



Mechanical Mixing Box

MBM



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Mechanical Mixing Box MBM

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Mechanical Mixing Box MBM

Description

Mixing boxes are used in twin-duct air-conditioning systems. The mixing box type MBM consists of a housing with two round connection pieces and an integrated sound absorber for reducing flow generated noise. The round connection pieces contain elliptical control dampers, which are responsible for regulating the air temperature. The unit mixes cold and hot air in such a way that the difference between the highest and the lowest temperature at the outlet of the device is less than 10%. The actuator for the cold and hot air dampers, which are mounted offset to one another by 60° and are connected via a lever system, forms a control circuit together with the room temperature control and is managed by the room temperature control. If the requirement for cooling increases, the cold air flap is opened via the adjusting signal of the room temperature controller and the warm air flap is closed accordingly. Once the control signal decreases again, both dampers are moved accordingly into opposite directions.

The supply air volume is controlled by the second control circuit via one or two constant volumetric flow controllers independently of the duct pressure, for which a constant volumetric flow controller with electric setpoint value adjustment can be used at an extra charge. If the supply air or return air volume must be adjusted to variable room occupations, etc., this can be done using a constant volumetric flow controller equipped with an actuator without opening the false ceiling. The setting values and control signals for actuators with constant control can be obtained from the documentation. In OPEN / CLOSED actuators, the control setting is effected through a mechanical limit. The measurement voltage U (2 - 10 V DC) can be used for position feedback or as subsequent control signal.

The motors are arranged on the underside of the unit, in order to allow them to be checked through the inspection opening in the false ceiling.

The setpoint values are initially set ex works, during which all mixing boxes are checked for correct functioning.

For maintenance, service, retrofitting, etc., inspection openings in sufficient number and size must be provided on-site.

Field of application

- for supply air systems
- for constant volumetric flows
- Differential pressure range 250 - 1000 Pa
- for ambient temperatures from 0 to 55°C
- for air velocities in the silencer gap from 2 - 12 m/s
- Supply voltage actuator 24 V AC, 50/60 Hz
- Model for spiral duct connection to DIN 24145
- with integrated silencer to reduce flow generated noise
- additional acoustic cladding to reduce radiated noise available at an extra charge

Attention!

The cold air connection piece must be insulated on-site if there is a risk of condensate formation.

Construction

Housing

- Galvanised sheet steel, abrasion-resistant up to a duct velocity of 20 m/s

Damper unit

- lined with mineral wool, abrasion-resistant

Hot/cold air damper control

- Standard model: 2-/3-point via NM24A (1 actuator)
- Special model: continuously via NM24A-SR (1 actuator)
- Special model: pneumatically via AK 31 P (1 actuator)

Silencer unit

- lined with mineral wool, abrasion-resistant

Hot and cold air control damper

- Galvanised sheet steel, with silicone-free damper leaf seal made of PUR for airtight seal to DIN 1946 Part 4

Model

- MBM 100 - 250 - with a mechanical volumetric flow controller VRM 100 to 250
- MBM 315 - with two mechanical volumetric flow controllers VRM 250
- MBM 400 - with three mechanical volumetric flow controllers VRM 250

Accessories

Acoustic cladding (-DS)

- Galvanised sheet steel with 40 mm mineral wool lining

Rubber lip seal (-GD)

- Special rubber

Duct silencer (-RS)

- Galvanised sheet steel with mineral wool lining and perforated cover

Attention!

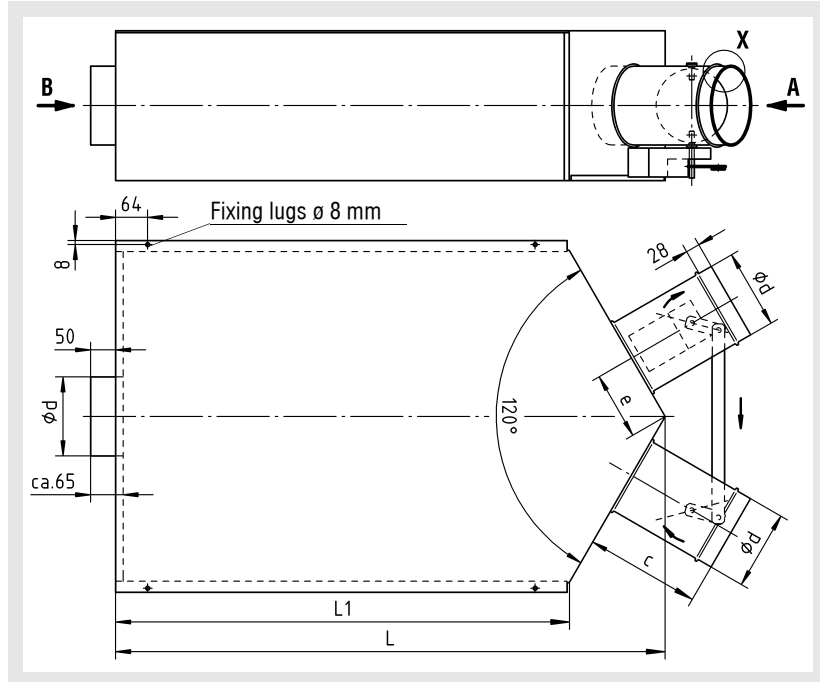
The activation of the continuous actuator NM24A-SR takes place via a 0-10V DC signal, whose working range is 2-10V DC. 2V DC corresponds to the 0% position of the actuator and 10V DC to the 100% position.

Mechanical Mixing Box MBM

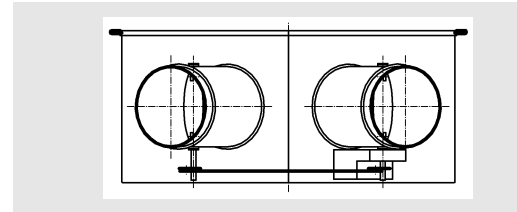
Models and dimensions

Dimensions

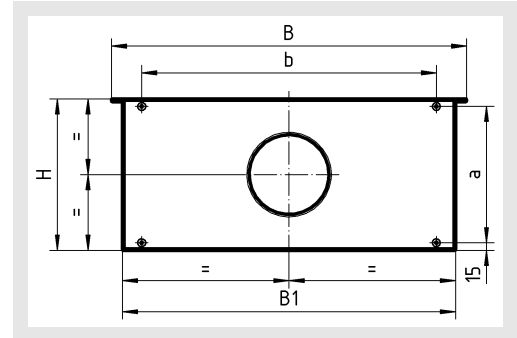
MBM 100-315



View A



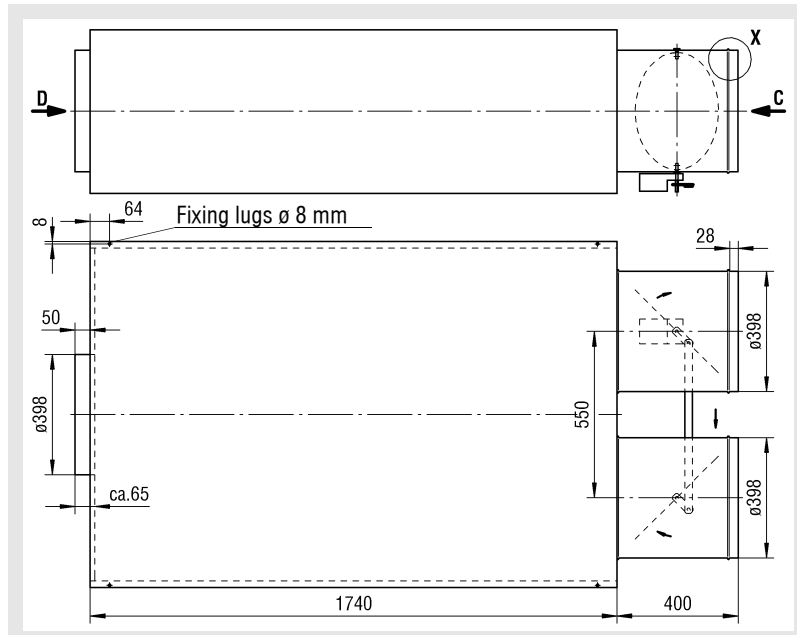
View B



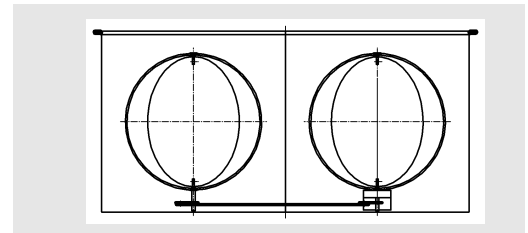
Available sizes

NW	L	L1	H	B	B1	ød	a	b	c	e
100	1100	910	240	704	660	98	210	584	170	135
125			265			123	235		200	
160			300			158	270		230	
200			340			198	310		260	
250			390			248	360		300	
315	1585	1280	455	1104	1060	313	425	984	410	255

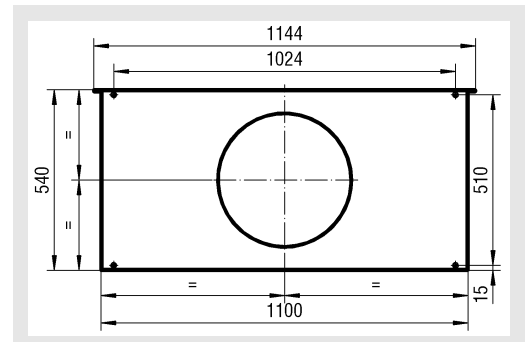
MBM 400



View C



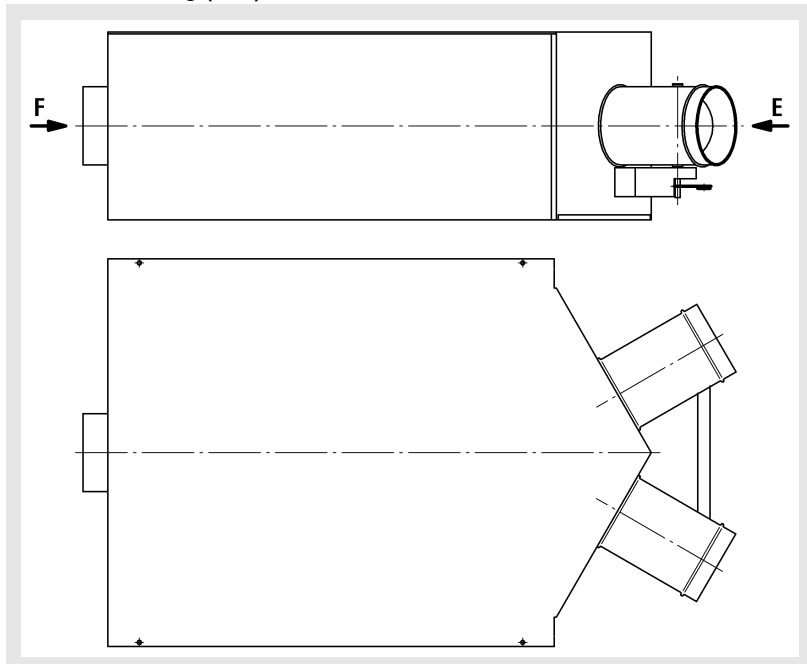
View D



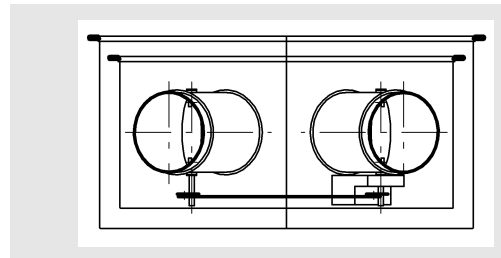
Mechanical Mixing Box MBM

Dimensions of accessories

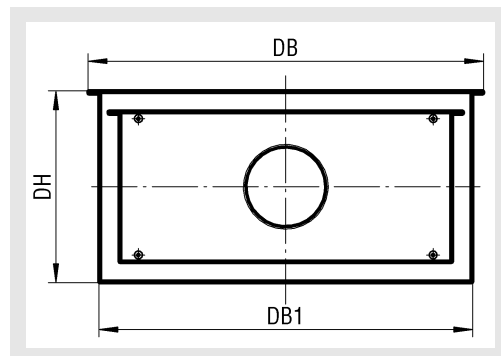
Acoustic cladding (-DS)



View E



View F



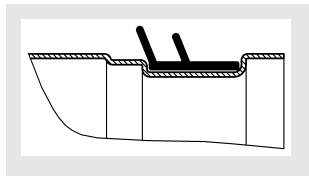
Available sizes

NW	DH	DB	DB1
100	320	784	740
125	345		
160	380		
200	420		
250	470		
315	535	1184	1140
400	620	1224	1180

Inspection openings are provided at the underside of the unit, in order to allow the constant volumetric flow controller to be checked and adjusted.

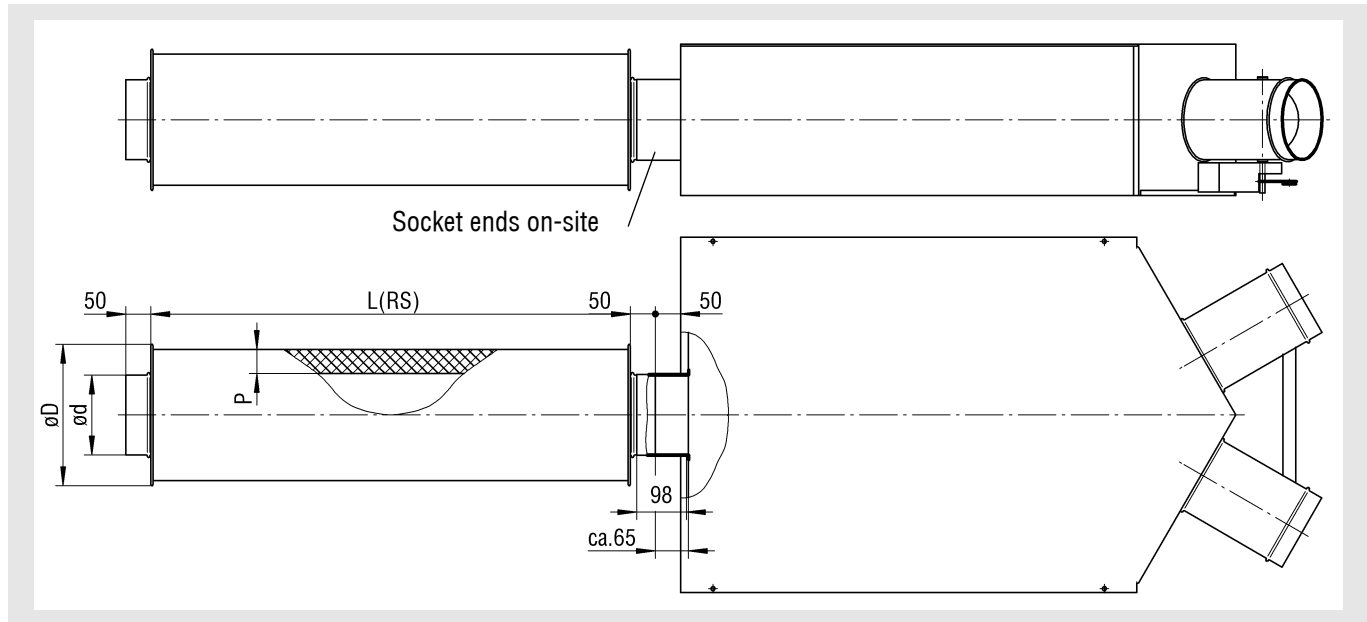
Rubber lip seal (-GD)

Detail X



Mechanical Mixing Box MBM

Duct silencer (-RS)



Available sizes

NW	$\varnothing d$	$\varnothing D$		
		P (mm)		
		50	100	150
100	98	200	300	-
125	123	225	325	-
160	158	260	360	-
200	198	300	400	-
250	248	350	450	-
315	313	415	515	615
400	398	500	600	700

Selection chart packing thickness

NW	L(RS)=500			L(RS)=950			L(RS)=1450			L(RS)=1950		
	P (mm)			P (mm)			P (mm)			P (mm)		
	50	100	150	50	100	150	50	100	150	50	100	150
100	X	X	-	X	X	-	X	-	-	X	-	-
125	X	X	-	X	X	-	X	-	-	X	-	-
160	X	X	-	X	X	-	X	X	-	-	X	-
200	X	X	-	X	X	-	X	X	-	-	X	-
250	X	X	-	X	X	-	X	X	-	-	X	-
315	X	X	X	X	X	X	X	X	X	-	-	X
400	X	X	X	X	X	X	X	X	X	-	-	X

- X = available
- = not available
- P = Packing thickness

Mechanical Mixing Box MBM

Technical Data

Volumetric flow range

NW	V _{ZU} (m ³ /h)		V _{ZU} [l/s]	
	min.	max.	min.	max.
100	85	385	24	107
125	140	580	39	161
160	183	952	51	264
200	289	1418	80	394
250	450	2391	125	664
315	900	4782	250	1328
400	1350	7173	375	1993

Flow generated noise

NW	V _{ZU}		L _{WA} [dB(A)]	
	(m ³ /h)	[l/s]	Δp _t = 250 Pa	Δp _t = 500 Pa
100	85	24	25	29
	133	37	27	31
	218	61	31	36
	385	107	37	42
125	140	39	27	31
	210	58	30	33
	349	97	34	38
	580	161	40	41
160	183	51	28	32
	348	97	31	36
	549	153	35	39
	952	264	42	45
200	289	80	29	33
	549	153	32	36
	841	234	36	40
	1418	394	43	47
250	450	125	30	35
	862	239	32	36
	1441	400	37	39
	2391	664	45	48
315	900	250	33	34
	1376	382	37	41
	2707	752	43	47
	4782	1328	48	52
400	1350	375	36	40
	2228	619	39	43
	4143	1151	46	50
	7173	1993	51	55

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Radiated noise

without acoustic cladding

NW	V _{ZU}		L _{WA} [dB(A)]	
	(m ³ /h)	[l/s]	$\Delta p_t = 250 \text{ Pa}$	$\Delta p_t = 500 \text{ Pa}$
100	85	24	30	34
	133	37	32	36
	218	61	37	40
	385	107	41	45
125	140	39	32	36
	210	58	34	39
	349	97	39	42
	580	161	44	47
160	183	51	33	37
	348	97	35	40
	549	153	40	43
	952	264	45	48
200	289	80	33	38
	549	153	37	42
	841	234	42	46
	1418	394	46	50
250	450	125	36	41
	862	239	39	44
	1441	400	44	49
	2391	664	48	51
315	900	250	37	40
	1376	382	40	42
	2707	752	44	47
	4782	1328	49	52
400	1350	375	39	41
	2228	619	42	43
	4143	1151	47	47
	7173	1993	51	54

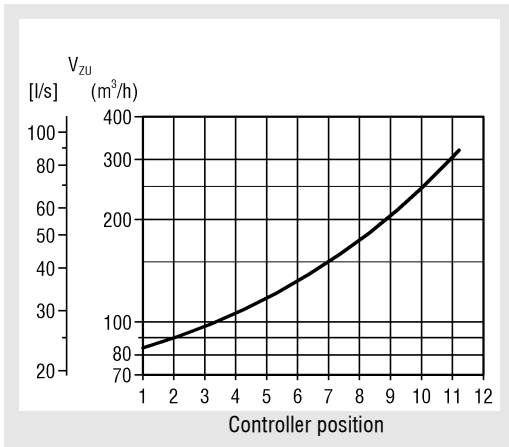
with acoustic cladding (-DS) 40mm

NW	V _{ZU}		L _{WA} [dB(A)]	
	(m ³ /h)	[l/s]	$\Delta p_t = 250 \text{ Pa}$	$\Delta p_t = 500 \text{ Pa}$
100	85	24	26	30
	133	37	28	32
	218	61	32	36
	385	107	37	41
125	140	39	28	32
	210	58	31	34
	349	97	34	38
	580	161	38	42
160	183	51	30	33
	348	97	32	36
	549	153	36	40
	952	264	39	43
200	289	80	30	35
	549	153	35	39
	841	234	37	42
	1418	394	41	45
250	450	125	33	36
	862	239	36	41
	1441	400	38	43
	2391	664	43	47
315	900	250	34	37
	1376	382	37	39
	2707	752	40	44
	4782	1328	45	48
400	1350	375	32	35
	2228	619	36	40
	4143	1151	42	44
	7173	1993	45	50

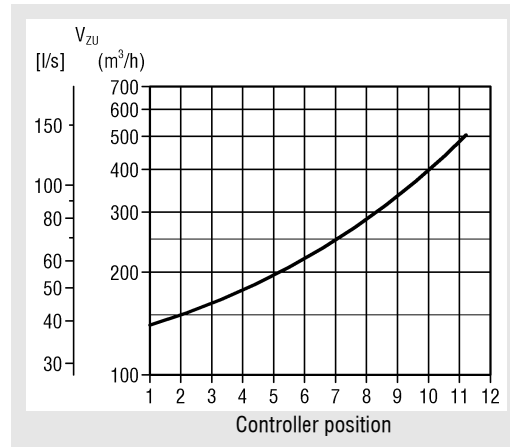
Mechanical Mixing Box MBM

Setting curves for air volume regulation

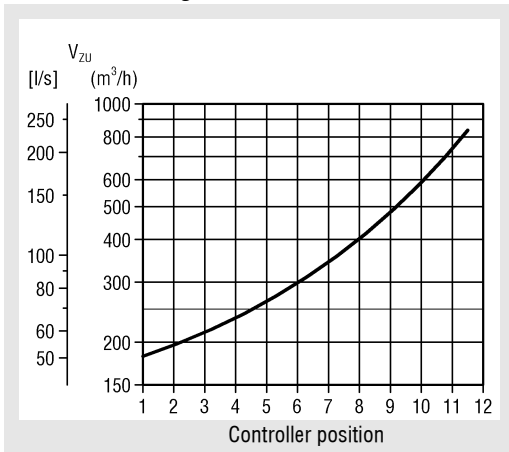
Controller setting MBM 100



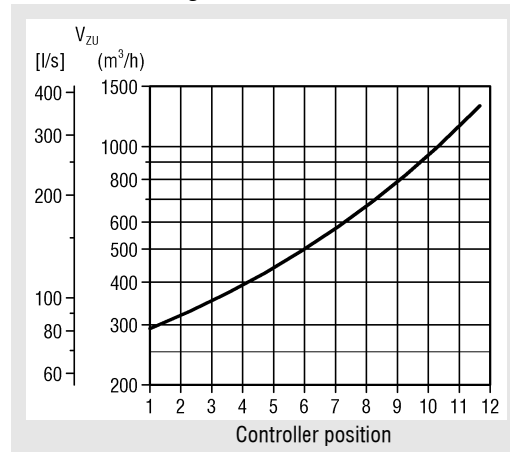
Controller setting MBM 125



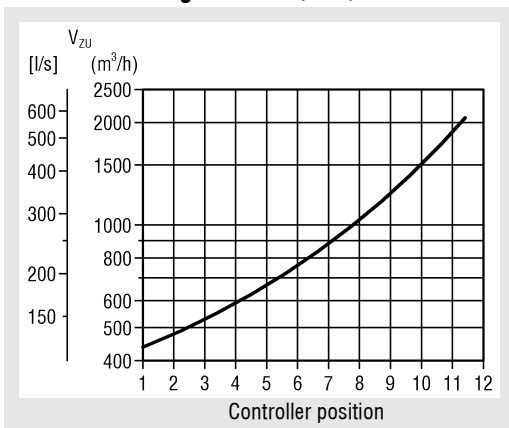
Controller setting MBM 160



Controller setting MBM 200



Controller setting MBM 250/315/400



Attention!

The **MBM 315** is equipped with 2 VRM-250, both constant controllers being activated in parallel, i.e., the air volume must be calculated twice.

Attention!

The **MBM 400** is equipped with 3 VRM-250, all constant controllers being activated in parallel, i.e., the air volume must be calculated three times.

For correct design and use of the mixing box MBM, we recommend not exceeding the max. controller setting of 10. This ensures that the mechanical constant volumetric flow controller is working in the optimum range.

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Minimum pressure differences

Size		100		125		160		200		250		315		400		
Mixing ratio Hot/cold air		100/0	50/50	100/0	50/50	100/0	50/50	100/0	50/50	100/0	50/50	100/0	50/50	100/0	50/50	
Controller position	1	V_{ZU} (m ³ /h)	85		140		183		289		450		900		1350	
		[l/s]	24		39		51		80		125		250		375	
		$\Delta p_{t \min}$ (Pa)	77	82	79	85	68	72	67	71	81	85	80	84	80	84
	2	V_{ZU} (m ³ /h)	90		150		195		320		480		960		1440	
		[l/s]	25		42		54		89		133		267		400	
		$\Delta p_{t \min}$ (Pa)	79	85	81	88	72	76	74	79	88	93	83	87	83	87
	3	V_{ZU} (m ³ /h)	98		160		215		355		525		1050		1575	
		[l/s]	27		44		60		99		146		292		438	
		$\Delta p_{t \min}$ (Pa)	82	89	83	91	76	81	78	84	99	104	86	91	86	91
	4	V_{ZU} (m ³ /h)	107		175		240		400		600		1200		1800	
		[l/s]	30		49		67		111		167		333		500	
		$\Delta p_{t \min}$ (Pa)	84	93	86	95	80	87	82	90	116	123	90	97	90	97
5	V_{ZU} (m ³ /h)	120		195		265		450		685		1370		2005		
	[l/s]	33		54		74		125		190		381		557		
	$\Delta p_{t \min}$ (Pa)	88	99	89	101	83	91	86	95	133	142	94	103	93	101	
6	V_{ZU} (m ³ /h)	138		220		300		500		750		1500		2250		
	[l/s]	38		61		83		139		208		417		625		
	$\Delta p_{t \min}$ (Pa)	94	109	96	111	87	97	89	101	145	156	98	108	98	108	
7	V_{ZU} (m ³ /h)	150		250		350		580		845		1690		2535		
	[l/s]	42		69		97		161		235		469		704		
	$\Delta p_{t \min}$ (Pa)	101	118	109	128	94	108	98	114	160	174	107	121	107	121	
8	V_{ZU} (m ³ /h)	175		290		400		680		1050		2100		3150		
	[l/s]	49		81		111		189		292		583		875		
	$\Delta p_{t \min}$ (Pa)	125	148	140	166	106	124	119	141	187	208	145	167	145	167	
9	V_{ZU} (m ³ /h)	205		340		490		800		1250		2500		3750		
	[l/s]	57		94		136		222		347		694		1042		
	$\Delta p_{t \min}$ (Pa)	175	206	202	237	150	177	165	195	210	240	198	229	198	229	
10	V_{ZU} (m ³ /h)	250		400		600		950		1500		3000		4500		
	[l/s]	69		111		167		264		417		833		1250		
	$\Delta p_{t \min}$ (Pa)	282	329	298	347	242	283	250	292	249	292	262	306	262	306	
11	V_{ZU} (m ³ /h)	310		495		750		1200		1915		3830		5745		
	[l/s]	86		138		208		333		532		1064		1596		
	$\Delta p_{t \min}$ (Pa)	455	527	479	554	402	466	423	490	377	447	511	581	511	581	
12	V_{ZU} (m ³ /h)	385		580		952		1418		2391		4782		7173		
	[l/s]	107		161		264		394		664		1328		1993		
	$\Delta p_{t \min}$ (Pa)	1048	1160	847	951	856	959	682	776	595	705	901	1011	901	1011	

100/0 = Mixing ratio of hot air to cold air 100% to 0%

50/50 = Mixing ratio of hot air to cold air 50% to 50%

Mechanical Mixing Box MBM

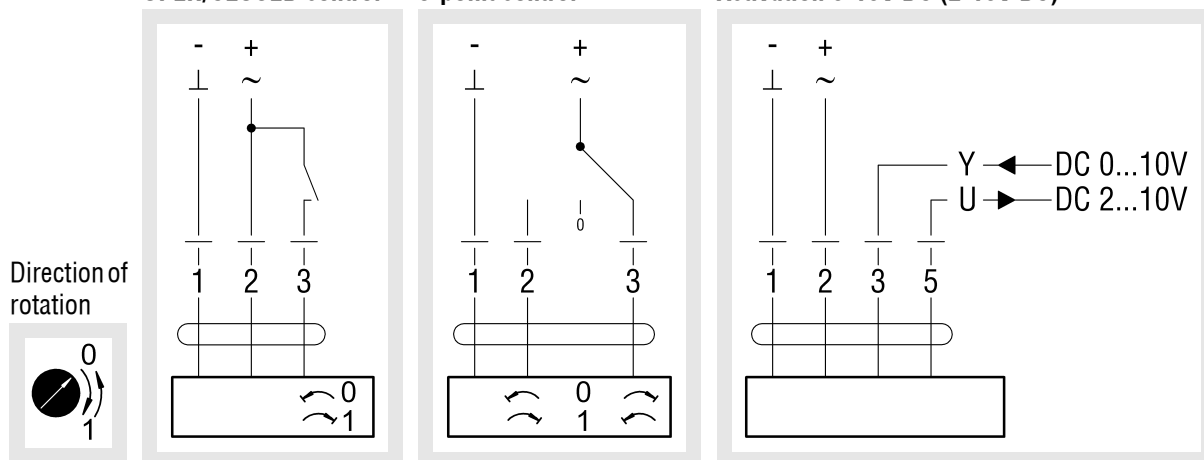
Circuit diagram

Actuator make Belimo type NM24A/NM24A-SR/SM24A/SM24A-SR

OPEN/CLOSED control

3-point control

Activation 0-10V DC (2-10V DC)



Notes

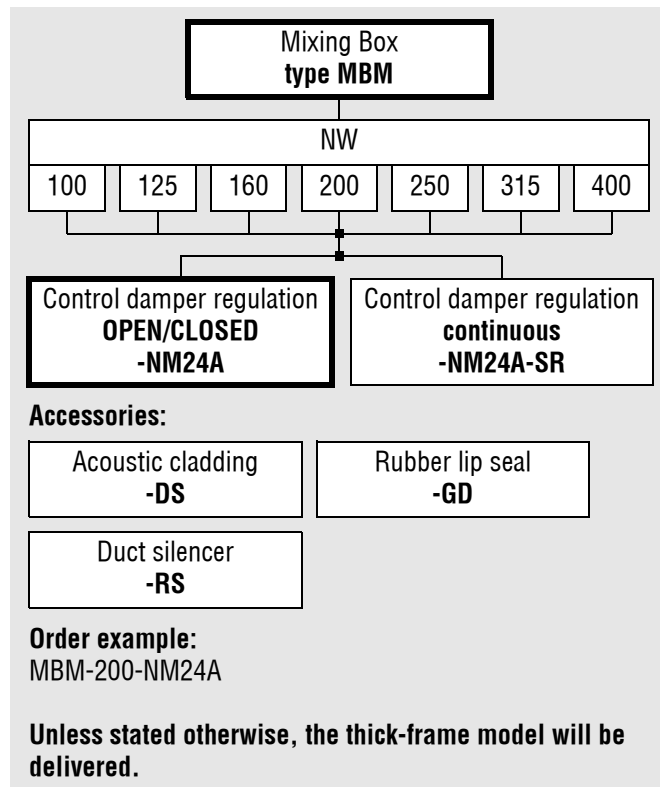
- Connection via safety transformer.
- Parallel connection of further drives is possible.
- Observe output data.



Legend

V_{ZU}	(m ³ /h)	=	Supply air volumetric flow
V_{ZU}	[l/s]	=	Supply air volumetric flow
DS	(mm)	=	Thickness of the acoustic cladding 40mm
RS	-	=	Duct silencer
P	(mm)	=	Packing thickness
NW	(mm)	=	Nominal width
Δp_t	(Pa)	=	Minimum static pressure difference
L_{WA}	[dB(A)]	=	A-weighted sound power level (room and ceiling damping not yet included)

Order details



Mechanical Mixing Box MBM

Specification text

Mixing box for use in twin-duct air-conditioning systems, including two round connection pieces arranged at an angle of 120°, relative to one another, with control dampers with damper leaf seal made of PUR, fits ducts to DIN 24 145, sealing airtight to DIN 1946 Part 4. Fitted with integrated mechanical constant volumetric flow controller type VRM in round design, in which the mechanics and damper are in a closed control unit outside the air flow, insensitive to contamination. Differential pressure range 250 to 1,000 Pa, volumetric flow deviation $\pm 5\%$, relative to the V_{\max} volume. Galvanised sheet steel housing with integrated silencer unit with thermal and acoustic mineral wool lining, abrasion-resistant up to an air velocity of 20 m/s. Control damper and damper axis of sizes 100 and 125 mm are made of plastic, otherwise made of galvanised sheet steel. Regulation of cold/hot air damper continuous or via 3-point signal, supply voltage 24V AC, 50/60 Hz, ambient temperature 0-55°C.

Product: SCHAKO **type MBM**

Accessories (at an extra charge)

- Acoustic cladding (-DS) made of sound-damping mineral wool thickness 40 mm, with sheet metal casing made of galvanised sheet steel
- Duct silencer (-RS), outer casing and perforated sheet made of galvanised sheet steel with mineral wool filling.
- Rubber lip seal (-GD), made of silicone-free rubber.