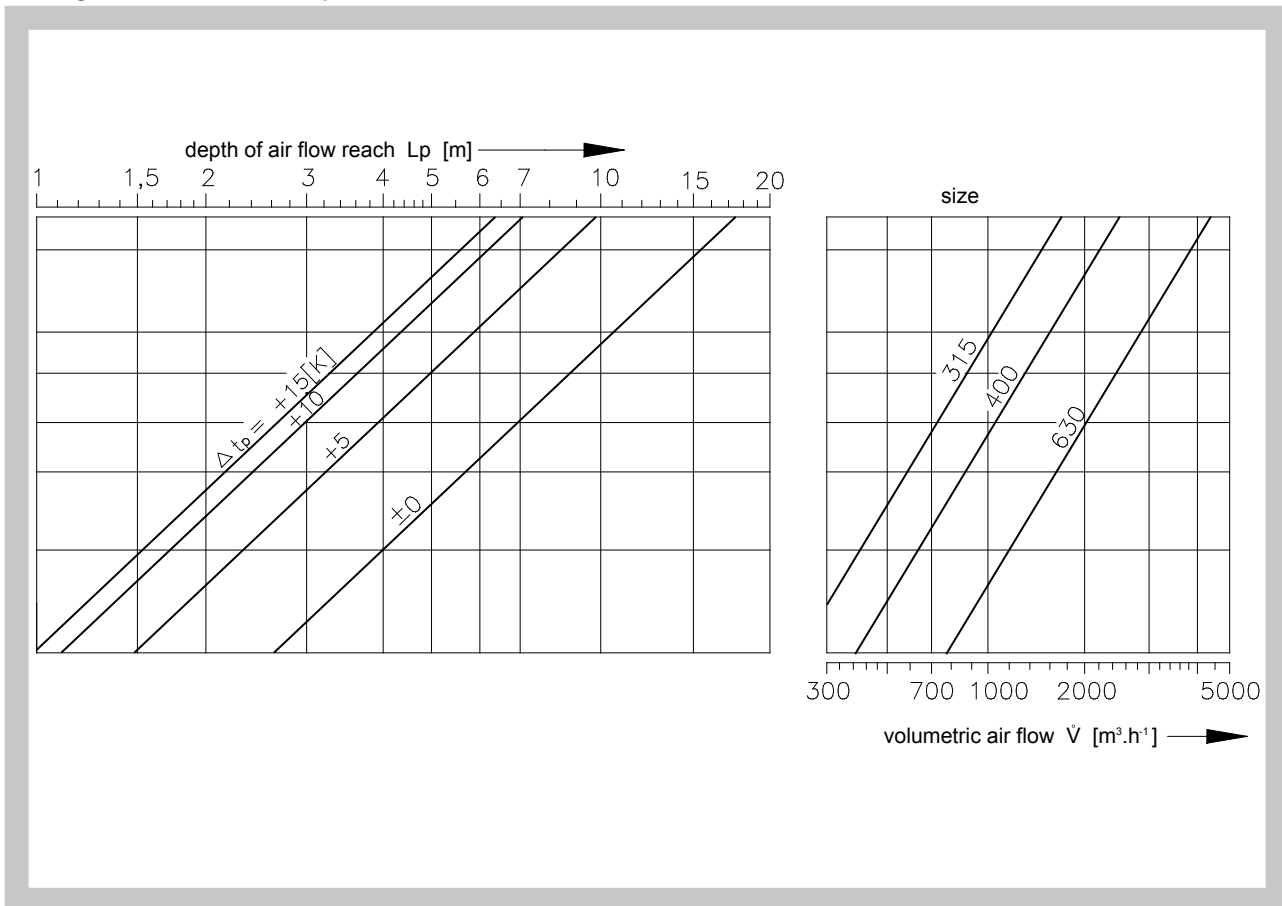


Diagram 6.3.3. Maximum depth of air flow reach - outlet 75°

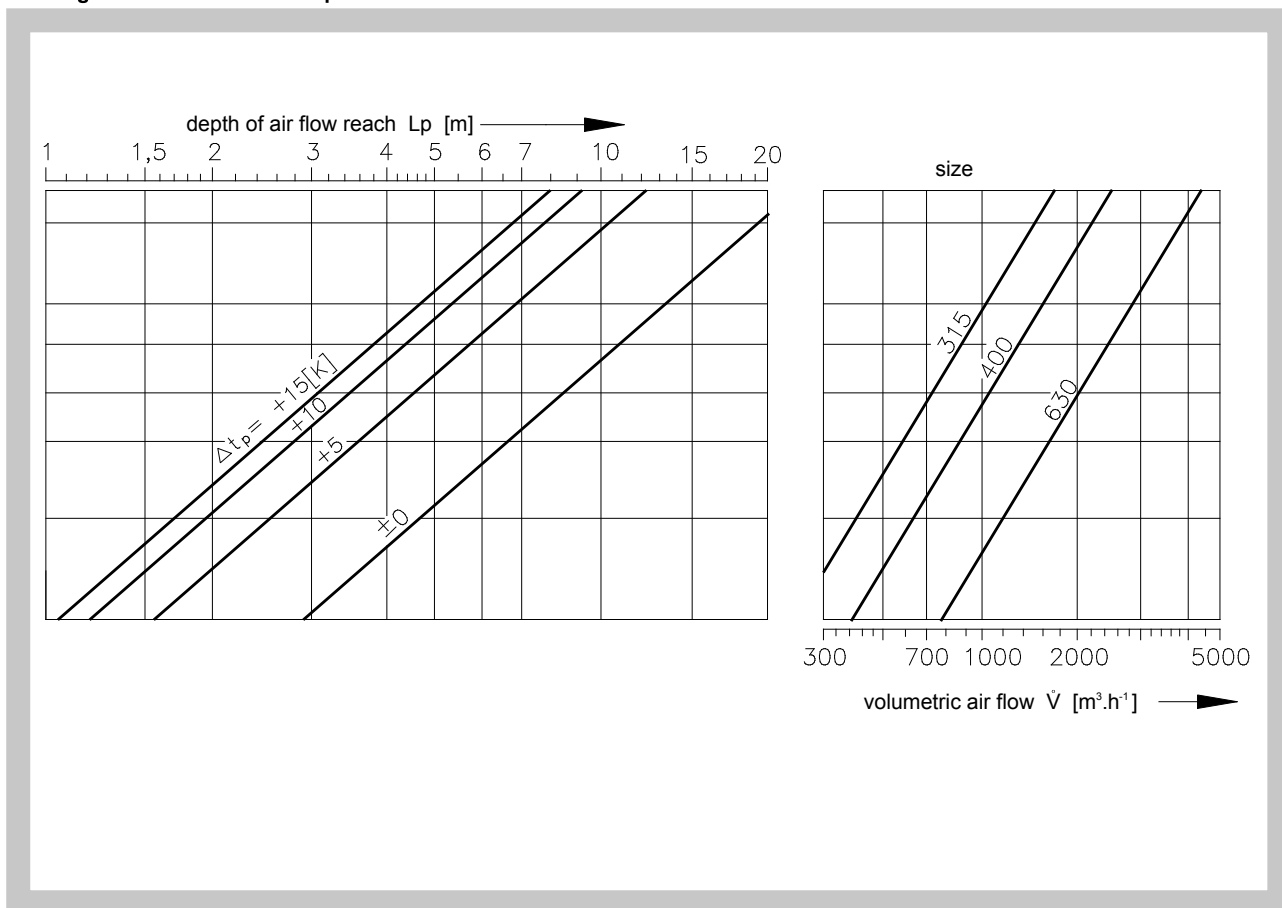


Diagram 6.3.4. Maximum depth of air flow reach - vertical outlet

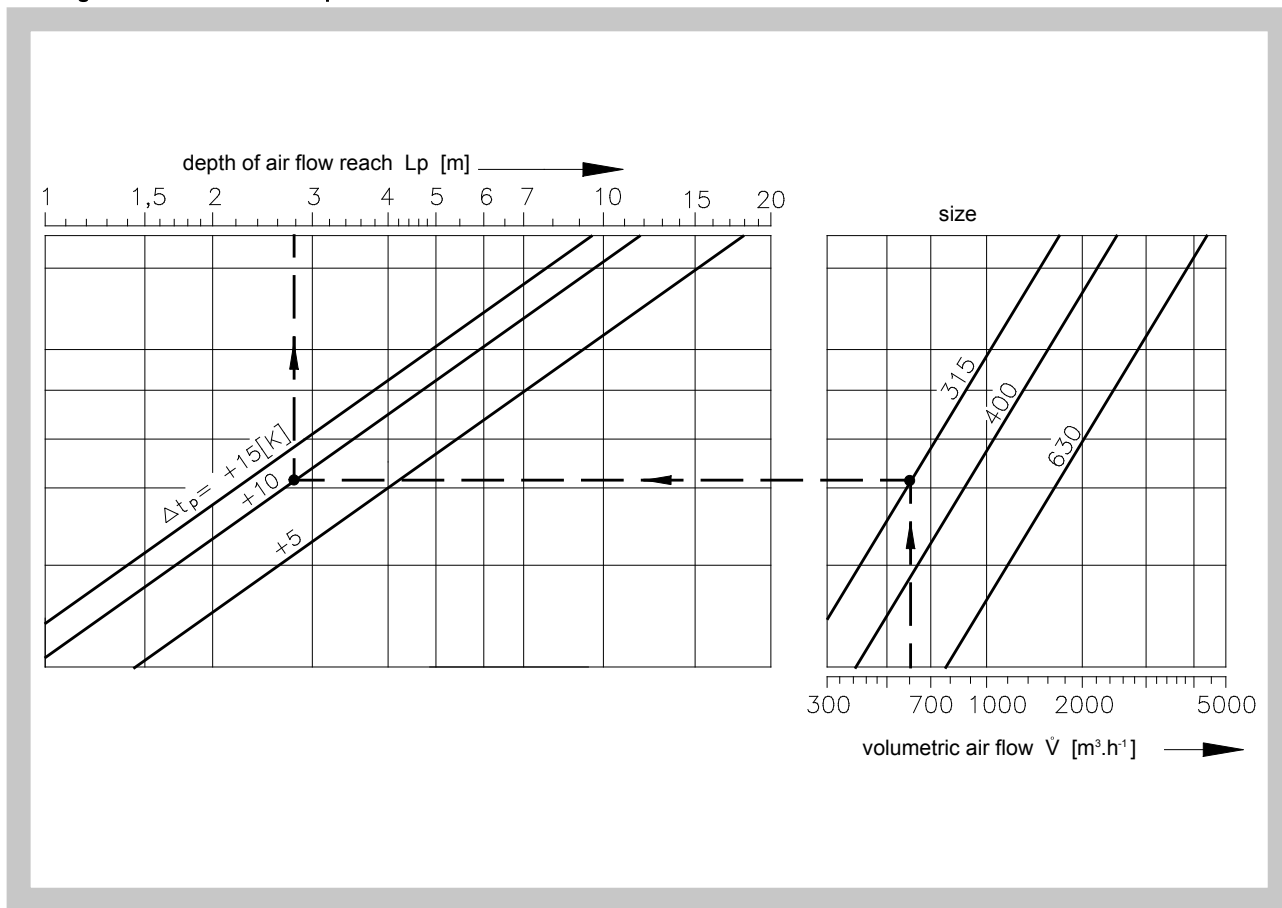


Fig. 15 Example

Data input:	Anemostat VASM horizontal connection $\dot{V} = 600 \text{ m}^3 \cdot \text{h}^{-1}$ output: cooling – horizontal $\Delta t_p = - 7 \text{ K}$ heating – vertical $\Delta t_p = +10 \text{ K}$ $H_1 = 2 \text{ m}$ $A = 2,8 \text{ m}$ $X = 1,2 \text{ m}$
Diagram 6.2.1. :	$L_{WA} = 42 \text{ dB(A)}$ $\Delta p_c = 27 \text{ Pa}$
Diagram 6.2.4. :	$\Delta t_L / \Delta t_p = 0,037$ $\Delta t_L = - 7 * 0,037 = - 0,255 \text{ K}$ $L = X + H_1 = 3,2 \text{ m (at wall)}$
Diagram 6.2.5. :	$\bar{w}_{H1} = 0,12 \text{ m/s (between anemostats)}$ $\bar{w}_L = 0,23 \text{ m/s (at wall)}$
Diagram 6.3.4. :	maximum depth of reach: heating – vertical exhaust $L_P = 3,1 \text{ m}$

IV. MATERIAL, FINISHING

7. Material

- 7.1. The parts of anemostat front panels are made of steel sheet, except for the diffuser of anemostat size 630 which is made of aluminium sheet. The surface of front panels with diffusers and adjustable blades is finished with white baking varnish of RAL 9010 colour shade. Other shade requirements have to be agreed with the manufacturer in advance.
- 7.2. Connection boxes are made of galvanized plate.

V. PACKING, TRANSPORT AND STORAGE

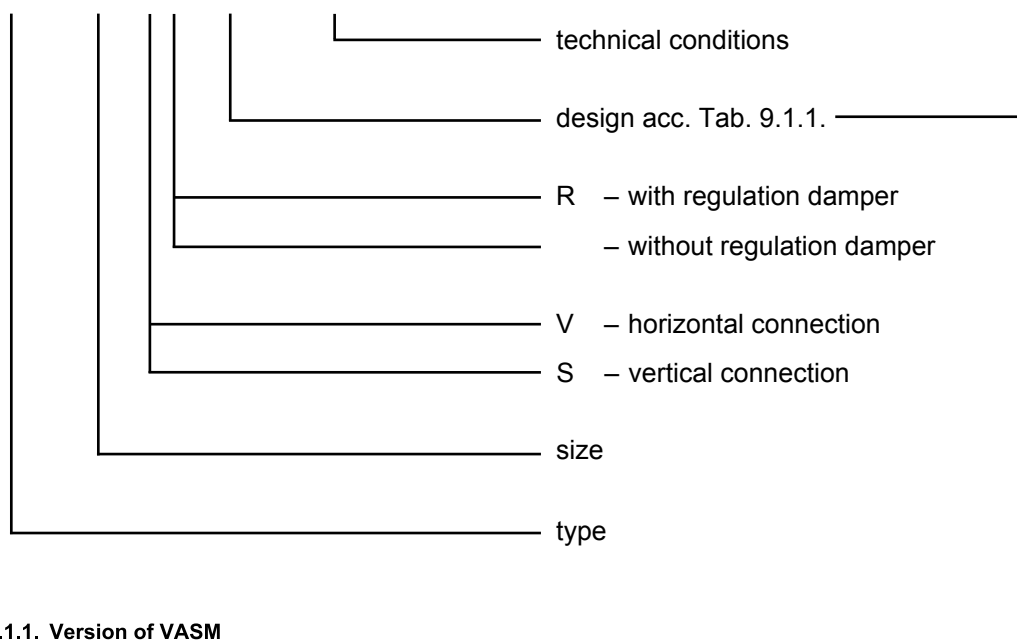
8. Logistic data

- 8.1. Anemostats are supplied in cardboard packages in bulk. As agreed with customers, anemostats may be transported on pallets or in crates. While transported and stored they must be protected against mechanical damage and weather conditions.
- 8.2. Anemostats have to be stored in closed premises, in the environment without aggressive steams, gases and dusts. Temperature range have to be from -5 to +40°C and relative humidity max. 80%.

VI. ORDERING INFORMATION

9. Ordering key

VASM 400 V/R -.56 TPM 017/01



Tab. 9.1.1. Version of VASM

Version of anemostat - type of control	Two digits following the TP mark
Manually controlled	.01
Actuator controlled 230V, position regulation without signalling	.45
Actuator controlled 230V, position regulation with signalling	.46
Actuator controlled 24V, position regulation without signalling	.55
Actuator controlled 24V, position regulation with signalling	.56
Actuator controlled 24V SR, with smooth regulation	.57

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