

FDMO

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 FDMO
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. FDMO fire dampers are in motorised design only with actuator.

Damper blades automatically closes air duct using a spring return actuator. 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 blades, 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.



Damper characteristics

- CE certified acc. to EN 15650
- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3
- Fire resistance up to E 90 S
- Leakage acc. to EN 1751, through the casing class ATC 3 (old marking "C") and through the damper blades class 3
- Cycling tests 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/FDMO/01/XX/X

Working conditions

- Exact damper function is provided under the following conditions:
 - maximum air velocity 12 m/s
 - maximum pressure difference 1500 Pa
 - Even distribution of air flow in complete damper cross section area
- Dampers can be installed with a horizontal blade axis.
- 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 spring return actuator

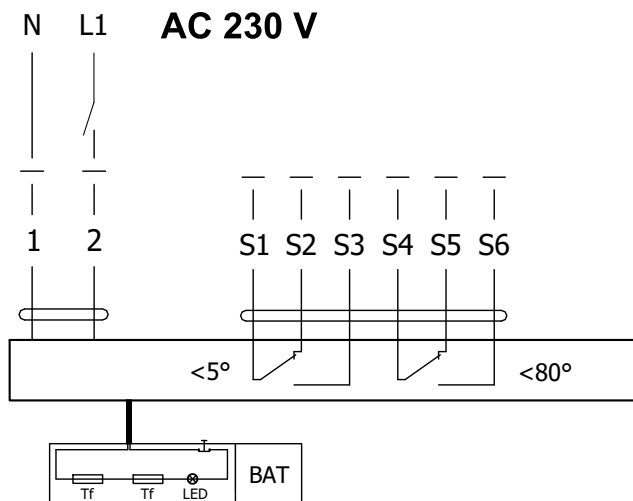
Design .40 and .50

- 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 blades to the operating position "OPEN" and at the same time prestretches its return spring. When the actuator is power supplied, the damper blades are in the position "OPEN" and the return spring is prestretched. Time needed for full opening of the damper blades 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 blades to the breakdown position "CLOSED". The time of closing the damper blades from the position "OPEN" to the position "CLOSED" takes maximum 20 sec.
- In case that the power supply is restored again (the blades can be in any position), the actuator starts to rotate the damper blades 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, rotate the damper blades into the breakdown position "CLOSED".
- Signalisation of damper blades position "OPEN" and "CLOSE" is provided by two microswitches.

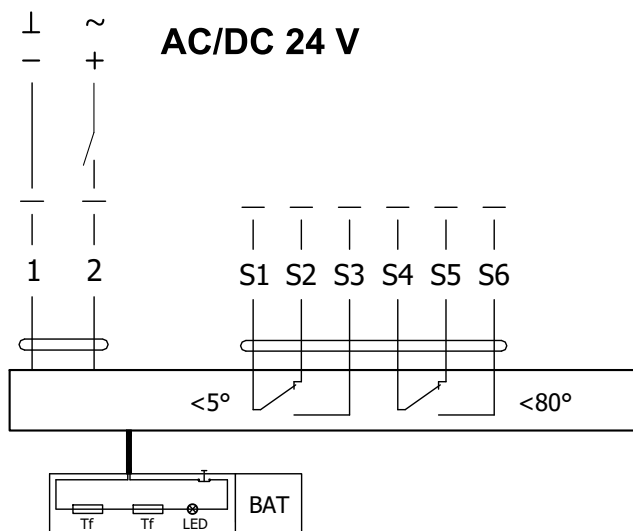
Spring return actuator



Actuator BELIMO BFL 230-T(-ST)



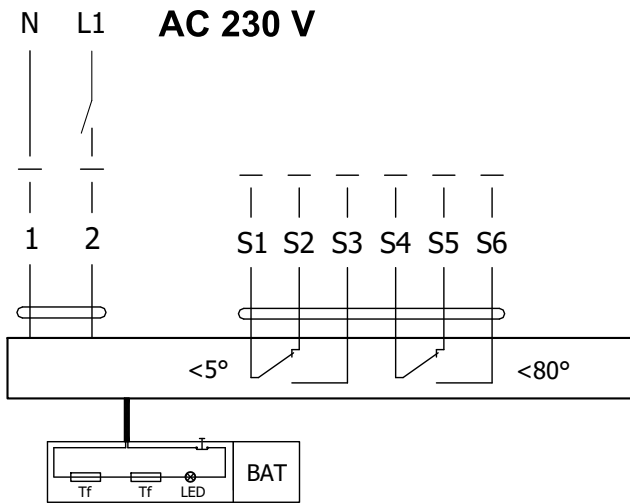
Actuator BELIMO BFL 24-T(-ST)



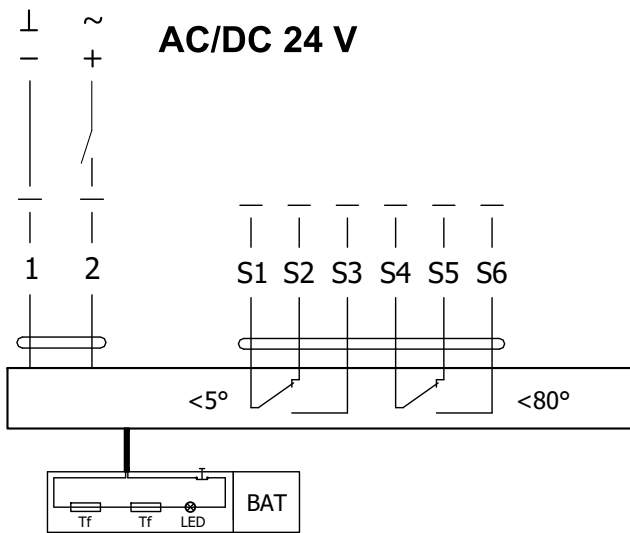
Actuator BELIMO BFL 230-T(-ST), BFL 24-T(-ST)

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(-ST)



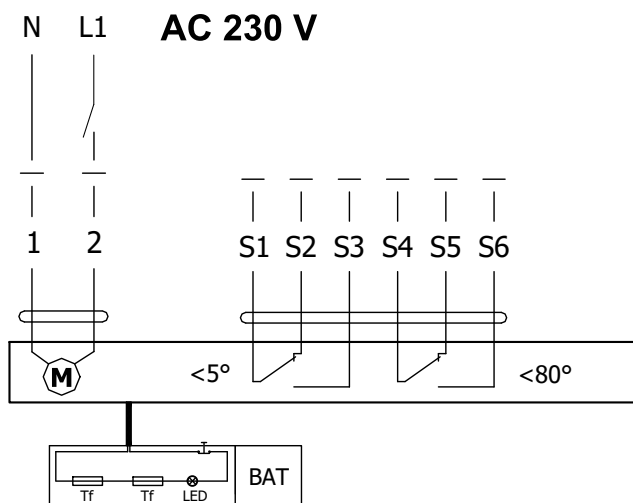
Actuator BELIMO BFN 24-T(-ST)



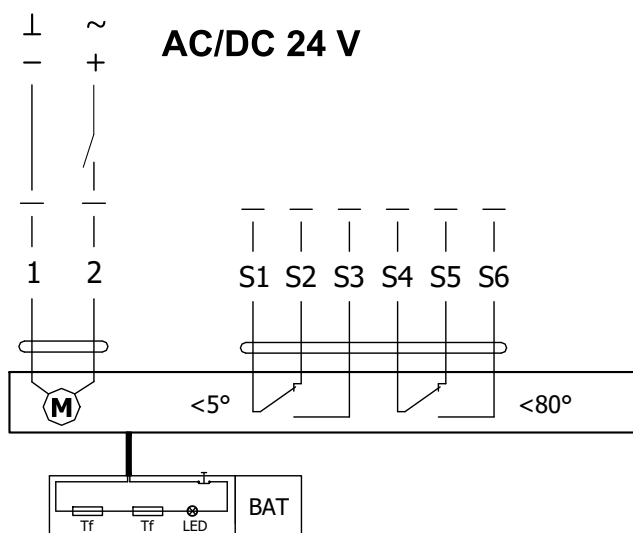
Actuator BELIMO BFN 230-T(-ST), BFN 24-T(-ST)

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 VA (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(-ST)



Actuator BELIMO BF 24-TN (-ST)



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

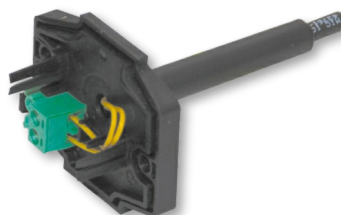
Actuator BELIMO - 18 Nm/ 12 Nm Spring	BF 230-TN(-ST)	BF 24-TN(-ST)
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	8,5 W 3 W	7 W 2 W
Dimensioning	11 VA (I _{max} 8,3 A @ 5 ms)	10 VA (I _{max} 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	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

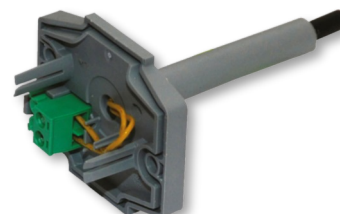
- If the thermal fuse Tf1 is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. Thermoelectric activation device BAT is integral part of the actuator.
- If the thermal fuse Tf2 is interrupted (due to temperature inside the duct), only the spare part 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.



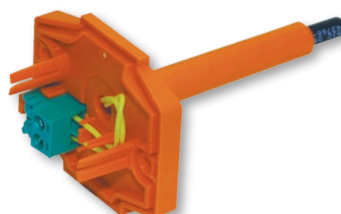
BELIMO ZBAT 72
Black (BK) = 72°C (standard)



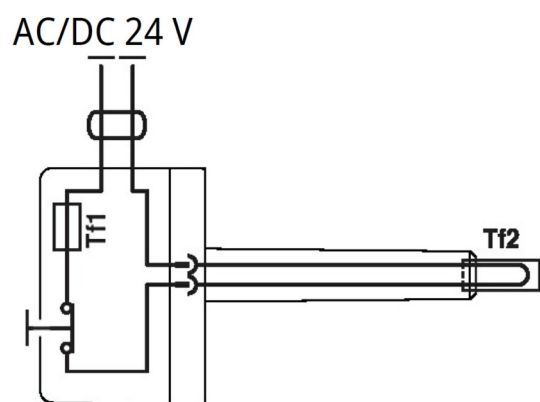
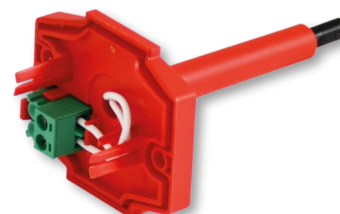
BELIMO ZBAT 95
Grey (GY) = 95°C



BELIMO ZBAT 120
Orange (OG) = 120°C



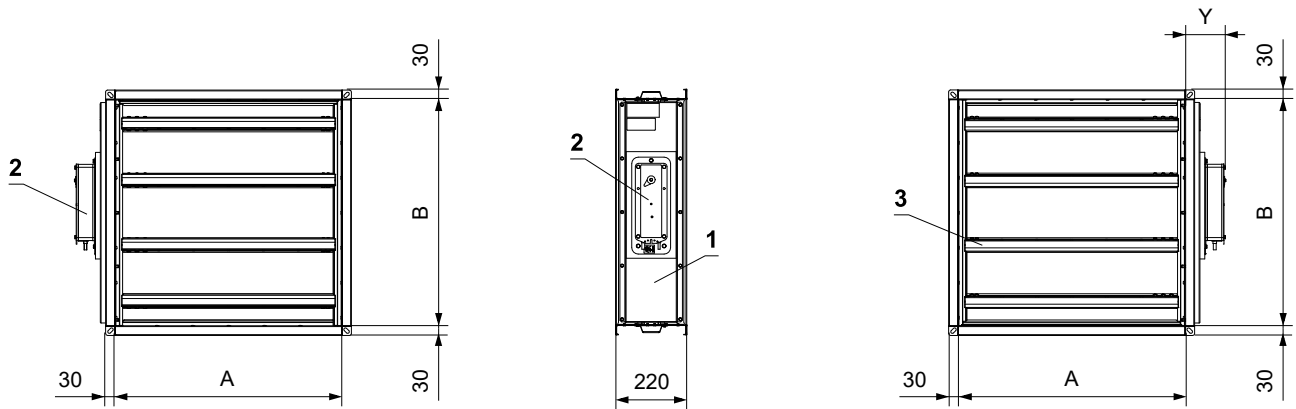
BELIMO ZBAT 140
Red (RD) = 140°C



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

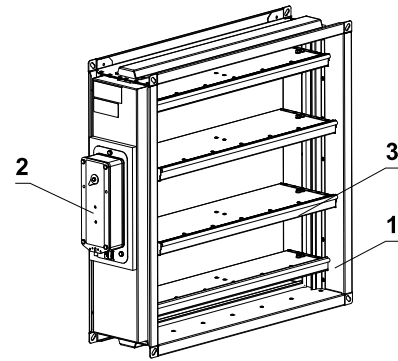
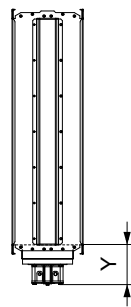
Power voltage	AC/DC 24 V 50/60Hz
Rated current	1 A
AC/DC throughput resistance	<1 Ω
Protection class	III
Degree of protection	IP 54
Probe length	65 mm
Ambient temperature	-30 °C ... +50 °C
Storage temperature	-40 °C ... +50 °C
Ambient humidity	Max. 95% RH, non-condensing
Connection supply	Cable 1 m, 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

III. DIMENSIONS



Y=114 mm (BFL)
 Y=118 mm (BFN)
 Y=124 mm (BF)

- 1 Damper casing
- 2 Spring return actuator
- 3 Damper blade



Technical parameters

A x B [mm]	Number of blades	Weight [kg]	Free area S _f [m ²]	Actuator	A x B [mm]	Number of blades	Weight [kg]	Free area S _f [m ²]	Actuator		
200 x	200	1	9,9	BFL	350 x	1100	6	45	BFN		
	250	2	13,1			1200	6	47,3			
	300	2	14,1		400 x	200	1	13,6	BFL		
	350	2	15,2			250	2	17,5			
	400	2	16,2			300	2	18,7			
	450	3	18,4			350	2	20			
	500	3	19,8			400	2	21,2			
	600	3	21,9			450	3	24,2			
	700	4	25,4		450 x	500	3	25,8	BFN		
	800	4	27,5			600	3	28,8			
	900	5	31,6			700	4	33,2			
	1000	5	33,7			800	4	35,7			
1100	6	37,4	900	5		40,4					
1200	6	39,4	1000	5		42,9					
250 x	200	1	10,8	BFN	450 x	1100	6	47,5	BFN		
	250	2	14,2			1200	6	50			
	300	2	15,2			500 x	200	1		14,5	BFL
	350	2	16,4				250	2		18,6	
	400	2	17,5				300	2		19,8	
	450	3	19,9				350	2		21,2	
	500	3	21,3		400		2	23			
	600	3	21,9		450		3	26,1			
	700	4	27,7		500 x	500	3	27,7	BFN		
	800	4	29,9			600	3	30,4			
	900	5	33,8			700	4	35,1			
	1000	5	36			800	4	37,7			
1100	6	39,9	900	5		42,6					
1200	6	42	1000	5		45,2					
300 x	200	1	11,7	BFL	500 x	1100	6	51,8	BFN		
	250	2	15,3			1200	6	54,4			
	300	2	16,4			600 x	200	1		15,4	BFL
	350	2	17,6				250	2		19,7	
	400	2	18,7				300	2		20,9	
	450	3	21,3				350	2		22,4	
	500	3	22,8		400		2	24,2			
	600	3	25,1		450		3	27,5			
	700	4	29,6		600 x	500	3	29,2	BFN		
	800	4	31,8			600	3	32			
	900	5	36			700	4	36,9			
	1000	5	38,2			800	4	39,6			
1100	6	42,4	900	5		44,8					
1200	6	44,7	1000	5		49,2					
350 x	200	1	12,7	BFL	600 x	1100	6	54,4	BF		
	250	2	16,4			1200	6	57,1			
	300	2	17,5			600 x	200	1		17,2	BFL
	350	2	18,8				250	2		21,8	
	400	2	20				300	2		23,2	
	450	3	22,8				350	2		25,2	
	500	3	24,3		400		2	26,7			
	600	3	27,2		450		3	30,4			
	700	4	31,4		600 x	500	3	32,2	BFN		
	800	4	33,8			600	3	35,2			
	900	5	38,2			700	4	40,6			
	1000	5	40,6			800	4	43,5			

A x B [mm]	Number of blades	Weight [kg]	Free area S _f [m ²]	Actuator	A x B [mm]	Number of blades	Weight [kg]	Free area S _f [m ²]	Actuator		
600 x	900	5	31,6	0,1360	200 x	1100	6	74,7	0,8009	BF	
	1000	5	33,7	0,1545		1200	6	78,3	0,8894		
	1100	6	37,4	0,1674		200	1	25,2	0,1527	BFL	
	1200	6	39,4	0,1859		250	2	31,1	0,1724	BFN	
700 x	200	1	19	0,1062	300	2	32,8	0,2216			
	250	2	24	0,1199	350	2	34,9	0,2709			
	300	2	25,5	0,1541	400	2	36,8	0,3201			
	350	2	27,6	0,1884	450	3	43,7	0,3398			
	400	2	29,2	0,2226	500	3	45,9	0,3891	BF		
	450	3	33,3	0,2363	600	3	49,8	0,4876			
	500	3	35,2	0,2706	700	4	57,2	0,5565			
	600	3	38,4	0,3391	800	4	61	0,6550			
700	4	46,1	0,3870	900	5	68,5	0,7240				
800	4	49,2	0,4555	1000	5	72,3	0,8225				
900	5	55,3	0,5035	1100	6	79,8	0,8914				
1000	5	58,4	0,5720	1200	6	83,6	0,9899				
800 x	1100	6	64,5	0,6199	200	1	27	0,1682	BFL		
	1200	6	67,7	0,6884	250	2	33,3	0,1899	BFN		
	200	1	20,8	0,1217	300	2	35,1	0,2441			
	250	2	26,2	0,1374	350	2	37,3	0,2984			
	300	2	27,8	0,1766	400	2	41,1	0,3526	BF		
	350	2	30,1	0,2159	450	3	46,6	0,3743			
	400	2	31,8	0,2551	500	3	48,9	0,4286			
	450	3	36,2	0,2708	600	3	53	0,5371			
	500	3	38,2	0,3101	700	4	60,9	0,6130			
	600	3	43,4	0,3886	800	4	64,9	0,7215			
	700	4	49,8	0,4435	900	5	72,9	0,7975			
	800	4	53,2	0,5220	1000	5	77	0,9060			
	900 x	900	5	59,7	0,5770	1100	6	85	0,9819	BF	
		1000	5	63,1	0,6555	1200	6	89	1,0904		
		1100	6	69,7	0,7104	200	1	28,8	0,1837		BFL
		1200	6	73	0,7889	250	2	35,5	0,2074		BFN
200		1	22,6	0,1372	300	2	37,4	0,2666			
250		2	28,9	0,1549	350	2	39,7	0,3259			
300		2	30,5	0,1991	400	2	43,6	0,3851	BF		
350		2	32,5	0,2434	450	3	49,5	0,4088			
400	2	34,3	0,2876	500	3	51,9	0,4681				
450	3	39,1	0,3053	600	3	56,2	0,5866				
500	3	41,2	0,3496	700	4	64,6	0,6695				
600	3	46,6	0,4381	800	4	68,8	0,7880				
700	4	53,5	0,5000	900	5	77,3	0,8710				
800	4	57,1	0,5885	1000	5	81,6	0,9895				
900	5	64,1	0,6505	1100	6	90	1,0724				
1000	5	67,7	0,7390	1200	6	94,3	1,1909				

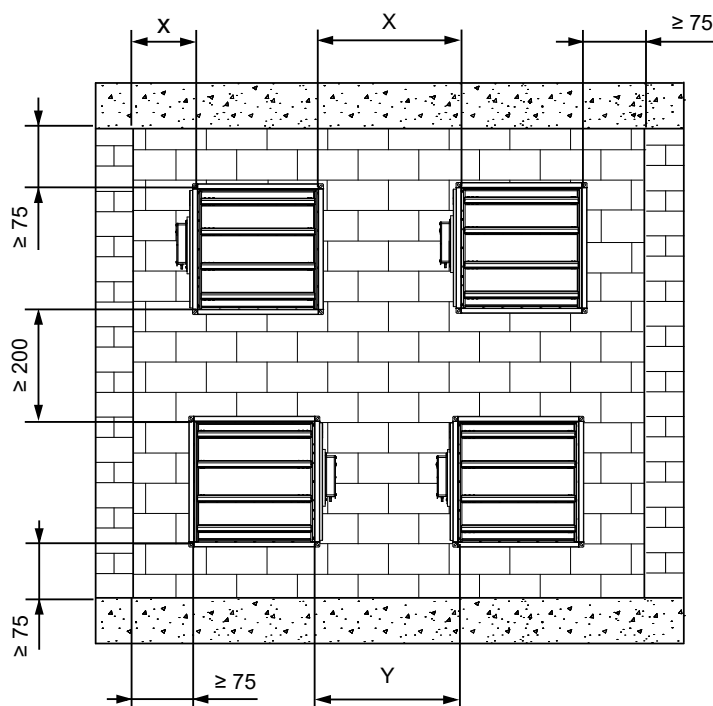
IV. INSTALLATION

Placement and installation

- The damper can be installed with a horizontal blade axis , temperature sensor (BAT) must always be in the upper part of the duct. 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.
- 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 blades 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.
- Dampers are not equipped with inspection openings. For simple maintenance and revision they must be completed with connecting inspection part installed just behind the damper.

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

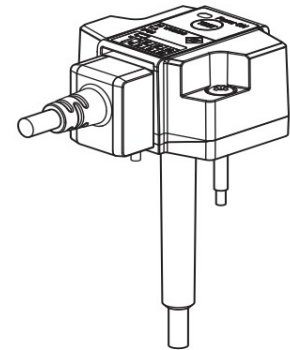
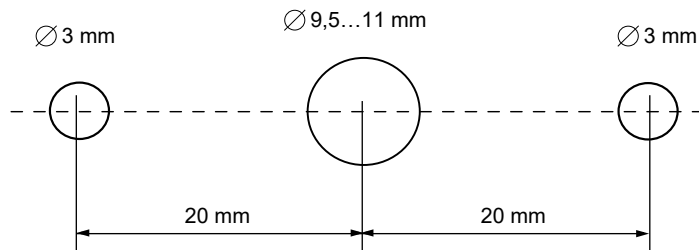


X = recommended min. distance for actuator ≥ 150 mm

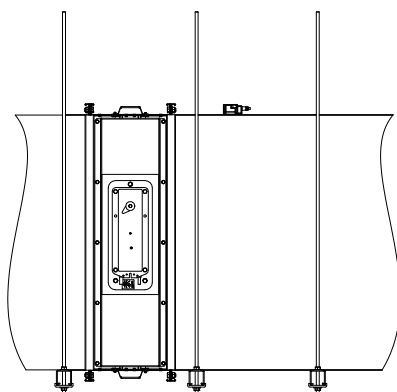
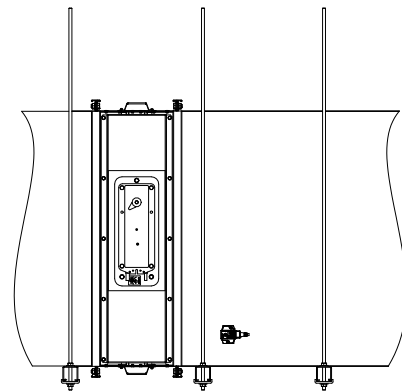
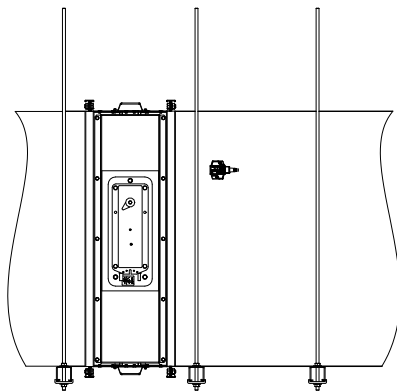
Y = min. distance for actuator ≥ 200 mm acc. to EN 1366-2

BAT Device Installation in the Duct

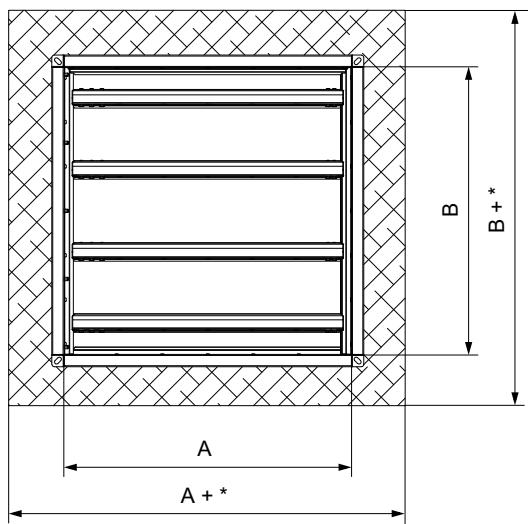
- The thermoelectric activation device is delivered loose and must be installed in the connected duct.
- For installation, holes must be drilled in accordance with the dimensions shown below.



- The device must always be placed in the upper part of the duct as shown below.



Dimensions of an installation opening



* Mineral wool + L-profile

- min. A(B)+60
- max. A(B)+90

Statement of installations

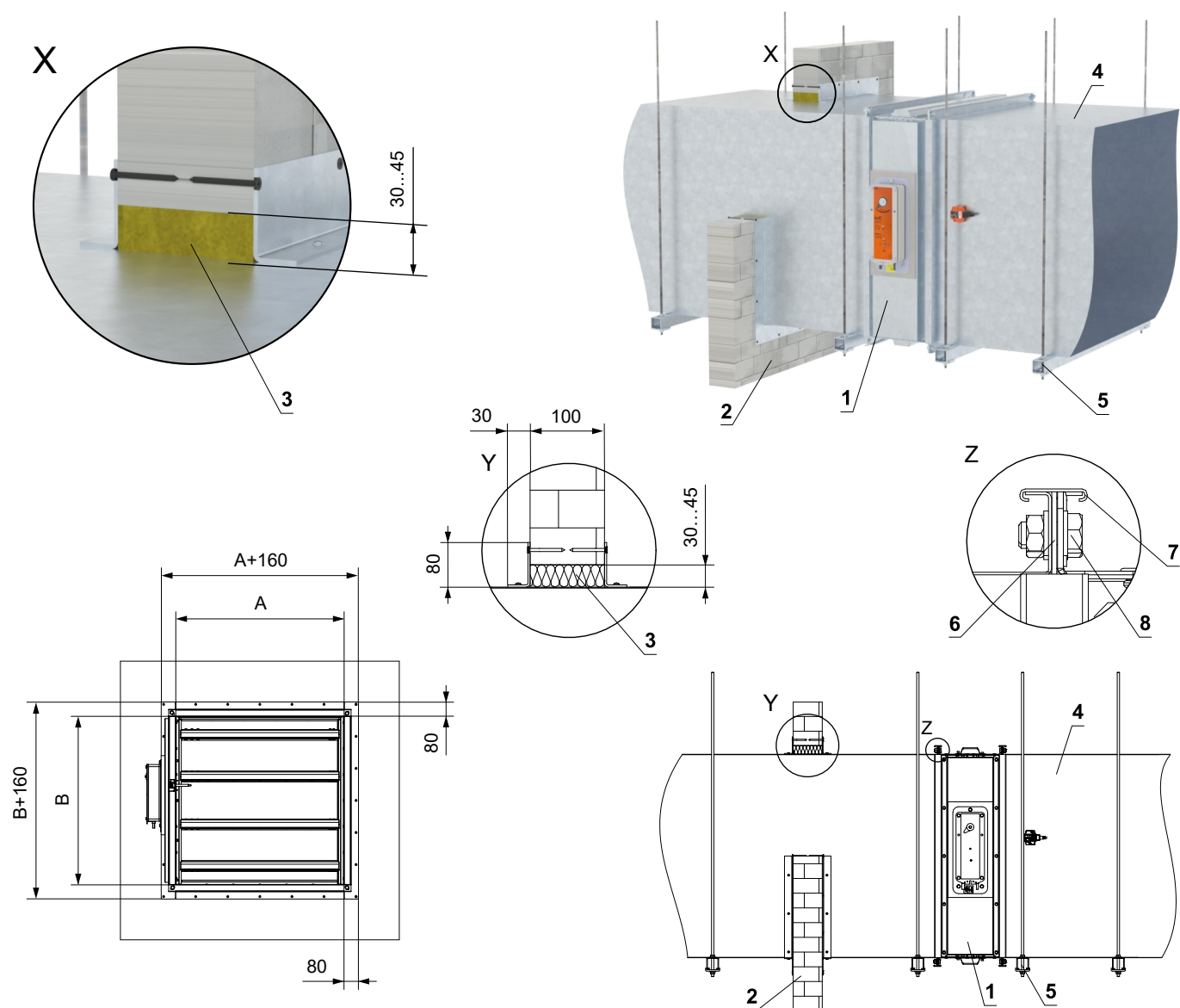
Fire separating construction, location of the damper	Installation type, installation system	Gap width [mm]	Fire resistance	Page
Standard low- and high-density rigid wall construction according to EN 1363-1 <ul style="list-style-type: none"> ● damper remote from the wall ● 100 mm min. wall thickness 	Mineral wool + L-profile	30-45	E 90 (v _e) S [H]	15
Standard flexible wall construction min. EI 60 according to EN 1363-1. <ul style="list-style-type: none"> ● damper remote from the wall ● 100 mm min. wall thickness 	Mineral wool + L-profile	30-45	E 90 (v _e) S [H]	16
Standard low- and high-density rigid floor construction according to EN 1366-2 <ul style="list-style-type: none"> ● damper remote from the ceiling ● 150 mm min. ceiling thickness 	Mineral wool + L-profile	30-45	E 60 (h _o) S [H]	17

Installation outside solid wall construction

Outside solid wall construction - Mineral wool + L-profile

E 90 (v_e) S [H]

- Standard low- and high-density rigid wall construction according to EN 1363-1
- Minimum and maximum distance between the wall and fire damper is not limited
- The duct must be suspended on both sides of damper (Follow national regulations and the duct manufacturer's instructions)
- 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 and/or the duct manufacturer's instructions
- Load of the suspension system depends on weight of the fire damper and duct system → see page 18
- Max. distance between two suspension systems is 1500 mm (Follow national regulations and the duct manufacturer's instructions)
- 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



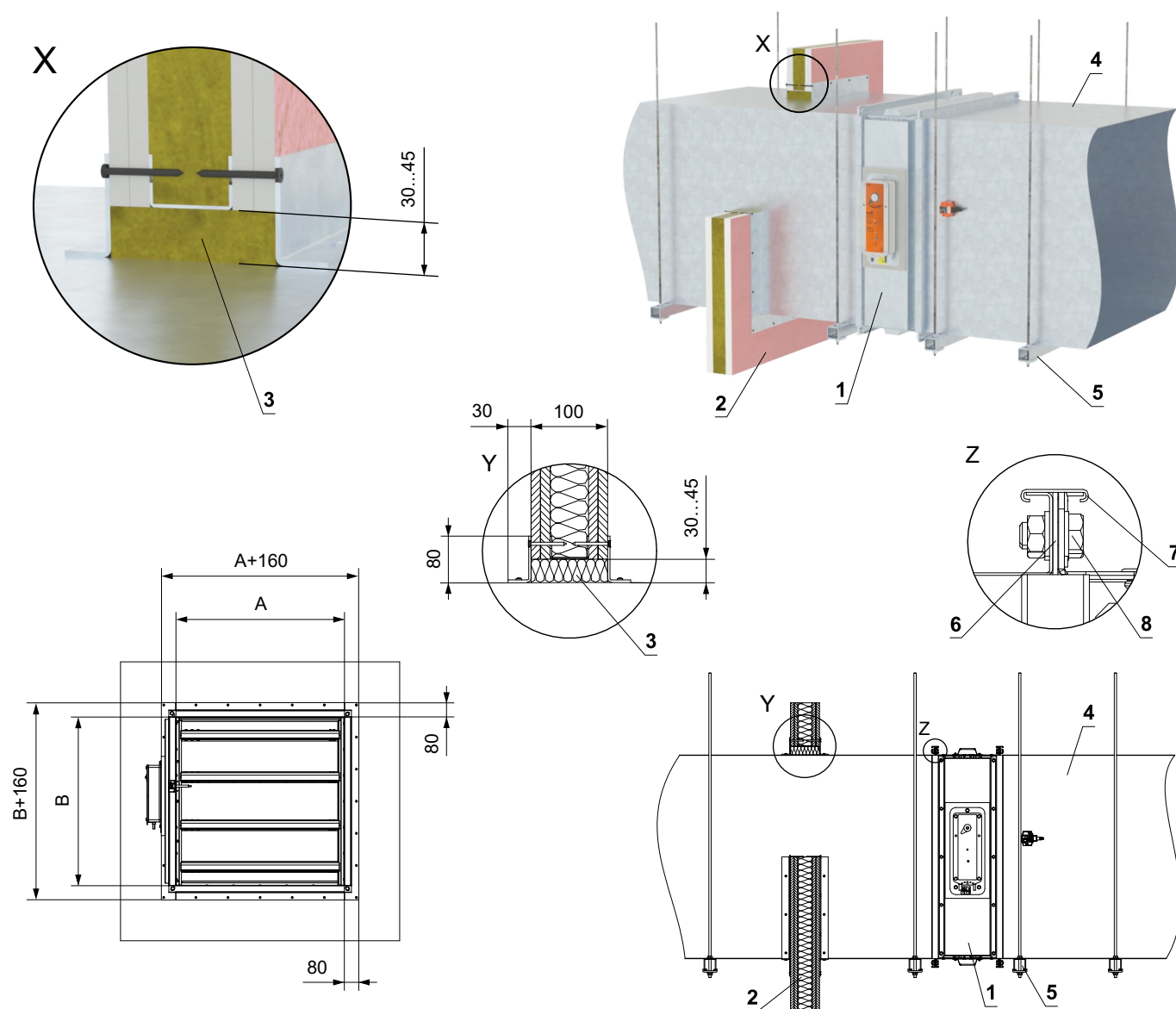
- 1 FDMO
- 2 Solid wall construction
- 3 Stone wool min. density 45 kg/m³ (e.g. ORSTECH 45)
- 4 Standard air duct made of galvanized sheet metal, thickness according to damper size – the duct must be anchored on both sides of the fire-separating structure, e.g. using L-profiles 30 × 30 × 3 mm – according to the ISOVER manufacturer's instructions
- 5 Profile with threaded rod → see pages 18 to 19
- 6 Sealing - ceramic self-adhesive tape Fibre Gasket 15x5
- 7 C-connecting strip for flanged ducts
- 8 Screw connection M8 (screw, 2 x washer, nut)

Installation outside gypsum wall construction

Outside gypsum wall construction min. EI 60 - Mineral wool + L-profile

E 90 (v_e) S [H]

- Standard flexible wall construction min. EI 60 according to EN 1363-1.
- Minimum and maximum distance between the wall and fire damper is not limited
- The duct must be suspended on both sides of damper (Follow national regulations and the duct manufacturer's instructions)
- 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 and/or the duct manufacturer's instructions
- Load of the suspension system depends on weight of the fire damper and duct system → see page 18
- Max. distance between two suspension systems is 1500 mm (Follow national regulations and the duct manufacturer's instructions)
- 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



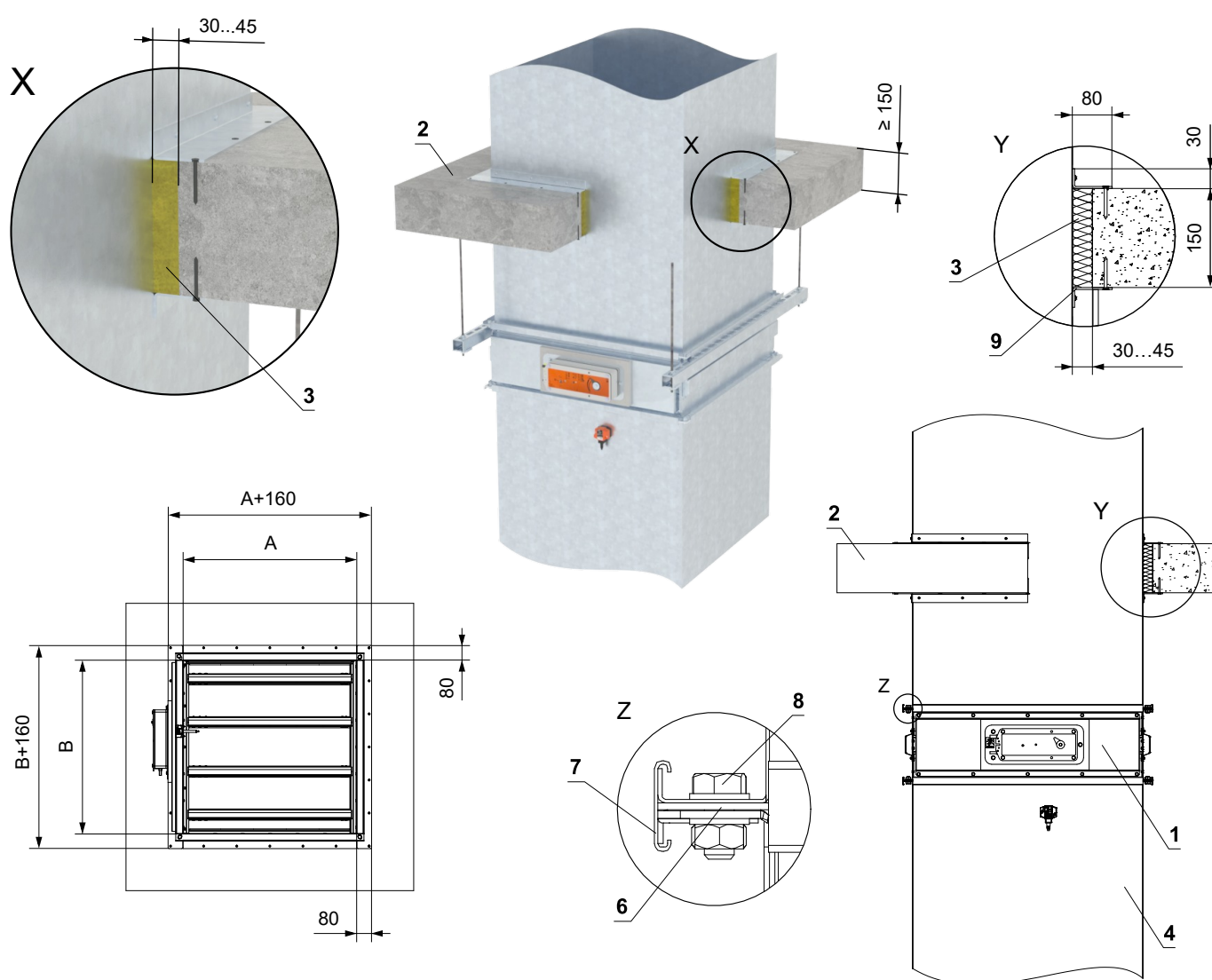
- 1 FDMO
- 2 Flexible wall construction
- 3 Stone wool min. density 45 kg/m³ (e.g. ORSTECH 45)
- 4 Standard air duct made of galvanized sheet metal, thickness according to damper size – the duct must be anchored on both sides of the fire-separating structure, e.g. using L-profiles 30 × 30 × 3 mm – according to the ISOVER manufacturer's instructions
- 5 Profile with threaded rod → see pages 18 to 19
- 6 Sealing - ceramic self-adhesive tape Fibre Gasket 15x5
- 7 C-connecting strip for flanged ducts
- 8 Screw connection M8 (screw, 2 x washer, nut)

Installation outside solid ceiling construction

Outside solid ceiling construction min. thickness 150 mm - Mineral wool + L-profile

E 60 (h_o) S [H]

- Standard low- and high-density rigid floor construction according to EN 1366-2
- Minimum and maximum distance between the ceiling and fire damper is not limited
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper (Follow national regulations and the duct manufacturer's instructions)
- 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 and/or the duct manufacturer's instructions
- Load of the suspension system depends on weight of the fire damper and duct system → see page 18
- Max. distance between two suspension systems is 1500 mm (Follow national regulations and the duct manufacturer's instructions)
- 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
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.



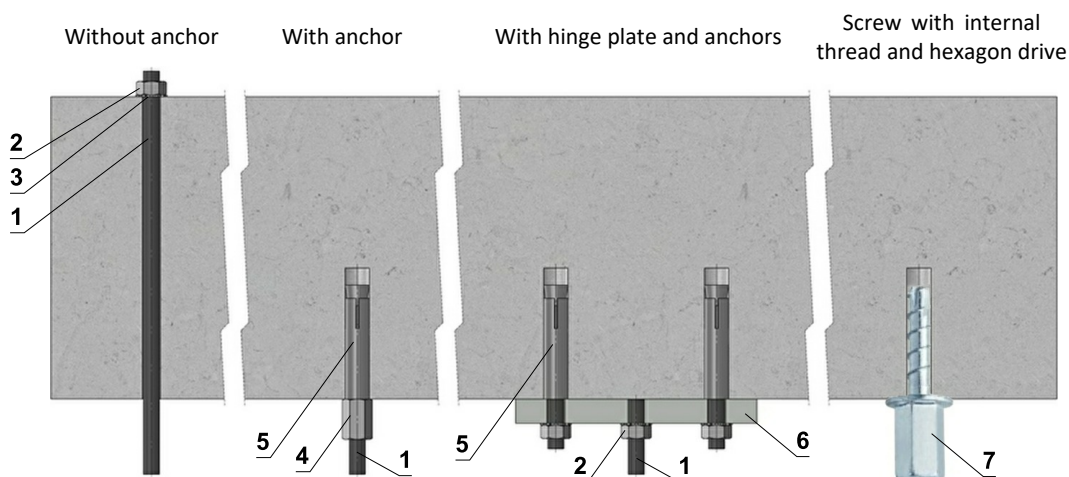
- 1 FDMO
- 2 Solid ceiling construction
- 3 Stone wool min. density 45 kg/m³ (e.g. ORSTECH 45)
- 4 Standard air duct made of galvanized sheet metal, thickness according to damper size – the duct must be anchored on both sides of the fire-separating structure, e.g. using L-profiles 30 × 30 × 3 mm – according to the ISOVER manufacturer's instructions
- 5 Profile with threaded rod → see pages 18 to 19
- 6 Sealing - ceramic self-adhesive tape Fibre Gasket 15x5
- 7 C-connecting strip for flanged ducts
- 8 Screw connection M8 (screw, 2 x washer, nut)

V. SUSPENSION SYSTEMS

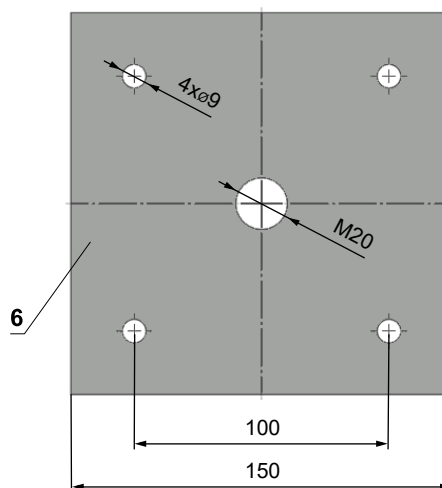
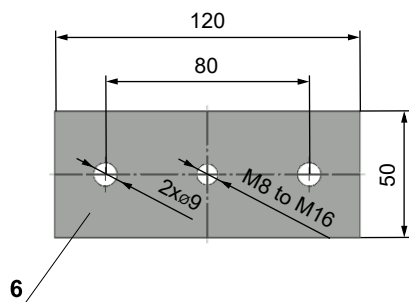
Mounting to the ceiling wall

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

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



Hinge plates



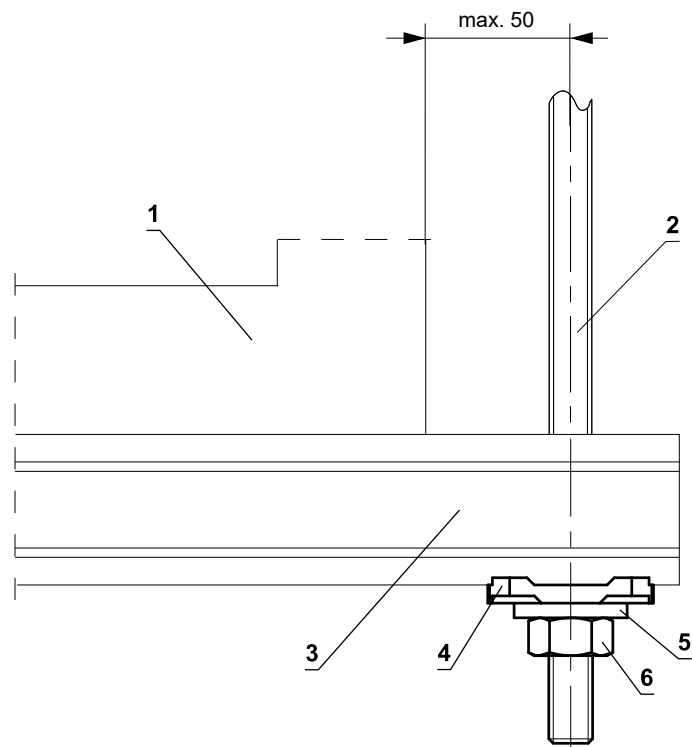
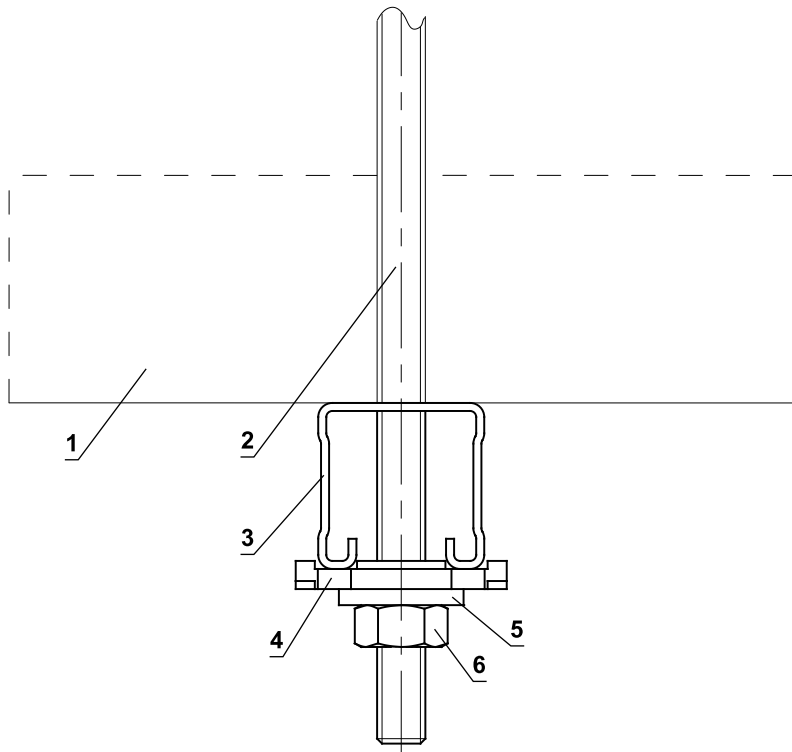
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

Load capacities of threaded rods at the required fire resistance 60 min. $t \le 120 \text{ min.}$

Size	As [mm ²]	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 FDMO
- 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

VI. TECHNICAL DATA

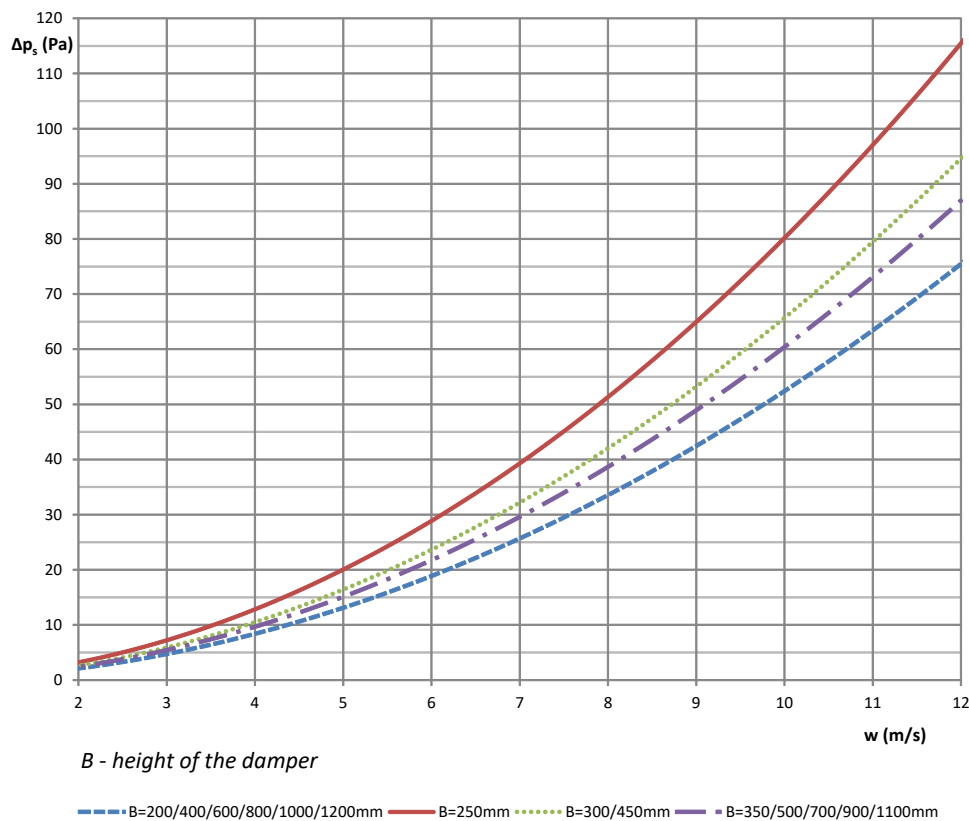
Pressure loss

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 21

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



Sound power level corrected with filter A

Sound power level L_w in dB(A) for B=250/300/450mm, damper fully open

	f (Hz)	63	125	250	500	1000	2000	4000	8000	Total
w (m/s)	2	16	24	29	29	28	26	23	9	35
	3	25	33	38	38	37	35	32	18	44
	4	32	40	45	45	44	42	39	25	51
	5	38	46	51	51	50	48	45	31	57
	6	42	50	55	55	54	52	49	35	61
	7	46	54	59	59	58	56	53	39	65
	8	49	57	62	62	61	59	56	42	68
	9	50	58	63	63	62	60	57	43	69
	10	53	61	66	66	65	63	60	46	72
	11	55	63	68	68	67	65	62	48	74
	12	57	65	70	70	69	67	64	50	76

w [m/s] - air velocity in the free cross section (AxB) - i.e. before blades

f [Hz] - frequency of octave band

Sound power level L_w in dB(A) for B=350/500/700/900/1100mm, damper fully open

	f (Hz)	63	125	250	500	1000	2000	4000	8000	Total
w (m/s)	2	15	23	28	28	27	25	22	8	34
	3	24	32	37	37	36	34	31	17	43
	4	31	39	44	44	43	41	38	24	50
	5	36	44	49	49	48	46	43	29	55
	6	41	49	54	54	53	51	48	34	60
	7	45	53	58	58	57	55	52	38	64
	8	48	56	61	61	60	58	55	41	67
	9	49	57	62	62	61	59	56	42	68
	10	51	59	64	64	63	61	58	44	70
	11	53	61	66	66	65	63	60	46	72
	12	55	63	68	68	67	65	62	48	74

w [m/s] - air velocity in the free cross section (AxB) - i.e. before blades

f [Hz] - frequency of octave band

Sound power level L_w in dB(A) for B=200/400/600/800/1000/1200mm, damper fully open

	f (Hz)	63	125	250	500	1000	2000	4000	8000	Total
w (m/s)	2	13	21	26	26	25	23	20	6	32
	3	21	29	34	34	33	31	28	14	40
	4	28	36	41	41	40	38	35	21	47
	5	34	42	47	47	46	44	41	27	53
	6	38	46	51	51	50	48	45	31	57
	7	42	50	55	55	54	52	49	35	61
	8	45	53	58	58	57	55	52	38	64
	9	47	55	60	60	59	57	54	40	66
	10	48	56	61	61	60	58	55	41	67
	11	50	58	63	63	62	60	57	43	69
	12	52	60	65	65	64	62	59	45	71

w [m/s] - air velocity in the free cross section (AxB) - i.e. before blades

f [Hz] - frequency of octave band

VII. MATERIAL, FINISHING

- Damper casing and blades are made from galvanized sheet metal without further surface treatment.
- The cover housing for the actuator is placed on fire resistant asbestos free boards made of mineral fibres.
- Closing mechanism and fasteners are galvanized.
- Plastic, rubber and silicon components, sealants, foaming tapes, glass-ceramic seals, housings, brass bearings of the blades, actuators, and end switches are identical for all material variants of the dampers.
- 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 in bulk. 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 blades 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 FDMO, 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. actuators, 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.

Manual operation - actuator control without electric voltage

- A special wrench (part of the actuator) can be used to manually turn the damper blades to any position. When the wrench is turned in the direction of the arrow, the damper blades rotate to open position. As the blades 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 blades 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).

Installation / fixing the damper

- It is necessary to ground the damper casing before installation.
- The damper casing shall not be deformed in the course of bricking in.
- Once the damper is built in, the damper blades shall not grind on the damper casing during opening or closing.

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 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 blades 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 blades 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 blades, contact surfaces and silicon seal.

Following checks must be carried out for all dampers

- Check the rotation of the blades 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 blades 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).

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 8.
- 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 8

X. ORDERING INFORMATION

Ordering key



EXAMPLE:

FDMO EN 1000x300 .40 120 Q20-ZN

Fire damper FDMO, dimension 1000x300 mm, control design with spring return actuator AC 230 V, activation temperature 120 °C, flange dimension 20 mm, galvanized material variant.

1| Fire damper type - FDMO

2| Country of destination

3| Damper dimensions A x B → see pages 10 to 11

„A“ is the width of the damper
 „B“ is the height of the damper

4| Damper design

.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 MEAN WELL HDR-15-24 (voltage 230 V AC)
.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 24V DC)

* Optical smoke detectors ORS 142 K and power supply unit MEAN WELL HDR-15-24 are delivered in bulk

5| Activation temperature

Spring return actuator control	
	72 °C *
95	95 °C
120	120 °C
140	140 °C

* Standard activation temperature

6| Flange dimension

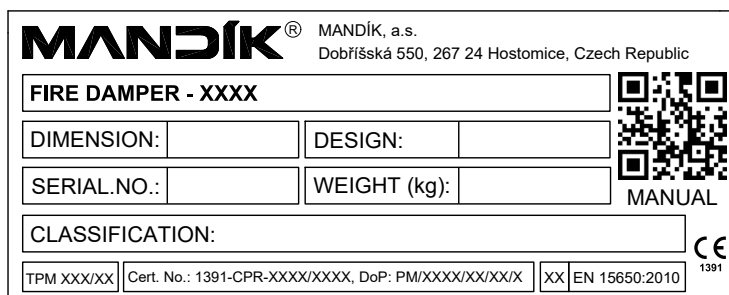
Q30	Flange width 30 mm
Q20	Flange width 20 mm

7| Material

ZN	Galvanized
----	------------

Data label

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



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

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