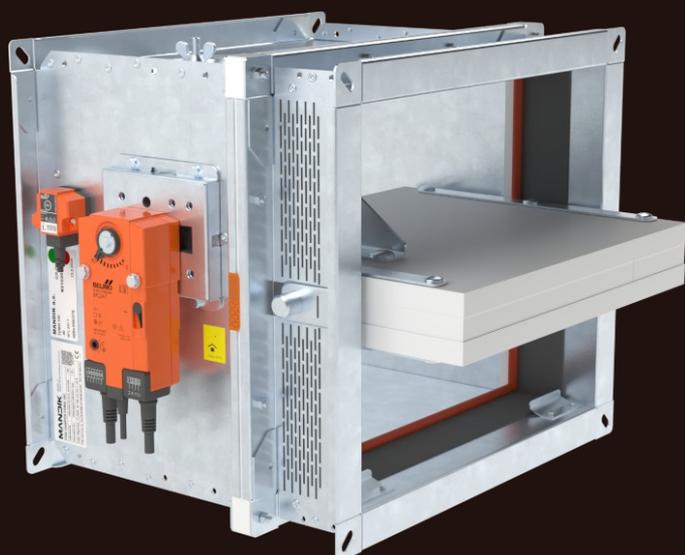


FDMQ 180

Fire damper

Technical Documentation

Installation, Commissioning, Operation, Maintenance and Service Manual



CE
1391

These technical specifications state a row of manufactured sizes and models of fire dampers FDMQ 180
It is valid for production, designing, ordering, delivery, maintenance and operation.

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I. GENERAL

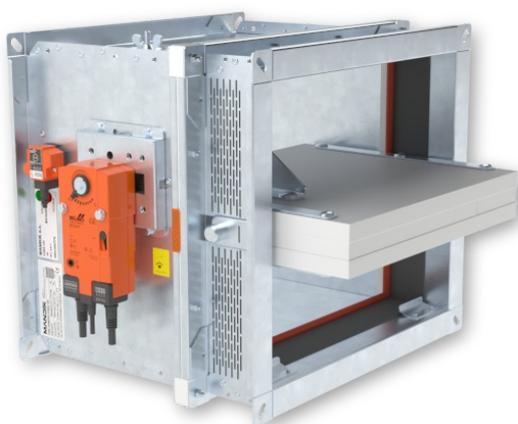
Description

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.



FDMQ 180 with spring return actuator



FDMQ 180 with manual control

Damper characteristics

- CE certified acc. to EN 15650
- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3+A1
- External Casing leakage class ATC 3 (old marking "C"), Internal leakage class 3 acc. to EN 1751
- Cycling test in class C₁₀₀₀₀ acc. to EN 15650
- Corrosion resistant acc. to EN 15650
- Certificate of constancy of performance No. 1391-CPR-XXXX/XXXX
- Declaration of Performance No. PM/FDMQ 180/01/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 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 manual control with a thermal fuse which actuates the shutting device, after the nominal activation temperature 72°C has been reached.
- Automatic initiation of the manual control is not activated if the temperature does not exceed 70°C.
- In case that other activation temperatures are required, thermal fuses with nominal activation temperature +104°C or +147°C can be supplied (this requirement must be specified in the order).



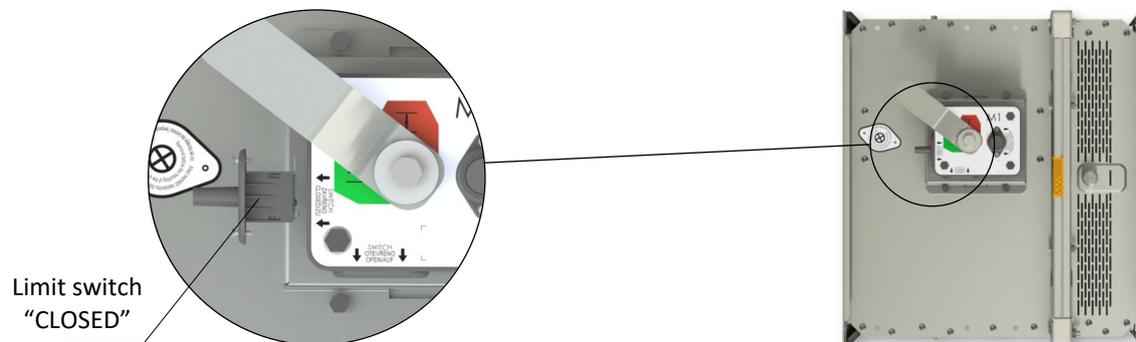
Design .01

ATTENTION:

- Manual controls are produced in five sizes M1 to M5, difference is only in size of a closing spring, which closes the fire damper.
- For the size of fire dampers is always assigned the size of the manual control → see pages 16 to 20
- It is not recommended to use different size of the manual control than given by the manufacturer, otherwise there is a risk of damaging the fire damper.

Design .11

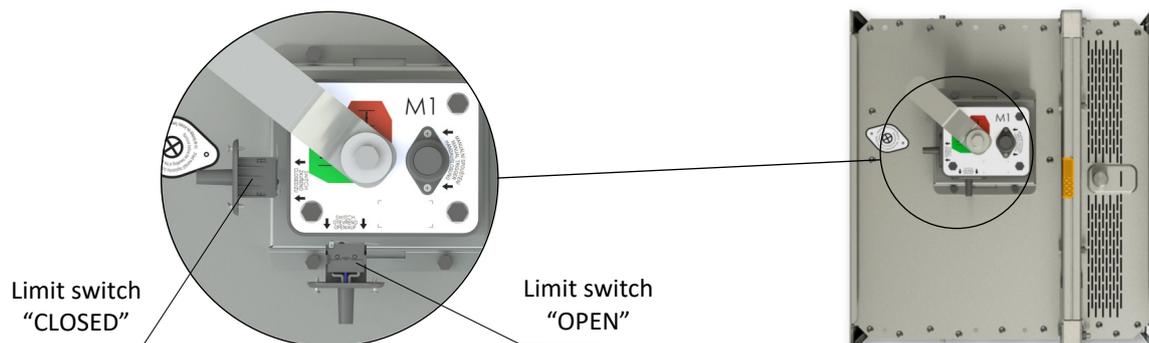
- Design .01 with manual control can be complemented with a limit switch signaling of the damper blade position "CLOSED".
- Cable is connected directly to limit switch.
- Limit switch detail → see page 5



Design .11

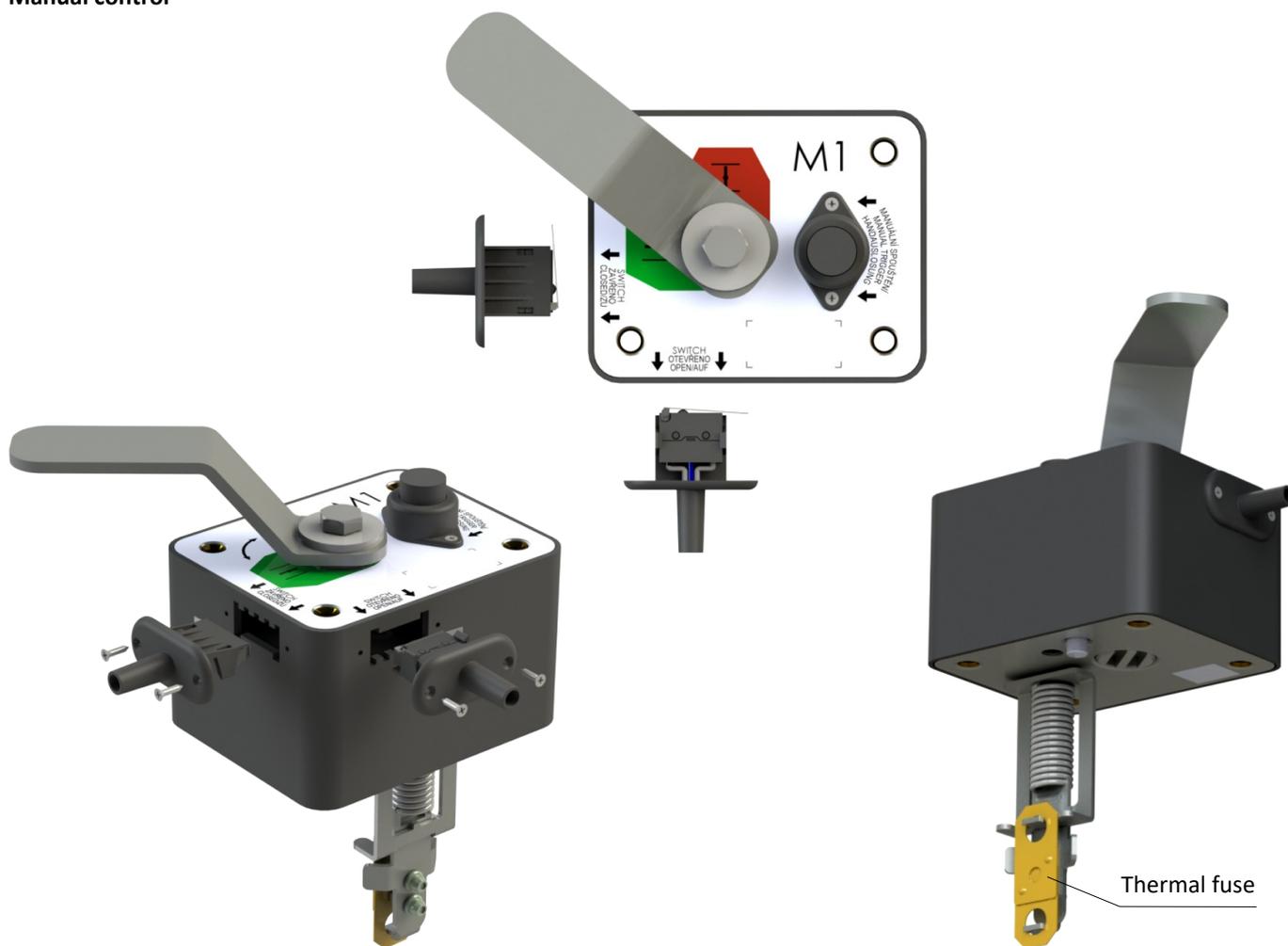
Design .80

- Design .01 with manual control can be complemented with two limit switches signaling of the damper blade position "CLOSED" and "OPEN".
- Cables are connected directly to limit switches.
- Limit switch detail → see page 5

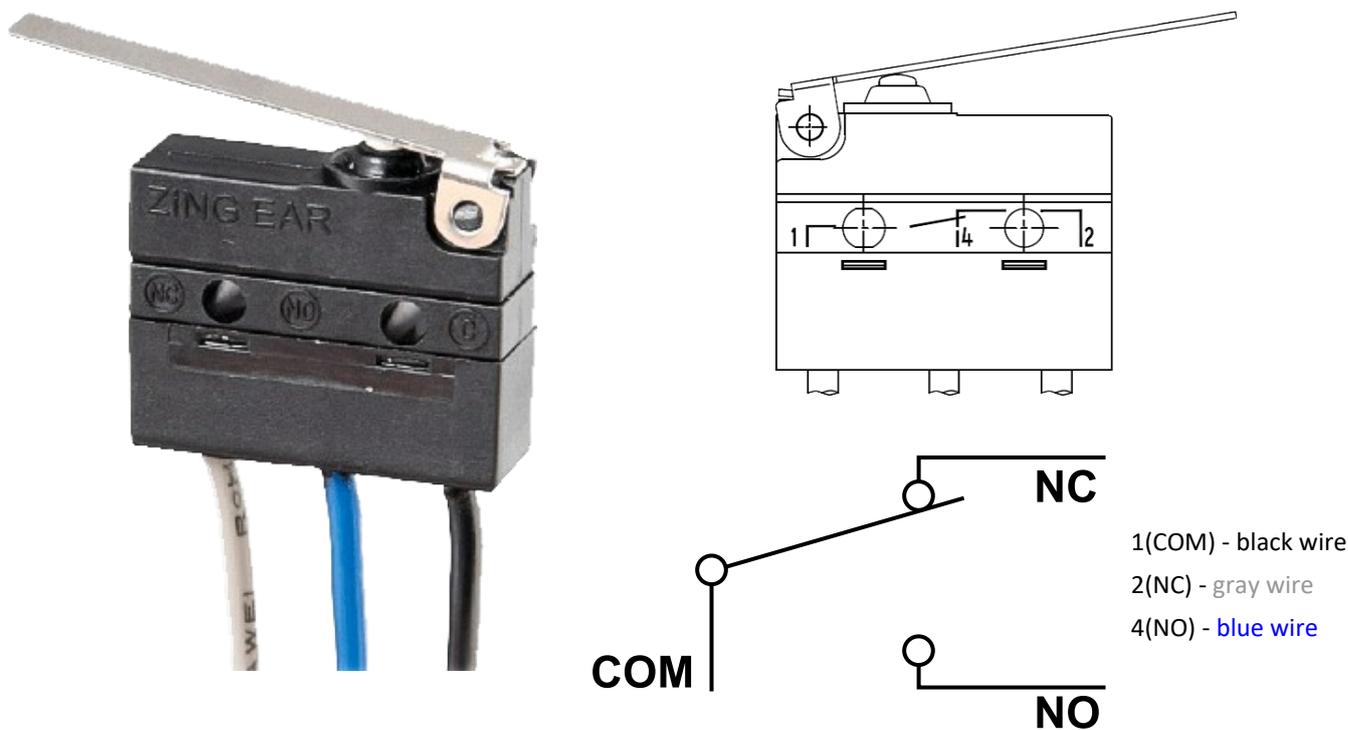


Design .80

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

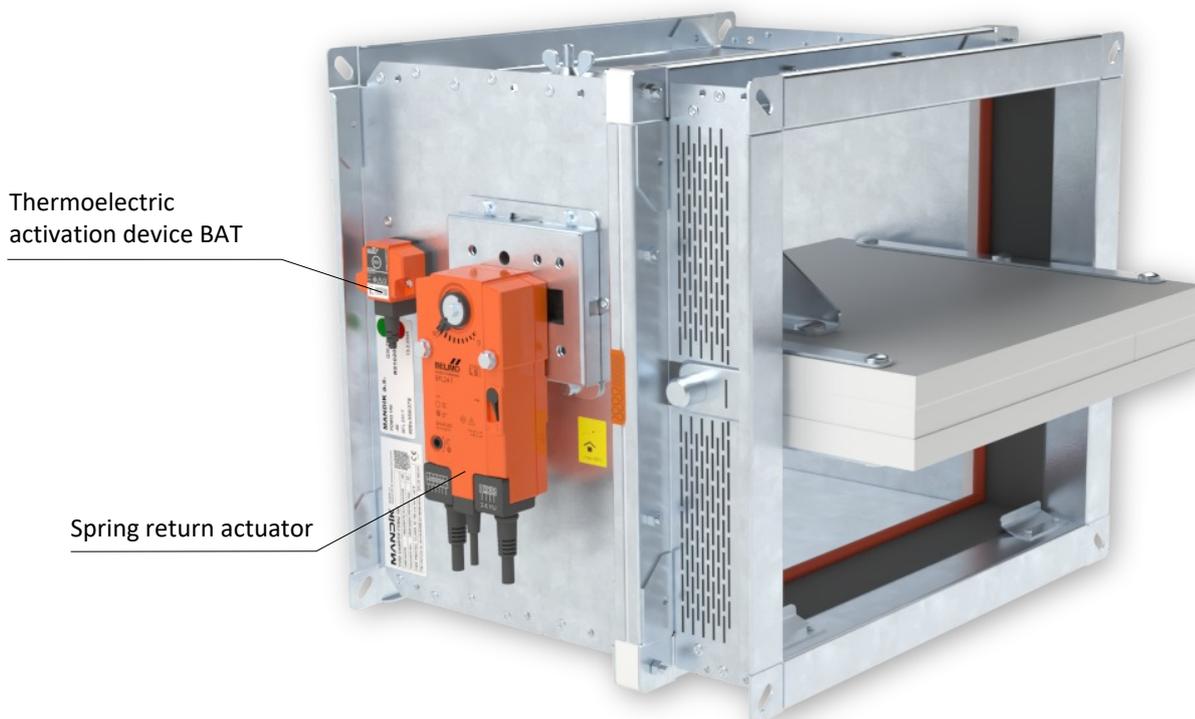
This limit switch is possible to connect in two following ways

- 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

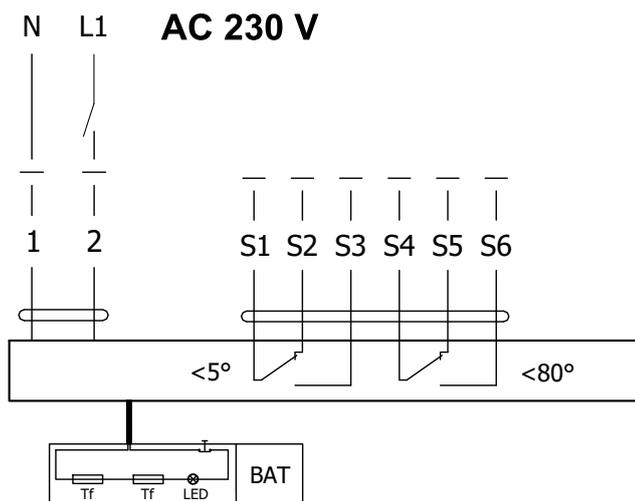
Design .40 and .50

- 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). The thermoelectric activation device can also be equipped with a Tf2 thermal fuse type ZBAT 95/120/140 (must be specified in the order). In this case, the activation temperature inside the duct is +95°C, +120°C or +140°C (depending on the type).
- 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.

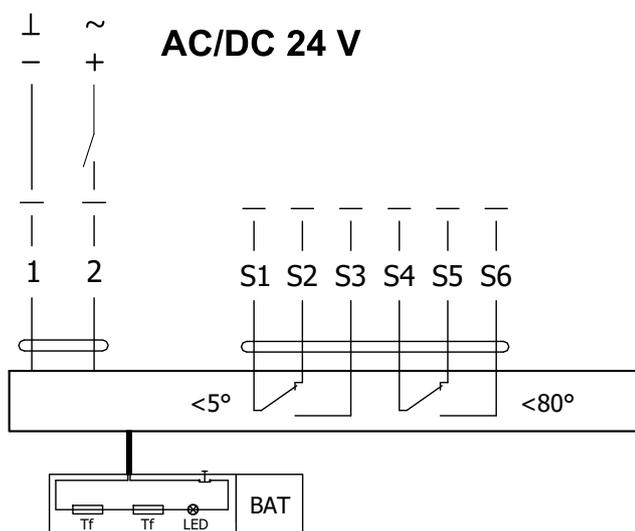


Design .40 and .50

Actuator BELIMO BFL 230-T



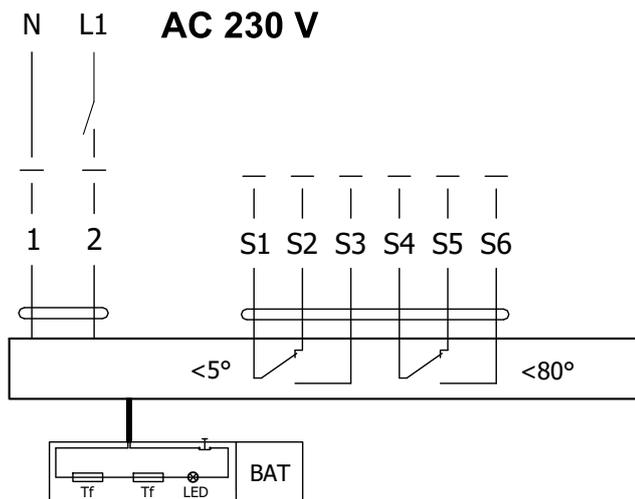
Actuator BELIMO BFL 24-T(-ST)



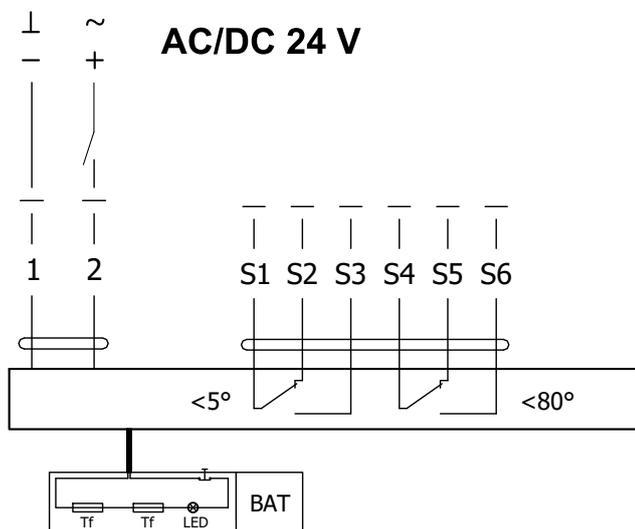
Actuator BELIMO BFL 230-T(-ST), BFL 24-T(-ST)

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	2,6 W 0,7 W	2,0 W 0,7 W
Dimensioning	4 VA (I _{max} 4 A @ 5 ms)	2,8 VA (I _{max} 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 (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



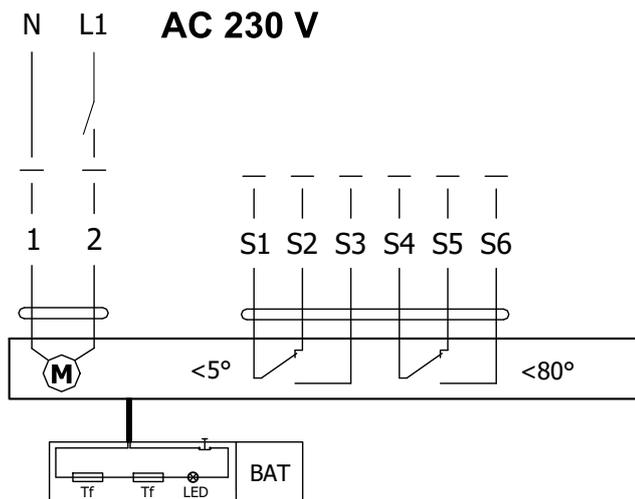
Actuator BELIMO BFN 24-T(-ST)



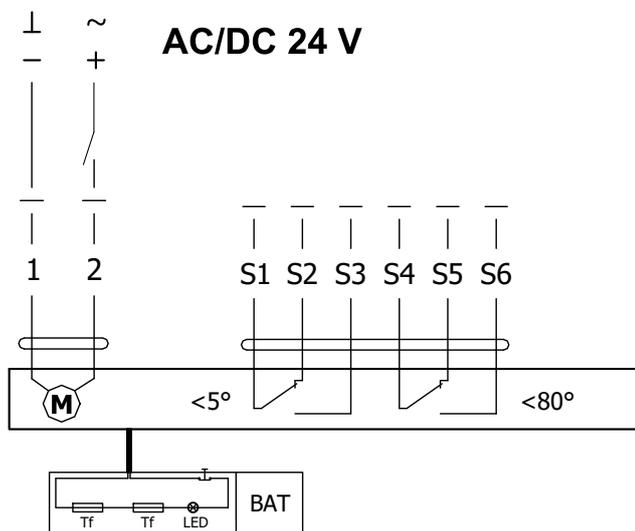
Actuator BELIMO BFN 230-T(-ST), BFN 24-T(-ST)

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	3,5 W 1,3 W	3,2 W 1,2 W
Dimensioning	6,5 (I _{max} 4 A @ 5 ms)	4,3 VA (I _{max} 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 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 (I _{max} 8,3 A @ 5 ms)	10 VA (I _{max} 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 is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. Thermoelectric activation device BAT is integral part of the actuator.
- 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).
- 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.



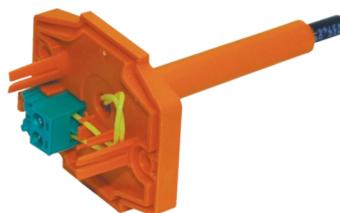
BELIMO ZBAT 72
Black (BK) = 72°C (standard)



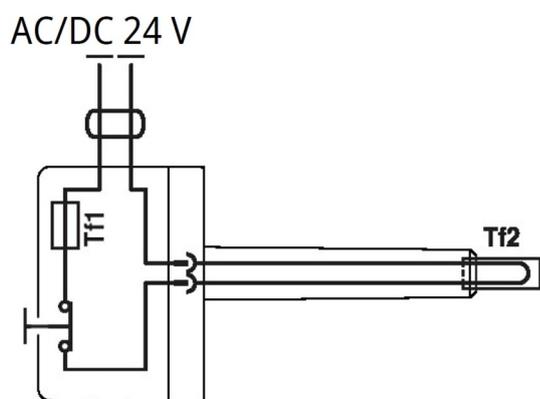
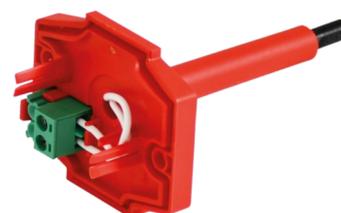
BELIMO ZBAT 95
Grey (GY) = 95°C



BELIMO ZBAT 120
Orange (OG) = 120°C



BELIMO ZBAT 140
Red (RD) = 140°C



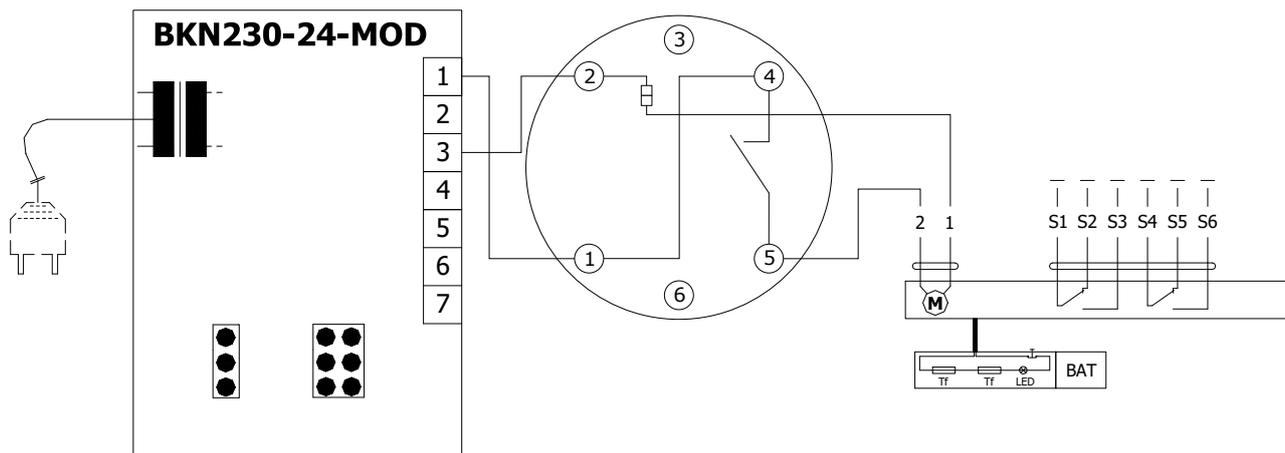
Thermoelectric activation device BAT 72 (95/120/140)

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 mm ² , Betaflam cable heatresistant up to 145°C
Response temperature thermal fuse	Duct inside temperature +72 (95/120/140)°C Duct outside temperature +72 (95/120/140)°C

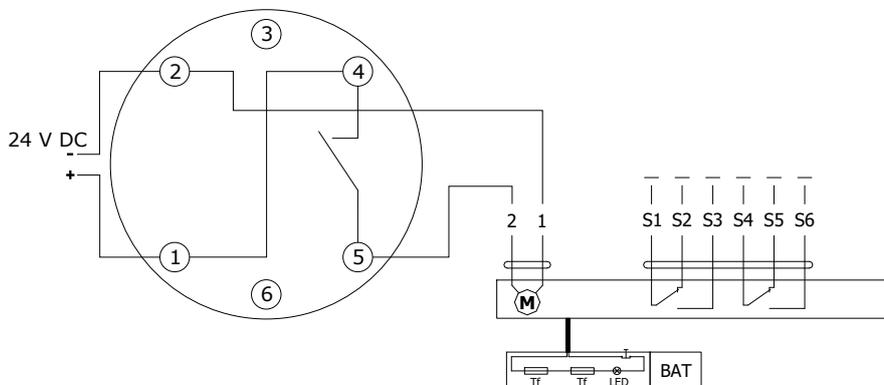
Design .41 and .51

- Design .41 or .51 with actuator and smoke detector ORS 142 K. The voltage can be AC 230 V or 24 V DC. Design .41 with voltage AC 230 V is equipped with communication and supply device BKN 230-24-MOD and with actuator BF 24-TN (BFL 24-T, BFN 24-T).
- The smoke detector is activated when smoke spreads in air duct system. Deactivation of the smoke detector alarm status is provided by interruption of supply voltage for min. 2s.
- Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two microswitches.

Design .41 with actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K and with supply device BKN 230-24-MOD (voltage AC 230 V)



Design .51 with actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K (voltage 24 V DC)



Communication and supply device BKN 230-24-MOD

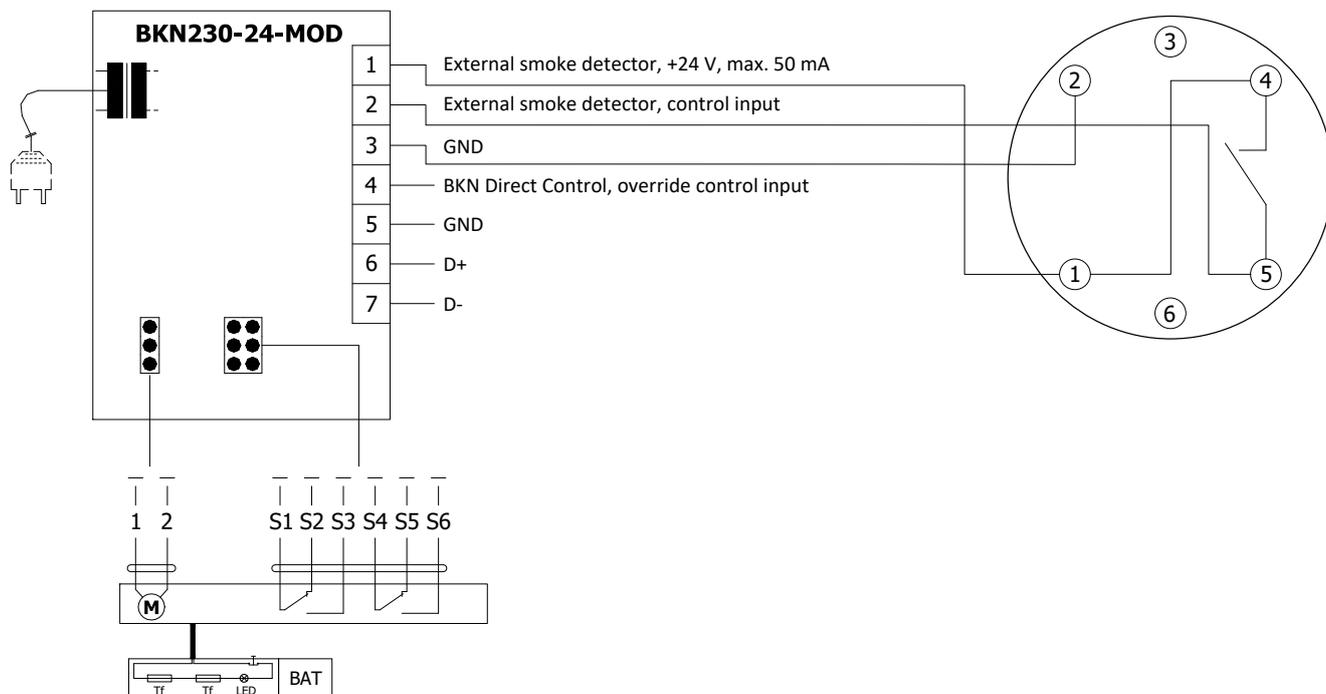
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3 W (operating position)
Dimensioning	14 VA (including actuator)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-40°C ... +80°C
Connection - net	cable 0,9 m with EURO plug type 26
- motor	6-pole connector, 3-pole connector
- terminal board	screw terminals for cable 2x1,5 mm ²

Design with the communication and supply device

Design .63, 63S

- Design with the communication and supply device BKN 230-24-MOD and actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) for communication with control systems using the Modbus RTU or BACnet MS / TP. Design 63. can be extended with an optical smoke detector ORS 142 K (design .63S).
- The wiring of the line is to be carried out in accordance with applicable RS485 regulations.
- Parameterization of the communication is done using DIL switches.
- BKN 230-24-MOD can be installed separately, without a connection to a master control system, in which case the connection bridge between the terminals 1 and 4 must be installed.
- If the test button on BAT is pressed or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION) is disconnected, the damper blade position will be "FAILURE".
- For design .63S the smoke detector is activated when smoke spreads in air duct system. Deactivation of the smoke detector alarm status is provided by interruption of supply voltage for min. 2s.

Design with communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) and smoke detector ORS 142 K



Communication and supply device BKN 230-24-MOD

Nominal voltage	AC 230 V 50/60Hz
Power consumption	3 W (operating position)
Dimensioning	14 VA (including actuator)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-40°C ... +80°C
Connection - net	cable 0,9 m with EURO plug type 26
- motor	6-pole connector, 3-pole connector
- terminal board	screw terminals for cable 2x1,5 mm ²

Optical smoke detector ORS 142 K with the socket 143A

- The smoke detector ORS 142 K is used for early smoke detection in rooms or inside the ventilation system.
- The sensor operates on the light scatter principle. Inside the scanning chamber is a light source and a light sensor, in the normal state the light from the source does not fall on the sensor. Only when smoke enters the scanning chamber the light is scattered and falls on the sensor.
- The smoke detector can be connected directly to the actuator (design .41 and .51) which, in case of smoke detection, passes to the safety position, or to the BKN communication and supply device (design .63).
- By early detection of smoke, it can be effectively prevented from spreading of smoke through the ventilation system. In addition to smoke detection, the sensor can distinguish and signal slight and heavy contamination, e.g. the presence of large amounts of dust.
- The ORS 142 K smoke detector has an alarm memory, i.e. if the alarm is triggered, the safety relay opens and stays in this state even if the smoke disappears from the scanning chamber. The sensor remains in the alarm state until the power supply is briefly reset.
- On the pin 3, an external device can be connected via RS-Bus communication to report the status of the sensor.
- Pin 6 has no connection to the detector and is designed as a load-bearing structure in the base.

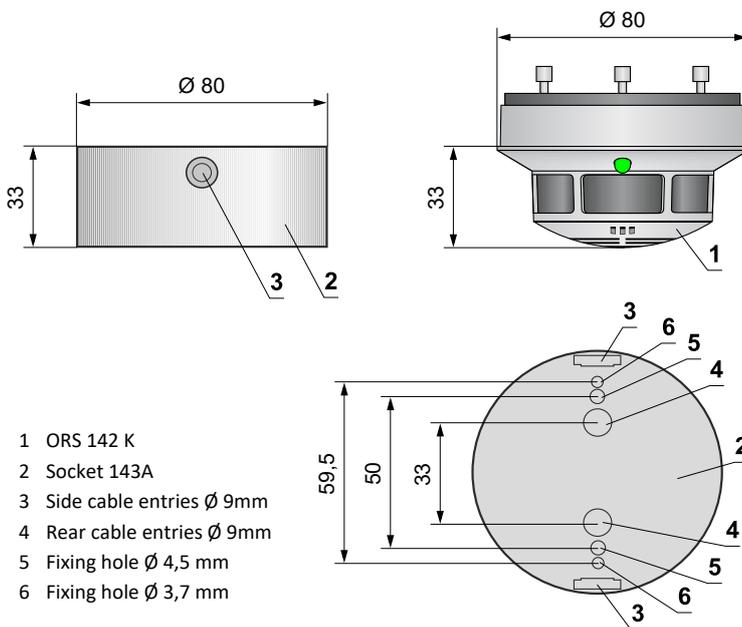
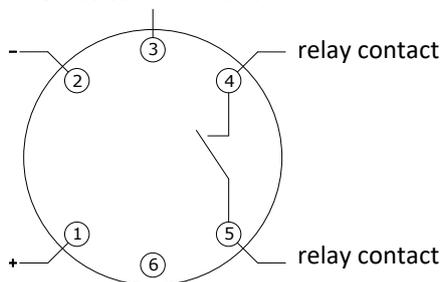
ORS 142 K



Socket 143A



RS-Bus communication



Relay contact		LED	
In operation		Green	Shines
Slight contamination		Green / Yellow	Flashes
Heavy contamination		Green / Yellow	Flashes
Fault		Yellow	Shines
Alarm		Red	Shines
Power Off		Off	-

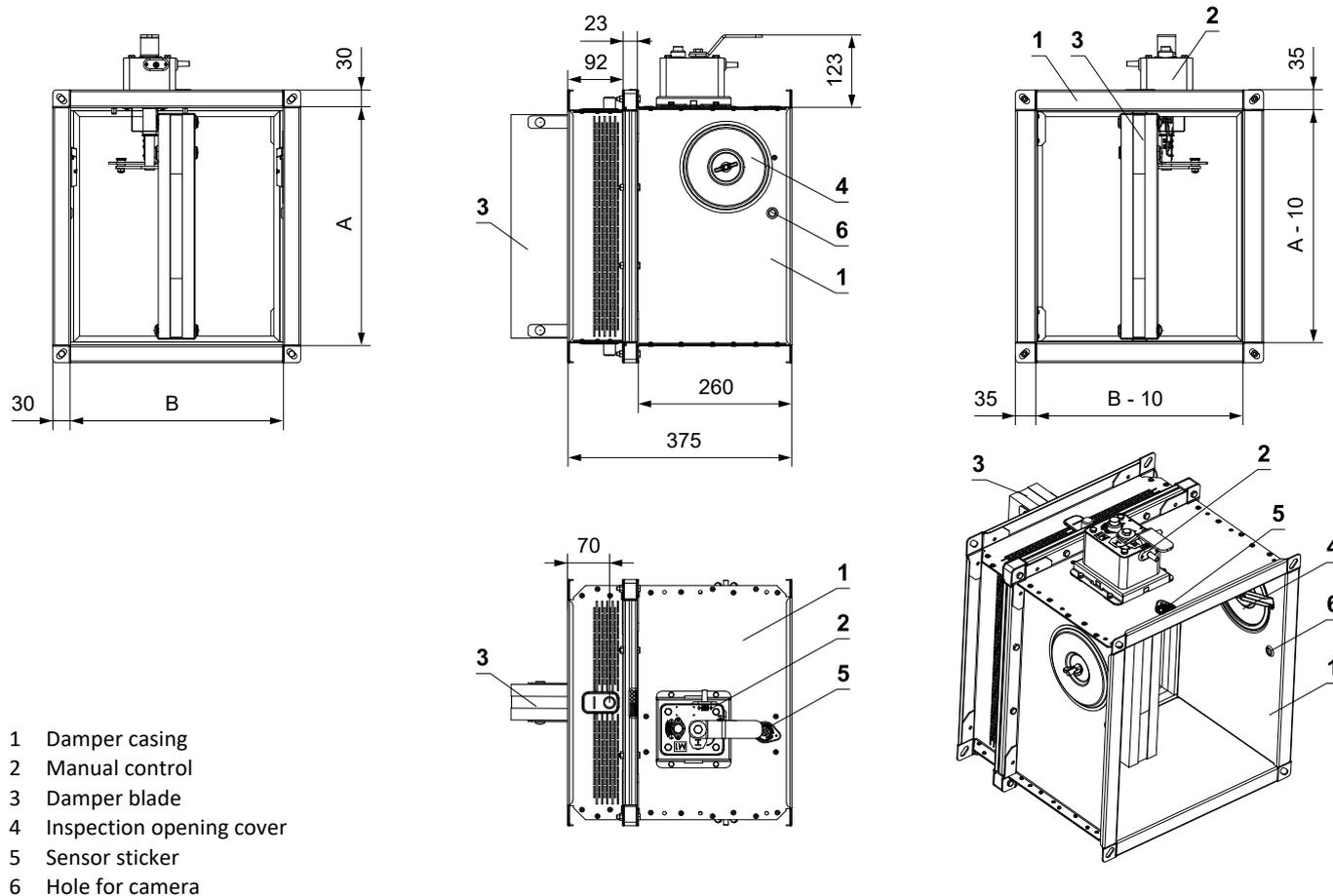
- 1 ORS 142 K
- 2 Socket 143A
- 3 Side cable entries Ø 9mm
- 4 Rear cable entries Ø 9mm
- 5 Fixing hole Ø 4,5 mm
- 6 Fixing hole Ø 3,7 mm

Optical smoke detector ORS 142 K with the socket 143A

Operating voltage	18 ... 28 V DC
Residual ripple	≤ 200 mV
Power Consumption Socket (without actuator)	max. 22 mA
Degree of protection	IP 42
Ambient temperature	-20°C ... +75°C
Additional temperature sensor	+70°C
Connection - net	Cabel 1m, connected to terminals 1, 2 and 4
- motor	Actuator connected on the terminals 2 and 5
- communication and supply device BKN	Cabel 1m, connected to terminals 1, 2, 4 and 5

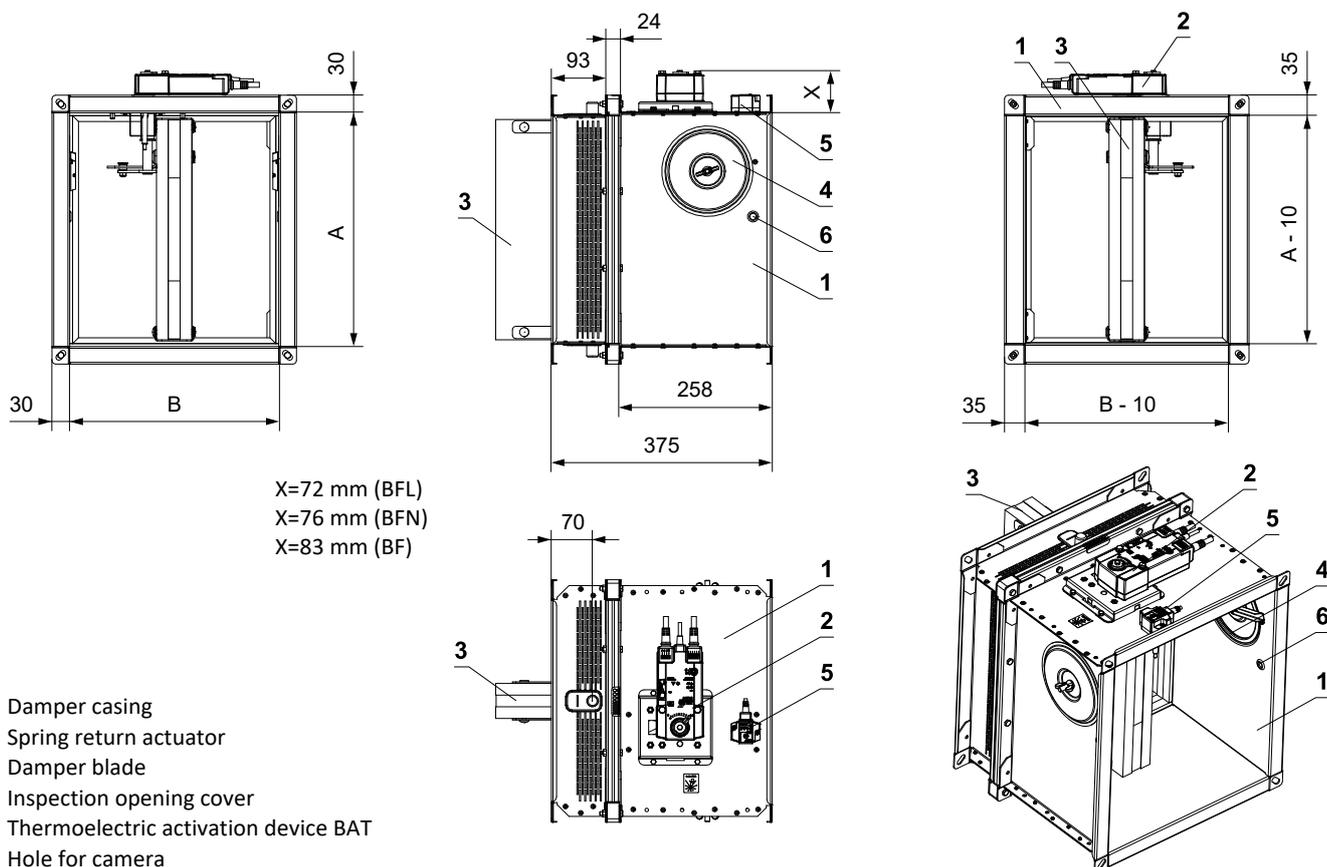
III. DIMENSIONS

FDMQ 180 with manual control



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

FDMQ 180 with spring return actuator

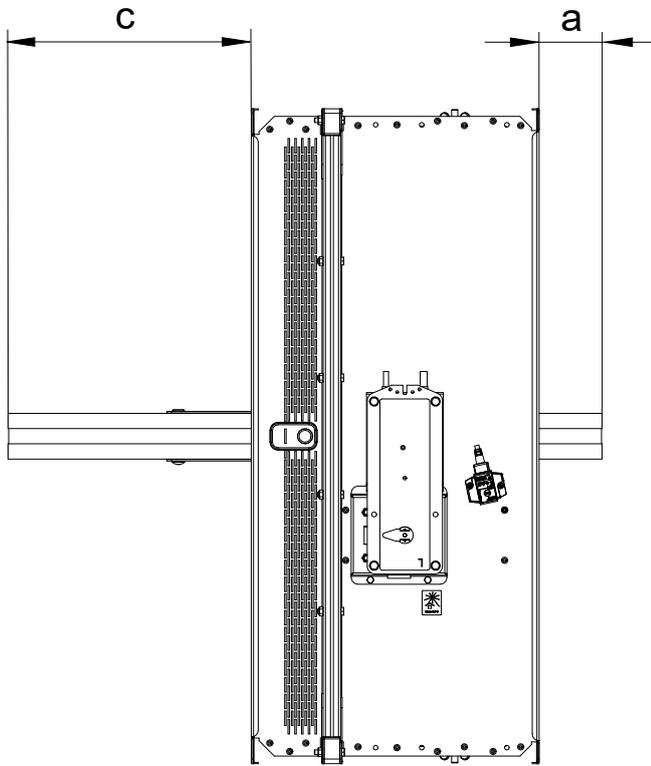


X=72 mm (BFL)
 X=76 mm (BFN)
 X=83 mm (BF)

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

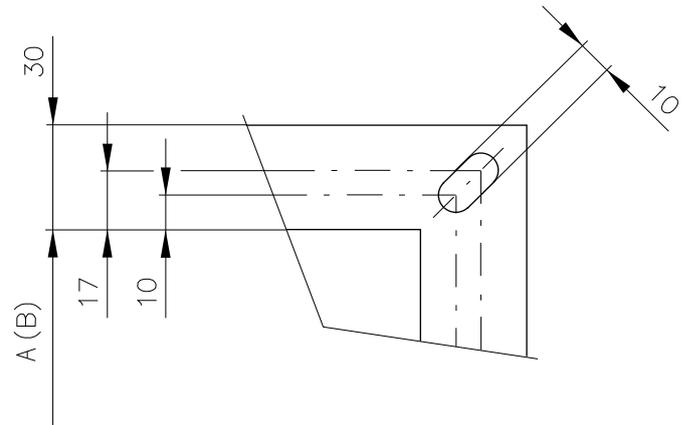
Damper blade overlaps

- Open damper blade overlaps the damper casing by the value "a" or "c". These values are specified in chapter Technical parameters → see pages 16 to 20

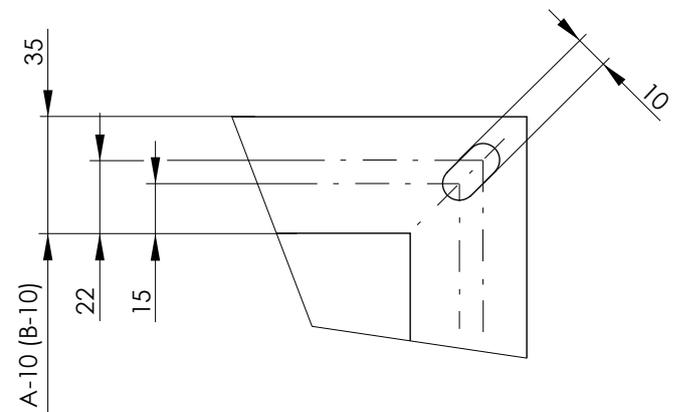


Values "a" and "c" must be respected when projecting following air-conditioning duct.

Flange of a damper - CONTROL SIDE



Flange of a damper - INSTALLATION SIDE



Flanges of dampers are 30 mm wide with oval hole.

Technical parameters

A x B [mm]	Damper blades overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*				
200 x	200	-	17	10,8	10,9	0,0201	M1	250 x	700	32	267	24,9	25,3	0,1384	BFN	M2
	225	-	29	11,5	11,6	0,0245			710	37	272	25,1	25,5	0,1406		
	250	-	42	12,0	12,1	0,0289			750	57	292	26,1	26,5	0,1496		M3
	280	-	57	12,7	12,8	0,0341			800	82	317	27,4	27,8	0,1609		
	300	-	67	13,3	13,4	0,0376			280 x	200	-	17	12,6	12,7		0,0293
	315	-	74	13,7	13,8	0,0403		225		-	29	13,4	13,5	0,0357		
	355	-	94	14,8	14,9	0,0473		250		-	42	14,1	14,2	0,0421		
	400	-	117	15,8	15,9	0,0551		280		-	57	14,9	15,0	0,0497		
	450	-	142	17,0	17,1	0,0639	300	-		67	15,6	15,7	0,0548			
	500	-	167	18,1	18,2	0,0726	315	-		74	16,0	16,1	0,0587	BFN		
	550	-	192	18,9	19,0	0,0814	355	-	94	17,3	17,4	0,0689				
	560	-	197	19,1	19,2	0,0831	400	-	117	18,6	18,7	0,0803	M2			
	600	-	217	20,0	20,1	0,0901	450	-	142	19,9	20,0	0,0931				
	630	-	232	20,7	20,8	0,0954	500	-	167	21,2	21,3	0,1058	BFN			
	650	7	242	21,1	21,2	0,0989	550	-	192	22,3	22,4	0,1186				
	700	32	267	22,3	22,7	0,1076	560	-	197	22,6	23,0	0,1211	M2			
710	37	272	22,5	22,9	0,1094	600	-	217	23,7	24,1	0,1313					
750	57	292	23,4	23,8	0,1164	630	-	232	24,5	24,9	0,1390	BFN				
800	82	317	24,5	24,9	0,1251	650	7	242	25,0	25,4	0,1441					
225 x	200	-	17	11,3	11,4	0,0230	M1	300 x	700	32	267	26,4	26,8	0,1568	BFN	M3
	225	-	29	12,1	12,2	0,0280			710	37	272	26,7	27,1	0,1594		
	250	-	42	12,7	12,8	0,0330			750	57	292	27,7	28,1	0,1696		
	280	-	57	13,4	13,5	0,0390			800	82	317	29,1	29,5	0,1823		
	300	-	67	14,1	14,2	0,0430			315 x	200	-	17	12,9	13,0		0,0316
	315	-	74	14,4	14,5	0,0460		225		-	29	13,7	13,8	0,0385		
	355	-	94	15,6	15,7	0,0540		250		-	42	14,4	14,5	0,0454		
	400	-	117	16,7	16,8	0,0630		280		-	57	15,3	15,4	0,0536		
	450	-	142	17,9	18,0	0,0730	300	-		67	16,3	16,4	0,0591			
	500	-	167	19,1	19,2	0,0830	315	-		74	16,7	16,8	0,0633	BFN		
	550	-	192	20,0	20,1	0,0930	355	-	94	18,0	18,1	0,0743				
	560	-	197	20,2	20,3	0,0950	400	-	117	19,2	19,3	0,0866	M2			
	600	-	217	21,2	21,6	0,1030	450	-	142	20,6	20,7	0,1004				
	630	-	232	21,9	22,3	0,1090	500	-	167	22,0	22,1	0,1141	BFN			
	650	7	242	22,4	22,8	0,1130	550	-	192	22,8	23,2	0,1279				
	700	32	267	23,6	24,0	0,1230	560	-	197	23,1	23,5	0,1306	M2			
710	37	272	23,8	24,2	0,1250	600	-	217	24,2	24,6	0,1416					
750	57	292	24,8	25,2	0,1330	630	-	232	25,0	25,4	0,1499	BFN				
800	82	317	26,0	26,4	0,1430	650	7	242	25,5	25,9	0,1554					
250 x	200	-	17	11,9	12,0	0,0259	M1	350 x	700	32	267	26,8	27,2	0,1691	M3	
	225	-	29	12,7	12,8	0,0315			710	37	272	27,1	27,5	0,1719		
	250	-	42	13,3	13,4	0,0371			750	57	292	28,2	28,6	0,1829		
	280	-	57	14,1	14,2	0,0439			800	82	317	29,5	29,9	0,1966		
	300	-	67	14,8	14,9	0,0484			315 x	200	-	17	13,2	13,3		0,0334
	315	-	74	15,1	15,2	0,0518		225		-	29	14,1	14,2	0,0406		
	355	-	94	16,4	16,5	0,0608		250		-	42	14,8	14,9	0,0479		
	400	-	117	17,5	17,6	0,0709		280		-	57	15,7	15,8	0,0566		
	450	-	142	18,8	18,9	0,0821	300	-		67	16,7	16,8	0,0624			
	500	-	167	20,1	20,2	0,0934	315	-		74	17,1	17,2	0,0667	BFN		
	550	-	192	21,0	21,1	0,1046	355	-	94	18,5	18,6	0,0783				
	560	-	197	21,3	21,4	0,1069	400	-	117	19,7	19,8	0,0914	M2			
	600	-	217	22,3	22,7	0,1159	450	-	142	21,1	21,2	0,1059				
	630	-	232	23,1	23,5	0,1226	500	-	167	22,5	22,6	0,1204	BFN			
	650	7	242	23,6	24,0	0,1271	550	-	192	23,4	23,8	0,1349				

Sizes in increments of 5 mm can be manufactured on request.

* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blades overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control					
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*								
315 x 700	-	217	24,8	25,2	0,1648	BFN	M2	450 x 500	-	167	27,3	27,7	0,1764	BFN	M2					
	-	232	25,6	26,0	0,1581				-	192	28,5	28,9	0,1976							
	7	242	26,1	26,5	0,1639				-	197	28,8	29,2	0,2019							
	32	267	27,5	27,9	0,1784				-	217	30,2	30,6	0,2189							
	37	272	27,8	28,2	0,1813				-	232	31,2	31,6	0,2316							
	57	292	28,9	29,3	0,1929				-	242	31,8	32,2	0,2401							
	82	317	30,2	30,6	0,2074				-	267	33,5	35,6	0,2614							
355 x 500	-	17	14,1	14,2	0,0380	BFL	M1	500 x 500	-	17	17,3	17,4	0,0546	BFL	M1					
	-	29	15,0	15,1	0,0462				-	29	18,4	18,5	0,0665							
	-	42	15,8	15,9	0,0545				-	42	19,4	19,5	0,0784							
	-	57	16,7	16,8	0,0644				-	57	20,6	20,7	0,0926							
	-	67	17,7	17,8	0,0710				-	67	21,6	21,7	0,1021							
	-	74	18,2	18,3	0,0759				-	74	22,2	22,3	0,1093							
	-	94	19,6	19,7	0,0891				-	94	23,9	24,0	0,1283							
400 x 500	-	117	21,0	21,1	0,1040	BFN	M2	550 x 500	-	117	25,5	25,6	0,1496	BFN	M2					
	-	142	22,4	22,5	0,1205				-	142	27,3	27,7	0,1734							
	-	167	23,9	24,3	0,1370				-	167	29,1	29,5	0,1971							
	-	192	24,9	25,3	0,1535				-	192	30,7	31,1	0,2209							
	-	197	25,2	25,6	0,1568				-	197	31,1	31,5	0,2256							
	-	217	26,4	26,8	0,1700				-	217	32,6	33,0	0,2446							
	-	232	27,2	27,6	0,1799				-	232	33,7	34,1	0,2589							
450 x 500	7	242	27,8	28,2	0,1865	BF	M3	560 x 500	7	242	34,4	36,5	0,2684	BF	M3					
	32	267	29,3	29,7	0,2030				32	267	36,3	38,4	0,2921							
	37	272	29,6	30,0	0,2063				37	272	36,6	38,7	0,2969							
	57	292	30,7	31,1	0,2195				57	292	38,1	40,2	0,3159							
	82	317	32,2	34,3	0,2360				82	317	39,9	42,0	0,3396							
	-	17	15,1	15,2	0,0431				BFL	M1	560 x 560	-	17			18,4	18,5	0,0604	BFL	M1
	-	29	16,1	16,2	0,0525							-	29			19,6	19,7	0,0735		
-	42	16,9	17,0	0,0619	-	42	20,7	20,8				0,0866								
-	57	17,9	18,0	0,0731	-	57	21,9	22,0				0,1024								
-	67	18,9	19,0	0,0806	-	67	23,0	23,1				0,1129								
-	74	19,4	19,5	0,0863	-	74	23,6	23,7				0,1208								
-	94	20,9	21,0	0,1013	-	94	25,3	25,4				0,1418								
400 x 550	-	117	22,4	22,5	0,1181	BFN	M2	560 x 560	-	117	27,1	27,5	0,1654	BFN	M2					
	-	142	23,9	24,0	0,1369				-	142	29,0	29,4	0,1916							
	-	167	25,5	25,9	0,1556				-	167	31,2	31,6	0,2179							
	-	192	26,6	27,0	0,1744				-	192	32,6	33,0	0,2441							
	-	197	26,9	27,3	0,1781				-	197	33,0	33,4	0,2494							
	-	217	28,2	28,6	0,1931				-	217	34,6	35,0	0,2704							
	-	232	29,1	29,5	0,2044				-	232	35,8	37,9	0,2861							
450 x 550	7	242	29,7	30,1	0,2119	BF	M3	560 x 560	7	242	36,6	38,7	0,2966	BF	M3					
	32	267	31,3	31,7	0,2306				32	267	38,5	40,6	0,3229							
	37	272	31,6	32,0	0,2344				37	272	38,9	41,0	0,3281							
	57	292	32,8	34,9	0,2494				57	292	40,4	42,5	0,3491							
	82	317	34,4	36,5	0,2681				82	317	42,4	44,5	0,3754							
	-	17	16,2	16,3	0,0489				BFL	M1	560 x 560	-	17			18,7	18,8	0,0615	BFL	M1
	-	29	17,3	17,4	0,0595							-	29			19,9	20,0	0,0749		
-	42	18,2	18,3	0,0701	-	42	20,9	21,0				0,0883								
-	57	19,2	19,3	0,0829	-	57	22,2	22,3				0,1043								
-	67	20,3	20,4	0,0914	-	67	23,2	23,3				0,1150								
-	74	20,8	20,9	0,0978	-	74	23,8	23,9				0,1231								
-	94	22,4	22,5	0,1148	-	-	-	-				-	-							
450 x 560	-	117	23,9	24,0	0,1339	BFN	M2	-	117	23,9	24,0	0,1339	BFN	M2						
	-	142	25,6	26,0	0,1551			-	142	25,6	26,0	0,1551								

Sizes in increments of 5 mm can be manufactured on request.

* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blades overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*			
560 x	-	94	25,6	25,7	0,1445	BFL	M1	280	-	57	24,2	24,3	0,1219	BFL	M1
	-	117	27,4	27,8	0,1685	BFN	M2	300	-	67	25,2	25,3	0,1344		
	-	142	29,3	29,7	0,1953			315	-	74	25,9	26,0	0,1438		
	-	167	31,5	31,9	0,2220			355	-	94	27,8	27,9	0,1688		
	-	192	33,0	33,4	0,2488			400	-	117	29,7	30,1	0,1969		
	-	197	33,4	33,8	0,2541			450	-	142	31,7	32,1	0,2281		
	7	242	37,0	39,1	0,3023			500	-	167	34,1	34,5	0,2594		
	32	267	38,9	41,0	0,3290			550	-	192	35,7	36,1	0,2906		
	37	272	39,3	41,4	0,3344			560	-	197	36,1	38,2	0,2969		
	57	292	40,9	43,0	0,3558			600	-	217	37,8	39,9	0,3219		
	82	317	42,9	45,0	0,3825			630	-	232	39,1	41,2	0,3406		
								650	7	242	39,9	42,0	0,3531		
600 x	-	17	19,3	19,4	0,0661			BFL	M1	700	32	267	42,0	44,1	0,3844
	-	29	20,5	20,6	0,0805	710	37			272	42,4	44,5	0,3906		
	-	42	21,6	21,7	0,0949	750	57			292	44,1	46,2	0,4156		
	-	57	22,9	23,0	0,1121	800	82			317	46,2	48,3	0,4469		
	-	67	23,9	24,0	0,1236	200	-			17	21,5	21,6	0,0776		
	-	74	24,5	24,6	0,1323	225	-			29	22,8	22,9	0,0945		
	-	94	26,3	26,4	0,1553	250	-			42	24,0	24,1	0,1114		
	-	117	28,1	28,5	0,1811	280	-			57	25,4	25,5	0,1316		
	-	142	30,1	30,5	0,2099	300	-			67	26,5	26,6	0,1451		
	-	167	32,3	32,7	0,2386	315	-			74	27,2	27,3	0,1553		
	-	192	33,8	34,2	0,2674	355	-			94	29,2	29,6	0,1823		
	-	197	34,2	34,6	0,2731	400	-			117	31,2	31,6	0,2126		
7	242	37,8	39,9	0,3249	450	-	142	33,3	33,7	0,2464					
32	267	39,8	41,9	0,3536	500	-	167	35,8	36,2	0,2801					
37	272	40,2	42,3	0,3594	550	-	192	37,5	39,6	0,3139					
57	292	41,8	43,9	0,3824	560	-	197	38,0	40,1	0,3206					
82	317	43,8	45,9	0,4111	600	-	217	39,7	41,8	0,3476					
630 x	-	17	20,0	20,1	0,0696	BFL	M1	630	-	232	41,1	43,2	0,3679	BF	M2
	-	29	21,2	21,3	0,0847			650	7	242	41,9	44,0	0,3814		
	-	42	22,3	22,4	0,0998			700	32	267	44,1	46,2	0,4151		
	-	57	23,6	23,7	0,1180			710	37	272	44,6	46,7	0,4219		
	-	67	24,7	24,8	0,1301			750	57	292	46,3	48,4	0,4489		
	-	74	25,3	25,4	0,1392			800	82	317	48,5	50,6	0,4826		
	-	94	27,2	27,3	0,1634			200	-	17	21,7	21,8	0,0788		
	-	117	29,0	29,4	0,1906			225	-	29	23,0	23,1	0,0959		
	-	142	31,1	31,5	0,2208			250	-	42	24,3	24,4	0,1130		
	-	167	33,4	33,8	0,2511			280	-	57	25,7	25,8	0,1336		
	-	192	34,9	35,3	0,2813			300	-	67	26,8	26,9	0,1473		
	-	197	35,4	35,8	0,2874			315	-	74	27,5	27,6	0,1576		
7	242	39,1	41,2	0,3418	355	-	94	29,5	29,9	0,1850					
32	267	41,1	43,2	0,3721	400	-	117	31,5	31,9	0,2158					
37	272	41,5	43,6	0,3781	450	-	142	33,7	34,1	0,2500					
57	292	43,2	45,3	0,4023	500	-	167	36,1	36,5	0,2843					
82	317	45,2	47,3	0,4326	550	-	192	37,9	40,0	0,3185					
650 x	-	17	20,4	20,5	0,0719	BFL	M1	560	-	197	38,3	40,4	0,3254	BFN	M2
	-	29	21,7	21,8	0,0875			600	-	217	40,1	42,2	0,3528		
	-	42	22,8	22,9	0,1031			630	-	232	41,5	43,6	0,3733		
								650	7	242	42,3	44,4	0,3870		
								700	32	267	44,6	46,7	0,4213		
								710	37	272	45,0	47,1	0,4281		
								750	57	292	46,8	48,9	0,4555		
								800	82	317	49,0	51,1	0,4898		

Sizes in increments of 5 mm can be manufactured on request.

* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blades overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control	
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*				
750 x	-	17	22,5	22,6	0,0834	BFL	M1	900 x	710	37	272	53,3	55,4	0,5469	BF	M3
	-	29	24,0	24,1	0,1015				750	57	292	55,4	57,5	0,5819		
	-	42	25,2	25,3	0,1196				800	82	317	58,0	60,1	0,6256		
	-	57	26,7	26,8	0,1414				200	-	17	28,0	28,1	0,1121		
	-	67	27,9	28,0	0,1559			225	-	29	29,7	29,8	0,1365	BFL		
	-	74	28,5	28,6	0,1668			250	-	42	31,3	31,4	0,1609			
	-	94	30,6	31,0	0,1958			280	-	57	33,2	33,3	0,1901	BFN	M2	
	-	117	32,7	33,1	0,2284			300	-	67	34,4	34,8	0,2096			
	-	142	35,0	35,4	0,2646			315	-	74	35,3	35,7	0,2243			
	-	167	37,5	37,9	0,3009			355	-	94	37,8	38,2	0,2633			
	-	192	39,4	41,5	0,3371			400	-	117	40,3	40,7	0,3071	BFN		
	-	197	39,8	41,9	0,3444			450	-	142	43,1	43,5	0,3559			
	-	217	41,7	43,8	0,3734			500	-	167	46,2	48,3	0,4046			
	-	232	43,1	45,2	0,3951			550	-	192	48,5	50,6	0,4534			
	-	242	44,0	46,1	0,4096			560	-	197	49,1	51,2	0,4631	BF		
	32	267	46,3	48,4	0,4459			600	-	217	51,4	53,5	0,5021			
	37	272	46,8	48,9	0,4531			630	-	232	53,1	55,2	0,5314			
	57	292	48,6	50,7	0,4821			650	7	242	54,2	56,3	0,5509			
	82	317	50,9	53,0	0,5184			700	32	267	57,0	59,1	0,5996	BF	M3	
	200	-	17	23,6	23,7			0,0891	710	37	272	57,6	59,7			0,6094
225	-	29	25,1	25,2	0,1085	750	57	292	59,9	62,0	0,6484					
250	-	42	26,4	26,5	0,1279	800	82	317	62,7	64,8	0,6971					
280	-	57	28,0	28,1	0,1511	300	-	67	37,0	37,4	0,2311	BFN	M2			
300	-	67	29,2	29,3	0,1666	315	-	74	38,0	38,4	0,2473					
315	-	74	29,9	30,0	0,1783	355	-	94	40,6	41,0	0,2903					
355	-	94	32,1	32,5	0,2093	400	-	117	43,3	43,7	0,3386					
400	-	117	34,2	34,6	0,2441	450	-	142	46,4	48,5	0,3924	BFN				
450	-	142	36,6	37,0	0,2829	500	-	167	49,7	51,8	0,4461					
500	-	167	39,2	39,6	0,3216	550	-	192	52,2	54,3	0,4999					
550	-	192	41,2	43,3	0,3604	560	-	197	52,8	54,9	0,5106					
560	-	197	41,7	43,8	0,3681	600	-	217	55,3	57,4	0,5536	BF	M3			
600	-	217	43,6	45,7	0,3991	630	-	232	57,1	59,2	0,5859					
630	-	232	45,1	47,2	0,4224	650	7	242	58,3	60,4	0,6074					
650	7	242	46,0	48,1	0,4379	700	32	267	61,4	63,5	0,6611					
700	32	267	48,4	50,5	0,4766	710	37	272	62,0	64,1	0,6719	BF	M4			
710	37	272	48,9	51,0	0,4844	750	57	292	64,4	66,5	0,7149					
750	57	292	50,9	53,0	0,5154	800	82	317	67,5	69,6	0,7686					
800	82	317	53,3	55,4	0,5541	200	-	17	33,1	33,2	0,1409					
200	-	17	25,8	25,9	0,1006	225	-	29	35,1	35,2	0,1715	BFL				
225	-	29	27,4	27,5	0,1225	250	-	42	37,0	37,4	0,2021					
250	-	42	28,9	29,0	0,1444	280	-	57	39,3	39,7	0,2389					
280	-	57	30,6	30,7	0,1706	300	-	67	40,5	40,9	0,2634					
300	-	67	31,8	31,9	0,1881	315	-	74	41,5	41,9	0,2818	BFN	M2			
315	-	74	32,6	33,0	0,2013	355	-	94	44,3	44,7	0,3308					
355	-	94	34,9	35,3	0,2363	400	-	117	47,3	47,7	0,3859					
400	-	117	37,2	37,6	0,2756	450	-	142	50,5	52,6	0,4471					
450	-	142	39,8	40,2	0,3194	500	-	167	54,1	56,2	0,5084	BF	M3			
500	-	167	42,7	44,8	0,3631	550	-	192	56,9	59,0	0,5696					
550	-	192	44,9	47,0	0,4069	560	-	197	57,5	59,6	0,5819					
560	-	197	45,4	47,5	0,4156	600	-	217	60,2	62,3	0,6309					
600	-	217	47,5	49,6	0,4506	630	-	232	49,1	51,2	0,4769	BF				
630	-	232	49,1	51,2	0,4769	650	7	242	50,1	52,2	0,4944					
650	7	242	50,1	52,2	0,4944	700	32	267	52,7	54,8	0,5381					
700	32	267	52,7	54,8	0,5381											

Sizes in increments of 5 mm can be manufactured on request.

* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blades overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*				
1250 x	630	-	232	62,2	64,3	0,6676		1400 x	710	37	272	73,8	75,9	0,8594		
	650	7	242	63,5	65,6	0,6921	M3		750	57	292	76,7	78,8	0,9144	BF	M5
	700	32	267	66,8	68,9	0,7534	BF		800	82	317	80,3	82,4	0,9831		
	710	37	272	67,4	69,5	0,7656			M4	200	-	17	38,4	38,5	0,1696	BFL
	750	57	292	70,0	72,1	0,8146			M5	225	-	29	40,8	40,9	0,2065	
	800	82	317	73,3	75,4	0,8759			250	-	42	43,0	43,4	0,2434	M2	
200	-	17	36,3	36,4	0,1581	BFL	280	-	57	45,6	46,0	0,2876	BFN			
225	-	29	38,5	38,6	0,1925		300	-	67	46,9	47,3	0,3171				
250	-	42	40,6	41,0	0,2269		M2	315	-	74	48,1	48,5		0,3393		
280	-	57	43,1	43,5	0,2681	BFN		355	-	94	51,3	51,7	0,3983			
300	-	67	44,4	44,8	0,2956			400	-	117	54,8	56,9	0,4646			
315	-	74	45,4	45,8	0,3163		1500 x	450	-	142	58,5	60,6	0,5384	M3		
355	-	94	48,5	48,9	0,3713	500		-	167	62,6	64,7	0,6121				
400	-	117	51,8	53,9	0,4331	M3		550	-	192	65,9	68,0	0,6859			
450	-	142	55,3	57,4	0,5019		560	-	197	66,7	68,8	0,7006	BF	M4		
500	-	167	59,2	61,3	0,5706		600	-	217	69,7	71,8	0,7596				
550	-	192	62,3	64,4	0,6394	BF	630	-	232	72,0	74,1	0,8039				
560	-	197	63,0	65,1	0,6531		650	7	242	73,5	75,6	0,8334	M5			
600	-	217	65,9	68,0	0,7081		700	32	267	77,3	79,4	0,9071				
630	-	232	68,0	70,1	0,7494	M4	710	37	272	78,1	80,2	0,9219				
650	7	242	69,5	71,6	0,7769	M5	750	57	292	81,1	83,2	0,9809				
700	32	267	73,1	75,2	0,8456		800	82	317	84,9	87,0	1,0546				

Sizes in increments of 5 mm can be manufactured on request.

* For designs with BKN a weight of 0.5 kg must be added.

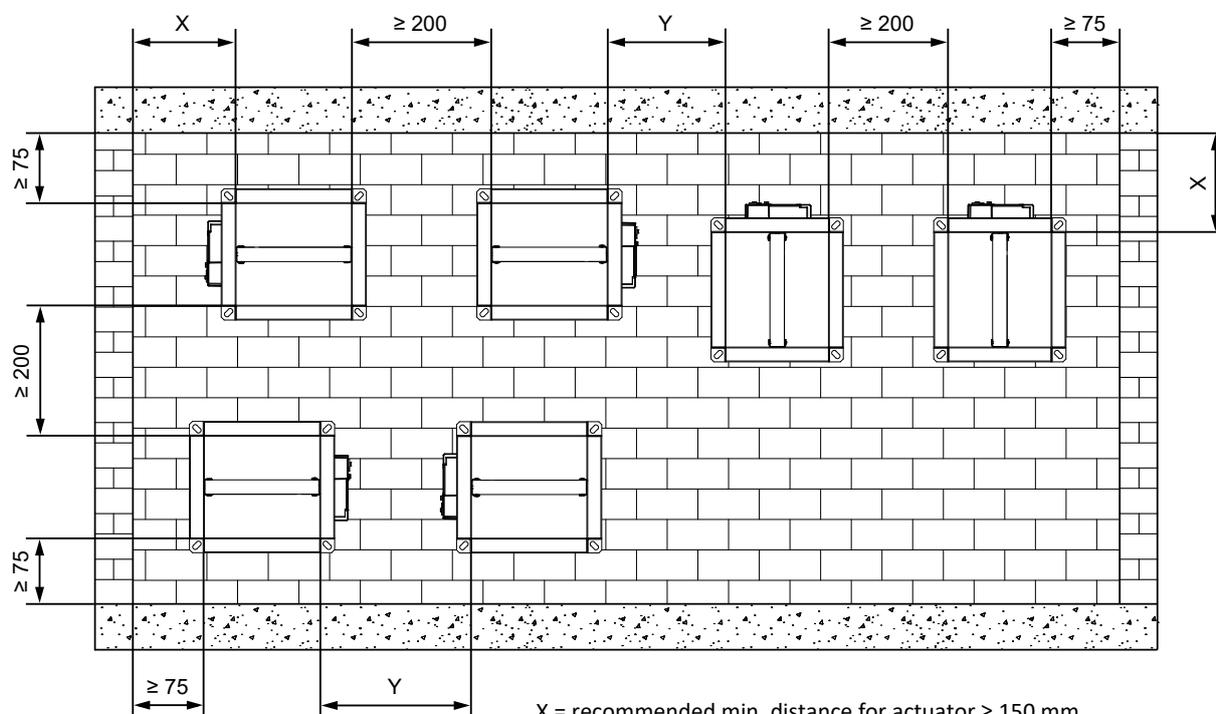
IV. INSTALLATION

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 24
- 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 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 1366-2.

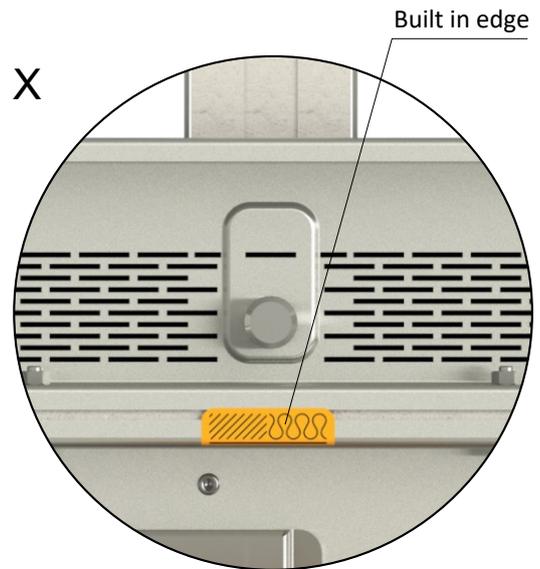
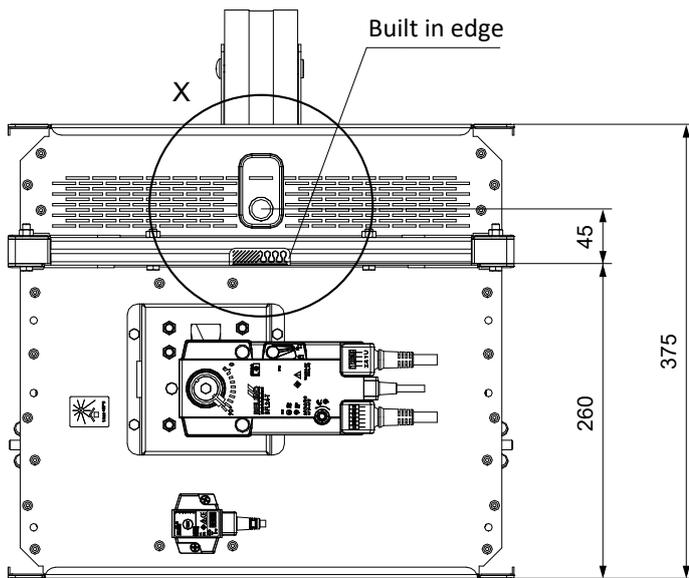
Minimum distance between the fire dampers and the construction

- minimum distance 200 mm between dampers, according to EN 1366-2
- minimum distance 75 mm between damper and construction (wall/ceiling), according to 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

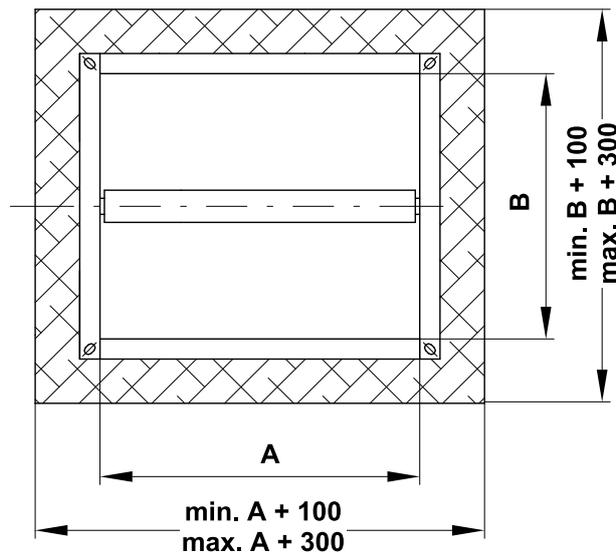


X = recommended min. distance for actuator ≥ 150 mm
 X = recommended min. distance for manual control ≥ 250 mm
 Y = min. distance for actuator ≥ 200 mm acc. to EN 1366-2
 Y = recommended min. distance for manual control ≥ 250 mm

Built in edge



Dimensions of an installation opening



Statement of installations

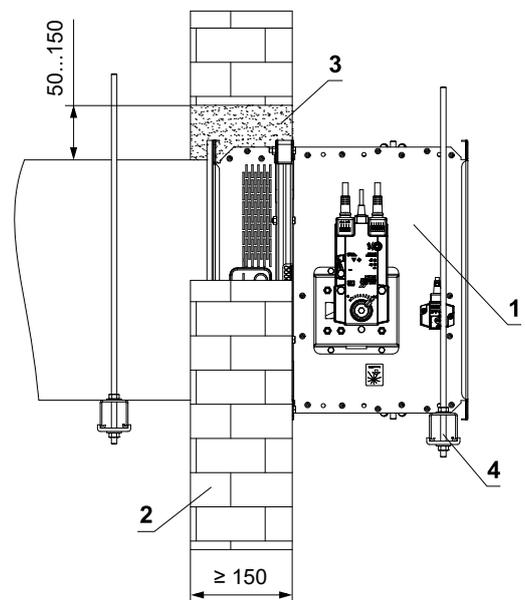
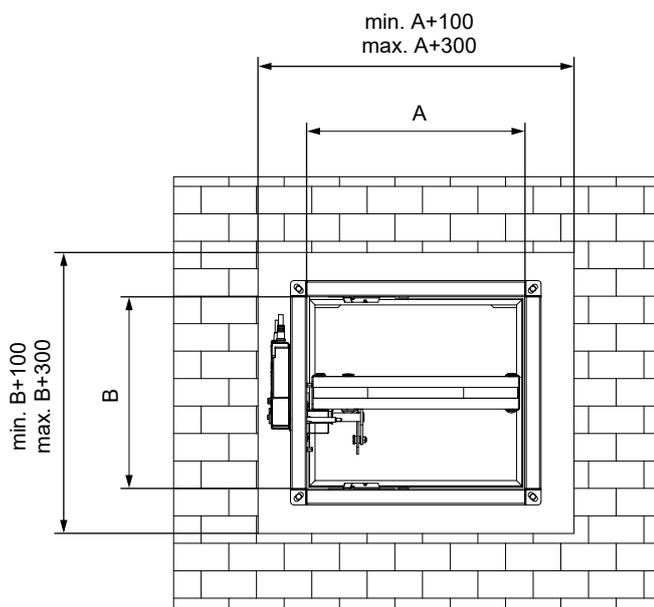
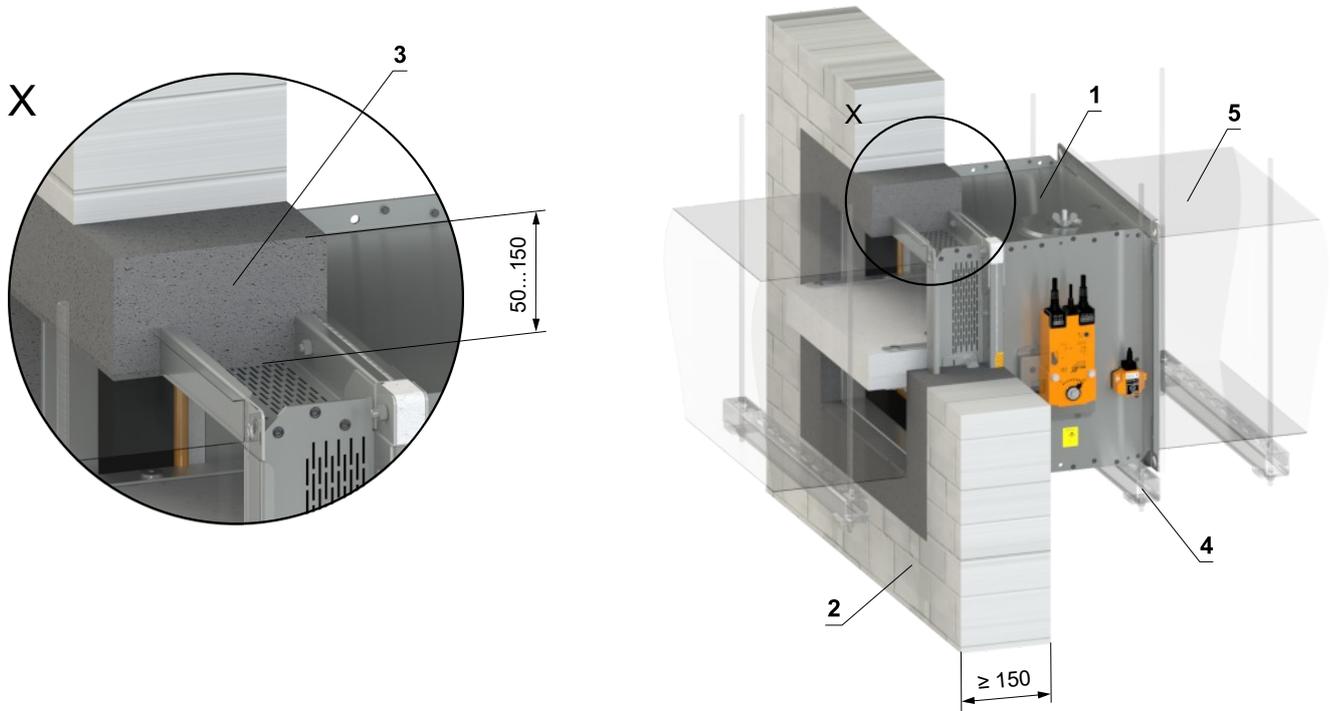
Placement	wall/ceiling min. thickness [mm]	Method of installation	Fire resistance	Page
In solid wall construction	150	Mortar or gypsum	EI 180 (v _e i↔o) S - 500 Pa	23
In solid ceiling construction	150	Mortar or gypsum	EI 180 (h _o i↔o) S - 500 Pa	24

Installation in solid wall construction

In solid wall construction - mortar or gypsum

EI 180 ($v_e i \leftrightarrow o$) S - 500 Pa

- For connection following duct → see page 28



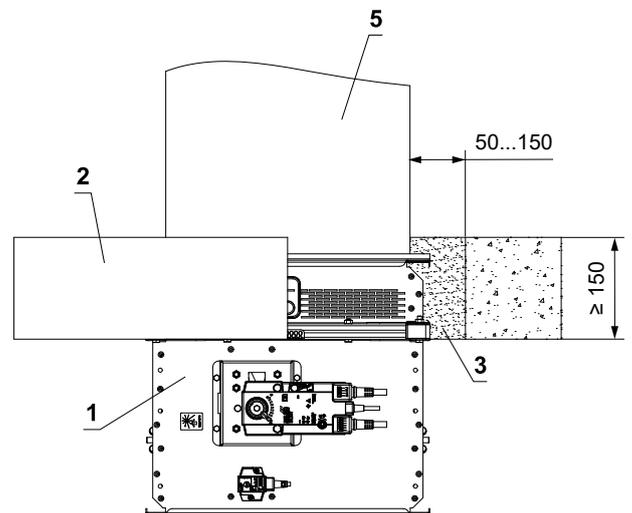
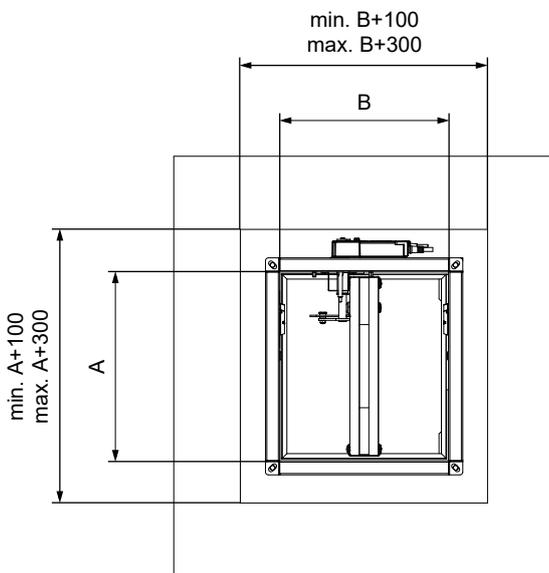
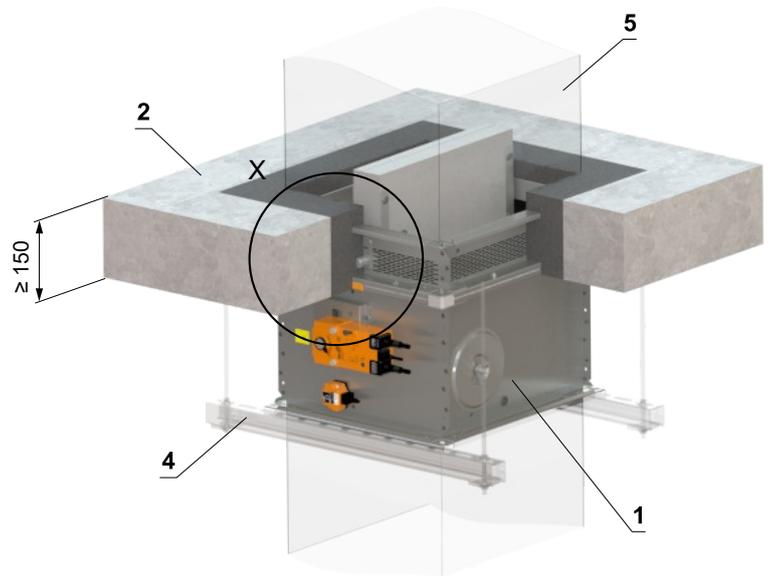
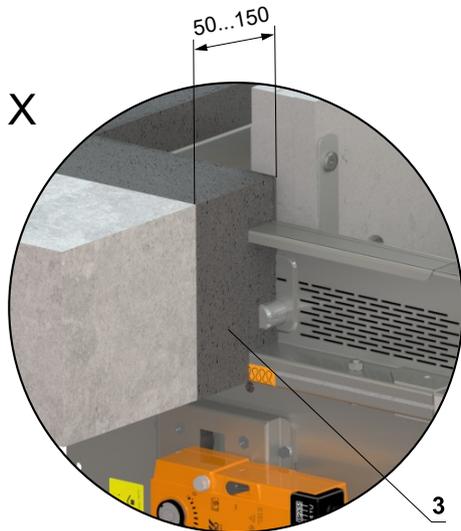
- 1 FDMQ 180
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 25 to 27
- 5 Duct

Installation in solid ceiling construction

In solid ceiling construction - mortar or gypsum

El 180 (h_o i↔o) S - 500 Pa

- For connection following duct → see page 28
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.



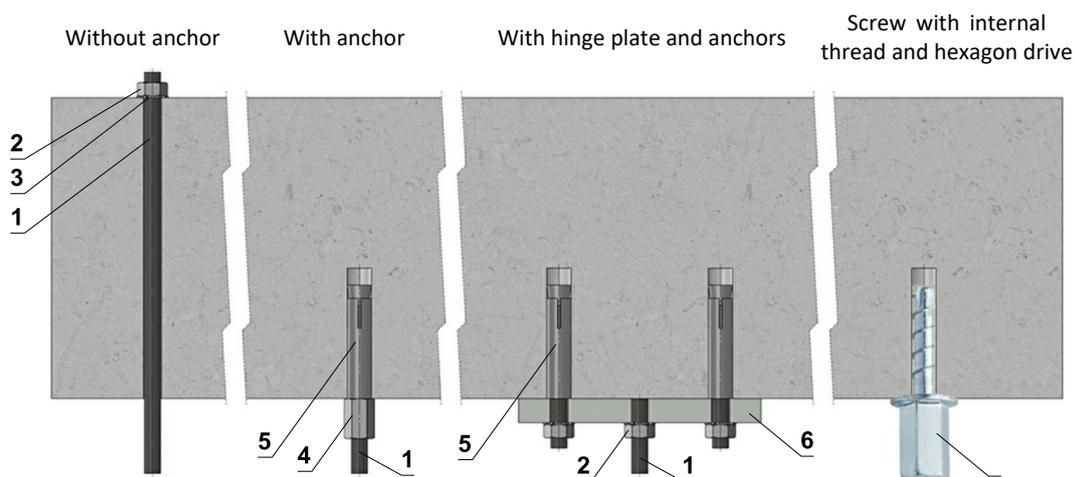
- 1 FDMQ 180
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 25 to 27
- 5 Duct

V. SUSPENSION SYSTEMS

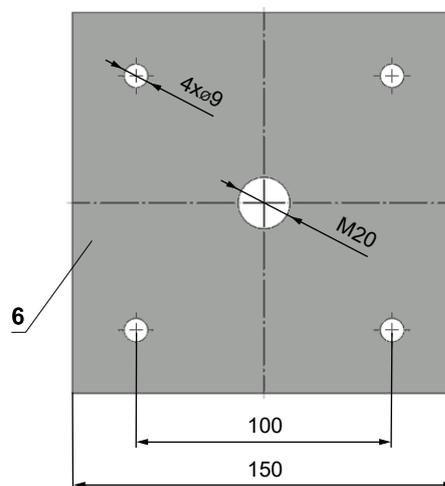
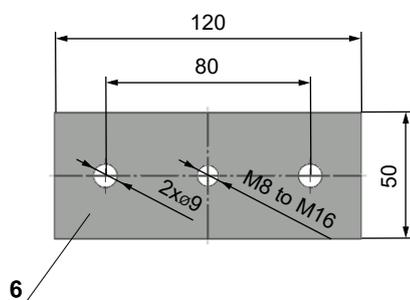
Mounting to the ceiling wall

- 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



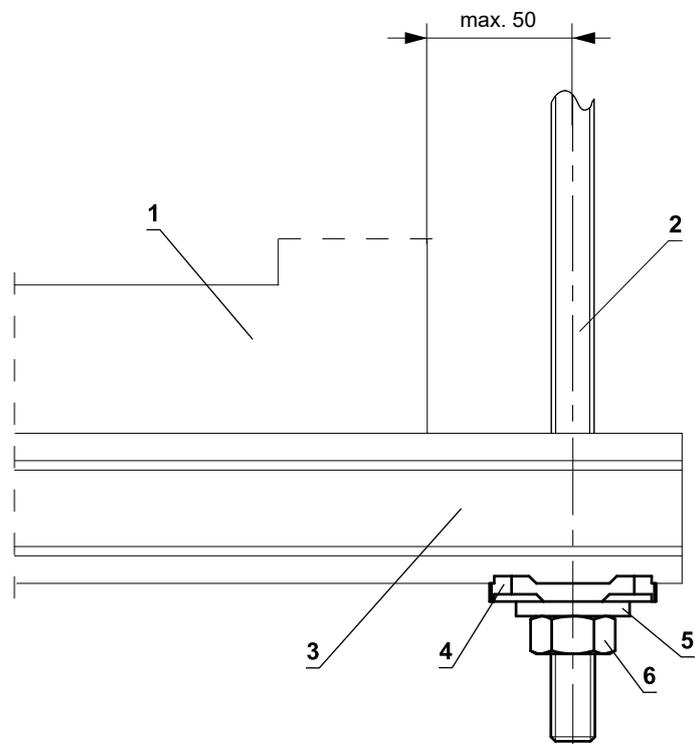
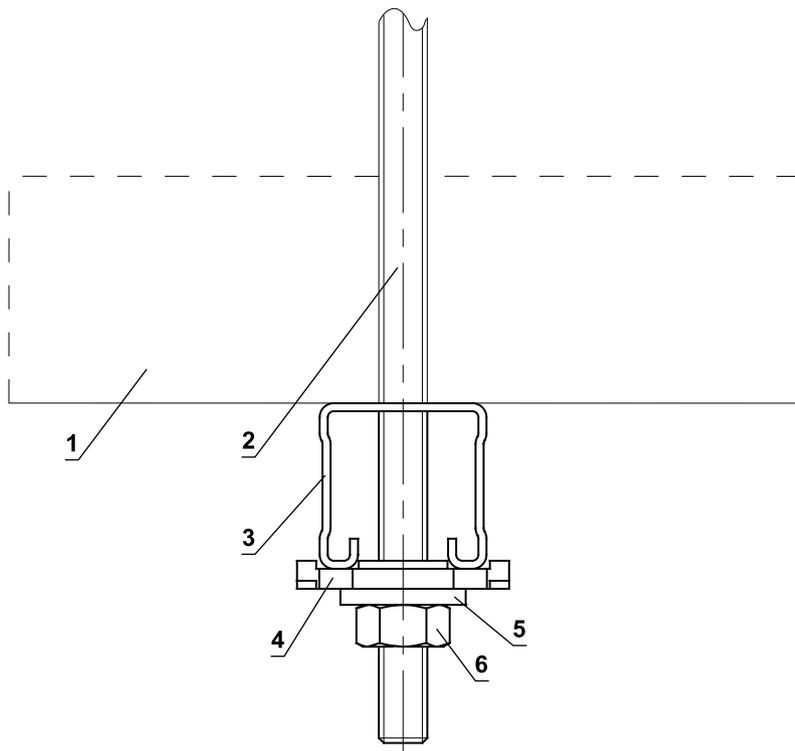
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

Load capacities of threaded rods at the required fire resistance 120 min. < t ≤ 240 min.

Size	As [mm ²]	Weight [kg]	
		for 1 rod	for 2 rods
M8	36,6	11	22
M10	58	17,5	35
M12	84,3	26	52
M16	157	48	96
M18	192	58,5	117
M20	245	75	150

- 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)

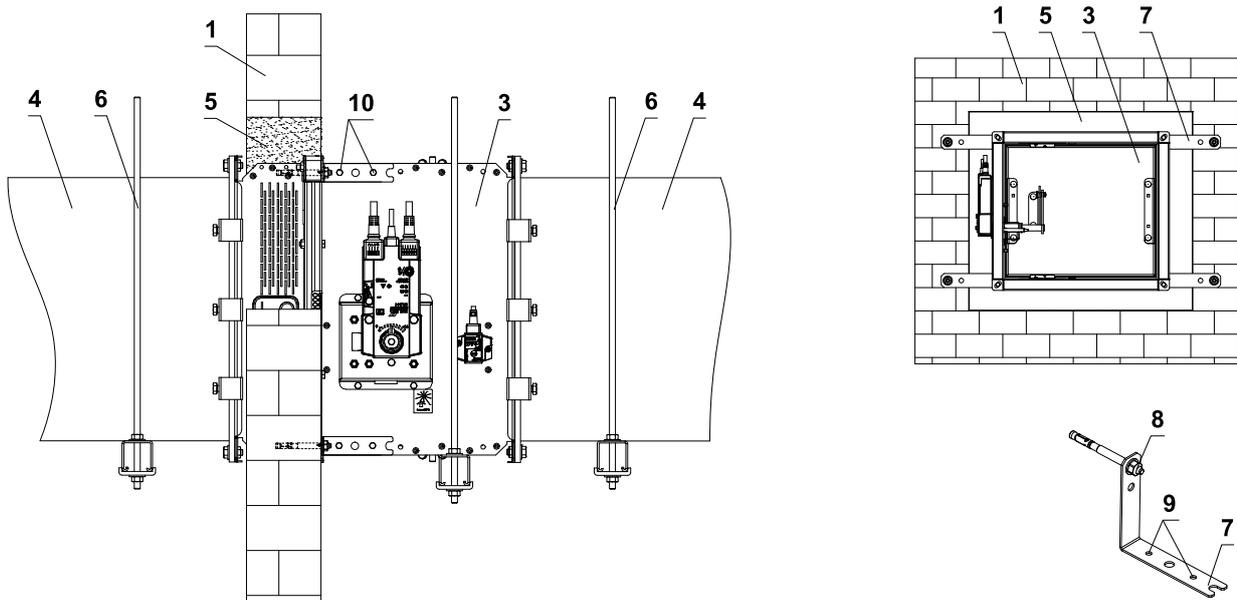
Example of placing of mounting profiles HILTI



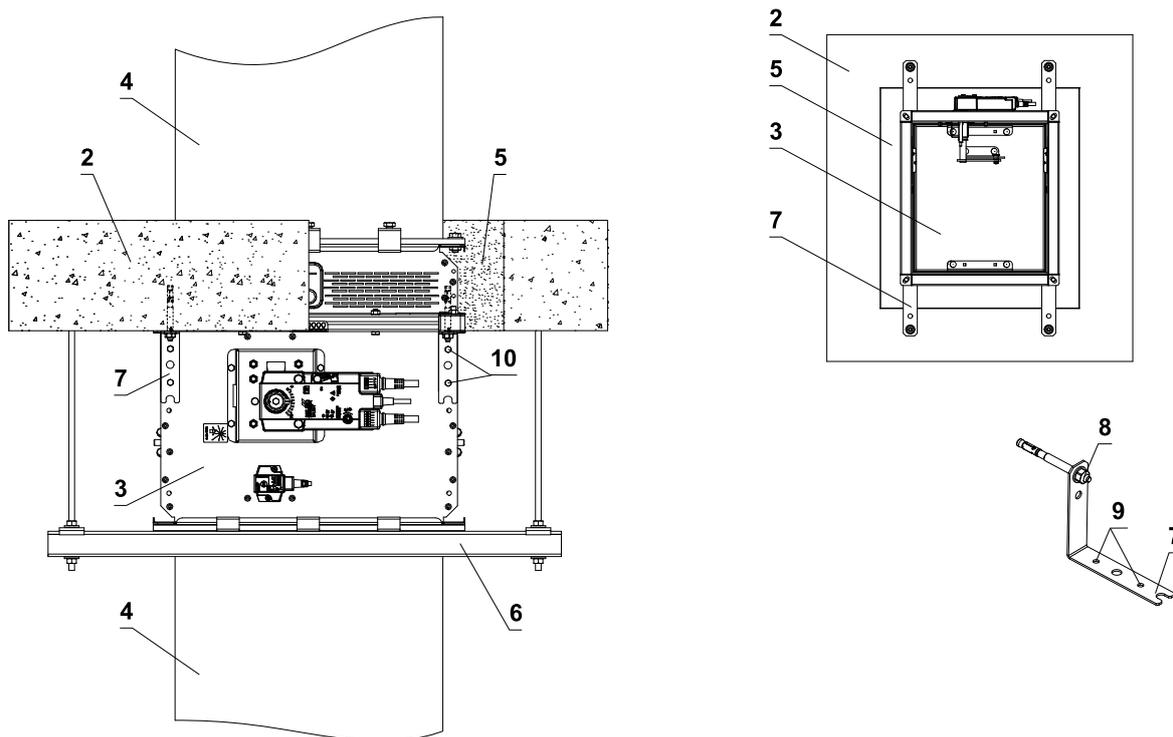
- 1 FDMQ 180
- 2 Threaded rod M8 - M12
- 3 Support HILTI MQ-41 or MQ-41/3
- 4 Bored plate HILTI MQZ-L
- 5 Washer for M8 - M12
- 6 Nut M8 - M12

Example of fixing FDMQ 180

In solid wall construction



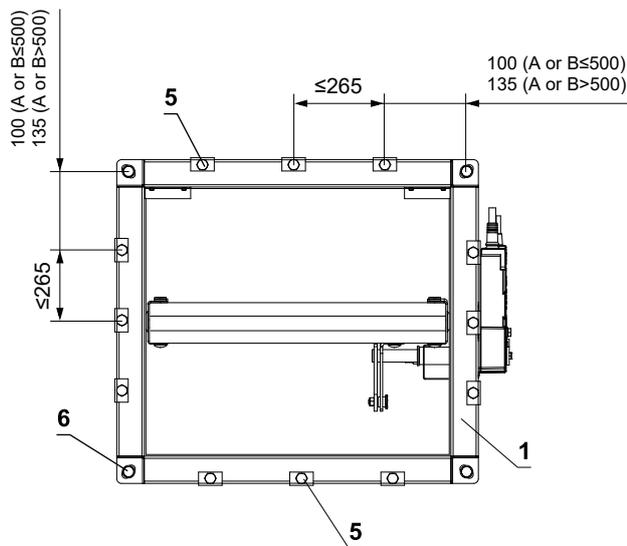
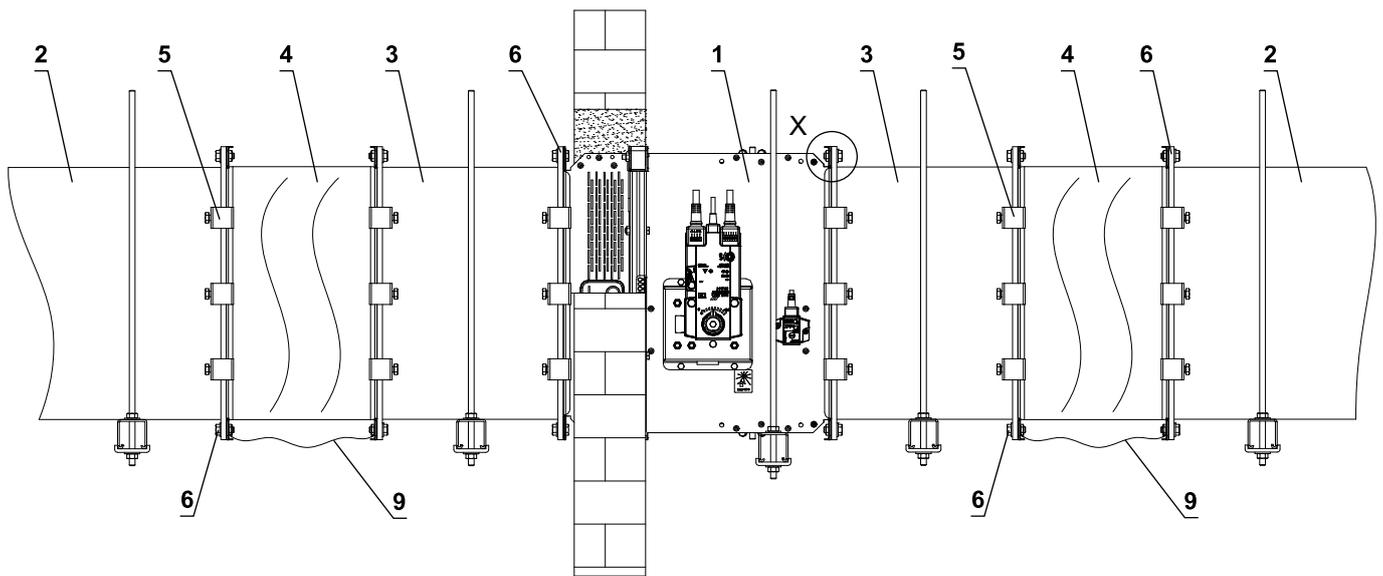
In gypsum wall construction



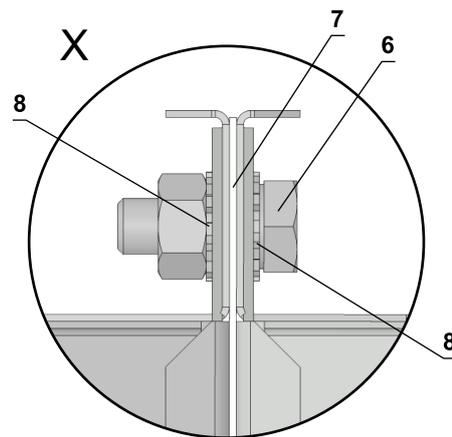
- 1 Solid wall construction
- 2 Solid ceiling construction
- 3 FDMQ 180
- 4 Duct
- 5 Mortar or gypsum
- 6 Profile with threaded rod → see page 26
- 7 Fixing element/steel holder for connecting damper to the wall (optional accessories MANDIK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
- 8 Nut M8 with anchor
- 9 Installation holes
- 10 Screw assembly M6 (screw M6x10, nut M6)

■ The method of attachment must follow the minimum requirements for attachment and connection of ductwork in accordance with national regulations. Also, the elements can be suspended from the top, or supported from bottom, or fastened from the side.

Example of duct connection



Electrically conductive connection



* min. one connection must be electrically conductive

- 1 FDMQ 180
- 2 Duct
- 3 Extension piece (if required)
- 4 Damping pad
- 5 Steel clamp min. screw M8
- 6 Screw assembly M8 (screw M8x20 mm, 2 pcs toothed lock washer M8, nut M8) *
- 7 Sealing
- 8 Toothed lock washer M8
- 9 Protective bonding conductor

VI. TECHNICAL DATA

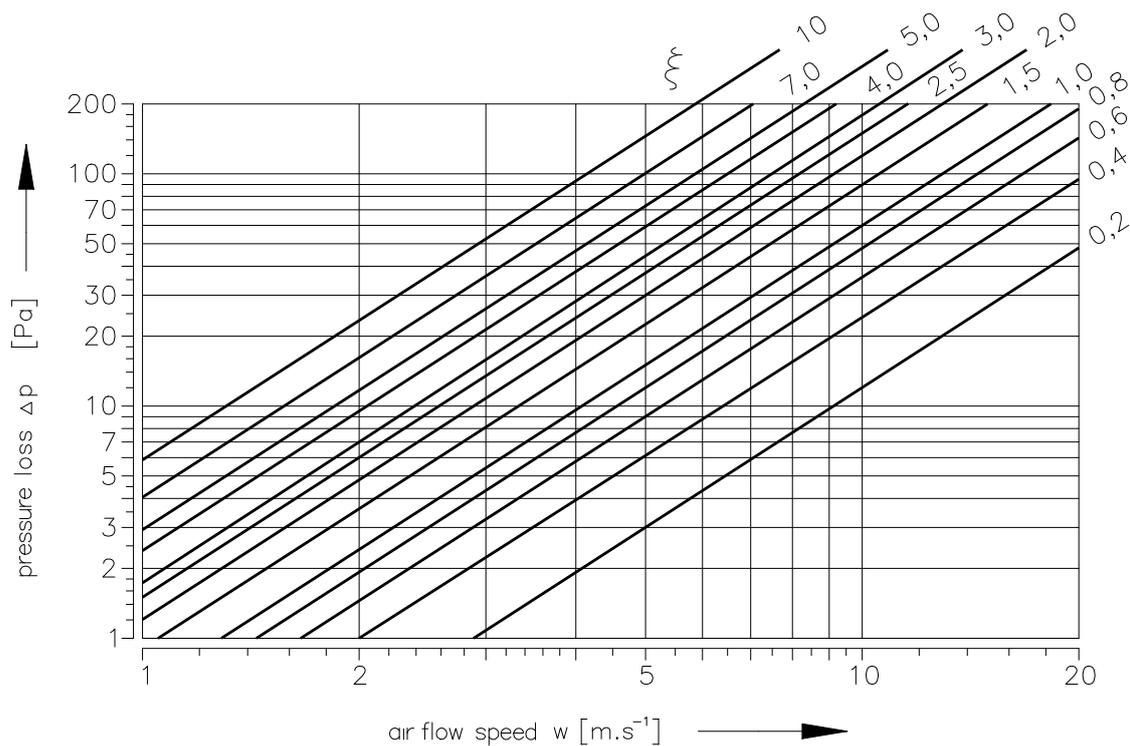
Pressure loss

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 30

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



Coefficient of local pressure loss

B	A												
	200	225	250	280	300	315	355	400	450	500	550	560	600
200	2,035	1,953	1,878	1,775	1,714	1,634	1,565	1,508	1,459	1,419	1,401	1,385	1,363
225	1,516	1,374	1,347	1,310	1,270	1,225	1,165	1,106	1,088	1,053	1,023	1,011	1,003
250	1,218	1,174	1,134	1,071	1,014	0,976	0,932	0,899	0,869	0,846	0,831	0,823	0,816
280	1,107	1,061	1,024	0,974	0,914	0,863	0,805	0,779	0,757	0,744	0,735	0,718	0,712
300	0,981	0,943	0,901	0,848	0,798	0,742	0,710	0,695	0,658	0,649	0,643	0,639	0,624
315	0,815	0,788	0,755	0,716	0,673	0,647	0,619	0,594	0,574	0,559	0,548	0,543	0,536
355	0,686	0,655	0,629	0,598	0,568	0,545	0,519	0,500	0,482	0,468	0,460	0,456	0,451
400	0,590	0,563	0,542	0,512	0,493	0,467	0,447	0,428	0,414	0,402	0,395	0,390	0,387
450	0,517	0,496	0,477	0,454	0,427	0,408	0,391	0,375	0,362	0,350	0,348	0,342	0,337
500	0,465	0,447	0,433	0,405	0,387	0,367	0,350	0,336	0,325	0,315	0,312	0,308	0,302
550	0,440	0,422	0,407	0,383	0,359	0,341	0,331	0,313	0,301	0,299	0,290	0,287	0,284
560	0,421	0,406	0,387	0,364	0,349	0,331	0,316	0,303	0,293	0,285	0,281	0,277	0,275
600	0,399	0,382	0,369	0,346	0,328	0,313	0,300	0,292	0,281	0,269	0,263	0,254	0,251
630	0,384	0,370	0,356	0,334	0,317	0,302	0,288	0,277	0,267	0,259	0,246	0,251	0,249
650	0,369	0,354	0,341	0,321	0,308	0,294	0,276	0,266	0,259	0,249	0,237	0,241	0,238
700	0,359	0,344	0,332	0,316	0,299	0,284	0,271	0,258	0,252	0,242	0,229	0,228	0,226
710	0,354	0,340	0,326	0,310	0,294	0,277	0,265	0,255	0,245	0,238	0,226	0,226	0,224
750	0,340	0,331	0,318	0,295	0,279	0,267	0,254	0,245	0,237	0,229	0,226	0,222	0,218
800	0,329	0,318	0,305	0,290	0,272	0,258	0,246	0,236	0,227	0,221	0,217	0,215	0,211

B	A											
	630	650	700	710	750	800	900	1000	1100	1250	1400	1500
200	1,352	1,337	1,327	1,323	1,311	1,298	1,276	1,260	1,244	1,229	1,218	1,210
225	0,989	0,965	0,956	0,946	0,938	0,930	0,913	0,901	0,889	0,870	0,854	0,849
250	0,803	0,793	0,792	0,786	0,779	0,771	0,757	0,748	0,738	0,729	0,722	0,718
280	0,709	0,682	0,676	0,670	0,664	0,655	0,647	0,637	0,622	0,607	0,597	0,586
300	0,607	0,602	0,601	0,600	0,593	0,583	0,573	0,556	0,544	0,536	0,534	0,526
315	0,530	0,523	0,521	0,519	0,512	0,508	0,500	0,493	0,487	0,481	0,475	0,473
355	0,445	0,438	0,436	0,435	0,429	0,427	0,419	0,413	0,407	0,403	0,398	0,396
400	0,381	0,374	0,373	0,372	0,368	0,365	0,357	0,353	0,348	0,345	0,342	0,338
450	0,333	0,328	0,327	0,326	0,323	0,318	0,313	0,309	0,305	0,302	0,297	0,296
500	0,299	0,298	0,294	0,292	0,289	0,287	0,281	0,277	0,274	0,270	0,268	0,266
550	0,281	0,275	0,270	0,268	0,265	0,264	0,259	0,256	0,252	0,247	0,244	0,243
560	0,270	0,267	0,266	0,264	0,261	0,258	0,254	0,250	0,247	0,243	0,241	0,240
600	0,250	0,248	0,247	0,246	0,242	0,237	0,235	0,231	0,228	0,224	0,222	0,220
630	0,246	0,243	0,242	0,241	0,238	0,234	0,231	0,228	0,225	0,221	0,219	0,217
650	0,235	0,233	0,230	0,229	0,227	0,224	0,218	0,215	0,213	0,208	0,205	0,203
700	0,226	0,225	0,224	0,222	0,220	0,217	0,214	0,211	0,209	0,206	0,203	0,200
710	0,224	0,223	0,222	0,220	0,218	0,216	0,212	0,208	0,206	0,203	0,201	0,199
750	0,214	0,212	0,211	0,210	0,209	0,207	0,203	0,198	0,195	0,193	0,191	0,189
800	0,209	0,207	0,206	0,205	0,203	0,200	0,197	0,193	0,191	0,188	0,187	0,186

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 m² section

w [m/s]	ξ [-]																
	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	8	10
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	44,2	45,9
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	54,7	56,5
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	62,2	64
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	68	69,8
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	72,8	74,5
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	76,8	78,6
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	80,3	82
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	83,4	85,1
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	86,1	87,9
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	88,6	90,3
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	90,9	92,6

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}

w [m/s]	f [Hz]							
	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 – 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 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 boards of homogeneous material Promatect-H, connected with galvanized "U" clips on the outside, sealed with Promat K84 glue.

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, 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.
- The warranty for fire dampers FDMQ 180, 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.
- 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).

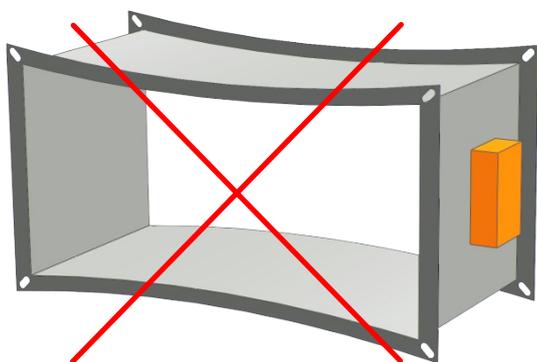
Limit switches

- 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.

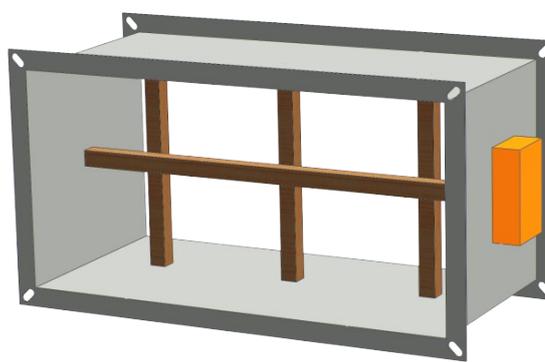
Installation / fixing the damper

- 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!

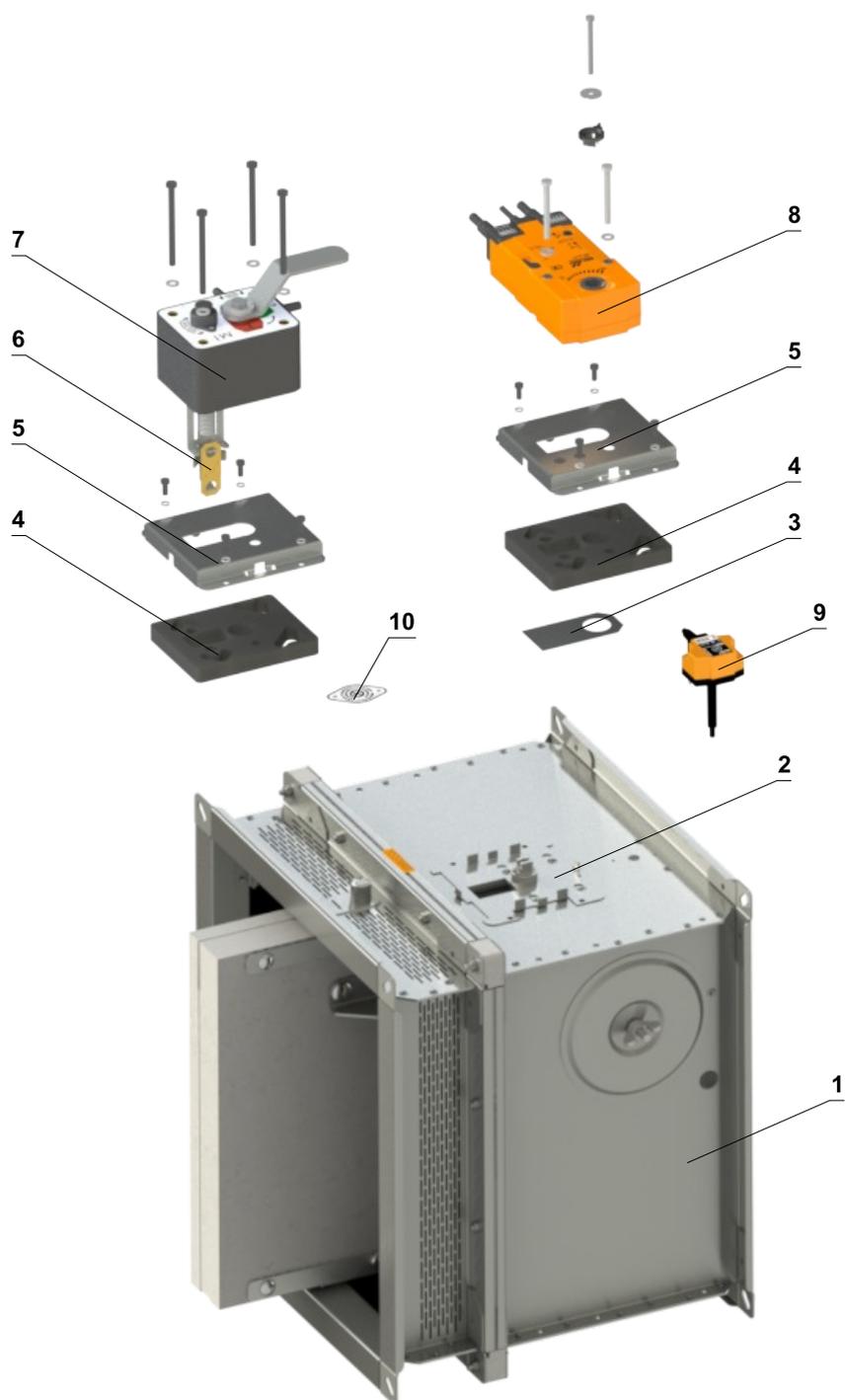


WRONG!



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 |

Commissioning 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 out 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.

For dampers with manual control, following checks must be carried out

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 M5, depending on the closing spring strength.

For dampers with actuators, following checks must be carried out

- 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).

Before putting the dampers into operation and during subsequent function checks, the following checks must be carried out for dampers with optical smoke detector

- The function checks of the optical smoke detector are to be carried out by employees of an authorized organization who have corresponding electrotechnical qualification and have been properly trained by the manufacturer. The function checks are to be carried out as a part of function checks of the fire dampers, at least 1x a year.
- For the function checks, the damper blade should be in "CLOSED" position with the fan off or with closed air regulation situated between the fan and the fire damper.
- 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



EXAMPLES:

FDMQ 180 EN 500x250/375 .40 Q30-ZN

Fire damper FDMQ 180, dimension 500x250 mm, built length 375 mm, control design with spring return actuator AC 230 V, standard activation temperature 72 °C, flange dimension 30 mm, galvanized material variant, without installation kit/frame, standard silicon seal.

FDMQ 180 EN 500x250/375 .40 120 Q30-ZN IW G

Fire damper FDMQ 180, dimension 500x250 mm, built length 375 mm, control design with spring return actuator AC 230 V, activation temperature 120 °C, flange dimension 30 mm, galvanized material variant, impregnation against humidity, rubber cold seal.

1| Fire damper type - FDMQ 180

2| Country of destination

3| Damper dimensions A x B → see pages 16 to 20

"A" is the width of the damper
 "B" is the height of the damper

4| Built length - 375 mm

5| Damper design

.01	Manual control and thermal
.11	Manual control and thermal with a terminal switch („CLOSED“)
.80	Manual control and thermal with two terminal switches („OPEN“, „CLOSED“)
.40	With actuator BF 230-TN (BFL, BFN 230-T) - voltage AC 230 V
.41	With actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K and with supply device BKN 230-24-MOD (voltage AC 230 V)
.50	With actuator BF 24-TN (BFL, BFN 24-T) - voltage AC/DC 24 V
.51	With actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K (voltage AC/DC 24 V)
.63	With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST)
.63S	With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST) and with smoke detector ORS 142 K

6| Activation temperature

Manual control		Spring return actuator control	
	72 °C *		72 °C *
104	104 °C	95	95 °C
147	147 °C	120	120 °C
		140	140 °C

* Standard activation temperature

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) - included damper blade impregnation against chemical - type PROMAT SR

9|Surface treatment

	Without surface treatment
IW	Damper blade impregnation, impregnating agent PROMAT 2000 - impregnation against humidity
IA	Damper blade impregnation, impregnating agent PROMAT SR - impregnation against chemical

10| Cold seal variant

	Silicone rubber *
G	Silicone-free rubber

* Standard cold seal

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

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

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