

EN 15650:2010-09

MANDÍK®

FIRE DAMPER FDMD



These technical specifications state a row of manufactured sizes and models of fire dampers (further only dampers) FDMD. It is valid for production, designing, ordering, delivery, assembly and operation.

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II. GENERAL INFORMATION

1. Description

Fig. 1 Fire damper FDMD, design .01 - damper with inner mechanical control



Fig. 2 Fire damper FDMD, design .01v1 - damper with outer mechanical control



Fig. 3 Fire damper FDMD, design .01v2 - damper with outer mechanical control and mechanical control cover



Fig. 4 Fire damper FDMD, design with actuating mechanism



- 1.1. Fire dampers are shutters in duct systems of air-conditioning devices that prevent spreading the fire and combustion products from one fire segment to the other one by means of closing the air duct in the points of fire separating constructions. Dampers blade automatically closes air duct using a shutting spring or an actuating mechanism back spring. The back spring of the actuating mechanism is started when the thermoelectrical starting mechanism BAE 72B-S is activated, when a reset button on BAE 72B-S is pushed or when a power supply of the actuating mechanism is stopped. The damper is sealed with a silicon packing against smoke penetration after closing the blade. At the same time, the damper blade is bedded in a material which enlarges its capacity and air proofs the air duct. Dampers have one inspection hole, since the shutting device and the inspection hole can be set into the most advantageous position (with respect to the operation and manipulation with the control device).

1.2. Damper characteristics

- CE certified acc. to EN 15650
- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3+A1
- Fire resistance EIS 120, EIS 90
- External Casig leakage class min. C, Internal leakage class 3 (D=200 mm) and class 2 (D=100 - 180 mm) acc. to EN 1751
- Cycling test in class C 10000 acc. to EN 15650
- Corrosion resistant acc. to EN 15650
- ES Certificate of conformity No. 1391-CPR-0089/2014
- Declaration of Performance No. CDM/FDMD/001/14
- Hygienic assessment of fire dampers - Report No. 1.6/13/16/1

1.3. Working conditions

Exact damper function is provided under the following conditions:

- a) Maximum air circulation speed: 12 m.s⁻¹
Maximum pressure difference: 1500 Pa
- b) Dampers could be displaced into position "CLOSED" only in case that ventilator, or Air Handling Unit is switched off. The goal is the securing of proper closing and safe function of Fire Damper in case of Fire.
- c) The air circulation in the whole damper section must be secured as steady on whole surface.

Operation of the dampers does not depend on the direction of air circulation. The dampers can be located in an arbitrary position.

Dampers are suitable for systems without abrasive, chemical and adhesive particles.

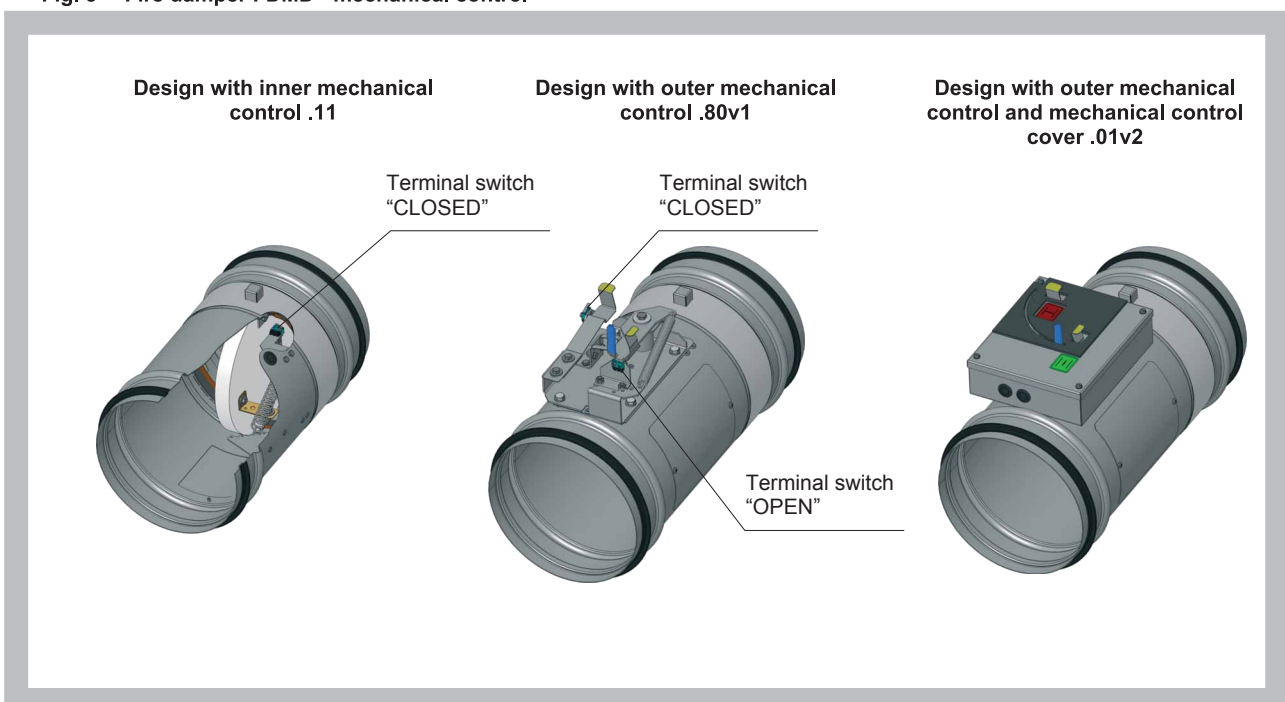
Dampers are designed for macroclimatic areas with mild climate according to EN 60 721-3-3.

Temperature in the place of installation is permitted to range from - 20°C to + 50°C.

2. Damper design

2.1. Design with mechanical control

Fig. 5 Fire damper FDMD - mechanical control



Design .01, .01v1 a .01v2

Design with mechanical control with a thermal protective fuse which actuates the shutting device within 120 seconds at latest after the nominal start temperature 72 °C has been reached. Automatic initiation of the shutting device is not activated if the temperature does not exceed 70 °C. In case that other start temperatures are required, thermal fuses with nominal start temperature + 104 °C or +147 °C can be supplied (this requirement must be specified in the order).

Design .11, .11v1 a .11v2

Design .01 with mechanical control can be complemented with a limit switch signalling of the damper blade position "CLOSED". Limit switch is connected via damper casing (.01), cable is connected directly to limit switch (.01v1) or limit switch is connected via mechanical control cover (.01v2).

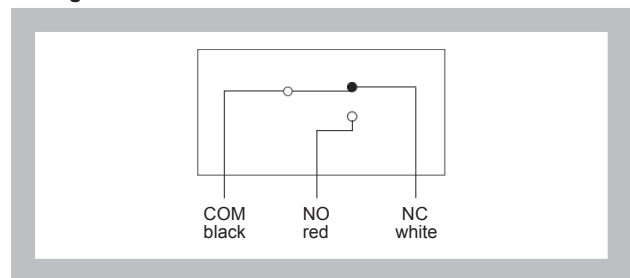
Design .80v1 a .80v2

Design .01 with mechanical control can be complemented with a terminal switches signaling of the damper blade position "CLOSED" or "OPEN". Limit switches are connected via damper casing (.01), cables are connected directly to limit switches (.01v1) or limit switches are connected via mechanical control cover (.01v2).

Tab. 2.1.1. Limit switch ASQ10617

Limit switch ASQ10617	
Nominal voltage, current	DC 30 V; 0,1 A
Degree of protection	IP 67
Ambient temperature	-40 °C ... 85 °C

Fig. 6 Limit switch ASQ10617



2.2. Design with actuating mechanism

Fig. 7 Fire damper FDMD with actuating mechanism



Design .40, .50

Design with an actuating mechanism BLF 230-T or BLF 24-T (further only "actuating mechanism"). After being connected to power supply AC/DC 24V or 230V, the actuating mechanism displaces the damper blade into operation position "OPEN" and at the same time it pre-stretches its back spring. When the actuating mechanism is under voltage, the damper blade is in the position "OPEN" and the back spring is pre-stretched. Time needed for full opening of the flap blade from the position "CLOSED" to the position "OPEN" is maximum 140s. If the actuating power supply is cut off (due to loss of supply voltage, activation of thermoelectrical actuating mechanism or pushing the reset button on the thermoelectrical starting mechanism BAE 72B-S),

the back spring displaces the damper blade into the breakdown position "CLOSED". The time of displacing the blade from the position "OPEN" to the position "CLOSED" takes maximum 16 s. In case that the power supply is restored again (the blade can be in any position), the actuating mechanism starts to re-displace the damper blade into the position "OPEN".

A thermoelectrical starting mechanism BAE 72B-S, which contains three thermal fuses Tf1 and Tf2/Tf3, is a part of the actuating mechanism. These fuses are activated when temperature +72 °C has been exceeded (the fuse Tf1 when the temperature around the damper and the fuses Tf2/Tf3 when the temperature inside the air-conditioning piping has been exceeded). After the thermal fuse Tf1 or Tf2/Tf3 has been activated, the power supply is permanently and irreversibly cut off and the actuating mechanism, by means of the pre-stretched spring, displaces the damper blade into the breakdown position "CLOSED".

Signalling of blade positions "OPEN" and "CLOSED" is ensured by two firmly set integrated limit switches.

Fig. 8 Actuating mechanism BELIMO BLF 24-T(-ST)

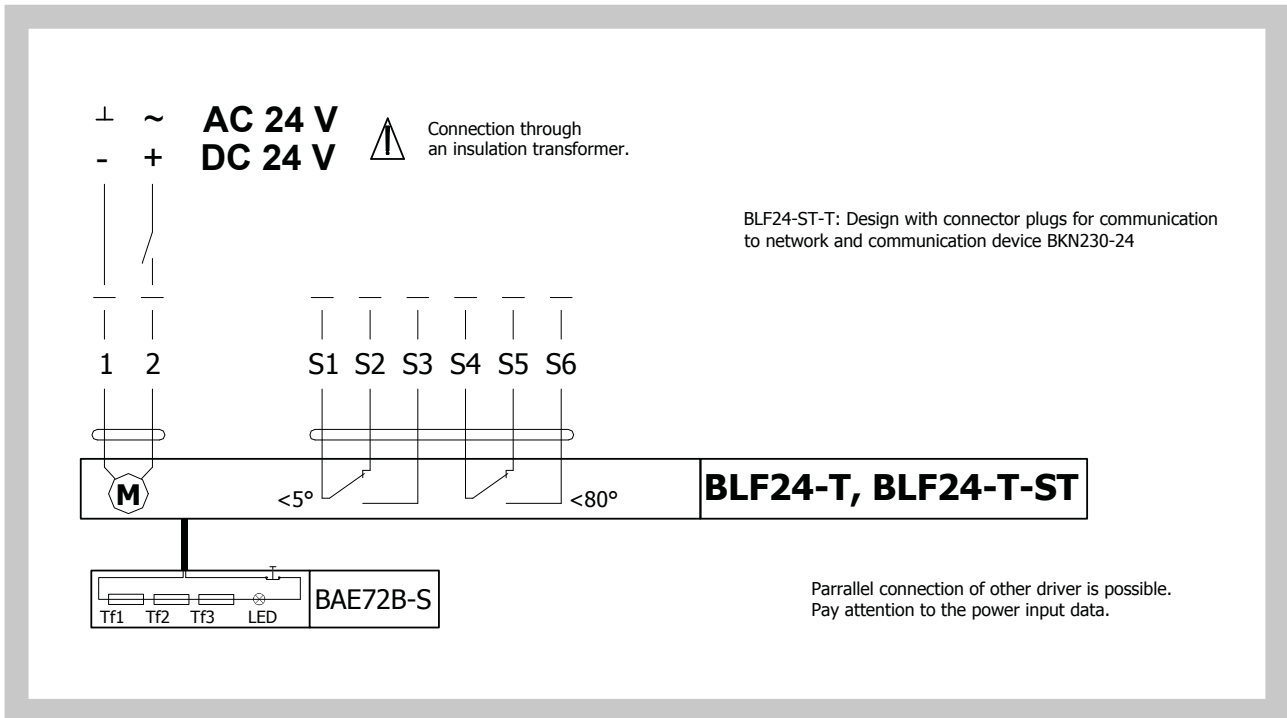
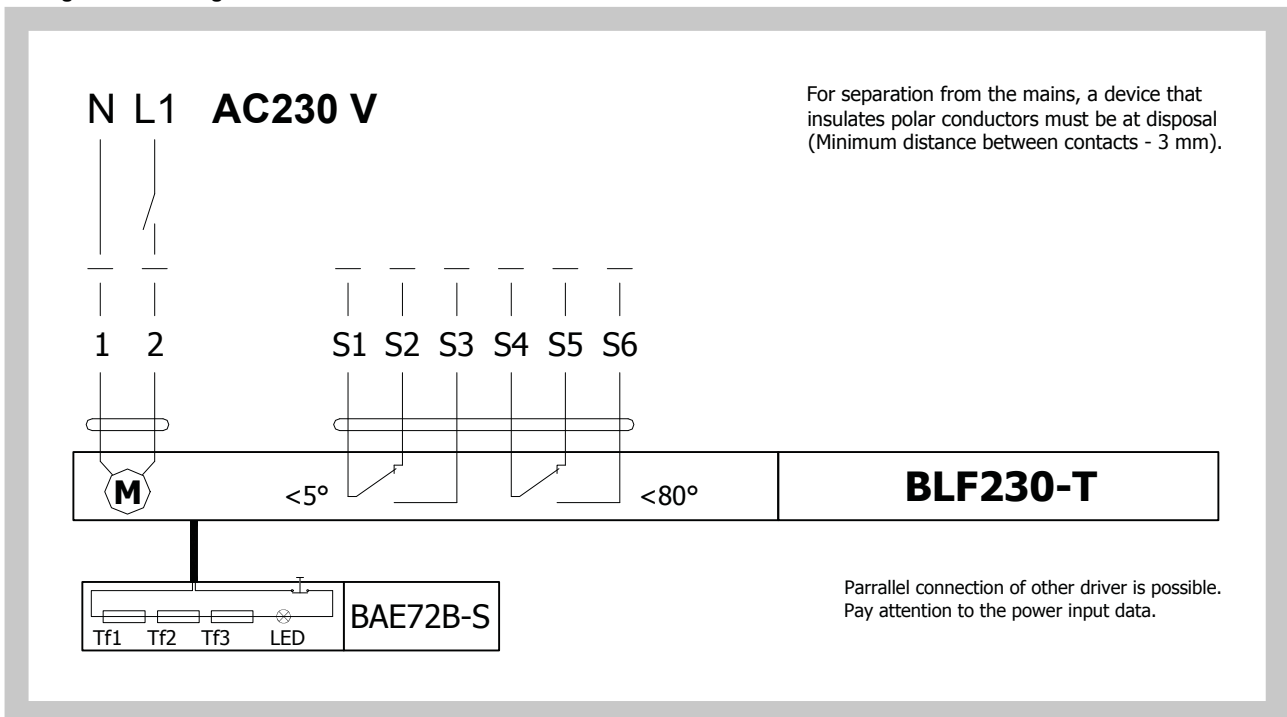


Fig. 9 Actuating mechanism BELIMO BLF 230-T

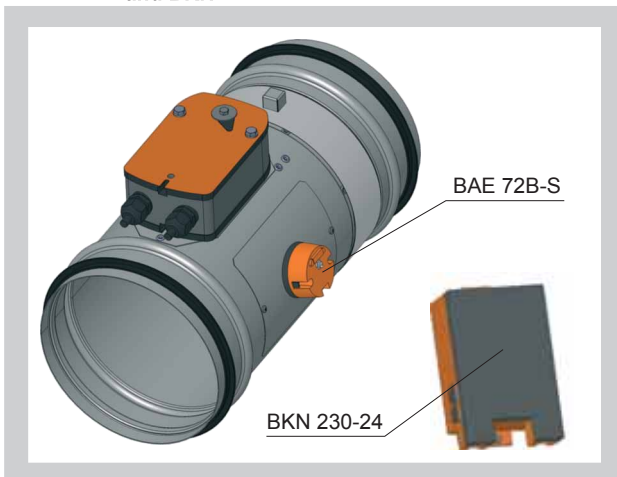


Tab. 2.2.1. Actuating mechanism BELIMO BLF 24-T(-ST), BLF 230-T

Actuating mechanism BELIMO	BLF 24-T-ST(24-ST)	BLF230-T
Nominal voltage	AC 24V 50/60Hz DC 24 V	AC 230 V 50/60Hz
Power consumption - motoring - holding	5 W 2,5 W	5W 3W
Dimensioning	7 VA (Imax 5,8 A @ 5 ms)	7 VA (Imax 150 mA @ 10 ms)
Protection Class	III	II
Degree of protection	IP 54	
Running time - motor - spring return	40..75 s ~ 20 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	
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm ² cable 1 m, 6 x 0,75 mm ² (BLF 24-T-ST) with pole plugs	
Thermal trips	Tf1: duct outside temperature 72°C Tf2/Tf3: duct inside temperature 72°C	

2.3. Design with the communication and supply device

Fig. 10 Fire damper FDMD with actuating mechanism and BKN



Design .60

Design with the communication and supply device BKN 230-24 and the actuating mechanism BLF 24-T-ST. It simplifies electrical wiring and interconnection of fire damper. It facilitates on site check and enables central control and checks of fire damper by means of a simple 2-conductor wiring.

BKN 230-24 functions as a decentralized network device for supplying the actuating mechanism BLF 24-T-ST with a spring back drive on one hand and on the other hand it transmits the signal informing about the fire damper position OPERATION and FAILURE through 2-conductor wiring to the central. Control command SWITCHED ON - SWITCHED OFF from the central through BKN 230-24 goes through the same wiring to the actuating mechanism.

To simplify the connection, the actuating mechanism BLF 24-T-ST is equipped with connecting plugs that are inserted directly to BKN 230-24. BKN 230-24 is supplied with a conductor and an EURO plug to be connected to the 230V mains.

2- conductor wiring is connected to BKN 230-24 by means of terminals 6 and 7.

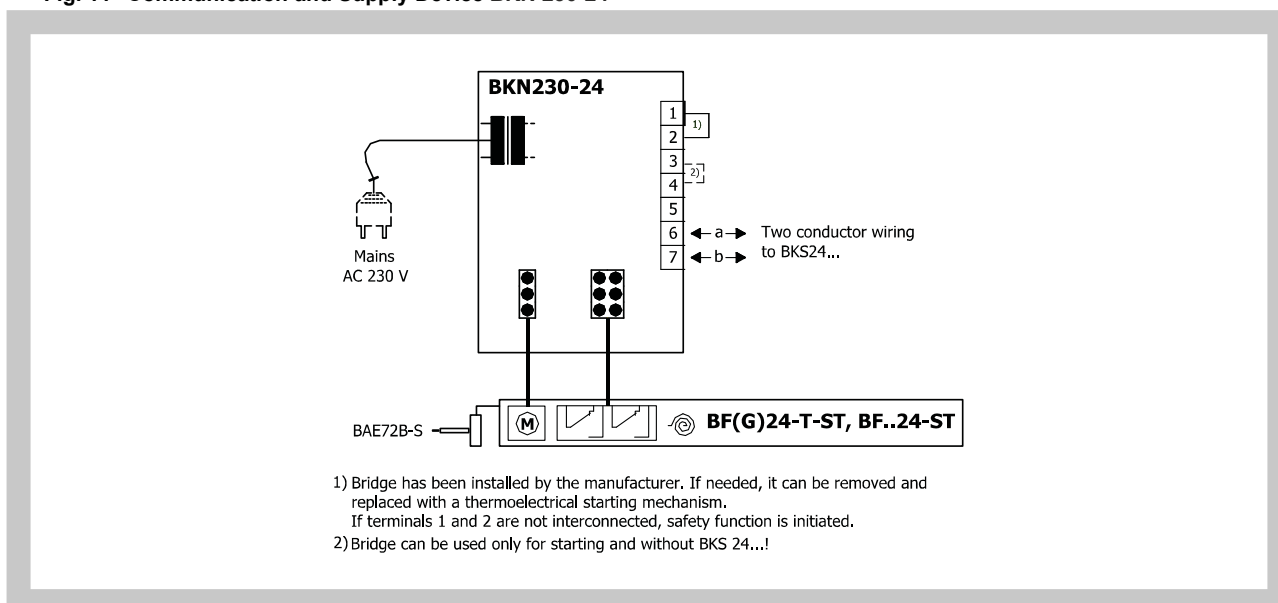
If the drive is supposed to be controlled without any signal from the central, it can be switched on by means of a bridge between the terminals 3 and 4. A green LED pilot light on BKN 230-24 is on when voltage is present in the drive (AC 24V). If the button on BAE 72-S is switched on or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION) is disconnected, the fire damper position will be "FAILURE".

Communication and supply device BKN 230-24 has to be placed near the damper. It is necessary for easy connection of actuating system equipped by BKN 230-24 device.

Tab. 2.3.1. Communication and Supply Device BKN 230-24

Communication and Supply Device	BKN 230-24
Nominal voltage	AC 230V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	11 VA (including actuating mechanism)
Protection Class	II
Degree of protection	IP 42
Ambient Temperature Storage Temperature	- 30 °C ... + 50 °C - 40 °C ... + 50 °C
Connection - mains - drive - terminal board	Cable 0,9 m with EURO plug of 26 type 6 pole plug, 3 pole plug screw terminals for conductor 2x1,5 mm ²

Fig. 11 Communication and Supply Device BKN 230-24



3. Communication and control devices


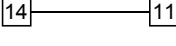
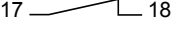
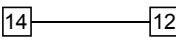

3.1. BKS 24-9A communication and control device is used for group control and checks of 1 to 9 fire dampers with the actuating mechanism BLF 24-T-ST in connection with the supply and communication device BKN 230-24. Signalisation of the damper position is individual; the dampers can be controlled and tested only as a group. BKS 24-9A is intended for use in the distribution board and displays the operation situations and failure reports of the connected fire dampers. It is possible to signalise functions such as the damper position and failure reports or to transmit them further to the system by means of integrated auxiliary switches. BKS 24-9A receives signals from BKN 230-24 through the two-conductor wiring and issues control commands. Proper damper operation is indicated by two light LED diodes:

Control ON = position OPERATION
Control OFF = position FAILURE

If the fire dampers do not reach the given position in time tolerable for displacing, the appropriate light diode FAILURE starts to flash and K1 contact is opened (current failure). In case that the faulty damper finally reaches its given position, K1 is closed and the failure report light shines (the failure is saved in memory).

K2 - the auxiliary contact - is used for signalisation of the flap position to the master device. Function of this auxiliary contact can be programmed through the terminal 14 according to the Tab. 3.1.1.

Tab. 3.1.1. BKS 24 -9A contacts K1 and K2

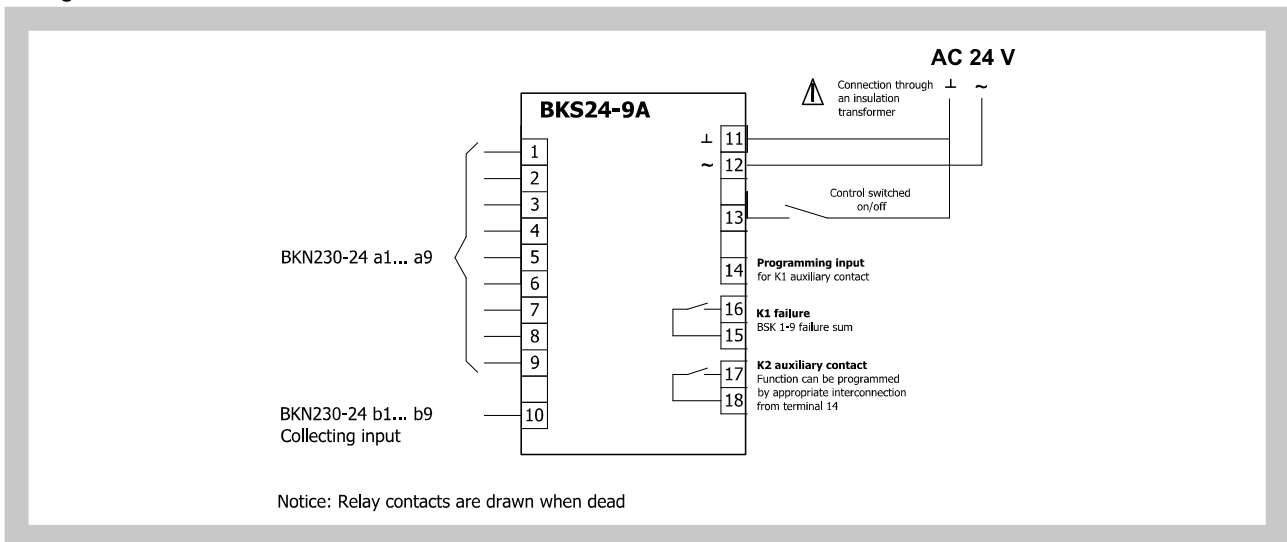
K1 Function Contact		Programming K2 Auxiliary Contact		
Situation	State	Function	Interconnection	State
Current Failure	15  16	K2 contact is on if all the dampers are open	14  11	17  18
		K2 contact is on if the damper No. 1 is open	14  12	
No Failure	15  16	K2 contact is on if all the dampers are closed	14 open	

Function check can be done in the position OPERATION by means of pushing the TEST button. While the button is pushed, the flap blade is turning into the position FAILURE. Fault function is indicated by a report "FAILURE".

Tab. 3.2.1. Communication and Control Device BKS 24-9A

Communication and Control Device	BKS 24-9A
Nominal voltage	AC 24 V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	5,5 VA
Protection Class	III (safe small voltage)
Degree of protection	IP 30
Ambient Temperature	0 ... + 50 °C
Connection	Terminals for conductor 2 x 1,5 mm ²

Fig. 12 Communication and Control Device BKS 24-9A



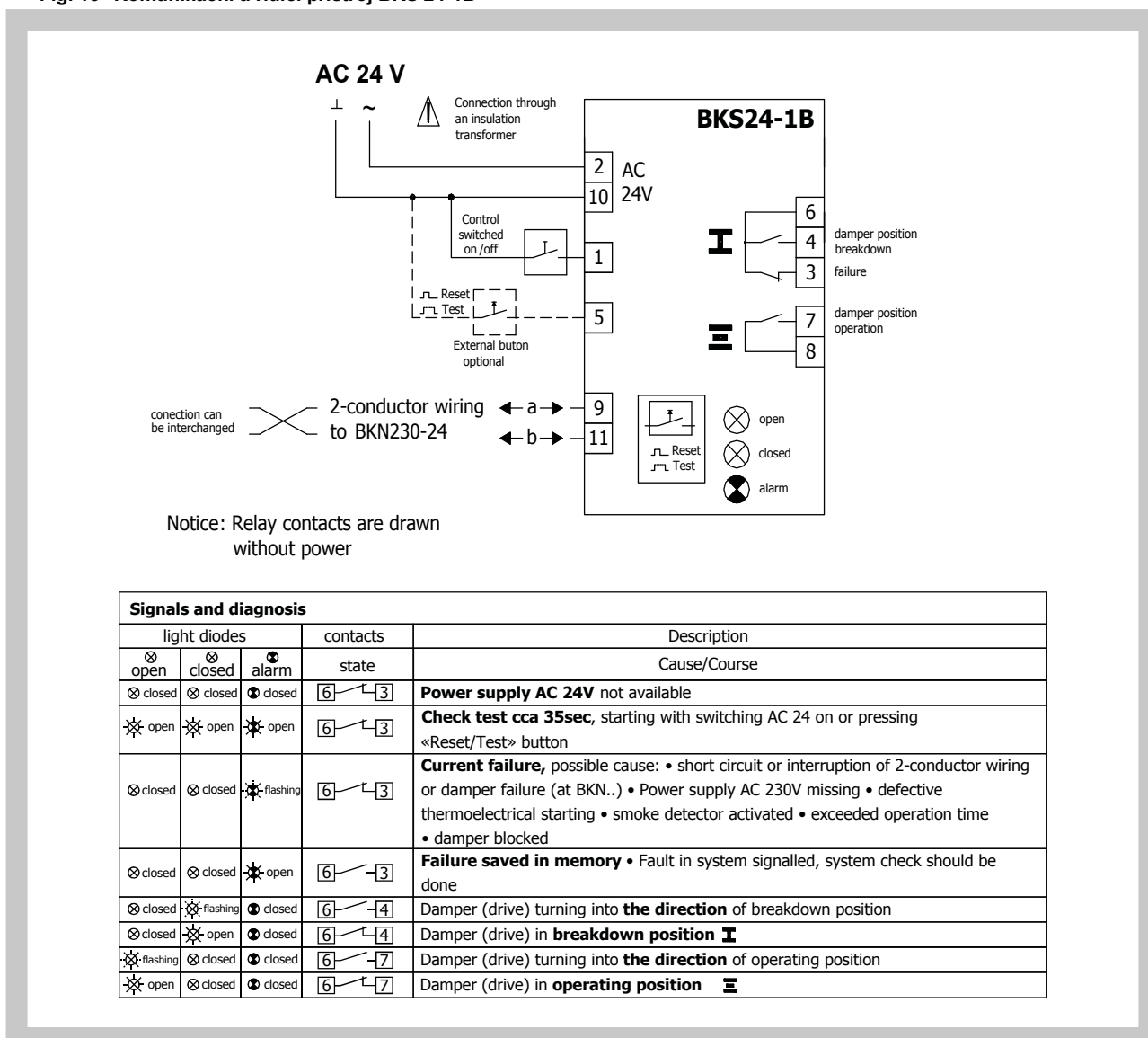
3.2. BKS 24-1B communication and control device is used for control and checks of fire dampers with the BLF 24-T-ST actuating mechanism in conjunction with the BKN 230-24 supply and communication device. BKS 24-1B receives information about the situation of the fire damper through the BKN 230-24 supply and communication device and issues controlling commands. The device is intended for building in into the distribution board. Light diodes on the front side of the device signalise the operating situations of the damper and breakdowns of the whole system. Nonpotential auxiliary contacts enable connection to the master control system (signalisation of the damper position, failure reports, release of the ventilators etc.).

While a flashing green LED pilot light signals flap blade motion towards the given position, the same pilot light reports reaching the required position when shining constantly. If the damper, with respect to the given time, does not reach the required position, then a red LED pilot light starts to flash and at the same time, the failure contact is active. Once the damper blade reaches the given position, this contact is deactivated. The LED pilot light keeps flashing unless the failure is unblocked by means of the RESET button.

Tab. 3.2.1. Communication and Control Device BKS 24-1B

Communication and Control Device	BKS 24-1B
Nominal voltage	AC 24 V 50/60Hz
Power consumption	2,5 W (operating position)
Dimensioning	5 VA
Protection Class	III (safe small voltage)
Degree of protection	IP 30
Ambient Temperature	0 ... + 50 °C
Connection	Into ZSO-11 connector which is not a part of BKS 24-1B. ZSO-11 connector has screw terminals 11 x 1,5 mm ²

Fig. 13 Komunikační a řídicí přístroj BKS 24-1B



4. Dimensions, weights

4.1. Dimensions

Fig. 14 Fire damper FDMD, design .01 - damper with inner mechanical control

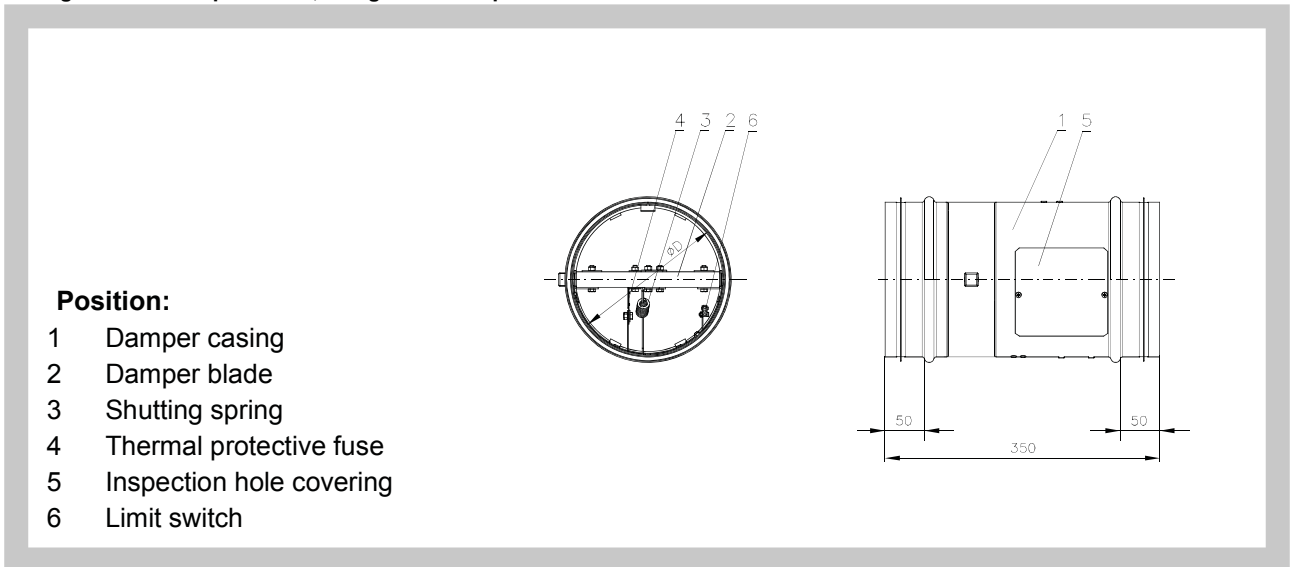


Fig. 15 Fire damper FDMD, design .01v1 - damper with outer mechanical control

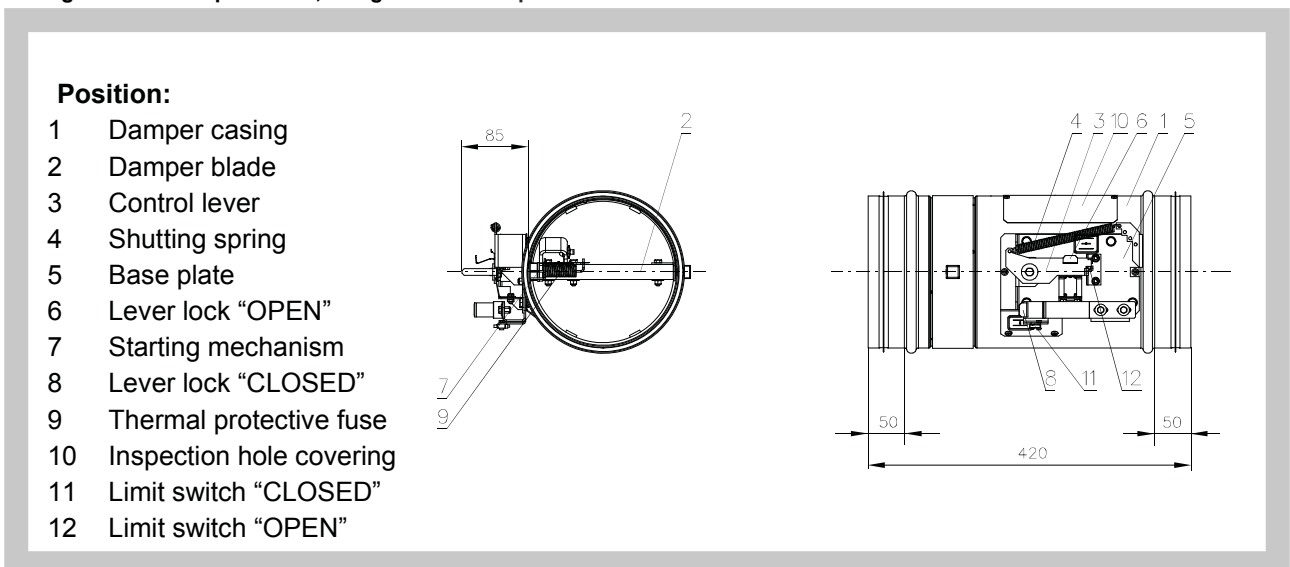


Fig. 16 Fire damper FDMD, design .01v2 - damper with outer mechanical control and mechanical control cover

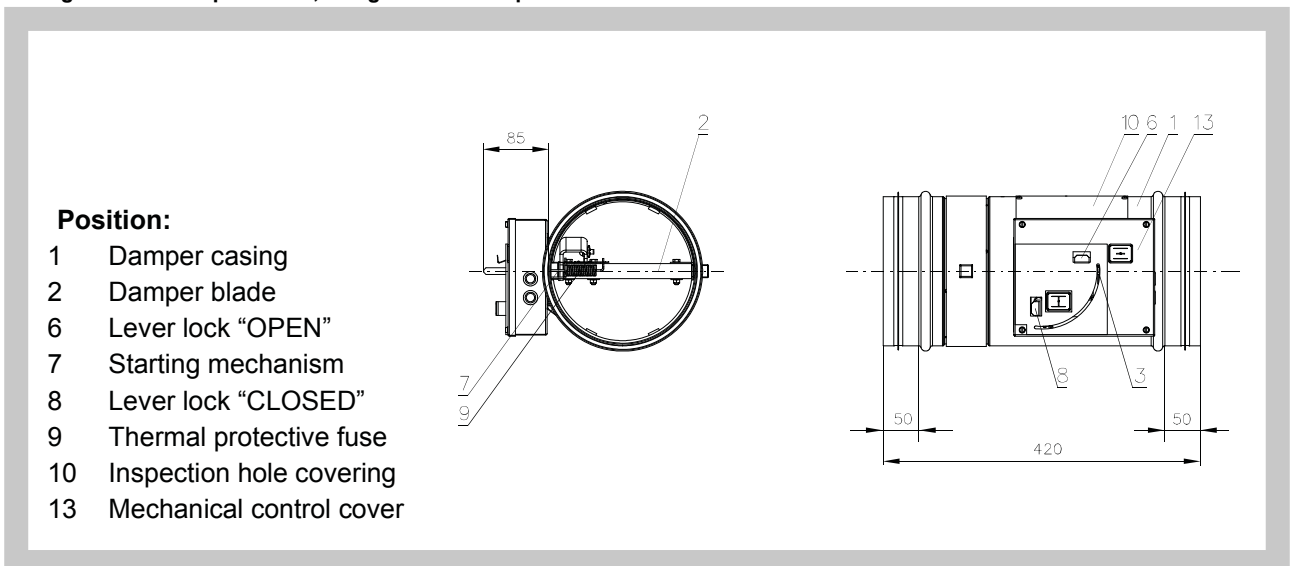
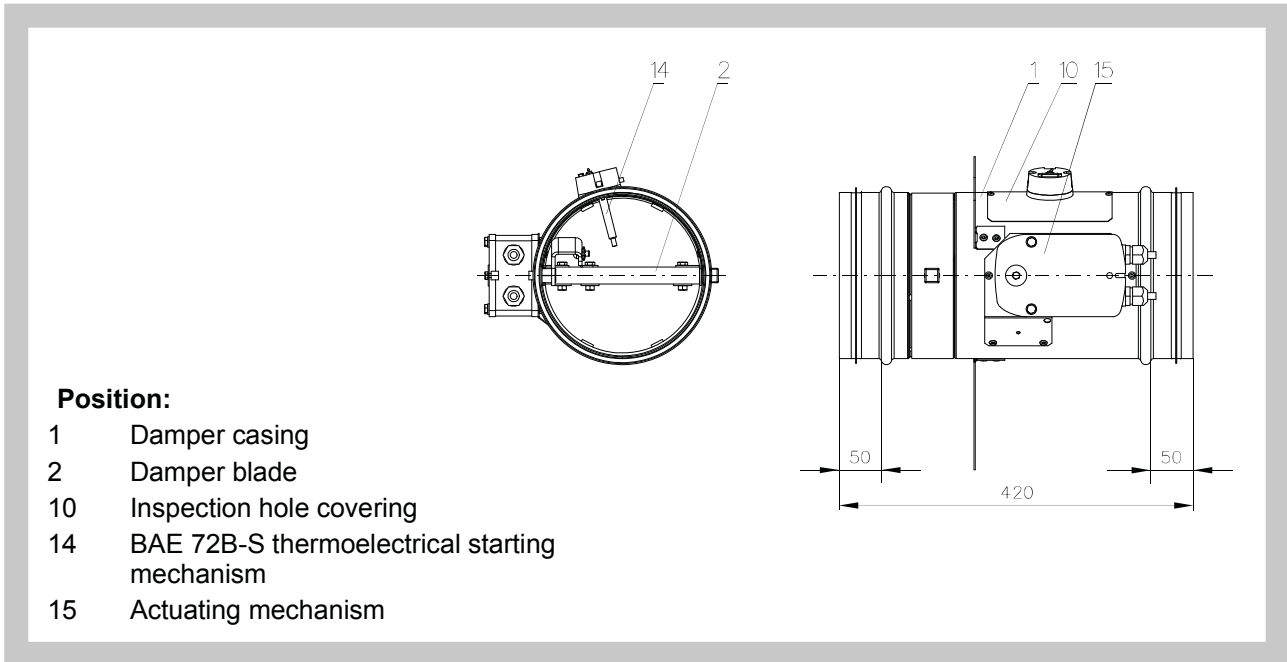
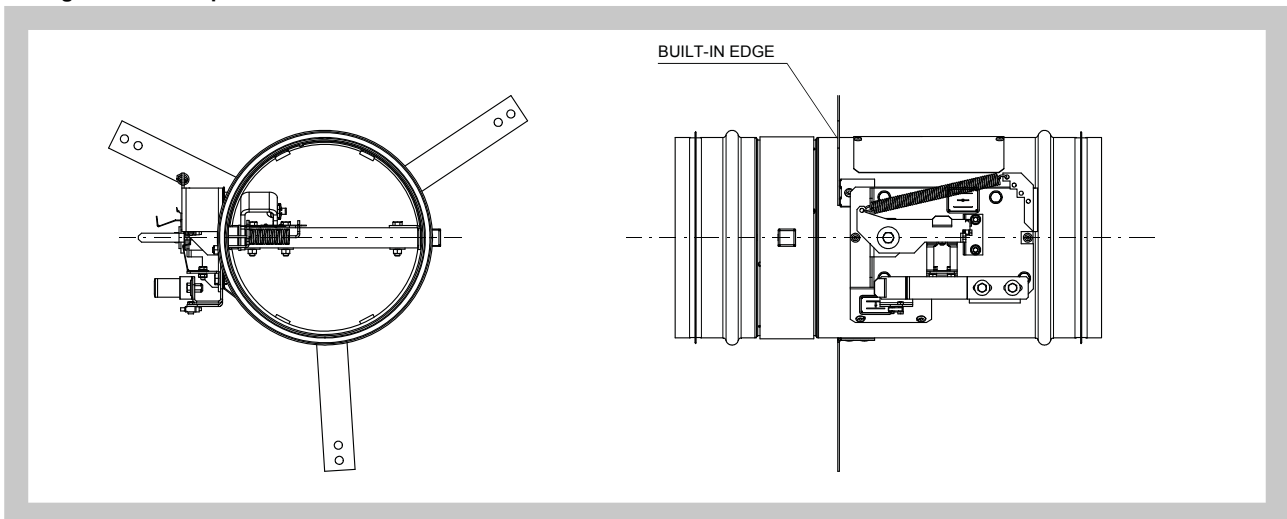


Fig. 17 Fire damper FDMD, design with actuating mechanism



4.2. Optional is possible use installation holders

Fig. 18 Fire damper FDMD - with installation holders



4.3. Weights and effective area

Tab. 4.3.1. Weights and effective area

Size ø D	Weight [kg]		Effective area S_{ef} [m ²]	Actuating mechanism
	Mechanical control	Actuating mechanism		
100	1,2	3,3	0,0032	BLF
125	1,4	3,7	0,0063	BLF
140	1,6	3,9	0,0086	BLF
150	1,7	4	0,0102	BLF
160	1,8	4,1	0,0122	BLF
180	2,1	4,4	0,0164	BLF
200	2,6	4,7	0,0213	BLF

5. Placement and Assembly

5.1. Fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating constructions. Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded. Installation gap must be filled by approved material perfectly in all the installation space volume (installation gap).

To provide needed access space to the control device, all other objects must be situated at least 350 mm from the control parts of the damper. Inspection hole must be accessible.

The distance between the fire damper and the construction (wall, ceiling) must be minimum 75 mm. In case that two or more dampers are supposed to be installed in one fire separating construction, the distance between the adjacent dampers must be at least 200 mm according to EN 1366-2 paragraph 13.5 (see Fig. 6).

The fire damper can be integrated into a solid or gypsum wall construction or into solid ceiling construction. Damper blade has to be inside of construction (labelled with BUILT-IN EDGE on the damper body).

Fig. 19 Installation of two or more dampers in one fire separating construction

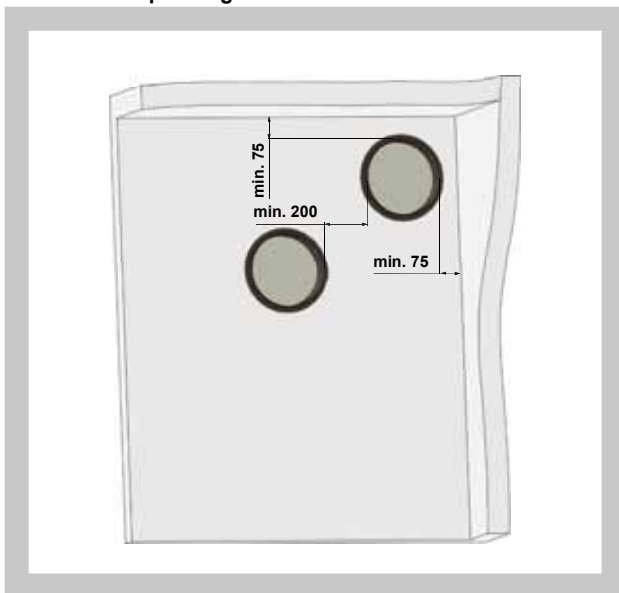


Fig. 20 Built-in edge - design .01

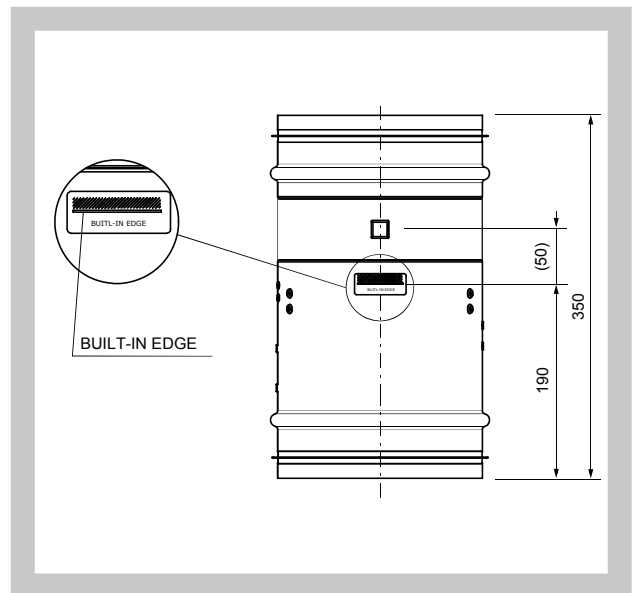
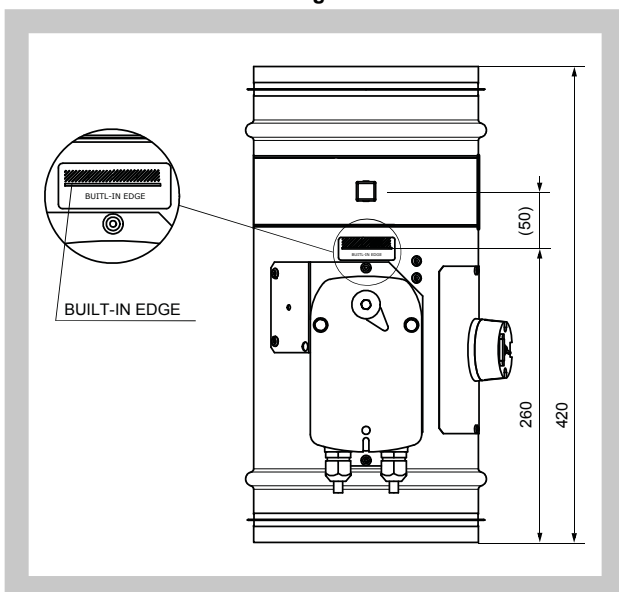


Fig. 21 Built-in edge - design with outer mechanical control or actuating mechanism



5.2. The control mechanism has to be protected (covered) against damage and pollution during installation process. All fire dampers has to be closed during installation process. The damper body should not be deformed in the course of bricking in. Once the damper is built in, its blade should not grind on the damper body during opening or closing.

5.3. Installation opening dimensions (see Fig. 23-24)

Fig. 22 nstallation opening

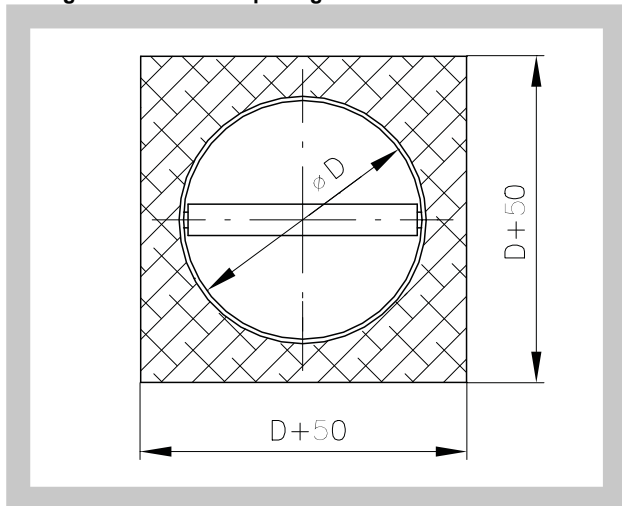


Fig. 23 nstallation opening

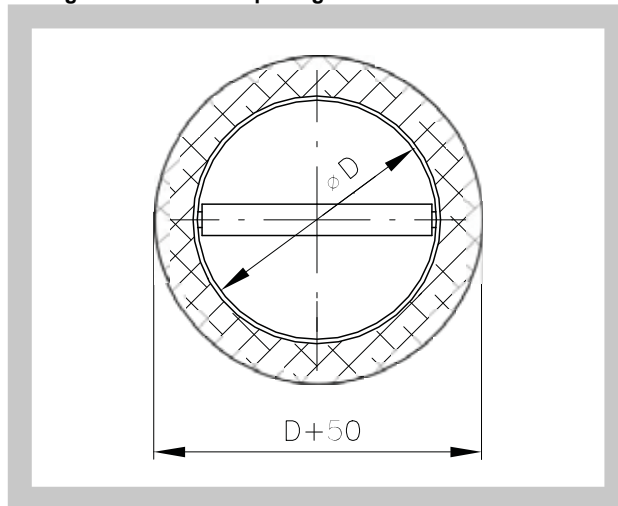
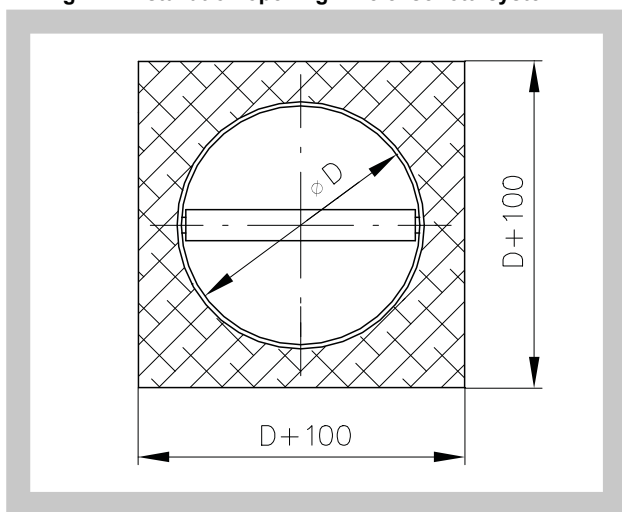


Fig. 24 Installation opening - Weichschott system



6. Statement of installations

6.1. Statement of installations

Tab. 6.1.1. Statement of installations

Size	FDMD installation	Classification	Figure
100-200	Damper installed in a solid wall construction min. thickness 100 mm. Space between damper and wall is filled by mortar or gypsum (notice 1)	EIS 120 EIS 90	25
	Damper installed in a solid wall construction min. thickness 100 mm. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m ³). Surface is covered by fire protection mastic min. thickness 1 mm (notice 1)	EIS 90	26
	Damper installed in a solid wall construction min. thickness 100 mm. Space between damper and wall is filled by system Weichshott (notice 1)	EIS 90	27
	Damper installed in a gypsum wall construction min. thickness 100 mm. Space between damper and wall is filled by mortar or gypsum (notice 3)	EIS 120 EIS 90	28
	Damper installed in a gypsum wall construction min. thickness 100 mm. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m ³). Surface is covered by fire protection mastic min. thickness 1 mm (notice 3)	EIS 90	29
	Damper installed in a gypsum wall construction min. thickness 100 mm. Space between damper and wall is filled by system Weichshott (notice 3)	EIS 90	30
	Damper installed in a solid ceiling construction min. thickness 100 mm. Space between damper and wall is filled by mortar or gypsum (notice 2)	EIS 120 EIS 90	31
	Damper installed in a solid ceiling construction min. thickness 100 mm. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m ³). Surface is covered by fire protection mastic min. thickness 1 mm (notice 2)	EIS 90	32
	Damper installed in a solid ceiling construction min. thickness 100 mm. Space between damper and wall is filled by system Weichshott (notice 2)	EIS 90	33
	Damper installed in a solid wall construction min. thickness 100 mm, in a gypsum wall construction min. thickness 100 mm or solid ceiling construction min. thickness 150 mm. For installation is used installation frame D1 or D2.	EIS 90	34
	Damper installed in a solid wall construction min. thickness 100 mm, in a gypsum wall construction min. thickness 100 mm or solid ceiling construction min. thickness 150 mm. For installation is used installation frame D3 or D4.	EIS 90	35
	Damper installed on a solid wall construction min. thickness 100 mm or on a solid ceiling construction min. thickness 150 mm. For installation is used installation frame D5.	EIS 90	36
	Damper installed outside a solid wall construction min. thickness 100 mm or outside a solid ceiling construction min. thickness 150 mm. For installation is used installation frame D6 and calciumsilkat boards.	EIS 90	37
	Damper installed outside a solid ceiling construction min. Thickness 150 mm. For installation is used concrete.	EIS 90	38
	Dampers installed on a solid wall construction min. thickness 100 mm. Dampers are placed in battery and space between dampers and wall is filled by mortar or gypsum.	EIS 90	39
	Dampers installed in a gypsum wall construction min. thickness 100 mm. Dampers are placed in battery and space between dampers and wall is filled by mortar or gypsum.	EIS 90	40

NOTICE:

- 1) Solid wall construction: normal concrete/masonry or porous concrete with minimum thickness 100 mm
- 2) Solid ceiling construction: normal concrete/masonry or porous concrete with minimum thickness 150 mm
- 3) Installation in gypsum wall construction: Installation opening has to be reinforced around the perimeter by standard profile used for gypsum wall constructions.

6.2. Conventional methods of fire dampers installation

Fig. 25 Installation in a solid wall construction

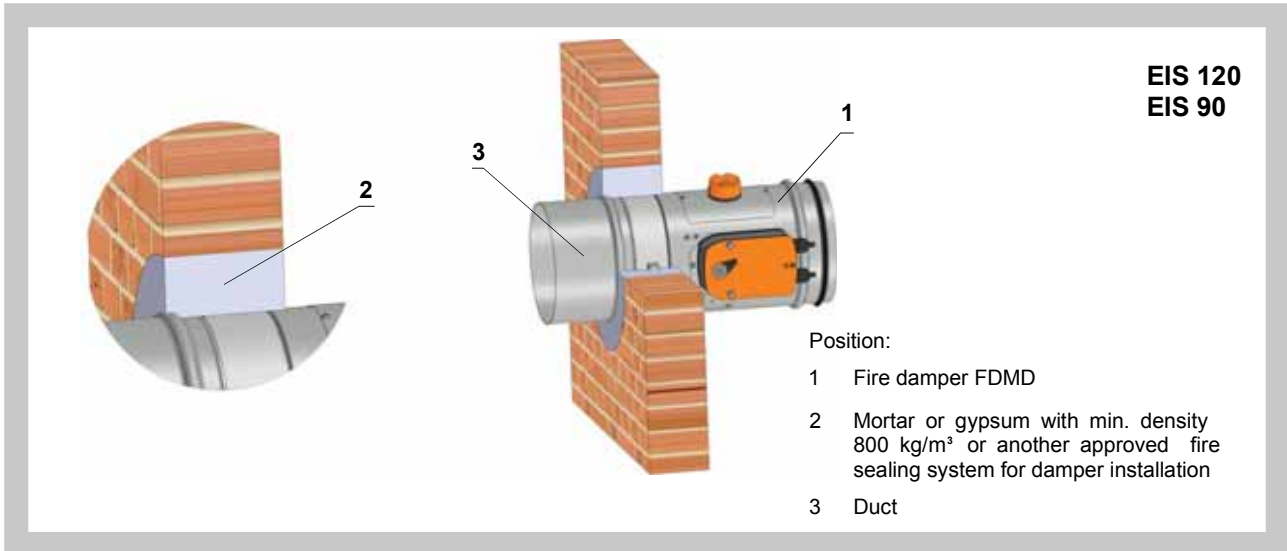


Fig. 26 Installation in a solid wall construction

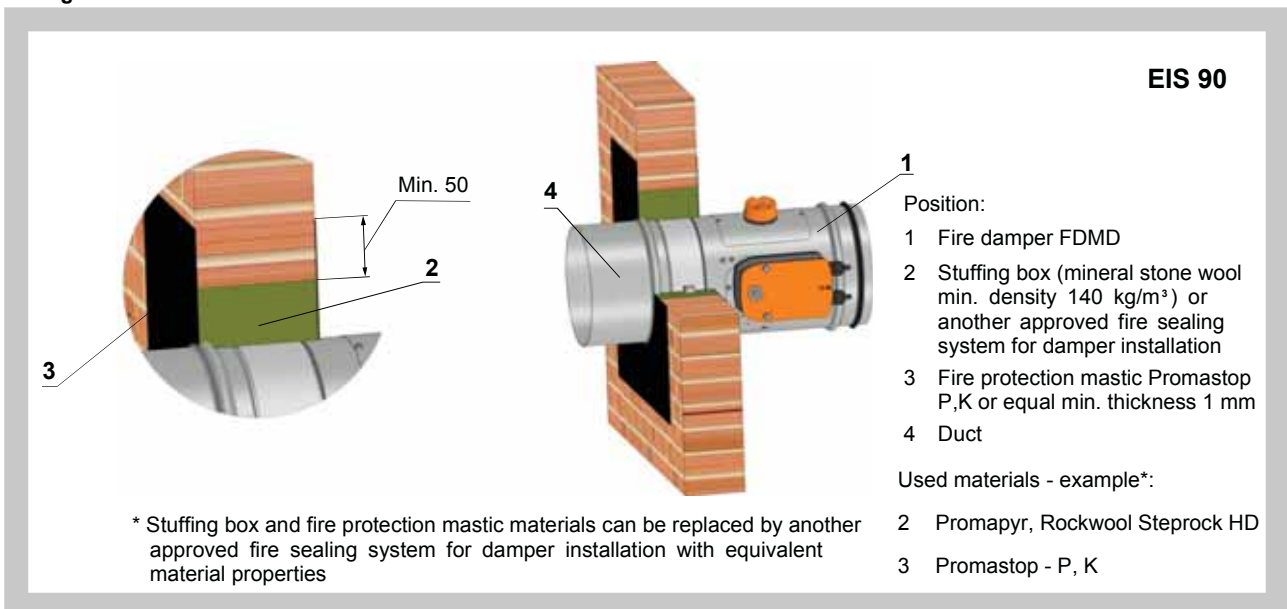


Fig. 27 Installation in a solid wall construction

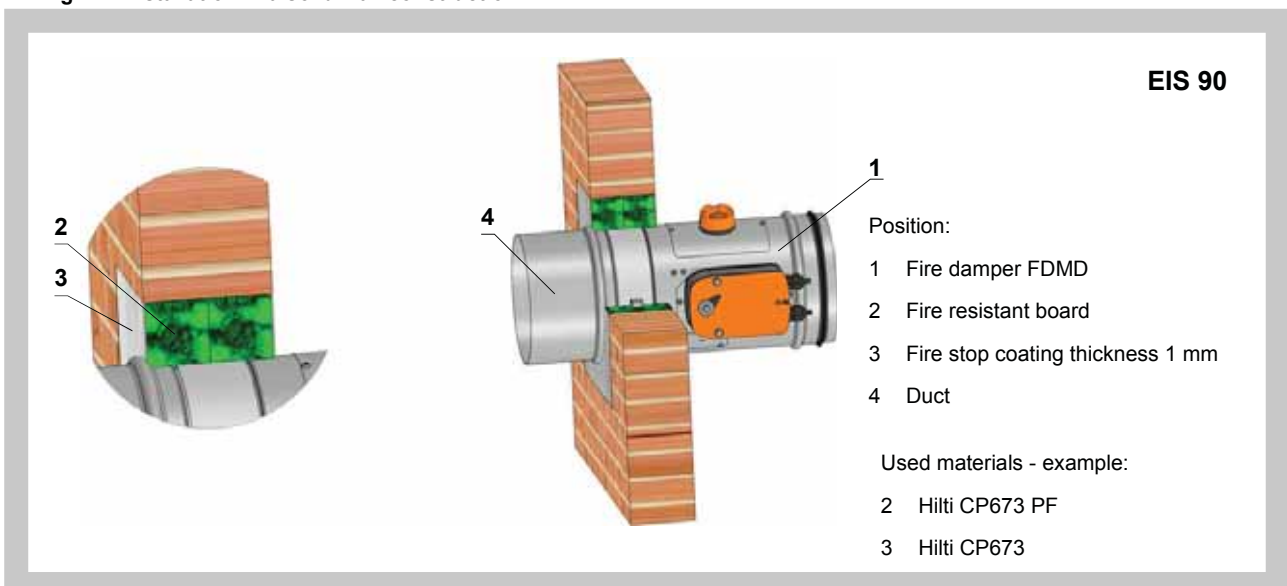


Fig. 28 Installation in a gypsum wall construction

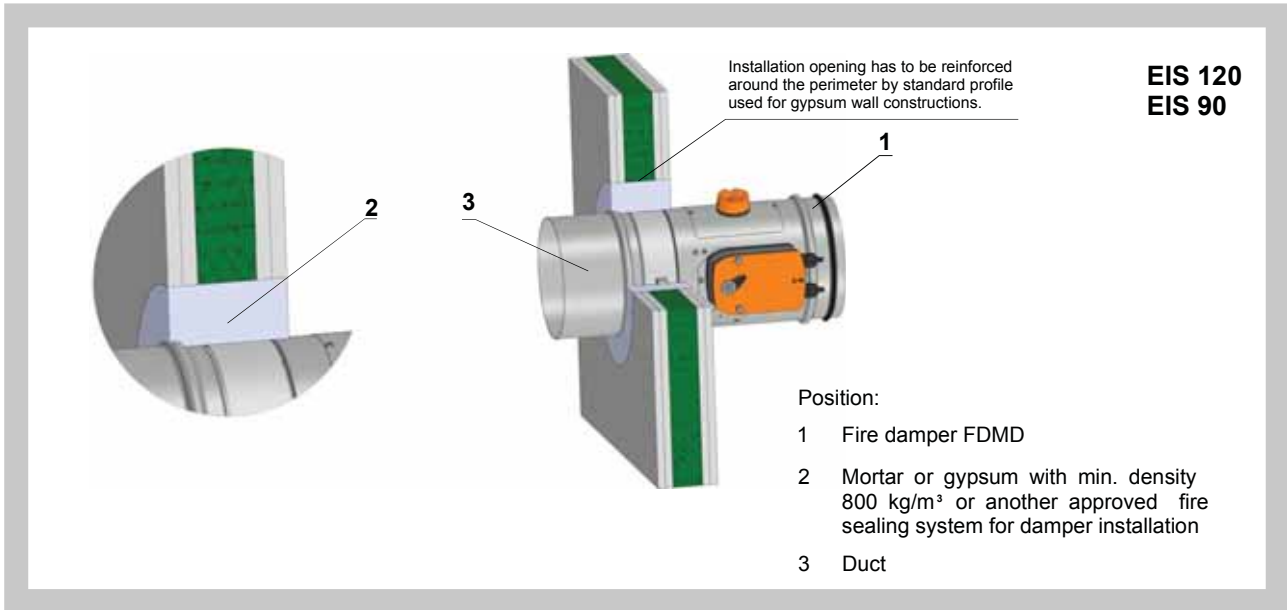


Fig. 29 Installation in a gypsum wall construction

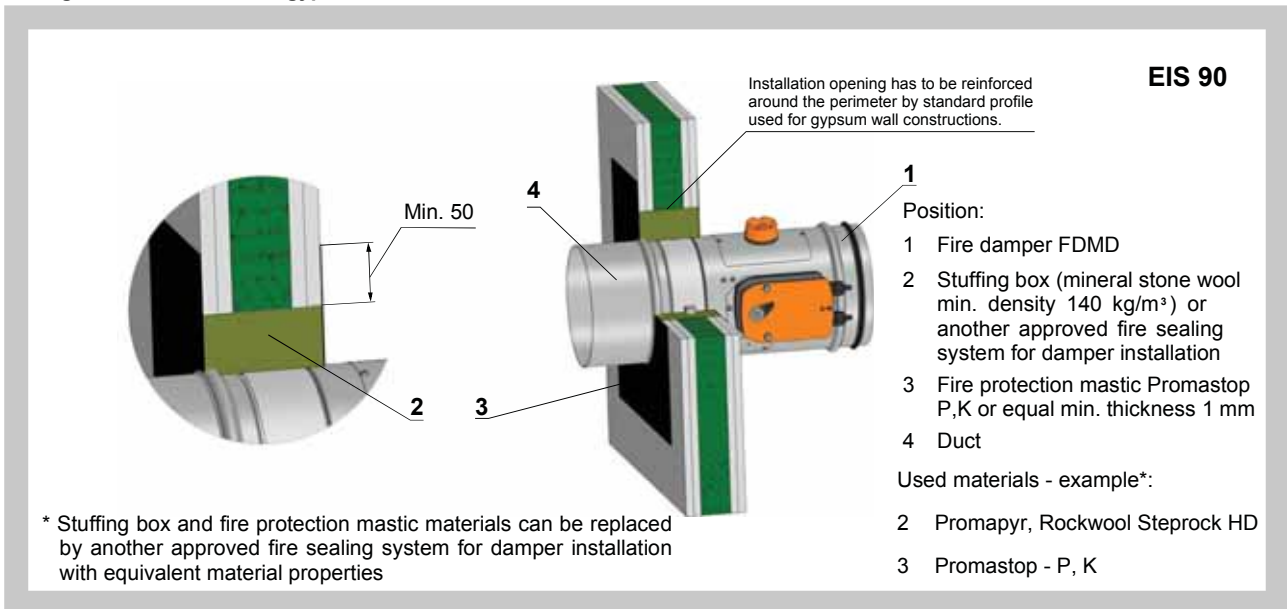


Fig. 30 Installation in a gypsum wall construction

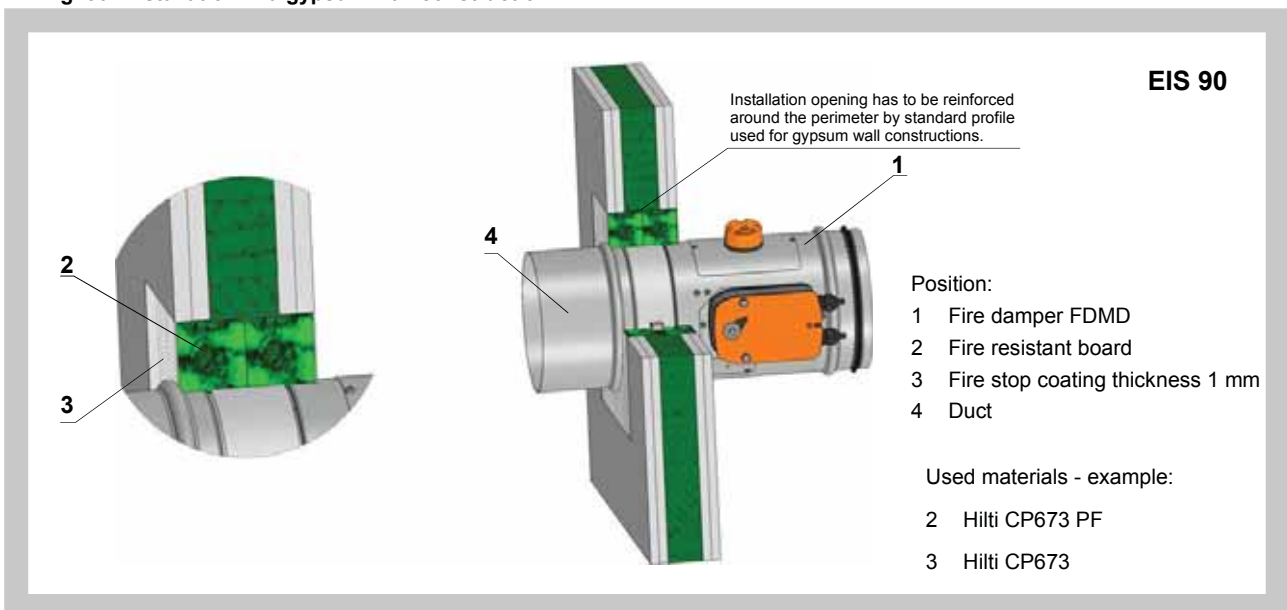


Fig. 31 Installation in a solid ceiling construction

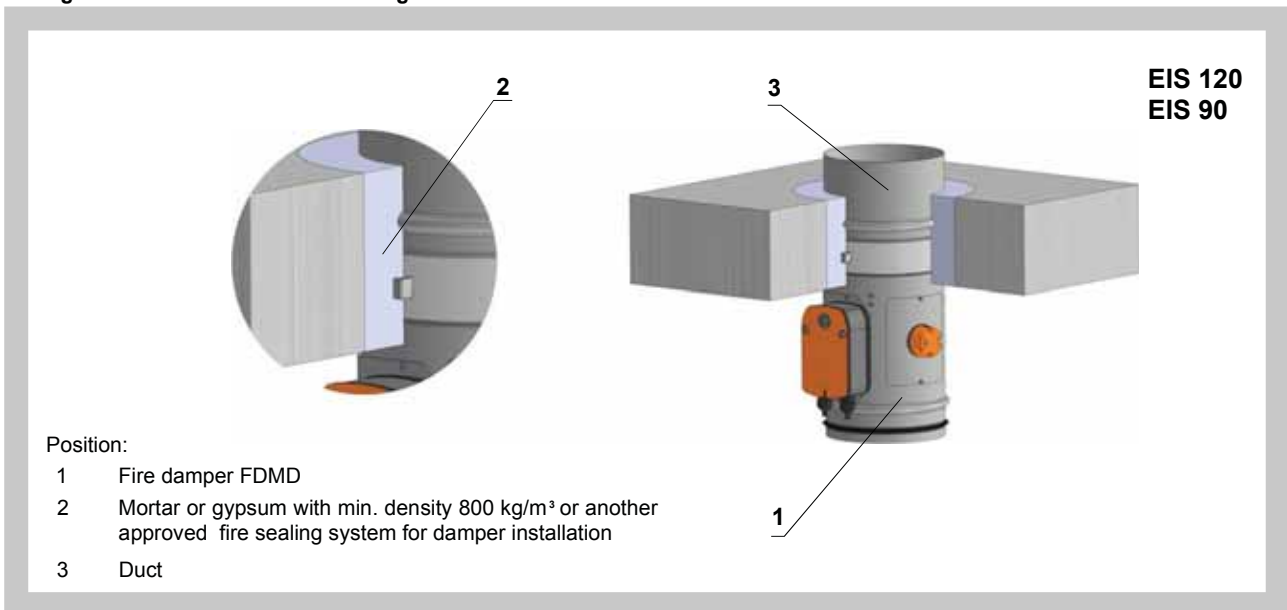


Fig. 32 Installation in a solid ceiling construction

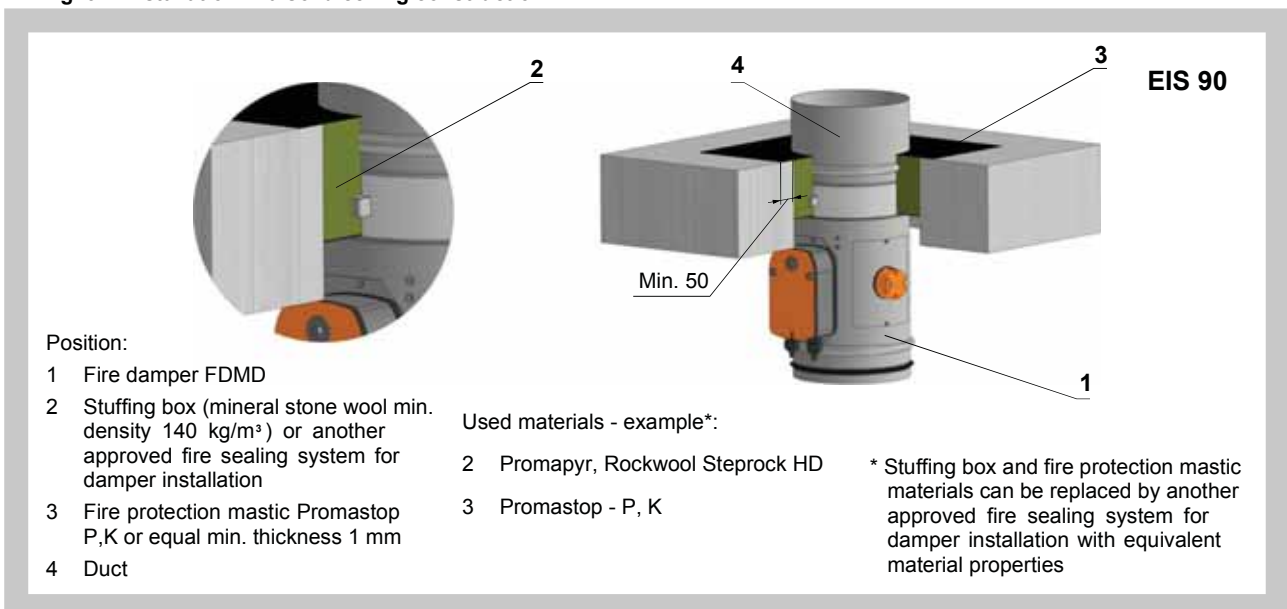
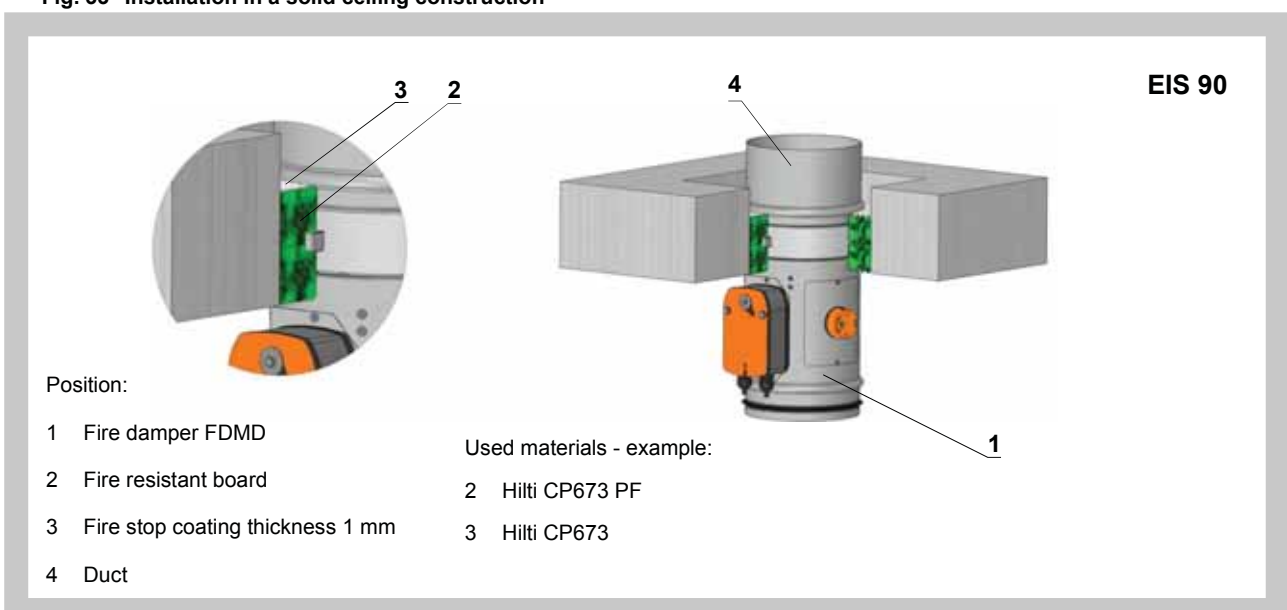


Fig. 33 Installation in a solid ceiling construction



6.3. Fire dampers installation by using installation frames

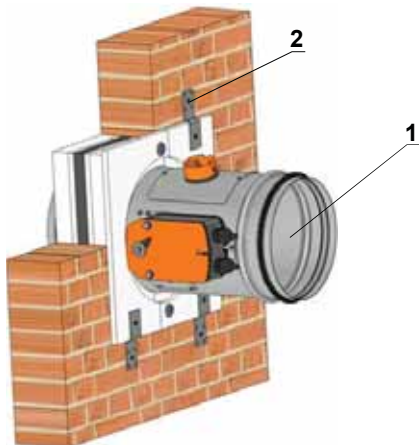
Fig. 34 Installation frame D1, D2

Installation opening:

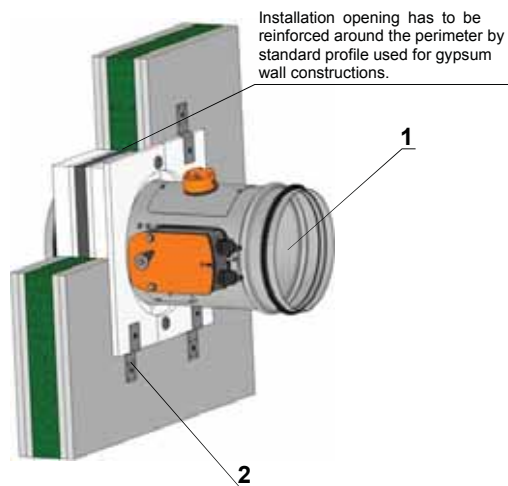
EIS 90

$$a \times b = (D + 97^{+3} \text{mm}) \times (D + 97^{+3} \text{mm})$$

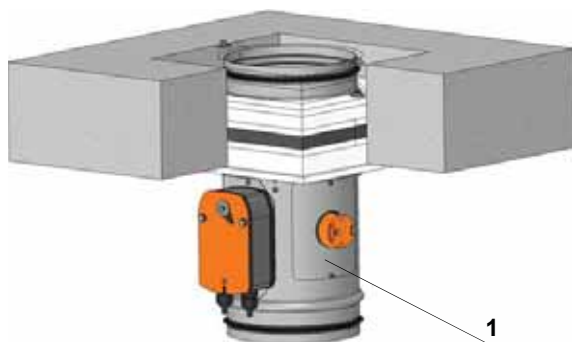
Solid wall construction



Gypsum wall construction



Solid ceiling construction



Position:

- 1 Damper with installation frame D1 or D2
- 2 Holder

Notice: Gap between fire damper body and installation frame and between installation frame and fire separating construction is filled by glue PROMAT K84.
Suspension of fire dampers has to be ensured accordingly chapter 7

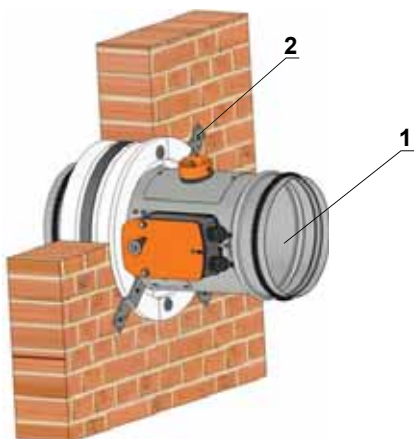
Fig. 35 Installation frame D3, D4

Installation opening:

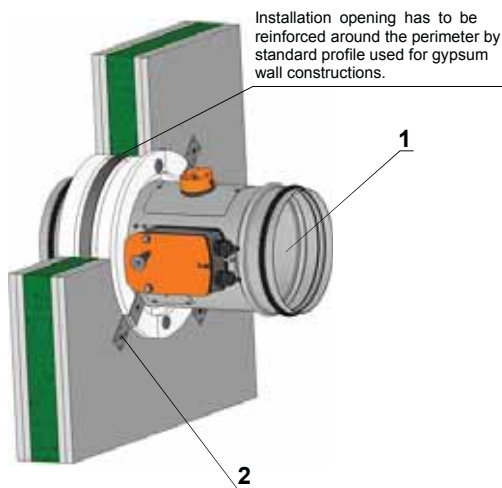
$$d = (D + 81^{+3} \text{ mm})$$

EIS 90

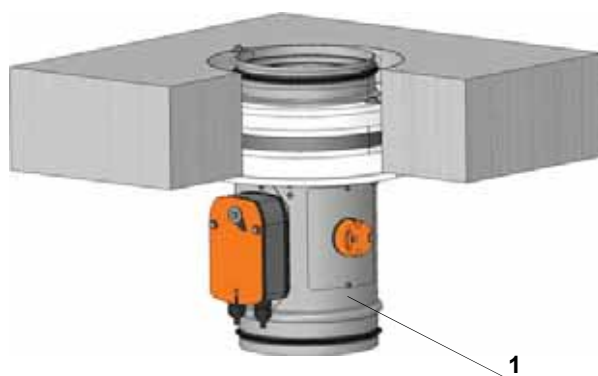
Solid wall construction



Gypsum wall construction



Solid ceiling construction



Position:

- 1 Damper with installation frame D3 or D4
- 2 Holder

Notice: Gap between fire damper body and installation frame and between installation frame and fire separating construction is filled by glue PROMAT K84.
Suspension of fire dampers has to be ensured accordingly chapter 7

Fig. 36 Installation frame D5

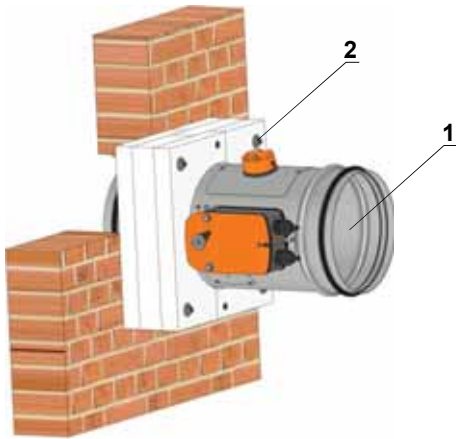
Installation opening:

EIS 90

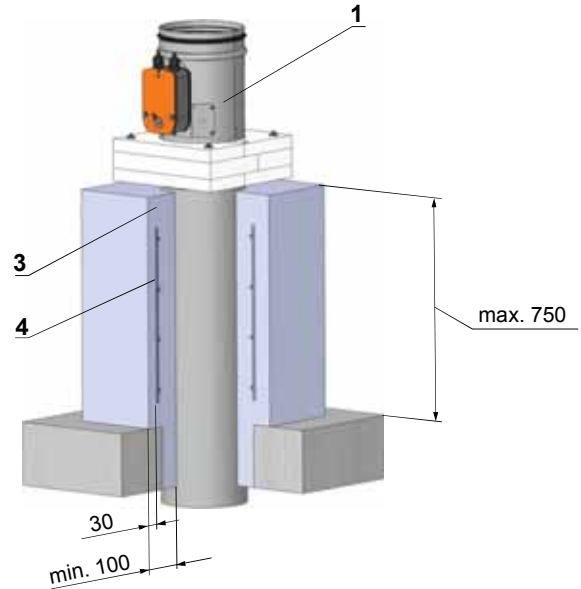
$d = (D + 10^{+3} \text{mm})$

$d = (D + 100^{+3} \text{mm})$ in the case of installation with using of concrete

Solid wall construction

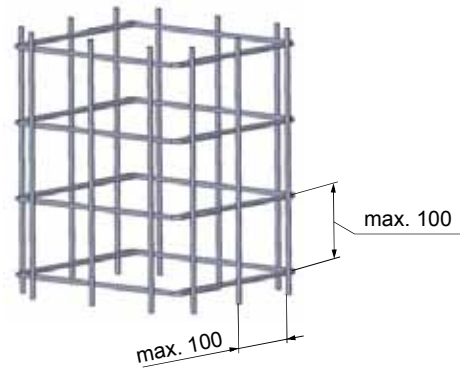
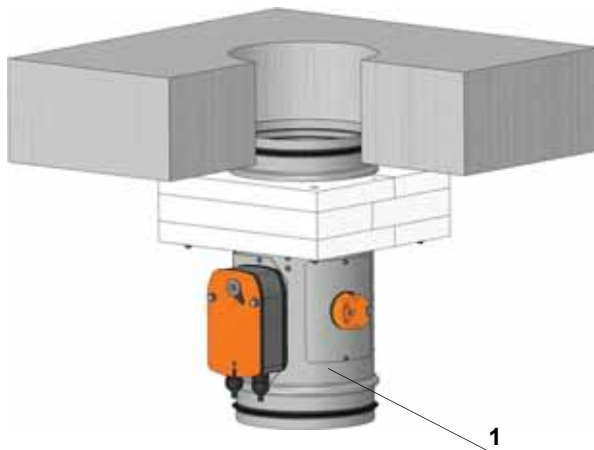


Installation with using of concrete



Armouring - steel rib Ø 6 mm

Solid ceiling construction



Position:

- 1 Damper with installation frame D3
- 2 Threaded rod trough fire separating construction or mounting by using of steel anchors

Notice: Suspension of fire dampers has to be ensured accordingly chapter 7

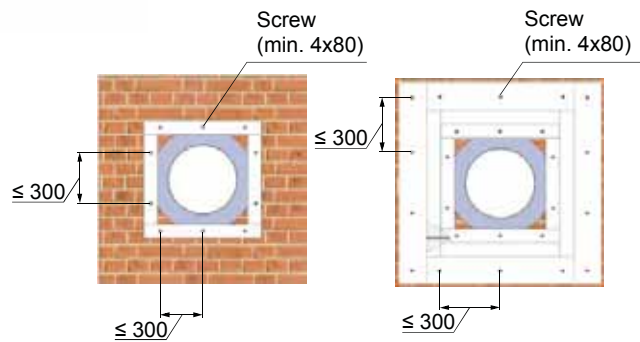
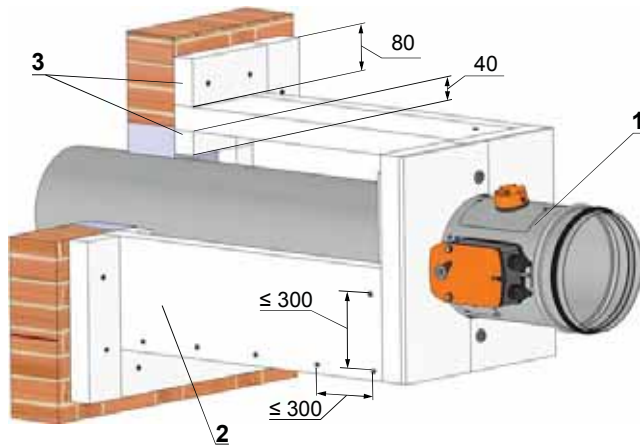
Fig. 37 Installation frame D6

Installation opening:

EIS 90

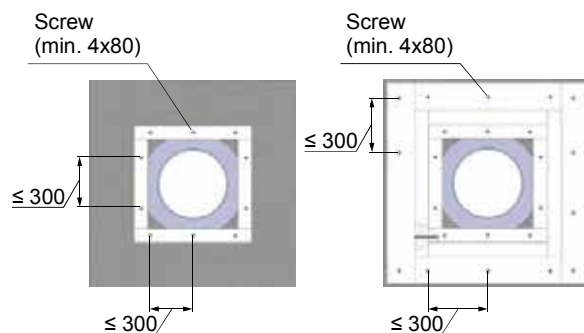
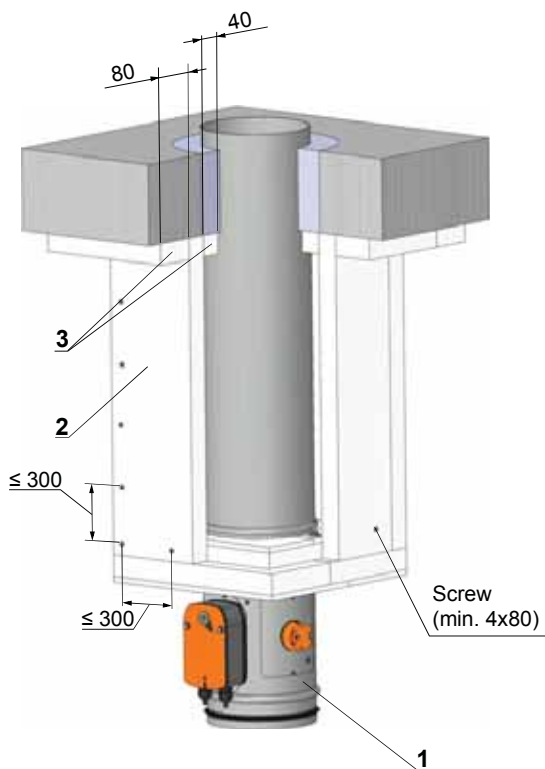
$$d = (D + 100^{+3}mm)$$

Solid wall construction



Screws has to be firmly fixed in wall/ceiling construction. (If it is necessary use steel anchors).

Solid ceiling construction



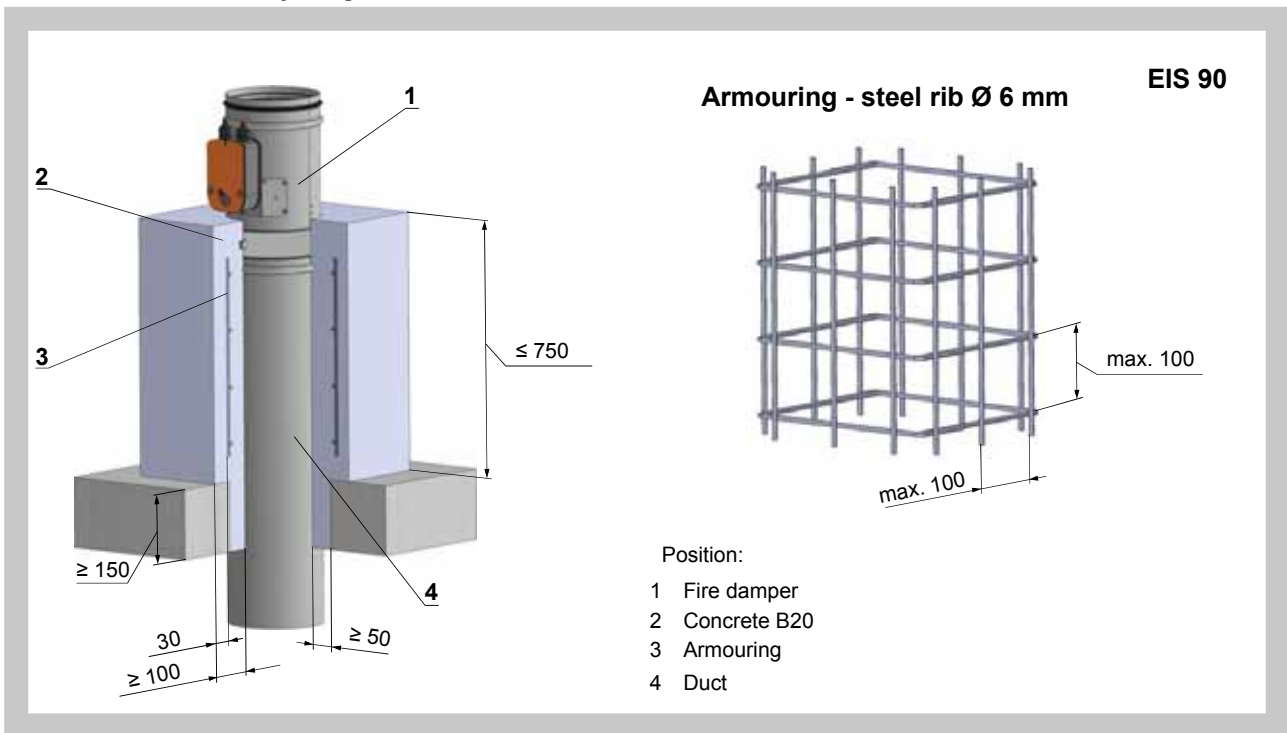
Position:

- 1 Fire damper with installation frame D6
- 2 Insulation made of kalciomsilkat boards min. density 450 kg/m³. Thickness 40 mm
- 3 Casing frames made of kalciomsilkat boards min. density 450 kg/m³. Thickness 40 mm

Notice: All items are glued by PROMAT K84 and secured by screws. Suspension of fire dampers has to be ensured accordingly chapter 7

6.4. Instalation by using of concrete.

Abb. 38 Instalation by using of concrete



6.5. Battery installation

Fig. 39 Battery installation - solid wall construction

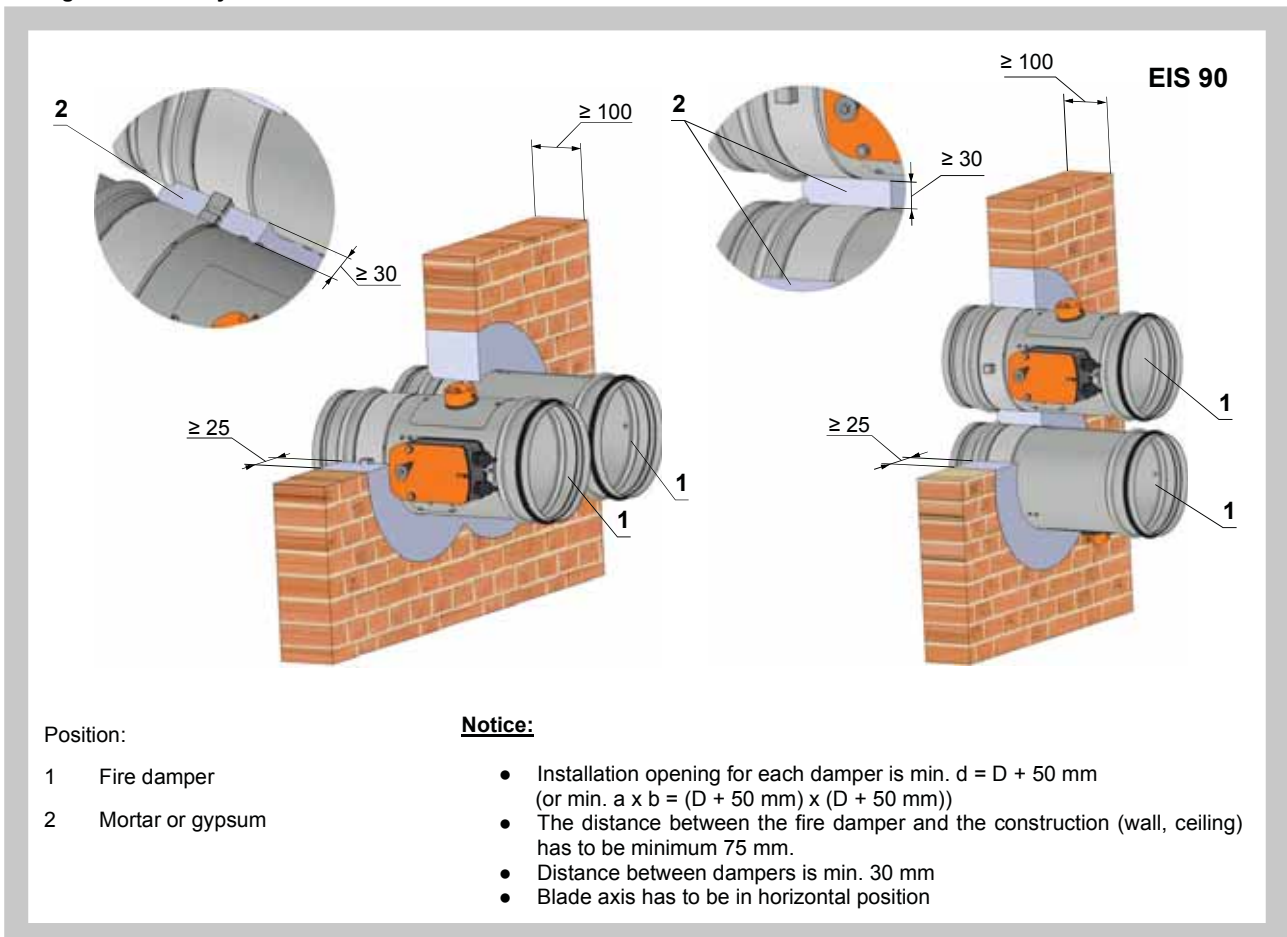
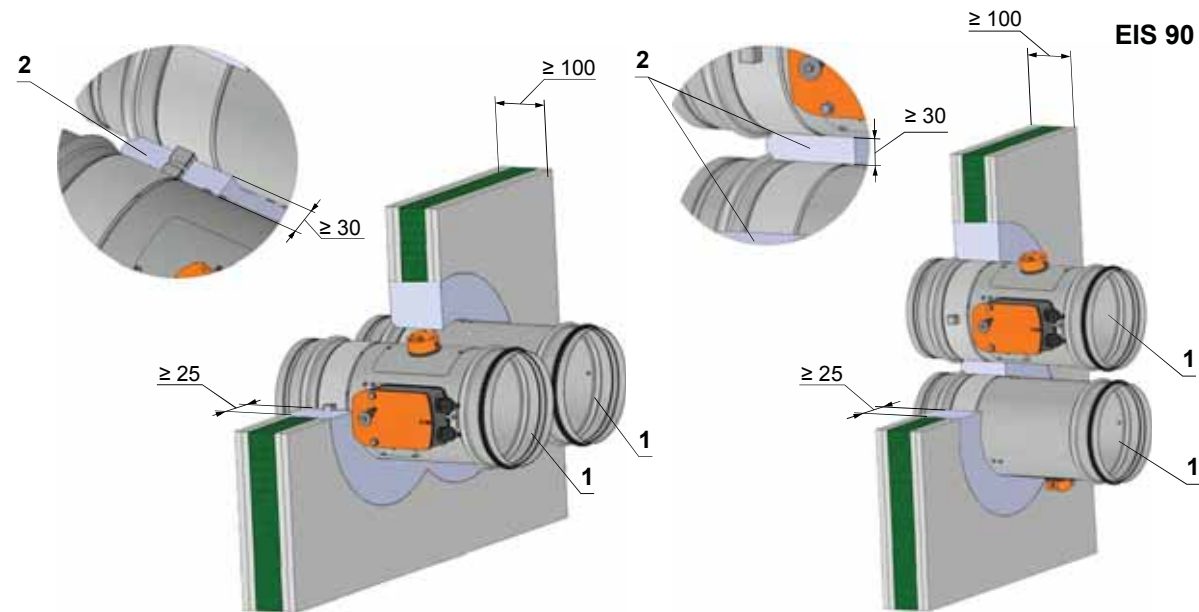


Fig. 40 Battery installation - gypsum wall construction



Position:

- 1 Fire damper
- 2 Mortar or gypsum

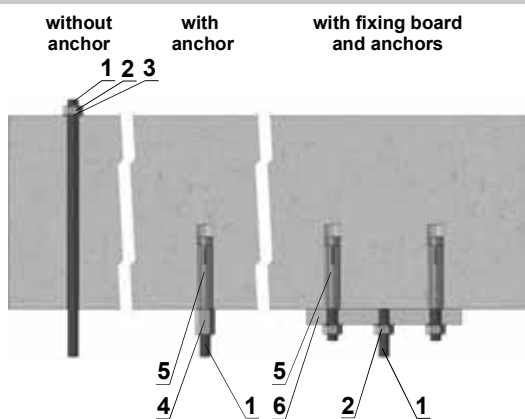
Notice:

- Installation opening for each damper is min. $d = D + 50$ mm (or min. $a \times b = (D + 50 \text{ mm}) \times (D + 50 \text{ mm})$)
- The distance between the fire damper and the construction (wall, ceiling) has to be minimum 75 mm.
- Distance between dampers is min. 30 mm
- Blade axis has to be in horizontal position

7. Suspension of fire dampers

7.1. Fixation to the ceiling

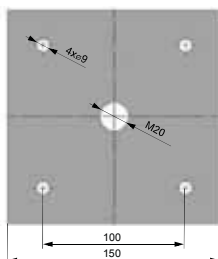
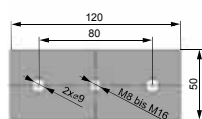
Fig. 41 Fixation to the ceiling



Permitted load of threaded rods F [N] by requested fire resistance 90 minutes

Size	A _s [mm ²]	Weight G [kg]	
		for 1 pcs.	for 1 couple
M8	36,6	22	44
M10	58,0	35	70
M12	84,3	52	104
M14	115	70	140
M16	157	96	192
M18	192	117	234
M20	245	150	300

Fixing boards



Position:

- 1 Threaded rod M8 – M20
- 2 Nut
- 3 Washer
- 4 Connecting nut
- 5 Anchor
- 6 Fixing board - min. thickness 10 mm

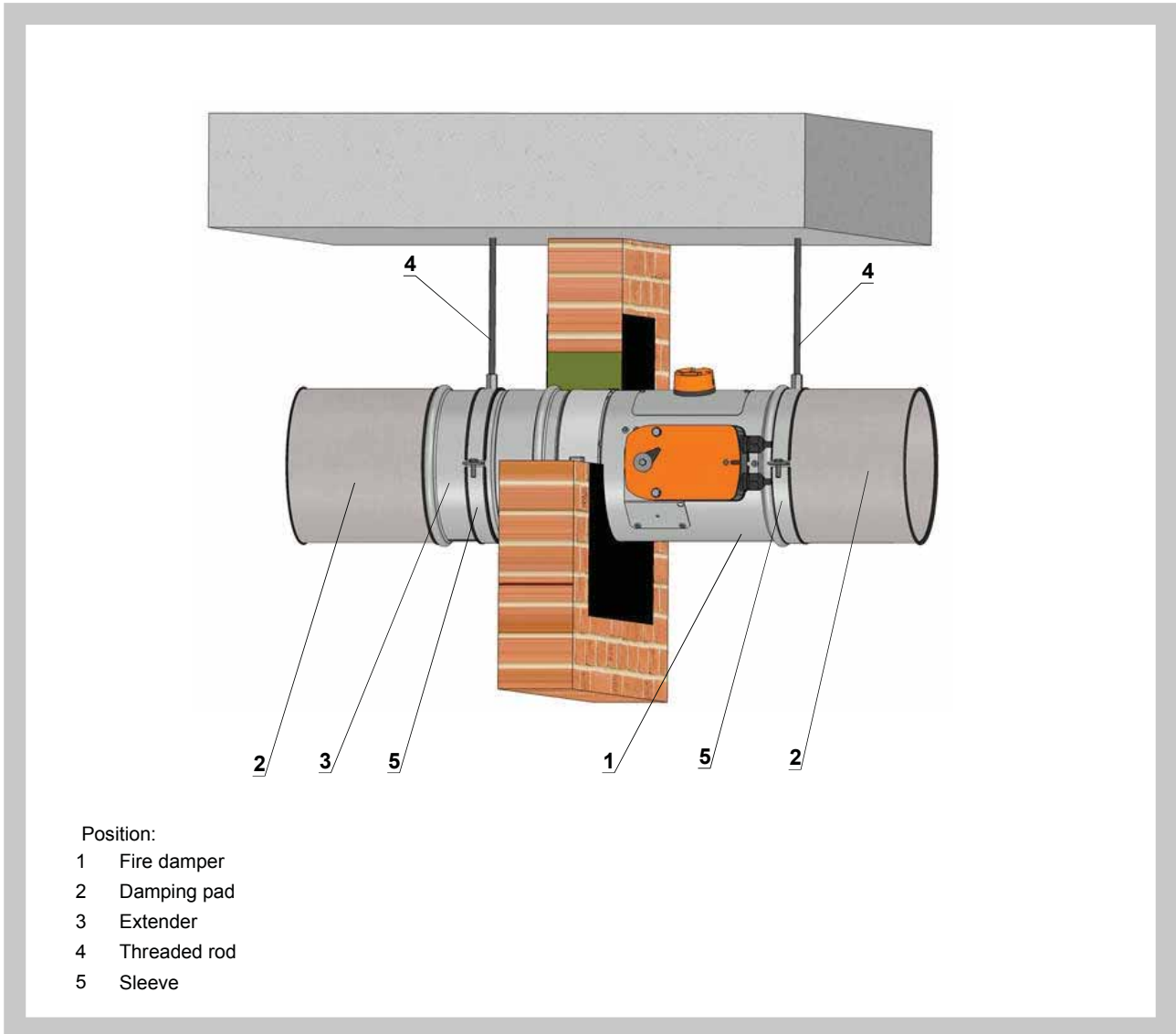
7.2. Horizontal installation

Damper suspension could be made by using of threaded rods and fixing rails. Its dimensioning depend on weight of damper.

Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

Threaded rods longer than 1,5 m has to be protected by fire resistant insulation.

Fig. 42 Suspension example - horizontal duct



7.3. Vertical installation

Damper suspension could be made by using of threaded rods and fixing rails. Its dimensioning depend on weight of damper.

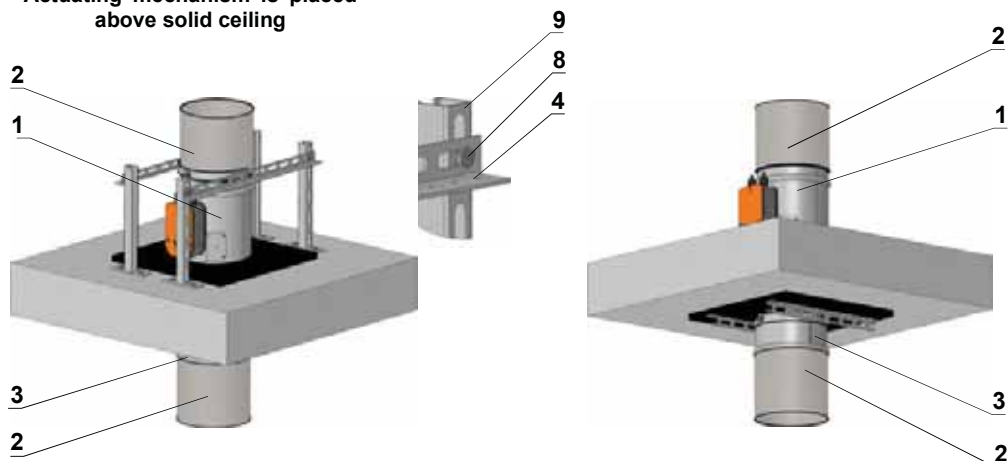
Damper suspension could be placed under or above solid ceiling.

Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

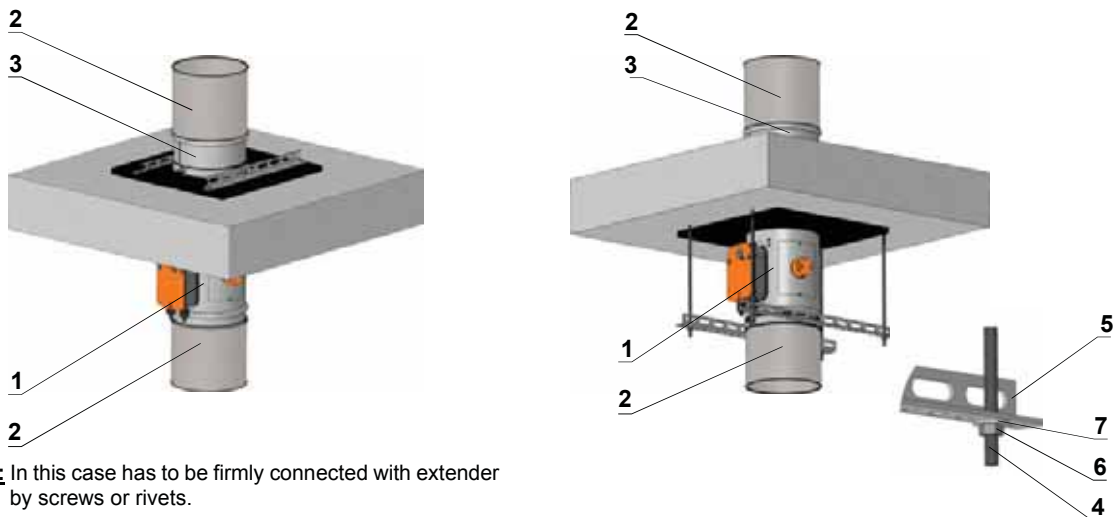
Threaded rods longer than 1,5 m has to be protected by fire resistant insulation.

Fig. 43 Suspension example - vertical duct

Actuating mechanism is placed above solid ceiling

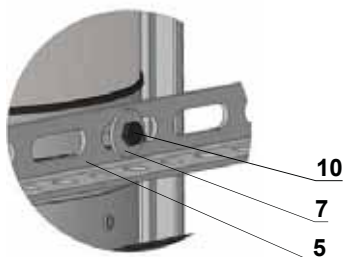


Actuating mechanism is placed under solid ceiling

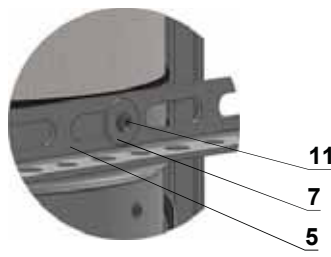


Notice: In this case has to be firmly connected with extender by screws or rivets.

Sleeve and fixing rail connection



Sleeve and fixing rail connection by using screw or rivet



Position:

- 1 Fire damper
- 2 Damping pad
- 3 Extender
- 4 Threaded rod
- 5 Fixing rail
- 6 Nut
- 7 Washer
- 8 Screw connection
- 9 Cantilever arm
- 10 Screw
- 11 Screw or rivet

III. TECHNICAL DATA

8. Pressure loss

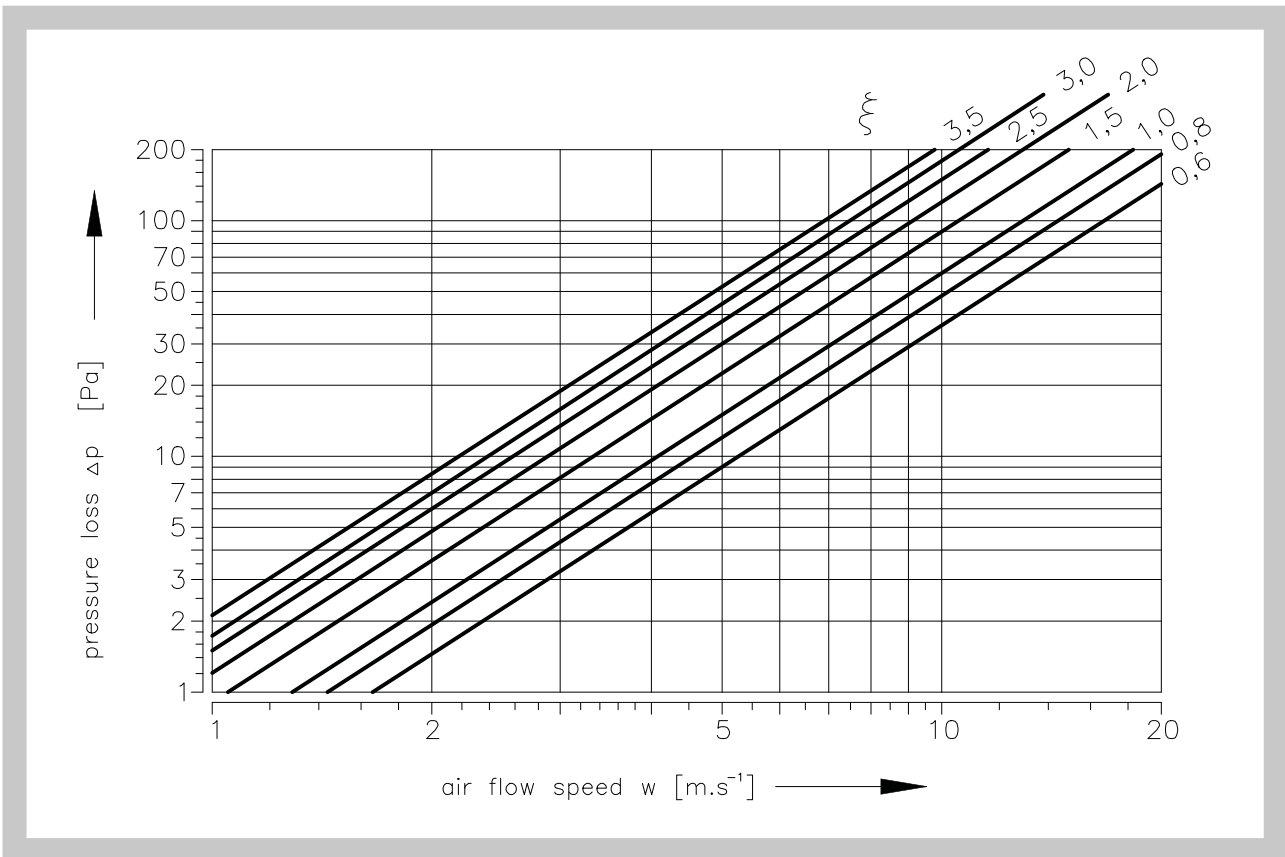
7.1. Pressure loss calculation

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

- Δp [Pa] pressure loss
- w [m.s⁻¹] 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 Tab. 9.1.1.)

7.2. Determination of pressure loss by using diagram 8.2.1. $\rho = 1,2 \text{ kg.m}^{-3}$

Diagram 8.2.1. Pressure losses for air density $\rho = 1,2 \text{ kg.m}^{-3}$



9. Coefficient of local pressure loss

9.1. Coefficient of local pressure loss ξ (-)

Tab. 9.1.1. Coefficient of local pressure loss

D	100	125	140	150	160	180	200
ξ	2,736	2,099	1,781	1,527	1,272	0,929	0,636

10. Noise data

10.1. 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 m² section (see Tab. 10.3.1.)

S [m²] duct cross section

K_A [dB] correction to the weight filter A (see Tab. 10.3.2.)

10.2. 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 m² section (see Tab. 10.3.1.)

S [m²] duct cross section

L_{rel} [dB] relative level expressing the shape of the spectrum (see Tab. 10.3.3.)

10.3. Table of acoustics values

Tab. 10.3.1. Level of acoustic output L_{W1} related to the 1 m² section

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

Tab. 10.3.2. Correction to the weight filter A

w [m.s⁻¹]	2	3	4	5	6	7	8	9	10	11	12
K_A [dB]	-15,0	-11,8	-9,8	-8,4	-7,3	-6,4	-5,7	-5,0	-4,5	-4,0	-3,6

Tab. 10.3.3. Relative level expressing the shape of the spectrum L_{rel}

w [m.s ⁻¹]	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	-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

Fig. 44 Calculation example

Given data	Fire damper FDMD 200
	$\dot{V} = 600 \text{ m}^3 \cdot \text{h}^{-1}$
	$\rho = 1,2 \text{ kg} \cdot \text{m}^{-3}$
	Octave range 1000 Hz
Tab. 4.3.1.	$S_{ef} = 0,0213 \text{ m}^2$
Calculation:	$w [\text{m} \cdot \text{s}^{-1}] = (\dot{V} [\text{m}^3 \cdot \text{h}^{-1}] / 3600) / S_{ef} [\text{m}^2]$
	$w = 7,83 \text{ m} \cdot \text{s}^{-1}$
Tab. 9.1.1.	$\xi = 0,636$
Calculation:	$\Delta p = \xi \cdot \rho \cdot (w^2/2) = 0,636 \cdot 1,2 \cdot (7,83^2/2) = 23,4 \text{ Pa}$
Tab. 10.3.1., Tab. 10.3.2. and Tab. 10.3.3.	$L_{W1} = 56,5 \text{ dB}$
	$K_A = -5,5 \text{ dB}$
	$L_{rel} = -10,7 \text{ dB (for 1000 Hz)}$
Calculation:	$L_{WA} = L_{W1} + 10 \log(S_{ef}) + K_A = 56,5 + 10 \log(0,0213) - 5,5 = 34,3 \text{ dB}$
	$L_{Woct} = L_{W1} + 10 \log(S_{ef}) + L_{rel} = 56,5 + 10 \log(0,0213) - 10,7 = 29,1 \text{ dB}$

IV. MATERIAL, FINISHING

11. Material

- 11.1. Damper bodies are supplied in the design made of galvanized plate without any other surface finishing.

Damper blades are made of fire resistant asbestos free boards made of mineral fibres.

Damper controls are made of galvanized materials with no other surface finish.

Springs are galvanized.

Thermal protective fuses are made of sheet brass, thickness = 0.5 mm.

Fasteners is galvanized. Fasteners is galvanized.

- 11.2. According to the customer's requirements, damper body, control, springs and jointing material can be made of stainless material.

V. INSPECTION, TESTING

12. Inspection, testing

- 12.1. The appliance is constructed and preset by the manufacturer, its operation is dependent on proper installation and adjustment.

VI. TRANSPORTATION AND STORAGE

13. Logistic terms

- 13.1. Dampers are transported by box freight vehicles without direct weather impact, there must not occur any sharp shocks and ambient temperature must not exceed + 40 °C. Dampers must be protected against mechanic damages when transported and manipulated. During transportation, the damper blade must be in the "CLOSED" position.

- 13.2. Dampers are stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -5 °C to +40 °C and maximum relative humidity 80 %. Dampers must be protected against mechanic damages when transported and manipulated.

VII. ASSEMBLY, ATTENDANCE, MAINTENANCE AND REVISIONS

14. Assembly

- 14.1. All effective safety standards and directives must be observed during fire damper assembly.
- 14.2. To ensure reliable fire damper function it is necessary to avoid blocking the closing mechanism and contact surfaces with collected dust, fibre and sticky materials and solvents.

15. Entry into service and revisions

- 15.1. Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out.

Visual inspection of proper damper integration, inside damper area, damper blade, contact surfaces and silicon sealing.

Inspection hole disassembly: release the covering lid by removing the two screws in the corners of inspection hole. Then remove lid from its original position.

- 15.2.** Before entering the dampers with manual control (design .01v1 and .01v2 into operation after their assembly and by sequential checks, checks according 15.1. and following checks must be carried out.

Check of thermal protective fuse and closing mechanism.

Push initiation lever lock "OPEN" to release the control lever and check its displacement into the position "CLOSED". Closing must be smart and the control lever must be firmly locked with a lever lock "CLOSED". In case that the closing is not smart enough and the control lever is not locked with the lever lock in the position "CLOSED", higher pre-stretch of the closing spring must be set by using new hole in base plate or using new spring.

Proper function of the thermal fuse can be checked when the fuse is removed from the starting mechanism. The initiation lever must be turned over and control lever is moved to position "CLOSED". If this is not possible, then the starting mechanism spring must be checked or the base plate must be replaced. The base plate is attached to the damper body with four M5 screws.

Displacing the damper blade into "OPEN" position is done the following way:
Push lever lock "CLOSED" and move control lever from "CLOSED" position towards position "OPEN" until control lever is locked in lever lock "OPEN".

- 15.3.** Before entering the dampers with actuating mechanism into operation after their assembly and by sequential checks, checks according 13. and following checks must be carried out.

Check of blade displacement into the breakdown position "CLOSED" can be done after cutting off the actuating mechanism supply (e.g. by pressing the RESET button at the thermoelectrical starting mechanism BAE 72B-S or cutting off the supply from ELECTRICAL FIRE SIGNALISATION). Check of blade displacement back into the "OPEN" position can be done after restoration of power supply (e.g. By releasing the RESET button or restoration of supply from ELECTRICAL FIRE SIGNALISATION).

- 15.4.** Manual operation

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.

- 15.5.** It is recommended to provide periodical checks, maintenance and service actions on Fire Equipment by Authorized persons schooled by Producer.

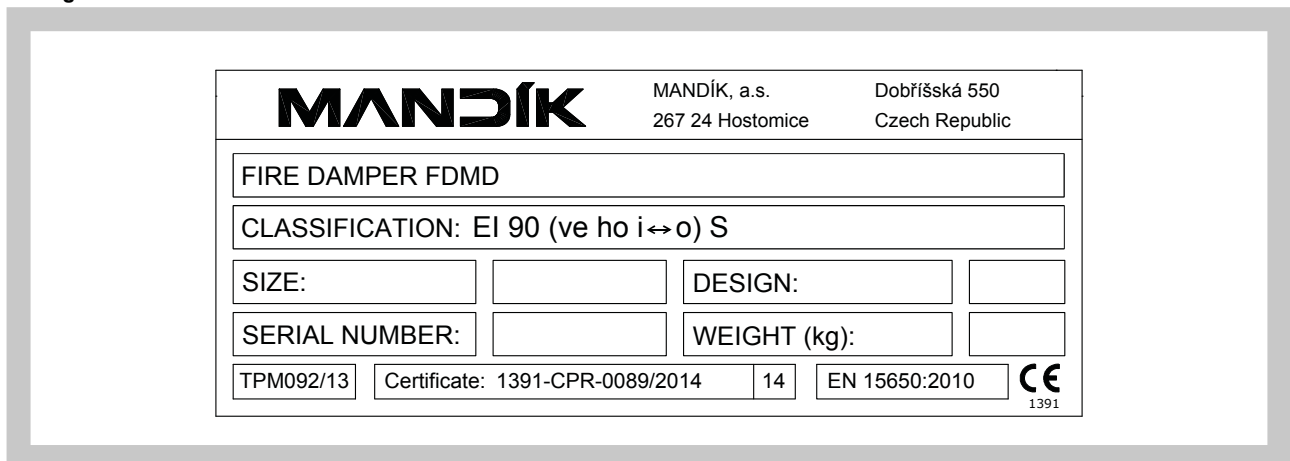
- 15.6.** All effective safety standards and directives must be observed during fire damper assembly.

VIII. DATA OF THE PRODUCT

16. Data label


- 16.1.** Data label is placed on the casing of fire damper.

Fig. 45 Data label



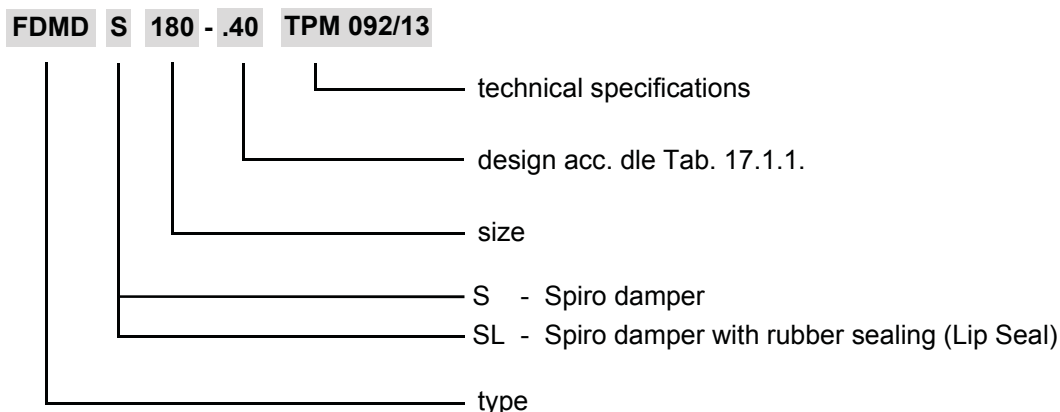
17. Quick review

Tab. 16.1.1. Quick review

Damper		FDMD 		
Size		Ø 100 - 200		
Fire separating construction	Wall/Ceiling	Installation	Fire rezistance	Fig.
	Min. thickness [mm]			
Solid wall construction	100	Mortar or gypsum	EIS 120 EIS 90	25
	100	Stuffing box with fire protection mastic	EIS 90	26
	100	Weichschott	EIS 90	27
	100	Installation frame D1	EIS 90	34
	150	Installation frame D2	EIS 90	34
	100	Installation frame D3	EIS 90	35
	150	Installation frame D4	EIS 90	35
	100	Battery installation	EIS 90	39
Gypsum wall construction	100	Mortar or gypsum	EIS 120 EIS 90	28
	100	Stuffing box with fire protection mastic	EIS 90	29
	100	Weichschott	EIS 90	30
	100	Installation frame D1	EIS 90	34
	150	Installation frame D2	EIS 90	34
	100	Installation frame D3	EIS 90	35
	150	Installation frame D4	EIS 90	35
	100	Battery installation	EIS 90	40
Solid ceiling construction	150	Mortar or gypsum	EIS 120 EIS 90	31
	150	Stuffing box with fire protection mastic	EIS 90	32
	150	Weichschott	EIS 90	33
	150	Installation frame D1	EIS 90	34
	150	Installation frame D2	EIS 90	34
	150	Installation frame D3	EIS 90	35
	150	Installation frame D4	EIS 90	35
Outside solid wall construction	100	Installation frame D6	EIS 90	37
Outside solid ceiling construction	150	Concrete	EIS 90	38
	150	Concrete with installation frame D5	EIS 90	36
	150	Installation frame D6	EIS 90	37
An solid wall construction	100	Installation frame D5	EIS 90	36
An solid ceiling construction	150	Installation frame D5	EIS 90	36

IX. ORDERING INFORMATION

18. Ordering key



If are requested installation holders or installation frame, it has to be mentioned separately in the order. Installation frame could be fixed to the damper body or supplied separately.

Tab. 22.1.1. Dampers design

Dampers design	Additional digit
Thermal with inner mechanical control	.01
Thermal with inner mechanical control and limit switch („CLOSED“)	.11
Thermal with outer mechanical control	.01v1
Thermal with outer mechanical control and limit switch („CLOSED“)	.11v1
Thermal with outer mechanical control and two limit switches („CLOSED“), („OPEN“)	.80v1
Thermal with outer mechanical control and mechanical control cover	.01v2
Thermal with outer mechanical control, mechanical control cover and limit switch („CLOSED“)	.11v2
Thermal with outer mechanical control, mechanical control cover and two limit switches („CLOSED“), („OPEN“)	.80v2
With actuating mechanism BLF 230-T	.40
With actuating mechanism BLF 24-T	.50
With communication and supply device BKN 230-24 and actuating mechanism BLF 24-T-ST*	.60

* communication and supply device BKN 230-24 has to be placed near the damper. It is necessary for easy connection of actuating system equipped by BKN 230-24 device.

