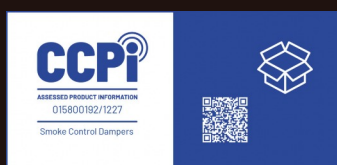
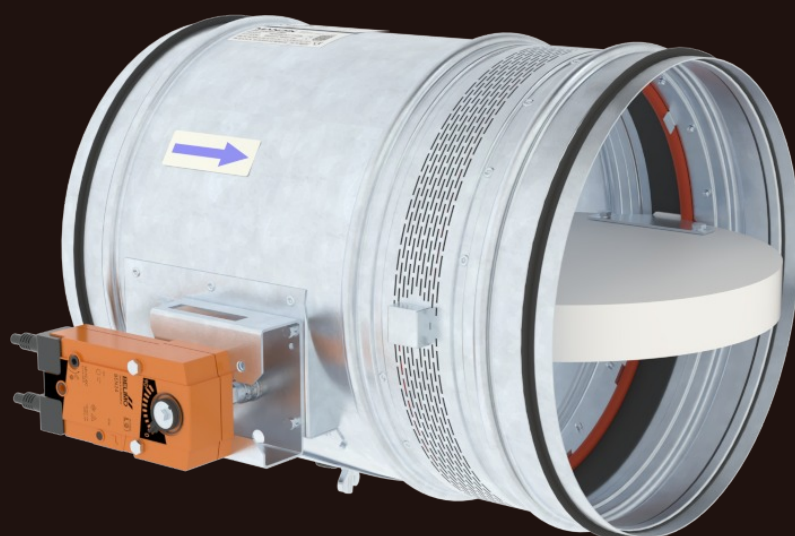


MSD (MSD-W)

Multi compartment smoke control damper

Technical Documentation

Installation, Commissioning, Operation, Maintenance and Service Manual



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These technical specifications state a row of manufactured sizes, main dimensions, design and range of use of multi compartment smoke control dampers MSD. It is valid for production, design, ordering, delivery, storage, assembly, operation, maintenance and serviceability checks.

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I. GENERAL

Description

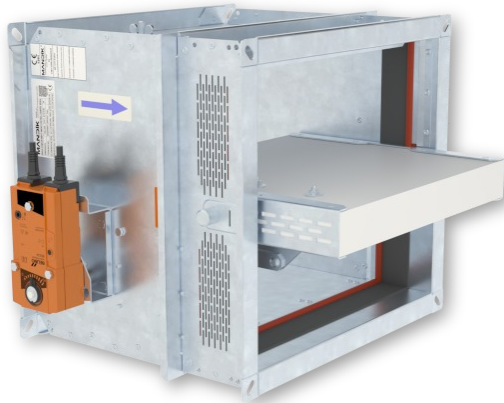
Smoke control dampers – MULTI are closures installed in ductwork of smoke extraction systems. In the event of fire, the Smoke and Heat Exhaust Ventilation Systems system opens the dampers in the affected section, thereby allowing the exhaust fans to remove combustion products and heat from the endangered areas.

The damper blade is controlled by electrical actuating mechanism.

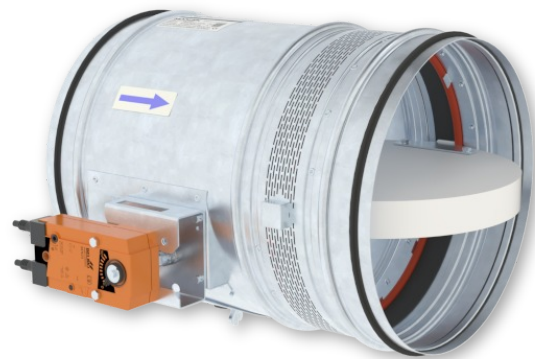
Dampers are fire resistant and are intended for systems with automatic activation.

Dampers can be installed in the structure of the fire compartment.

Dampers are designed for use in fire compartments that can be connected to smoke exhaust ducts (tested according to EN 1366-10), or they can be installed in or on the structure of the fire compartment.



MSD - rectangular



MSD - circular

Basic types of rectangular dampers

- MSD - Cycling test with load (possible design .44, .54, .65)
- MSD-W - Cycling test without load (possible design .44, .54, .4M0, .4M1, .5M0, .5M1)

Basic types of circular dampers

- MSD - Cycling test with load (possible design .44, .54)
- MSD-W - Cycling test without load (possible design .4M0, .4M1, .5M0, .5M1)

MSD dampers can be open against flow and pressure.

MSD-W dampers has to be open with the help of flow or without flow present.

Damper characteristics

- CE certified acc. to EN 12101-8
- Tested in accordance with EN 1366-10
- Classified acc. to EN 13501-4
- External Casing leakage class ATC 3 (old marking "C"), Internal leakage min. class 2 acc. to EN 1751
- Leakage across the blade: circular dampers - min. class 2, diameters from 560 mm to 630 mm
min. class 3 according to EN 1751
rectangular dampers - min. class 2, for max. size 1500 × 800 mm
min. class 3 according to EN 1751
- Cycling: MSD rectangular dampers C_{mod} according to EN 12101-8
MSD, MSD-W circular dampers C_{10000} according to EN 12101-8
MSD-W rectangular dampers C_{10000} according to EN 12101-8 (tested without load according to EN 1366-10)
- EC Certificate of Conformity No. 1391-CPR-XXXX/XXXX for MSD
- EC Certificate of Conformity No. 1391-CPR-XXXX/XXXX for MSD-W
- Declaration of Performance No. PM/MSD/01/XX/X, PM/MSD-W/01/XX/X
- Hygienic assessment – Report No. 1.6/pos/19/19c

Classification of rectangular dampers

Supporting construction	Installation type	Classification
Horizontal or vertical smoke extraction ducts tested according to EN 1366-8 or EN 1366-9 • Into or onto the duct	Damper installed Into or onto a duct	EI 120 (h _{od}) S1500[H]C _{mod} HOT400/30AAmulti EI 120 (v _{ed}) S1500[H]C _{mod} HOT400/30AAmulti
Standard low- and high-density rigid wall construction according to EN 1363-1 • damper in the wall • 100 mm min. wall thickness	Mortar or gypsum	EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti
	Ablative Coated Batt	
Standard flexible wall construction min. EI 90 according to EN 1363-1 • damper in the wall • 100 mm min. wall thickness	Mortar or gypsum	
	Ablative Coated Batt	
Standard low- and high-density rigid floor construction according to EN 1366-2 • damper in the ceiling • 150 mm min. ceiling thickness	Mortar or gypsum	EI 120 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (h _{ow}) S1500[H]C ₁₀₀₀₀ AAmulti
	Ablative Coated Batt	EI 90 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti EI 120 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (h _{ow}) S1500[H]C ₁₀₀₀₀ AAmulti

* Applies to MSD-W damper

Classification of circular dampers

Supporting construction	Installation type	Classification
Standard low- and high-density rigid wall construction according to EN 1363-1 • damper in the wall • 125 mm min. wall thickness	Mortar or gypsum	EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti
Standard flexible wall construction min. EI 90 according to EN 1363-1 • damper in the wall • 125 mm min. wall thickness	Mortar or gypsum	EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti
Standard low- and high-density rigid floor construction according to EN 1366-2 • damper in the ceiling • 150 mm min. ceiling thickness	Mortar or gypsum	EI 120 (h _{ow}) S1500[H]C ₁₀₀₀₀ AAmulti

Working conditions

- Exact damper function is provided under the following conditions
 - maximum air velocity 15 m/s
 - underpressure max. -1500 Pa or overpressure max. 500 Pa
- Dampers can be installed with a horizontal blade axis.
- Dampers are designed for macroclimatic areas with mild climate according to EN IEC 60 721-3-3 ed.2., class 3K22. (Environment 3K22 is typically protected place with regulated temperature)
- Temperature in the place of installation is permitted to range from -30 °C to +50 °C.

II. DESIGN

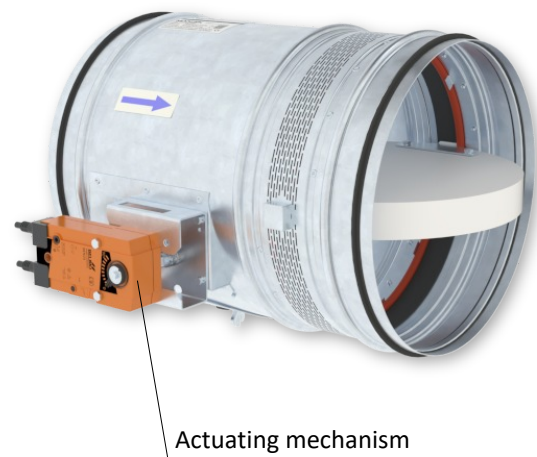
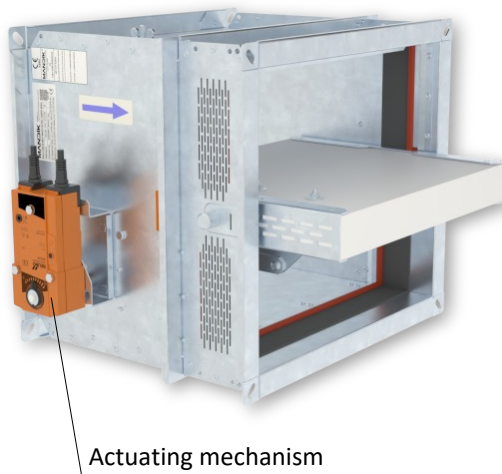
Design with actuating mechanism

Design .44 and .54

- Belimo actuators are used for dampers, series BEN, BEE, BE for 230V AC resp. 24 V AC/DC, Schischek InMax 50.75-S actuators (universal 24V or 230V supply) are used for large size of dampers.
- After connection to the power supply voltage, the actuator moves the damper blade to the "OPEN" position or "CLOSED" (according to the corresponding connection, see wiring diagram). If the power supply is interrupted, the actuator stops at the current position. The signalling of the "OPEN" and "CLOSED" damper blade positions is ensured by two built-in fixed "potential-free" end- limit switches.
- The actuator for operating the damper blade is mounted in an insulated cover/box. It is accessible after removing the cover lid. The electrical connection of the actuator is made with a non-flammable cable (or a cable located in the adjoining cable duct), which passes through an opening made in the wall of the insulated cover/box when installing the damper or when connecting the actuator power cable. Cable penetrations must meet a minimum fire resistance of 30 minutes.

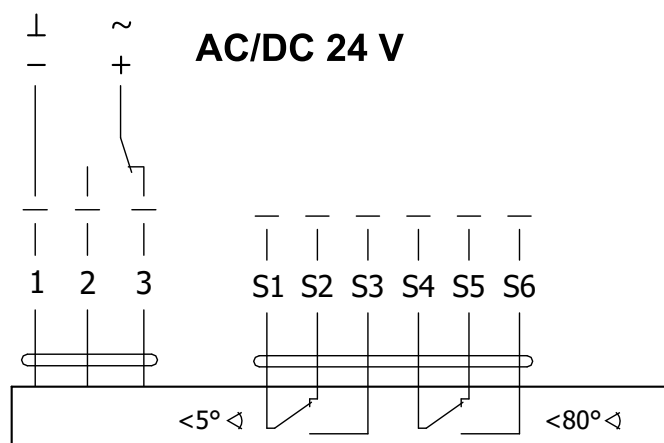
Design .65 - only for rectangular dampers MSD

- Belimo modulating actuators, BEN (BEE)-SR series for 24V AC/DC are specially designed for remote control of smoke control dampers. The position of the damper blade is adjustable by means of control voltage 0 (2)...10V DC.
- The signalling of the "OPEN" and "CLOSED" damper blade positions is ensured by two built-in fixed "potential-free" limit switches.
- The actuator for operating the damper blade is mounted in an insulated cover/box. It is accessible after removing the cover lid. The electrical connection of the actuator is made with non-flammable cables (or cables located in the adjoining cable duct), which pass through an opening made in the wall of the insulated cover when installing the damper or when connecting the power cables of the actuator. Cable penetrations must meet a minimum fire resistance of 30 minutes.

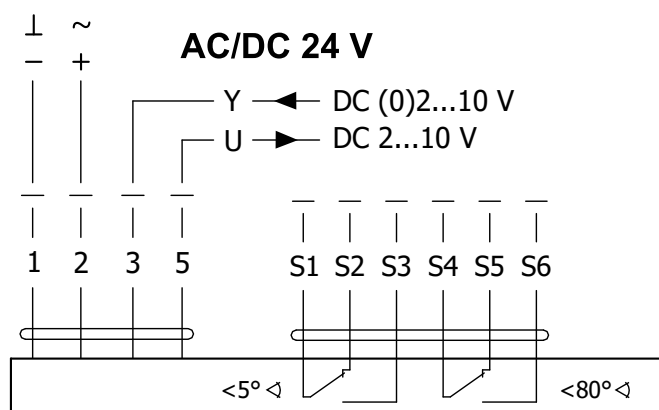


Design .44, .54 and .65

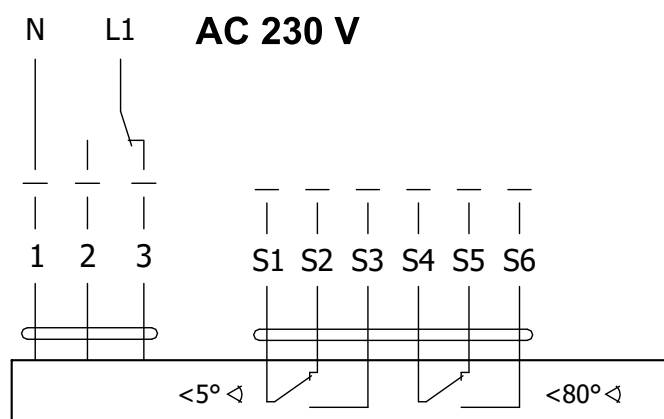
Actuator BELIMO BEN 24(-ST)



Actuator BELIMO BEN 24-SR



Actuator BELIMO BEN 230

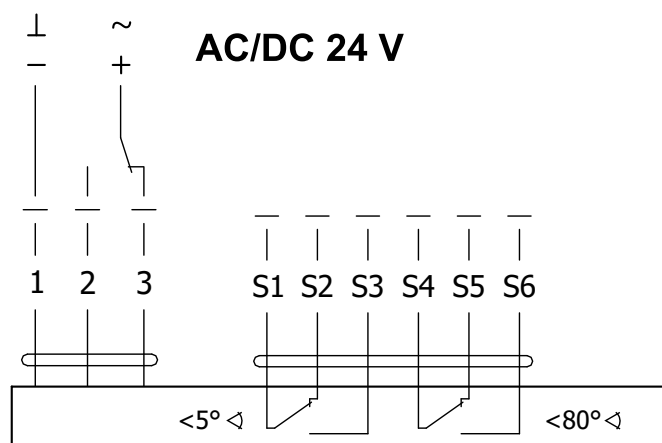


Actuator BELIMO BEN 24(-ST), BEN 24-SR, BEN 230

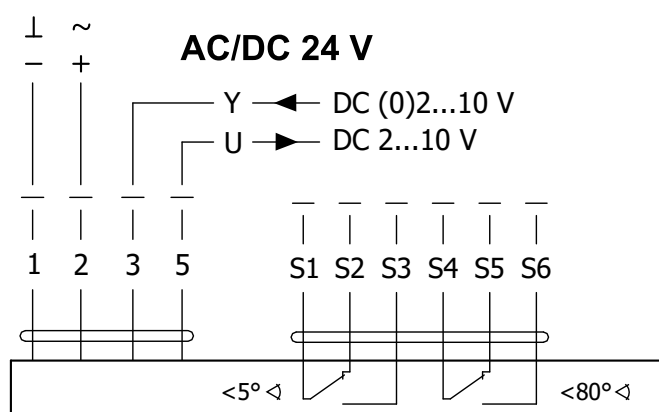
Actuator BELIMO - 15 Nm	BEN 24(-ST)	BEN 24-SR*	BEN 230
Power voltage	AC/DC 24 V 50/60Hz	AC/DC 24 V 50/60Hz	AC 230 V 50/60Hz
Power consumption - in operation - in the end position	3 W 0,1 W	3 W 0,3 W	4 W 0,4 W
Dimensioning	6 VA (I _{max} 8,2 A @ 5 ms)	6,5 VA (I _{max} 8.2 A @ 5 ms)	7 VA (I _{max} 4 A @ 5 ms)
Protection class	III	III	II
Degree of protection		IP 54	
Adjustment time for 95°		< 30 s	
Ambient temperature Storage temperature		-30°C ... +55°C -40°C ... +80°C	
Connection - drive - auxiliary switch	Cable 1 m, 3 x 0,75 mm ² Cable 1 m, 6 x 0,75 mm ² (BEN 24-ST) with plug connectors	Cable 1 m, 4 x 0,75 mm ² Cable 1 m, 6 x 0,75 mm ²	Cable 1 m, 3 x 0,75 mm ² Cable 1 m, 6 x 0,75 mm ²

* Only available for 24V and selected damper sizes

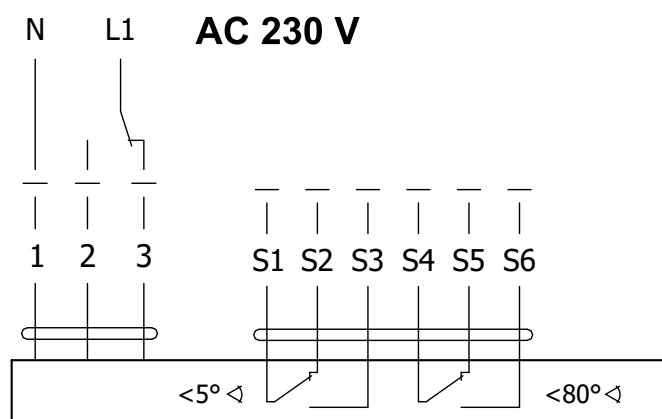
Actuator BELIMO BEE 24(-ST)



Actuator BELIMO BEE 24-SR



Actuator BELIMO BEE 230

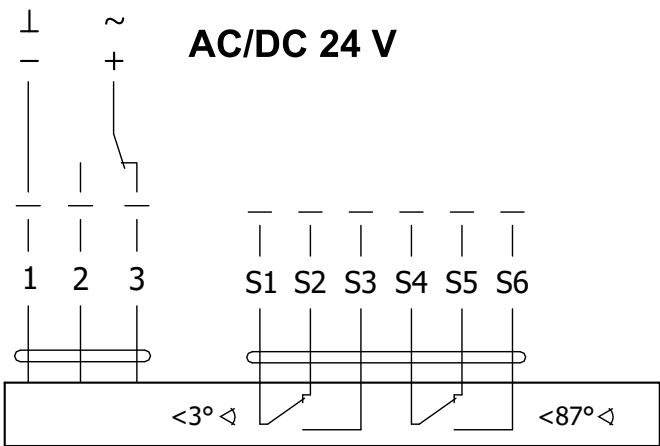


Actuator BELIMO BEE 24(-ST), BEE 24-SR, BEE 230

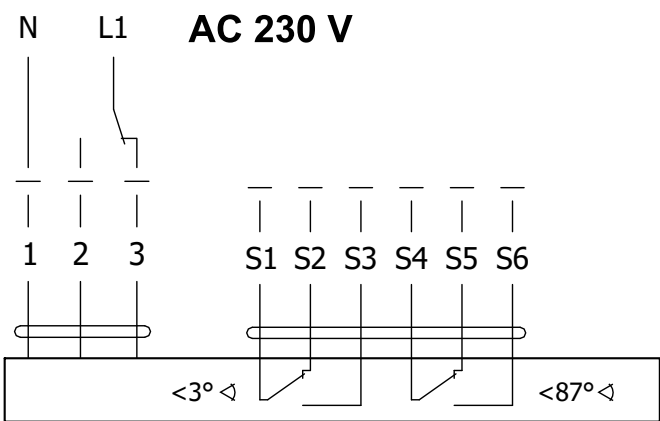
Actuator BELIMO - 25 Nm	BEE 24(-ST)	BEE 24-SR*	BEE 230
Power voltage	AC/DC 24 V 50/60Hz	AC/DC 24 V 50/60Hz	AC 230 V 50/60Hz
Power consumption - in operation - in the end position	2,5 W 0,1 W	3 W 0,3 W	3,5 W 0,4 W
Dimensioning	5 VA (Imax 8,2 A @ 5 ms)	5,5 VA (Imax 8.2 A @ 5 ms)	6 VA (Imax 4 A @ 5 ms)
Protection class	III	III	II
Degree of protection		IP 54	
Adjustment time for 95°		< 60 s	
Ambient temperature Storage temperature		-30°C ... +55°C -40°C ... +80°C	
Connection - drive - auxiliary switch	Cable 1 m, 3 x 0,75 mm ² Cable 1 m, 6 x 0,75 mm ² (BEE 24-ST) with plug connectors	Cable 1 m, 4 x 0,75 mm ² Cable 1 m, 6 x 0,75 mm ²	Cable 1 m, 3 x 0,75 mm ² Cable 1 m, 6 x 0,75 mm ²

* Only available for 24V and selected damper sizes

Actuator BELIMO BE 24-12(-ST)

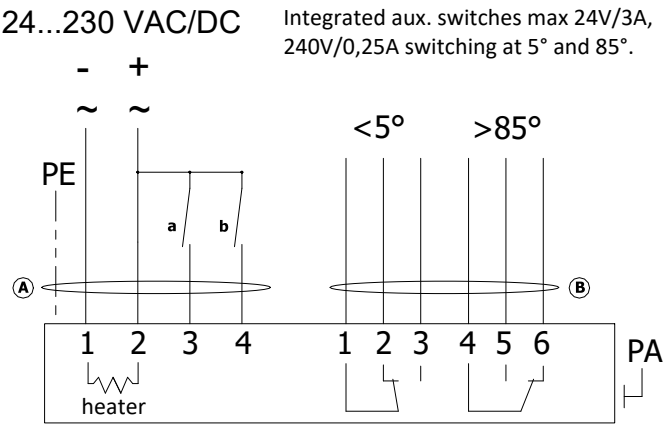


Actuator BELIMO BE 230-12



Actuator BELIMO BE 24-12(-ST), BE 230-12		
Actuator BELIMO - 40 Nm	BE 24-12(-ST)	BE 230-12
Power voltage	AC/DC 24 V 50/60Hz	AC 230 V 50/60Hz
Power consumption - in operation - in the end position	12 W 0,5 W	8 W 0,5 W
Dimensioning	18 VA (Imax 8,2 A @ 5 ms)	15 VA (Imax 7.9 A @ 5 ms)
Protection class	III	II
Degree of protection	IP 54	
Adjustment time for 95°	< 60 s	
Ambient temperature	-30°C ... +55°C	
Storage temperature	-40°C ... +80°C	
Connection - drive - auxiliary switch	Cable 1 m, 3 x 0,75 mm ² Cable 1 m, 6 x 0,75 mm ² (BE 24-ST) with plug connectors	

Actuator SCHISCHEK InMax 50.75-S

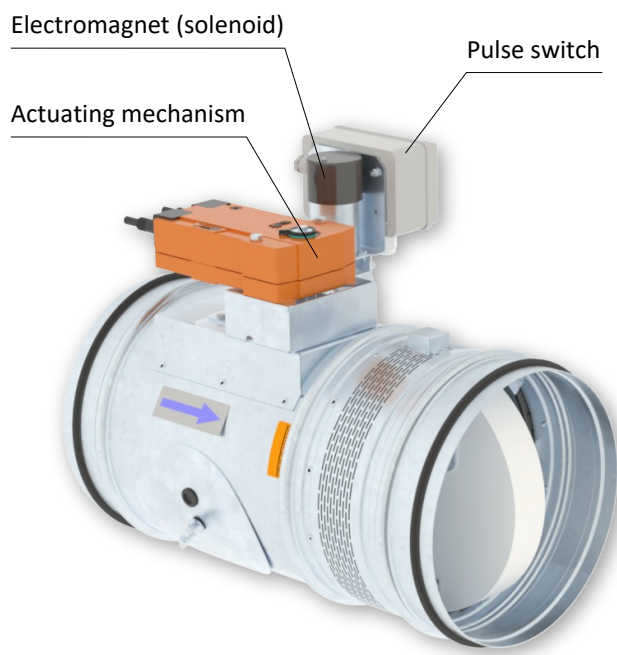
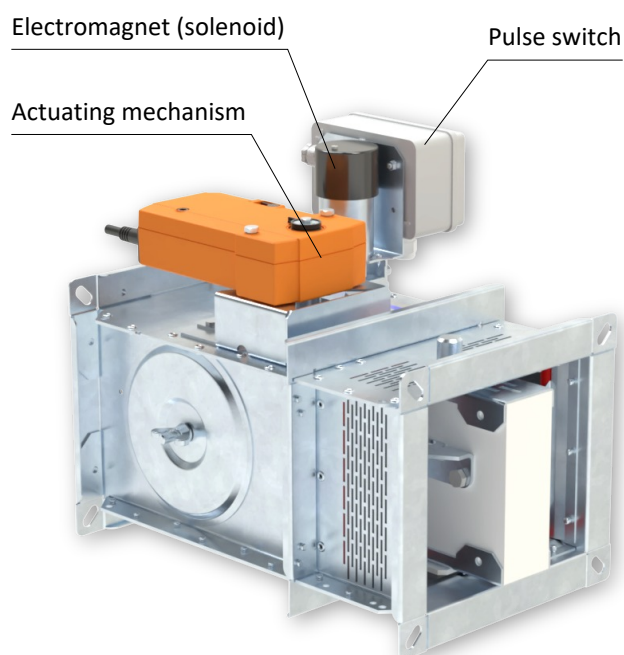


Actuator SCHISCHEK InMax 50.75-S	
Actuator SCHISCHEK	InMax 50.75-S
Power voltage	24-240 VAC/DC 50/60Hz
Power consumption - in operation - heating	10 W 16 W (start at -20°C)
Protection class	I
Degree of protection	IP 66
Adjustment time for 95°	< 60 s
Ambient temperature	-40°C ... +50°C
Storage temperature	-40°C ... +70°C
Connection	cable 1 m, 0,5 mm ²

Design with electric actuating mechanism with emergency function and electromagnet

Design .4M0, .4M1, .5M0 and .5M1

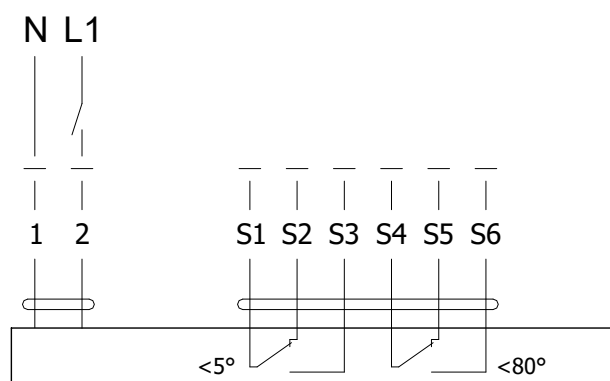
- MSD-W is always equipped by electric actuating mechanism BFN 230-T, BFN 24-T, DAF2.20S or DAF1.20S (further only "actuating mechanism") and is complemented with initiation by means of an electromagnet (solenoid).
- After being connected to power supply AC/DC 24V or 230V, the actuating mechanism displaces the damper blade into operation position "CLOSED" and at the same time it pre-stretches its back spring. When the actuating mechanism is under voltage, the damper blade is in the position "CLOSED" and the back spring is pre-stretched. Time needed for full closing of the flap blade from the position "OPEN" to the position "CLOSED" is maximum 60 sec. This position is secured by initial lever. If the actuating power supply is cut off damper is still in the position "CLOSED". After activation of electromagnet is released initiation lever and the back spring displaces the damper blade into the breakdown position "OPEN".
- The time of displacing the blade from the position "OPEN" to the position "CLOSED" takes maximum 16 sec. In case that the power supply is restored again (the blade can be in any position), the actuating mechanism starts to re-displace the damper blade into the position "CLOSED".
- By voltage AC 230 V is damper equipped by electromagnet EM230. By voltage AC/DC 24 V is damper equipped by electromagnet EM230 with pre-pulse switch SIEM24. SEIM24 activates the electromagnet after capacitor charge witch is placed inside of SIEM24. It takes about 10 sec.
- Charging time depends on the current supply. For reliable operation is necessary connect to electromagnet or pre-pulse switch appropriate supply for 2 sec (230 V) or 20 to 30 sec (24 V).



Design .4M0, .4M1, .5M0 and .5M1

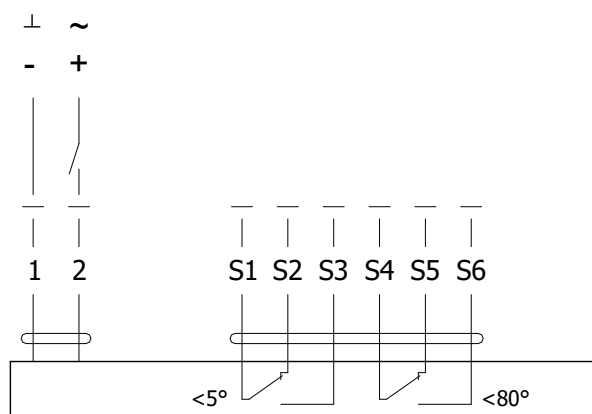
Actuator BELIMO BFN 230

AC230 V



Actuator BELIMO BFN 24

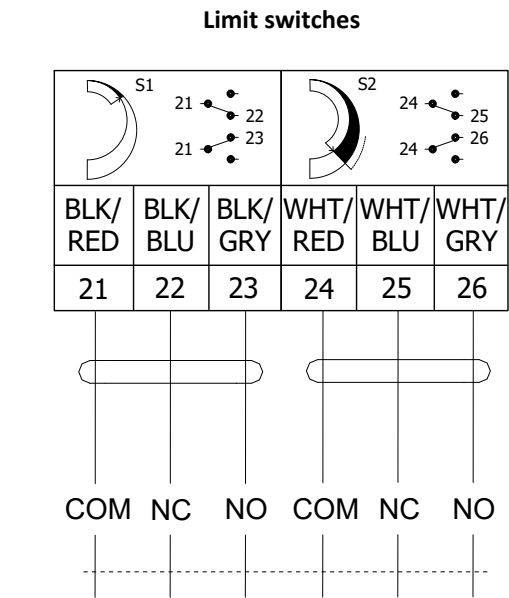
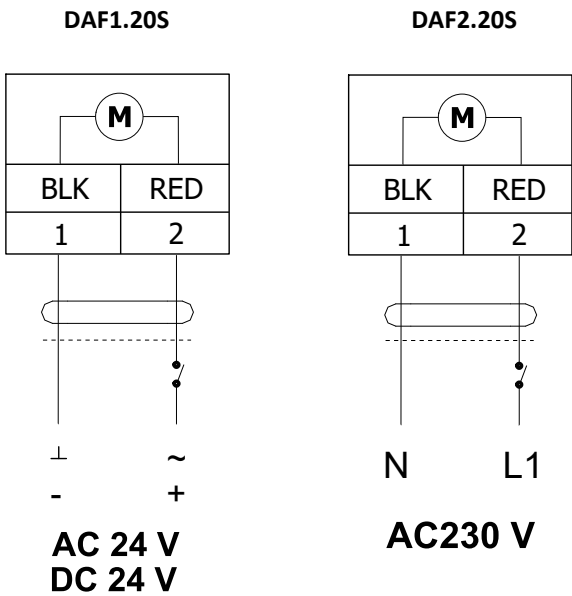
AC/DC 24



Actuator BELIMO BFN 230, BFN 24

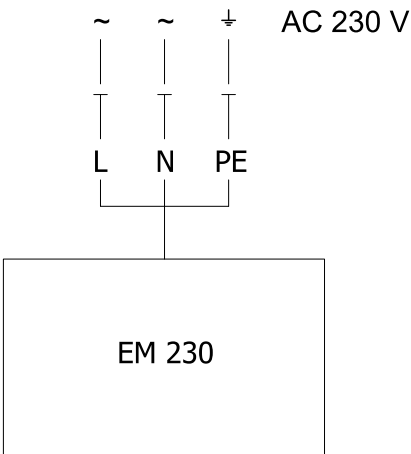
Actuator BELIMO - 9 Nm/ 7 Nm Spring	BFN 230	BFN 24
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	3,5 W 1,3 W	3,2 W 1,2 W
Dimensioning	6,5 VA (Imax 4 A @ 5 ms)	4,3 VA (Imax 2,9 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	< 60 s ~ 20 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	-30°C ... +55°C The safe position will be attained up to max. 75°C -40°C ... +55°C	
Connection - supply/control - auxiliary switch	cable 1 m, 2 x 0,75 mm ² (BFN 2xx-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm ² (BFN 2xx-T-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

Actuator Joventa DAF1.20S and DAF2.20S



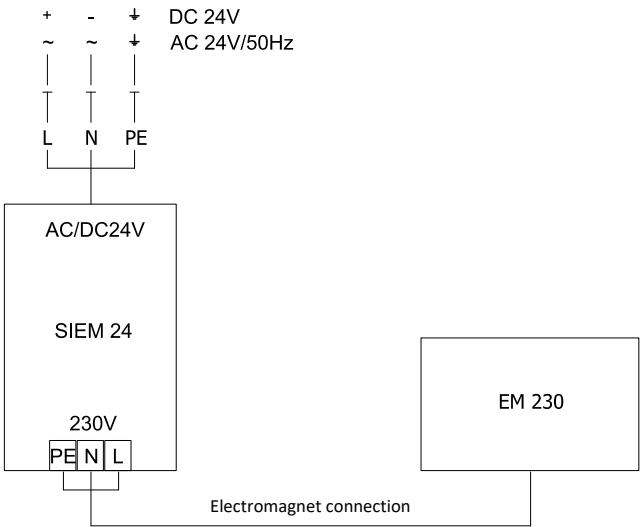
Actuator Joventa DAF1.20S and DAF2.20S		
Actuator Joventa	DAF1.20S	DAF2.20S
Power voltage	AC/DC 24 V 50/60Hz	AC 230 V 50/60Hz
Power consumption - in operation	26 VA (AC); 15,6 W (DC)	0,15 A
- in rest position	9,3 VA (AC); 2,6 W (DC)	0,09 A
Dimensioning	14 VA	14 VA
Protection class	II	II
Degree of protection	IP 54	
Running time - motor	24...57 s	
- spring return	11...15 s	
Ambient temperature - normal duty	-40°C ... +55°C	
- non-operating temperature	-65°C ... +85°C	
Connection - motor	cable 1,2 m halogen-free; 2-wires	
- auxiliary switch	cable 1,2 m halogen-free; 6-wires	

Electromagnet EM230



Electromagnet EM230	
Nominal voltage	AC 230 V 50 Hz
Dimensioning	1,2 A
Degree of protection	IP 40
Ambient temperature range	-10°C ... +40°C
Connecting	cable 1m, 3x0,75mm ²

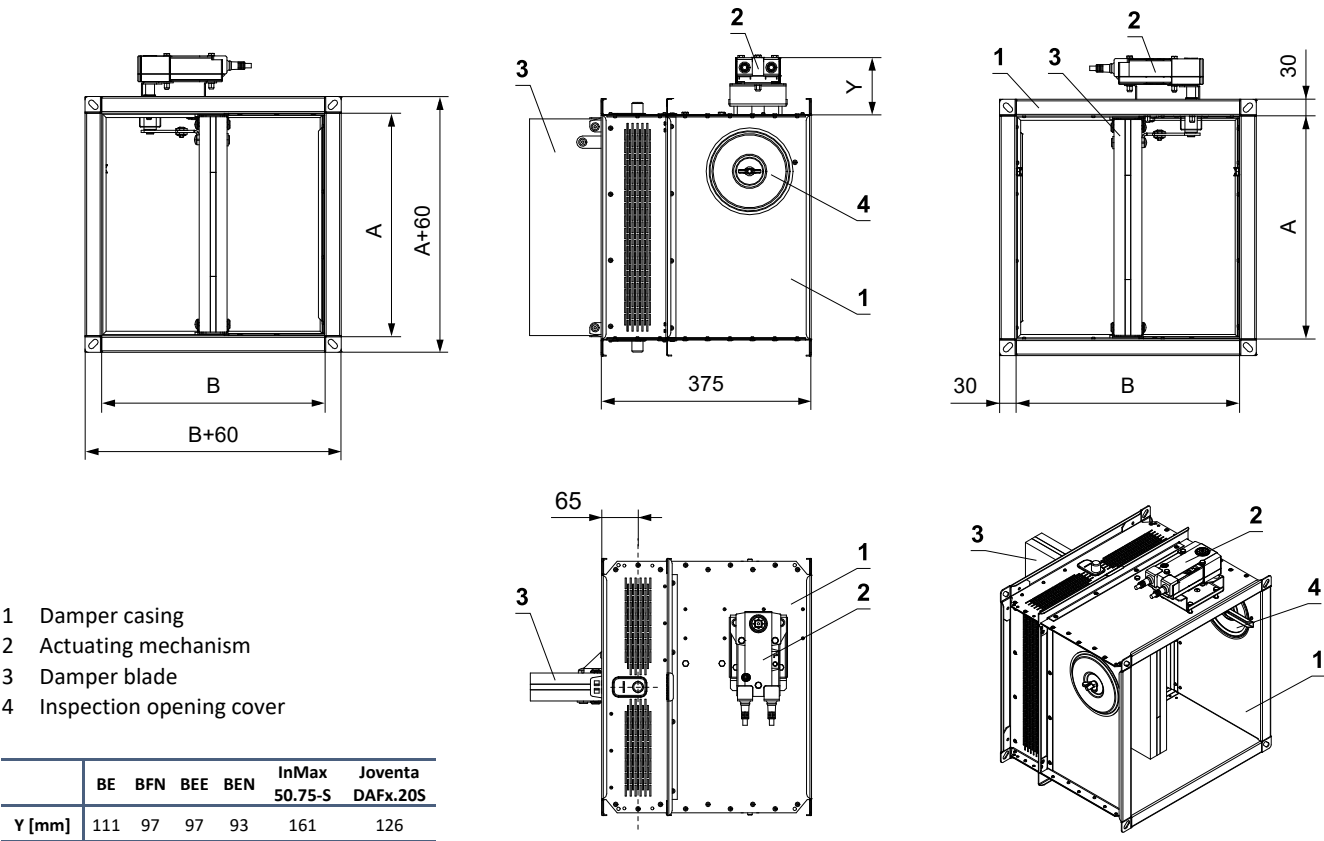
Electromagnet EM230 with impulse switch SIEM24



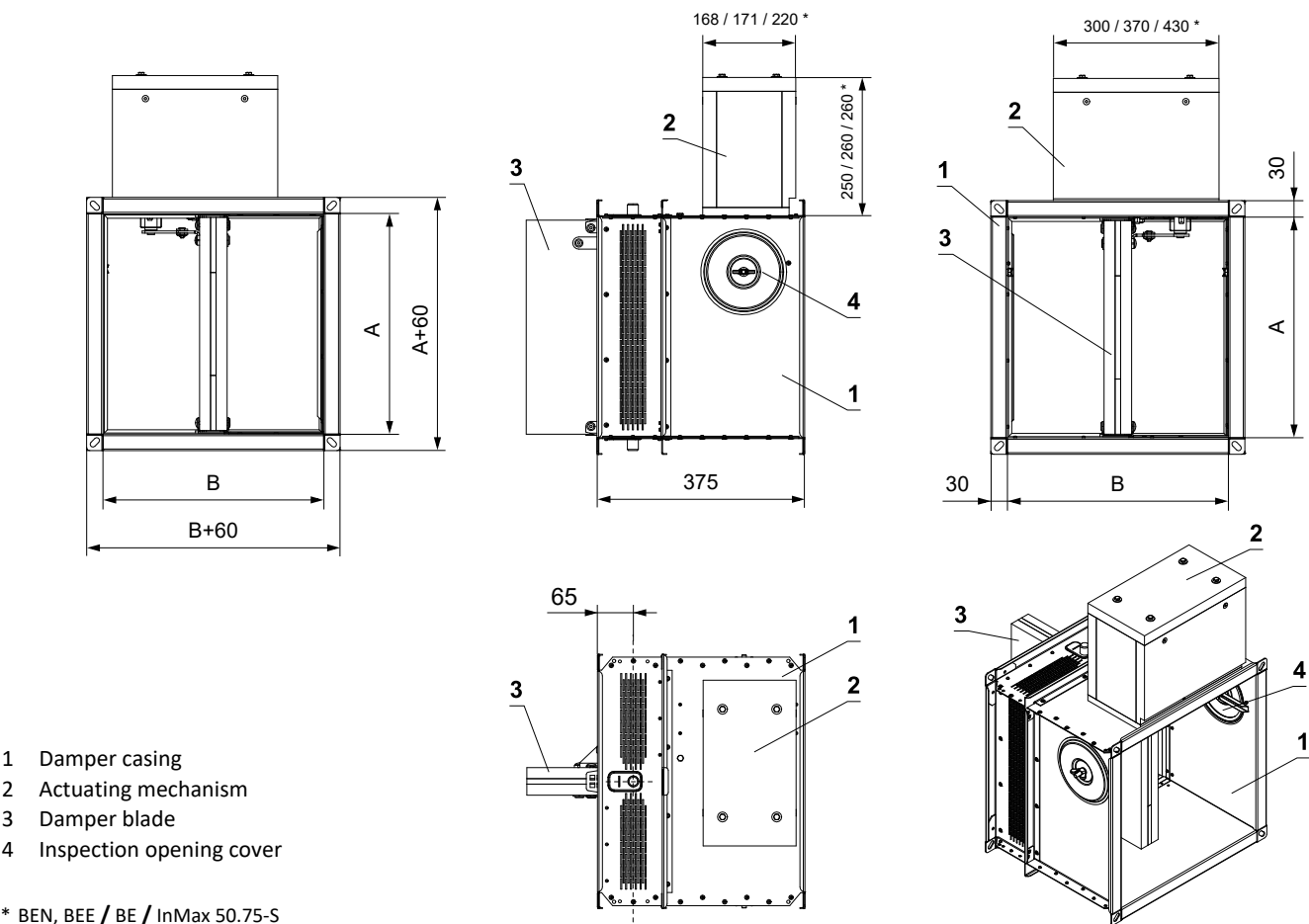
Electromagnet EM230 with impulse switch SIEM24	
Nominal voltage	AC/DC 24 V 50 Hz
Dimensioning	1 A
Degree of protection	IP 40
Ambient temperature range	-10°C ... +40°C
Switching frequency	max. 1x per minute
Connecting	cable 1m, 3x0,75mm ²

III. DIMENSIONS

Rectangular MSD (MSD-W) - design with actuating mechanism

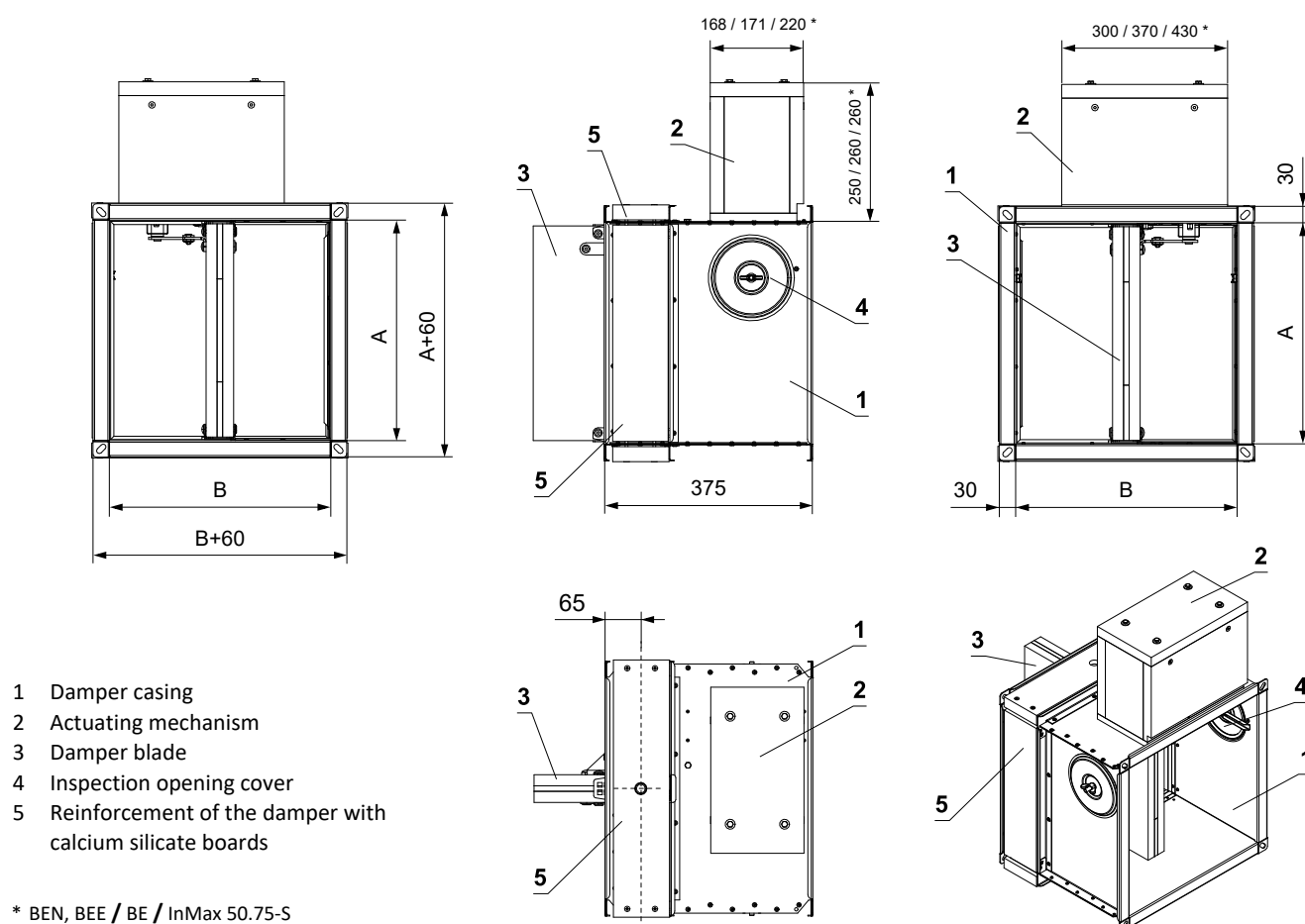


Rectangular MSD - design with actuating mechanism and insulation box

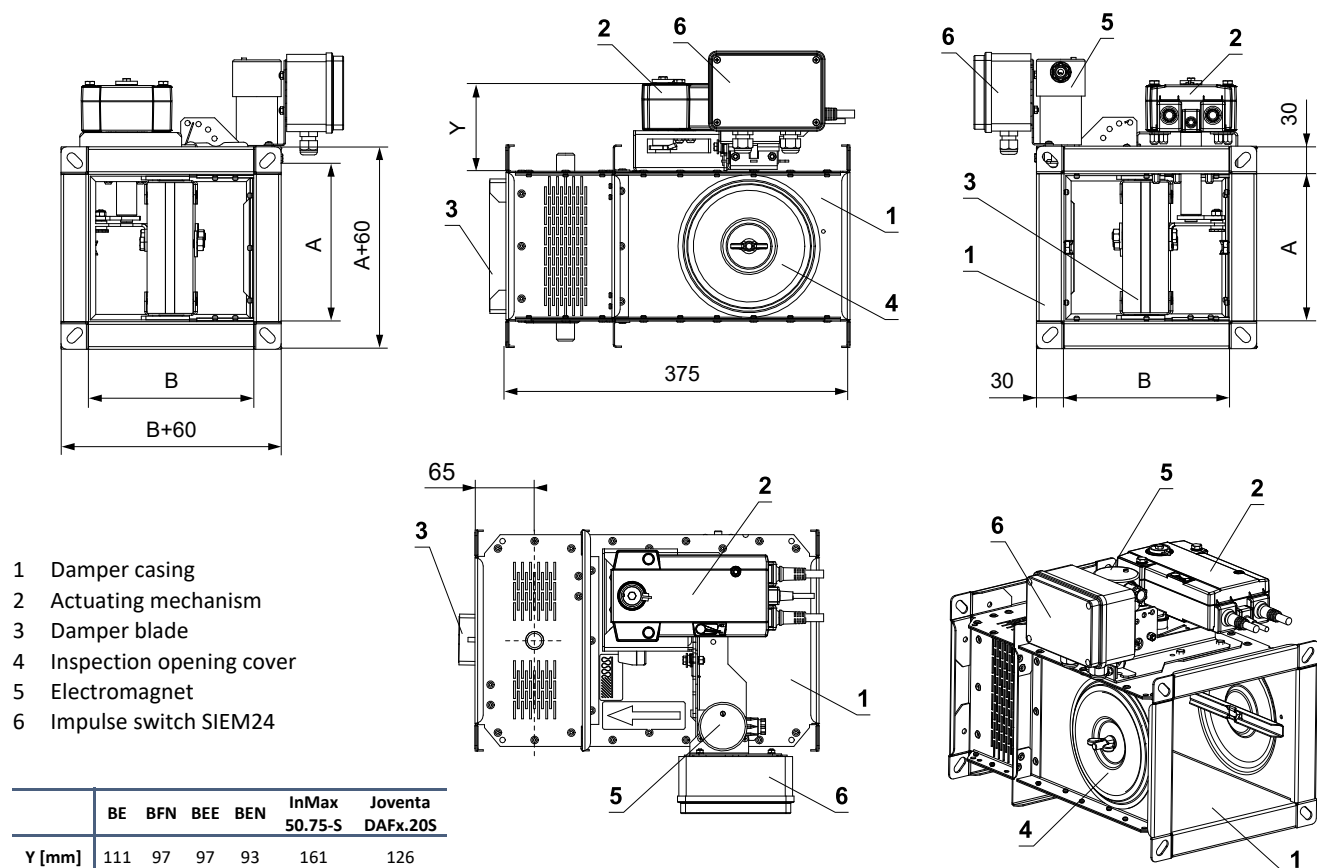


* BEN, BEE / BE / InMax 50.75-S

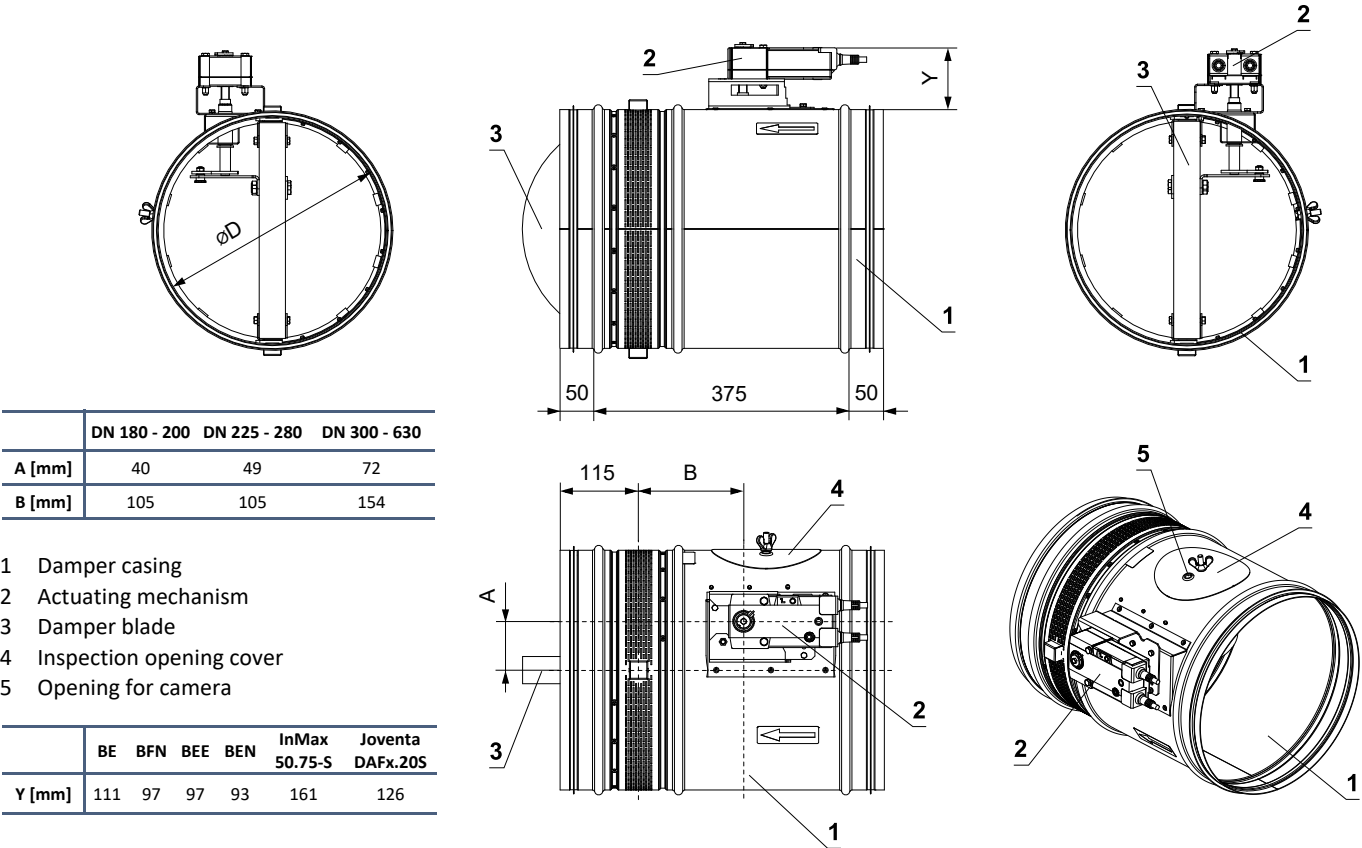
Rectangular MSD (MSD-W) - design with actuating mechanism, insulation box and lining panels



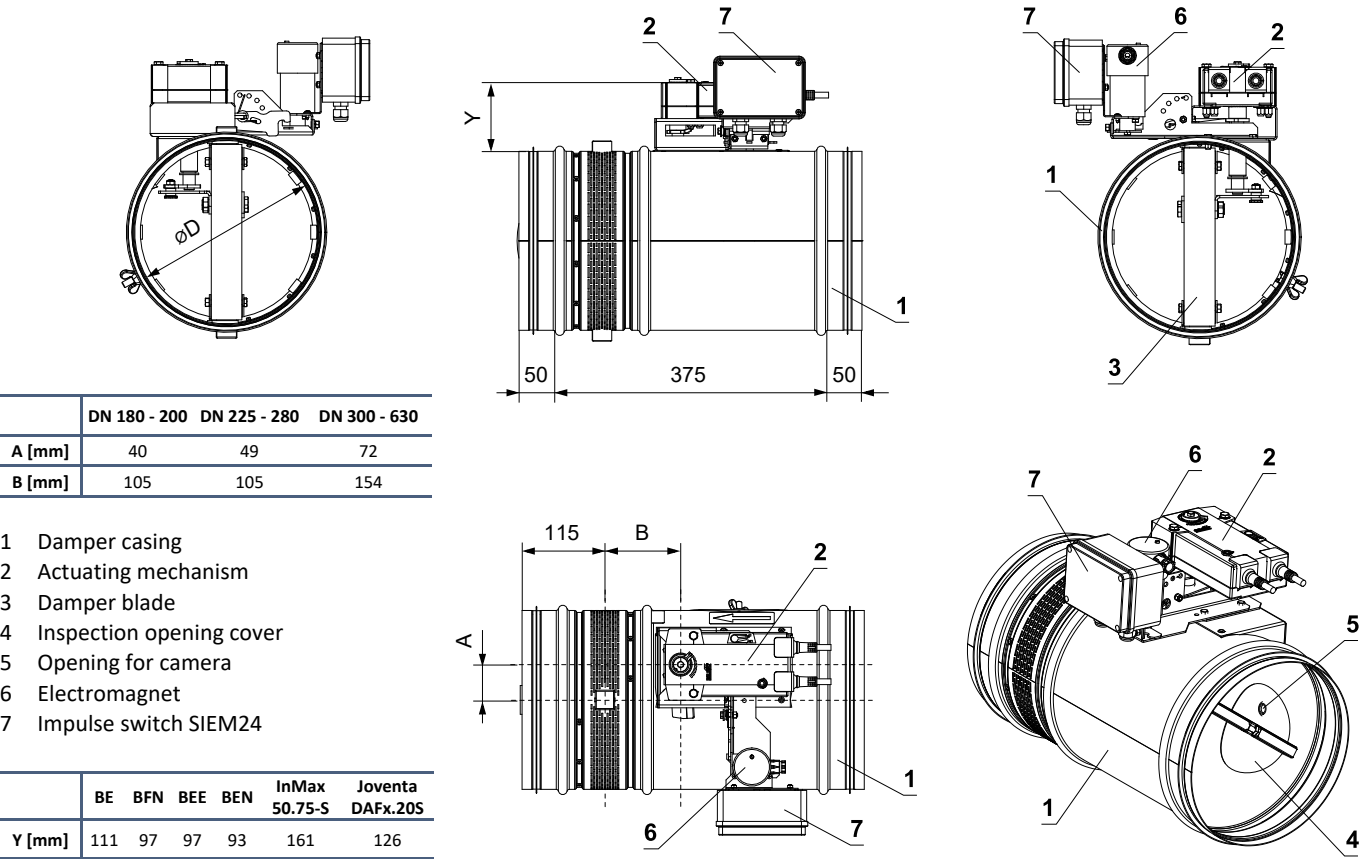
Rectangular MSD-W - design with actuating mechanism with emergency function and electromagnet



Circular MSD (MSD-W) - design with actuating mechanism

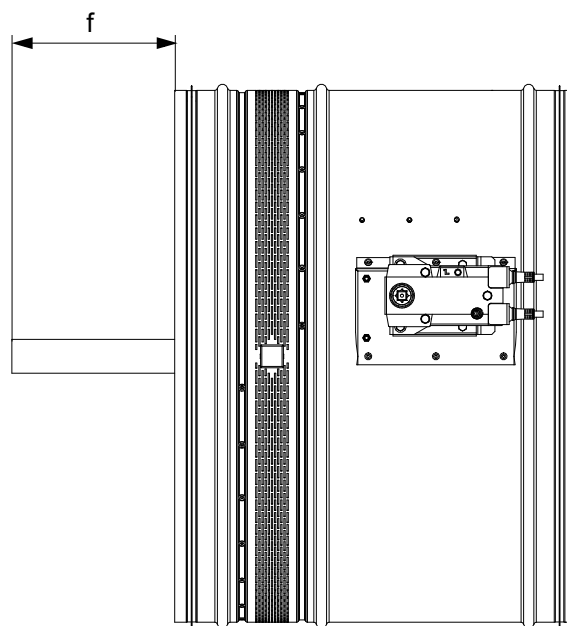
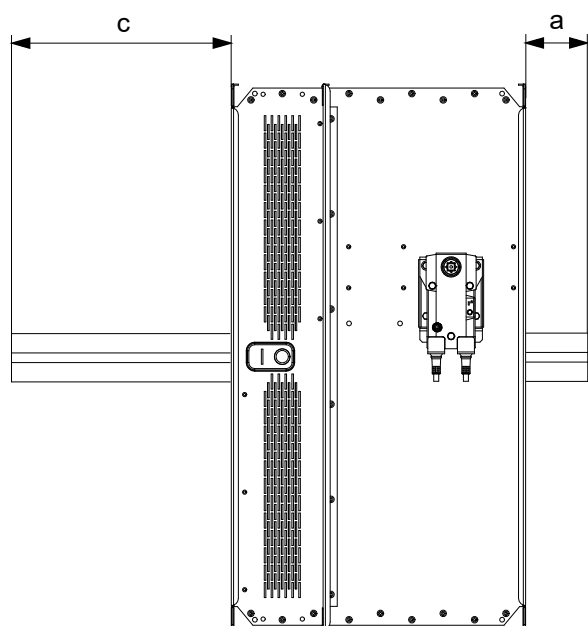


Circular MSD-W - design with actuating mechanism with emergency function and electromagnet



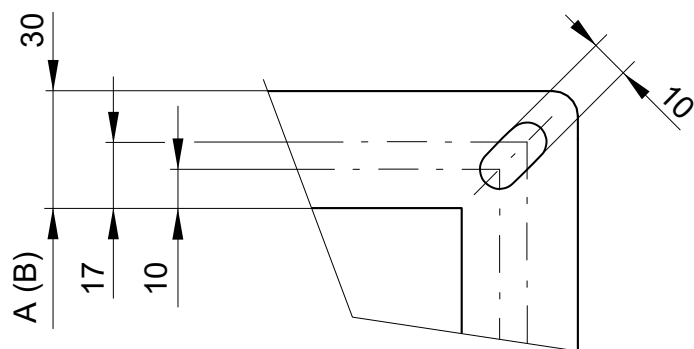
Damper blade overlaps

- Open damper blade overlaps the rectangular damper casing by the value "a" or "c". These values are specified in chapter Technical parameters → see pages 18 to 27
- Open damper blade overlaps the circular damper casing by the value "f". These values are specified in chapter Technical parameters → see page 28



Values "a" , "c" and "f" has to be respected when projecting following air-conditioning duct.

Flange of a damper



30 mm wide flanges are fitted with oval holes in the corners

Technical parameters

For rectangular dampers

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
160 x	180	–	19	0,0162	BELIMO BEN	11,4	BELIMO BFN	9,3	BELIMO BEN
	200	–	29	0,0191		11,8		9,8	
	225	–	41,5	0,0228		12,3		10,3	
	250	–	54	0,0264		12,9		10,8	
	280	–	69	0,0307		13,8		11,5	
	300	–	79	0,0336		14,3		12,1	
	315	–	86,5	0,0358		14,6		12,4	
	355	–	106,5	0,0416		15,4		13,3	
	400	–	129	0,0481		16,4		14,2	
	450	–	154	0,0554		17,4		15,3	
	500	–	179	0,0626		18,5	JOVENTA DAFx.20S	16,3	
	550	–	204	0,0699		19,5		17,4	
	560	–	209	0,0713		19,7		17,6	
	600	–	229	0,0771		20,6		18,4	
	630	–	244	0,0815		21,2		19	
	650	9	254	0,0844		21,6		19,5	
	700	34	279	0,0916		24,4		20,5	
	710	39	284	0,0931		24,6		20,7	
	750	59	304	0,0989		25,5		21,6	
	800	84	329	0,1061		26,5		22,6	
180 x	180	–	19	0,0185	BELIMO BEN	11,8	BELIMO BFN	9,7	BELIMO BEN
	200	–	29	0,0218		12,2		10,2	
	225	–	41,5	0,0259		12,8		10,7	
	250	–	54	0,0300		13,3		11,3	
	280	–	69	0,0350		14,3		11,9	
	300	–	79	0,0383		14,8		12,6	
	315	–	86,5	0,0408		15,1		13	
	355	–	106,5	0,0474		16		13,8	
	400	–	129	0,0548		17		14,8	
	450	–	154	0,0630		18,1		15,9	
	500	–	179	0,0713		19,2	JOVENTA DAFx.20S	17	
	550	–	204	0,0795		20,3		18,1	
	560	–	209	0,0812		20,5		18,3	
	600	–	229	0,0878		21,4		19,2	
	630	–	244	0,0927		22		19,9	
	650	9	254	0,0960		22,5		20,3	
	700	34	279	0,1043		25,3		21,4	
	710	39	284	0,1059		25,6		21,6	
	750	59	304	0,1125		26,4		22,5	
	800	84	329	0,1208		27,5		23,6	
200 x	180	–	19	0,0207	BELIMO BEN	12,2	BELIMO BFN	10,1	BELIMO BEN
	200	–	29	0,0244		12,6		10,6	
	225	–	41,5	0,0290		13,2		11,2	
	250	–	54	0,0337		13,8		11,7	
	280	–	69	0,0392		14,8		12,4	
	300	–	79	0,0429		15,3		13,1	
	315	–	86,5	0,0457		15,6		13,5	
	355	–	106,5	0,0531		16,5		14,4	
	400	–	129	0,0614		17,6		15,4	
	450	–	154	0,0707		18,7		16,6	
	500	–	179	0,0799		19,9		17,7	
	550	–	204	0,0892		21		18,9	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
200 x	560	–	209	0,0910	BELIMO BEN	21,2	BELIMO BFN	19,1	BELIMO BEN
	600	–	229	0,0984		22,2		20	
	630	–	244	0,1040		22,8		20,7	
	650	9	254	0,1077		23,3	JOVENTA DAFx.20S	21,1	
	700	34	279	0,1169		26,2		22,3	
	710	39	284	0,1188		26,4		22,5	
	750	59	304	0,1262		27,4		23,4	
	800	84	329	0,1354		28,5		24,6	
225 x	180	–	19	0,0235	BELIMO BEN	12,7	BELIMO BFN	10,6	BELIMO BEN
	200	–	29	0,0277		13,1		11,1	
	225	–	41,5	0,0330		13,7		11,7	
	250	–	54	0,0382		14,3		12,3	
	280	–	69	0,0445		15,4		13	
	300	–	79	0,0487		15,9		13,7	
	315	–	86,5	0,0519		16,3		14,1	
	355	–	106,5	0,0603		17,2		15,1	
	400	–	129	0,0697		18,3		16,1	
	450	–	154	0,0802		19,5	JOVENTA DAFx.20S	17,4	
	500	–	179	0,0907		20,7		18,6	
	550	–	204	0,1012		21,9		19,8	
	560	–	209	0,1033		22,2		20	
	600	–	229	0,1117		23,1		21	
	630	–	244	0,1180		25,6		21,7	
	650	9	254	0,1222		26,1		22,2	
	700	34	279	0,1327		27,3		23,4	
	710	39	284	0,1348		27,6		23,6	
	750	59	304	0,1432		28,5		24,6	
	800	84	329	0,1537		29,7		25,8	
250 x	180	–	19	0,0263	BELIMO BEN	13,1	BELIMO BFN	11,1	BELIMO BEN
	200	–	29	0,0310		13,6		11,6	
	225	–	41,5	0,0369		14,3		12,2	
	250	–	54	0,0428		14,9		12,8	
	280	–	69	0,0498		16		13,6	
	300	–	79	0,0545		16,5		14,4	
	315	–	86,5	0,0580		16,9		14,8	
	355	–	106,5	0,0674		17,9		15,8	
	400	–	129	0,0780		19,1		16,9	
	450	–	154	0,0898		20,3	JOVENTA DAFx.20S	18,2	
	500	–	179	0,1015		21,6		19,4	
	550	–	204	0,1133		22,9		20,7	
	560	–	209	0,1156		23,1		21	
	600	–	229	0,1250		25,9		22	
	630	–	244	0,1321		26,6		22,7	
	650	9	254	0,1368		27,1		23,2	
	700	34	279	0,1485		28,4		24,5	
	710	39	284	0,1509		28,7		24,8	
	750	59	304	0,1603		29,7		25,8	
	800	84	329	0,1720		30,9		27	
280 x	180	–	19	0,0297	BELIMO BEN	13,7	BELIMO BFN	11,7	BELIMO BEN
	200	–	29	0,0350		14,3		12,2	
	225	–	42	0,0416		14,9		12,9	
	250	–	54	0,0482		15,6		13,5	
	280	–	69	0,0562		16,7		14,3	
	300	–	79	0,0615		17,3		15,1	
	315	–	86,5	0,0655		17,7		15,5	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
280 x	355	–	106,5	0,0761	16,6	18,8	BELIMO BFN	16,6	BELIMO BEN
	400	–	129	0,0880	17,8	20		17,8	
	450	–	154	0,1012	19,2	21,3		19,1	
	500	–	179	0,1145	20,5	22,6		20,5	
	550	–	204	0,1277	21,8	24		21,8	
	560	–	209	0,1304	22,1	26	JOVENTA DAFx.20S	22,1	
	600	–	229	0,1410	23,2	27,1		23,1	
	630	–	244	0,1489	24	27,9		24	
	650	9	254	0,1542	24,5	28,4		24,5	
	700	34	279	0,1675	25,9	29,8		25,8	
	710	39	284	0,1701	26,1	30		26,1	
	750	59	304	0,1807	27,2	31,1		27,2	
	800	84	329	0,1940	28,5	32,4		28,5	
300 x	180	–	19	0,0319	12	14,1	BELIMO BFN	12,1	BELIMO BEN
	200	–	29	0,0376	12,5	14,7		12,6	
	225	–	41,5	0,0447	13,2	15,4		13,3	
	250	–	54	0,0519	13,9	16,1		14	
	280	–	69	0,0604	15,1	17,2		14,8	
	300	–	79	0,0661	15,6	17,7		15,6	
	315	–	86,5	0,0704	16	18,1		16	
	355	–	106,5	0,0818	17,1	19,2	JOVENTA DAFx.20S	17	
	400	–	129	0,0946	18,3	20,4		18,2	
	450	–	154	0,1089	19,6	21,8		19,6	
	500	–	179	0,1231	21	23,1		20,9	
	550	–	204	0,1374	22,3	26,2		22,3	
	560	–	209	0,1402	22,6	26,5		22,6	
	600	–	229	0,1516	23,7	27,5		23,6	
	630	–	244	0,1602	24,5	28,4		24,4	
	650	9	254	0,1659	25	28,9		25	
	700	34	279	0,1801	26,4	30,3		26,3	
	710	39	284	0,1830	26,6	30,5		26,6	
	750	59	304	0,1944	27,7	31,6		27,7	
	800	84	329	0,2086	29	32,9		29	
315 x	180	–	19	0,0336	12,2	14,4	BELIMO BFN	12,3	BELIMO BEN
	200	–	29	0,0396	12,8	15		12,9	
	225	–	41,5	0,0471	13,5	15,7		13,6	
	250	–	54	0,0546	14,2	16,4		14,3	
	280	–	69	0,0636	15,5	17,6		15,2	
	300	–	79	0,0696	15,9	18,1		15,9	
	315	–	86,5	0,0741	16,4	18,5		16,3	
	355	–	106,5	0,0861	17,5	19,6	JOVENTA DAFx.20S	17,4	
	400	–	129	0,0996	18,7	20,8		18,7	
	450	–	154	0,1146	20,1	22,2		20	
	500	–	179	0,1296	21,4	23,6		21,4	
	550	–	204	0,1446	22,8	26,7		22,8	
	560	–	209	0,1476	23,1	27		23,1	
	600	–	229	0,1596	24,2	28,1		24,2	
	630	–	244	0,1686	25	28,9		25	
	650	9	254	0,1746	25,6	29,5		25,5	
	700	34	279	0,1896	27	30,8		26,9	
	710	39	284	0,1926	27,2	31,1		27,2	
	750	59	304	0,2046	28,3	32,2		28,3	
	800	84	329	0,2196	29,7	33,6		29,7	
355 x	180	–	19	0,0381	13	15,2	BELIMO BFN	13,1	BELIMO BEN
	200	–	29	0,0449	13,6	15,8		13,7	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
355 x	225	–	41,5	0,0534	14,4	16,5	BELIMO BFN	14,5	BELIMO BEN
	250	–	54	0,0619	15,2	17,3		15,2	
	280	–	69	0,0721	16,4	18,6		16,2	
	300	–	79	0,0789	16,9	19,1		16,9	
	315	–	86,5	0,0840	17,4	19,5		17,3	
	355	–	106,5	0,0976	18,5	20,7		18,5	
	400	–	129	0,1129	19,8	22		19,8	
	450	–	154	0,1299	21,3	23,4		21,2	
	500	–	179	0,1469	22,7	26,6	JOVENTA DAFx.20S	22,7	
	550	–	204	0,1639	24,2	28,1		24,2	
	560	–	209	0,1673	24,5	28,4		24,4	
	600	–	229	0,1809	25,6	29,5		25,6	
	630	–	244	0,1911	26,5	30,4		26,5	
	650	9	254	0,1979	27,1	31		27,1	
	700	34	279	0,2149	28,5	32,4		28,5	
	710	39	284	0,2183	28,8	32,7		28,8	
	750	59	304	0,2319	30	33,9		30	
	800	84	329	0,2489	31,4	35,3		31,7	BELIMO BEE
400 x	180	–	19	0,0431	13,9	16	BELIMO BFN	14	BELIMO BEN
	200	–	29	0,0508	14,6	16,7		14,6	
	225	–	41,5	0,0604	15,4	17,5		15,5	
	250	–	54	0,0701	16,2	18,3		16,3	
	280	–	69	0,0816	17,5	19,6		17,2	
	300	–	79	0,0893	18	20,1		18	
	315	–	86,5	0,0951	18,5	20,6		18,5	
	355	–	106,5	0,1105	19,7	21,8		19,7	
	400	–	129	0,1278	21,1	23,2	JOVENTA DAFx.20S	21,1	
	450	–	154	0,1471	22,6	24,8		22,6	
	500	–	179	0,1663	24,2	28,1		24,1	
	550	–	204	0,1856	25,7	29,6		25,7	
	560	–	209	0,1894	26	29,9		26	
	600	–	229	0,2048	27,2	31,1		27,2	
	630	–	244	0,2164	28,2	32,1		28,1	
	650	9	254	0,2241	28,8	32,7		28,8	
	700	34	279	0,2433	30,3	34,2		30,3	
	710	39	284	0,2472	30,6	34,5		30,6	
	750	59	304	0,2626	31,9	35,8		31,8	
	800	84	329	0,2818	33,4	37,3		33,6	BELIMO BEE
450 x	180	–	19	0,0487	14,9	17	BELIMO BFN	15	BELIMO BEN
	200	–	29	0,0574	15,6	17,7		15,7	
	225	–	41,5	0,0683	16,4	18,6		16,5	
	250	–	54	0,0792	17,3	19,5		17,4	
	280	–	69	0,0922	18,7	20,9		18,5	
	300	–	79	0,1009	19,2	21,4		19,2	
	315	–	86,5	0,1074	19,7	21,9		19,7	
	355	–	106,5	0,1248	21	23,2		21	
	400	–	129	0,1444	22,5	24,6	JOVENTA DAFx.20S	22,5	
	450	–	154	0,1662	24,1	28		24,1	
	500	–	179	0,1879	25,8	29,7		25,7	
	550	–	204	0,2097	27,4	31,3		27,4	
	560	–	209	0,2140	27,7	31,6		27,7	
	600	–	229	0,2314	29	32,9		29	
	630	–	244	0,2445	30	33,9		30	
	650	9	254	0,2532	30,7	34,5		30,6	
	700	34	279	0,2749	32,3	36,2		32,3	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
450 x	710	39	284	0,2793	BELIMO BEN	32,6	JOVENTA DAFx.20S	32,6	BELIMO BEN
	750	59	304	0,2967		33,9		33,9	
	800	84	329	0,3184		35,6		35,8	
500 x	180	–	19	0,0543	BELIMO BEN	15,8	BELIMO BFN	15,9	BELIMO BEN
	200	–	29	0,0640		16,6		16,7	
	225	–	41,5	0,0761		17,5		17,6	
	250	–	54	0,0883		18,4		18,5	
	280	–	69	0,1028		19,9		19,7	
	300	–	79	0,1125		20,4		20,4	
	315	–	86,5	0,1198		21		20,9	
	355	–	106,5	0,1392		22,4		22,3	
	400	–	129	0,1610		23,9		23,9	
	450	–	154	0,1853		25,6		25,6	
	500	–	179	0,2095		27,4		27,3	
	550	–	204	0,2338		29,1		29,1	
	560	–	209	0,2386		29,4		29,4	
	600	–	229	0,2580		30,8		30,8	
	630	–	244	0,2726		31,9		31,8	
	650	9	254	0,2823		32,5	JOVENTA DAFx.20S	32,5	
	700	34	279	0,3065		34,3		34,3	
	710	39	284	0,3114		34,6		34,6	
	750	59	304	0,3308		36		36	
	800	84	329	0,3550		37,7		38	BELIMO BEE
550 x	180	–	19	0,0599	BELIMO BEN	16,8	BELIMO BFN	16,9	BELIMO BEN
	200	–	29	0,0706		17,6		17,7	
	225	–	41,5	0,0840		18,6		18,7	
	250	–	54	0,0974		19,6		19,7	
	280	–	69	0,1134		21,1		20,9	
	300	–	79	0,1241		21,7		21,6	
	315	–	86,5	0,1321		22,2		22,2	
	355	–	106,5	0,1535		23,7		23,6	
	400	–	129	0,1776		25,3		25,3	
	450	–	154	0,2044		27,1		27,1	
	500	–	179	0,2311		29		28,9	
	550	–	204	0,2579		30,8		30,8	
	560	–	209	0,2632		31,1		31,1	
	600	–	229	0,2846		32,6	JOVENTA DAFx.20S	32,6	
	630	–	244	0,3007		33,7		33,7	
	650	9	254	0,3114		34,4		34,4	
	700	34	279	0,3381		36,3		36,2	
	710	39	284	0,3435		36,6		36,6	
	750	59	304	0,3649		38,1		38,3	
	800	84	329	0,3916		39,9		40,1	BELIMO BEE
560 x	180	–	19	0,0610	BELIMO BEN	17	BELIMO BFN	17,1	BELIMO BEN
	200	–	29	0,0719		17,8		17,9	
	225	–	42	0,0856		18,8		18,9	
	250	–	54	0,0992		19,8		19,9	
	280	–	69	0,1155		21,4		21,1	
	300	–	79	0,1264		21,9		21,9	
	315	–	87	0,1346		22,5		22,4	
	355	–	106,5	0,1564		23,9		23,9	
	400	–	129	0,1809		25,6		25,6	
	450	–	154	0,2082		27,4	JOVENTA DAFx.20S	27,4	
	500	–	179	0,2354		29,3		29,2	
	550	–	204	0,2627		31,1		31,1	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
560 x	560	–	209	0,2681	BELIMO BEN	35,4	JOVENTA DAFx.20S	31,5	BELIMO BEN
	600	–	229	0,2899		36,8		32,9	
	630	–	244	0,3063		38		34	
	650	9	254	0,3172		38,7		34,8	
	700	34	279	0,3444		40,6		36,6	
	710	39	284	0,3499		40,9		37	
	750	59	304	0,3717		42,4		38,7	
	800	84	329	0,3989		44,2		40,6	
600 x	180	–	19	0,0655	BELIMO BEN	19,9	BELIMO BFN JOVENTA DAFx.20S	17,8	BELIMO BEN
	200	–	29	0,0772		20,8		18,7	
	225	–	41,5	0,0918		21,8		19,7	
	250	–	54	0,1065		22,9		20,8	
	280	–	69	0,1240		24,5		22,1	
	300	–	79	0,1357		25		22,8	
	315	–	86,5	0,1445		25,6		23,4	
	355	–	106,5	0,1679		27,1		25	
	400	–	129	0,1942		30,6		26,7	
	450	–	154	0,2235		32,5		28,6	
	500	–	179	0,2527		34,4		30,5	
	550	–	204	0,2820		36,4		32,4	
	560	–	209	0,2878		36,7		32,8	
	600	–	229	0,3112		38,3		34,4	
	630	–	244	0,3288		39,4		35,5	
	650	9	254	0,3405		40,2		36,3	
	700	34	279	0,3697		42,1		38,2	
	710	39	284	0,3756		42,5		38,8	
	750	59	304	0,3990		44,1		40,4	
	800	84	329	0,4282		46		42,3	
	180	–	19	0,0689		20,5		18,4	
	200	–	29	0,0812		21,4		19,3	
	225	–	41,5	0,0966		22,4		20,4	
	250	–	54	0,1119		23,5		21,5	
630 x	280	–	69	0,1304		25,2		22,8	
	300	–	79	0,1427		25,7		23,6	
	315	–	86,5	0,1519		26,3		24,2	
	355	–	106,5	0,1765		27,9		25,8	
	400	–	129	0,2042		31,4		27,5	
	450	–	154	0,2349		33,4		29,5	
	500	–	179	0,2657		35,4		31,5	
	550	–	204	0,2964		37,4		33,5	
	560	–	209	0,3026		37,8		33,9	
	600	–	229	0,3272		39,4		35,4	
	630	–	244	0,3456		40,5		36,6	
	650	9	254	0,3579		41,3		37,4	
	700	34	279	0,3887		43,3		39,4	
	710	39	284	0,3948		43,7		40	
	750	59	304	0,4194		45,3		41,6	
	800	84	329	0,4502		47,3		45,4	
	180	–	19	0,0711		20,9		18,8	
	200	–	29	0,0838		21,8		19,7	
	225	–	41,5	0,0997		22,9		20,8	
	250	–	54	0,1156		24		21,9	
	280	–	69	0,1346		25,7		23,3	
	300	–	79	0,1473		26,2		24	
	315	–	86,5	0,1568		26,8		24,7	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
650 x	355	–	106,5	0,1822	26,3	28,4	BELIMO BFN	26,3	
	400	–	129	0,2108	28,1	32		28,1	
	450	–	154	0,2426	30,1	34		30,1	
	500	–	179	0,2743	32,1	36		32,1	
	550	–	204	0,3061	34,2	38,1		34,1	BELIMO BEN
	560	–	209	0,3124	34,6	38,5		34,5	
	600	–	229	0,3378	36,2	40,1	JOVENTA	36,2	
	630	–	244	0,3569	37,4	41,3	DAFx.20S	37,4	
	650	9	254	0,3696	38,2	42,1		38,2	
	700	34	279	0,4013	40,2	44,1		40,4	
	710	39	284	0,4077	40,6	44,5		40,8	BELIMO BEE
	750	59	304	0,4331	42,2	46,1		42,5	
	800	84	329	0,4648	44,3	48,1		46,3	BELIMO BE
700 x	180	–	19	0,0767	19,7	21,8		19,8	
	200	–	29	0,0904	20,6	22,8		20,7	
	225	–	41,5	0,1075	21,8	23,9		21,9	
	250	–	54	0,1247	23	25,1	BELIMO BFN	23,1	
	280	–	69	0,1452	24,7	26,9		24,5	
	300	–	79	0,1589	25,3	27,4		25,3	
	315	–	86,5	0,1692	25,9	28,1		25,9	
	355	–	106,5	0,1966	27,6	31,5		27,6	BELIMO BEN
	400	–	129	0,2274	29,5	33,4		29,5	
	450	–	154	0,2617	31,6	35,5		31,6	
	500	–	179	0,2959	33,7	37,6		33,7	
	550	–	204	0,3302	35,9	39,7		35,8	
	560	–	209	0,3370	36,3	40,2		36,3	
	600	–	229	0,3644	38	41,9	JOVENTA	37,9	
	630	–	244	0,3850	39,2	43,1	DAFx.20S	39,2	
	650	9	254	0,3987	40,1	44		40,3	
	700	34	279	0,4329	42,2	46,1		42,4	
	710	39	284	0,4398	42,6	46,5		42,8	BELIMO BEE
	750	59	304	0,4672	44,3	48,2		44,5	
	800	84	329	0,5014	46,4	50,3		48,5	BELIMO BE
710 x	180	–	19	0,0778	19,9	22		20	
	200	–	29	0,0917	20,8	23		20,9	
	225	–	41,5	0,1091	22	24,2		22,1	
	250	–	54	0,1265	23,2	25,3	BELIMO BFN	23,3	
	280	–	69	0,1473	25	27,1		24,7	
	300	–	79	0,1612	25,5	27,7		25,5	
	315	–	86,5	0,1717	26,2	28,3		26,2	
	355	–	106,5	0,1995	27,9	31,8		27,9	BELIMO BEN
	400	–	129	0,2307	29,8	33,7		29,8	
	450	–	154	0,2655	31,9	35,8		31,9	
	500	–	179	0,3002	34,1	38		34	
	550	–	204	0,3350	36,2	40,1		36,2	
	560	–	209	0,3419	36,6	40,5		36,6	
	600	–	229	0,3697	38,3	42,2	JOVENTA	38,3	
	630	–	244	0,3906	39,6	43,5	DAFx.20S	39,6	
	650	9	254	0,4045	40,5	44,4		40,7	
	700	34	279	0,4392	42,6	46,5		42,8	BELIMO BEE
	710	39	284	0,4462	43	46,9		43,2	
	750	59	304	0,4740	44,7	48,6		46,8	
	800	84	329	0,5087	46,9	50,8		48,9	BELIMO BE
	180	–	19	0,0823	20,7	22,8		20,8	
	200	–	29	0,0970	21,7	23,8	BELIMO BFN	21,7	BELIMO BEN
750 x									

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
750 x	225	–	41,5	0,1154	22,9	25	BELIMO BFN	23	BELIMO BEN
	250	–	54	0,1338	24,1	26,3		24,2	
	280	–	69	0,1558	26	28,1		25,7	
	300	–	79	0,1705	26,5	28,6		26,5	
	315	–	86,5	0,1815	27,2	29,3		27,2	
	355	–	106,5	0,2109	29	32,8		28,9	
	400	–	129	0,2440	30,9	34,8	JOVENTA DAFx.20S	30,9	BELIMO BEN
	450	–	154	0,2808	33,1	37		33,1	
	500	–	179	0,3175	35,4	39,2		35,3	
	550	–	204	0,3543	37,6	41,5		37,5	
	560	–	209	0,3616	38	41,9		38	
	600	–	229	0,3910	39,8	43,7		39,7	
	630	–	244	0,4131	41,1	45		41,1	BELIMO BEE
	650	9	254	0,4278	42	45,9		42,2	
	700	34	279	0,4645	44,2	48,1		44,4	
	710	39	284	0,4719	44,6	48,5	BELIMO BE	44,9	BELIMO BE
	750	59	304	0,5013	46,4	50,3		48,4	
	800	84	329	0,5380	48,6	52,5		50,6	
800 x	180	–	19	0,0879	21,6	23,8	BELIMO BFN	21,7	BELIMO BEN
	200	–	29	0,1036	22,7	24,8		22,8	
	225	–	41,5	0,1232	23,9	26,1		24	
	250	–	54	0,1429	25,2	27,4		25,3	
	280	–	69	0,1664	27,2	29,3		26,9	
	300	–	79	0,1821	27,8	29,9		27,8	
	315	–	86,5	0,1939	28,5	30,6	JOVENTA DAFx.20S	28,5	BELIMO BEN
	355	–	106,5	0,2253	30,4	34,3		30,4	
	400	–	129	0,2606	32,5	36,4		32,5	
	450	–	154	0,2999	34,9	38,7		34,8	
	500	–	179	0,3391	37,2	41,1		37,2	
	550	–	204	0,3784	39,6	43,5		39,5	
	560	–	209	0,3862	40	43,9		40	BELIMO BEE
	600	–	229	0,4176	41,9	45,8		41,9	
	630	–	244	0,4412	43,3	47,2		43,6	
	650	9	254	0,4569	44,3	48,2	BELIMO BE	44,5	BELIMO BE
	700	34	279	0,4961	46,6	50,5		46,9	
	710	39	284	0,5040	47,1	51		49,1	
	750	59	304	0,5354	49	52,9	BELIMO BEN	51	BELIMO BE
	800	84	329	0,5746	51,3	55,2		53,4	
900 x	180	–	19	0,0991	23,6	25,7	BELIMO BFN	23,7	BELIMO BEN
	200	–	29	0,1168	24,7	26,8		24,8	
	225	–	42	0,1389	26,1	28,3		26,2	
	250	–	54	0,1611	27,5	29,7		27,6	
	280	–	69	0,1876	29,6	31,7		29,3	
	300	–	79	0,2053	30,2	32,4		30,2	
	315	–	86,5	0,2186	31	34,9	JOVENTA DAFx.20S	31	BELIMO BEN
	355	–	106,5	0,2540	33	36,9		33	
	400	–	129	0,2938	35,3	39,2		35,3	
	450	–	154	0,3381	37,9	41,8		37,8	
	500	–	179	0,3823	40,4	44,3		40,4	
	550	–	204	0,4266	43	46,9		42,9	
	560	–	209	0,4354	43,5	47,4	BELIMO BEE	43,7	BELIMO BEE
	600	–	229	0,4708	45,5	49,4		45,7	
	630	–	244	0,4974	47	50,9		47,3	
	650	9	254	0,5151	48,1	51,9		48,3	
	700	34	279	0,5593	50,6	54,5		52,6	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
900 x	710	39	284	0,5682	51,1	55	JOVENTA DAFx.20S	53,1	BELIMO BE
	750	59	304	0,6036		57		55,2	
	800	84	329	0,6478		59,6		57,7	
1000 x	180	–	19	0,1103	25,5	27,6	BELIMO BFN	25,6	BELIMO BEN
	200	–	29	0,1300		28,9		26,8	
	225	–	42	0,1546		30,4		28,3	
	250	–	54	0,1793		31,9		29,9	
	280	–	69	0,2088		34,1		31,7	
	300	–	79	0,2285		36,5		32,6	
	315	–	86,5	0,2433		37,4		33,5	
	355	–	106,5	0,2827		39,6		35,7	
	400	–	129	0,3270		42		38,1	
	450	–	154	0,3763		44,8		40,8	
	500	–	179	0,4255		47,5		43,6	
	550	–	204	0,4748		50,2	JOVENTA DAFx.20S	46,6	
	560	–	209	0,4846		50,8		47,1	BELIMO BEE
	600	–	229	0,5240		53		49,3	
	630	–	244	0,5536		54,6	BELIMO BE	51	BELIMO BE
	650	9	254	0,5733		55,7		53,9	
	700	34	279	0,6225		58,5		56,6	
	710	39	284	0,6324		59	BELIMO BE	57,1	BELIMO BE
	750	59	304	0,6718		61,2		59,3	
	800	84	329	0,7210		63,9		62,1	
1100 x	180	–	19	0,1215	27,4	29,6	BELIMO BFN	27,5	BELIMO BEN
	200	–	29	0,1432		30,9		28,9	
	225	–	41,5	0,1703		32,6		30,5	
	250	–	54	0,1975		34,2		32,2	
	280	–	69	0,2300		36,5		34,1	
	300	–	79	0,2517		39		35,1	
	315	–	86,5	0,2680		39,9		36	
	355	–	106,5	0,3114		42,2		38,3	
	400	–	129	0,3602		44,8		40,9	
	450	–	154	0,4145		47,8		43,9	
	500	–	179	0,4687		50,7	JOVENTA DAFx.20S	47	BELIMO BEE
	550	–	204	0,5230		53,6		50	
	560	–	209	0,5338		54,2		50,5	
	600	–	229	0,5772		56,6	BELIMO BE	52,9	BELIMO BE
	630	–	244	0,6098		58,3		56,5	
	650	9	254	0,6315		59,5		57,6	
	700	34	279	0,6857		62,4	BELIMO BE	60,6	BELIMO BE
	710	39	284	0,6966		63		61,2	
	750	59	304	0,7400		65,4		63,5	
	800	84	329	0,7942		68,3	BELIMO BFN	66,4	BELIMO BEN
	180	–	19	0,1383		32,5		30,4	
	200	–	29	0,1630		34		31,9	
1250 x	225	–	41,5	0,1939	33,6	35,8	BELIMO BFN	33,7	BELIMO BEN
	250	–	54	0,2248		37,6		35,6	
	280	–	69	0,2618		41,9		37,8	
	300	–	79	0,2865		42,6	JOVENTA DAFx.20S	38,7	BELIMO BEN
	315	–	87	0,3050		43,6		39,7	
	355	–	106,5	0,3544		46,2		42,3	
	400	–	129	0,4100		49,1	BELIMO BEE	45,1	BELIMO BEE
	450	–	154	0,4718		52,3		48,4	
	500	–	179	0,5335		55,5		51,8	
	550	–	204	0,5953		58,7		55	

A x B [mm]	Damper blade overlaps		Free area S _f [m ²]	MSD-W		MSD-W with electromagnet		MSD	
	a [mm]	c [mm]		Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
1250 x	560	–	209	0,6076	BELIMO BEN	59,4	JOVENTA DAFx.20S	55,7	BELIMO BE
	600	–	229	0,6570		61,9		60,1	
	630	–	244	0,6941		63,9		62	
	650	9	254	0,7188		65,1		63,3	
	700	34	279	0,7805		68,4		66,5	
	710	39	284	0,7929		69		67,2	
	750	59	304	0,8423		71,6		69,7	
	800	84	329	0,9040		74,8		72,9	
1400 x	180	–	19	0,1551	BELIMO BEN	35,4	BELIMO BFN	33,3	BELIMO BEN
	200	–	29	0,1828		37		34,9	
	225	–	41,5	0,2174		39		36,9	
	250	–	54	0,2521		42,6		39	
	280	–	69	0,2936		45,5	JOVENTA DAF2.20S	41,4	
	300	–	79	0,3213		46,3		42,3	
	315	–	86,5	0,3421		47,3		43,4	
	355	–	106,5	0,3975		50,1		46,2	
	400	–	129	0,4598		53,3		49,4	
	450	–	154	0,5291		56,8		53,1	
	500	–	179	0,5983		60,3		56,6	
	550	–	204	0,6676		63,8		61,9	
	560	–	209	0,6814		64,5		62,6	
	600	–	229	0,7368		67,3		65,4	
	630	–	244	0,7784		69,4		67,5	
	650	9	254	0,8061		70,8		68,9	
	700	34	279	0,8753		74,3		72,5	
	710	39	284	0,8892		75		73,2	
	750	59	304	0,9446		77,8		76	
	800	84	329	1,0138		81,3		87	SCHISCHEK InMax 50.75
1500 x	180	–	19	0,1663	BELIMO BEN	37,3	BELIMO BFN	35,3	BELIMO BEN
	200	–	29	0,1960		39		37	
	225	–	42	0,2331		41,2		39,1	
	250	–	54	0,2703		44,9		41,2	
	280	–	69	0,3148		48	JOVENTA DAFx.20S	43,8	
	300	–	79	0,3445		48,7		44,8	
	315	–	86,5	0,3668		49,8		45,9	
	355	–	106,5	0,4262		52,8		48,9	
	400	–	129	0,4930		56,1		52,2	
	450	–	154	0,5673		59,8		56,1	
	500	–	179	0,6415		63,5		59,8	
	550	–	204	0,7158		67,2		65,3	
	560	–	209	0,7306		67,9		66,1	
	600	–	229	0,7900		70,9		69	
	630	–	244	0,8346		73,1		71,3	
	650	9	254	0,8643		74,6		72,7	
	700	34	279	0,9385		78,3		76,4	
	710	39	284	0,9534		79		77,2	
	750	59	304	1,0128		82		80,1	
	800	84	329	1,0870		85,7	JOVENTA DAF2.20S	91,3	SCHISCHEK InMax 50.75

For circular dampers

Nominal size ØD [mm]	Damper blade overlaps f [mm]	Free area Sf [m²]	MSD-W with electromagnet		MSD	
			Weight [kg]	Actuating mechanism	Weight [kg]	Actuating mechanism
180	–	0,0160	11,3	BELIMO BFN	5,9	BELIMO BEN
200	–	0,0208	11,7		6,4	
225	–	0,0277	12,2		7	
250	2,5	0,0356	12,9		7,7	
280	17,5	0,0463	13,6		8,6	
315	35	0,0607	14,6		9,7	
355	55	0,0794	15,8		10,9	
400	77,5	0,1035	15,6	JOVENTA DAFx.20S	12,4	
450	102,5	0,1339	17,3		14,2	
500	127,5	0,1683	19,2		16	
560	157,5	0,2148	21,7		18,3	
630	192,5	0,2762	24,8		21,2	

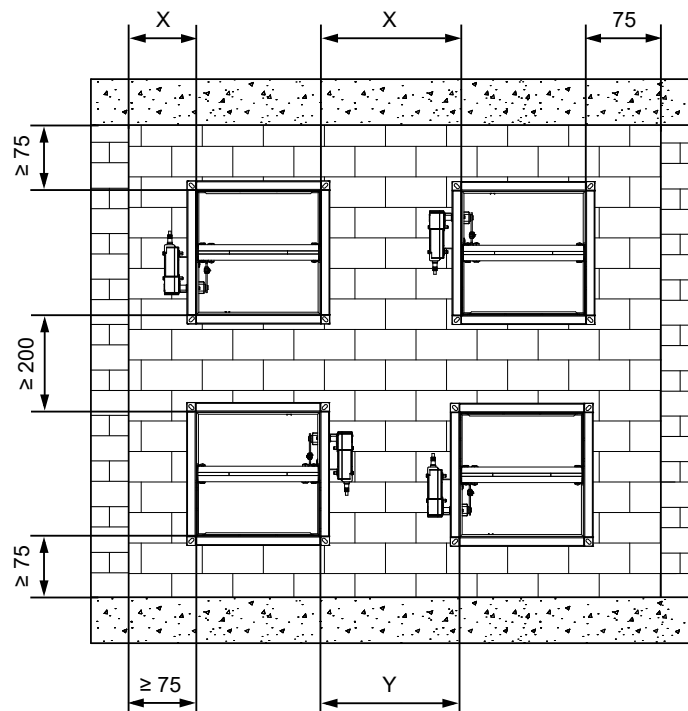
IV. INSTALLATION

Placement and installation

- Dampers are designed to remove heat and combustion products (e.g. smoke) from fire compartments.
- Dampers are suitable for installation in vertical and horizontal position passages of fire separating constructions. The damper installation procedures must be done so that all load transfer from the fire separating constructions to the damper is absolutely excluded.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the damper flange is absolutely excluded.
- The gap between the installed damper and the fire separating construction must be perfectly filled with approved material.
- After installing the damper, the damper blades must only be opened, or closed by operation of the actuator only.
- The distance between the damper and the construction (wall, ceiling) must be 75 mm at the minimum, according to EN 1366-2. If two or more dampers are to be installed in one fire separating construction, the distance between adjacent dampers must be 200 mm at the minimum, according to EN 1366-10.
- To provide the necessary space for access to the control device, it is recommended that other objects be at least 350 mm away from the control parts of the damper device, it is recommended that other objects be at least 350 mm away from the control parts of the damper.

Minimum distance between the dampers and the construction (applies to both circular and rectangular dampers)

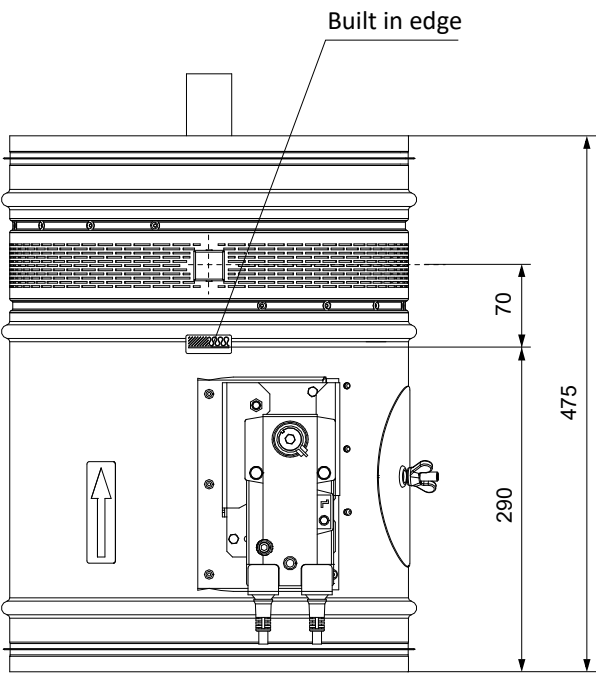
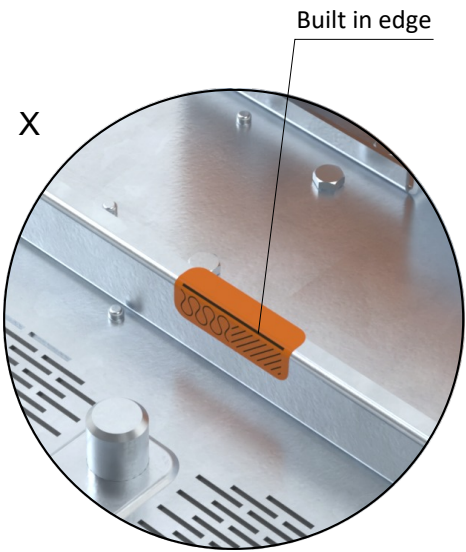
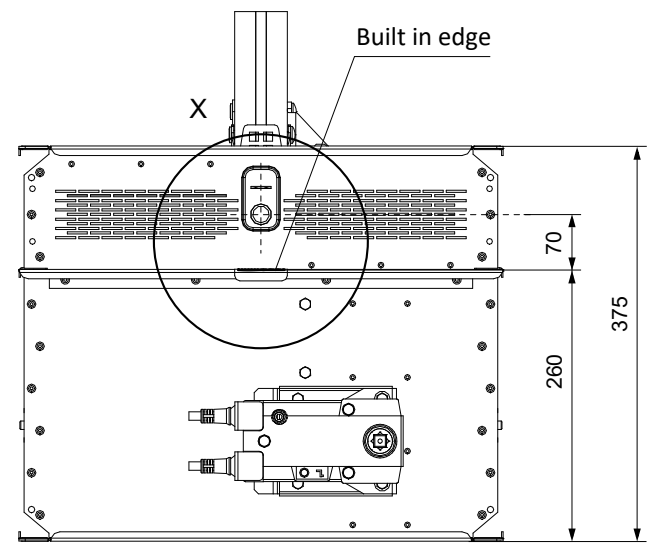
- minimum distance 200 mm between dampers, according to EN 1366-10
- minimum distance 75 mm between damper and construction (wall/ceiling), according to EN 1366-10



X = recommended minimum distance for a rectangular damper with actuator ≥ 200 mm
 X = recommended minimum distance for a rectangular damper with actuator and box ≥ 400 mm
 X = recommended minimum distance for a circular damper with actuator ≥ 200 mm

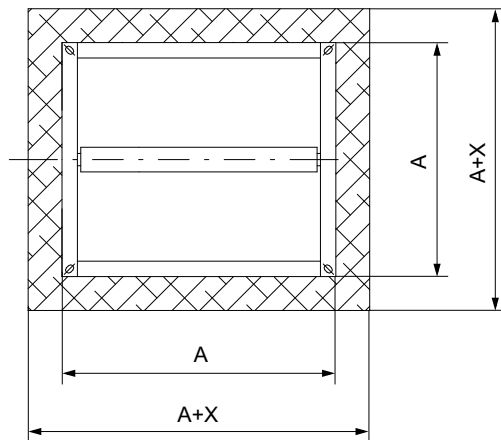
Y = recommended minimum distance for a rectangular damper with actuator ≥ 380 mm
 Y = recommended minimum distance for a rectangular damper with actuator and box ≥ 700 mm
 Y = recommended minimum distance for a circular damper with actuator ≥ 350 mm

Built in edge



Dimensions of an installation opening

Dimensions of an installation opening - rectangular dampers



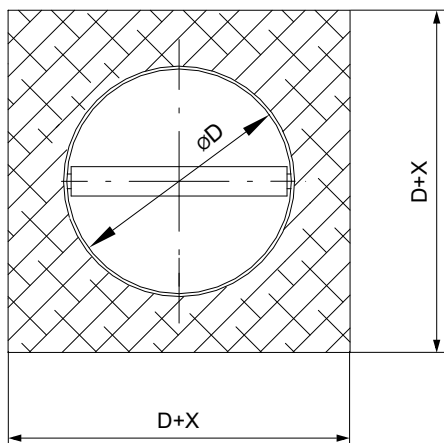
Mortar or gypsum

- X = min. 50 mm
- X = max. 150 mm

Ablative Coated Batt

- X = min. 50 mm
- X = max. 200 mm

Dimensions of an installation opening - circular dampers



Mortar or gypsum

- X = min. 50 mm
- X = max. 150 mm

Statement of installations

Fire separating construction, location of the damper	Shape of the damper	Damper in section	Installation type, installation system	Gap width [mm]	Classification	Page
Standard low- and high-density rigid wall construction according to EN 1363-1 - damper in the wall 125 mm min. wall thickness	Circular	SINGLE	Mortar or gypsum	50-150	EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti	33
Standard low- and high-density rigid wall construction according to EN 1363-1 - damper in the wall 100 mm min. wall thickness	Rectangular	SINGLE	Mortar or gypsum	50-150	EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti	34
		MULTI			EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti	35
		SINGLE	Ablative Coated Batt	50-200	EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti	36
		MULTI			EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti	37
Standard flexible wall construction min. EI 90 according to EN 1363-1 - damper in the wall 125 mm min. wall thickness	Circular	SINGLE	Mortar or gypsum	50-150	EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti	38
Standard flexible wall construction min. EI 90 according to EN 1363-1 - damper in the wall 100 mm min. wall thickness	Rectangular	SINGLE	Mortar or gypsum	50-150	EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti	39
		MULTI			EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti	40
		SINGLE	Ablative Coated Batt	50-200	EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (v _{ew}) S1500[H]C ₁₀₀₀₀ AAmulti	41
		MULTI			EI 120 (v _{ew}) S1500[H]C _{mod} HOT400/30AAmulti	42
Standard low- and high-density rigid floor construction according to EN 1366-2 - damper in the ceiling 150 mm min. ceiling thickness	Circular	SINGLE	Mortar or gypsum	50-150	EI 120 (h _{ow}) S1500[H]C ₁₀₀₀₀ AAmulti	43
	Rectangular	SINGLE			EI 120 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (h _{ow}) S1500[H]C ₁₀₀₀₀ AAmulti	44
		MULTI			EI 120 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti	45
		SINGLE	Ablative Coated Batt	50-200	EI 90 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti E 120 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti * EI 120 (h _{ow}) S1500[H]C ₁₀₀₀₀ AAmulti	46
		MULTI			EI 90 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti E 120 (h _{ow}) S1500[H]C _{mod} HOT400/30AAmulti	47
Horizontal or vertical smoke extraction ducts tested according to EN 1366-8 or EN 1366-9 Into or onto the duct	Rectangular	MULTI	Damper installed Into or onto a duct	N/A	EI 120 (v _{ed}) S1500[H]C _{mod} HOT400/30AAmulti EI 120 (h _{od}) S1500[H]C _{mod} HOT400/30AAmulti	48-49

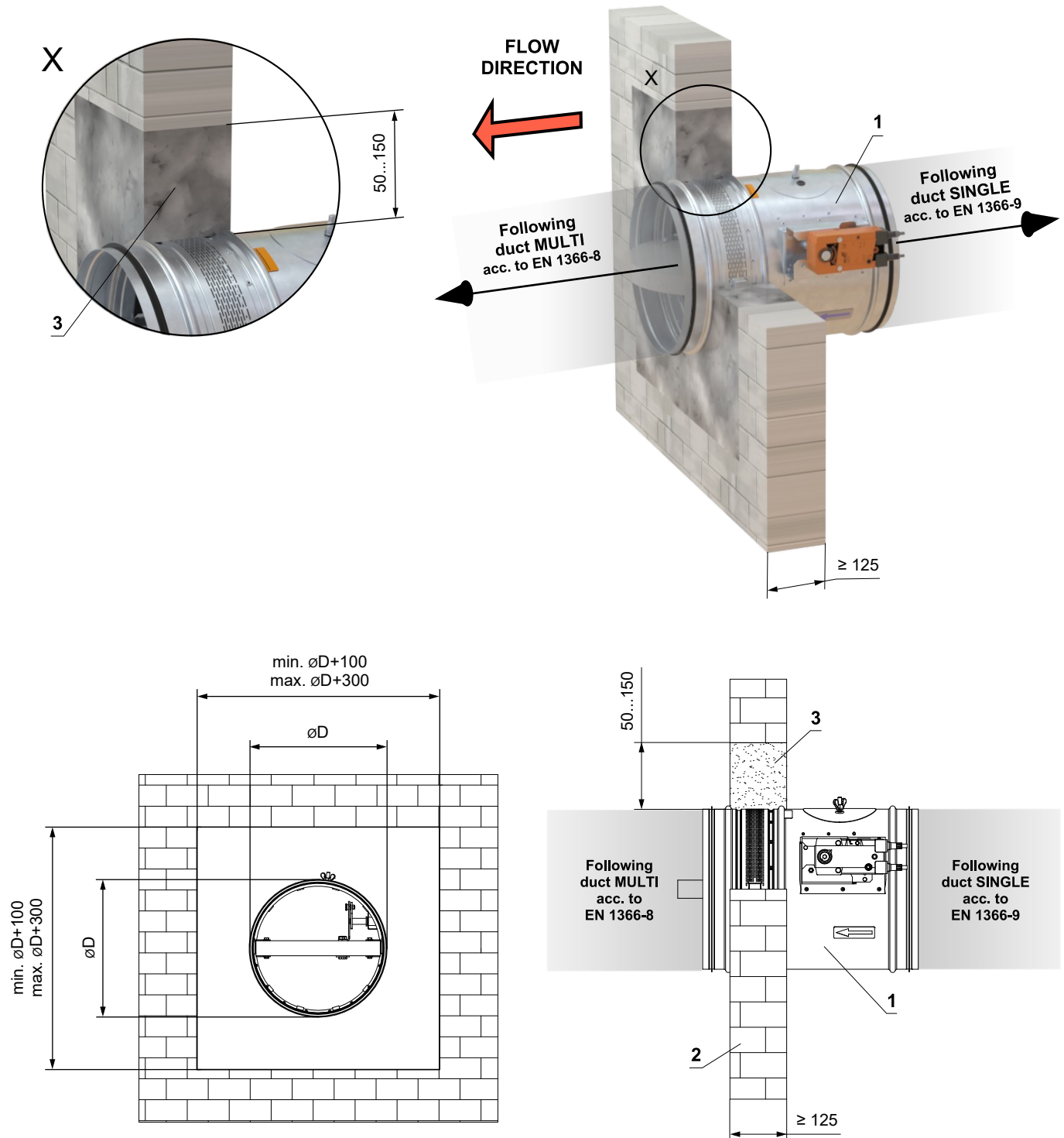
* Applies to MSD-W damper

In solid wall construction

In solid wall construction - mortar or gypsum
- damper placement in a single section

EI 120 (v_{ew}) S1500[H]C₁₀₀₀₀AAmulti

- Standard low- and high-density rigid wall construction according to EN 1363-1
- For connection of following duct → see page 52



- 1 MSD-W / MSD - design „A“
- 2 Solid wall construction
- 3 Mortar or gypsum

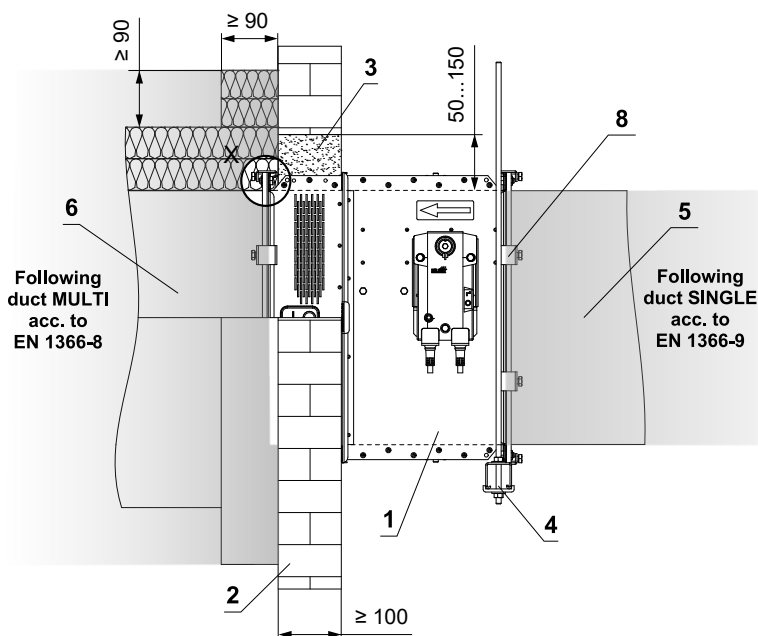
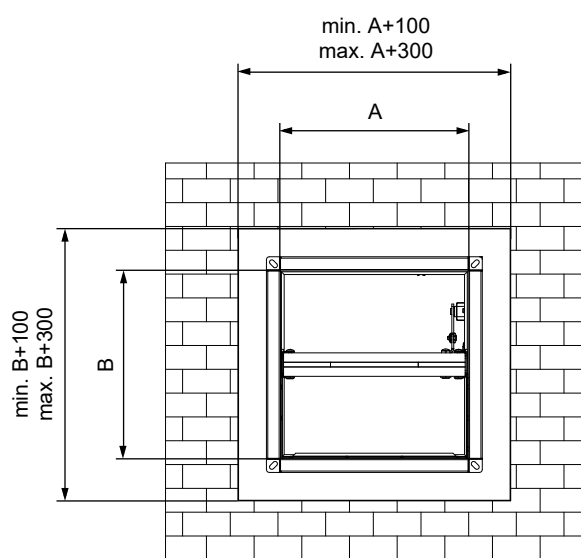
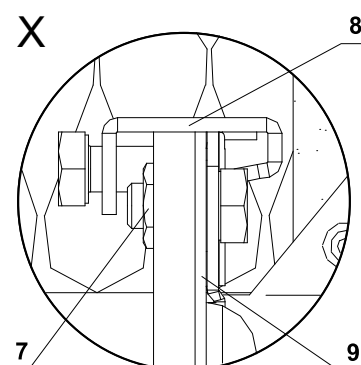
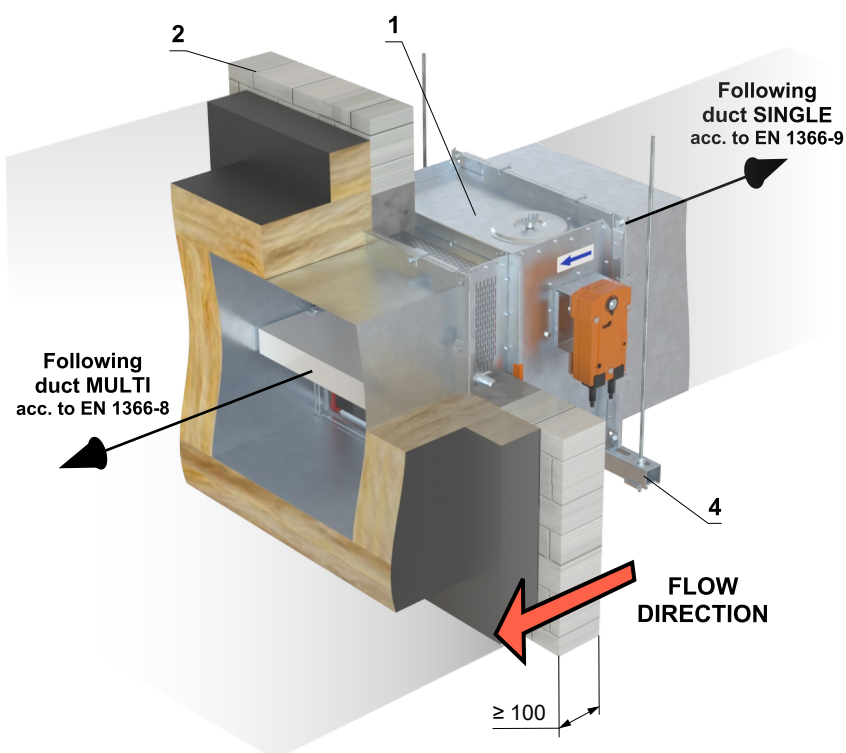
**In solid wall construction - mortar or gypsum
- damper placement in a single section**

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti

*** EI 120 (v_{ew}) S1500[H]C₁₀₀₀₀AAmulti**

- Standard low- and high-density rigid wall construction according to EN 1363-1
- For connection of following duct → see page 52

** Applies to MSD-W damper*

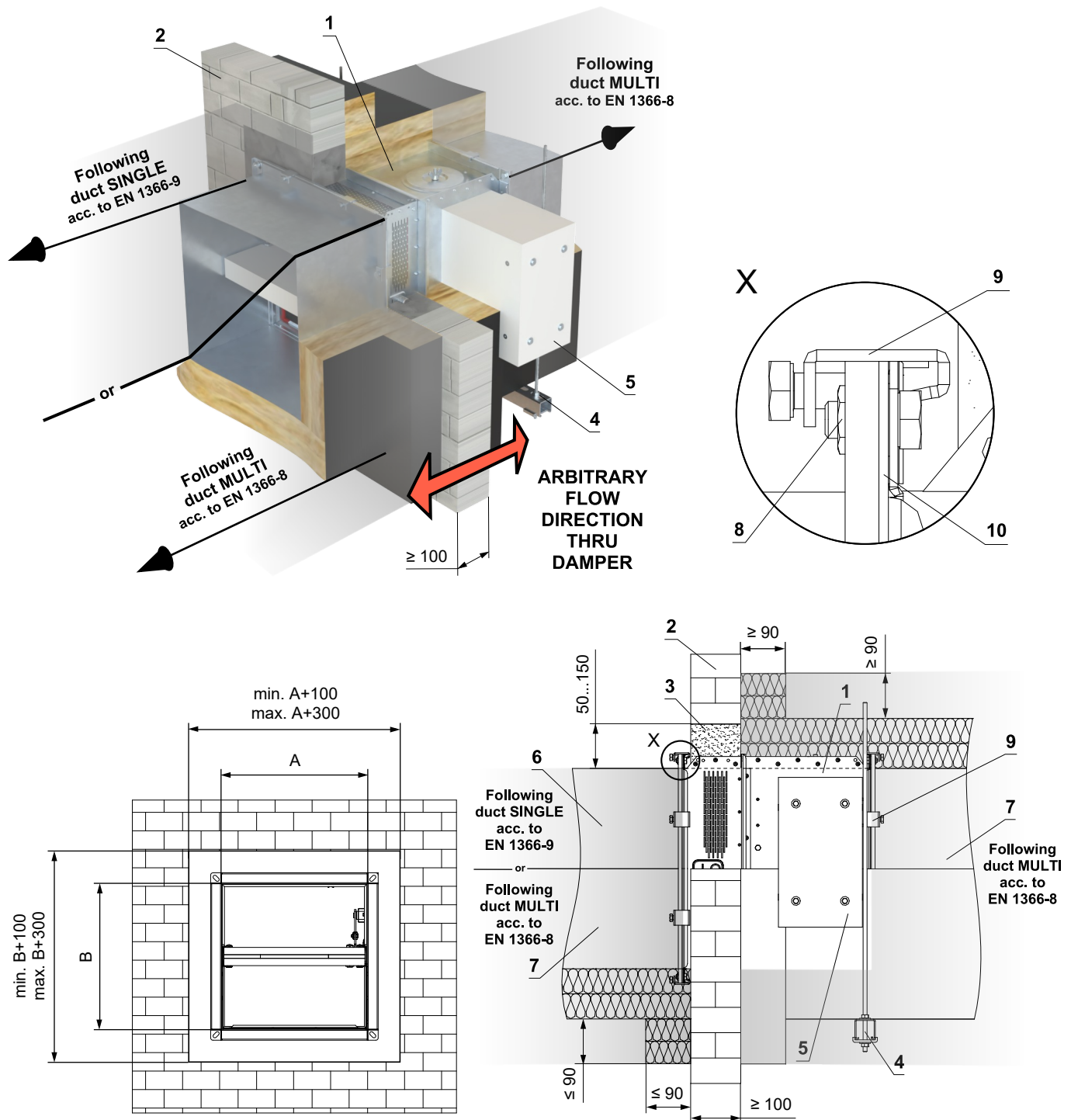


- 1 MSD-W / MSD - design „A“
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Suspension system (type according to duct manufacturer instructions) → see page 51
- 5 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 6 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 7 Flange connection at corners - M10 bolt, washers and nut
- 8 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 9 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)

**In solid wall construction - mortar or gypsum
- damper placement in a multi section**

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti

- Standard low- and high-density rigid wall construction according to EN 1363-1
- For connection of following duct → see page 52



- 1 MSD - design „IB“
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Suspension system (type according to duct manufacturer instructions) → see page 51
- 5 Actuator cover - must be removable after installation of the damper
- 6 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 7 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 8 Flange connection at corners - M10 bolt, washers and nut
- 9 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 10 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)

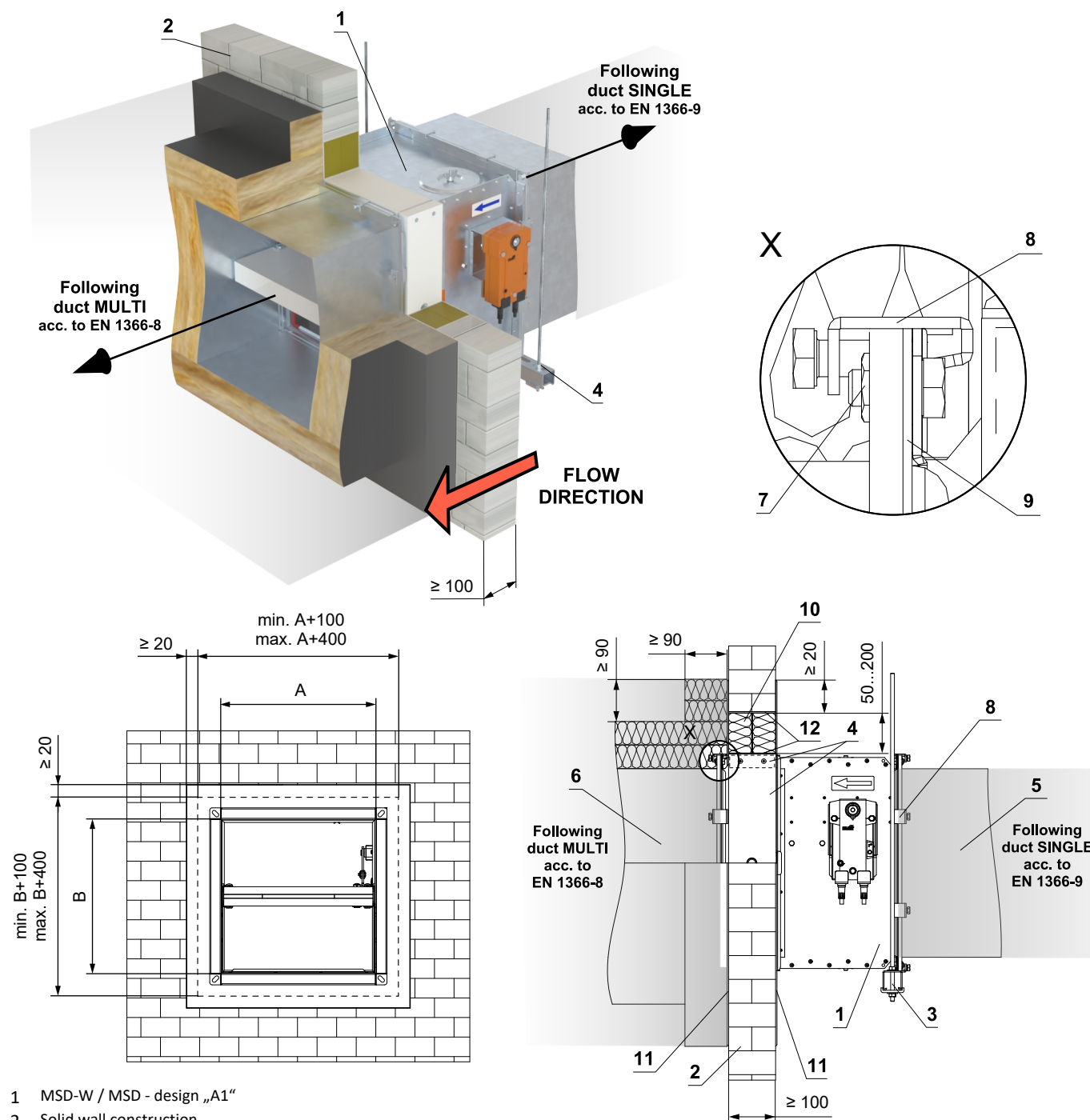
**In solid wall construction - Ablative Coated Batt
- damper placement in a single section**

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti

*** EI 120 (v_{ew}) S1500[H]C₁₀₀₀₀AAmulti**

- Standard low- and high-density rigid wall construction according to EN 1363-1
- For connection of following duct → see page 52

** Applies to MSD-W damper*



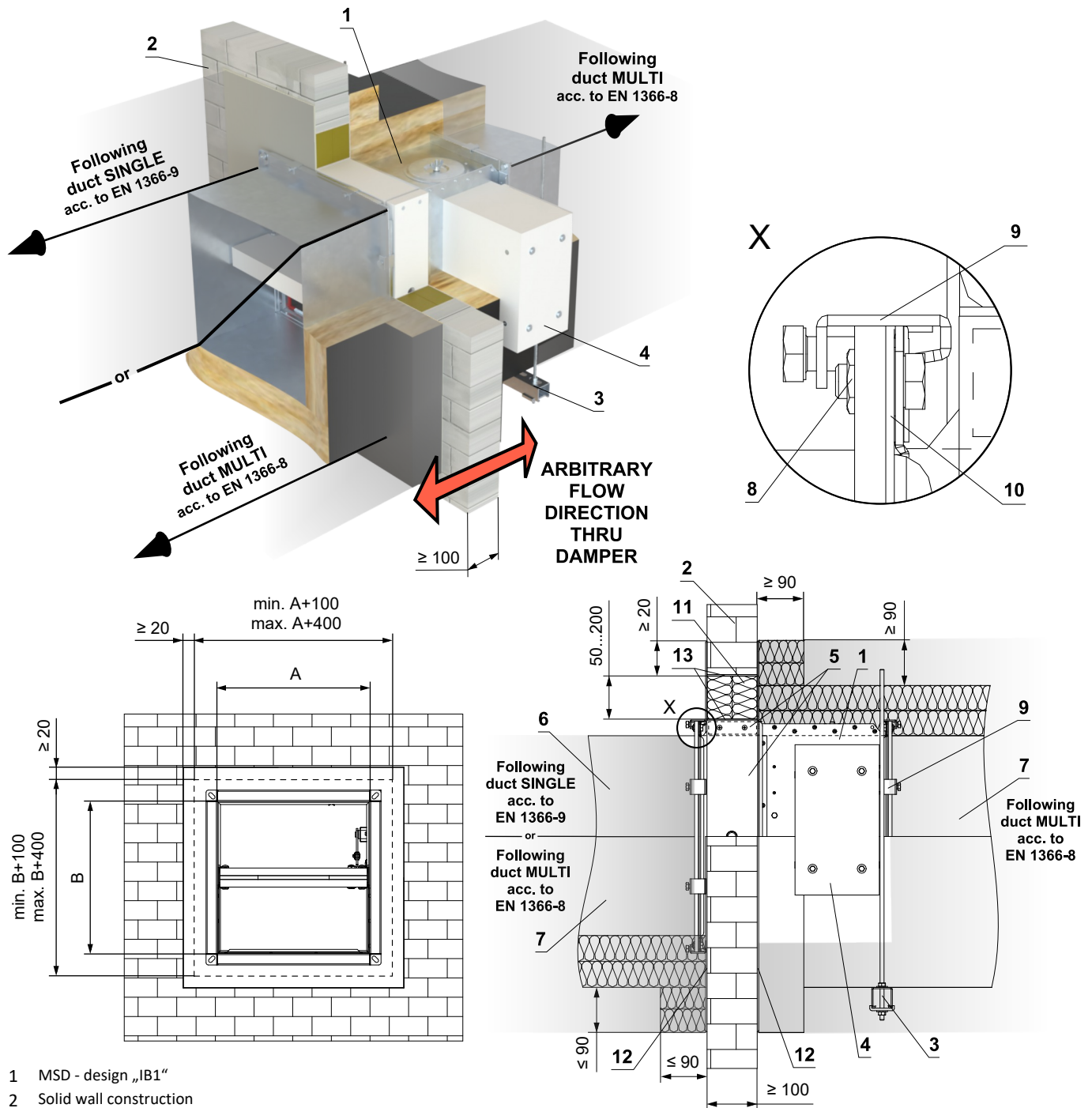
- 1 MSD-W / MSD - design „A1“
- 2 Solid wall construction
- 3 Suspension system (type according to duct manufacturer instructions) → see page 51
- 4 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 59
- 5 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 6 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 7 Flange connection at corners - M10 bolt, washers and nut
- 8 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 9 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)
- Ablative Coated Batt System HILTI*
- 10 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 11 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct.
- 12 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing.

* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In solid wall construction - Ablative Coated Batt - damper placement in a multi section

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti

- Standard low- and high-density rigid wall construction according to EN 1363-1
- For connection of following duct → see page 52



- 1 MSD - design „IB1“
- 2 Solid wall construction
- 3 Suspension system (type according to duct manufacturer instructions) → see page 51
- 4 Actuator cover - must be removable after installation of the damper
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 59
- 6 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 7 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 8 Flange connection at corners - M10 bolt, washers and nut
- 9 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 10 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)
- 11 Ablative Coated Batt System HILTI*
- 12 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 13 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct.
- 13 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing.

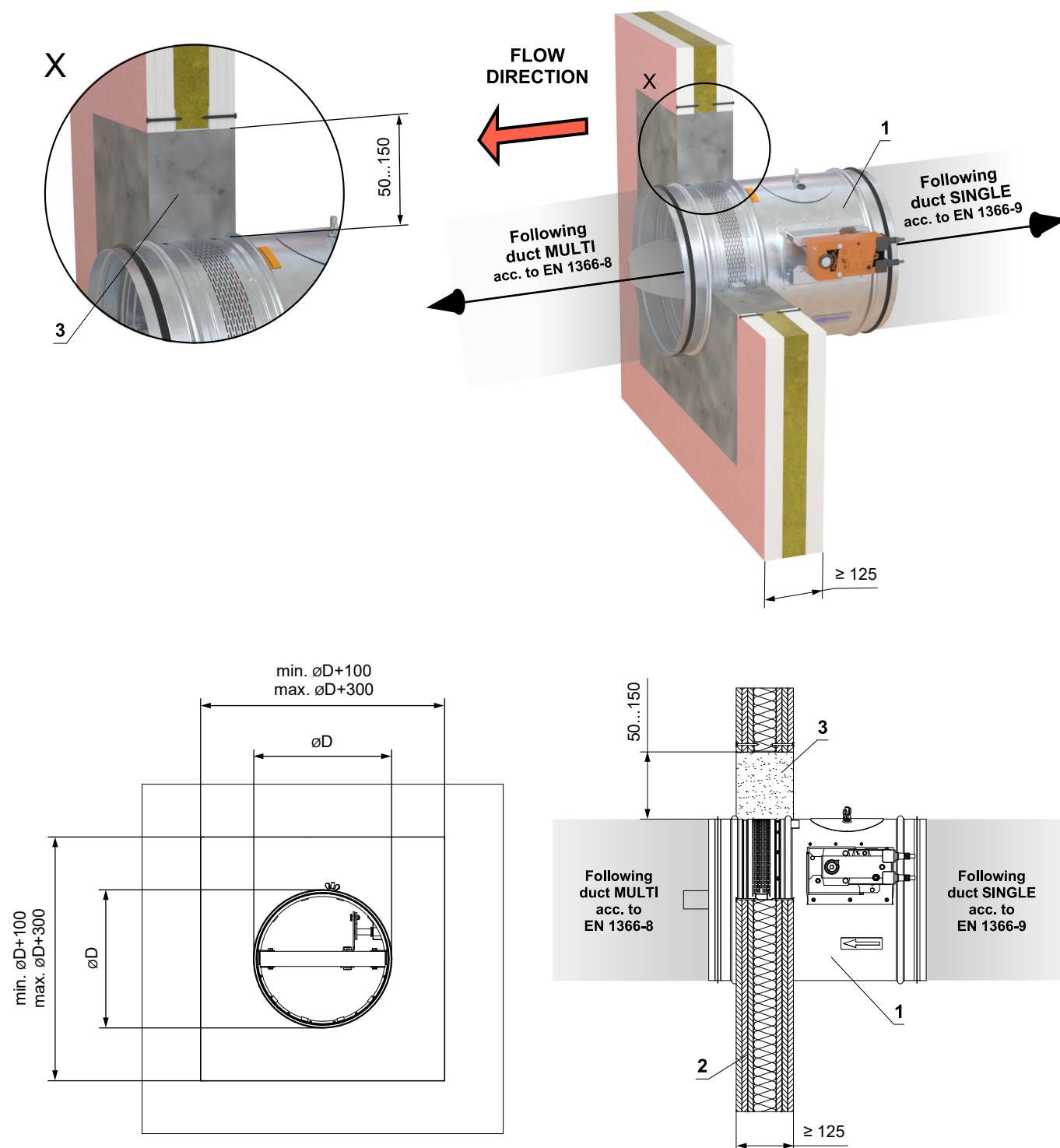
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In gypsum wall construction

In gypsum wall construction min. EI 90 - mortar or gypsum
- damper placement in a single section

EI 120 (v_{ew}) S1500[H]C₁₀₀₀₀AAmulti

- Standard flexible wall construction min. EI 90 according to EN 1363-1.
- For connection of following duct → see page 52
- The installation opening is lined with a UW/CW profile.



- 1 MSD-W / MSD - design „A“
- 2 Gypsum wall construction
- 3 Mortar or gypsum

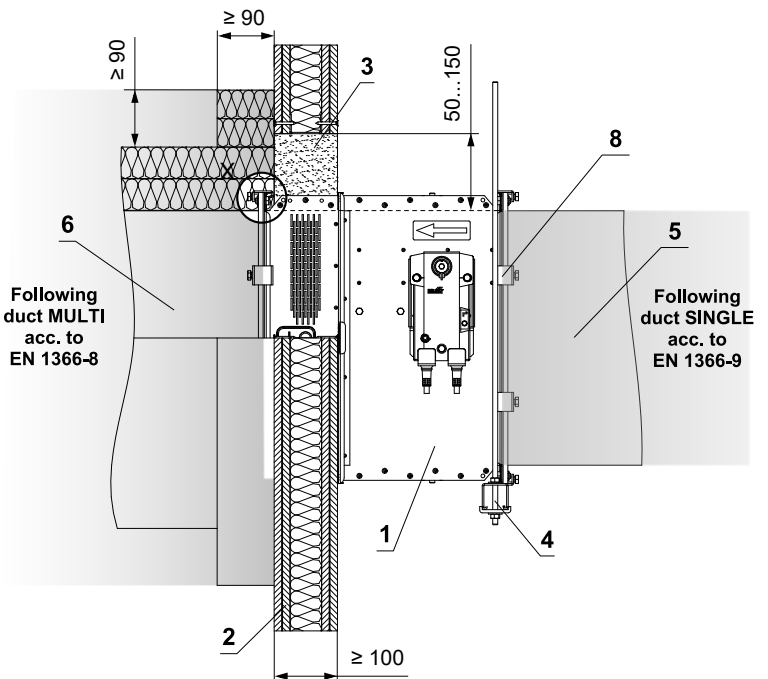
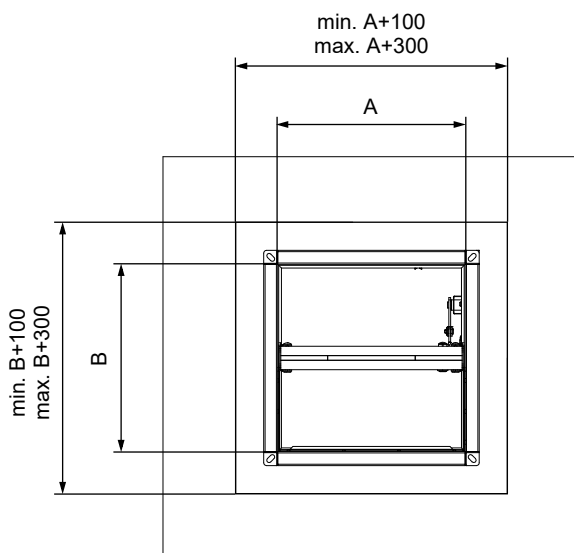
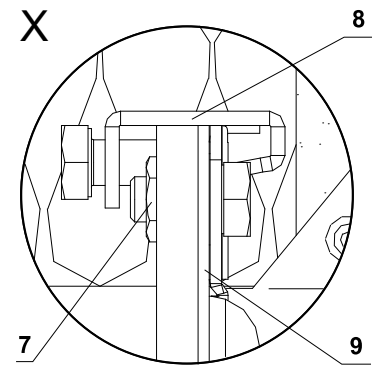
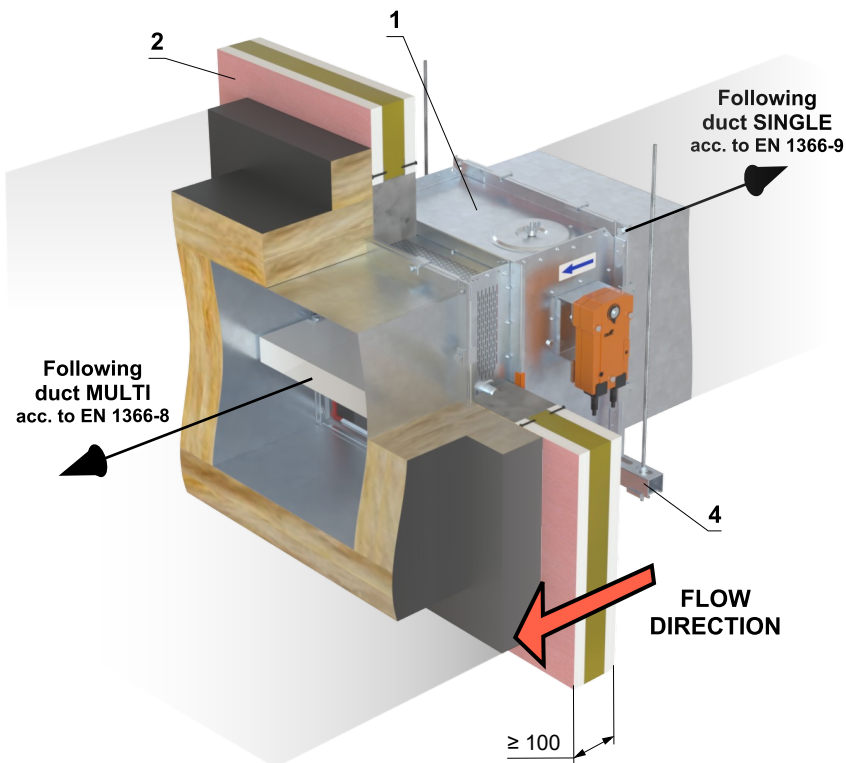
**In gypsum wall construction min. EI 90 - mortar or gypsum
- damper placement in a single section**

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti

*** EI 120 (v_{ew}) S1500[H]C₁₀₀₀₀AAmulti**

- Standard flexible wall construction min. EI 90 according to EN 1363-1.
- For connection of following duct → see page 52
- The installation opening is lined with a UW/CW profile.

* Applies to MSD-W damper

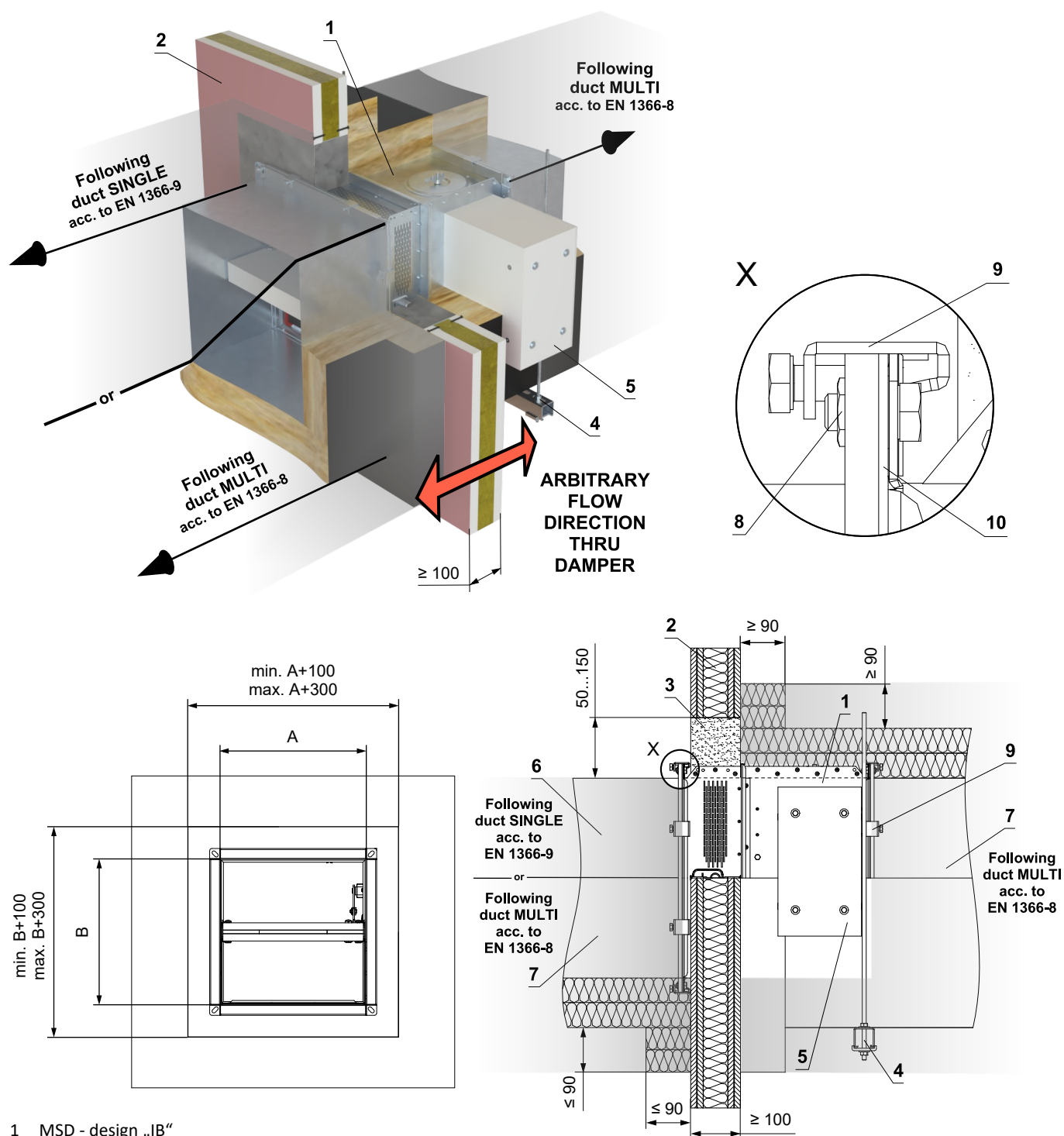


- 1 MSD-W / MSD - design „A“
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Suspension system (type according to duct manufacturer instructions) → see page 51
- 5 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 6 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 7 Flange connection at corners - M10 bolt, washers and nut
- 8 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 9 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)

**In gypsum wall construction min. EI 90 - mortar or gypsum
- damper placement in a multi section**

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti

- Standard flexible wall construction min. EI 90 according to EN 1363-1.
- For connection of following duct → see page 52
- The installation opening is lined with a UW/CW profile.



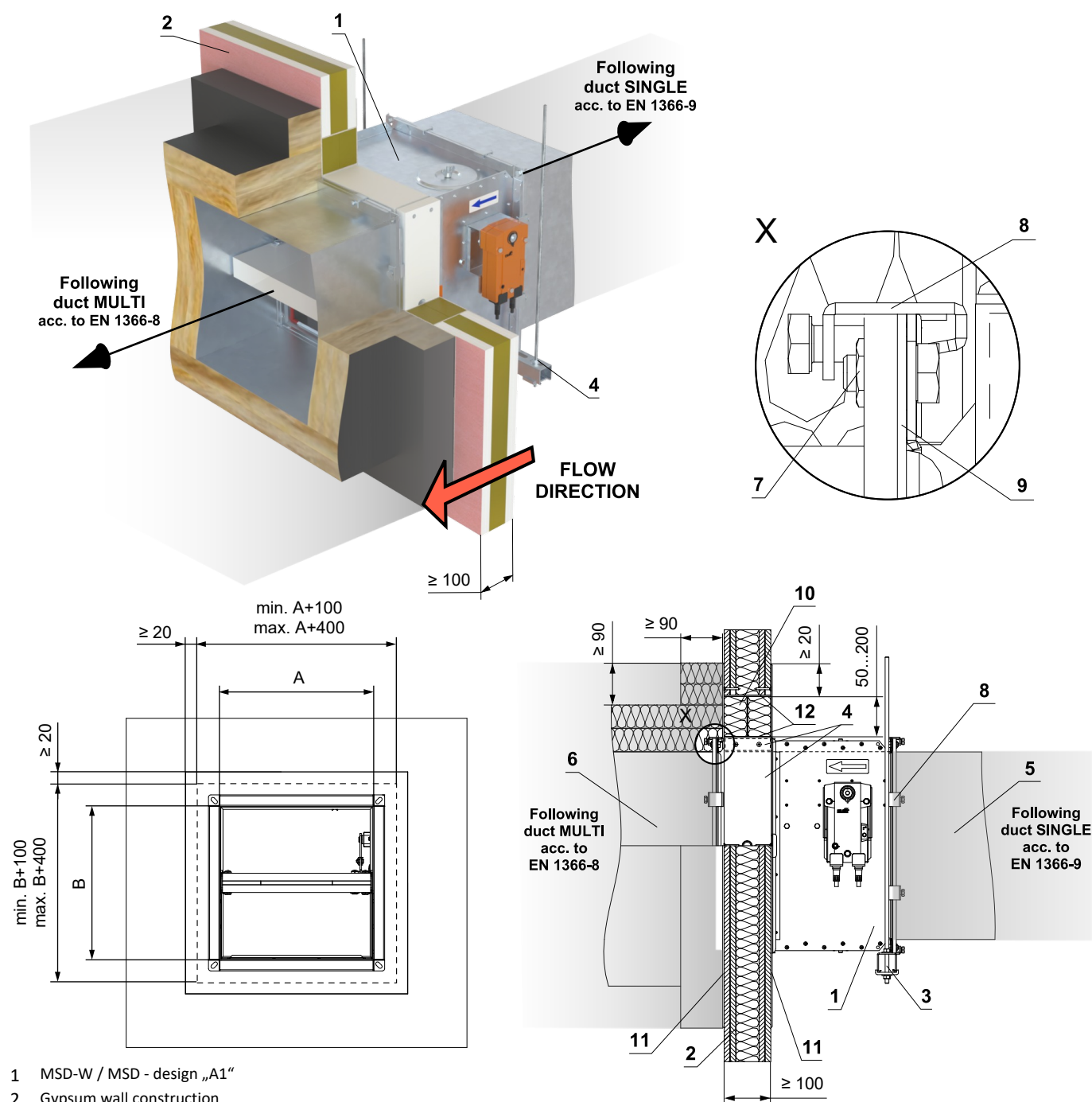
- 1 MSD - design „IB“
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Suspension system (type according to duct manufacturer instructions) → see page 51
- 5 Actuator cover - must be removable after installation of the damper
- 6 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 7 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 8 Flange connection at corners - M10 bolt, washers and nut
- 9 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 10 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)

In gypsum wall construction min. EI 90 - Ablative Coated Batt - damper placement in a single section

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti* EI 120 (v_{ew}) S1500[H]C₁₀₀₀₀AAmulti

* Applies to MSD-W damper

- Standard flexible wall construction min. EI 90 according to EN 1363-1.
- For connection of following duct → see page 52
- The installation opening is lined with a UW/CW profile.



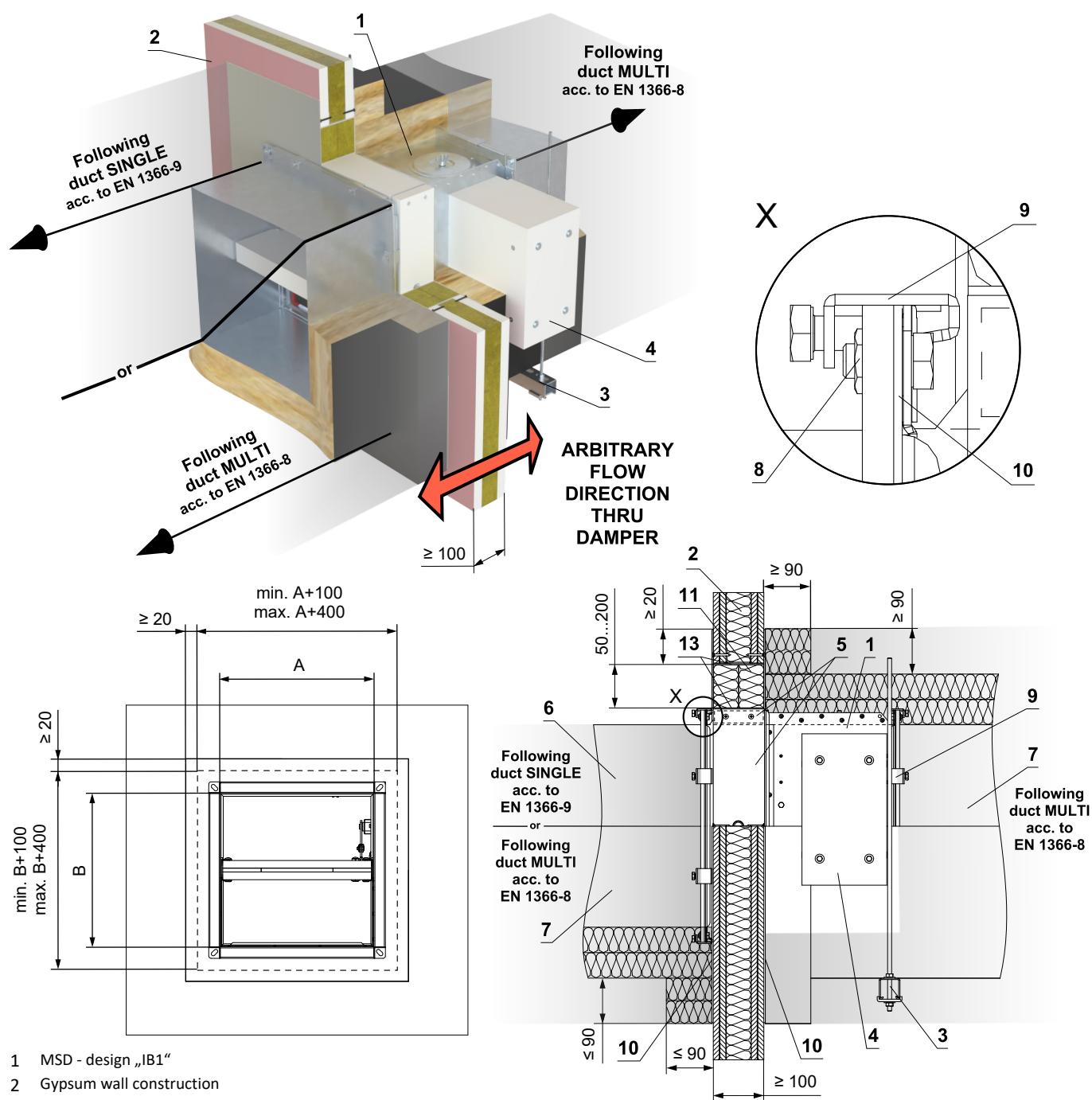
- MSD-W / MSD - design „A1“
- Gypsum wall construction
- Suspension system (type according to duct manufacturer instructions) → see page 51
- Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 59
- SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- Flange connection at corners - M10 bolt, washers and nut
- M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)
- Ablative Coated Batt System HILTI*
- Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct.
- Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing.

* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In gypsum wall construction min. EI 90 - Ablative Coated Batt - damper placement in a multi section

EI 120 (v_{ew}) S1500[H]C_{mod}HOT400/30AAmulti

- Standard flexible wall construction min. EI 90 according to EN 1363-1.
- For connection of following duct → see page 52
- The installation opening is lined with a UW/CW profile.



- 1 MSD - design „IB1“
- 2 Gypsum wall construction
- 3 Suspension system (type according to duct manufacturer instructions) → see page 51
- 4 Actuator cover - must be removable after installation of the damper
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 59
- 6 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 7 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 8 Flange connection at corners - M10 bolt, washers and nut
- 9 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 10 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions) Ablative Coated Batt System HILTI*
- 11 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 12 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct.
- 13 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing.

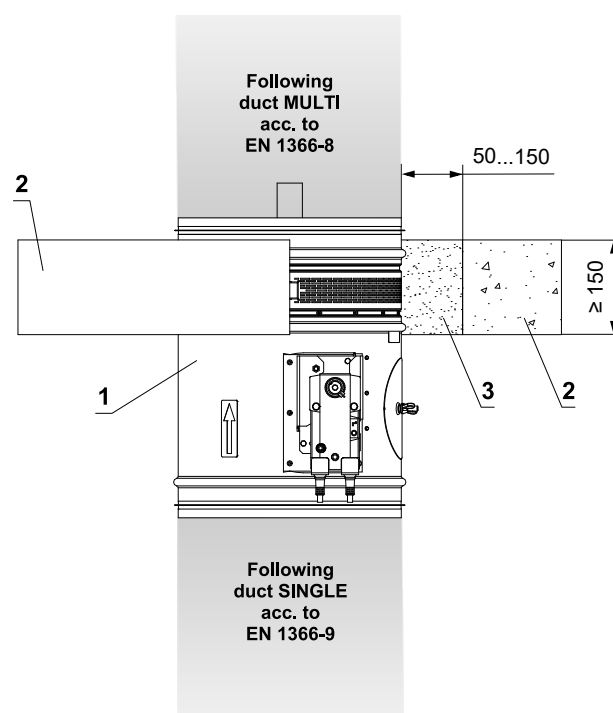
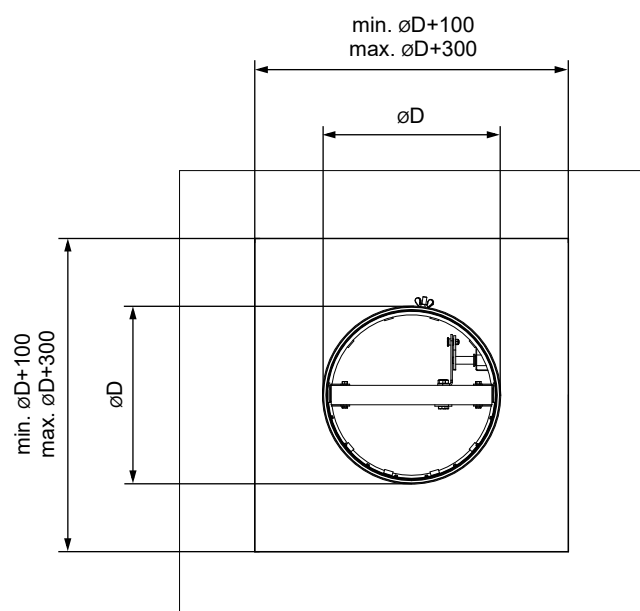
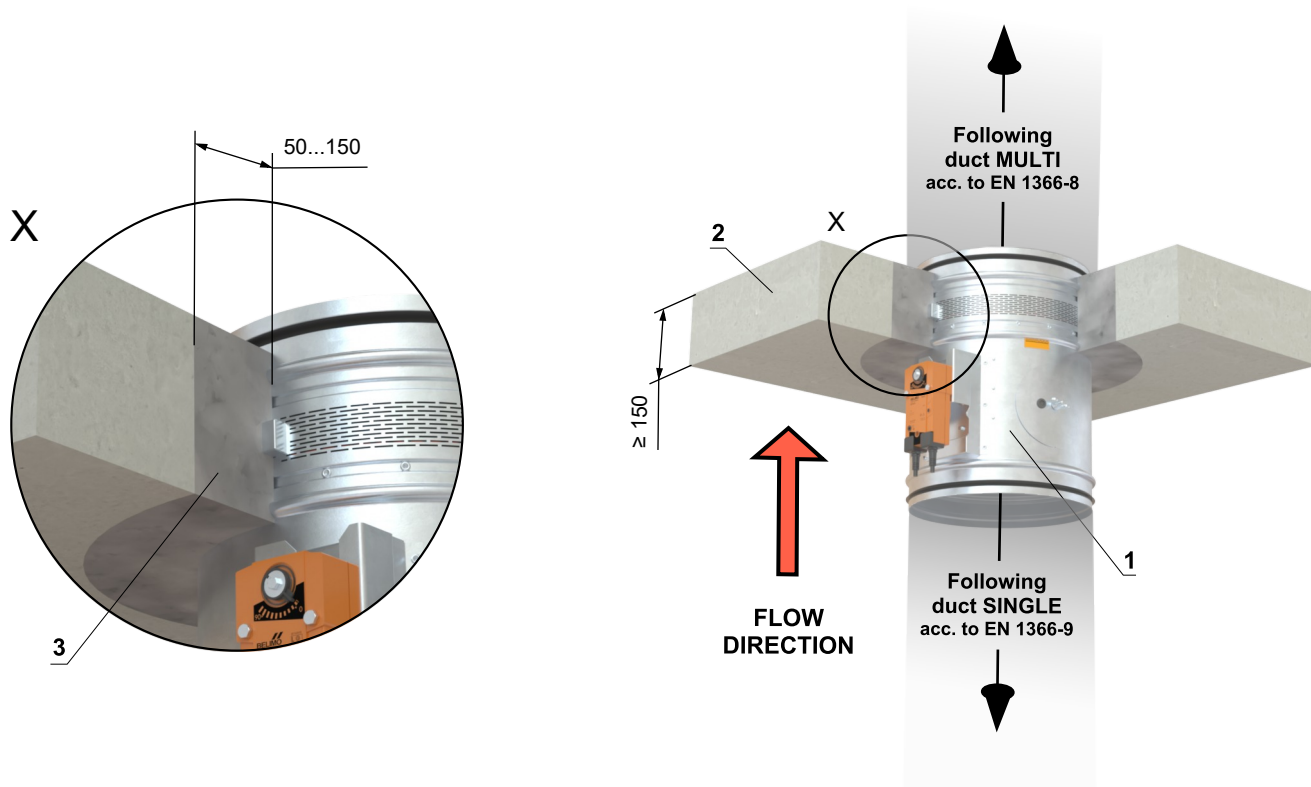
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In solid ceiling construction

In solid ceiling construction - mortar or gypsum - damper placement in a single section

EI 120 (h_{ow}) S1500[H]C₁₀₀₀₀AAmulti

- Standard low- and high-density rigid floor construction according to EN 1366-2
- For connection of following duct → see page 52
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling



- 1 MSD-W / MSD - design „A“
- 2 Solid ceiling construction
- 3 Mortar or gypsum

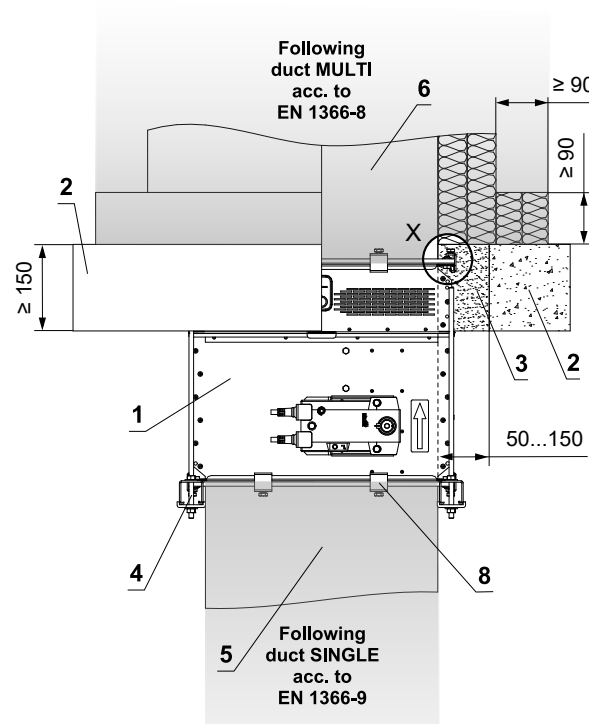
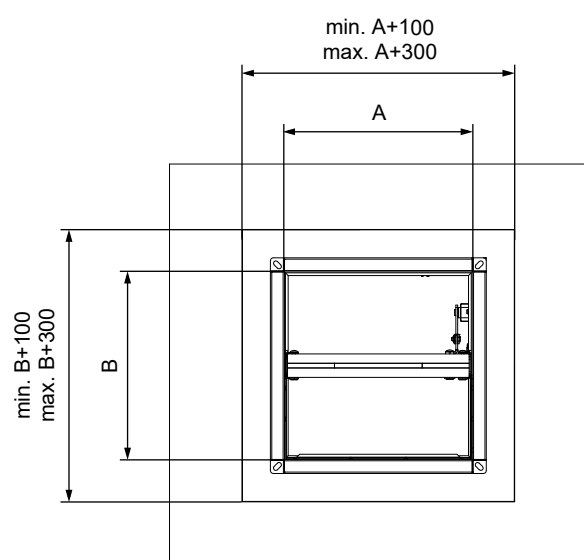
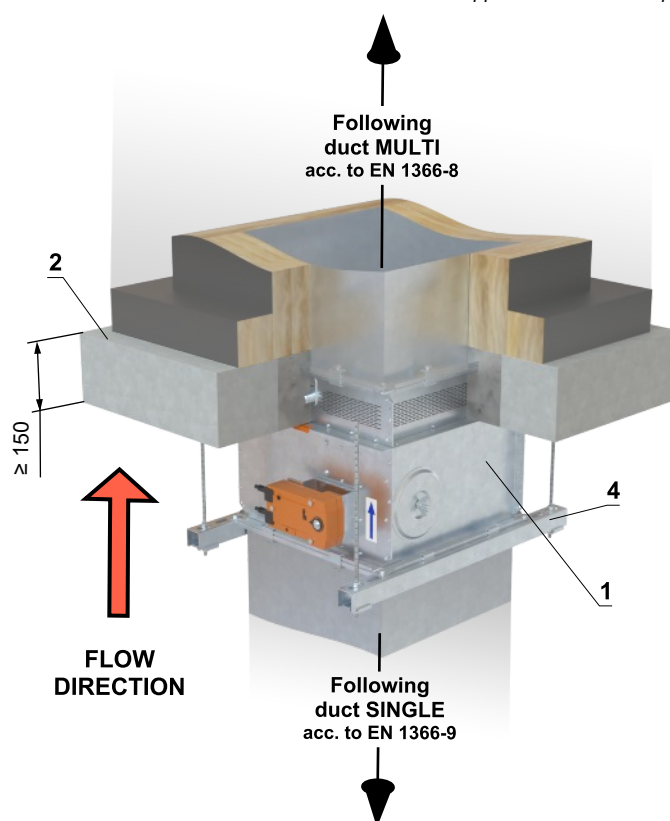
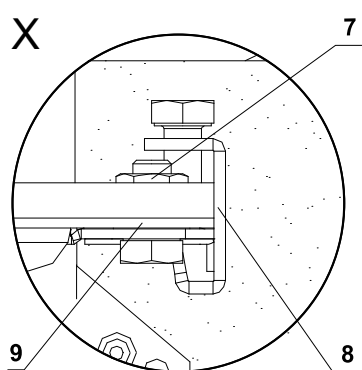
**In solid ceiling construction - mortar or gypsum
- damper placement in a single section**

- Standard low- and high-density rigid floor construction according to EN 1366-2
- For connection of following duct → see page 52
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling

EI 120 (h_{ow}) S1500[H]C_{mod}HOT400/30AAmulti

* EI 120 (h_{ow}) S1500[H]C₁₀₀₀₀AAmulti

* Applies to MSD-W damper

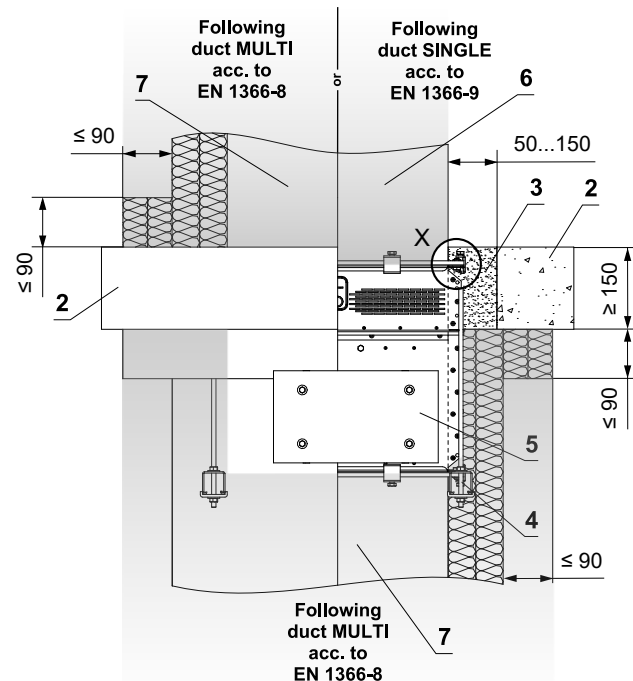
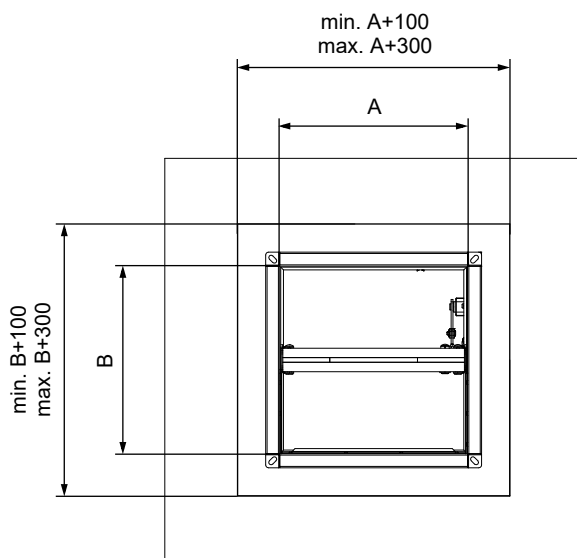
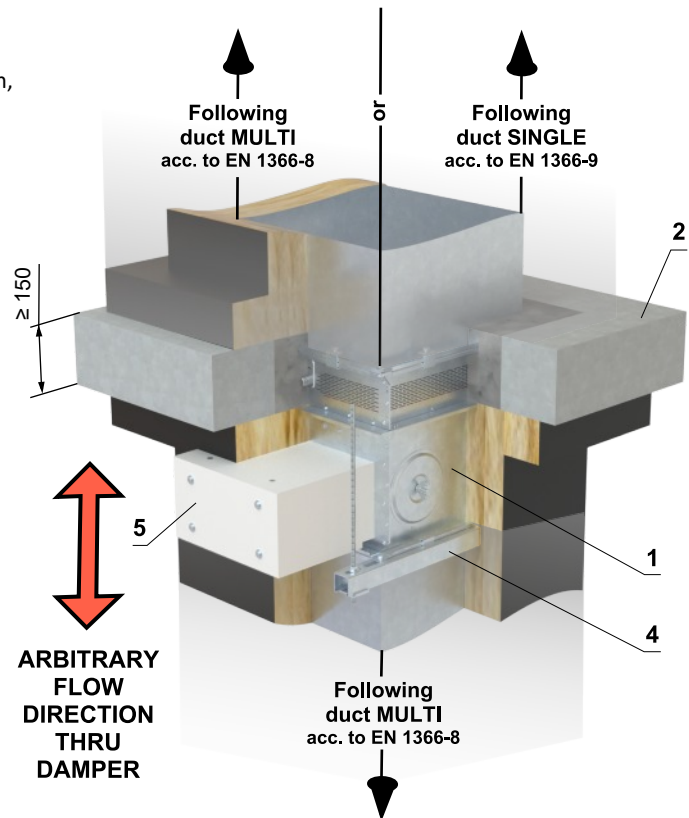
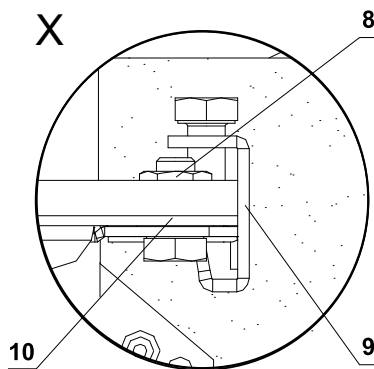


- 1 MSD-W / MSD - design „A“
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Suspension system (type according to duct manufacturer instructions) → see page 51
- 5 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 6 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 7 Flange connection at corners - M10 bolt, washers and nut
- 8 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 9 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)

**In solid ceiling construction - mortar or gypsum
- damper placement in a multi section**

EI 120 (h_{ow}) S1500[H]C_{mod}HOT400/30AAmulti

- Standard low- and high-density rigid floor construction according to EN 1366-2
- For connection of following duct → see page 52
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling



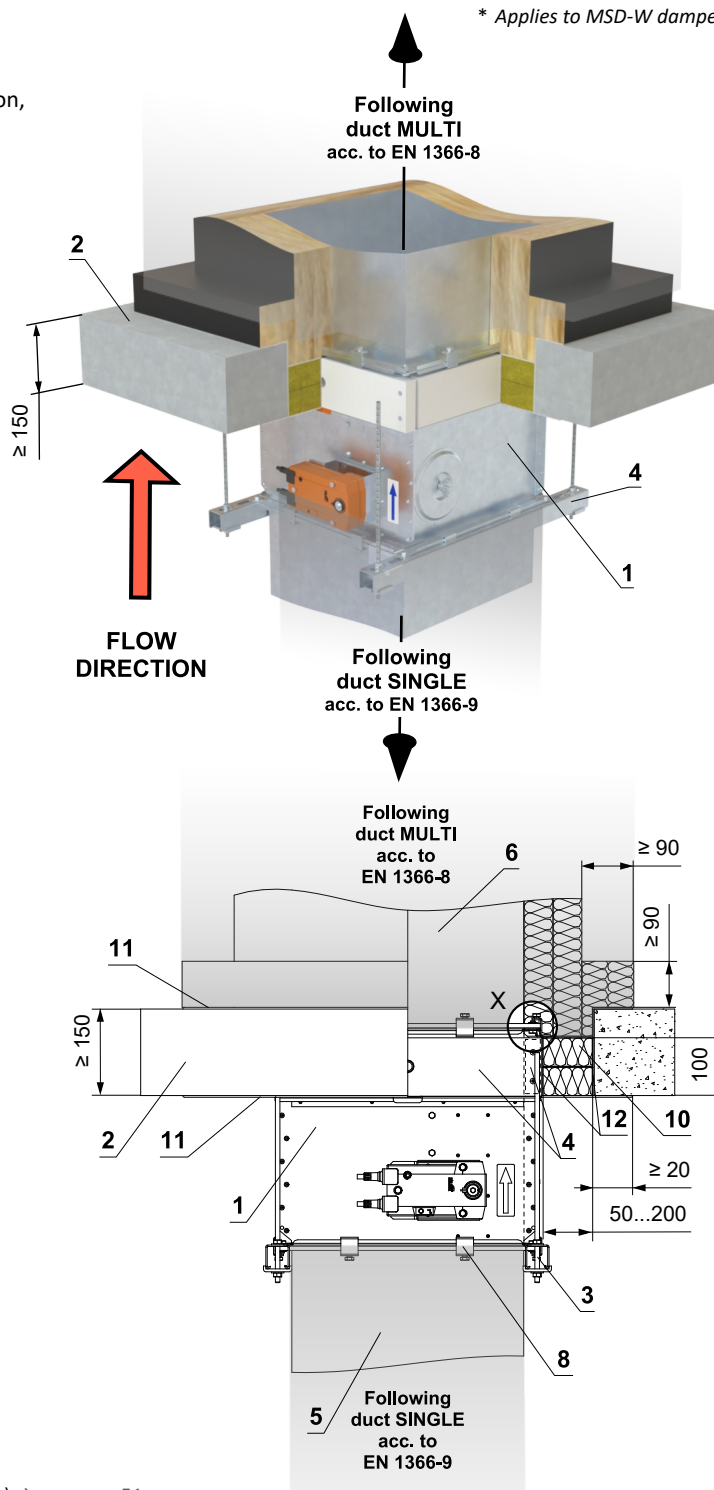
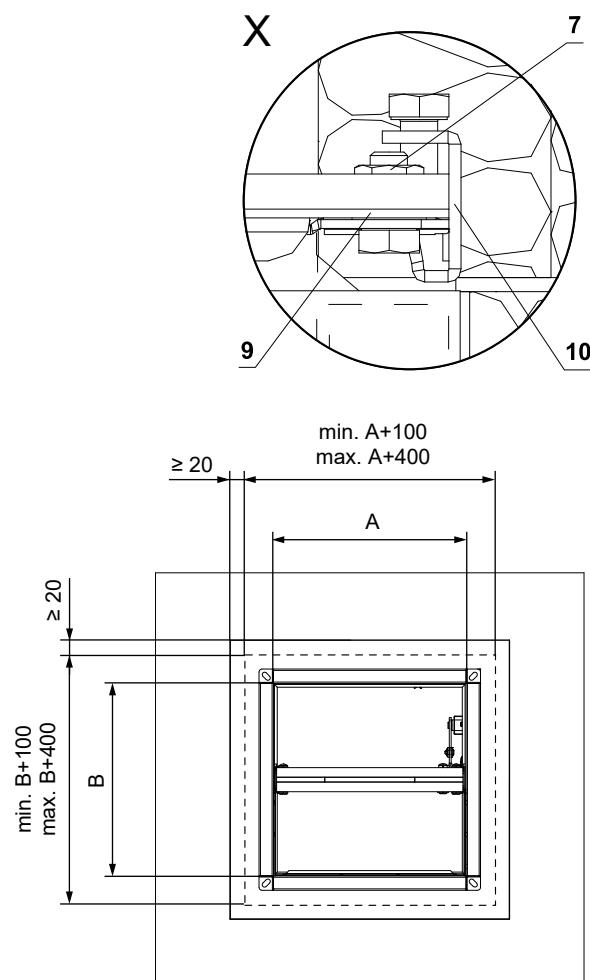
- 1 MSD - design „IB“
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Suspension system (type according to duct manufacturer instructions) → see page 51
- 5 Actuator cover - must be removable after installation of the damper
- 6 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 7 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 8 Flange connection at corners - M10 bolt, washers and nut
- 9 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 10 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)

**In solid ceiling construction - Ablative Coated Batt
- damper placement in a single section**

- Standard low- and high-density rigid floor construction according to EN 1366-2
- For connection of following duct → see page 52
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling

EI 90 (h_{ow}) S1500[H]C_{mod}HOT400/30AAmulti
E 120 (h_{ow}) S1500[H]C_{mod}HOT400/30AAmulti
* EI 120 (h_{ow}) S1500[H]C₁₀₀₀₀AAmulti

* Applies to MSD-W damper



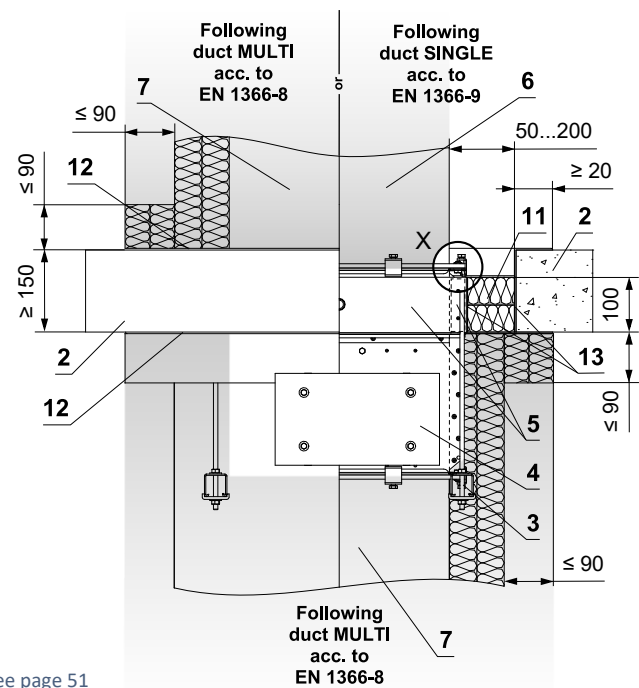
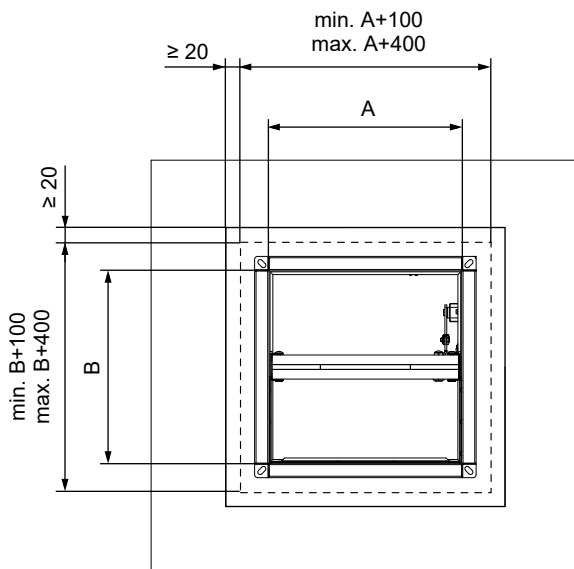
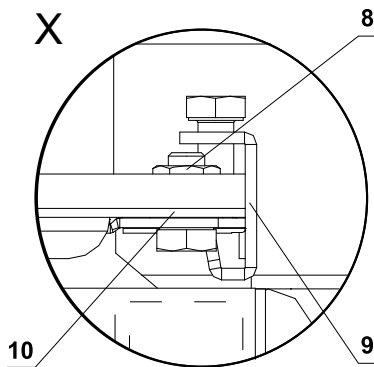
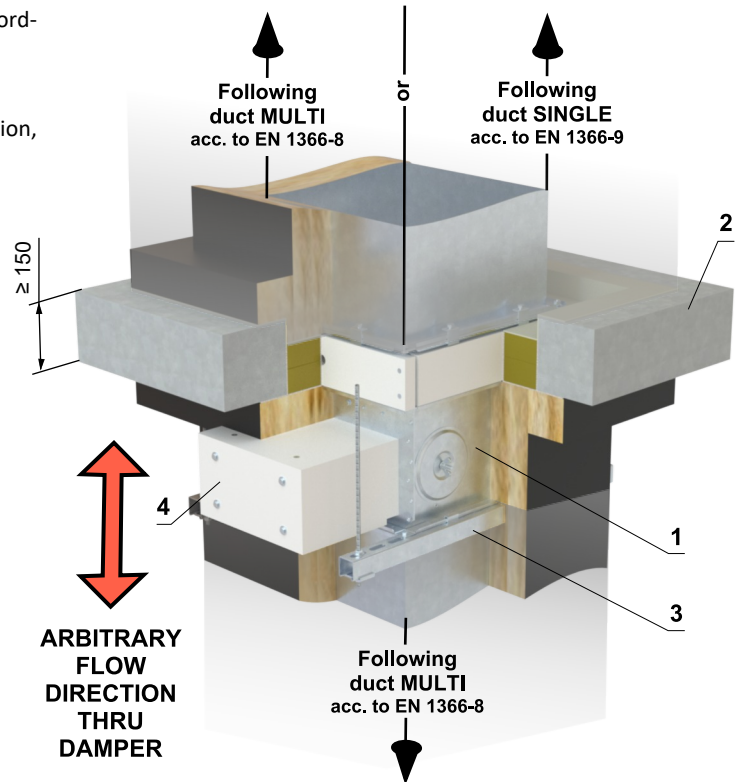
- MSD-W / MSD - design „A1“
- Solid ceiling construction
- Suspension system (type according to duct manufacturer instructions) → see page 51
- Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 59
- SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- Flange connection at corners - M10 bolt, washers and nut
- M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)
- Ablative Coated Batt System HILTI*
- Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct.
- Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing.

* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In solid ceiling construction - Ablative Coated Batt - damper placement in a multi section

- Standard low- and high-density rigid floor construction according to EN 1366-2
- For connection of following duct → see page 52
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling

EI 90 (h_{ow}) S1500[H]C_{mod}HOT400/30AAmulti
E 120 (h_{ow}) S1500[H]C_{mod}HOT400/30AAmulti



- 1 MSD - design „IB1“
- 2 Solid ceiling construction
- 3 Suspension system (type according to duct manufacturer instructions) → see page 51
- 4 Actuator cover - must be removable after installation of the damper
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 59
- 6 SINGLE duct made of sheet metal, thickness min. 1 mm, acc. to EN 1366-9
- 7 MULTI duct made of sheet metal acc. to EN 1366-8 → see page 48
- 8 Flange connection at corners - M10 bolt, washers and nut
- 9 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)
- 10 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)
Ablative Coated Batt System HILTI*
- 11 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 12 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct.
- 13 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing.

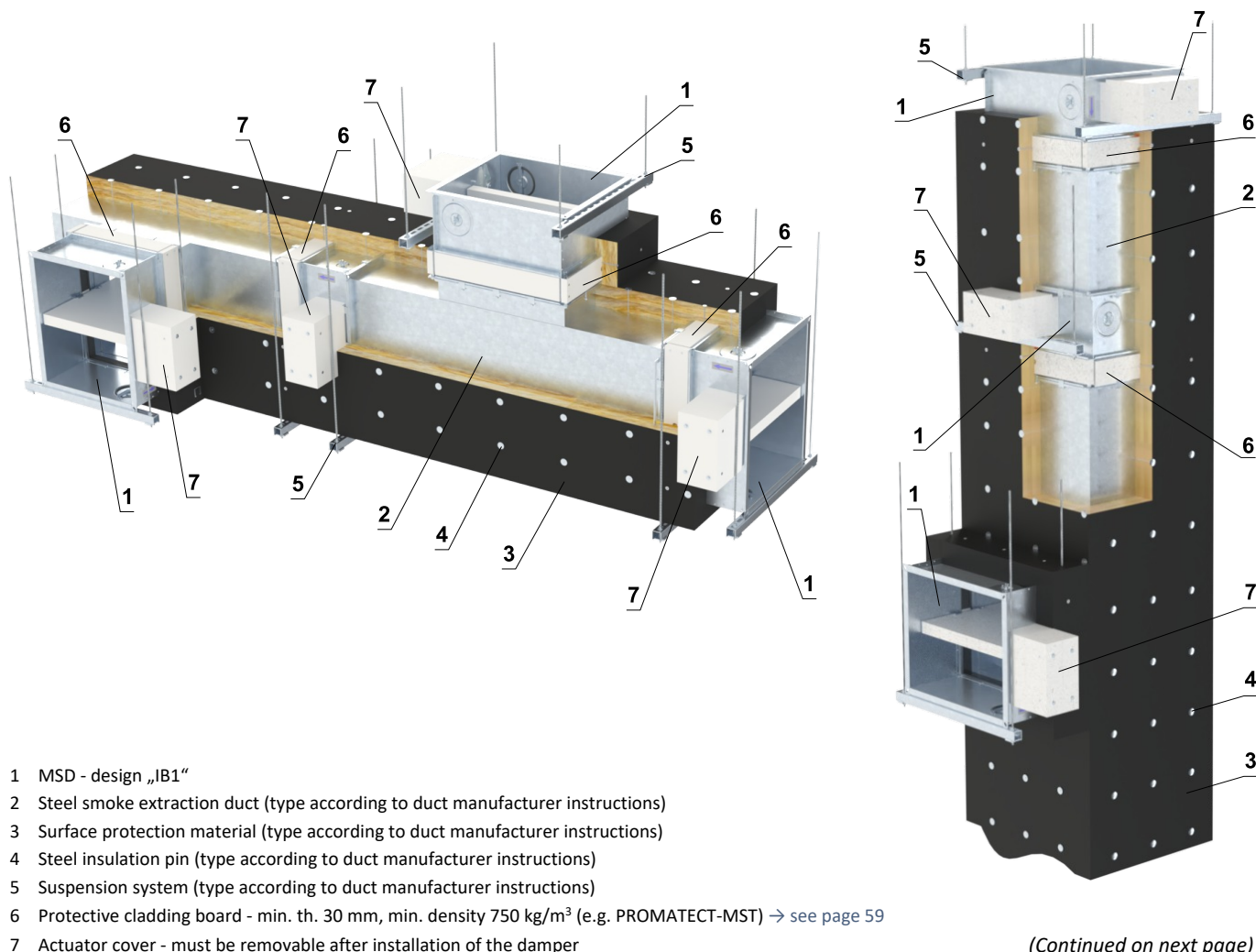
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

Installation damper into/onto smoke extraction ducts

Installation of the damper into/onto horizontal or vertical steel smoke extraction duct insulated with mineral wool
- damper placement in a multi section

EI 120 (h_{od}) S1500[H]C_{mod}HOT400/30AAmulti
EI 120 (v_{ed}) S1500[H]C_{mod}HOT400/30AAmulti

- The dampers may be installed onto or into smoke extraction ducts listed below:
 - **FlameshieldEN (manufacturer Kent Ductwork Ltd.)**
The duct is made of 1.2 mm thick galvanized steel sheet and insulated with 1 layer of 90 mm thick stone wool Rockwool FirePro DuctRock Slab (manufacturer ROCKWOOL Ltd.). The stone wool is finished with a black aluminium foil on the outer side.
 - **FPL BW18 (manufacturer Fire Protection Ltd.)**
The duct is made of galvanized steel sheet. The thickness of the duct depends of its dimensions. The surface of the duct is fire sprayed with Flamebar BW18 (manufacturer Firespray International Ltd). The duct is insulated with two layers of stone wool. The first layer is made of 50 mm thick ROCKWOOL FPL 110 SLAB and the second layer with aluminium foil is made of 50 mm thick ROCKWOOL FPL 110 FOIL FACED SLAB (manufacturer ROCKWOOL Ltd.)
 - **IFS-DS (manufacturer Imperial Ductwork Services Ltd.)**
The duct is made of 1 mm thick galvanized steel sheet and insulated with two layers of 60 mm thick stone wool ULTIMATE U Protect Slab 4.0 Alu1 (manufacturer ISOVER). The stone wool is finished with a black aluminium foil on the outer side.
- The dampers may be installed onto or into other smoke extraction ducts than that specified above with the following limitations:
 - The duct shall be tested according to EN 1366-9 or EN 1366-8 depending on the intended use.
 - The duct shall be made of material of the same or greater density and of the same or greater thickness as the ducts listed above.
 - Changing surface protection materials is not permitted.
 - Changing the paint surface finish is not permitted.
- Support, drop rods, anchors etc. must be used in accordance with a duct manufacturer instructions.
- The connected duct shall be suspended in such a way that the transfer of all loads from the duct to the damper is completely excluded.
- The damper may be installed in position according picture below.



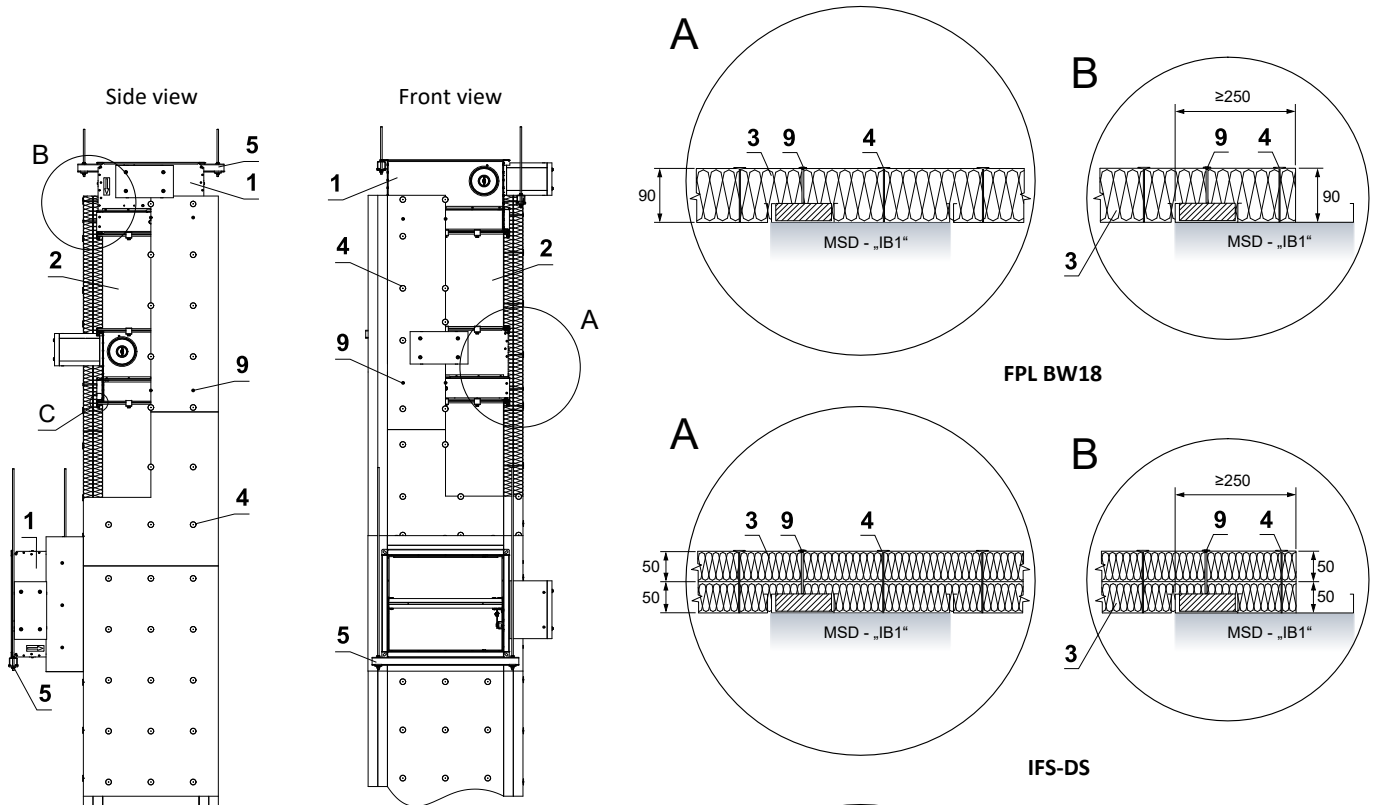
(Continued on next page)

continuation of installation damper into/onto horizontal or vertical steel smoke extraction duct insulated with mineral wool

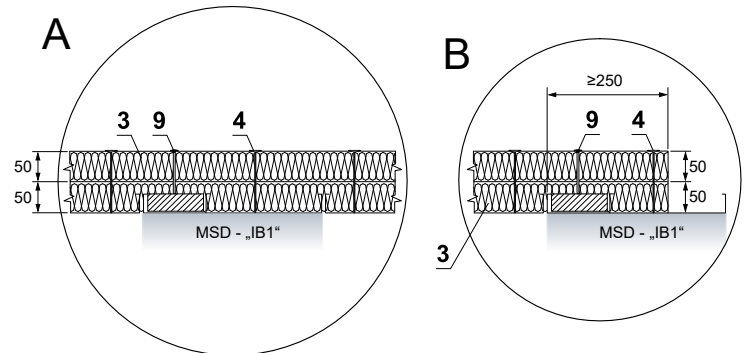
■ The damper is connected to the smoke extraction duct by the damper flange as follow:

- M10 bolts, washers and nuts are used at the corners of the flange
- C-clamps with M8 bolts with a maximum spacing of 200 mm are used around the circumference
- Ceramic selfadhesive sealing tape is inserted between flanges

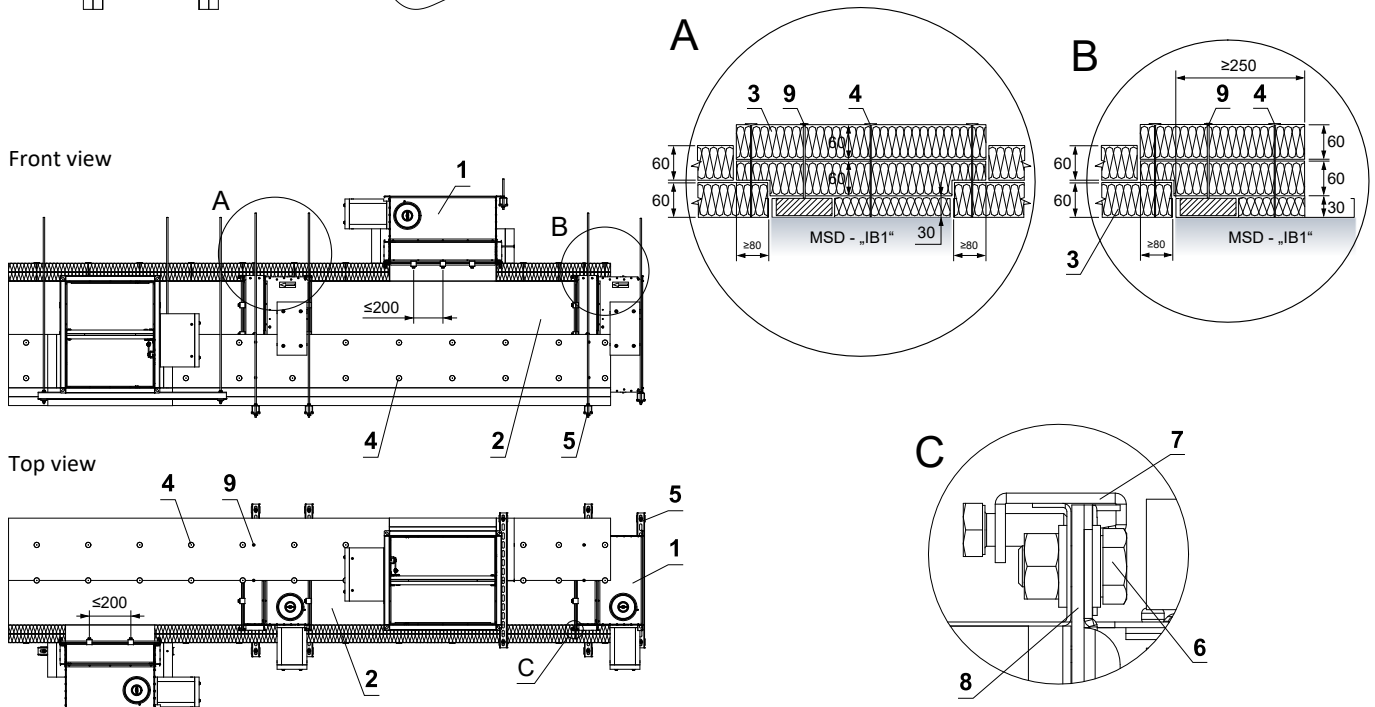
FlameshieldEN



FPL BW18



IFS-DS



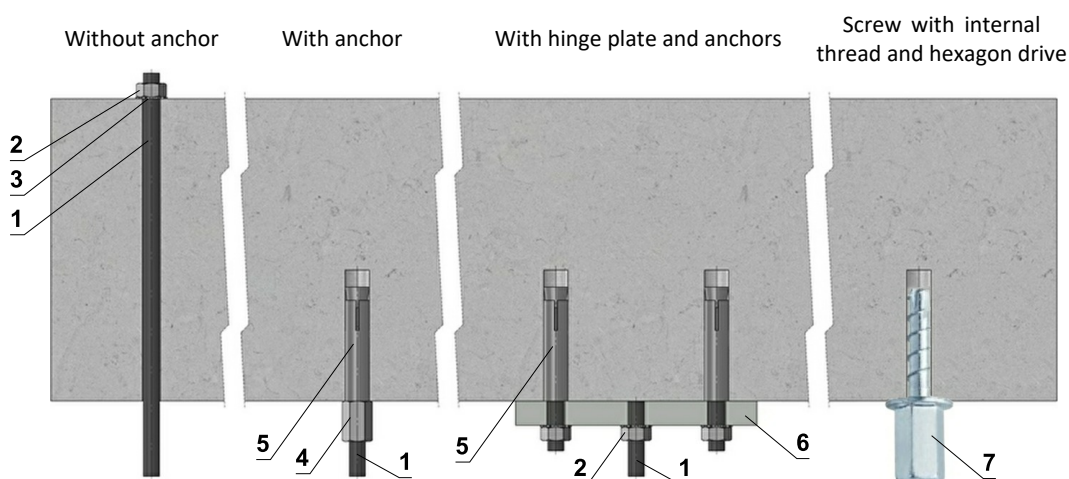
- | | |
|--|---|
| <p>1 MSD - design „IB1“</p> <p>2 Steel smoke extraction duct (type according to duct manufacturer instructions)</p> <p>3 Surface protection material (type according to duct manufacturer instructions)</p> <p>4 Steel insulation pin (type according to duct manufacturer instructions)</p> <p>5 Suspension system (type according to duct manufacturer instructions)</p> <p>6 Flange connection at corners - M10 bolt, washers and nut</p> | <p>7 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)</p> <p>8 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)</p> <p>9 Insulation connection to the damper body – washer M5 (DIN 9021), screw 5xL mm (screw length = insulation thickness + 20 mm), with a maximum spacing of 200 mm and a distance of 50–150 mm from the damper edges</p> |
|--|---|

V. SUSPENSION SYSTEMS

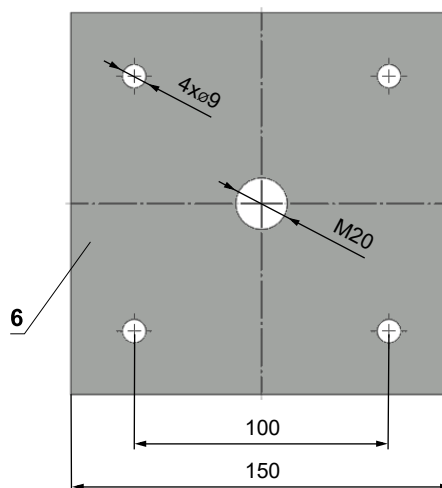
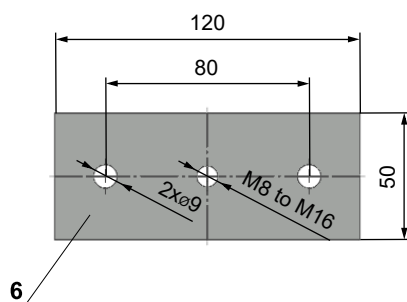
Mounting to the ceiling wall

- The dampers must be suspended using threaded rods and mounting profiles. Their dimensioning depend on the weight of the damper.
- The dampers and the duct must be suspended separately.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the damper flanges is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.

Examples of anchoring to the ceiling construction Follow the instructions of fixing specialist or installation company



Hinge plates



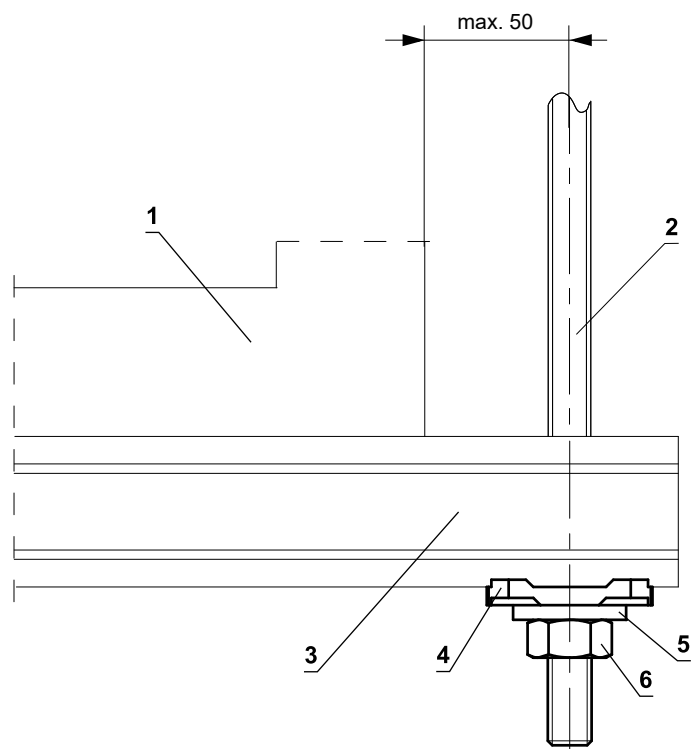
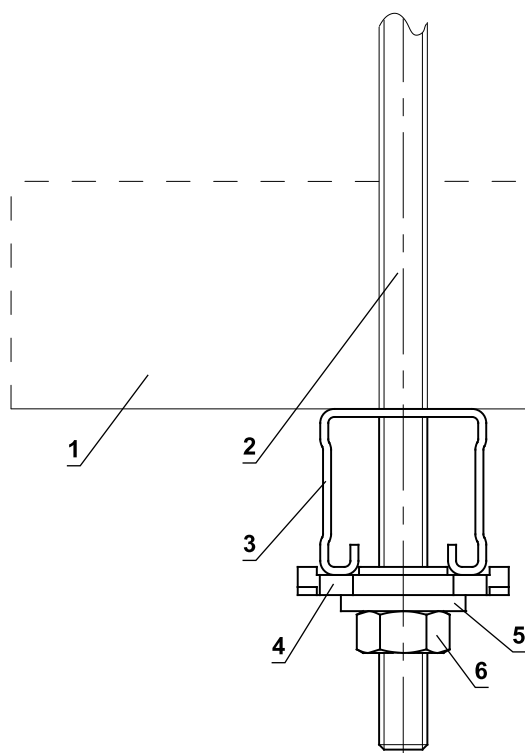
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

Load capacities of threaded rods at the required fire resistance 60 min. < t ≤ 120 min.

Size	As [mm²]	Weight [kg]	
		for 1 rod	for 2 rods
M8	36,6	22	44
M10	58	35	70
M12	84,3	52	104
M16	157	96	192
M18	192	117	234
M20	245	150	300

- 1 Threaded rod M8 - M20
- 2 Nut M8 - M20
- 3 Washer for M8 - M20
- 4 Coupling Nut M8 - M20
- 5 Anchor
- 6 Hinge plate - min. thickness 10 mm
- 7 Concrete screw tested for fire resistance R30-R90, max. Tension up to 0.75 KN (length 35 mm)

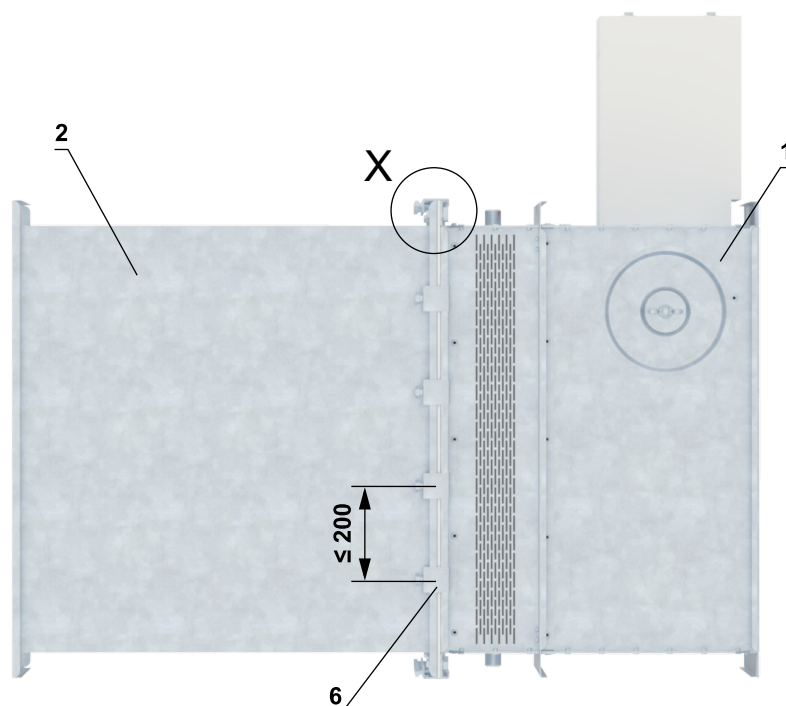
Example of placing of mounting profiles HILTI



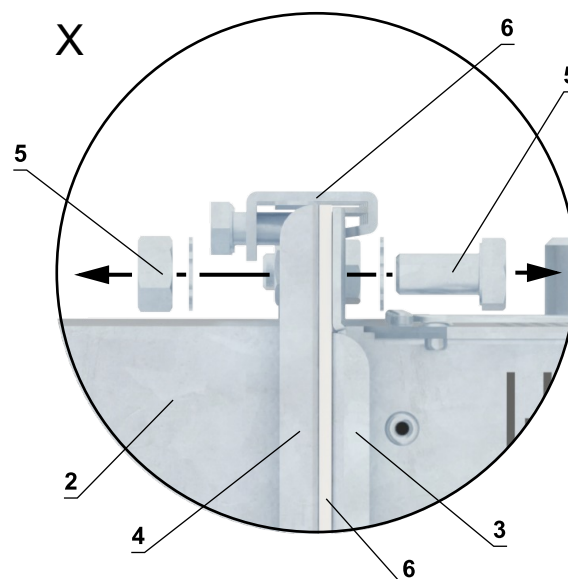
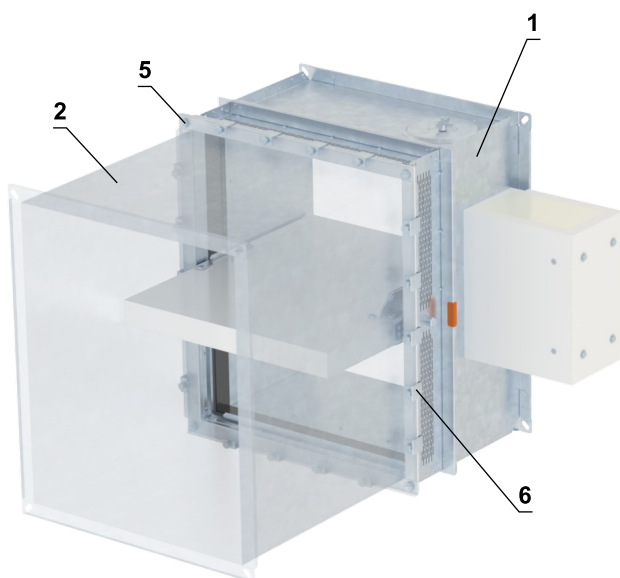
- 1 MSD
- 2 Threaded rod M8 - M12
- 3 Support HILTI MQ-41 or MQ-41/3
- 4 Bored plate HILTI MQZ-L
- 5 Washer for M8 - M12
- 6 Nut M8 - M12

Example of duct connection

Connection to smoke extract duct acc. to EN 1366-8 (MULTI) / to EN 1366-9 (SINGLE)



Electrically conductive connection



- 1 MSD
- 2 Duct
- 3 Flange of MSD
- 4 Flange of duct
- 5 M8 bolt assembly (bolt M8x20 mm, 2 pcs lock washer M8, nut M8) *
- 6 Ceramic selfadhesive sealing tape - around the duct circumference (type according to duct manufacturer instructions)
- 7 M8 C-clamps - maximum spacing of C-clamps 200 mm (type according to duct manufacturer instructions)

* min. one connection must be electrically conductive

VI. TECHNICAL DATA

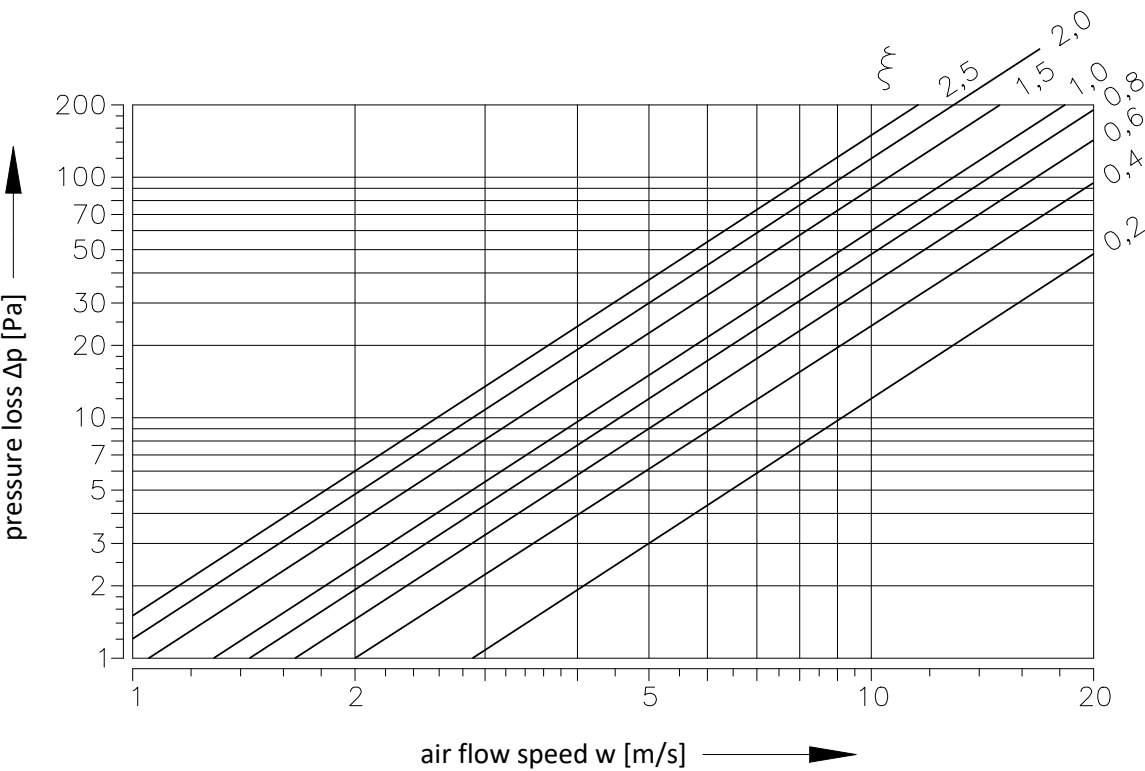
Pressure loss

Pressure loss calculation

$$\Delta p = \xi \cdot \rho \cdot \frac{w^2}{2}$$

Δp	[Pa]	pressure loss
w	[m/s]	air flow speed in nominal damper section
ρ	[kg/m³]	air density
ξ	[-]	coefficient of local pressure loss for the nominal damper section → see page 54

Determination of pressure loss by using diagram $\rho = 1,2 \text{ kg/m}^3$



Coefficient of local pressure loss of rectangular dampers

A	B									
	180	200	225	250	280	300	315	355	400	450
180	2,1314	1,6906	1,3782	1,1149	1,0037	0,9288	0,7918	0,6827	0,6003	0,5350
200	1,9945	1,5804	1,2423	1,0368	0,9748	0,8785	0,7383	0,6367	0,5585	0,4976
225	1,9207	1,5162	1,1256	0,9994	0,9341	0,8442	0,7137	0,6078	0,5329	0,4772
250	1,8415	1,4584	1,1032	0,9651	0,9009	0,8068	0,6837	0,5832	0,5125	0,4590
280	1,7505	1,3782	1,0732	0,9116	0,8571	0,7597	0,6484	0,5543	0,4847	0,4366
300	1,6853	1,3311	1,0400	0,8635	0,8046	0,7148	0,6099	0,5264	0,4665	0,4109
315	1,6071	1,2690	1,0037	0,8303	0,7597	0,6645	0,5864	0,5050	0,4419	0,3927
355	1,5408	1,2155	0,9544	0,7929	0,7083	0,6356	0,5607	0,4815	0,4227	0,3756
400	1,4841	1,1706	0,9063	0,7651	0,6859	0,6227	0,5382	0,4633	0,4045	0,3606
450	1,4359	1,1331	0,8913	0,7394	0,6666	0,5896	0,5200	0,4473	0,3916	0,3478
500	1,3996	1,1021	0,8624	0,7201	0,6548	0,5810	0,5061	0,4344	0,3799	0,3371
550	1,3803	1,0882	0,8378	0,7073	0,6474	0,5757	0,4965	0,4269	0,3734	0,3349
560	1,3643	1,0754	0,8282	0,7009	0,6324	0,5725	0,4922	0,4227	0,3692	0,3285
600	1,3493	1,0582	0,8218	0,6944	0,6270	0,5585	0,4858	0,4184	0,3659	0,3242
630	1,3332	1,0497	0,8100	0,6837	0,6238	0,5436	0,4804	0,4130	0,3606	0,3199
650	1,3204	1,0379	0,7907	0,6752	0,6003	0,5393	0,4740	0,4066	0,3542	0,3157
700	1,3108	1,0304	0,7832	0,6741	0,5949	0,5382	0,4719	0,4045	0,3531	0,3146
710	1,3043	1,0272	0,7747	0,6688	0,5896	0,5371	0,4697	0,4034	0,3520	0,3135
750	1,2926	1,0176	0,7683	0,6634	0,5842	0,5307	0,4633	0,3980	0,3478	0,3103
800	1,2808	1,0079	0,7618	0,6559	0,5767	0,5222	0,4601	0,3959	0,3456	0,3060
900	1,2594	0,9908	0,7479	0,6441	0,5692	0,5136	0,4526	0,3884	0,3381	0,3007
1000	1,2433	0,9780	0,7383	0,6367	0,5607	0,4976	0,4462	0,3831	0,3338	0,2975
1100	1,2284	0,9662	0,7287	0,6281	0,5478	0,4869	0,4408	0,3777	0,3296	0,2932
1250	1,2155	0,9544	0,7126	0,6206	0,5339	0,4804	0,4355	0,3734	0,3264	0,2900
1400	1,2027	0,9459	0,6998	0,6142	0,5254	0,4783	0,4301	0,3692	0,3231	0,2857
1500	1,1952	0,9395	0,6955	0,6110	0,5157	0,4708	0,4280	0,3670	0,3199	0,2846

A	B									
	500	550	560	600	630	650	700	710	750	800
180	0,4879	0,4665	0,4462	0,4216	0,4109	0,3916	0,3884	0,3820	0,3681	0,3585
200	0,4526	0,4323	0,4152	0,3959	0,3820	0,3681	0,3606	0,3552	0,3424	0,3328
225	0,4355	0,4152	0,4002	0,3788	0,3681	0,3531	0,3456	0,3413	0,3338	0,3221
250	0,4216	0,4002	0,3809	0,3659	0,3542	0,3403	0,3328	0,3274	0,3210	0,3092
280	0,3948	0,3766	0,3585	0,3435	0,3328	0,3199	0,3167	0,3114	0,2975	0,2932
300	0,3766	0,3531	0,3435	0,3253	0,3157	0,3071	0,2996	0,2953	0,2814	0,2750
315	0,3574	0,3349	0,3264	0,3103	0,3007	0,2932	0,2846	0,2782	0,2696	0,2611
355	0,3413	0,3253	0,3114	0,2975	0,2868	0,2750	0,2718	0,2664	0,2557	0,2493
400	0,3274	0,3082	0,2985	0,2900	0,2761	0,2654	0,2589	0,2557	0,2472	0,2386
450	0,3167	0,2964	0,2889	0,2782	0,2654	0,2589	0,2525	0,2461	0,2386	0,2301
500	0,3071	0,2943	0,2803	0,2664	0,2579	0,2482	0,2429	0,2386	0,2311	0,2236
550	0,3039	0,2857	0,2771	0,2611	0,2450	0,2365	0,2301	0,2268	0,2279	0,2194
560	0,2996	0,2825	0,2729	0,2515	0,2504	0,2408	0,2290	0,2268	0,2236	0,2172
600	0,2943	0,2793	0,2707	0,2493	0,2482	0,2375	0,2268	0,2247	0,2194	0,2140
630	0,2910	0,2761	0,2664	0,2482	0,2450	0,2343	0,2268	0,2247	0,2161	0,2119
650	0,2900	0,2707	0,2632	0,2461	0,2418	0,2322	0,2258	0,2236	0,2140	0,2097
700	0,2868	0,2654	0,2622	0,2450	0,2408	0,2301	0,2247	0,2226	0,2129	0,2087
710	0,2846	0,2632	0,2600	0,2440	0,2397	0,2290	0,2226	0,2215	0,2119	0,2076
750	0,2814	0,2611	0,2568	0,2397	0,2365	0,2268	0,2204	0,2194	0,2108	0,2054
800	0,2793	0,2600	0,2547	0,2354	0,2333	0,2236	0,2183	0,2172	0,2087	0,2022
900	0,2739	0,2547	0,2504	0,2333	0,2301	0,2172	0,2151	0,2129	0,2044	0,1990
1000	0,2696	0,2515	0,2461	0,2290	0,2268	0,2151	0,2119	0,2087	0,2001	0,1958
1100	0,2664	0,2482	0,2429	0,2258	0,2236	0,2129	0,2097	0,2065	0,1969	0,1937
1250	0,2632	0,2429	0,2397	0,2226	0,2204	0,2076	0,2065	0,2044	0,1947	0,1905
1400	0,2611	0,2397	0,2375	0,2204	0,2183	0,2044	0,2033	0,2022	0,1926	0,1894
1500	0,2589	0,2386	0,2365	0,2183	0,2161	0,2022	0,2012	0,2001	0,1905	0,1883

Coefficient of local pressure loss of circular dampers

ØD	180	200	225	250	280	315	355	400	450	500	560	630
ξ	3,546	2,124	1,291	0,877	0,609	0,438	0,328	0,255	0,205	0,173	0,147	0,127

Noise data

Level of acoustic output corrected with filter A

$$L_{WA} = L_{W1} + 10 \log(S) + K_A$$

L_{WA}	[dB(A)]	level of acoustic output corrected with filter A
L_{W1}	[dB]	level of acoustic output L_{W1} related to the 1 m ² section
S	[m ²]	duct cross section
K_A	[dB]	correction to the weight filter A

Level of acoustic output L_{W1} [dB] related to the 1 m² section - rectangular dampers

	ξ [-]											
w [m/s]	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1	1,5	2	2,5
2	15,5	18,7	20,9	22,6	24	25,2	26,3	27,2	28	31,2	33,4	35,1
3	26,1	29,2	31,5	33,2	34,6	35,8	36,9	37,8	38,6	41,7	44	45,7
4	33,6	36,7	39	40,7	42,1	43,3	44,3	45,3	46,1	49,2	51,5	53,2
5	39,4	42,5	44,8	46,5	47,9	49,1	50,2	51,1	51,9	55	57,3	59
6	44,1	47,3	49,5	51,3	52,7	53,9	54,9	55,8	56,6	59,8	62	63,8
7	48,2	51,3	53,5	55,3	56,7	57,9	58,9	59,8	60,7	63,8	66,1	67,8
8	51,6	54,8	57	58,8	60,2	61,4	62,4	63,3	64,1	67,3	69,5	71,3
9	54,7	57,9	60,1	61,8	63,2	64,4	65,5	66,4	67,2	70,4	72,6	74,3
10	57,4	60,6	62,8	64,6	66	67,2	68,2	69,1	70	73,1	75,3	77,1
11	59,9	63,1	65,3	67,1	68,5	69,7	70,7	71,6	72,4	75,6	77,8	79,6
12	62,2	65,4	67,6	69,3	70,7	71,9	73	73,9	74,7	77,9	80,1	81,8

Level of acoustic output L_{W1} [dB] related to the 1 m² section - circular dampers

	ξ [-]											
w [m/s]	0,1	0,2	0,3	0,4	0,6	0,8	1,0	1,5	2	2,5	3	3,5
2	9	11,5	14,7	16,9	20,1	22,3	24,1	27,2	29,4	31,2	32,6	33,8
3	16,7	22,1	25,3	27,5	30,7	32,9	34,6	37,8	40	41,7	43,2	44,4
4	24,2	29,6	32,8	35	38,1	40,4	42,1	45,3	47,5	49,2	50,7	51,9
5	30	35,4	38,6	40,8	44	46,2	47,9	51,1	53,3	55,1	56,5	57,7
6	34,8	40,2	43,3	45,6	48,7	51	52,7	55,8	58,1	59,8	61,2	62,4
7	38,8	44,2	47,3	49,6	52,7	55	56,7	59,9	62,1	63,8	65,2	66,4
8	42,3	47,7	50,8	53,1	56,2	58,4	60,2	63,3	65,6	67,3	68,7	69,9
9	45,4	50,7	53,9	56,1	59,3	61,5	63,3	66,4	68,6	70,4	71,8	73
10	48,1	53,5	56,6	58,9	62	64,3	66	69,1	71,4	73,1	74,5	75,7
11	50,6	56	59,1	61,4	64,5	66,7	68,5	71,6	73,9	75,6	77	78,2
12	52,8	58,2	61,4	63,6	66,8	69,0	70,7	73,9	76,1	77,9	79,3	80,5

Correction to the weight filter A - rectangular and circular dampers

w [m/s]	2	3	4	5	6	7	8	9	10	11	12
K_A [dB]	-15	-11,8	-9,8	-8,4	-7,3	-6,4	-5,7	-5	-4,5	-4	-3,6

Level of acoustic output in octave ranges

$$L_{Woct} = L_{W1} + 10 \log(S) + L_{rel}$$

L_{Woct}	[dB]	spectrum of acoustic output in octave range
L_{W1}	[dB]	level of acoustic output L_{W1} related to the 1 m ² section
S	[m ²]	duct cross section
L_{rel}	[dB]	relative level expressing the shape of the spectrum

Relative level expressing the shape of the spectrum L_{rel} - rectangular and circular dampers								
	f [Hz]							
w [m/s]	63	125	250	500	1000	2000	4000	8000
2	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9	-56,4
3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4	-48,9
4	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9
5	-4	-4,1	-5,9	-9,4	-14,6	-21,5	-30,0	-40,3
6	-4,2	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4
7	-4,5	-3,9	-4,9	-7,5	-11,9	-17,9	-25,7	-35,1
8	-4,9	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2
9	-5,2	-3,9	-4,3	-6,4	-10,1	-15,6	-22,7	-31,5
10	-5,5	-4	-4,1	-5,9	-9,4	-14,6	-21,5	-30
11	-5,9	-4,1	-4	-5,6	-8,9	-13,8	-20,4	-28,8
12	-6,2	-4,3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6

VII. MATERIAL, FINISHING

- Damper casings are made from galvanized sheet metal without further surface treatment.
- Damper blades and actuator cover are made from fire resistant asbestos free boards made of mineral fibres.
- Fasteners are galvanized.
- According to the customer's requirements, dampers can be made of stainless steel material.
- Specifications for stainless-steel design:
 - Class A2 – Food-grade stainless steel (AISI 304 – EN 1.4301)
 - Class A4 – Chemistry-grade stainless steel (AISI 316, 316L – EN 1.4401, EN 1.4404)

The respective stainless steel is the material for all components that are located or entering the damper inner space; components outside the damper casing are typically from galvanised sheet metal (fasteners for mounting the actuator).

The following components, including the fasteners, are made from stainless steel at all times:

- 1) Damper casing and all components permanently attached
- 2) Blade holders including pins, metal parts of blades
- 3) Control components inside the damper (L-profile, pin with lever, rod, fasteners)
- 4) Inspection opening cover including the stirrup and fasteners (if they are parts of the cover)
- 5) Bearing for torque transfer from the lever with pin on the blade L-profile (made from AISI 440C)

The damper blade is made from boards of homogeneous material Promatect-H, connected with "U" clips on the outside, sealed with Promat K84 glue.

Plastic, rubber and silicon components, sealants, foaming tapes, glass-ceramic seals, housings, brass bearings of the blade, actuators are identical for all material variants of the dampers.

Some fasteners and components are only available in one class of stainless steel; the type will be used in all stainless-steel variants.

The damper blade in the variant for chemical environments (Class A4) is always treated with a coating of chemically resistant Promat SR.

Any other requirements for the design will be considered atypical and will be addressed on an individual basis.

VIII. TRANSPORTATION, STORAGE AND WARRANTY

Logistic terms

- Dampers are delivered on pallets. As standard, the dampers are wrapped in plastic foil for protection during transport and must not be used for long-term storage. Temperature changes during transport can cause condensation of water inside the packaging and thereby cause corrosion of materials used in the dampers (e.g. white corrosion on zinc-coated items or mould on calcium silicate). Therefore, it is necessary to remove the transport packaging immediately after unloading to allow air to circulate around the product.
- The dampers must be stored in clean, dry, well ventilated and dust-free environment out of direct sunlight. Ensure protection against moisture and extreme temperatures (minimum temperature +5°C). The dampers must be protected against mechanical and accidental damage prior to installation.
- Another required packaging system should be approved and agreed by manufacturer. Packaging material is not returnable in case that another packaging system (material) is required and used and it is not included into final price of damper.
- Dampers are transported by box freight vehicles without direct weather impact, there must not occur any shocks and ambient temperature must not exceed +50°C. Dampers must be protected against impact when transported and manipulated. During transportation, the damper blade must be in the "CLOSED" position.
- Dampers must be stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -30°C to +50°C and maximum relative humidity 95%.

Warranty

- The manufacturer provides a warranty of 24 months from the date of dispatch for the dampers.
- In case of using a Schischek actuator, the manufacturer provides a 12-month warranty for the actuator from the date of shipment.
- The warranty for dampers MSD, provided by the manufacturer, is completely void if actuating, closing and control devices are unprofessionally handled by untrained workers or if electric components, i.e. limit switches, actuators, communication and supply devices and thermoelectric activation devices are dismantled.
- The warranty is void if dampers are used for other purposes, devices and working conditions than those allowed by these technical conditions or if the dampers are mechanically damaged during handling.
- If the dampers are damaged by transport, a record must be written down with the forwarder at reception for later complaint.

IX. ASSEMBLY, ATTENDANCE AND MAINTENANCE

- Assembly, maintenance and damper function check can be done only by qualified and trained person, i.e. "AUTHORIZED PERSON" according to the manufacturer documentation. All works done on the fire dampers must be done according international and local norms and laws.
- All effective safety standards and directives must be observed during damper assembly.
- To ensure reliable damper function it is necessary to avoid blocking the actuating mechanism and contact surfaces with collected dust, fibre and sticky materials and solvents.
- Flange and screw joints must be conductively connected to protect against dangerous contact. 2 galvanized lock washers that are placed under the head of one screw and a fastened nut are used for conductive connection.

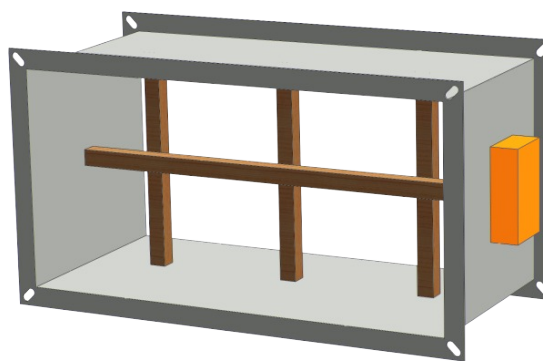
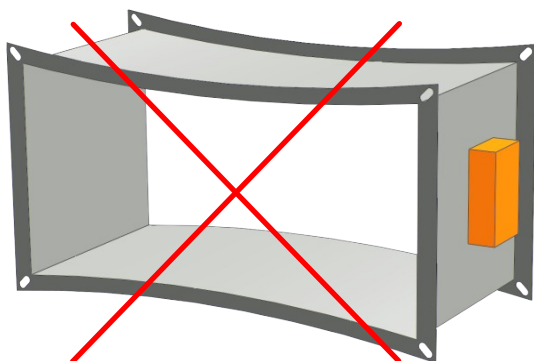
Manual operation - actuator control without electric voltage

- A special wrench (part of the actuator) can be used to manually turn the damper blade to any position. When the wrench is turned in the direction of the arrow, the damper blade rotates to its open position. As the blade rotation is stopped, in every position, the actuator will be locked. Unlocking is possible even manually as per instructions on the actuator, or by the activation of the supply voltage.

Installation / fixing the damper

- The damper casing shall not be deformed in the course of bricking in.
- Once the damper is built in, the damper blade shall not grind on the damper casing during opening or closing.

Protection of the damper casing against buckling during installation, especially for large sizes!

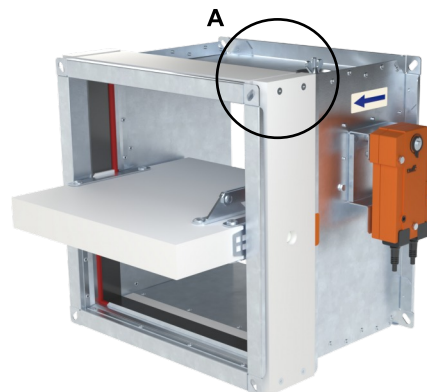
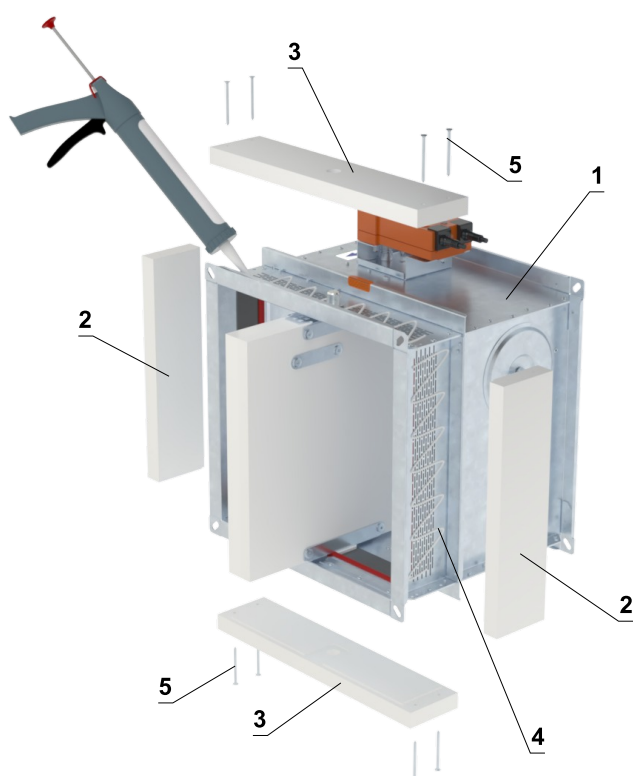


Protective cladding boards

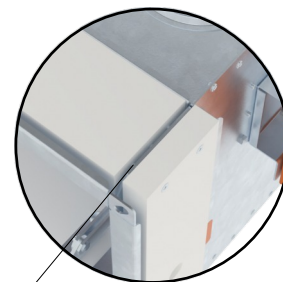
- Protective cladding boards must be used as part of the penetration filling of installation with Ablative Coated Batt.
- Can be ordered from MANDIK (installed on the damper or as an accessory) or can be sourced from local supplier
- If protective cladding boards are required, this must be specified in the ordering key
- Protective cladding boards are made of PROMATECT-MST, thickness 30 mm.
- Glue K84 is not included in the package

Installation procedure

- 1) Apply K84 glue over the entire surface
- 2) Attach protective cladding boards on all sides of a fire damper and glue them on the damper casing
- 3) Screw parts A and B using four screws 5x70 mm
- 4) Completely fill the gaps with glue



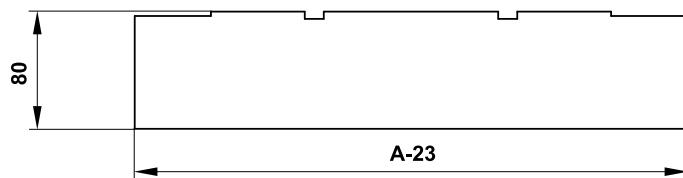
DETAIL A



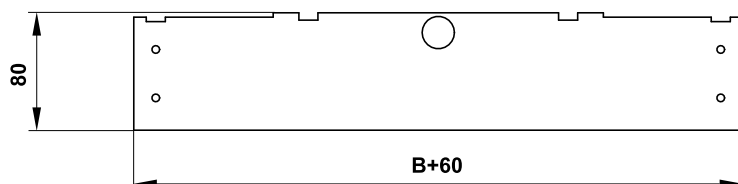
Completely fill the gaps between boards!

- 1 MSD
- 2 Part A
- 3 Part B
- 4 Glue PROMAT K-84
- 5 Screw 5x70 mm

Part A



Part B



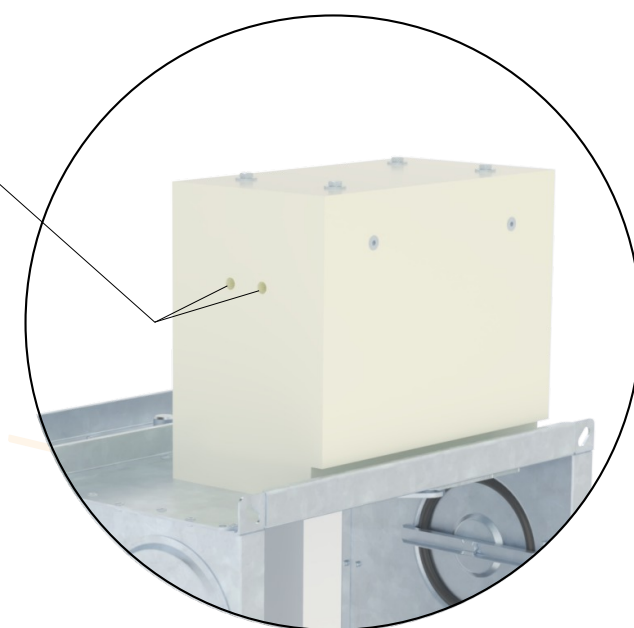
- Detailed dimensions of protective cladding boards on request.

Electrical connection of the actuator in protection box

protection box without slot or predrilled holes

- Drill two holes into the protection box (from outside to inside) and pull through field wiring cables (CAT 3 fire resistant cables as BS 8519) to connect to the actuator trailing lead inside the housing, using a standard screwed cable connector block, the protection box is made of calcium silicate plates.
- Procedure
 - Use drill (drill size acc. To suit connecting cable $\varnothing + 2$ mm for seal up by mastic) and make two holes. It is possible to drill holes in any side of the housing.
 - Pull the heat resistant cable through the calcium silicate plate (wall) and connect with cables from actuator acc. To electrical diagram → [see pages 6 to 9](#)
 - Seal up the space around cable with fire resistant mastic (HILTI CFS-S ACR, PROMASTOP) or equivalent.
 - Let the mastic harden

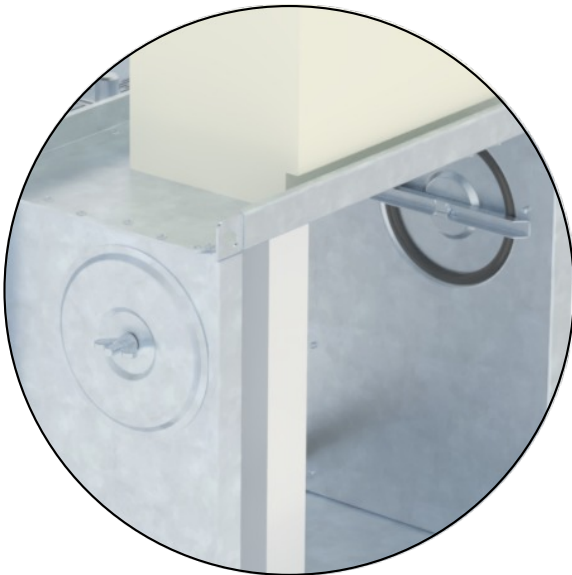
Example of drilled holes



Example of position of holes in the wall of the box, without pre-manufactured slot

Entry into service and revisions

- Before entering the dampers into operation after assembly and after sequential revisions, checks and functionality tests of all designs including operation of the electrical components must be successfully provided and finished. After entering into operation, these revisions must be done according to requirement set by national regulations.
- In case that dampers are found unable to serve for their function for any cause, it must be clearly marked. The operator is obliged to ensure that the damper is put into condition in which it is ready for function and meanwhile he is obliged to provide the fire protection by another appropriate way.
- Removing the inspection hole cover
 - Unscrew four of the edge screws to release the cover and then remove it from its original position.
- Results of regular checks, imperfections found and all-important facts connected with the damper function must be recorded in the "FIRE BOOK" and immediately reported to the operator.
- Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out for all designs.
- Visual inspection of proper damper integration, inside damper area, damper blade, contact surfaces and silicon sealing.



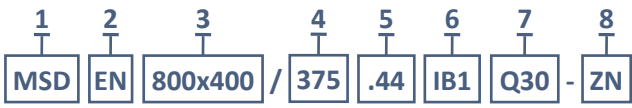
Inspection hole detail

- Ensure each damper is fully checked for operational capability, control should be initiated from the control system. Dampers blades should open and close correctly and operation should be visually inspected and documented prior to handover.

X. ORDERING INFORMATIONS

Ordering key MSD

Rectangular damper MSD



EXAMPLE:

MSD EN 800x400/375 .44 IB1 Q30-ZN

Rectangular smoke control damper MSD, dimension 800x400 mm, built length 375 mm, control design with actuating mechanism 230 V, design includes protection box of the actuator and include the protective cladding boards in line with the blade, flange dimension 30 mm, galvanized material variant.

1| Type of smoke control damper - MSD

2| Country of destination

3| Damper dimensions A x B → see pages 18 to 27

4| Built length - 375 mm

"A" is the width of the damper

"B" is the height of the damper

5| Damper design

.44	With actuating mechanism BEN, BEE, BE, InMax 50.75-S for 230V
.54	With actuating mechanism BEN, BEE, BE, InMax 50.75-S for 24V
.65*	With actuating mechanism BEN (BEE)-SR for 24V

* Design .65 is not available by using actuating mechanism BE, InMax 50.75-S

6| Accessories

	Without accessories
A	Design does not include protection box of the actuator and does not include protective cladding boards in line with the blade
A1	Design does not include protection box of the actuator and includes protective cladding boards in line with the blade
IB	Design includes protection box of the actuator and does not include the protective cladding boards in line with the blade
IB1	Design includes protection box of the actuator and include the protective cladding boards in line with the blade

7| Flange dimension

Q30	Flange width 30 mm
-----	--------------------

8| Material and other design options

ZN	Galvanized
A2	Stainless steel 1.4301 (AISI 304)
A4	Stainless steel 1.4404 (AISI 316L)

Circular damper MSD



EXAMPLE:

MSD EN DN 500 .44 RS-ZN

Circular smoke control damper MSD, dimension DN 500 mm, control design with actuating mechanism 230 V, straight connection to circular duct, galvanized material variant.

1| Type of smoke control damper - MSD

2| Country of destination

3| Damper dimensions ØD → see page 28

4| Damper design

.44	With actuating mechanism BEN 230V
.54	With actuating mechanism BEN 24V

5| Duct connection

RS	Straight connection to circular duct
----	--------------------------------------

6| Material and other design options

ZN	Galvanized
A2	Stainless steel 1.4301 (AISI 304)
A4	Stainless steel 1.4404 (AISI 316L)

Ordering key MSD-W

Rectangular damper MSD-W



EXAMPLE:

MSD-W EN 800x400/375 .44 Q30-ZN

Rectangular smoke control damper MSD-W, dimension 800x400 mm, built length 375 mm, control design with actuating mechanism 230 V, flange dimension 30 mm, galvanized material variant.

1| Type of smoke control damper - MSD-W

2| Country of destination

3| Damper dimensions A x B → see pages 18 to 27

"A" is the width of the damper

"B" is the height of the damper

4| Built length - 375 mm

5| Damper design

.44	With actuating mechanism BEN 230V
.54	With actuating mechanism BEN 24V
.4M0	With actuating mechanism BFN 230, JOVENTA DAF2.20S with an electromagnet for 230V
.4M1	With actuating mechanism BFN 230, JOVENTA DAF2.20S with an electromagnet for 24V
.5M0	With actuating mechanism BFN 24, JOVENTA DAF1.20S with an electromagnet for 230V
.5M1	With actuating mechanism BFN 24, JOVENTA DAF1.20S with an electromagnet for 24V

6| Flange dimension

Q30	Flange width 30 mm
-----	--------------------

7| Material and other design options

ZN	Galvanized
A2	Stainless steel 1.4301 (AISI 304)
A4	Stainless steel 1.4404 (AISI 316L)

Circular damper MSD-W



EXAMPLE:

MSD-W EN DN 400 .4M0 RS-ZN

Circular smoke control damper MSD-W, dimension DN 400 mm, control design with actuating mechanism 230 V, straight connection to circular duct, galvanized material variant.

1| Type of smoke control damper - MSD-W

2| Country of destination

3| Damper dimensions ØD → see page 28

4| Damper design

.4M0	With actuating mechanism BFN 230, JOVENTA DAF2.20S with an electromagnet for 230V
.4M1	With actuating mechanism BFN 230, JOVENTA DAF2.20S with an electromagnet for 24V
.5M0	With actuating mechanism BFN 24, JOVENTA DAF1.20S with an electromagnet for 230V
.5M1	With actuating mechanism BFN 24, JOVENTA DAF1.20S with an electromagnet for 24V

5| Duct connection

RS	Straight connection to circular duct
----	--------------------------------------

6| Material and other design options

ZN	Galvanized
A2	Stainless steel 1.4301 (AISI 304)
A4	Stainless steel 1.4404 (AISI 316L)

Data label

- Data label is placed on the damper casing (example)

MANDÍK®		MANDÍK, a.s. Dobříšská 550, 267 24 Hostomice, Czech Republic	
MULTI COMPARTMENT SMOKE CONTROL DAMPER - XXXX			
DIMENSION:		DESIGN:	
SERIAL.NO.:		WEIGHT (kg):	
CLASSIFICATION:		MANUAL	
TPM XXX/XX	Cert. No.: 1391-CPR-XXXX/XXXX, DoP: PM/XXXX/XX/XX/X	XX	EN 12101:2011
			 1391

The producer reserves the right for innovations of the product.
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