

MANDÍK®

LONG - REACH NOZZLE

DDM II



These technical specifications state a row of manufactured sizes and models of long-reach nozzles (further only nozzles) DDM II. It is valid for production, designing, ordering, delivery, assembly and operation.

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II. GENERAL INFORMATION

1. Description

1.1. Long-reach nozzles are end parts of air handling, air conditioning or heating systems. Nozzles are designed to supply air to the occupied zone for long distance. The temperature difference between the supplied air and the air in the room deflected air stream. This stream could be deflected by internal environment in the room. In heating, ventilation and cooling modes supplied air stream direction has to be changed according to optimal air distribution requirements in the occupied area.

Nozzles could be adjusted manually or by using of actuating mechanism. Fixed nozzles are also manufactured. In this case air stream direction cannot be changed. Adjustable nozzles DDM II/N consist of spherical discharge nozzle placed in the nozzle body and a cylindrical protective ring which covers mounting holes. Adjustable nozzles DDM II/S are equipped by actuating mechanism. For DDM II/N air stream direction can be changed according to table 2.1.1. in all directions. For DDM II/S air stream direction can be changed only in one axis.

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.

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

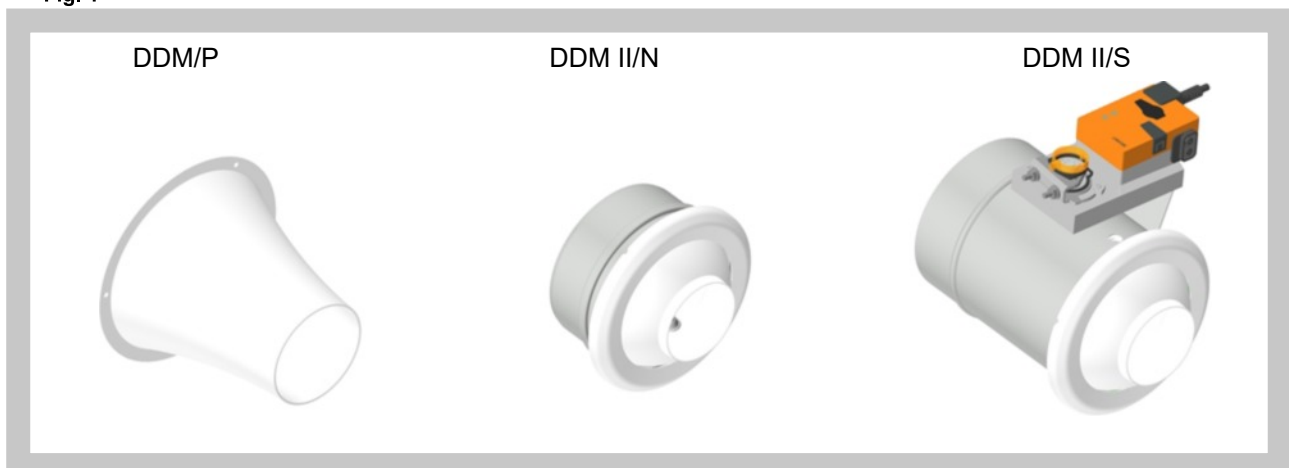
Nozzles are suitable for systems without abrasive, chemical and adhesive particles.

2. Design

2.1. According to the possibility of adjusting the air stream direction, the nozzles can be delivered in the following versions:

- Fixed DDM/P
- Manually adjustable DDM II/N
- Adjustable by actuating mechanism, position control 230V, DDM/S .45
- Adjustable by actuating mechanism, position control 24V, DDM/S .55
- Adjustable by actuating mechanism, continuous control 24V SR, DDM II/S.57.

Fig. 1



Tab. 2.1.1. Angle

Size	100	125	160	200	250	315	400
*Angle	±17°	±18°	±23°	±24°	±24°	±25°	±25°

* Air stream direction can be changed: DDM II/N – in all directions
DDM II/S – in one axis only.

Tab. 2.1.2. Actuating mechanisms

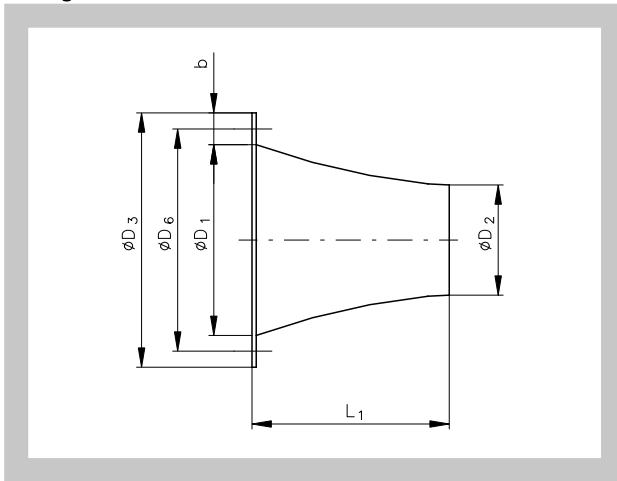
Size	Actuating mechanism	Torque (Nm)	Power supply (V)*	Power consumption in operation (W)	Weight (kg)
100, 125, 160	LM 230A	5	AC 230	1,5	0,5
	LM 24A	5	AC/DC 24	1	0,5
	LM 24A-SR	5	AC/DC 24	1	0,5
200, 250, 315, 400	NM 230A	10	AC 230	2,5	0,8
	NM 24A	10	AC/DC 24	15	0,75
	NM 24A-SR	10	AC/DC 24	2	0,8

* Pro frequency 50Hz

3. Dimestions, weights

3.1. Dimensions

Fig. 2



Tab. 3.1.1. Fixed nozzles DDM/P

Size	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_3$	$\varnothing D_6$	L_1	b
90	90	50	120	105	100	15
130	130	70	160	145	140	15
180	185	105	215	200	185	15
250	255	140	285	267	230	15
315	315	175	355	340	255	20
400	375	230	415	395	292	20

Tab. 3.1.2. Adjustable nozzles DDM II/N and DDM II/S

Size	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_4$	$\varnothing D_5$	E	C	L_2	L_3	L_4	L_5	L_s	L_u
100	98	50	104	136	65	16	94	45	50	114	207	30
125	123	64	130	157	75	16	112	50	50	127	200	30
160	158	81,5	166	191	75	17	124	45	50	144	207	30
200	198	108	206	233	75	22	133	40	50	164	207	30
250	248	136	256	281	100	22	171	55	50	189	207	35
315	313	174	321	346	120	24	212	67	50	222	215	40
400	398	229	406	431	125	28	239	60	50	264	220	40

Fig. 3 Adjustable nozzle with actuating mechanism DDM II/S

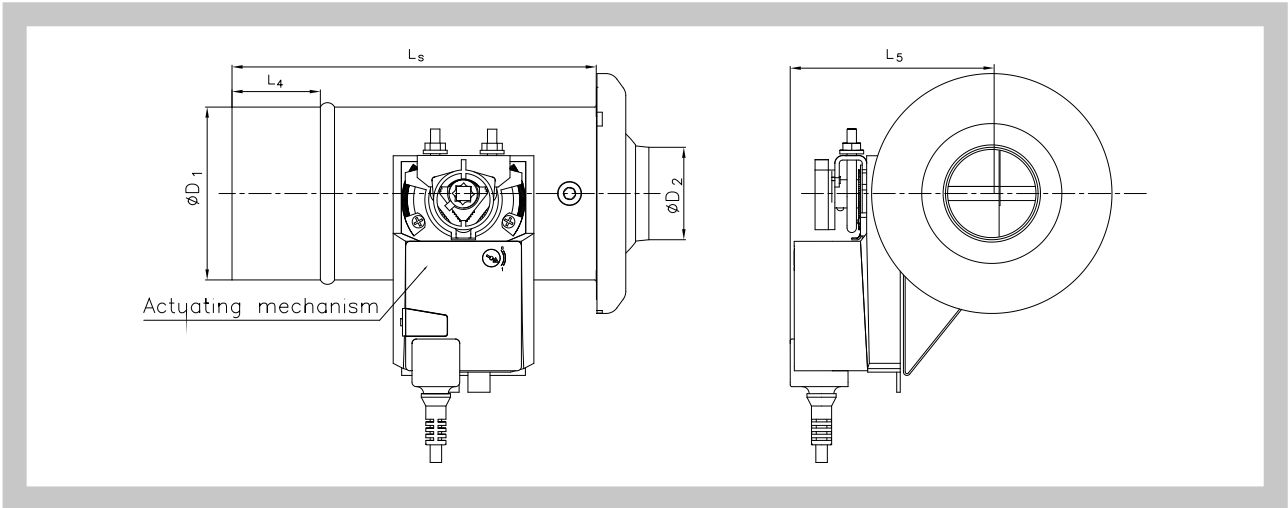
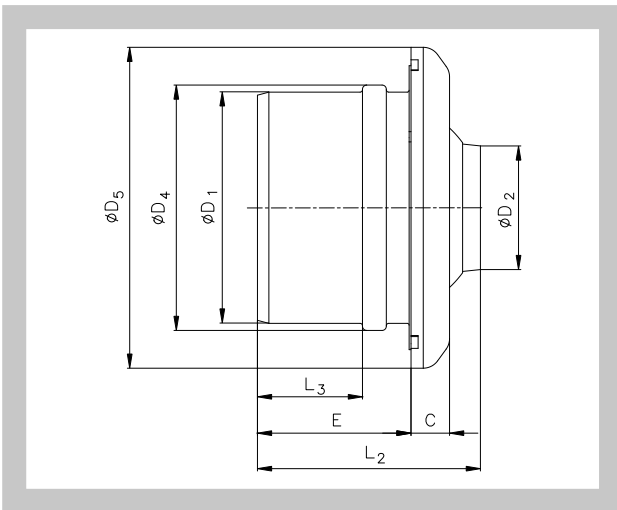


Fig. 4



3.2. Weights

Tab 3.2.2. Fixed nozzles

Size DDM/P	Weight
90	0,05
130	0,10
180	0,35
250	0,45
315	0,70
400	1,10

Tab 3.2.2. Adjustable nozzles

Size	Weight	
	DDM II/N	DDM II/S
100	0,42	1,4
125	0,56	1,7
160	0,80	1,9
200	1,10	2,6
250	1,58	3,1
315	2,43	4,1
400	3,70	5,4

4. Placement and Assembly

4.1. The fixed nozzles DDM/P and manually adjustable nozzles DDM II/N are installed in the sides of rectangular ducts or axially on spiro duct. They are equipped by pre-drilled holes for mounting.

Nozzles with actuating mechanism has extended body with actuating mechanism holder. Actuating mechanisms are fixed and set upped. End positions of actuating mechanism are secured by color mark. If is the color corrupted, the warranty expires.

4.2. Nozzle installation examples

Fig. 5 Fixed nozzle DDM/P installed in the sides of rectangular ducts

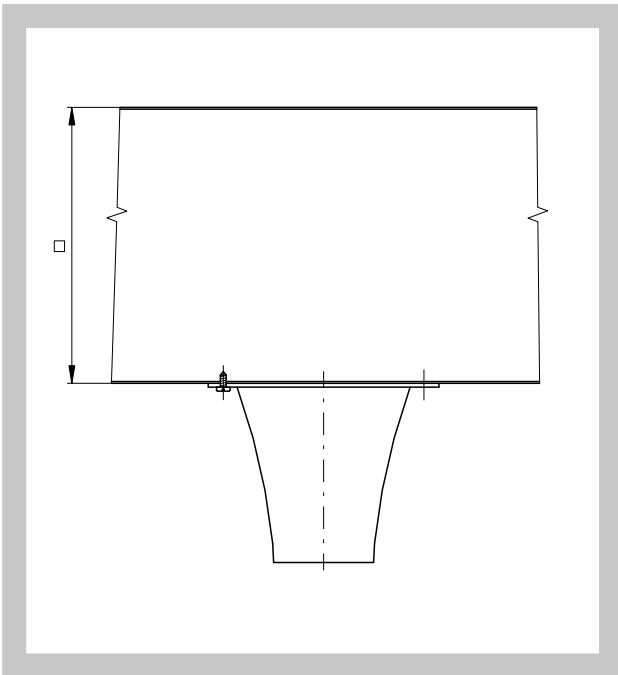


Fig. 6 Fixed nozzle DDM/P installed axially on spiro duct with adapter (adapter is not part of nozzle)

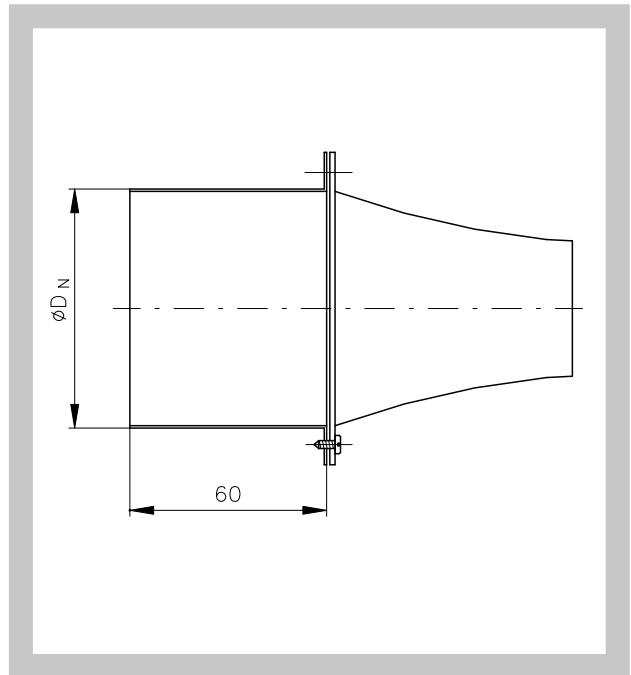


Fig. 7 Manually adjustable nozzle DDM II/N installed in the sides of rectangular ducts

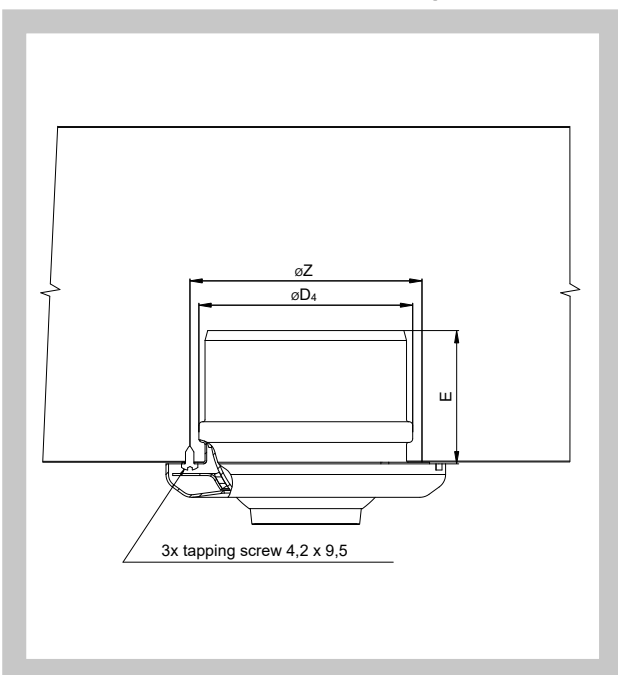
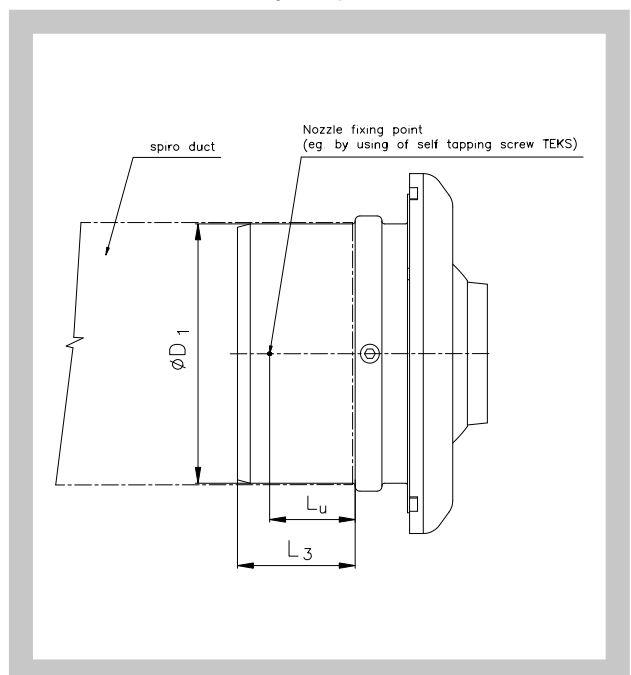
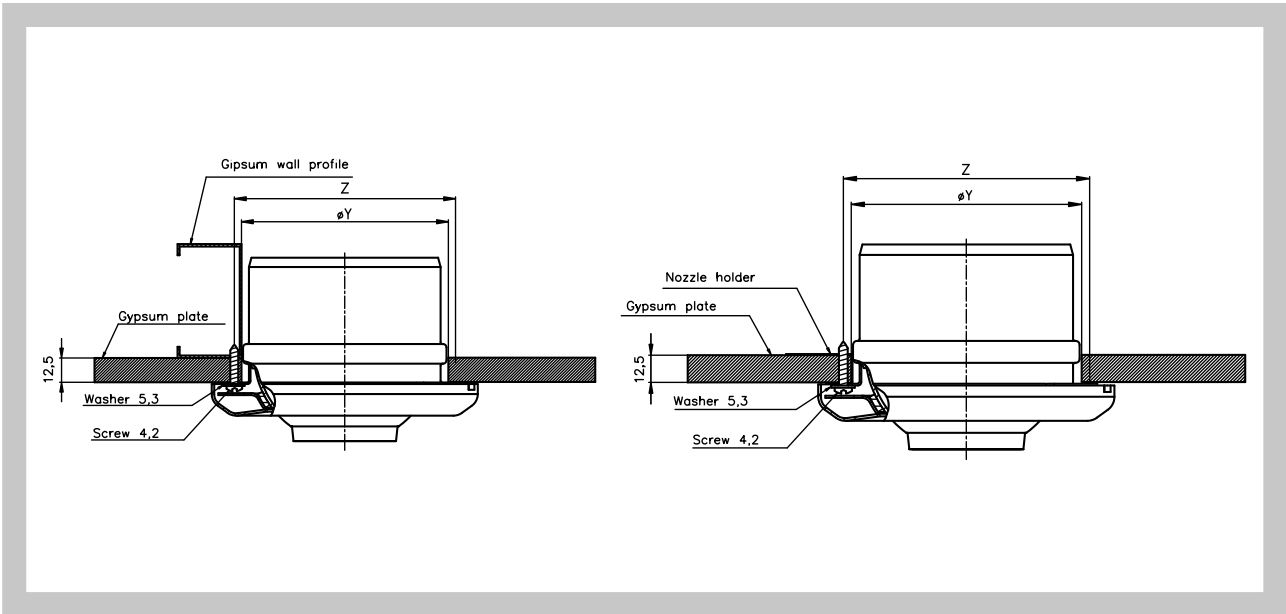


Fig. 8 Manually adjustable nozzle DDM II/N installed axially on spiro duct



* Dimmension Z acc. Tab. 4.1.1.

Fig. 9 Manually adjustable nozzle DDM II/N installed in gypsum wall



Tab. 4.1.1. Dimensions by installation in gypsum wall

Size	Y	Z	Number of screws
100	106	118	3
125	132	144	
160	168	178	
200	208	218	
250	258	268	
315	323	333	
400	408	418	

III. TECHNICAL DATA

5. Basic data

5.1. Volumetric air flow and effective area

Tab. 5.1.1. Technical data

Size	100	125	160	200	250	315	400
\dot{V}_{min} [m ³ .h ⁻¹]	40	60	90	160	240	450	750
\dot{V}_{max} [m ³ .h ⁻¹]	100	160	280	450	700	1200	2400
S_{ef} [m ²]	0,0019	0,0032	0,0052	0,0092	0,0145	0,0238	0,0412

6. Electrical components, wiring diagram

Fig. 10 Wiring diagram - actuating mechanism Belimo NM 230A a LM 230A

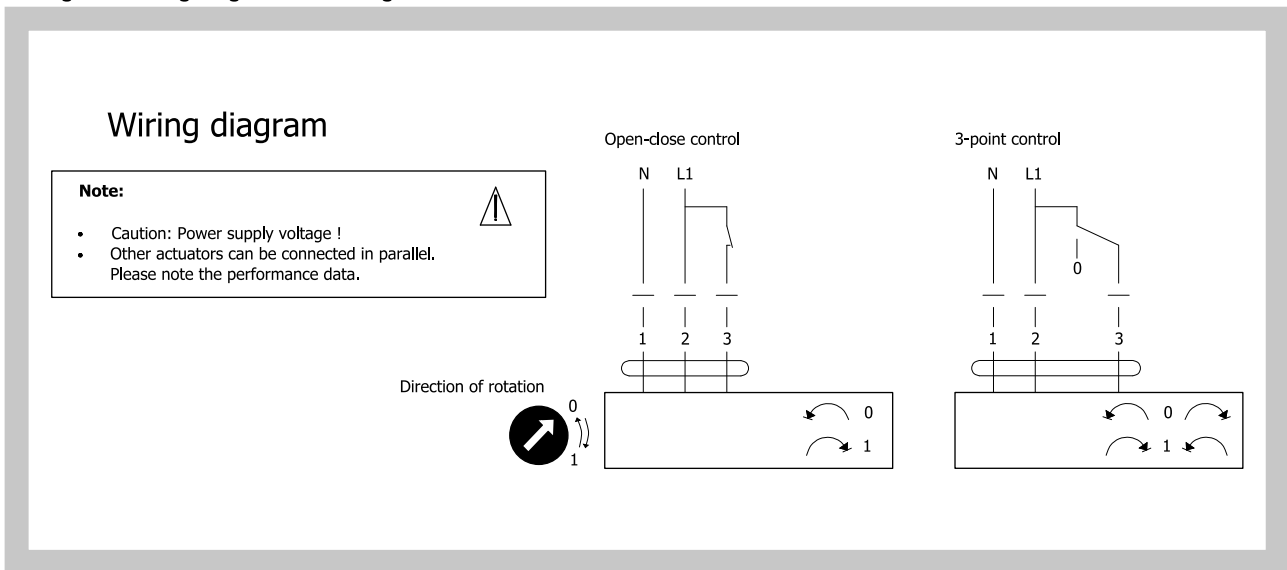


Fig. 11 Wiring diagram - actuating mechanism Belimo NM 24A a LM 24A

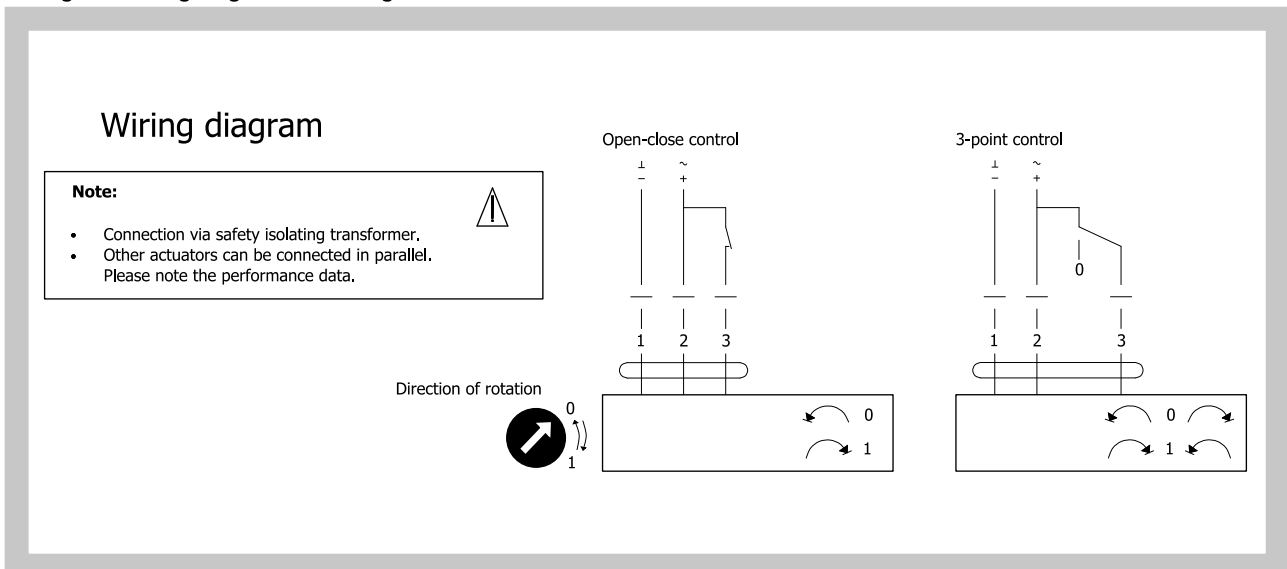
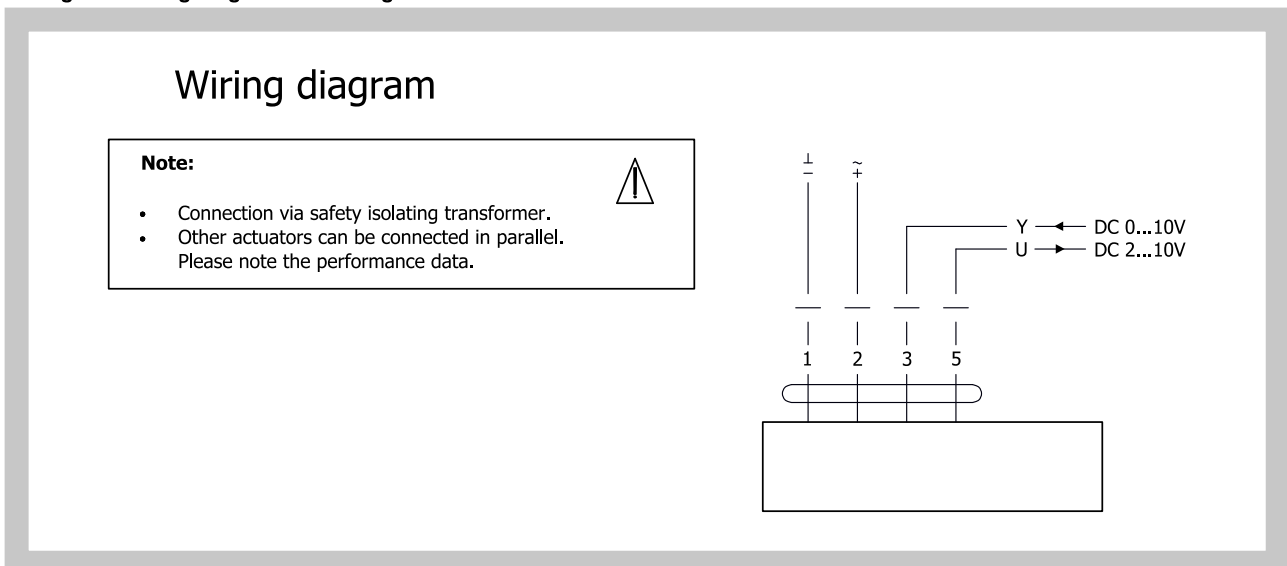


Fig. 12 Wiring diagram - actuating mechanism Belimo NM 24A-SR a LM 24A-SR



7. Aerodynamic data

7.1. Air stream diagram

Fig. 13 Air stream diagram - cold air supply

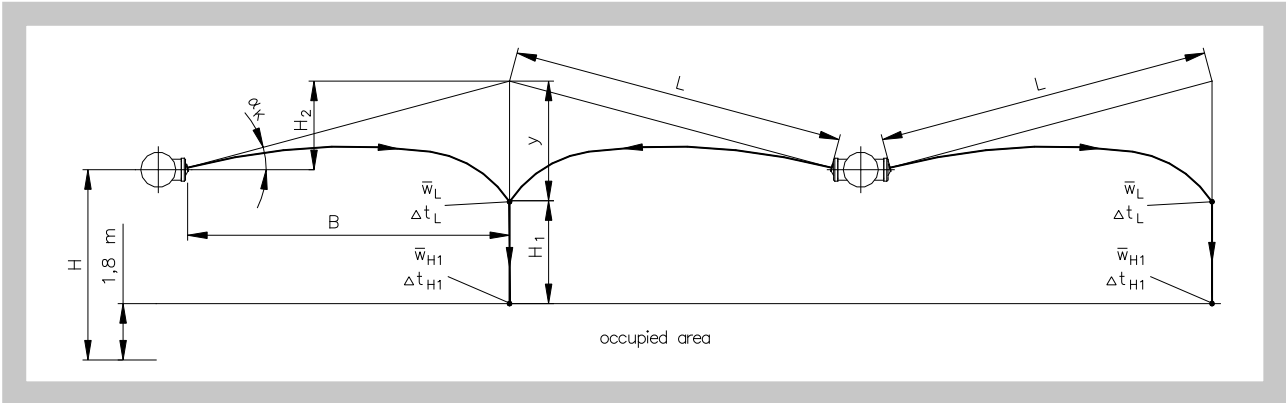


Fig. 14 Air stream diagram - isothermal air supply

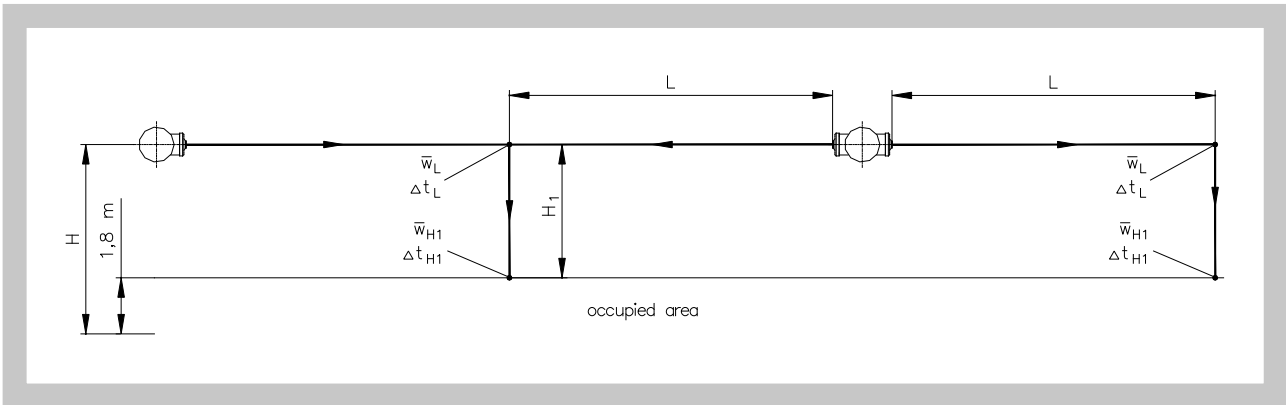
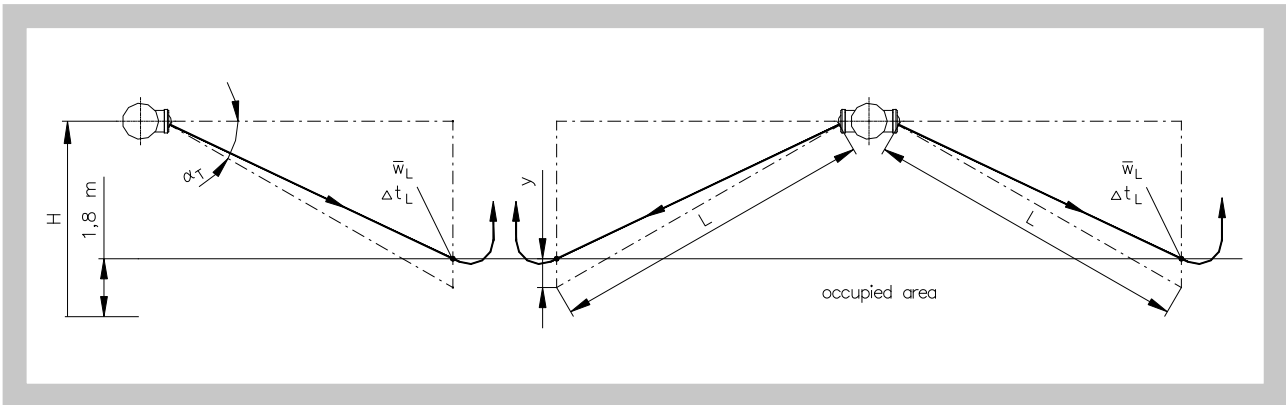


Fig. 15 Air stream diagram - warm air supply



\dot{V}	[m ³ .h ⁻¹]	volumetric air flow for one nozzle
A	[m]	axis distance between two nozzles in a row
B	[m]	horizontal distance from nozzle to meeting of two streams
L	[m]	length of stream by isothermal conditions
L _P	[m]	max. penetration of warm stream aimed downward
H	[m]	distance between nozzle and floor
H ₁	[m]	distance between two streams meeting point and occupied area
H ₂	[m]	distance between two streams meeting point and nozzle axis intersection (by isothermal conditions)

y	[m]	deviation of air stream
α_T	[°]	angle of nozzle's setting during heating
α_K	[°]	angle of nozzle's setting during cooling
\bar{w}_L	[m.s ⁻¹]	mean air stream velocity in distance L
\bar{w}_{H1}	[m.s ⁻¹]	mean air stream velocity in occupied area
w_{ef}	[m.s ⁻¹]	nozzle effective velocity
Δt_p	[K]	difference between supplied air temperature and temperature in the room
Δt_L	[K]	difference between temperature in stream axis in the distance L and temperature in the room
Δt_{H1}		difference between temperature in stream axis when entering occupied area and temperature in the room
Δp_c	[Pa]	total pressure loss by $\rho = 1,2 \text{ kg.m}^{-3}$
L_{WA}	[dB(A)]	level of acoustic output
S_{ef}	[m ²]	effective area

7.2. Pressure loss and sound data

Diagram 7.2.1. DDM/P - installed axially

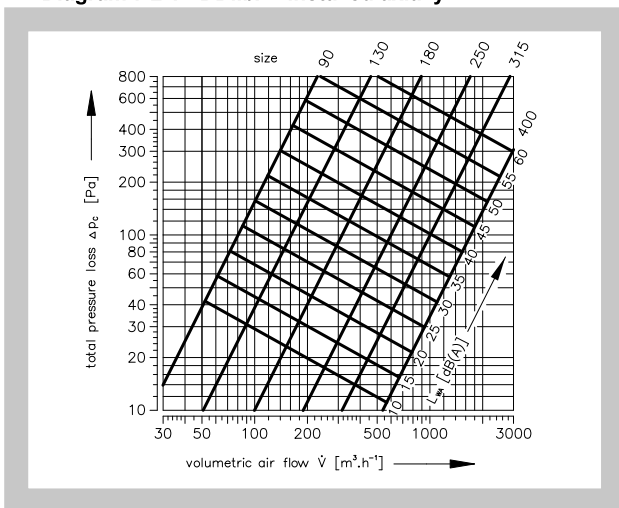
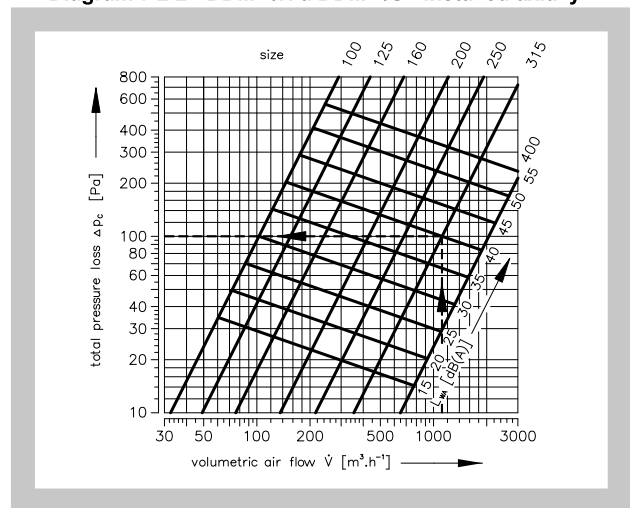


Diagram 7.2.2. DDM II/N a DDM II/S - installed axially



7.3. Air velocity, stream length and air stream deviation

Diagram 7.3.1. Air velocity and stream length by isothermal conditions

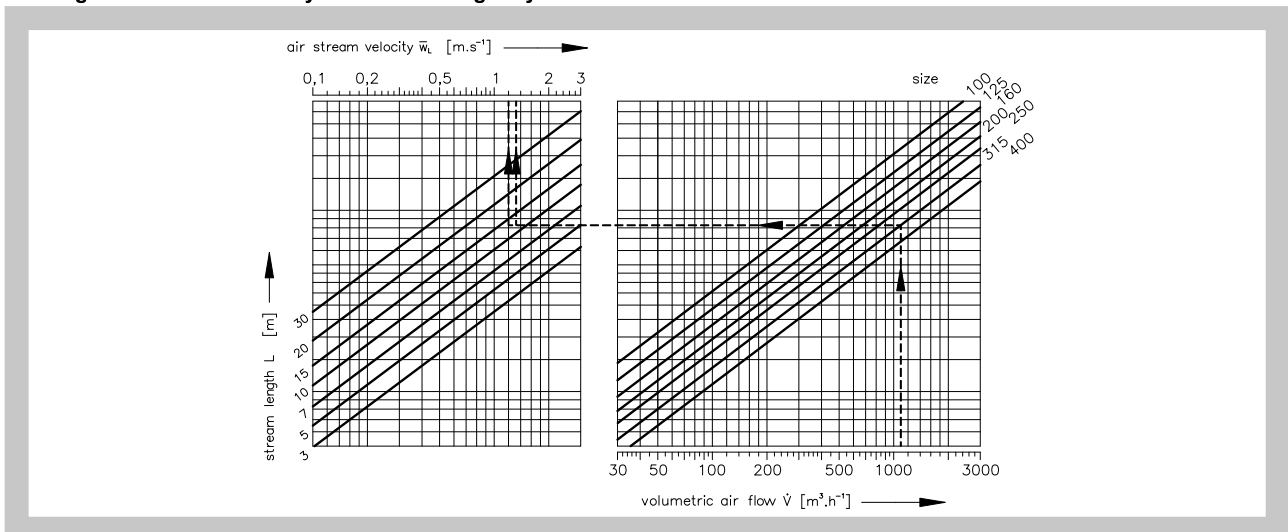
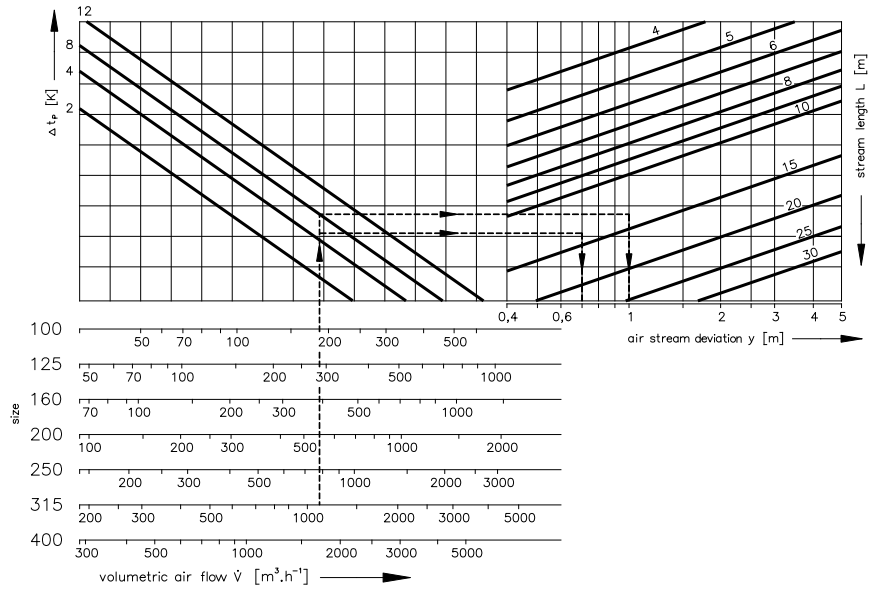
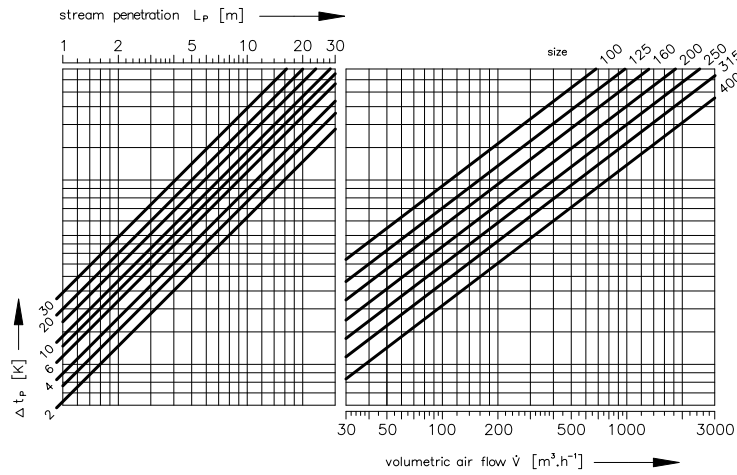


Diagram 7.3.2. Air stream deviation



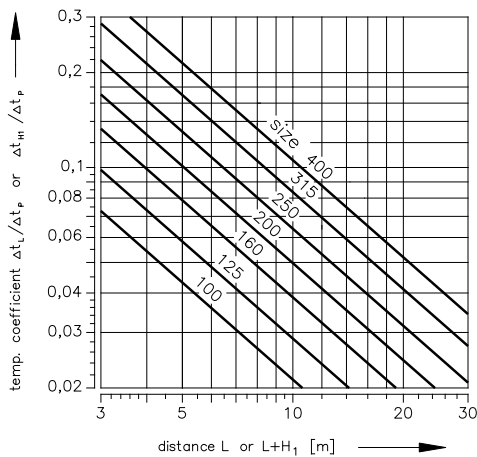
7.4. Maximum penetration of warm stream aimed downward

Diagram 7.4.1. Maximum penetration of warm stream aimed downward



7.5. Temperature coefficient

Diagram 7.5.1. Temperature coefficient



7.6. Flow velocity in occupied area

Diagram 7.6.1. Flow velocity in occupied area

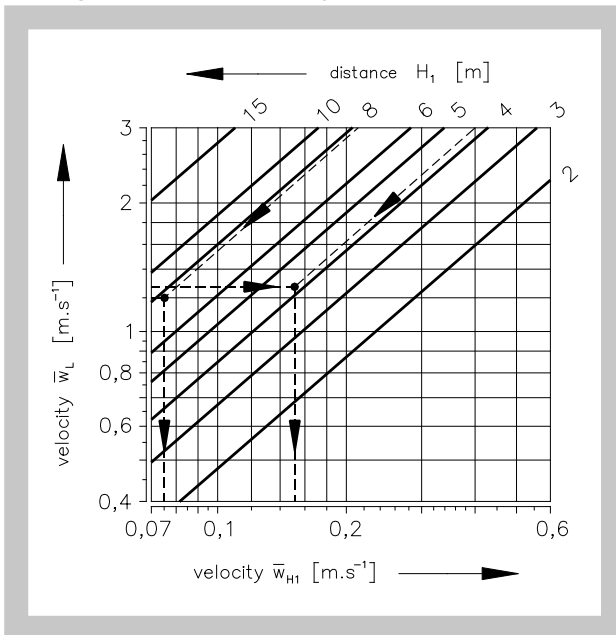


Fig. 16 Example

Given data:	$\dot{V} = 1100 \text{ m}^3 \cdot \text{h}^{-1}$, $B = 13 \text{ m}$, $H = 6 \text{ m}$ Cooling: $\Delta t_p = -8 \text{ K}$ $\alpha_K = 20^\circ$ Diagram 7.2.2. : $L_{WA} = 40 \text{ dB(A)}$ $\Delta p_c = 100 \text{ Pa}$ Nozzle: DDM II 315/S	Heating: $\Delta t_p = +5 \text{ K}$ $\bar{w}_L = 1,2 \text{ m} \cdot \text{s}^{-1}$
Cooling:	$L = B / \cos \alpha_K = 13 / 0,94 = 13,8 \text{ m}$ Diagram 7.3.1. : $\bar{w}_L = 1,2 \text{ m} \cdot \text{s}^{-1}$ Diagram 7.3.2. : $y = 1 \text{ m}$ $H_2 = \tan \alpha_K \cdot B = 0,36 \cdot 13 = 4,7 \text{ m}$ $H_1 = H - 1,8 + H_2 - y = 6 - 1,8 + 4,7 - 1 = 7,9 \text{ m}$ Diagram 7.5.1.: $\bar{w}_{H1} < 0,1 \text{ m} \cdot \text{s}^{-1}$	
Isothermal:	$L = B = 13 \text{ m}$ Diagram 7.3.1. : $\bar{w}_L = 1,3 \text{ m} \cdot \text{s}^{-1}$ $H_1 = H - 1,8 = 4,2 \text{ m}$ Diagram 7.6.1. : $\bar{w}_{H1} = 0,15 \text{ m} \cdot \text{s}^{-1}$	
Heating	$L = 14 \text{ m}$ Diagram 7.3.2. : $y = 0,7 \text{ m}$ $\sin \alpha_T = (H - 1,8 + y) / L = (6 - 1,8 + 0,7) / 14 = 0,35$ $\alpha_T = 21^\circ$	

IV. MATERIAL, FINISHING

8. Material and finishing

- 8.1. Spherical discharge nozzle and nozzle body are made of aluminium and the other components of galvanized sheet. Spherical discharge nozzle, nozzle body and cylindrical protective ring are coated by color RAL 9010. If other color is requested, please contact manufacturer.

V. TRANSPORTATION AND STORAGE

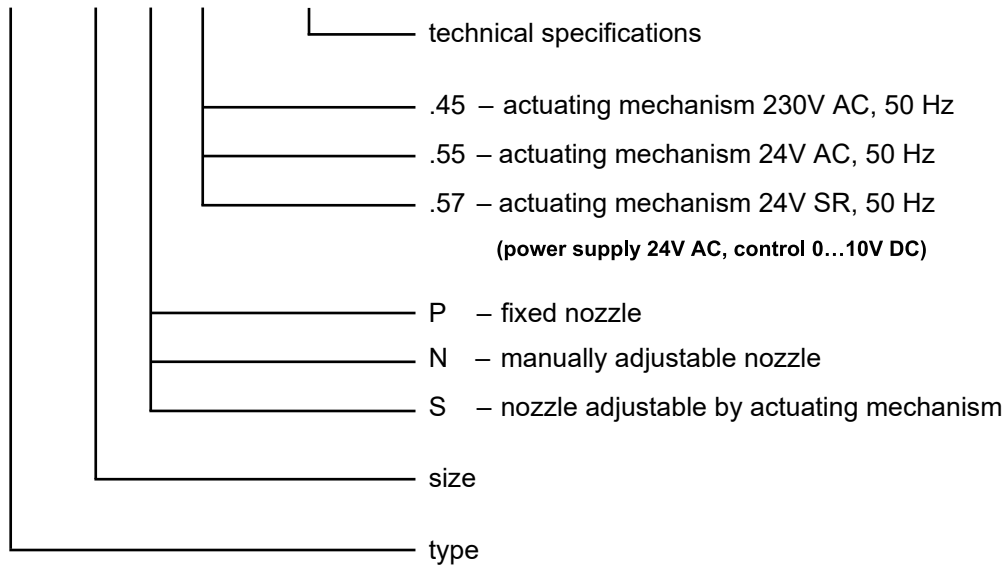
9. Logistic terms

- 9.1. Nozzles are supplied packed in carton packaging. While transported and stored they must be protected against mechanical damage and weather conditions.
- 9.2. Nozzles 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

10. Ordering key

DDM II 315 S -.45 TPM 072/08



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