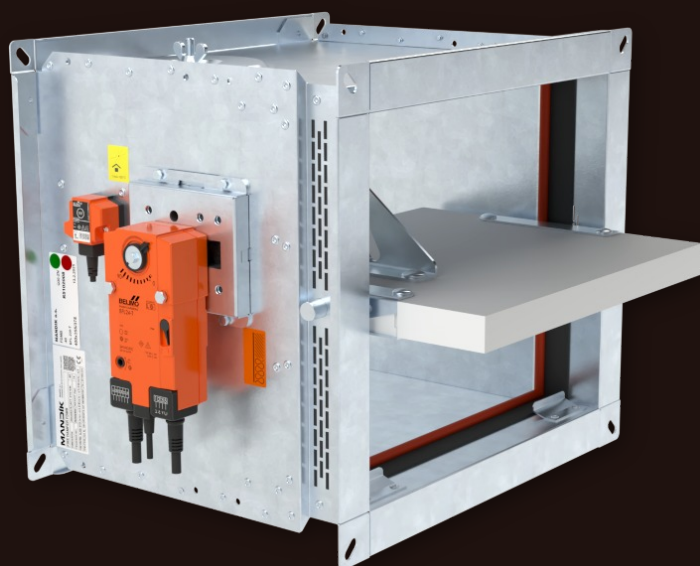


FDMB

Fire damper

Technical Documentation

Installation, Commissioning, Operation, Maintenance and Service Manual



These technical specifications state a row of manufactured sizes and models of fire dampers FDMB.
It is valid for production, designing, ordering, delivery, maintenance and operation.

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I. GENERAL

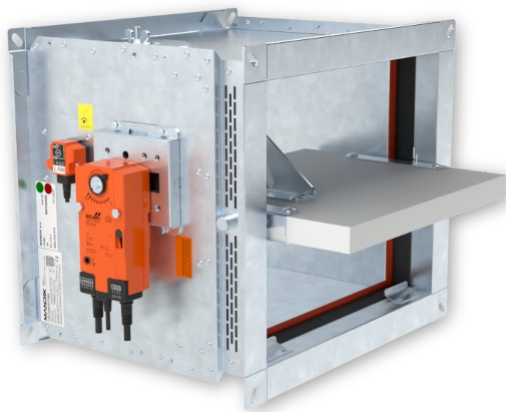
Description

Fire dampers are shutters in ducts of air-conditioning devices that prevent the spread of fire and combustion products from one fire segment to the other one by means of closing the duct in the points of fire separating constructions.

Damper blade automatically closes air duct using a closing spring or a spring return actuator. The closing spring is actuated by pressing a button on the manual control or by melting a thermal fuse.

The return spring of the actuator is actuated when a thermoelectric activation device BAT is activated, when a test button on BAT is pressed or when power supply of the actuator is interrupted.

After closing the blade, the damper is sealed with silicon against smoke penetration. On request by customer, the damper can be supplied silicon-free. In the closed position, the damper is also sealed with material which increases its volume due to increasing temperature and air proofs the air duct.



FDMB with spring return actuator



FDMB with manual control

Damper characteristics

- CE certified acc. to BS EN 15650
- Tested in accordance with BS EN 1366-2
- Classified acc. to BS EN 13501-3+A1
- External casing leakage for size: A<160 or B<160 class ATC 4 (old marking "B"), A≥160 a B≥160 class ATC 3 (old marking "C"), Internal leakage class 2 acc. to BS EN 1751
- Cycling test in class C₁₀₀₀₀ acc. to BS EN 15650
- Corrosion resistant acc. to BS EN 15650
- Certificate of constancy of performance UKCA No. 2822-UKCA-CPR-XXXX
- Certificate of constancy of performance CE No. 1391-CPR-XXXX/XXXX
- Declaration of Performance UKCA No. PM/FDMB/02/XX/X
- Declaration of Performance CE No. PM/FDMB/01/XX/X
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

Working conditions

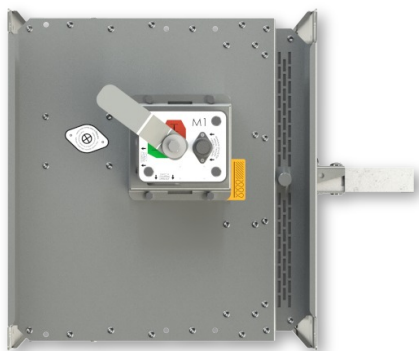
- Exact damper function is provided under the following conditions:
 - maximum air velocity 12 m/s
 - maximum pressure difference 1200 Pa
 - the air circulation in the whole damper section must be secured steady over the entire surface.
- Dampers can be installed in arbitrary position
- Dampers are suitable for systems without abrasive, chemical and adhesive particles.
- Dampers are designed for macroclimatic areas with mild climate according to BS 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 manual control

Design .01

- Design with mechanical control with a thermal protective fuse which actuates the shutting device, after the nominal start temperature 72°C has been reached.
- Automatic initiation of the shutting device is not activated if the temperature does not exceed 70°C.
- In case that other start temperatures are required, thermal fuses with nominal start temperature +104°C or +147°C can be supplied (this requirement must be specified in the order).



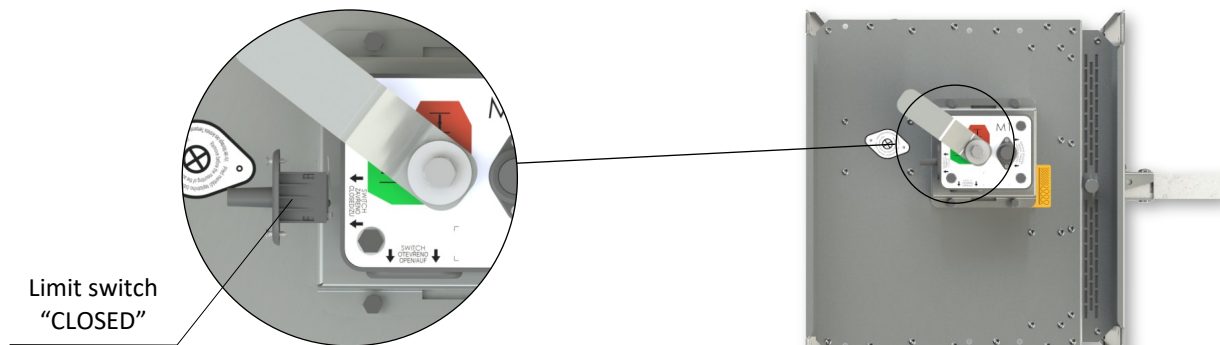
Design .01

ATTENTION:

- Mechanisms are produced in three designs M1 to M3, difference is only in size of inner spring, which closes the fire damper.
- For the size of fire dampers is always assigned the size of mechanism → see pages 14 to 19
- It is not recommended to use different size of mechanism, than given by the manufacturer, otherwise, there is a risk of fire damper destruction.

Design .11

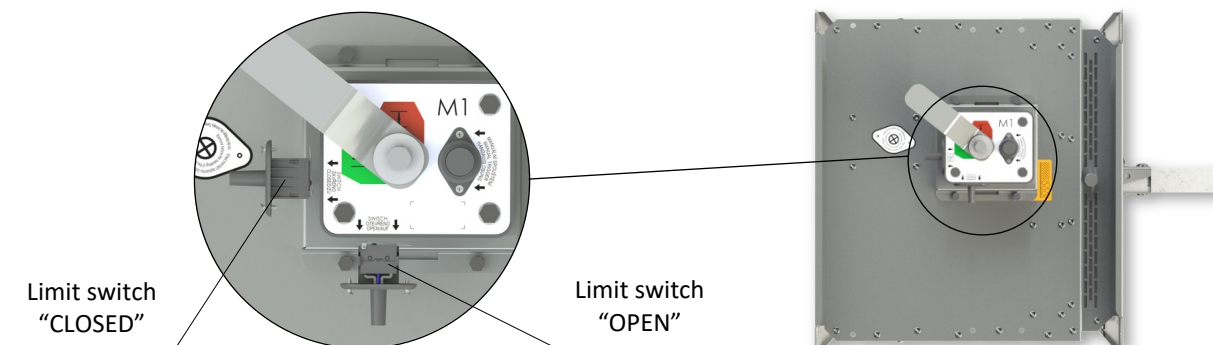
- Design .01 with mechanical control can be complemented with a limit switch signalling of the damper blade position "CLOSED".
- Cable is connected directly to limit switch.
- Limit switch detail → see page 5



Design .11

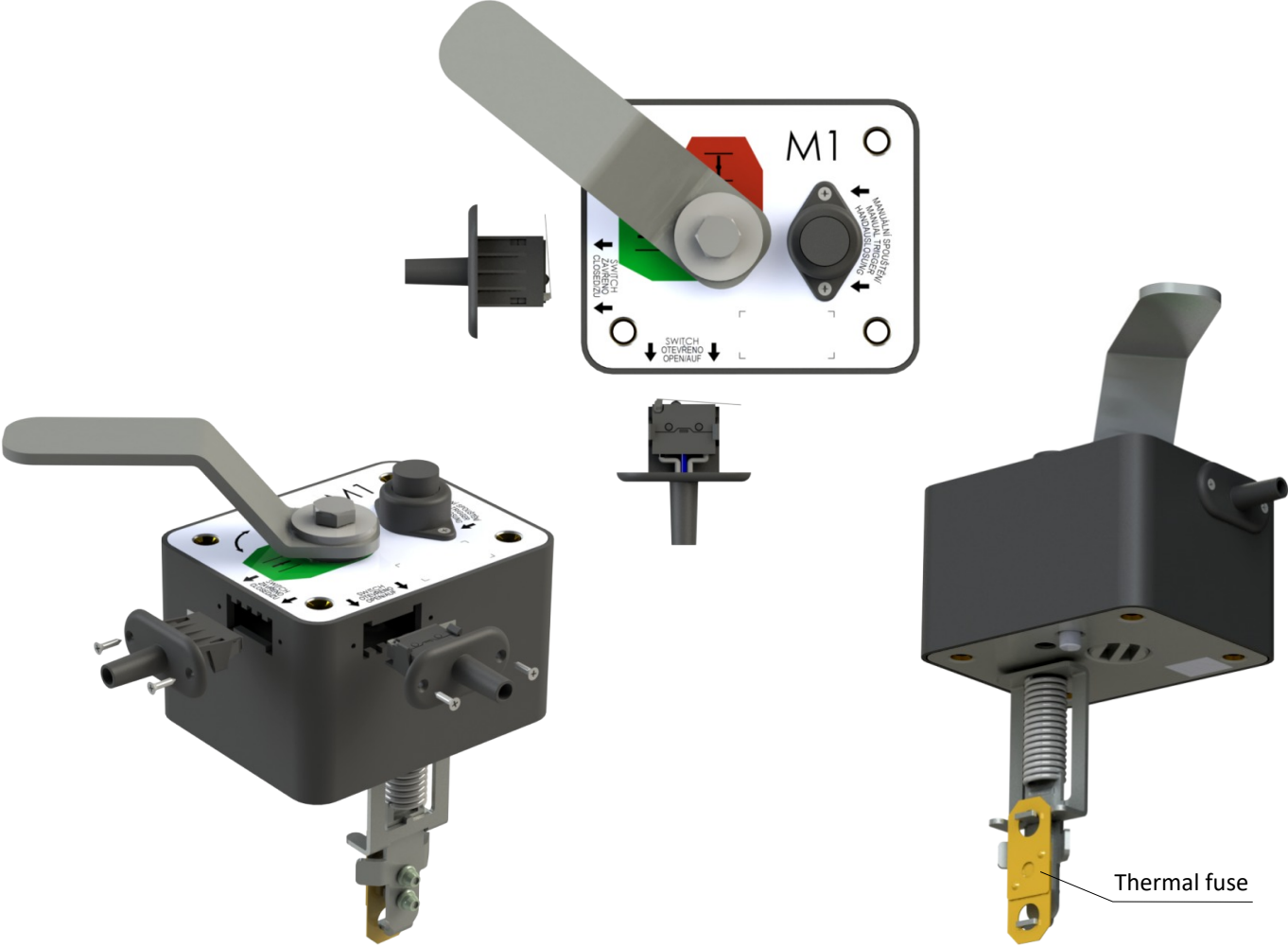
Design .80

- Design .01 with mechanical control can be complemented with a terminal switches signaling of the damper blade position "CLOSED" and "OPEN".
- Limit switches are connected via damper casing, cables are connected directly to limit switches.
- Limit switch detail → see page 5

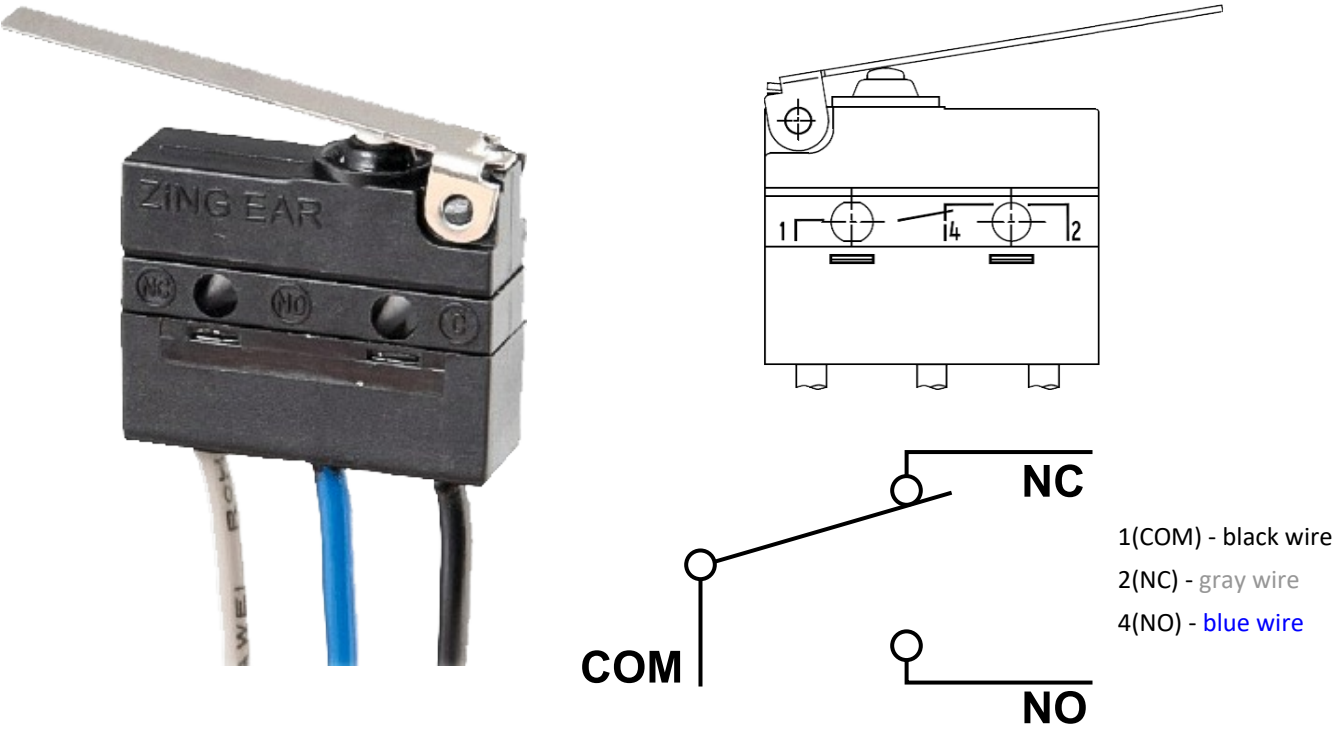


Design .80

Manual control



Limit switch G905-300E03W1



Nominal voltage and maximal current	AC 230V / 5A
Class of protection	IP 67
Working temperature	-25°C ... +120°C

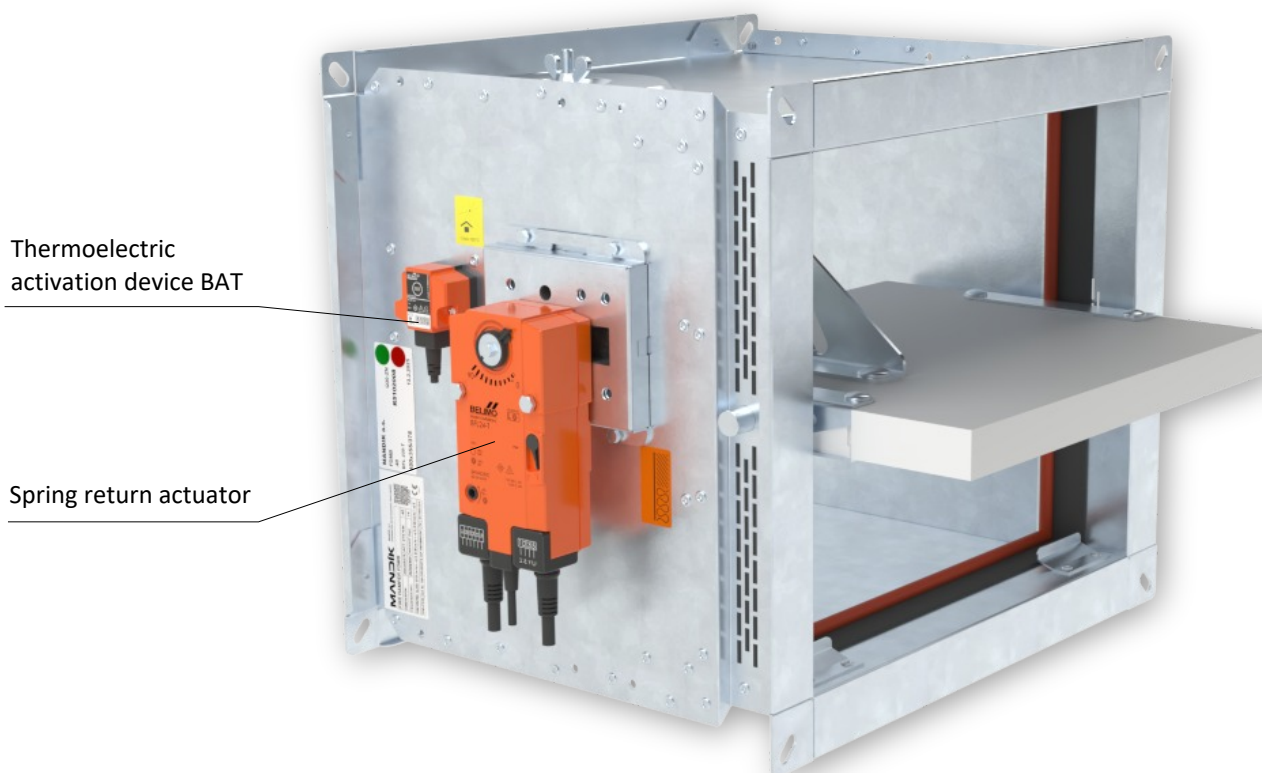
This limit switch is possible to connect in following two versions

- CUT-OFF if the arm is moving ... connect wire 1+2
- SWITCH-ON if the arm is moving ... connect wire 1+4

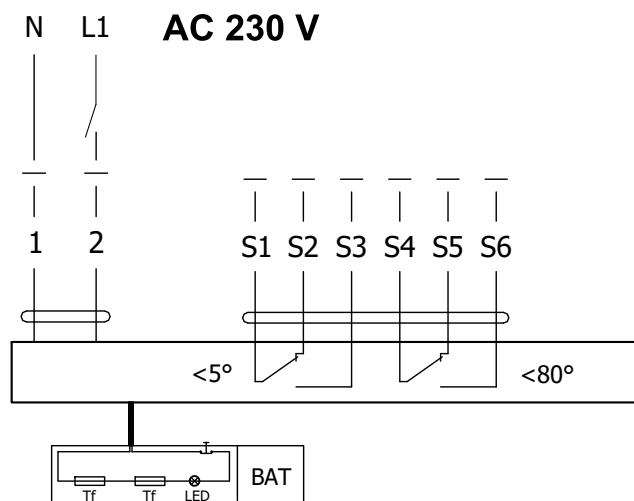
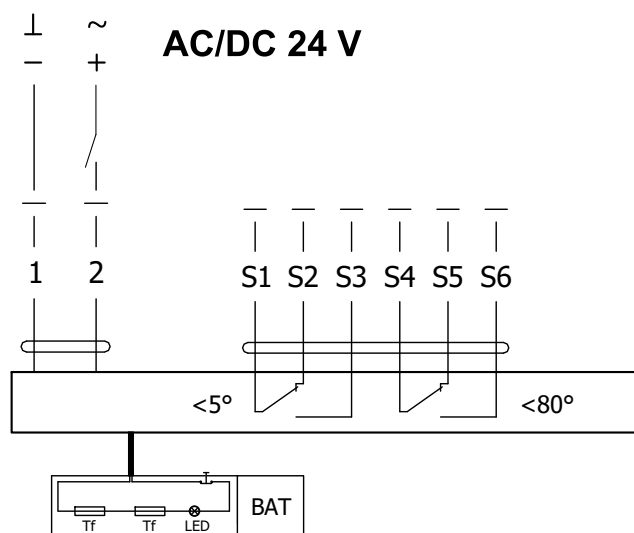
Design with spring return actuator

Design .40 and .50

- The fire dampers are equipped with Belimo spring return actuators with thermoelectric activation device BAT. The spring return actuator types are BFL, BFN or BF depending on the damper size. (Further mentioned as „actuator“).
- After being connected to power supply 230V or AC/DC 24V, the actuator rotates the damper blade to the operating position "OPEN" and at the same time pre-stretches its return spring.
- When the actuator is power supplied, the damper blade is in the position "OPEN" and the return spring is pre-stretched.
- Time needed for full opening of the damper blade from the position "CLOSED" to the position "OPEN" is maximum 120 sec. If the actuator power supply is interrupted (due to loss of supply voltage, or pressing a test button on the thermoelectric activation device BAT), the actuator rotates the damper blade to the breakdown position "CLOSED".
- The time of closing the damper blade from the position "OPEN" to the position "CLOSED" takes maximum 20 sec.
- In case that the power supply is restored again (the blade can be in any position), the actuator starts to rotate the damper blade back to the position "OPEN".
- A thermoelectric activation device BAT, which contains two thermal fuses Tf1 and Tf2, is an integral part of the actuator.
- These fuses are activated when temperature +72°C has been reached (the fuse Tf1 due to temperature outside the duct and the fuse Tf2 due to temperature inside the duct).
- After the thermal fuse Tf1 or Tf2 has been activated, the power supply is permanently and irreversibly interrupted and the actuator, by means of the pre-stretched spring, rotates the damper blade into the breakdown position "CLOSED".
- Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two microswitches.

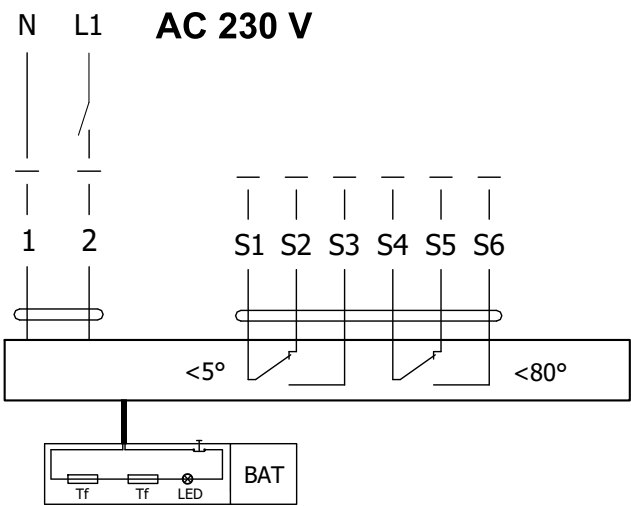


Design .40 and .50

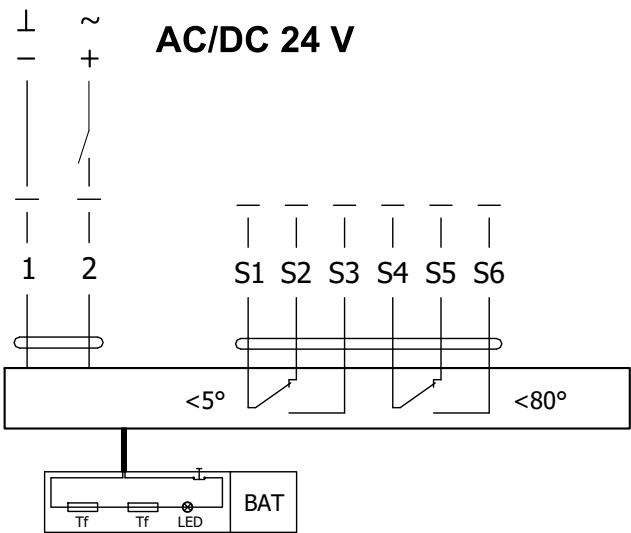
Actuator BELIMO BFL 230-T**Actuator BELIMO BFL 24-T(-ST)****Actuator BELIMO BFL 230-T(-ST), BFL 24-T(-ST)**

Actuator BELIMO - 4 Nm/ 3 Nm Spring	BFL 230-T(-ST)	BFL 24-T(-ST)
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	3,5 W 1,1 W	2,5 W 0,8 W
Dimensioning	6,5 VA (I _{max} 4 A @ 5 ms)	4 VA (I _{max} 8,3 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 (BFL 2xx-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm ² (BFL 2xx-T-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

Actuator BELIMO BFN 230-T

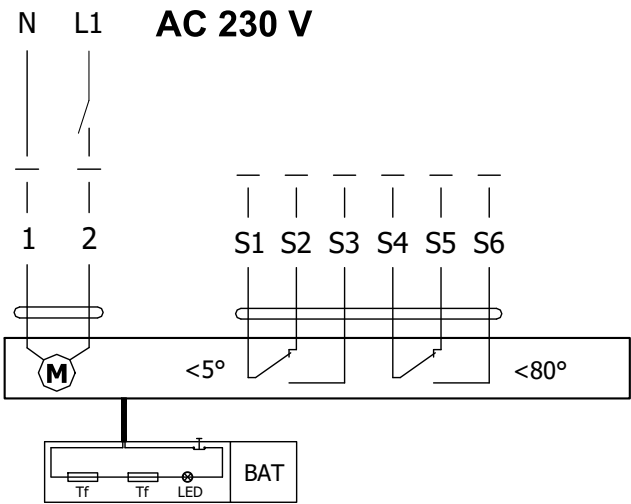


Actuator BELIMO BFN 24-T(-ST)

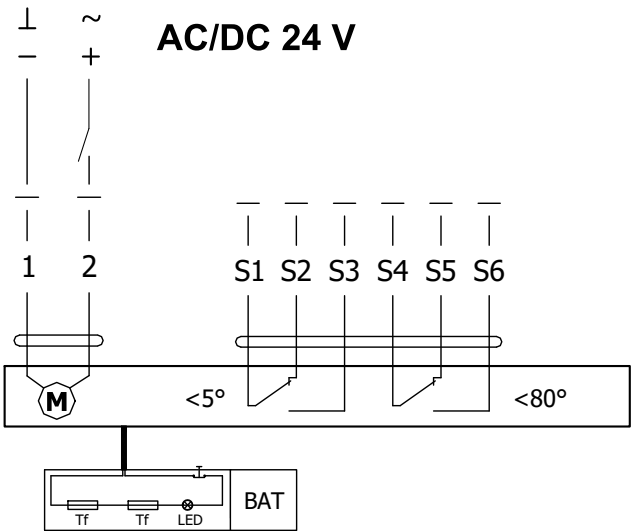


Actuator BELIMO BFN 230-T(-ST), BFN 24-T(-ST)		
Actuator BELIMO - 9 Nm/ 7 Nm Spring	BFN 230-T(-ST)	BFN 24-T(-ST)
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	5 W 2,1 W	4 W 1,4 W
Dimensioning	10 VA (Imax 4 A @ 5 ms)	6 VA (Imax 8,3 A @ 5 ms)
Protection 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 mm² (BFN 2xx-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm² (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 BELIMO BF 230-TN



Actuator BELIMO BF 24-TN (-ST)



Actuator BELIMO BF 230-TN(-ST), BF 24-TN(-ST)

Actuator BELIMO - 18 Nm/ 12 Nm Spring	BF 230-TN(-ST)	BF 24-TN(-ST)
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	8,5 W 3 W	7 W 2 W
Dimensioning	11 VA (Imax 8,3 A @ 5 ms)	10 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	120 s ~ 16 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	-30°C ... +50°C The safe position will be attained up to max. +75°C -40°C ... +50°C	
Connection - supply/control - auxiliary switch	cable 1 m, 2 x 0,75 mm ² (BF 2xx-TN-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm ² (BF 2xx-TN-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

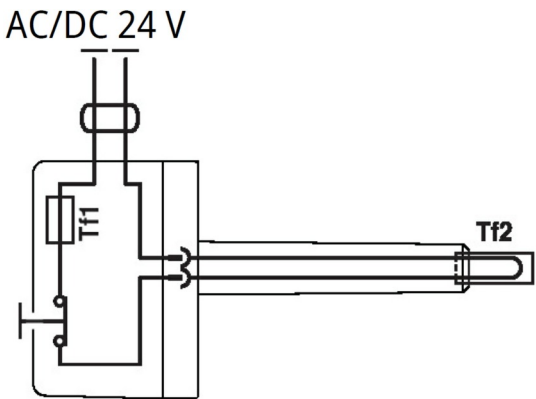
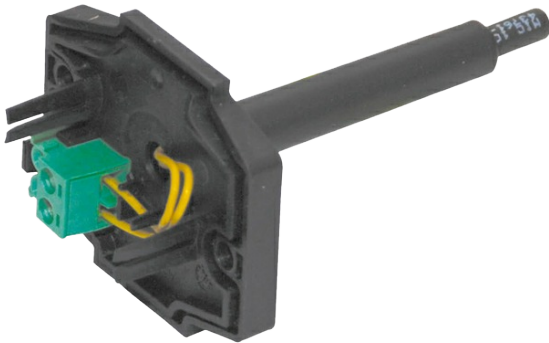
Thermoelectric activation device BAT

- If the thermal fuse Tf1 breaks (for a temperature close to the fire damper), it is necessary to replace the actuating mechanism. Thermoelectric starting mechanism BAT is integral part of the actuating mechanism.
 - If the thermal fuse Tf2 is interrupted (due to temperature inside the duct), only the spare part ZBAT 72.
- When one of the thermal fuses responds, the supply voltage is interrupted permanently and irreversibly.
 - The function (interruption of the supply voltage) can be checked by pressing the test button.
 - Installation is carried out with the pre-assembled, self-tapping screws.



Temperature thermal fuse
Spare parts are only supplied on the basis of an order.

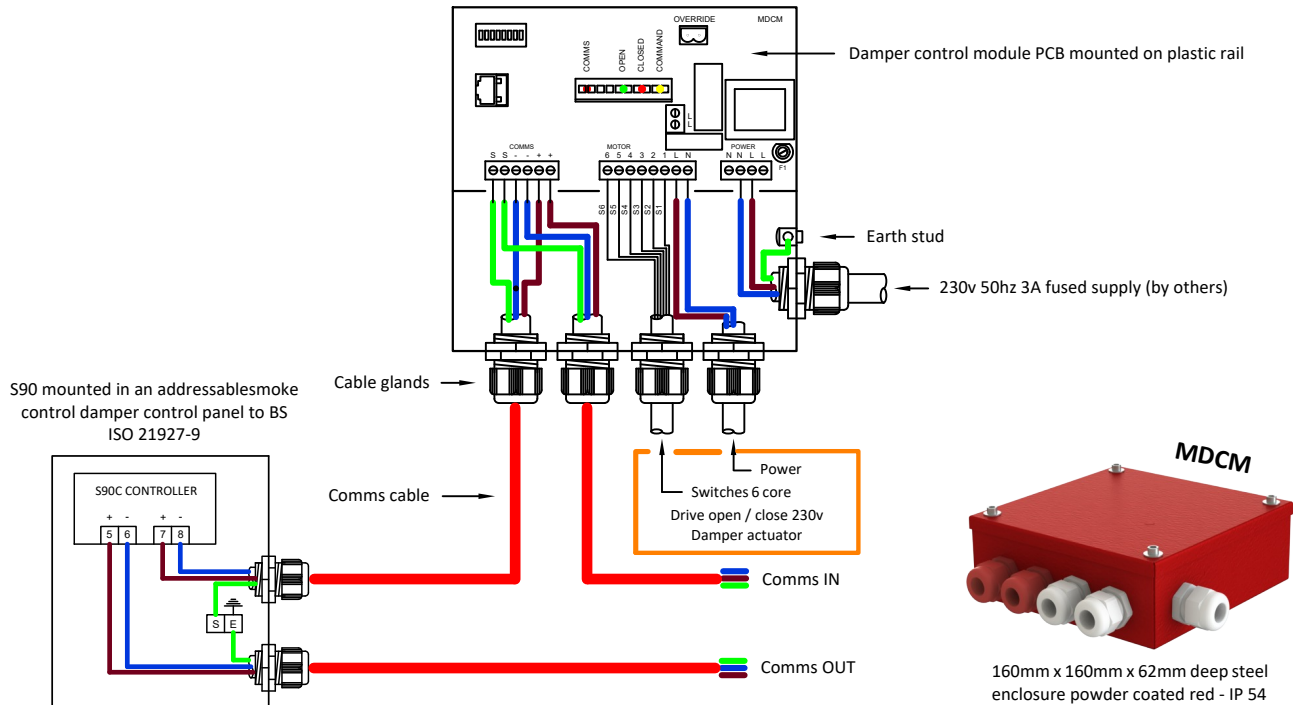
BELIMO ZBAT 72
Black (BK) = 72°C (standard)



Thermoelectric activation device BAT 72	
Power voltage	AC/DC 24 V 50/60Hz
Rated current	1 A
AC/DC throughput resistance	<1 Ω
Protection class	III
Degree of protection	IP 54
Probe length	65 mm
Ambient temperature	-30°C ... +50°C
Storage temperature	-40°C ... +50°C
Ambient humidity	Max. 95% RH, non-condensing
Connection supply	Cable 1 m, 2 x 0.5 mm², Betaflam cable heatresistant up to 145°C
Response temperature thermal fuse	Duct inside temperature +72°C Duct outside temperature +72°C

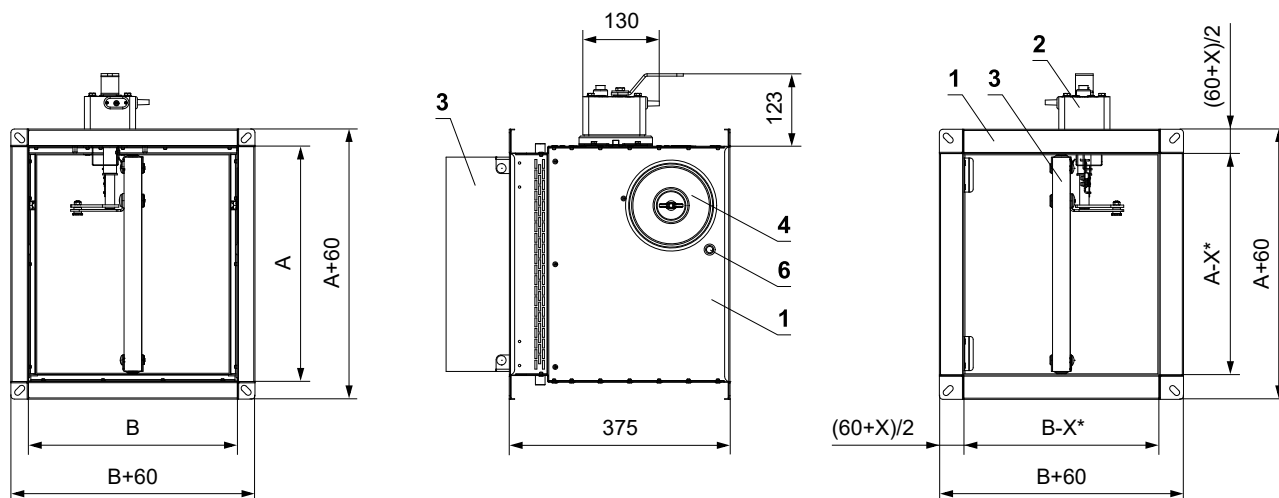
Communication and control module MDCM

- The MDCM damper control module is connected on a bi directional communication loop back to a control panel, typically located at the FCC.
- Each MDCM has a 230v local spur to power the damper actuator.
- Up to 96x MDCM's can be connected on one loop and multiple loops can be incorporated.
- This accessory is only required with MANDIK control systems.
- Max terminal size in MDCM 2.5mm²



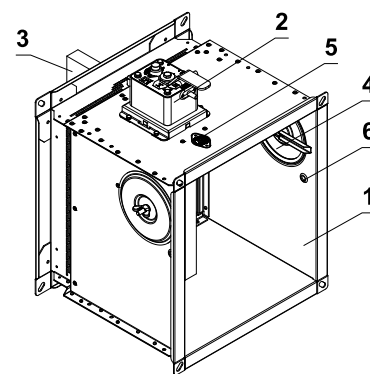
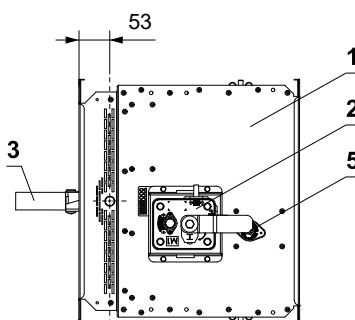
III. DIMENSIONS

FDMB with manual control

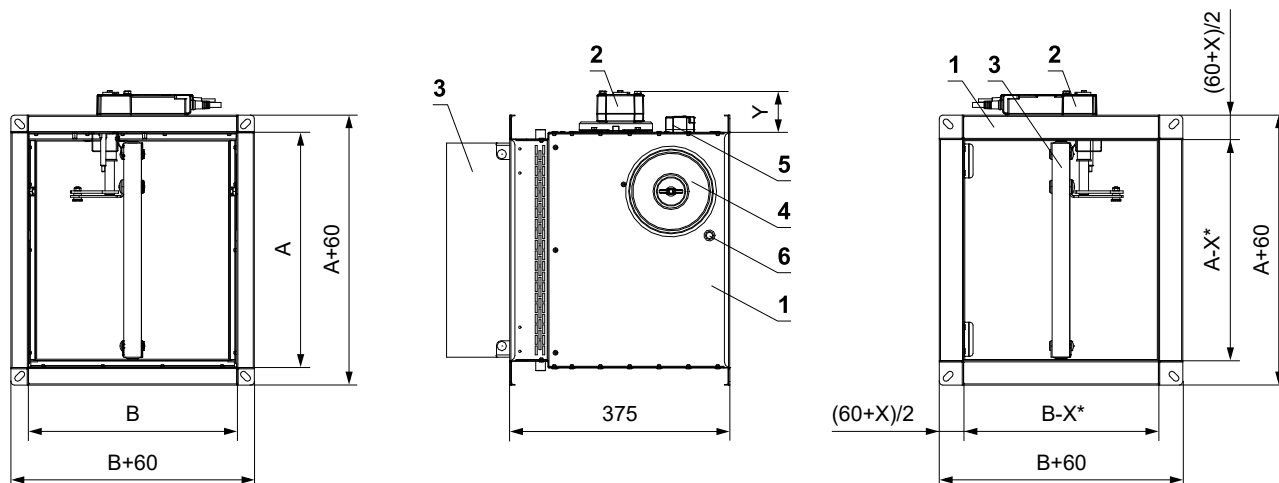


- * X=14 (A<160 or B<160)
- * X=23 (AxB≤500x400)
- * X=36 (AxB>500x400)

- 1 Damper casing
- 2 Manual control
- 3 Damper blade
- 4 Inspection opening cover
- 5 Sensor sticker
- 6 Hole for camera

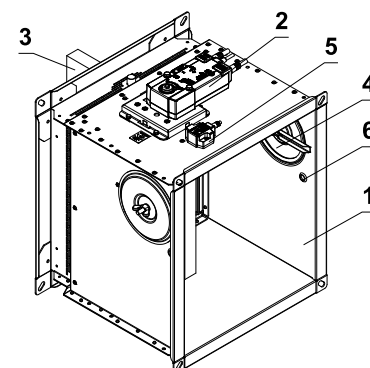
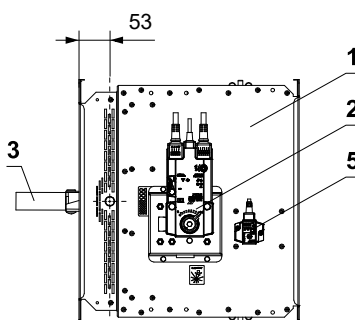


FDMB with spring return actuator



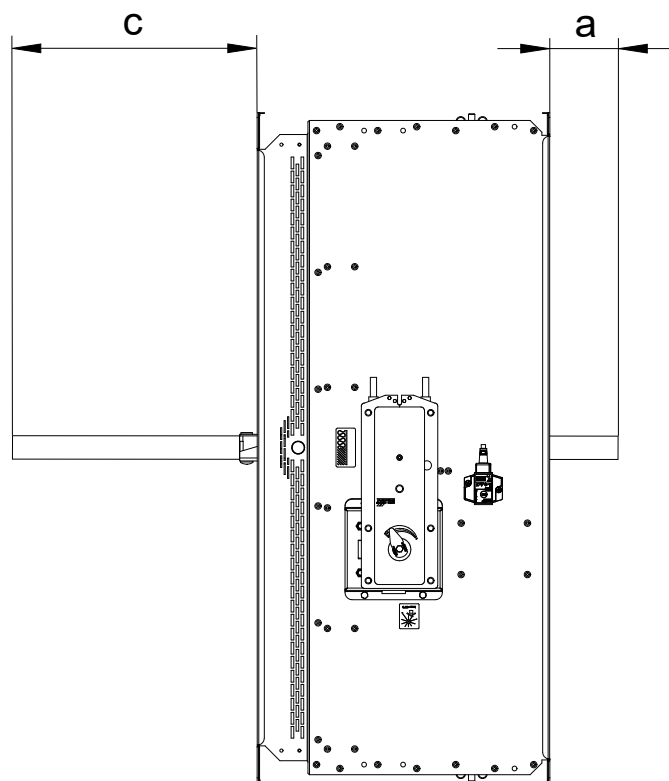
- * X=14 (A<160 or B<160) Y=72 mm (BFL)
- * X=23 (AxB≤500x400) Y=76 mm (BFN)
- * X=36 (AxB>500x400) Y=83 mm (BF)

- 1 Damper casing
- 2 Spring return actuator
- 3 Damper blade
- 4 Inspection opening cover
- 5 Thermoelectric activation device
- 6 Hole for camera



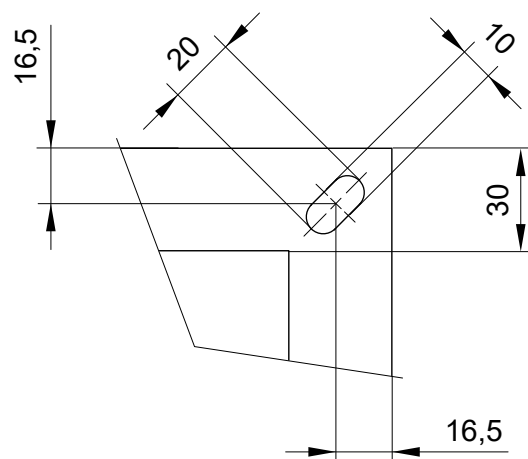
Damper blade overlaps

- Open damper blade overlaps the damper casing by the value "a" or "c". These values are specified in chapter Technical parameters → see pages 14 to 19

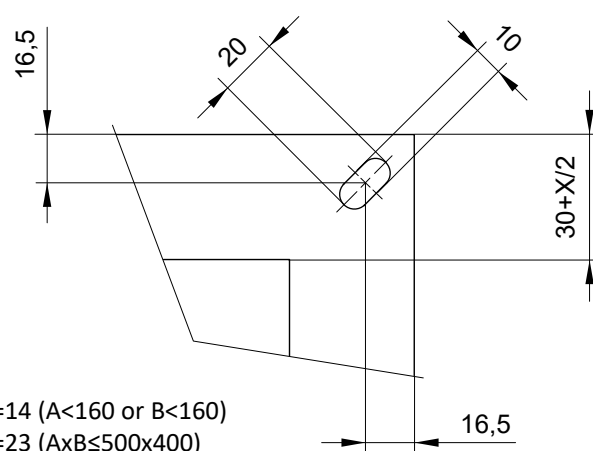


Values "a" and "c" has to be respected when projecting related air-conditioning ducts.

Flange of a damper - CONTROL SIDE



Flange of a damper - INSTALLATION SIDE



X=14 (A<160 or B<160)
X=23 (AxB≤500x400)
X=36 (AxB>500x400)

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

Technical parameters

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control		
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]					a [mm]	c [mm]	Man. [kg]	Actu. [kg]					
100 x	100	-	-	4,8	4,9	0,0030	BFL	M1	150 x	250	-	60	6,9	7,0	0,0234	BFL	M1
	110	-	-	4,9	5,0	0,0037				280	-	75	7,2	7,3	0,0271		
	125	-	-	5,1	5,2	0,0048			160 x	100	-	-	5,6	5,7	0,0055	BFL	M1
	140	-	5	5,2	5,3	0,0059				110	-	-	5,7	5,8	0,0069		
	150	-	10	5,3	5,4	0,0066				125	-	-	5,9	6,0	0,0088		
	160	-	15	5,4	5,5	0,0073				140	-	5	6,0	6,1	0,0108		
	180	-	25	5,6	5,7	0,0088				150	-	10	6,1	6,2	0,0121		
	200	-	35	5,8	5,9	0,0102				160	-	15	6,5	6,6	0,0113		
	225	-	47	6,0	6,1	0,0120				180	-	25	6,7	6,8	0,0137		
	250	-	60	6,2	6,3	0,0138				200	-	35	7,0	7,1	0,0161		
	280	-	75	6,5	6,6	0,0160				225	-	47	7,2	7,3	0,0191		
110 x	100	-	-	4,9	5,0	0,0034	BFL	M1	250	-	60	7,5	7,6	0,0222	BFL	M1	
	110	-	-	5,0	5,1	0,0043			280	-	75	7,8	7,9	0,0258			
	125	-	-	5,2	5,3	0,0055			300	-	85	8,3	8,4	0,0282			
	140	-	5	5,3	5,4	0,0067			315	-	92	8,5	8,6	0,0300			
	150	-	10	5,4	5,5	0,0075			355	-	112	9,4	9,5	0,0349			
	160	-	15	5,5	5,6	0,0084			400	-	135	9,9	10,0	0,0403			
	180	-	25	5,7	5,8	0,0100			450	-	150	10,5	10,6	0,0392			
	200	-	35	5,9	6,0	0,0116			500	-	175	11,0	11,1	0,0446			
	225	-	47	6,1	6,2	0,0137			550	-	200	11,4	11,5	0,0500			
	250	-	60	6,4	6,5	0,0157			560	-	205	11,5	11,6	0,0511			
	280	-	75	6,6	6,7	0,0182			600	-	225	11,9	12,0	0,0554			
125 x	100	-	-	5,1	5,2	0,0041	BFL	M1	630	-	240	12,3	12,4	0,0586	BFL	M2	
	110	-	-	5,2	5,3	0,0050			650	-	250	12,5	12,6	0,0608			
	125	-	-	5,3	5,4	0,0065			700	5	275	13,1	13,2	0,0662			
	140	-	5	5,5	5,6	0,0080			710	10	280	13,2	13,3	0,0673			
	150	-	10	5,6	5,7	0,0089			750	30	300	13,6	14,0	0,0716			
	160	-	15	5,7	5,8	0,0099			800	55	325	14,2	14,6	0,0770			
	180	-	25	5,9	6,0	0,0118			900	105	375	15,3	15,7	0,0878			
	200	-	35	6,1	6,2	0,0138			1000	155	425	16,4	16,8	0,0986			
	225	-	47	6,3	6,4	0,0162			100	-	-	5,8	5,9	0,0064			
	250	-	60	6,6	6,7	0,0186			110	-	-	5,9	6,0	0,0079			
	280	-	75	6,9	7,0	0,0215			125	-	-	6,1	6,2	0,0102			
140 x	100	-	-	5,2	5,3	0,0047	BFL	M1	140	-	5	6,2	6,3	0,0125	BFL	M1	
	110	-	-	5,3	5,4	0,0058			150	-	10	6,4	6,5	0,0140			
	125	-	-	5,5	5,6	0,0075			160	-	15	6,7	6,8	0,0131			
	140	-	5	5,6	5,7	0,0092			180	-	25	7,0	7,1	0,0159			
	150	-	10	5,7	5,8	0,0103			200	-	35	7,2	7,3	0,0187			
	160	-	15	5,8	5,9	0,0114			225	-	47	7,5	7,6	0,0222			
	180	-	25	6,0	6,1	0,0137			250	-	60	7,7	7,8	0,0258			
	200	-	35	6,2	6,3	0,0159			280	-	75	8,1	8,2	0,0300			
	225	-	47	6,5	6,6	0,0187			180 x	300	-	85	8,6	8,7			0,0328
	250	-	60	6,8	6,9	0,0215			315	-	92	8,8	8,9	0,0349			
	280	-	75	7,1	7,2	0,0249			355	-	112	9,7	9,8	0,0406			
150 x	100	-	-	5,3	5,4	0,0051	BFL	M1	400	-	135	10,2	10,3	0,0469	BFL	M2	
	110	-	-	5,4	5,5	0,0063			450	-	150	10,8	10,9	0,0465			
	125	-	-	5,6	5,7	0,0082			500	-	175	11,4	11,5	0,0529			
	140	-	5	5,7	5,8	0,0100			550	-	200	11,8	11,9	0,0593			
	150	-	10	5,8	5,9	0,0112			560	-	205	11,9	12,0	0,0605			
	160	-	15	5,9	6,0	0,0124			600	-	225	12,4	12,5	0,0657			
	180	-	25	6,2	6,3	0,0149			630	-	240	12,7	12,8	0,0695			
	200	-	35	6,4	6,5	0,0173			650	-	250	12,9	13,0	0,0721			
	225	-	47	6,6	6,7	0,0204			700	5	275	13,5	13,9	0,0785			

A x B [mm]		Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]		Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control
		a [mm]	c [mm]	Man. [kg]	Actu. [kg]						a [mm]	c [mm]	Man. [kg]	Actu. [kg]			
180 x	710	10	280	13,6	14,0	0,0797	BFN	M2	225 x	710	10	280	14,7	15,1	0,1078	BFN	M2
	750	30	300	14,1	14,5	0,0849				750	30	300	15,2	15,6	0,1147		
	800	55	325	14,7	15,1	0,0913				800	55	325	15,8	16,2	0,1233		
	900	105	375	15,9	16,3	0,1041				900	105	375	17,1	17,5	0,1406		
	1000	155	425	17,0	17,4	0,1169				1000	155	425	18,4	20,5	0,1579		
200 x	100	-	-	6,0	6,1	0,0072	BFL	M1	250 x	100	-	-	6,4	6,5	0,0093	BFL	M1
	110	-	-	6,1	6,2	0,0089				110	-	-	6,6	6,7	0,0115		
	125	-	-	6,3	6,4	0,0115				125	-	-	6,8	6,9	0,0149		
	140	-	5	6,4	6,5	0,0141				140	-	5	7,0	7,1	0,0182		
	150	-	10	6,6	6,7	0,0158				150	-	10	7,1	7,2	0,0204		
	160	-	15	7,0	7,1	0,0149				160	-	15	7,5	7,6	0,0194		
	180	-	25	7,2	7,3	0,0181				180	-	25	7,7	7,8	0,0236		
	200	-	35	7,4	7,5	0,0213				200	-	35	8,0	8,1	0,0278		
	225	-	47	7,7	7,8	0,0253				225	-	47	8,3	8,4	0,0331		
	250	-	60	8,0	8,1	0,0294				250	-	60	8,6	8,7	0,0384		
	280	-	75	8,3	8,4	0,0342				280	-	75	9,0	9,1	0,0447		
	300	-	85	8,9	9,0	0,0374				300	-	85	9,6	9,7	0,0489		
	315	-	92	9,1	9,2	0,0398				315	-	92	9,8	9,9	0,0521		
	355	-	112	10,0	10,1	0,0463				355	-	112	10,7	10,8	0,0605		
	400	-	135	10,5	10,6	0,0535				400	-	135	11,3	11,4	0,0700		
	450	-	150	11,2	11,3	0,0537				450	-	150	12,0	12,1	0,0719		
	500	-	175	11,8	11,9	0,0611				500	-	175	12,7	12,8	0,0818		
	550	-	200	12,1	12,2	0,0685				550	-	200	13,1	13,2	0,0917		
	560	-	205	12,3	12,4	0,0700				560	-	205	13,2	13,3	0,0937		
	600	-	225	12,8	12,9	0,0759				600	-	225	13,8	14,2	0,1016		
	630	-	240	13,1	13,2	0,0804				630	-	240	14,2	14,6	0,1075		
	650	-	250	13,4	13,5	0,0833				650	-	250	14,4	14,8	0,1115		
	700	5	275	14,0	14,4	0,0907				700	5	275	15,1	15,5	0,1214		
	710	10	280	14,1	14,5	0,0922				710	10	280	15,2	15,6	0,1234		
	750	30	300	14,6	15,0	0,0981				750	30	300	15,8	16,2	0,1313		
	800	55	325	15,2	15,6	0,1055				800	55	325	16,5	16,9	0,1412		
	900	105	375	16,4	16,8	0,1203				900	105	375	17,8	18,2	0,1610		
	1000	155	425	17,6	18,0	0,1351				1000	155	425	19,1	21,2	0,1808		
225 x	100	-	-	6,2	6,3	0,0083	BFL	M1	280 x	100	-	-	6,7	6,8	0,0106	BFL	M1
	110	-	-	6,3	6,4	0,0102				110	-	-	6,8	6,9	0,0131		
	125	-	-	6,5	6,6	0,0132				125	-	-	7,1	7,2	0,0169		
	140	-	5	6,7	6,8	0,0162				140	-	5	7,3	7,4	0,0207		
	150	-	10	6,8	6,9	0,0181				150	-	10	7,4	7,5	0,0232		
	160	-	15	7,2	7,3	0,0171				160	-	15	7,8	7,9	0,0221		
	180	-	25	7,5	7,6	0,0209				180	-	25	8,1	8,2	0,0269		
	200	-	35	7,7	7,8	0,0246				200	-	35	8,3	8,4	0,0317		
	225	-	47	8,0	8,1	0,0292				225	-	47	8,7	8,8	0,0377		
	250	-	60	8,3	8,4	0,0339				250	-	60	9,0	9,1	0,0438		
	280	-	75	8,7	8,8	0,0395				280	-	75	9,1	9,2	0,0510		
	300	-	85	9,2	9,3	0,0432				300	-	85	9,4	9,5	0,0558		
	315	-	92	9,4	9,5	0,0460				315	-	92	10,0	10,1	0,0594		
	355	-	112	10,3	10,4	0,0534				355	-	112	10,2	10,3	0,0691		
	400	-	135	10,9	11,0	0,0618				400	-	135	11,2	11,3	0,0799		
	450	-	150	11,6	11,7	0,0628				450	-	150	11,8	11,9	0,0828		
	500	-	175	12,2	12,3	0,0714				500	-	175	12,5	12,6	0,0942		
	550	-	200	12,6	12,7	0,0801				550	-	200	13,2	13,3	0,1056		
	560	-	205	12,8	12,9	0,0818				560	-	205	13,7	14,1	0,1078		
	600	-	225	13,3	13,4	0,0887				600	-	225	13,8	14,2	0,1170		
	630	-	240	13,7	14,1	0,0939				630	-	240	14,4	14,8	0,1238		
	650	-	250	13,9	14,3	0,0974				650	-	250	14,8	15,2	0,1284		
	700	5	275	14,5	14,9	0,1060				700	5	275	15,1	15,5	0,1398		

Sizes listed within the maximum/minimum sizes can be manufactured on request.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]					a [mm]	c [mm]	Man. [kg]	Actu. [kg]				
280 x	710	10	280	15,8	16,2	0,1420	BFN	M2	710	10	280	16,7	17,1	0,1638	BFN	M2
	750	30	300	15,9	16,3	0,1512			750	30	300	17,3	17,7	0,1744		
	800	55	325	16,5	16,9	0,1626	BF	M3	800	55	325	18,1	18,5	0,1875	BF	M3
	900	105	375	17,2	19,3	0,1854			900	105	375	19,6	21,7	0,2138		
	1000	155	425	18,6	20,7	0,2082			1000	155	425	21,0	23,1	0,2401		
300 x	100	-	-	6,9	7,0	0,0114	BFL	M1	100	-	-	7,7	7,8	0,0137	BFL	M1
	110	-	-	7,0	7,1	0,0141			110	-	-	7,9	8,0	0,0170		
	125	-	-	7,3	7,4	0,0182			125	-	-	8,1	8,2	0,0219		
	140	-	5	7,5	7,6	0,0223			140	-	5	8,4	8,5	0,0268		
	150	-	10	7,6	7,7	0,0250			150	-	10	8,5	8,6	0,0301		
	160	-	15	8,0	8,1	0,0239			160	-	15	8,6	8,7	0,0288		
	180	-	25	8,3	8,4	0,0291			180	-	25	8,9	9,0	0,0352		
	200	-	35	8,6	8,7	0,0343			200	-	35	9,2	9,3	0,0415		
	225	-	47	8,9	9,0	0,0408			225	-	47	9,6	9,7	0,0494		
	250	-	60	9,3	9,4	0,0474			250	-	60	10,0	10,1	0,0573		
	280	-	75	9,7	9,8	0,0552			280	-	75	10,4	10,5	0,0668		
	300	-	85	10,3	10,4	0,0604			300	-	85	11,0	11,1	0,0731		
	315	-	92	10,5	10,6	0,0643	315	-	92	11,3	11,4	0,0778				
	355	-	112	11,5	11,6	0,0748	355	-	112	12,3	12,4	0,0905				
	400	-	135	12,1	12,2	0,0865	400	-	135	13,0	13,1	0,1047				
	450	-	150	12,9	13,0	0,0900	450	-	150	13,8	13,9	0,1100				
	500	-	175	13,6	13,7	0,1024	500	-	175	14,6	15,0	0,1251				
	550	-	200	14,1	14,5	0,1148	550	-	200	15,1	15,5	0,1403				
	560	-	205	14,2	14,6	0,1173	560	-	205	15,3	15,7	0,1433				
	600	-	225	14,8	15,2	0,1272	600	-	225	15,9	16,3	0,1554				
	630	-	240	15,2	15,6	0,1347	630	-	240	16,4	16,8	0,1645				
	650	-	250	15,5	15,9	0,1396	650	-	250	16,7	17,1	0,1706				
	700	5	275	16,2	16,6	0,1520	700	5	275	17,5	17,9	0,1857				
	710	10	280	16,4	16,8	0,1545	710	10	280	17,7	18,1	0,1888				
750	30	300	17,0	17,4	0,1644	750	30	300	18,3	18,7	0,2009					
800	55	325	17,7	18,1	0,1768	800	55	325	19,1	21,2	0,2160					
900	105	375	19,2	21,3	0,2016	900	105	375	20,6	22,7	0,2463					
1000	155	425	20,6	22,7	0,2264	1000	155	425	22,2	24,3	0,2766					
315 x	100	-	-	7,0	7,1	0,0121	BFL	M1	100	-	-	8,2	8,3	0,0156	BFL	M1
	110	-	-	7,2	7,3	0,0149			110	-	-	8,4	8,5	0,0193		
	125	-	-	7,4	7,5	0,0192			125	-	-	8,6	8,7	0,0249		
	140	-	5	7,6	7,7	0,0235			140	-	5	8,9	9,0	0,0305		
	150	-	10	7,8	7,9	0,0264			150	-	10	9,0	9,1	0,0342		
	160	-	15	8,2	8,3	0,0252			160	-	15	9,1	9,2	0,0329		
	180	-	25	8,5	8,6	0,0308			180	-	25	9,4	9,5	0,0401		
	200	-	35	8,7	8,8	0,0363			200	-	35	9,7	9,8	0,0473		
	225	-	47	9,1	9,2	0,0432			225	-	47	10,1	10,2	0,0563		
	250	-	60	9,5	9,6	0,0501			250	-	60	10,5	10,6	0,0654		
	280	-	75	9,9	10,0	0,0584			280	-	75	11,0	11,1	0,0762		
	300	-	85	10,5	10,6	0,0639			400 x	300	-	85	11,7	11,8		
	315	-	92	10,7	10,8	0,0680	315	-		92	11,9	12,0	0,0888			
	355	-	112	11,7	11,8	0,0791	355	-		112	13,0	13,1	0,1033			
	400	-	135	12,3	12,4	0,0915	400	-		135	13,7	13,8	0,1195			
	450	-	150	13,2	13,3	0,0955	450	-		150	14,6	14,7	0,1263			
	500	-	175	13,9	14,0	0,1086	500	-		175	15,4	15,8	0,1437			
	550	-	200	14,4	14,8	0,1218	550	-		200	16,0	16,4	0,1611			
	560	-	205	14,5	14,9	0,1244	560	-		205	16,2	16,6	0,1646			
	600	-	225	15,1	15,5	0,1349	600	-		225	16,9	17,3	0,1785			
	630	-	240	15,6	16,0	0,1428	630	-		240	17,4	17,8	0,1890			
	650	-	250	15,9	16,3	0,1481	650	-		250	17,7	18,1	0,1959			
	700	5	275	16,6	17,0	0,1612	700	5		275	18,5	18,9	0,2133			

Sizes listed within the maximum/minimum sizes can be manufactured on request.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control			
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]					a [mm]	c [mm]	Man. [kg]	Actu. [kg]						
400 x	710	10	280	18,7	19,1	0,2168	BFN	M2	500 x 1000	155	425	26,5	28,6	0,4090	BF	M3		
	750	30	300	19,4	21,5	0,2307	BF	M3	125	-	-	10,3	10,4	0,0350	BFL	M1		
	800	55	325	20,2	22,3	0,2481			140	-	5	10,5	10,6	0,0428				
	900	105	375	21,9	24,0	0,2829			150	-	10	10,7	10,8	0,0480				
	1000	155	425	23,5	25,6	0,3177			160	-	15	10,8	10,9	0,0364				
450 x	125	-	-	9,2	9,3	0,0283	BFL	M1	180	-	25	11,1	11,2	0,0463	BFL	M1		
	140	-	5	9,4	9,5	0,0346			200	-	35	11,5	11,6	0,0563				
	150	-	10	9,6	9,7	0,0388			225	-	47	12,0	12,1	0,0687				
	160	-	15	9,6	9,7	0,0374			250	-	60	12,5	12,6	0,0812				
	180	-	25	10,0	10,1	0,0456			280	-	75	13,1	13,2	0,0961				
	200	-	35	10,3	10,4	0,0538			300	-	85	13,8	13,9	0,1061				
	225	-	47	10,7	10,8	0,0641			315	-	92	14,1	14,2	0,1135				
	250	-	60	11,2	11,3	0,0744			355	-	112	15,3	15,4	0,1335				
	280	-	75	11,7	11,8	0,0867			550 x 400	-	135	16,2	16,6	0,1559			BFN	M2
	300	-	85	12,3	12,4	0,0949	450	-	150	17,2	17,6	0,1808						
	315	-	92	12,6	12,7	0,1011	500	-	175	18,2	18,6	0,2057						
	355	-	112	13,7	13,8	0,1175	550	-	200	18,9	19,3	0,2306						
	400	-	135	14,5	14,6	0,1360	560	-	205	19,1	19,5	0,2356						
	450	-	150	15,5	15,9	0,1445	BFN	M2	600	-	225	19,9	20,3	0,2555	BF	M3		
	500	-	175	16,4	16,8	0,1644			630	-	240	20,5	22,6	0,2704				
	550	-	200	17,0	17,4	0,1843			650	-	250	20,9	23,0	0,2804				
	560	-	205	17,2	17,6	0,1883			700	5	275	21,9	24,0	0,3053				
	600	-	225	17,9	18,3	0,2042			710	10	280	22,1	24,2	0,3103	BF	M3		
	630	-	240	18,4	18,8	0,2161			750	30	300	23,0	25,1	0,3302				
	650	-	250	18,8	19,2	0,2241			800	55	325	24,0	26,1	0,3551				
	700	5	275	19,7	21,8	0,2440			900	105	375	26,0	28,1	0,4049				
710	10	280	19,8	21,9	0,2480	BF			M3	125	-	-	10,4	10,5	0,0356	BFL	M1	
750	30	300	20,6	22,7	0,2639		140	-		5	10,7	10,8	0,0436					
800	55	325	21,5	23,6	0,2838		150	-		10	10,8	10,9	0,0489					
900	105	375	23,2	25,3	0,3236		160	-		15	10,9	11,0	0,0371					
1000	155	425	25,0	27,1	0,3634		180	-		25	11,2	11,3	0,0472					
500 x	125	-	-	9,7	9,8	0,0316	BFL	M1	200	-	35	11,6	11,7	0,0574	BFL			M1
	140	-	5	10,0	10,1	0,0387			225	-	47	12,1	12,2	0,0701				
	150	-	10	10,2	10,3	0,0434			250	-	60	12,6	12,7	0,0828				
	160	-	15	10,1	10,2	0,0419			280	-	75	13,2	13,3	0,0980				
	180	-	25	10,5	10,6	0,0511			300	-	85	13,9	14,0	0,1082				
	200	-	35	10,9	11,0	0,0603			315	-	92	14,2	14,3	0,1158				
	225	-	47	11,3	11,4	0,0718			355	-	112	15,4	15,5	0,1361				
	250	-	60	11,8	11,9	0,0834			560 x 400	-	135	16,3	16,7	0,1590		BFN	M2	
	280	-	75	12,3	12,4	0,0972			450	-	150	17,4	17,8	0,1844				
	300	-	85	13,0	13,1	0,1064	500	-	175	18,4	18,8	0,2098						
	315	-	92	13,3	13,4	0,1133	550	-	200	19,1	19,5	0,2352						
	355	-	112	14,5	14,6	0,1318	BFN	M2	560	-	205	19,3	19,7	0,2403	BF	M3		
	400	-	135	15,3	15,4	0,1525			600	-	225	20,1	20,5	0,2606				
	450	-	150	16,3	16,7	0,1626			630	-	240	20,8	22,9	0,2758				
	500	-	175	17,3	17,7	0,1850			650	-	250	21,2	23,3	0,2860				
	550	-	200	18,0	18,4	0,2074			700	5	275	22,2	24,3	0,3114				
	560	-	205	18,1	18,5	0,2119			710	10	280	22,4	24,5	0,3165				
	600	-	225	18,9	19,3	0,2298			750	30	300	23,2	25,3	0,3368				
	630	-	240	19,5	19,9	0,2433			800	55	325	24,2	26,3	0,3622				
	650	-	250	19,9	22,0	0,2522			BF	M3	140	-	5	11,1			11,2	0,0469
	700	5	275	20,8	22,9	0,2746	150	-			10	11,3	11,4	0,0526				
710	10	280	21,0	23,1	0,2791	160	-	15			11,3	11,4	0,0400					
750	30	300	21,8	23,9	0,2970	180	-	25			11,7	11,8	0,0510					
800	55	325	22,7	24,8	0,3194	200	-	35			12,1	12,2	0,0619					
900	105	375	24,6	26,7	0,3642	225	-	47			12,6	12,7	0,0756					

Sizes listed within the maximum/minimum sizes can be manufactured on request.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control			
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]					a [mm]	c [mm]	Man. [kg]	Actu. [kg]						
600 x	250	-	60	13,1	13,2	0,0893	BFL	M1	650 x	630	-	240	22,7	24,8	0,3247	BF	M2	
	280	-	75	13,7	13,8	0,1058				650	-	250	23,1	25,2	0,3367			
	300	-	85	14,5	14,6	0,1167				700	5	275	24,2	26,3	0,3666			
	315	-	92	14,8	14,9	0,1249				710	10	280	24,5	26,6	0,3726			
	355	-	112	16,1	16,2	0,1469				750	30	300	25,4	27,5	0,3965			
	400	-	135	17,0	17,4	0,1715	BFN	M2	700 x	150	-	10	12,4	12,5	0,0618	BFL	M1	
	450	-	150	18,0	18,4	0,1989				160	-	15	12,4	12,5	0,0473			
	500	-	175	19,1	19,5	0,2263				180	-	25	12,8	12,9	0,0603			
	550	-	200	19,9	20,3	0,2537				200	-	35	13,3	13,4	0,0732			
	560	-	205	20,1	20,5	0,2592				225	-	47	13,9	14,0	0,0894			
	600	-	225	21,0	23,1	0,2811	BF	M3		250	-	60	14,4	14,5	0,1056	BFN		
	630	-	240	21,6	23,7	0,2976				280	-	75	15,1	15,2	0,1251			
	650	-	250	22,0	24,1	0,3085				300	-	85	15,9	16,0	0,1380			
	700	5	275	23,1	25,2	0,3359				315	-	92	16,2	16,3	0,1477			
	710	10	280	23,3	25,4	0,3414				355	-	112	17,6	18,0	0,1737			
	750	30	300	24,2	26,3	0,3633				400	-	135	18,6	19,0	0,2028			
	800	55	325	25,2	27,3	0,3907				450	-	150	19,8	20,2	0,2352			
630 x	140	-	5	11,5	11,6	0,0494	BFL	M1		500	-	175	20,9	21,3	0,2676	BF	M2	
	150	-	10	11,7	11,8	0,0554				550	-	200	21,9	24,0	0,3000			
	160	-	15	11,6	11,7	0,0422				560	-	205	22,1	24,2	0,3065			
	180	-	25	12,1	12,2	0,0538				600	-	225	23,0	25,1	0,3324			
	200	-	35	12,5	12,6	0,0653				630	-	240	23,8	25,9	0,3519			
	225	-	47	13,0	13,1	0,0798			650	-	250	24,2	26,3	0,3648				
	250	-	60	13,5	13,6	0,0942			700	5	275	25,4	27,5	0,3972				
	280	-	75	14,2	14,3	0,1116			710	10	280	25,6	27,7	0,4037				
	300	-	85	14,9	15,0	0,1231			BFN	M2	150	-	10	12,6	12,7	0,0627		BFL
	315	-	92	15,2	15,3	0,1318	160	-			15	12,5	12,6	0,0480				
	355	-	112	16,5	16,6	0,1549	180	-			25	12,9	13,0	0,0612				
	400	-	135	17,5	17,9	0,1809	200	-			35	13,4	13,5	0,0744				
	450	-	150	18,6	19,0	0,2098	225	-			47	14,0	14,1	0,0908				
	500	-	175	19,7	20,1	0,2387	250	-			60	14,6	14,7	0,1073				
	550	-	200	20,5	20,9	0,2676	280	-			75	15,2	15,3	0,1270				
	560	-	205	20,7	21,1	0,2734	300	-			85	16,0	16,1	0,1402				
	600	-	225	21,6	23,7	0,2965	315	-			92	16,4	16,5	0,1500				
	630	-	240	22,3	24,4	0,3139	BF	M3	710 x	355	-	112	17,7	18,1	0,1763	BFN		
	650	-	250	22,7	24,8	0,3254			400	-	135	18,8	19,2	0,2060				
	700	5	275	23,8	25,9	0,3543			450	-	150	20,0	20,4	0,2389				
	710	10	280	24,0	26,1	0,3601			500	-	175	21,1	21,5	0,2718	M2			
	750	30	300	24,9	27,0	0,3832			550	-	200	22,1	24,2	0,3047				
650 x	140	-	5	11,7	11,8	0,0510	BFL	M1	560	-	205	22,3	24,4	0,3112	BF			
	150	-	10	11,9	12,0	0,0572			600	-	225	23,3	25,4	0,3376				
	160	-	15	11,8	11,9	0,0437			630	-	240	24,0	26,1	0,3573				
	180	-	25	12,3	12,4	0,0556			650	-	250	24,4	26,5	0,3705				
	200	-	35	12,7	12,8	0,0676			700	5	275	25,6	27,7	0,4034				
	225	-	47	13,3	13,4	0,0825			750 x	150	-	10	13,0	13,1	0,0664			M1
	250	-	60	13,8	13,9	0,0975				160	-	15	12,9	13,0	0,0510			
	280	-	75	14,4	14,5	0,1154				180	-	25	13,4	13,5	0,0649			
	300	-	85	15,2	15,3	0,1274				200	-	35	13,9	14,0	0,0789			
	315	-	92	15,5	15,6	0,1363	225	-		47	14,5	14,6	0,0963	BFL				
	355	-	112	16,8	16,9	0,1603	250	-		60	15,1	15,2	0,1138					
	400	-	135	17,8	18,2	0,1872	280	-		75	15,8	15,9	0,1347					
	450	-	150	18,9	19,3	0,2171	300	-		85	16,6	16,7	0,1487					
	500	-	175	20,0	20,4	0,2470	BFN	M2	315	-	92	16,9	17,0	0,1591				
	550	-	200	20,9	21,3	0,2769			355	-	112	18,3	18,7	0,1871				
	560	-	205	21,1	23,2	0,2829			400	-	135	19,4	19,8	0,2185		BFN		
	600	-	225	22,0	24,1	0,3068			450	-	150	20,6	21,0	0,2534				

Sizes listed within the maximum/minimum sizes can be manufactured on request.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]					a [mm]	c [mm]	Man. [kg]	Actu. [kg]			
750 x	500	-	175	21,9	22,3	0,2883	BFN	900 x	200	-	35	15,6	15,7	0,0958	M1
	550	-	200	22,8	24,9	0,3232			225	-	47	16,3	16,4	0,1170	
	560	-	205	23,1	25,2	0,3302			250	-	60	17,0	17,1	0,1382	BFL
	600	-	225	24,1	26,2	0,3581	BF		280	-	75	17,8	17,9	0,1637	
	630	-	240	24,8	26,9	0,3790			300	-	85	18,7	18,8	0,1806	
	650	-	250	25,3	27,4	0,3930			315	-	92	19,1	19,5	0,1933	M2
800 x	150	-	10	13,6	13,7	0,0710		1000 x	355	-	112	20,6	21,0	0,2273	BFL
	160	-	15	13,4	13,5	0,0546	M1		400	-	135	21,8	22,2	0,2654	
	180	-	25	13,9	14,0	0,0696			450	-	150	23,2	23,6	0,3078	
	200	-	35	14,4	14,5	0,0845			500	-	175	24,6	26,7	0,3502	BF
	225	-	47	15,1	15,2	0,1032	BFL		550	-	200	25,7	27,8	0,3926	
	250	-	60	15,7	15,8	0,1219			160	-	15	15,6	15,7	0,0692	M1
	280	-	75	16,5	16,6	0,1444			180	-	25	16,2	16,3	0,0882	
	300	-	85	17,3	17,4	0,1593			200	-	35	16,8	16,9	0,1071	BFL
	315	-	92	17,7	17,8	0,1705			225	-	47	17,5	17,6	0,1308	
	355	-	112	19,1	19,5	0,2005	M2		250	-	60	18,2	18,3	0,1545	
	400	-	135	20,2	20,6	0,2341	BFN		280	-	75	19,1	19,2	0,1830	
	450	-	150	21,5	21,9	0,2715			300	-	85	20,0	20,4	0,2019	M2
	500	-	175	22,8	23,2	0,3089			315	-	92	20,5	20,9	0,2161	
	550	-	200	23,8	25,9	0,3463			355	-	112	22,1	22,5	0,2541	BFN
900 x	560	-	205	24,1	26,2	0,3538	BF		400	-	135	23,4	23,8	0,2967	
	600	-	225	25,1	27,2	0,3837			450	-	150	24,9	25,3	0,3441	
	160	-	15	14,5	14,6	0,0619	BFL		500	-	175	26,4	28,5	0,3915	BF
	180	-	25	15,1	15,2	0,0789	M1								

Sizes listed within the maximum/minimum sizes can be manufactured on request.

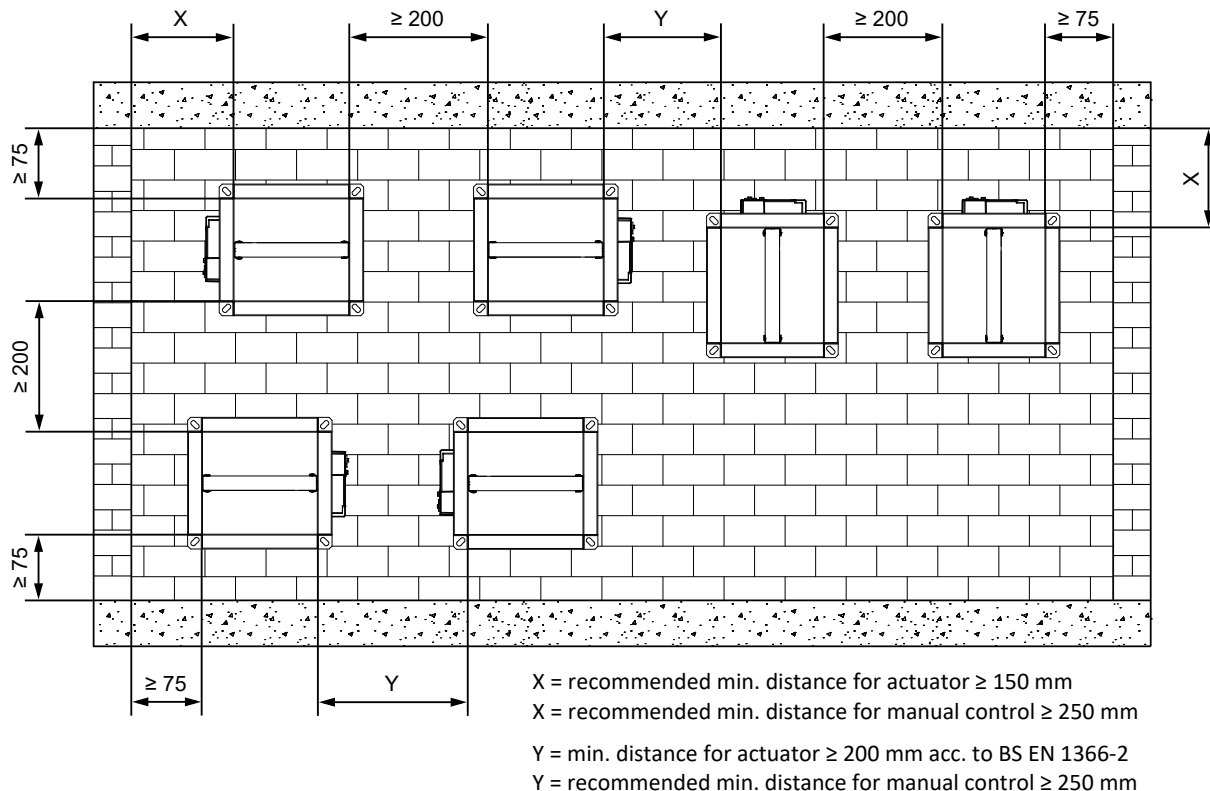
IV. INSTALLATION

Placement and installation

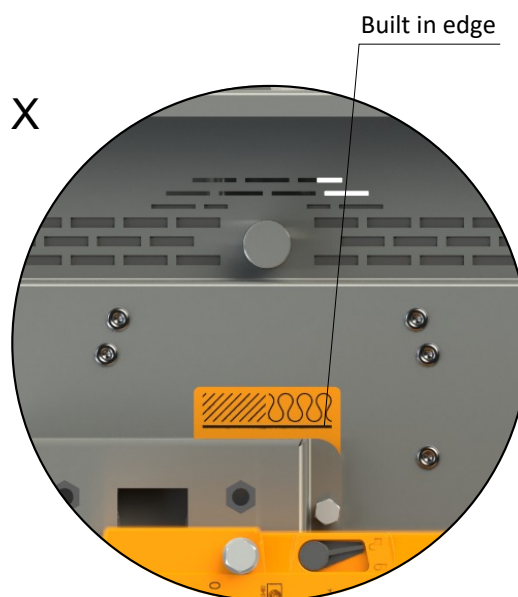
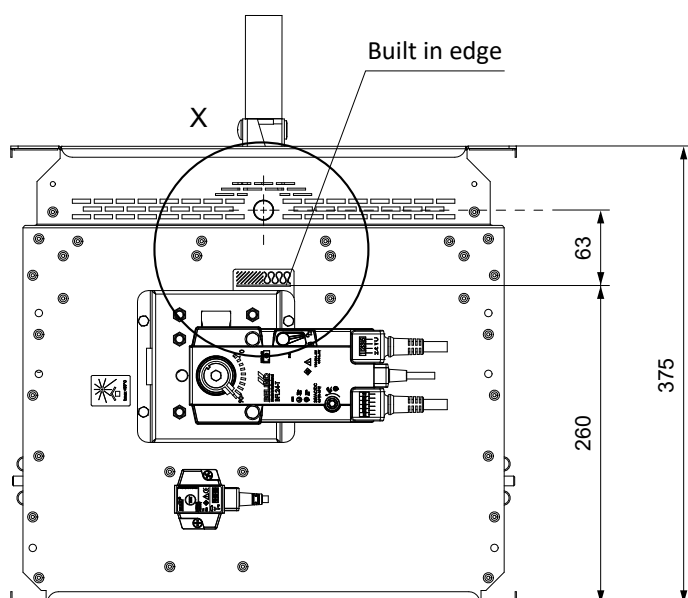
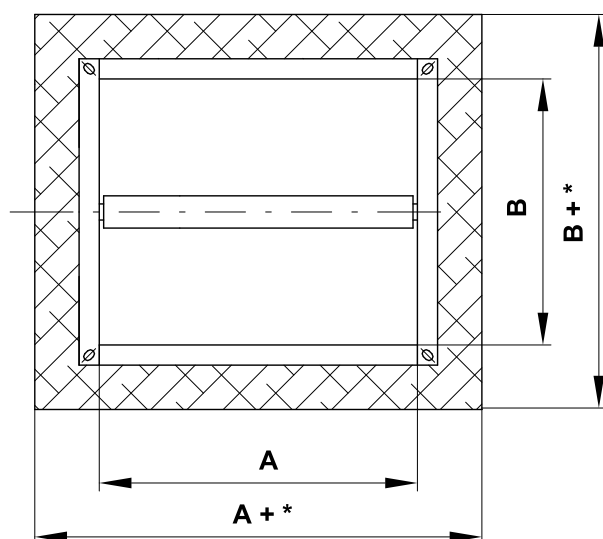
- The fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating constructions. The damper installation procedures must be done so that all load transfer from the fire separating constructions to the damper is absolutely excluded. Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. The gap between the installed damper and the fire separating construction must be perfectly filled with approved material.
- The damper must be installed so that the damper blade (in closed position) is situated in the fire separating construction - marked by the label BUILT-IN EDGE on the damper casing. If such solution is not possible, the duct between the fire separating construction and the damper blade must be protected according to the certified installation method → see pages 23 to 31
- During the installation and plastering process, the actuating mechanism must be protected (covered) against damage and pollution. The damper casing should not be deformed during bricking in. Once the damper is built in, the damper blade should not grind against the damper casing during opening or closing.
- The distance between the fire damper and the construction (wall, ceiling) must be 75 mm at the minimum, according to BS 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 BS EN 1366-2.

Minimum distance between the fire dampers and the construction

- minimum distance 200 mm between dampers, according to BS EN 1366-2
- minimum distance 75 mm between damper and construction (wall/ceiling), according to BS EN 1366-2
- recommended minimum distance 150 mm necessary for access to the actuator
- recommended minimum distance 250 mm necessary for access to the manual control



- Always consult the wall manufacturers specific guidelines for deflection heads, penetration size, location to other services, fire stopping and load bearing capacity.
- No other services should pass through the dampers building work opening.
- For lightweight walls always consult the wall manufacturer specific guidelines for penetrations sizes and distances.

Built in edge**Dimensions of an installation opening***** Mortar or gypsum**

- $A(B)+100^{+20/-0}$ for max. fire resistance of the installation EI 120 S
- min. $A(B)+100$ for max. fire resistance of the installation EI 90 S
- max. $A(B)+300$ for max. fire resistance of the installation EI 90 S

*** Ablative Coated Batt**

- min. $A(B)+80$
- max. $A(B)+260$

*** Ablative Coated Batt, damper outside construction**

- min. $A(B)+80$
- max. $A(B)+200$

*** Ablative Coated Batt, damper in shaft wall construction**

- $A(B)+180^{+0/-20}$ for max. fire resistance of the installation EI 90 S
- min. $A(B)+80$ for max. fire resistance of the installation EI 60 S
- max. $A(B)+260$ for max. fire resistance of the installation EI 60 S

Statement of installations

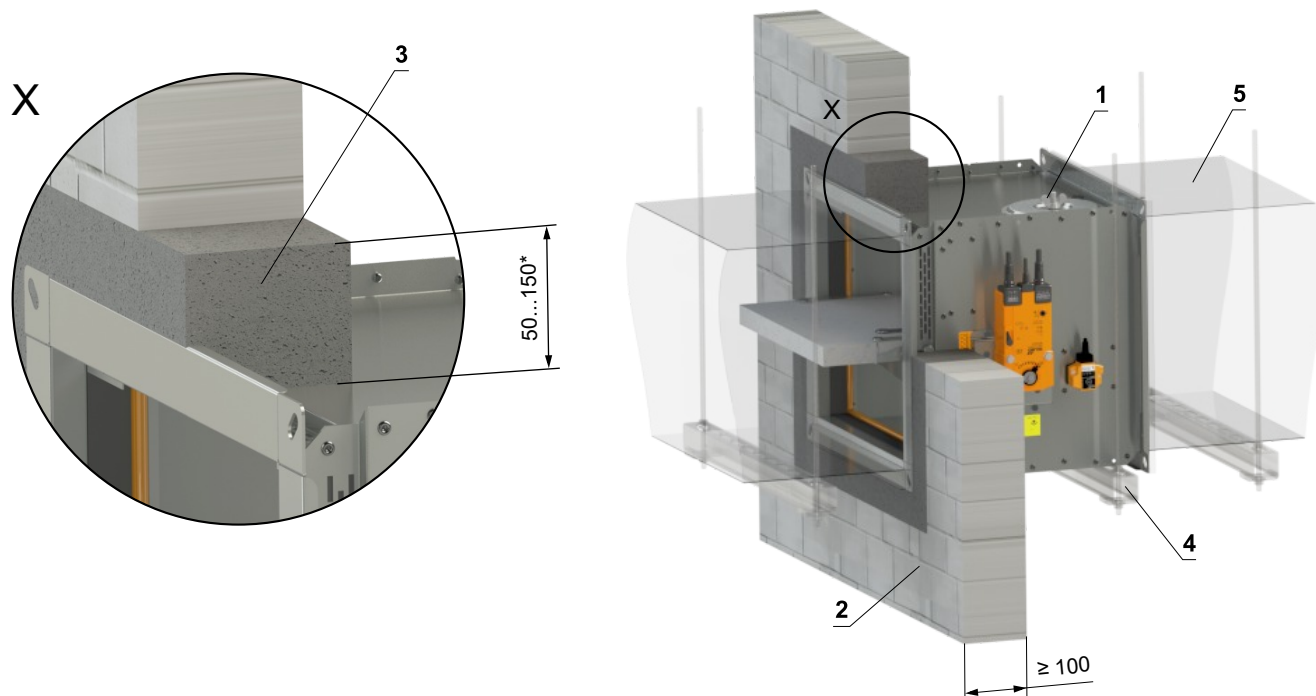
Placement	wall/ceiling min. thickness [mm]	Method of installation	Fire resistance	Page
In solid wall construction	100	Mortar or gypsum	El 120 ($v_e i \leftrightarrow o$) S El 90 ($v_e i \leftrightarrow o$) S	23
		Ablative Coated Batt	El 90 ($v_e i \leftrightarrow o$) S	24
Outside solid wall construction	100	ISOVER Ultimate Protect - Ablative Coated Batt	El 90 ($v_e i \leftrightarrow o$) S	25
In gypsum wall construction	100	Mortar or gypsum	El 120 ($v_e i \leftrightarrow o$) S El 90 ($v_e i \leftrightarrow o$) S	26
		Ablative Coated Batt 100mm	El 90 ($v_e i \leftrightarrow o$) S El 60 ($v_e i \leftrightarrow o$) S	27
	75	Ablative Coated Batt 50mm	El 45 ($v_e i \leftrightarrow o$) S El 30 ($v_e i \leftrightarrow o$) S	28
Outside gypsum wall construction	100	ISOVER Ultimate Protect - Ablative Coated Batt	El 90 ($v_e i \leftrightarrow o$) S	29
In shaft wall construction	85	Ablative Coated Batt	El 90 ($v_e i \leftrightarrow o$) S El 60 ($v_e i \leftrightarrow o$) S	30
In solid ceiling construction	150	Mortar or gypsum	El 120 ($h_o i \leftrightarrow o$) S El 90 ($h_o i \leftrightarrow o$) S	31

In solid wall construction

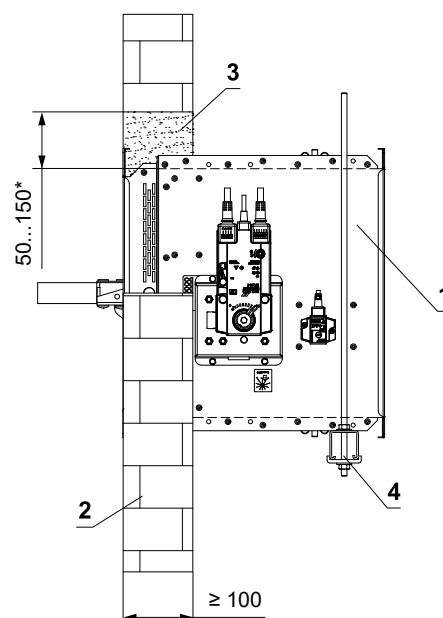
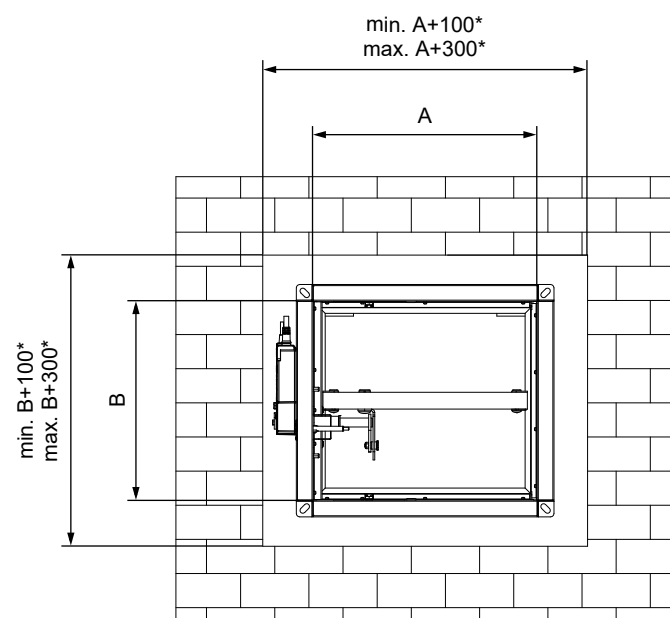
In solid wall construction - mortar or gypsum

- For connection following duct → see page 34
- This installation was tested without supports. Supports are optional, if are used, follow the manufacturer's instructions and national standards.

El 90 ($v_e i \leftrightarrow o$) S
El 120 ($v_e i \leftrightarrow o$) S*



* In the case of fire resistance EI 120, the installation gap is limited to 50 mm $^{+10/-0}$.
For fire resistance EI 90 or lower, an installation gap range of 50–150 mm is permitted.

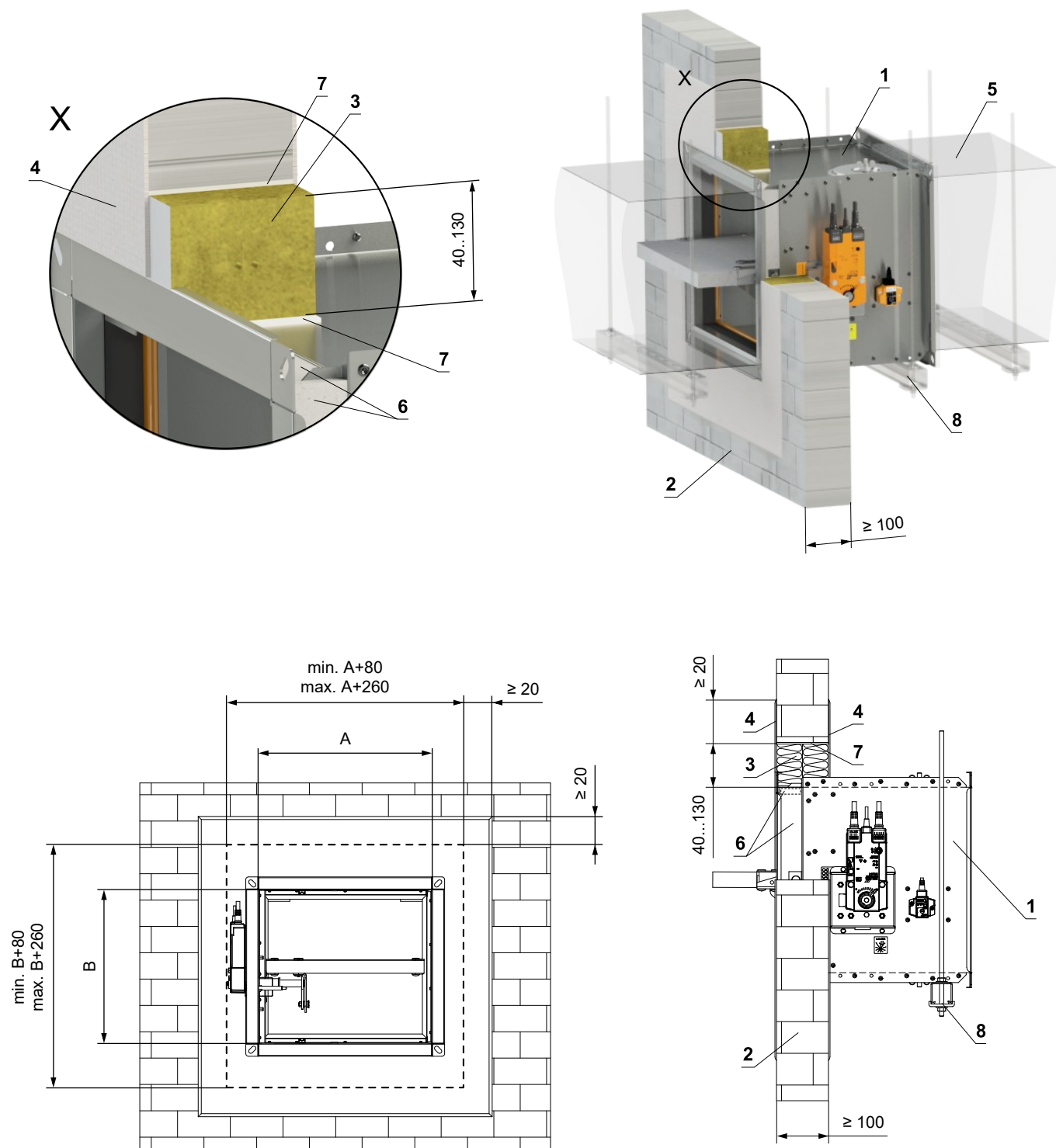


- 1 FDMB
- 2 Solid wall construction
- 3 British gypsum thistle bond 60 (or equivalent can be used)
minimum density 670 kg/m³
- 4 Fixing profile with threaded rod → see pages 32 to 33
- 5 Duct

In solid wall construction - Ablative Coated Batt

EI 90 (v_e i↔o) S

- For connection following duct → see page 34



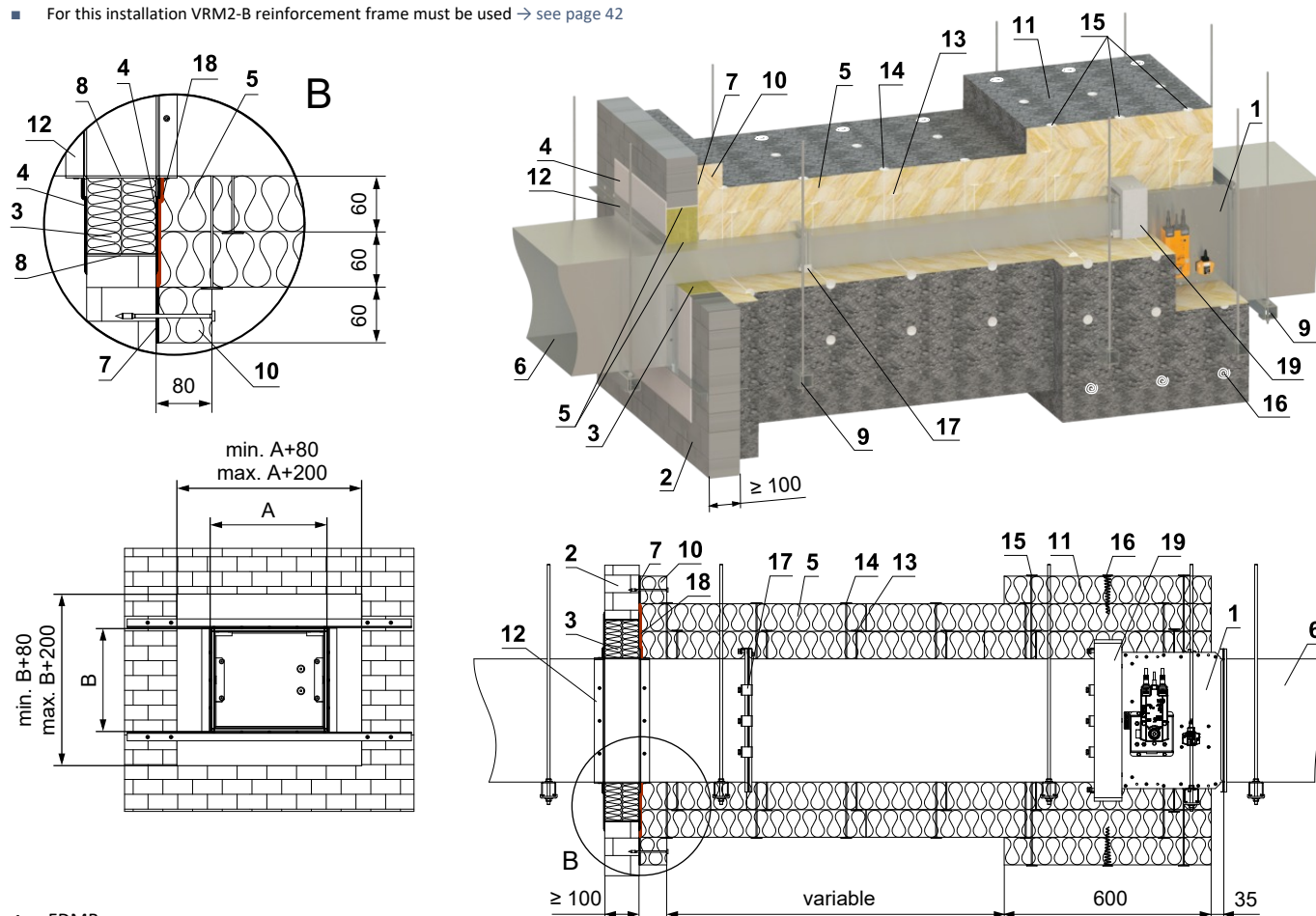
- 1 FDMB
- 2 Solid wall construction
- 3 Ablative Coated Batt (e.g. Firestop Board HILTI CFS-CT B 1S 140/50 - min. density 140 kg/m³ + Firestop acrylic sealant HILTI CFS-S ACR or equivalent)
- 4 Fire stop coating thickness 1 mm (e.g. HILTI CFS-CT, PROMASTOP-CC or equivalent)
- 5 Duct
- 6 Protective cladding boards - (not part of the damper) but must be used as part of the penetration filling → see page 43
- 7 Fire resistant mastic - fill the gap on both sides of the fire separation construction and around the perimeter of penetration and damper body. (e.g. HILTI CFS-S ACR)
- 8 Fixing profile with threaded rod → see pages 32 to 33

Installation outside solid wall construction

Outside solid wall construction - ISOVER Ultimate Protect - Ablative Coated Batt

EI 90 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 34
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ISOVER manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 32
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- Damper inspection holes are covered with insulation, therefore it's necessary to make an inspection hole on the connecting duct
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- For this installation VRM2-B reinforcement frame must be used → see page 42



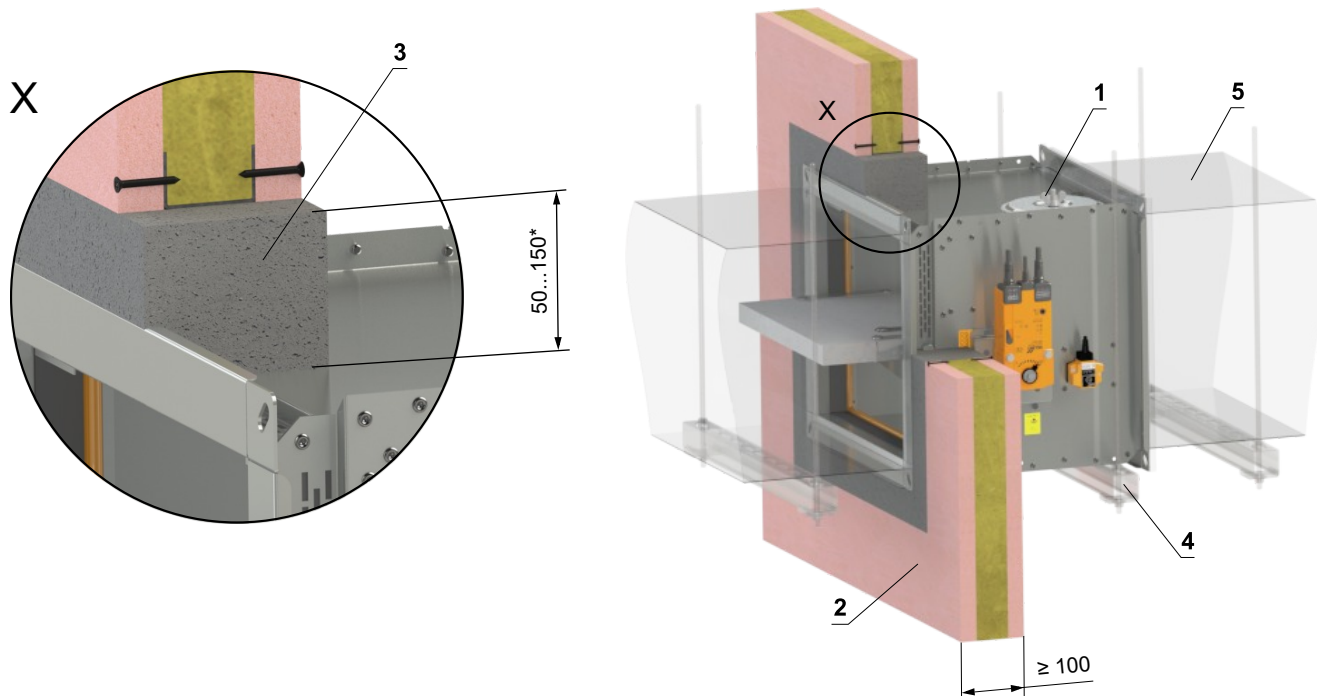
- | | | | |
|---|--|----|---|
| 1 | FDMB | 10 | Duct penetration insulation collar - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 60 mm - glued (pos. 7) and fixed with screws to the wall construction |
| 2 | Solid wall construction | 11 | Insulating collar of the damper and duct connection - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 60 mm |
| 3 | Ablative Coated Batt (e.g. Firestop Board HILTI CFS-CT B 1S 140/50 - min. density 140 kg/m³ + Firestop acrylic sealant HILTI CFS-SACR or equivalent) | 12 | L-profile 30x30x3 mm - dimensions and installation acc. to ISOVER manufacturer |
| 4 | Fire stop coating thickness 1 mm (e.g. HILTI CFS-CT, PROMASTOP-CC or equivalent) | 13 | Stud-welded pins 60 mm - quantity and placing acc. to ISOVER manufa. |
| 5 | Insulation board made of stone wool, with a surface treatment of aluminum foil, min. density 66 kg/m³ (ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 60 mm) | 14 | Stud-welded pins 120 mm - quantity and placing acc. to ISOVER manufa. |
| 6 | Standard air ducts, made of galvanized sheet thickness 0,8 mm, flanges 30 mm, acc. to BS EN 1507 and DIN 24190 | 15 | Stud-welded pins 180 mm - quantity and placing acc. to ISOVER manufa. |
| 7 | ISOVER Protect BSK glue - apply on the insulation and stick it to the fire separation construction | 16 | Fire spiral shaped screws - quantity and placing acc. to ISOVER manufa. |
| 8 | Fire resistant mastic - fill the gap on both sides of the fire separation construction and around the perimeter of penetration and damper body. (e.g. HILTI CFS-S ACR) | 17 | Steel clamp min. M8 bolts |
| 9 | Fixing profile with threaded rod → see pages 32 to 33 | 18 | ISOVER Protect BSF |
| | | 19 | VRM2-B → see page 42 |

In gypsum wall construction

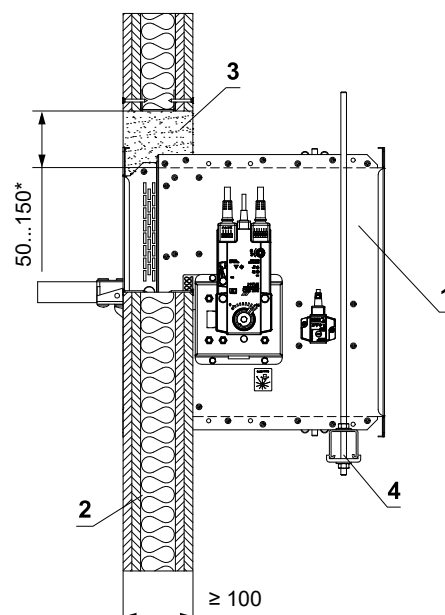
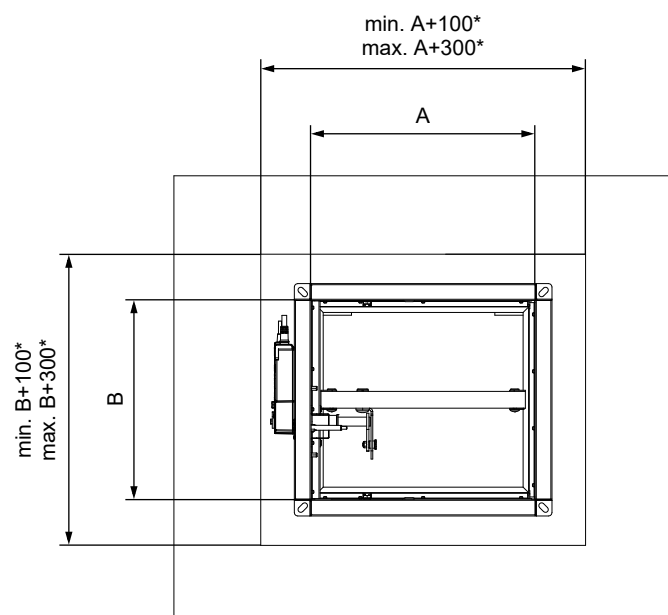
In gypsum wall construction - mortar or gypsum

El 90 ($v_e i \leftrightarrow o$) S
El 120 ($v_e i \leftrightarrow o$) S*

- For connection following duct → see page 34
- This installation was tested without supports. Supports are optional, if are used, follow the manufacturer's instructions and national standards.
- The installation opening is lined with a UW/CW profile.



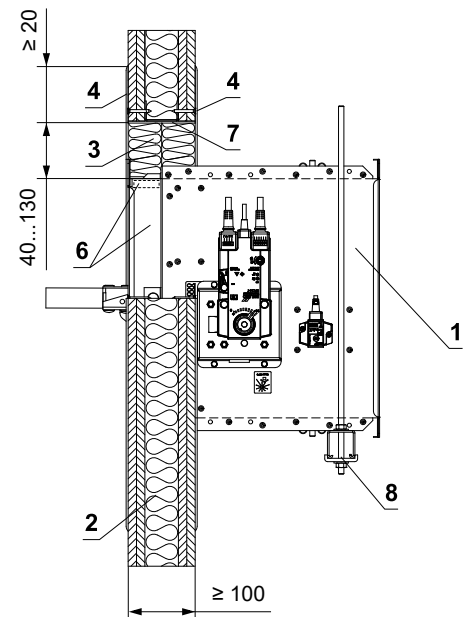
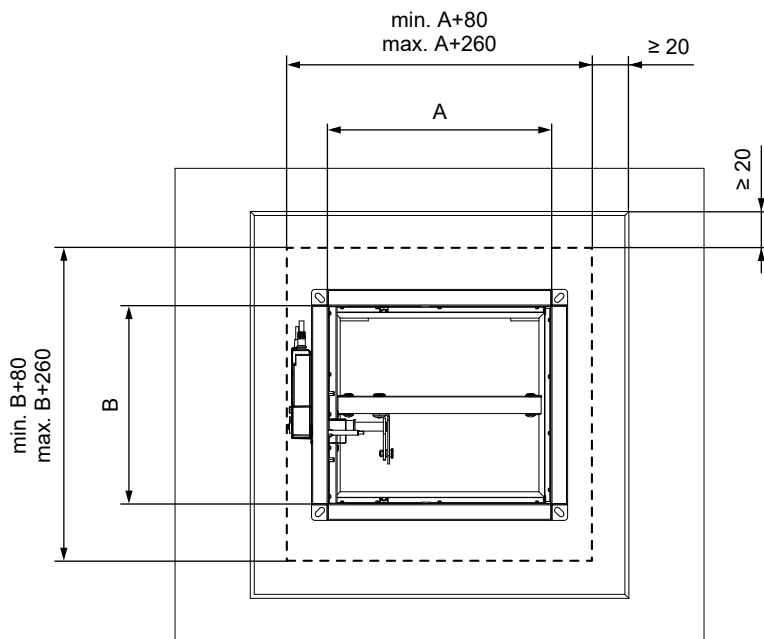
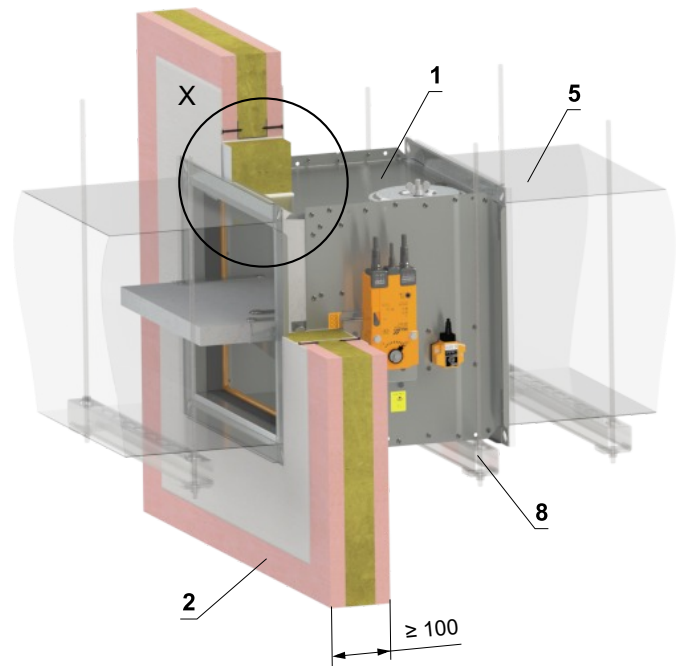
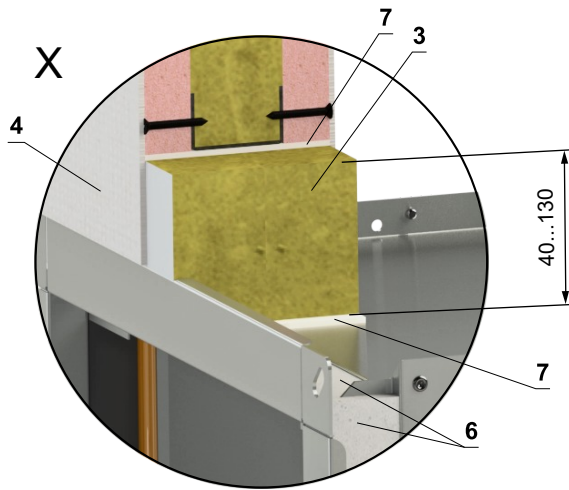
* In the case of fire resistance El 120, the installation gap is limited to 50 mm ^{+10/-0}.
For fire resistance El 90 or lower, an installation gap range of 50–150 mm is permitted.



- 1 FDMB
- 2 Gypsum wall construction
- 3 British gypsum thistle bond 60 (or equivalent can by used)
minimum density 670 kg/m³
- 4 Fixing profile with threaded rod → see pages 32 to 33
- 5 Duct

In gypsum wall construction - Ablative Coated Batt 100mm

- For connection following duct → see page 34
- The installation opening is lined with a UW/CW profile.

EI 90 ($v_e i \leftrightarrow o$) S with fire resistance wall EI 90EI 60 ($v_e i \leftrightarrow o$) S with fire resistance wall EI 60

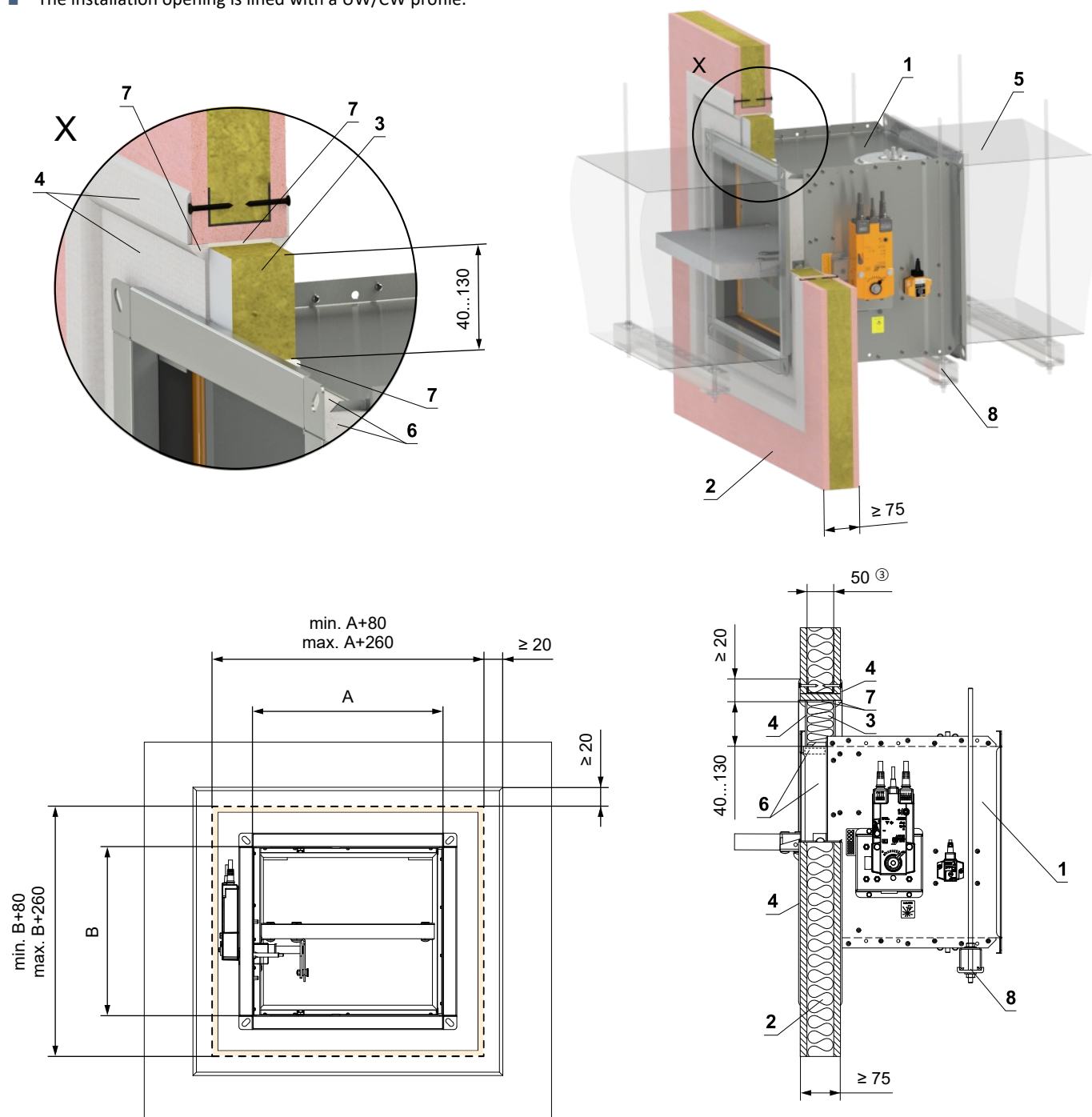
- 1 FDMB
- 2 Gypsum wall construction
- 3 Ablative Coated Batt (e.g. Firestop Board HILTI CFS-CT B 1S 140/50 - min. density 140 kg/m³ + Firestop acrylic sealant HILTI CFS-S ACR or equivalent)
- 4 Fire stop coating thickness 1 mm (e.g. HILTI CFS-CT, PROMASTOP-CC or equivalent)
- 5 Duct
- 6 Protective cladding boards - (not part of the damper) but must be used as part of the penetration filling → see page 43
- 7 Fire resistant mastic - fill the gap on both sides of the fire separation construction and around the perimeter of penetration and damper body. (e.g. HILTI CFS-S ACR)
- 8 Fixing profile with threaded rod → see pages 32 to 33

In gypsum wall construction - Ablative Coated Batt 50mm

- For connection following duct → see page 34
- In this installation below do not use BUILT IN EDGE sticker. The Damper blade must be installed in the centre line of the wall construction.
- The installation opening is lined with a UW/CW profile.

EI 45 ($v_e i \leftrightarrow o$) S with fire resistance wall EI 45

EI 30 ($v_e i \leftrightarrow o$) S with fire resistance wall EI 30



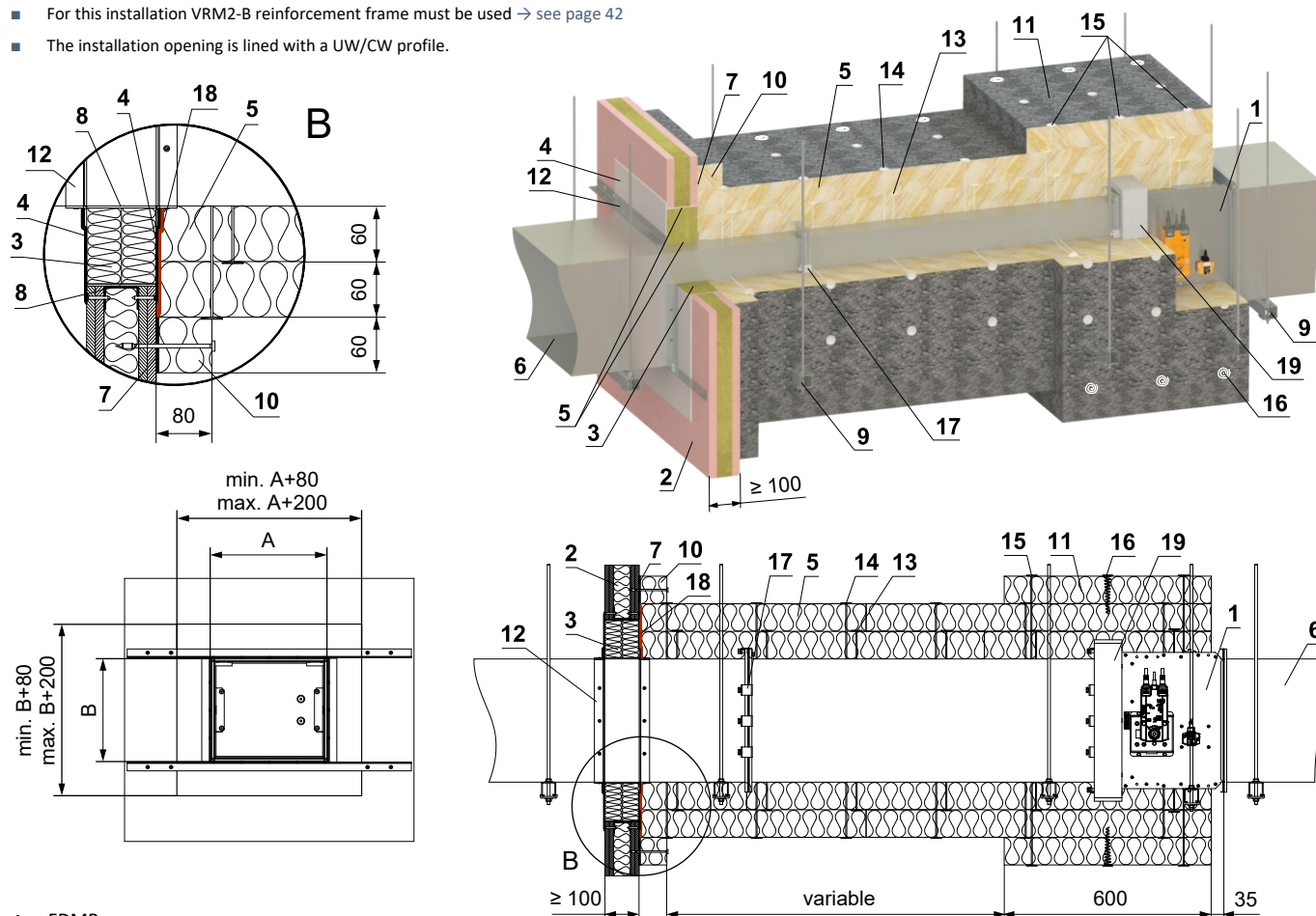
- 1 FDMB
- 2 Gypsum wall construction
- 3 Ablative Coated Batt (e.g. Firestop Board HILTI CFS-CT B 1S 140/50 - min. density 140 kg/m³ + Firestop acrylic sealant HILTI CFS-S ACR or equivalent)
- 4 Fire stop coating thickness 1 mm (e.g. HILTI CFS-CT, PROMASTOP-CC or equivalent)
- 5 Duct
- 6 Protective cladding boards - (not part of the damper) but must be used as part of the penetration filling → see page 43
- 7 Fire resistant mastic - fill the gap on both sides of the fire separation construction and around the perimeter of penetration and damper body. (e.g. HILTI CFS-S ACR)
- 8 Fixing profile with threaded rod → see pages 32 to 33

Installation outside gypsum wall construction

Outside gypsum wall construction - ISOVER Ultimate Protect - Ablative Coated Batt

EI 90 (v_e i↔o) S

- For connection of following duct → see page 34
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ISOVER manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 32
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- Damper inspection holes are covered with insulation, therefore it's necessary to make an inspection hole on the connecting duct
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- For this installation VRM2-B reinforcement frame must be used → see page 42
- The installation opening is lined with a UW/CW profile.



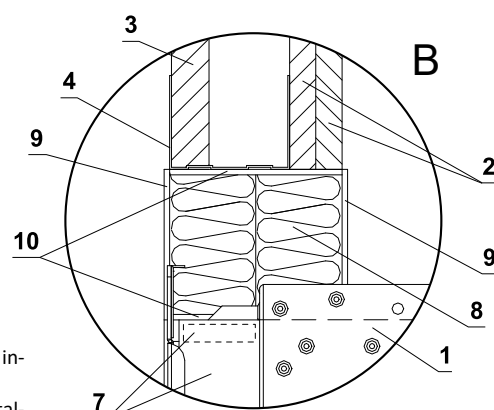
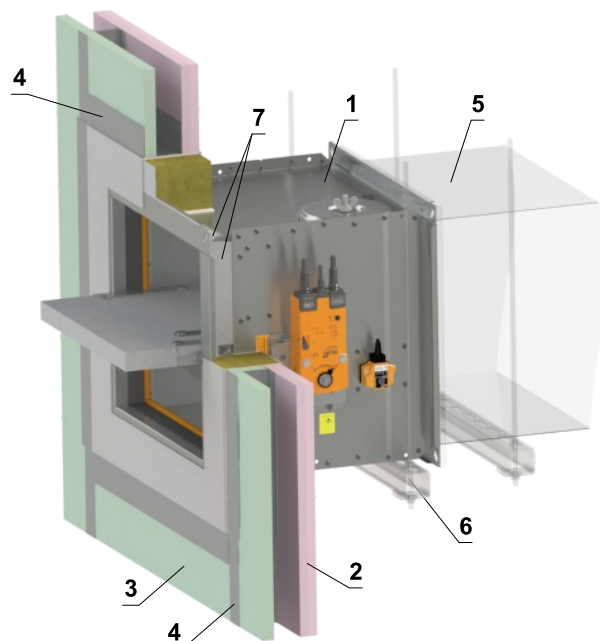
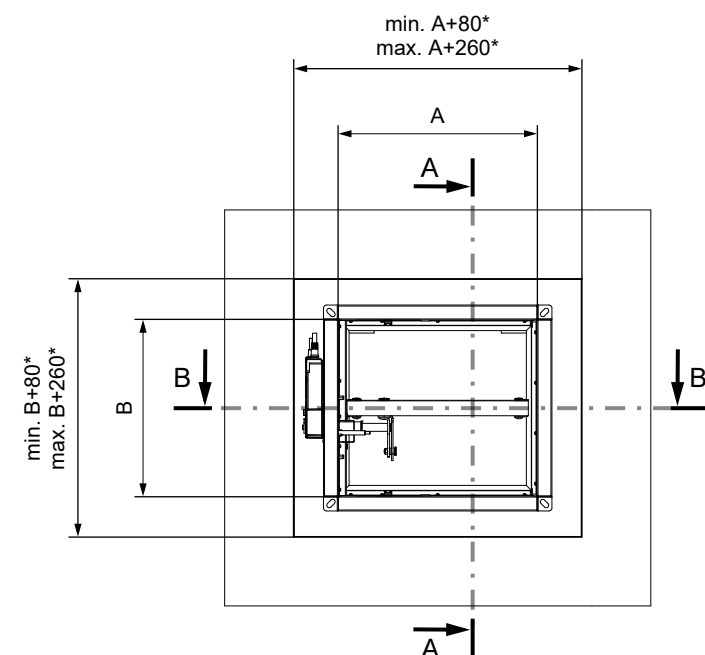
- | | | | |
|---|--|----|---|
| 1 | FDMB | 10 | Duct penetration insulation collar - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 60 mm - glued (pos. 7) and fixed with screws to the wall construction |
| 2 | Gypsum wall construction | 11 | Insulating collar of the damper and duct connection - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 60 mm |
| 3 | Ablative Coated Batt (e.g. Firestop Board HILTI CFS-CT B 1S 140/50 - min. density 140 kg/m ³ + Firestop acrylic sealant HILTI CFS-SACR or equivalent) | 12 | L-profile 30x30x3 mm - dimensions and installation acc. to ISOVER manufacturer |
| 4 | Fire stop coating thickness 1 mm (e.g. HILTI CFS-CT, PROMASTOP-CC or equivalent) | 13 | Stud-welded pins 60 mm - quantity and placing acc. to ISOVER manufa. |
| 5 | Insulation board made of stone wool, with a surface treatment of aluminum foil, min. density 66 kg/m ³ (ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 60 mm) | 14 | Stud-welded pins 120 mm - quantity and placing acc. to ISOVER manufa. |
| 6 | Standard air ducts, made of galvanized sheet thickness 0,8 mm, flanges 30 mm, acc. to BS EN 1507 and DIN 24190 | 15 | Stud-welded pins 180 mm - quantity and placing acc. to ISOVER manufa. |
| 7 | ISOVER Protect BSK glue - apply on the insulation and stick it to the fire separation construction | 16 | Fire spiral shaped screws - quantity and placing acc. to ISOVER manufa. |
| 8 | Fire resistant mastic - fill the gap on both sides of the fire separation construction and around the perimeter of penetration and damper body. (e.g. HILTI CFS-S ACR) | 17 | Steel clamp min. M8 bolts |
| 9 | Fixing profile with threaded rod → see pages 32 to 33 | 18 | ISOVER Protect BSF |
| | | 19 | VRM2-B → see page 42 |

In shaft wall construction

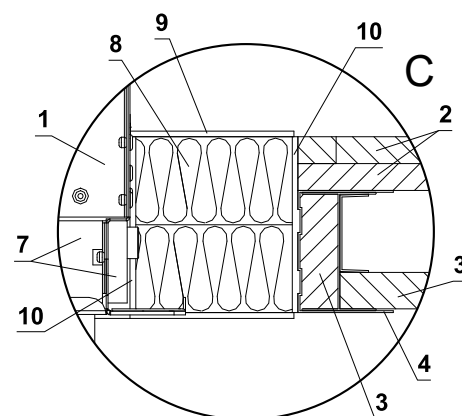
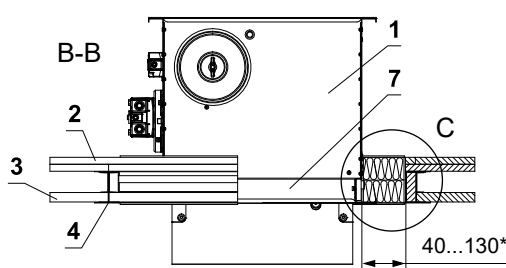
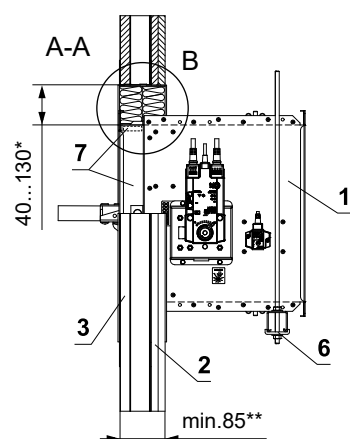
In shaft wall construction - Ablative Coated Batt

- For connection of following duct → see page 34
- Damper can be installed on either side of the wall
- It is possible to use e.g. wall type A306002 (EIS 60), A306003 (EIS 90)... from www.british-gypsum.com
- It is possible to use walls that have the same or greater thickness and density of boards than the walls listed below (more layers of boards can also be used)
- Follow the instructions of the shaft wall manufacturer.

El 90 (v_e i↔o) S with fire resistance wall El 90*
El 60 (v_e i↔o) S with fire resistance wall El 60



* In the case of fire resistance El 90, the installation gap is limited to 90 mm ^{+0/-10}.
For fire resistance El 60 or lower, an installation gap range of 40–130 mm is permitted.



- 1 FDMB
- 2 Plasterboard BS EN 520 - Type F min. 2x12,5 mm**
- 3 Plasterboard BS EN 520 - Type F min. 1x19 mm**
- 4 Plasterboard profile
- 5 Duct
- 6 Fixing profile with threaded rod → see pages 32 to 33
- 7 Protective cladding board - min. th. 10 mm, min. density 870 kg/m³ (e.g. PROMATECT-H) → see page 43
Ablative Coated Batt HILTI
- 8 Firestop Board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 9 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 10 Firestop acrylic sealant - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

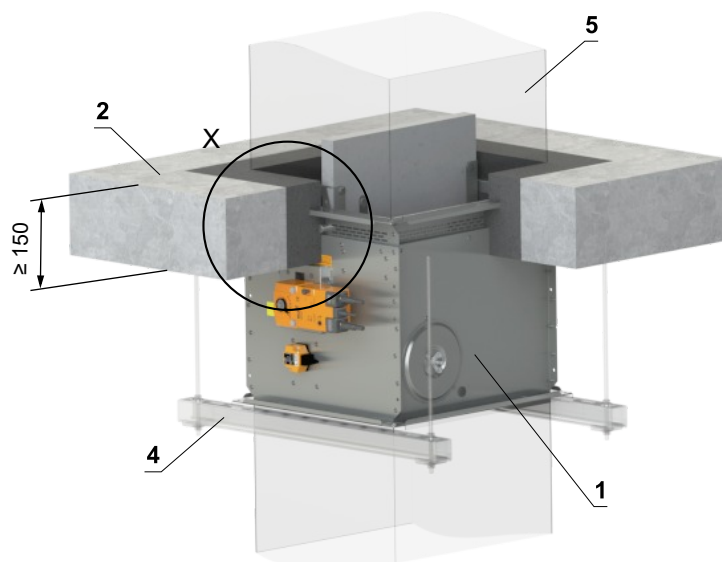
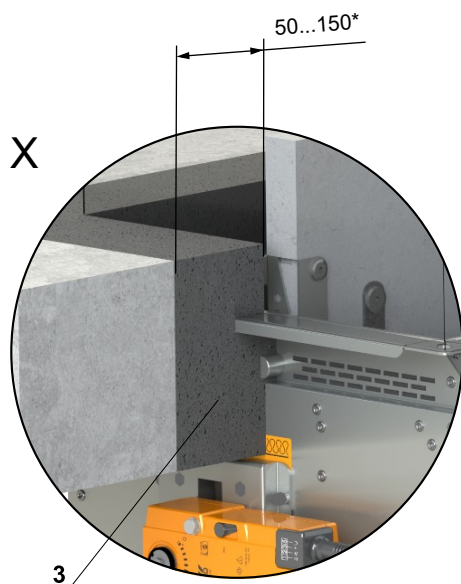
** For fire resistance of the shaftwall EIS 60

In solid ceiling construction

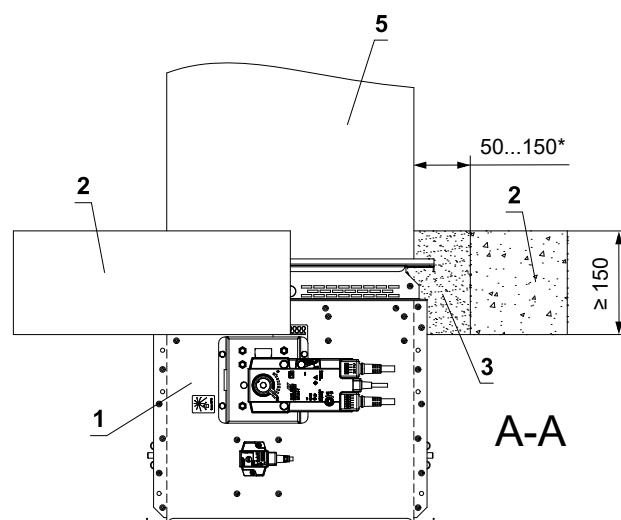
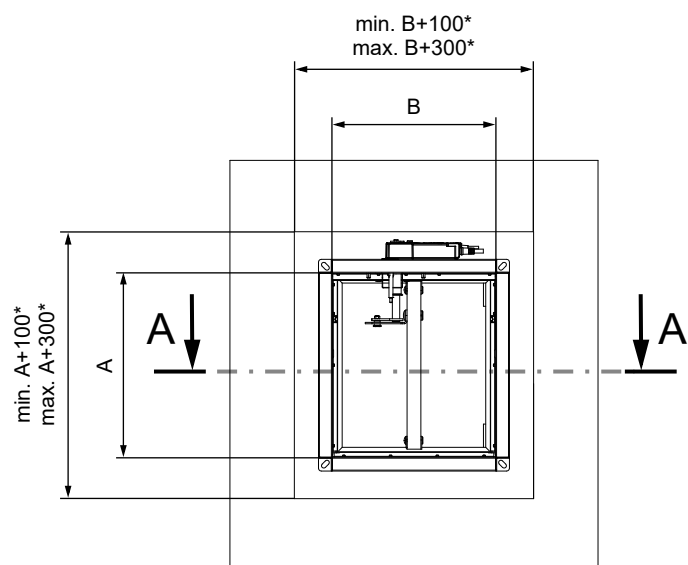
In solid ceiling construction - mortar or gypsum

El 90 ($h_o \leftrightarrow o$) S
El 120 ($h_o \leftrightarrow o$) S*

- For connection following duct → see page 34
- This installation was tested without supports. Supports are optional, if are used, follow the manufacturer's instructions and national standards.



* In the case of fire resistance EI 120, the installation gap is limited to 50 mm ^{+10/-0}.
For fire resistance EI 90 or lower, an installation gap range of 50–150 mm is permitted.



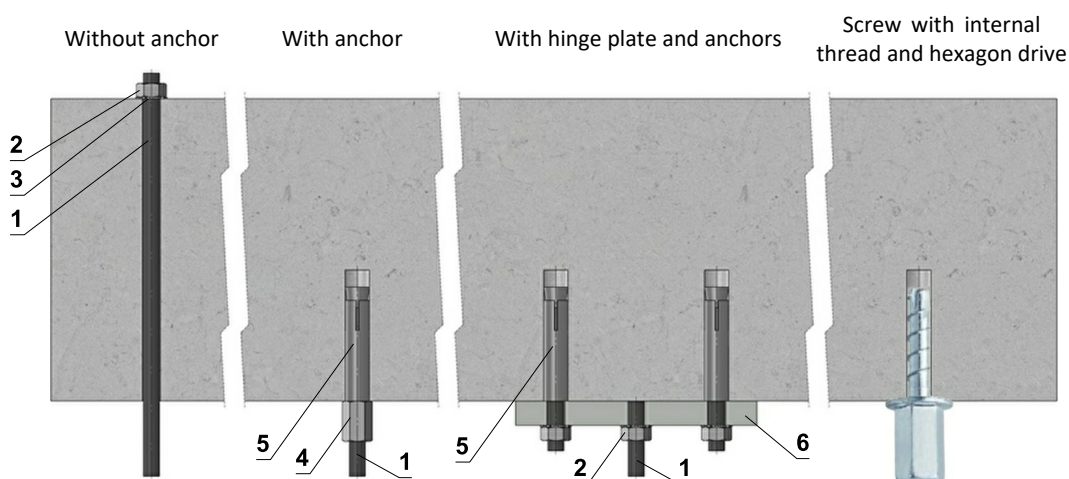
- 1 FDMB
- 2 Solid ceiling construction
- 3 British gypsum thistle bond 60 (or equivalent can by used)
minimum density 670 kg/m³
- 4 Fixing profile with threaded rod → see pages 32 to 33
- 5 Duct

V. SUSPENSION SYSTEMS

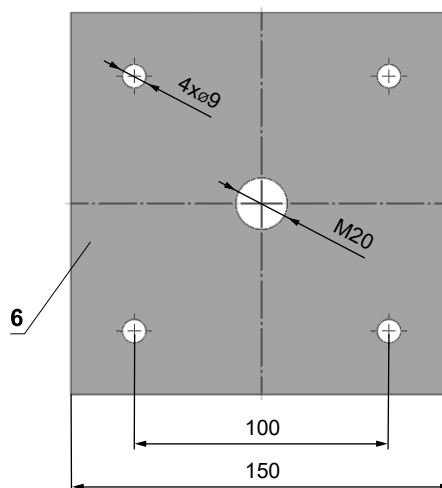
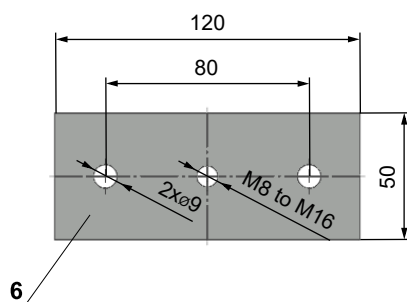
Mounting to the ceiling wall

- 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.
- Threaded rods longer than 1,5 m must be protected by fire insulation.

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



Hinge plates



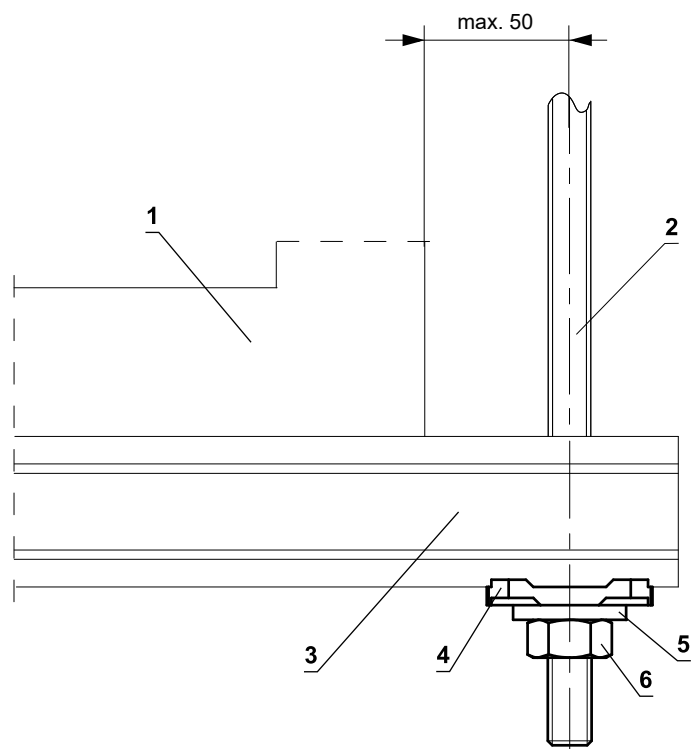
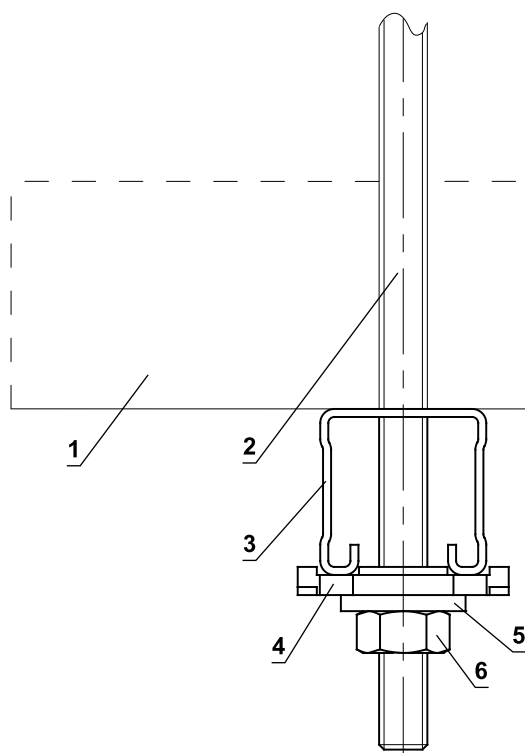
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

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

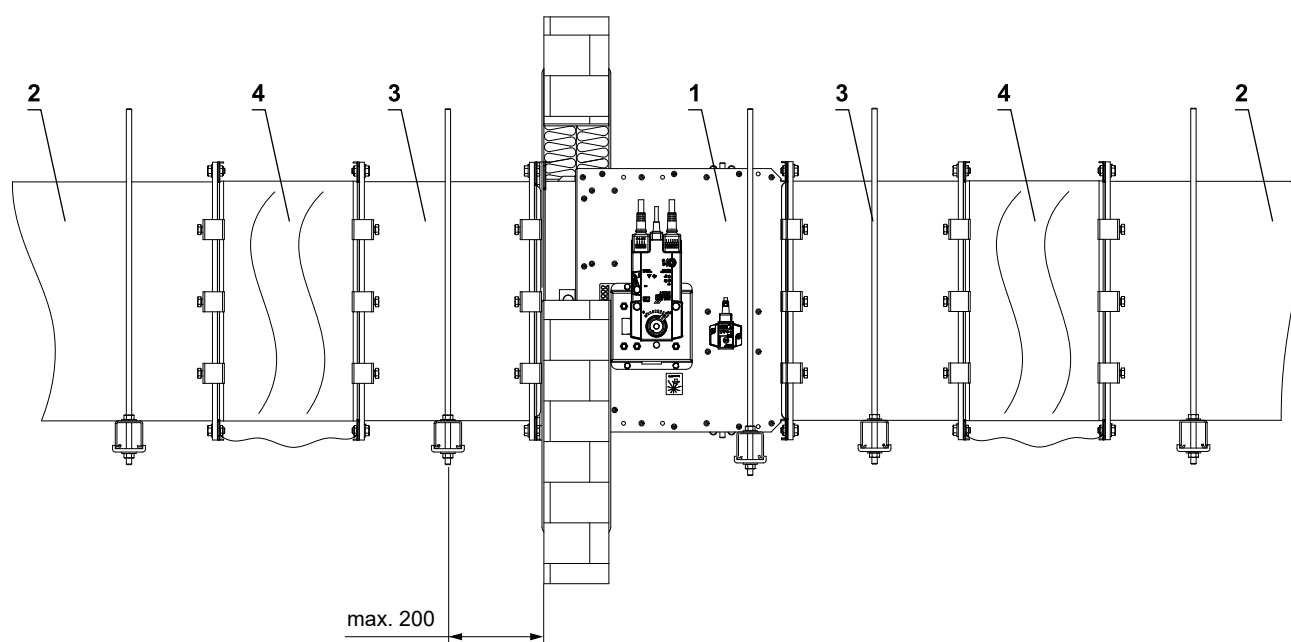
- 1 Threaded rod M8 - M20
- 2 Nut M8 - M20
- 3 Washer for M8 - M20
- 4 Coupling Nut M8 - M20
- 5 Anchor
- 6 Hinge plate - min. thickness 10 mm
- 7 Concrete screw tested for fire resistance R30-R90, max. Tension up to 0.75 KN (length 35 mm)

Example of placing of mounting profiles HILTI



- 1 FDMB
- 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



- 1 FDMB
- 2 Connecting air duct
- 3 Extension piece (if required)
- 4 Damping pad or breakaway connection as DW 144

VI. TECHNICAL DATA

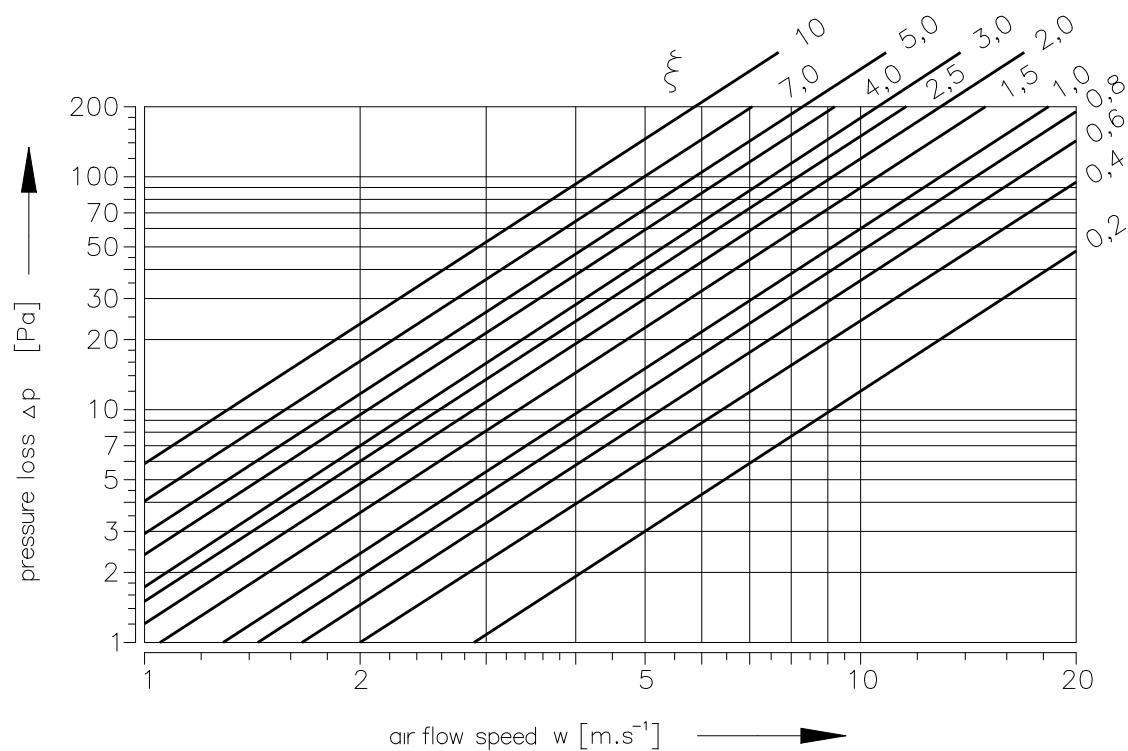
Pressure loss

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/m ³]	air density
ξ	[-]	coefficient of local pressure loss for the nominal damper section → see page 36

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



Coefficient of local pressure loss

	B													
A	100	110	125	140	150	160	180	200	225	250	280	300	315	355
100	19,025	15,910	11,370	7,983	6,374	5,264	2,959	2,962	2,162	1,548	1,399	–	–	–
110	15,690	12,678	9,499	6,910	5,576	4,528	2,743	2,649	1,978	1,459	1,299	–	–	–
125	11,247	9,984	7,440	5,444	4,529	3,773	2,461	2,208	1,744	1,327	1,163	–	–	–
140	8,673	7,669	5,933	4,489	3,755	3,195	2,204	1,893	1,552	1,217	1,044	–	–	–
150	7,408	6,620	5,144	4,007	3,388	2,899	2,091	1,728	1,443	1,160	0,985	–	–	–
160	6,659	5,813	4,748	3,683	3,129	4,771	3,458	2,717	2,285	1,813	1,538	1,407	1,327	1,165
180	4,528	4,270	3,630	3,000	2,644	4,102	3,251	2,351	2,016	1,676	1,342	1,221	1,136	0,986
200	4,490	4,170	3,466	2,807	2,446	3,701	2,951	2,105	1,867	1,554	1,302	1,113	1,052	0,933
225	4,220	3,969	3,379	2,767	2,431	3,654	2,873	2,056	1,726	1,475	1,226	1,067	1,029	0,917
250	4,120	3,904	3,306	2,744	2,405	3,588	2,793	2,005	1,675	1,386	1,155	1,033	0,987	0,893
280	3,520	3,404	3,005	2,551	2,266	3,411	2,692	1,975	1,599	1,341	1,123	0,986	0,916	0,822
300	3,307	3,225	2,876	2,457	2,189	3,288	2,599	1,903	1,536	1,315	1,101	0,974	0,911	0,787
315	3,219	3,139	2,760	2,338	2,072	3,102	2,454	1,833	1,489	1,289	0,988	0,933	0,833	0,721
355	2,914	2,842	2,550	2,195	1,963	2,955	2,302	1,796	1,412	1,199	0,956	0,902	0,799	0,678
400	3,291	3,125	2,665	2,196	1,926	2,833	2,159	1,703	1,356	1,126	0,931	0,825	0,711	0,635
450	–	–	2,690	2,176	1,884	2,732	2,055	1,623	1,302	1,103	0,852	0,777	0,677	0,599
500	–	–	2,590	2,110	1,836	2,670	1,988	1,587	1,251	1,025	0,796	0,725	0,618	0,529
550	–	–	1,976	1,885	1,731	4,219	2,941	2,237	1,687	1,402	1,156	1,039	0,968	0,827
560	–	–	1,978	1,884	1,727	4,194	2,922	2,222	1,623	1,392	1,147	1,031	0,910	0,820
600	–	–	–	1,841	1,696	4,104	2,857	2,170	1,573	1,357	1,117	1,004	0,935	0,797
630	–	–	–	1,828	1,682	4,046	2,814	2,137	1,553	1,334	1,098	0,986	0,918	0,782
650	–	–	–	1,814	1,670	4,010	2,788	2,116	1,526	1,320	1,086	0,975	0,908	0,773
700	–	–	–	–	1,664	3,975	2,759	2,098	1,515	1,297	1,071	0,965	0,892	0,761
710	–	–	–	–	1,645	3,918	2,720	2,062	1,496	1,284	1,055	0,947	0,881	0,749
750	–	–	–	–	1,630	3,865	2,682	2,032	1,475	1,264	1,037	0,931	0,866	0,736
800	–	–	–	–	1,612	3,808	2,640	1,999	1,445	1,241	1,018	0,913	0,849	0,721
900	–	–	–	–	–	3,715	2,572	1,946	1,414	1,205	0,988	0,885	0,822	0,697
1000	–	–	–	–	–	3,643	2,519	1,904	1,395	1,177	0,964	0,863	0,801	0,679

	B													
A	400	450	500	550	560	600	630	650	700	710	750	800	900	1000
100	–	–	–	–	–	–	–	–	–	–	–	–	–	–
110	–	–	–	–	–	–	–	–	–	–	–	–	–	–
125	–	–	–	–	–	–	–	–	–	–	–	–	–	–
140	–	–	–	–	–	–	–	–	–	–	–	–	–	–
150	–	–	–	–	–	–	–	–	–	–	–	–	–	–
160	1,040	2,025	1,874	1,761	1,741	1,672	1,627	1,601	1,598	1,532	1,493	1,452	1,386	1,336
180	0,922	1,676	1,548	1,451	1,434	1,375	1,337	1,315	1,289	1,256	1,224	1,180	1,133	1,090
200	0,801	1,445	1,332	1,246	1,232	1,179	1,146	1,126	1,106	1,074	1,046	1,015	0,965	0,928
225	0,781	1,239	1,172	1,075	1,035	0,998	0,965	0,938	0,926	0,905	0,873	0,856	0,822	0,803
250	0,736	1,113	1,021	0,952	0,940	0,898	0,871	0,855	0,831	0,813	0,790	0,765	0,725	0,695
280	0,713	0,996	0,912	0,849	0,880	0,800	0,775	0,760	0,742	0,722	0,701	0,678	0,641	0,613
300	0,692	0,937	0,857	0,797	0,786	0,750	0,726	0,712	0,689	0,675	0,655	0,633	0,599	0,572
315	0,634	0,900	0,822	0,764	0,754	0,718	0,695	0,681	0,662	0,646	0,626	0,605	0,572	0,546
355	0,588	0,821	0,749	0,694	0,685	0,651	0,630	0,617	0,603	0,584	0,566	0,546	0,514	0,490
400	0,527	0,757	0,689	0,637	0,628	0,597	0,577	0,565	0,543	0,534	0,516	0,498	0,468	0,445
450	0,507	0,705	0,640	0,591	0,583	0,553	0,534	0,522	0,503	0,493	0,476	0,458	0,430	0,408
500	0,460	0,666	0,603	0,556	0,548	0,520	0,501	0,490	0,482	0,462	0,446	0,429	0,401	0,380
550	0,719	0,635	0,575	0,529	0,521	0,494	0,476	0,465	0,441	0,437	0,422	0,405	0,379	–
560	0,713	0,630	0,570	0,524	0,517	0,489	0,471	0,461	0,448	0,433	0,418	0,401	–	–
600	0,692	0,611	0,552	0,507	0,500	0,473	0,455	0,445	0,426	0,418	0,403	0,387	–	–
630	0,678	0,598	0,540	0,496	0,489	0,462	0,445	0,435	0,418	0,408	0,393	–	–	–
650	0,670	0,590	0,533	0,490	0,482	0,456	0,439	0,428	0,414	0,402	0,387	–	–	–
700	0,656	0,581	0,527	0,483	0,476	0,444	0,431	0,421	0,409	0,398	–	–	–	–
710	0,648	0,571	0,515	0,472	0,465	0,439	0,422	0,412	0,399	–	–	–	–	–
750	0,636	0,560	0,504	0,462	0,455	0,429	0,413	0,403	–	–	–	–	–	–
800	0,623	0,547	0,493	0,451	0,444	0,419	–	–	–	–	–	–	–	–
900	0,602	0,528	0,474	0,434	–	–	–	–	–	–	–	–	–	–
1000	0,585	0,512	0,460	–	–	–	–	–	–	–	–	–	–	–

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 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

Tables of acoustics values

Level of acoustic output L_{W1} [dB] related to the 1 m ² section															
	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	3	4	5
2	15,5	18,7	20,9	22,6	24	25,2	26,3	27,2	28	31,2	33,4	35,1	36,5	38,8	40,5
3	26,1	29,2	31,5	33,2	34,6	35,8	36,9	37,8	38,6	41,7	44	45,7	47,1	49,4	51,1
4	33,6	36,7	39	40,7	42,1	43,3	44,3	45,3	46,1	49,2	51,5	53,2	54,6	56,9	58,6
5	39,4	42,5	44,8	46,5	47,9	49,1	50,2	51,1	51,9	55	57,3	59	60,4	62,7	64,4
6	44,1	47,3	49,5	51,3	52,7	53,9	54,9	55,8	56,6	59,8	62	63,8	65,2	67,4	69,2
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	69,2	71,4	73,2
8	51,6	54,8	57	58,8	60,2	61,4	62,4	63,3	64,1	67,3	69,5	71,3	72,7	74,9	76,7
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	75,7	78	79,7
10	57,4	60,6	62,8	64,6	66	67,2	68,2	69,1	70	73,1	75,3	77,1	78,5	80,7	82,5
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	81	83,2	85
12	62,2	65,4	67,6	69,3	70,7	71,9	73	73,9	74,7	77,9	80,1	81,8	83,2	85,5	87,2

Correction to the weight filter A											
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

Relative level expressing the shape of the spectrum L_{rel}								
	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 are made from fire resistant asbestos free boards made of mineral fibres.
- Manual control have cover made of mechanically resistant and durable plastic and the other parts are galvanized without further surface treatment.
- Thermal fuses are made of sheet brass, thickness 0,5 mm.
- Fasteners and springs 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 – BS EN 1.4301)
- Class A4 – Chemistry-grade stainless steel (AISI 316, 316L – BS EN 1.4401, BS 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 or manual control, mechanical components except Item 4), frame components.

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) Parts of a manual control entering the inner space of a damper casing (lower sheet of a manual control, lock holder "1", lock lever "2", closing spring, 8 dia. stopper pin, manual control pin)
- 5) Inspection opening cover including the stirrup and fasteners (if they are parts of the cover)
- 6) Bearing for torque transfer from the lever with pin on the blade L-profile (made from AISI 440C)

The damper blade is made from a board of homogeneous material Promatect-MST, thickness 30 mm.

Thermal fuse is identical for all material variants of the dampers. Upon specification by customer, the thermal fuse can be made from A4 from stainless steel sheet metal.

Thermoelectric activation device BAT is modified for stainless-steel variant of the dampers; standard galvanised screws are replaced with stainless-steel M4 screws of corresponding class. Damper casing has stainless-steel riveting M4 nuts.

Plastic, rubber and silicon components, sealants, foaming tapes, glass-ceramic seals, housings, brass bearings of the blade, actuators, and end switches 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 AND STORAGE

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 are 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% (avoid condensation on the damper body). Dampers must be protected against impact when transported and manipulated.

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.
- If the actuator is manually locked, the damper blade will not close in the event of a fire after the activation of the thermoelectric activation device BAT. To restore correct damper operation, the actuator must be unlocked (manually or by applying power supply).

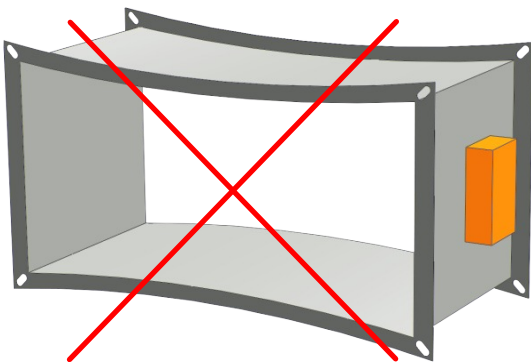
Limit switches

- If the damper is equipped with limit switches and these switches are not used during operation (e.g. because of a project change), they can be left on the damper and not connected (they need not be dismantled).
- On the other hand, if the limit switch is to be added to the damper design, the change can be implemented by change kit.
- These facts must be recorded in the respective operation documentation of the damper (record books of the damper, fire logs, etc.) and subsequently, adequate function checks must be carried out.

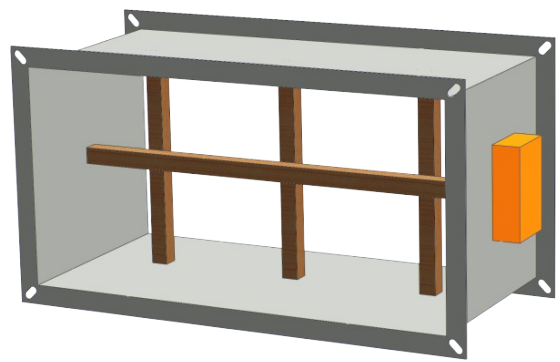
Installation / fixing the damper

- 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!

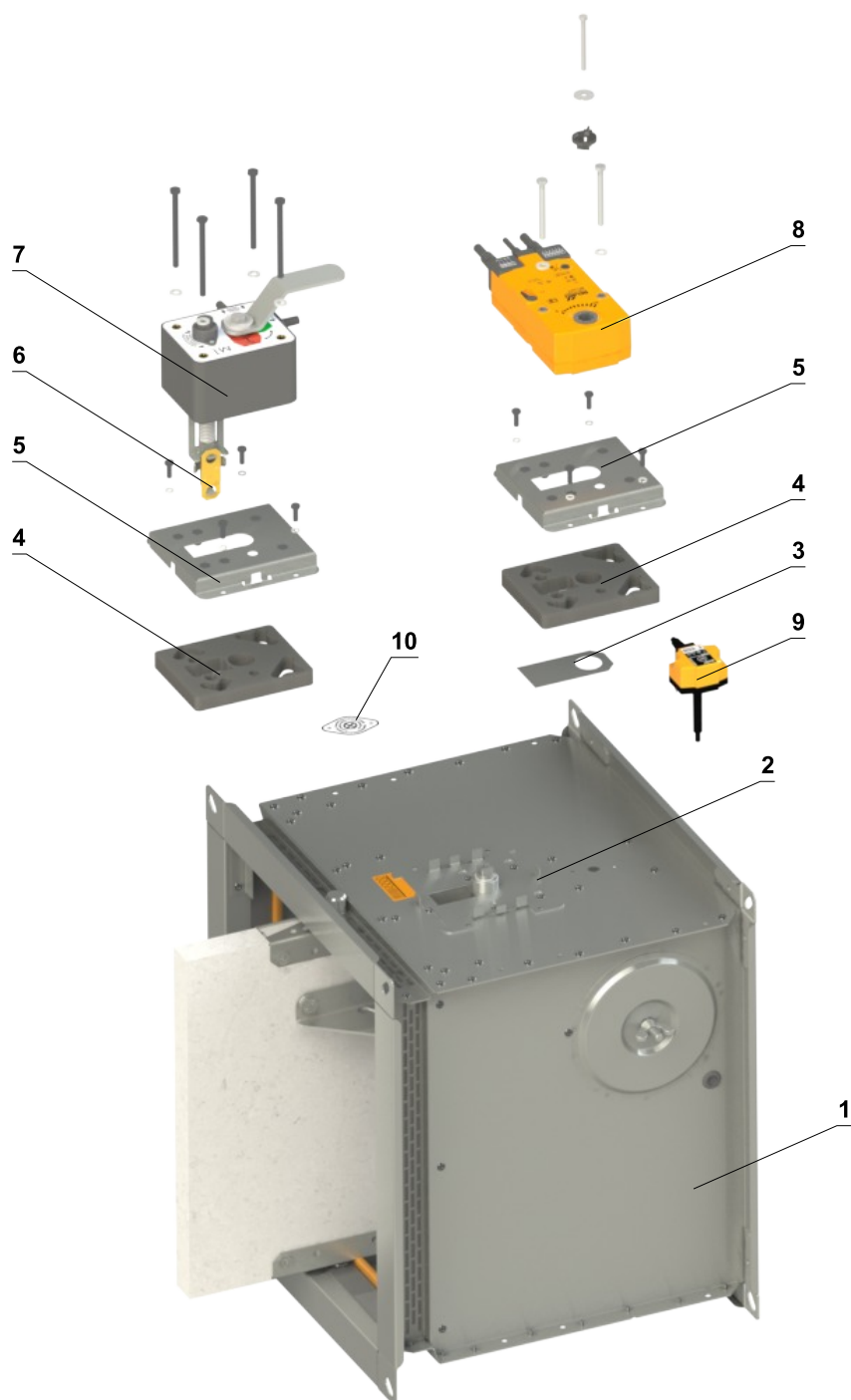


WRONG!



Reinforcement of the casing with wooden beams

Change of manual control for the actuator or vice versa

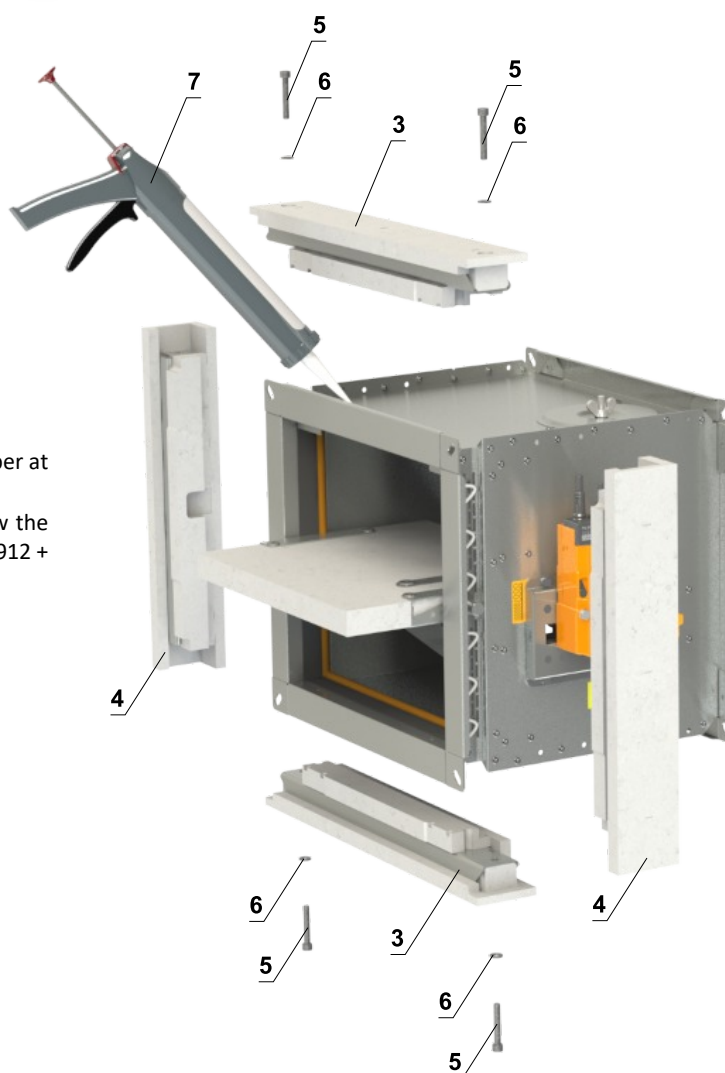
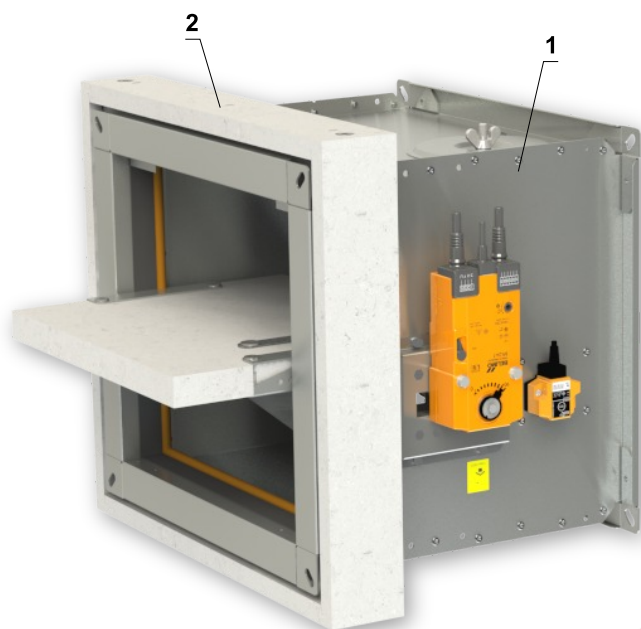


- | | | | |
|---|-----------------------------|----|--------------------------------------|
| 1 | Damper | 6 | Thermal fuse |
| 2 | Mounting plate | 7 | Manual control |
| 3 | Sealing cover | 8 | Spring return actuator |
| 4 | Sealing of a mounting plate | 9 | Thermoelectric activation device BAT |
| 5 | Cover of a mounting plate | 10 | Sensor sticker |

Reinforcing frame VRM2-B

- If the damper is installed outside the fire separation construction with insulation from ISOVER and fire resistance is $\geq$ EI 90 S, VRM2-B reinforcement frame must be used.
- For lower fire resistance than EI 90 S, VRM2-B reinforcement frame is not necessary!
- Glue K84 is not included in the package

Fixing of reinforcing frame VRM2-B to the damper casing



Installation procedure

- 1) Apply glue PROMAT K-84 on the entire surface of the damper at the place of perforation on all four sides of the damper
- 2) Attach parts A and B of the VRM2-B to the damper. Screw the parts together using four M8x50 hexagon socket bolts DIN 912 + four M8 washers DIN 7349.

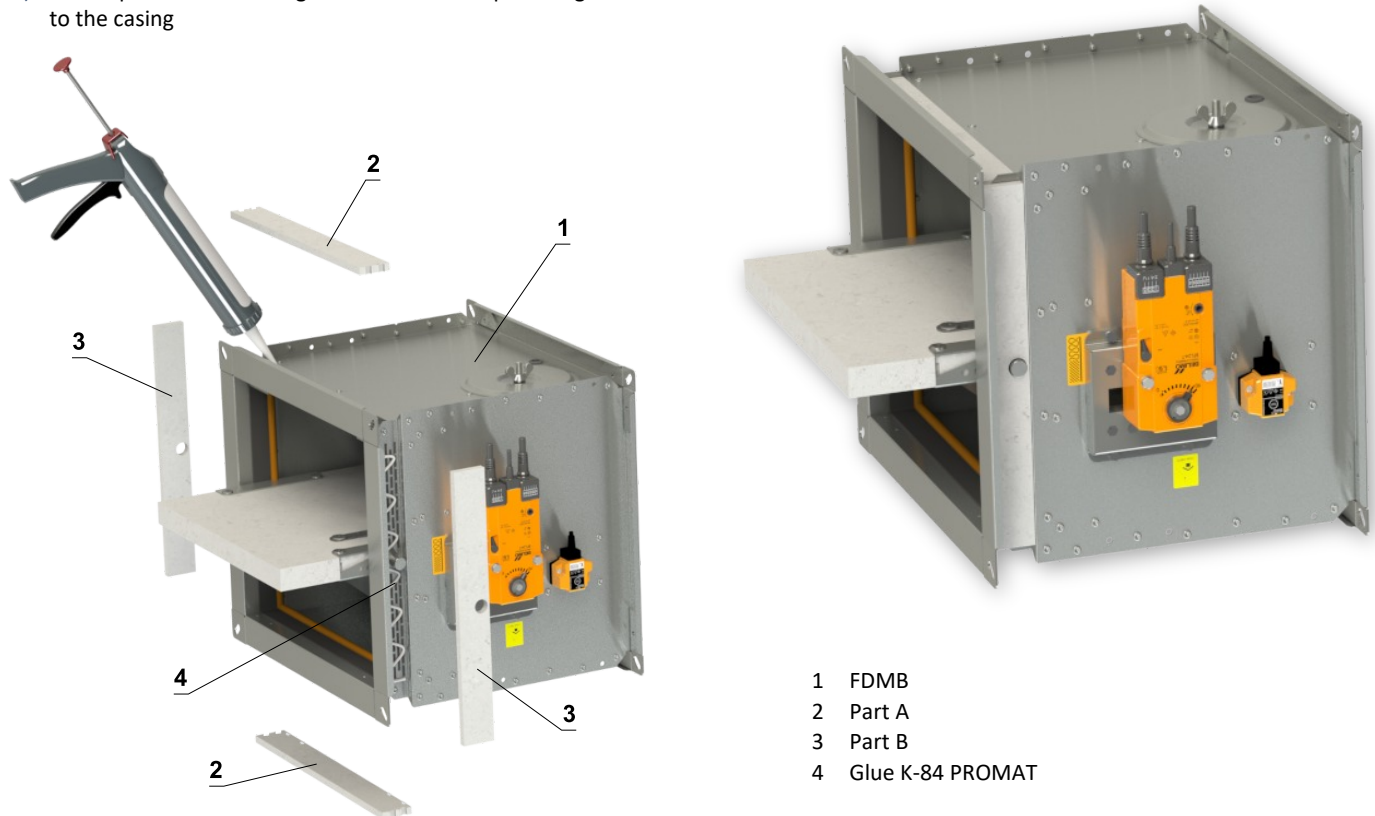
- 1 FDMB
- 2 VRM2-B
- 3 Part A of VRM2-B
- 4 Part B of VRM2-B
- 5 Hexagon socket bolt M8x50 DIN 912
- 6 Washer M8/8,4 DIN 7349
- 7 Glue PROMAT K-84

Protective cladding boards

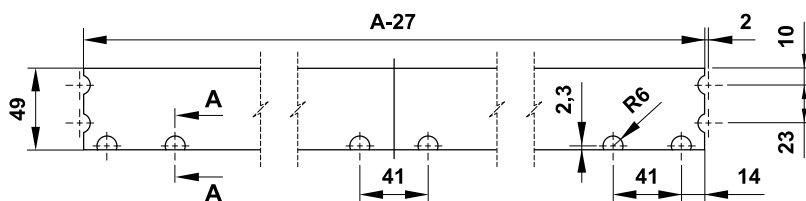
- Protective cladding boards must be used as part of the penetration filling of installation with ablative coated batt
- Can be ordered from MANDIK (installed on the damper or as an accessory) or can be sourced from local supplier
- If protective cladding boards are required, this must be specified in the ordering key
- Boards are made of PROMATECT-H, thickness 10 or 15 mm according to the damper size (SUPALUX, thickness 9 or 15 mm can be used as an alternative)
- Glue K84 is not included in the package

Installation procedure

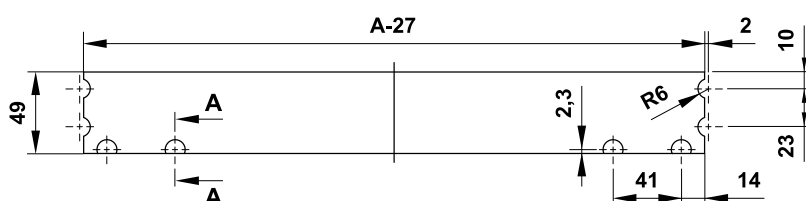
- 1) Apply K84 glue over the entire surface
- 2) Attach protective cladding boards to the damper and glue them to the casing



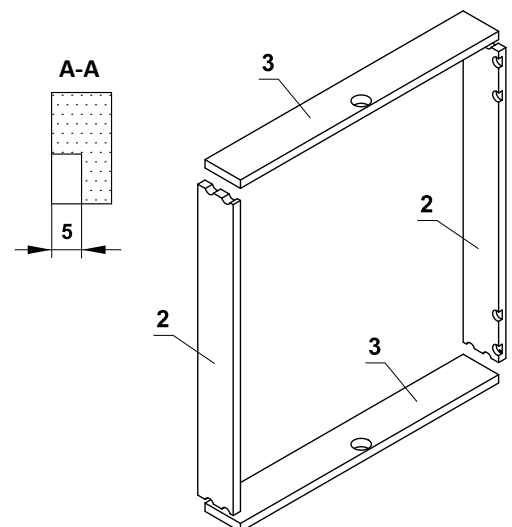
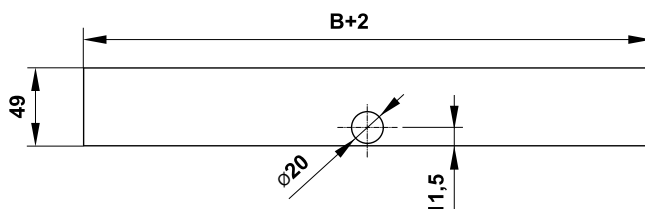
Part A (A≥630)



Part A (A<630)



Part B



- Thickness of protective cladding boards according to the damper size:
- for $A \times B \leq 500 \times 400$, thickness 10 mm
- for $A \times B > 500 \times 400$, thickness 15 mm

Entry into service and revisions

- Before putting the damper into operation, serviceability checks and functional tests must be carried out including testing of functionality of all electrical elements. After putting into operation these serviceability checks must be carried at least twice a year. If no defect is found during two subsequent serviceability checks, these checks can be carried out once a year.
- 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.
- 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 with actuator into operation after their assembly and by sequential checks. Check of blade rotation into the breakdown position "CLOSED" can be done after disconnecting the actuator supply (e.g. by pressing the test button at the thermoelectric activation device BAT or disconnecting the supply from ELECTRICAL FIRE SIGNALISATION). Check of blade rotation back into the "OPEN" position can be done after restoration of power supply (e.g. by releasing the test button or restoration of supply from ELECTRICAL FIRE SIGNALISATION). Without power supply, the damper can be operated manually and fixed in any required position. Release of the locking mechanism can be achieved manually or automatically by applying the supply voltage. It is recommended to provide periodical checks, maintenance and service actions on fire equipment by authorized persons. The authorized persons can be trained by producer, or by authorized distributor. All effective safety standards and directives must be observed during fire damper assembly.
- Visual inspection of proper damper installation, inner area of a damper, damper blade, contact surfaces and silicon seal.
- For regular or exceptional inspection of interior of fire damper, micro-camera device can be used. On each fire damper is an inspection opening. In the case of inspection by camera, take out the black rubber cap, insert the camera inside the damper, check interior and at the end of inspection, put the rubber cap back tightly to cover the empty hole.

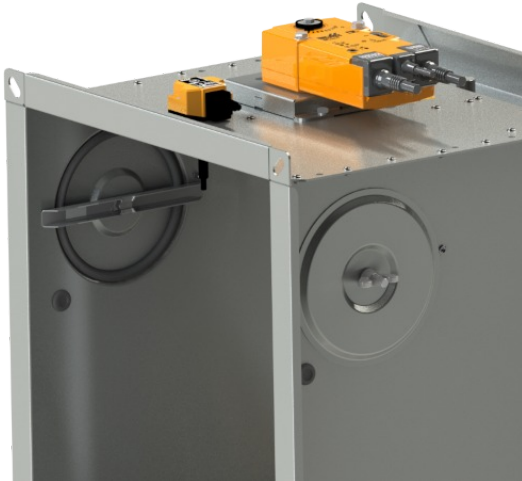
Following checks must be carried out for dampers with manual control

Check of a manual control and thermal fuse

- **To check the function of the manual control proceed as follows:**
- Turn the damper blade to "CLOSED" position as follows:
 - The damper blade is in "OPEN" position.
 - Press the control button of the manual control to turn the damper blade to "CLOSED" position.
 - Check the damper blade rotation to "CLOSED" position.
 - Damper blade closing shall be smooth and fast, the control lever shall be in „CLOSED“ position.
- Turn the damper blade to "OPEN" position as follows:
 - Turn the control lever by 90°.
 - Check the damper blade rotation to "OPEN" position.
 - The lever will automatically lock in "OPEN" position.
- **Check of function and condition of the thermal fuse:**
 - To check the function and the status of the fuse it's possible to remove the manual control from the casing of the fire damper which is attached to the damper casing with four screws M6.
 - Removing the thermal fuse from the fuse holder of a manual control, checks its correct functionality.
 - The manual control is identified as M1 to M3, depending on the closing spring strength.

Following checks must be carried out for dampers with actuator

- Check the rotation of the blade to "CLOSED" failure position after disconnection the power supply of the actuator (e.g. by pressing the test button on the thermoelectric activation device BAT or by disconnection the power supply from electrical fire signalization). Check the rotation of the blade back to "OPEN" position by restoring the power supply to the actuator (e.g. by releasing the test button or by restoring the power supply from electrical fire signalization).
- Inspection opening disassembly
 - Release the covering lid by turning the wing nut and while turning the lid right or left release it from the security belt. Then tilt the lid and remove it from its original position.



Inspection opening detail

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

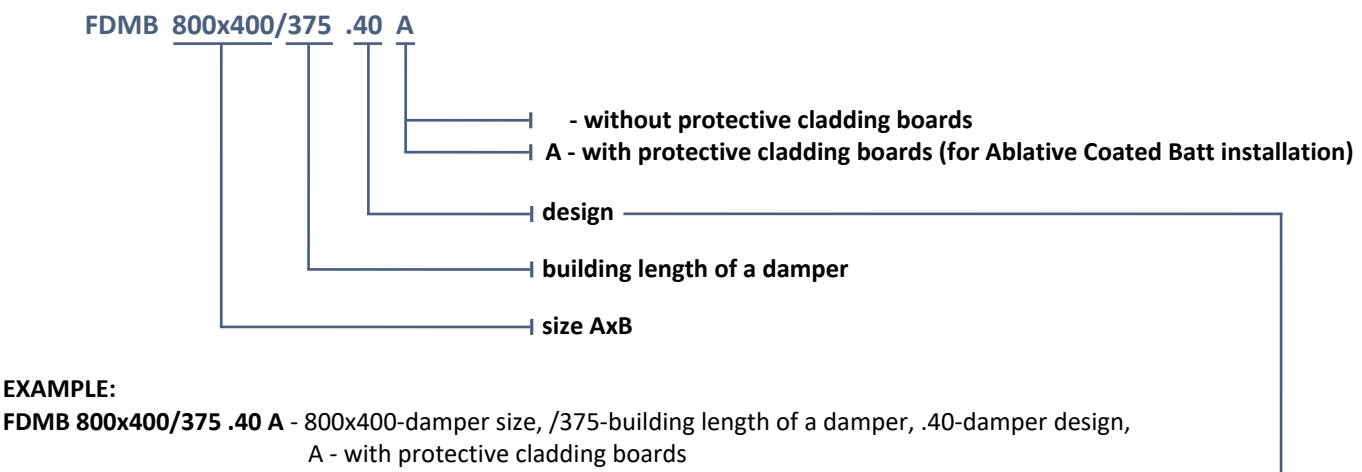
How to proceed after Tf1 or Tf2 fuses have been activated

- If the thermal fuse **Tf1** is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. → [see page 10](#)
- If the thermal fuse **Tf2** is interrupted (due to temperature inside the duct) , only the spare part ZBAT 72 (95/120/140) needs to be replaced (acc.to the activation temperature). → [see page 10](#)

X. ORDERING INFORMATIONS

Ordering key

Fire damper



Dampers design	Additional digit
Manual control and thermal	.01
Manual control and thermal with a terminal switch („CLOSED“)	.11
Manual control and thermal with two terminal switches („OPEN“, „CLOSED“)	.80
With actuator BF 230-TN (BFL, BFN 230-T) - voltage AC 230 V	.40
With actuator BF 24-TN (BFL, BFN 24-T) - voltage AC/DC 24 V	.50

Accessories

Reinforcing frame VRM2-B



Protective cladding boards



Data label

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

MANDÍK®

MANDÍK, a.s.
Dobříšská 550, 267 24 Hostomice, Czech Republic

FIRE DAMPER - XXXX						
DIMENSION:		DESIGN:				
SERIAL.NO.:		WEIGHT (kg):				
CLASSIFICATION:						
TPM XXX/XX	Cert. No.: 2822-UKCA-CPR-XXXX, DoP: PM/XXXX/XX/XX/X			XX	EN 15650:2010	UK CA 2822

MANUAL

MANDÍK®

MANDÍK, a.s.
Dobříšská 550, 267 24 Hostomice, Czech Republic

FIRE DAMPER - XXXX						
DIMENSION:		DESIGN:				
SERIAL.NO.:		WEIGHT (kg):				
CLASSIFICATION:						
TPM XXX/XX	Cert. No.: 1391-CPR-XXXX/XXXX, DoP: PM/XXXX/XX/XX/X			XX	EN 15650:2010	CE 1391

MANUAL

The producer reserves the right for innovations of the product.
For actual product information see www.mandik.co.uk

MANDÍK[®]
www.mandik.co.uk

Manufacturer

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