CE

TPM 075/09

Revision 6
Valid from 01/02/2016

EN 15650:2010-09

MANDÍK®

FIRE DAMPER

FDMB

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

I. CONTENT

II. GENERAL INFORMATION

1. Description

1.1. Fire dampers are shutters in ducts 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 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 shutting spring is started by releasing an initiation lever. The impulse for releasing the lever can be either a manual one, a thermal one or an electromagnetic one. The back spring of the actuating mechanism is started when the thermoelectrical starting mechanism BAT is activated, when a reset button on BAT 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.

rectangular dampers have two inspection holes.

Round 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).

Fig. 1 Rectangular FDMB - design manual and thermal

Fig. 2 Rectangular FDMB - design with actuating mechanism

Fig. 3 Round FDMB - design manual and thermal

Fig. 4 Round FDMB - design with actuating mechanism

Fig. 5 FDMB with covered control mechanism .01v2

Fig. 6 FDMB with covered control mechanism .01v2

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 Casing leakage class C, Internal leakage class 2 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-CPD-0011/2014
- Declaration of Performance No. CDM/FDMB/001/13
- Hygienic assessment of fire dampers - Report No. 1.6/13/16/1

1.3. Working conditions

Right damper function is secured under the following conditions:

a) Maximum air circulation speed: 12 $m.s^{-1}$
   Maximum pressure difference: 1200 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.

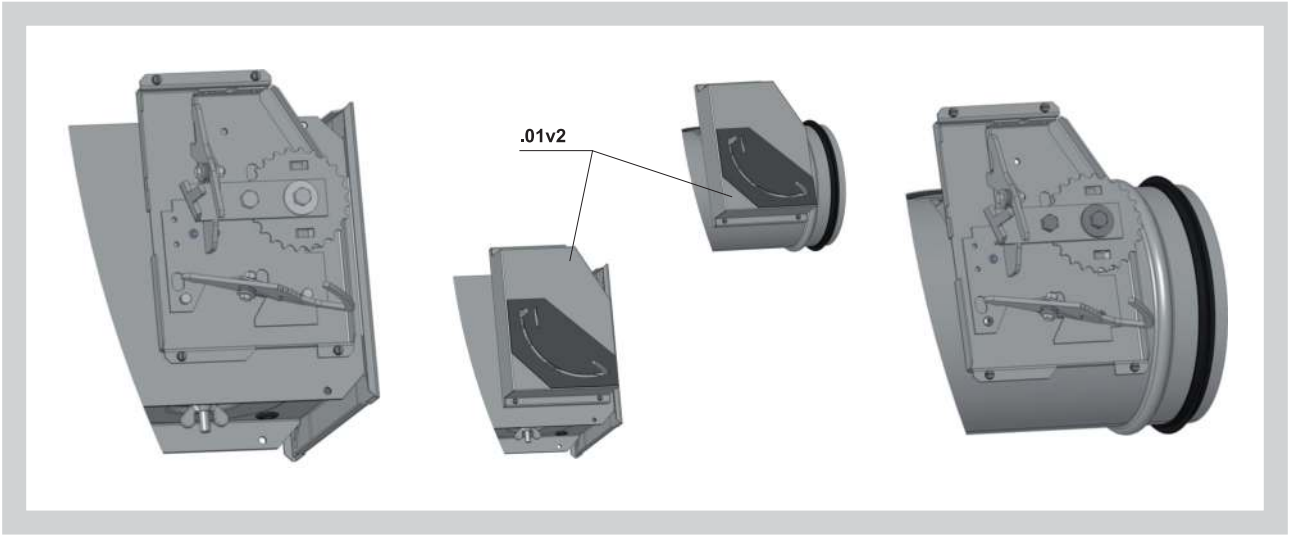
2. Design

2.1. Design with mechanical control

Design .01 and .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).

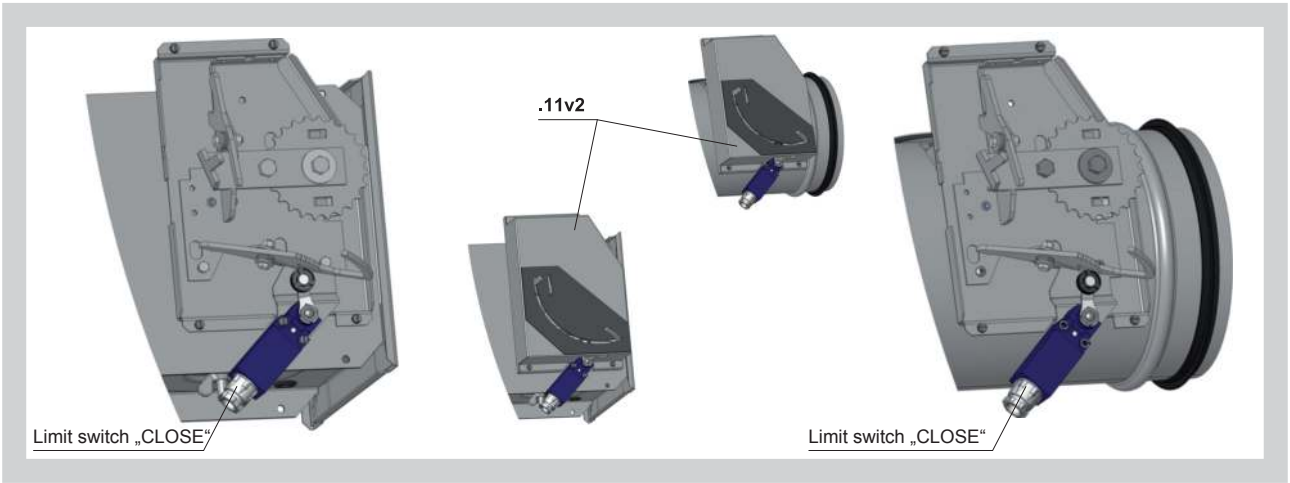
Fig. 7 Design with mechanical control



Design .11 and .11v2

Design .01 with mechanical control can be complemented with a limit switch signaling of the damper blade position "CLOSED".

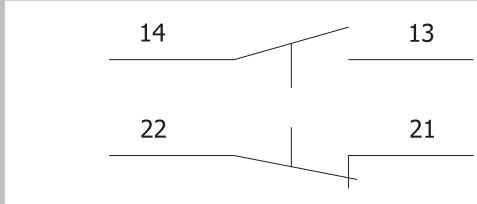
Fig. 8 Design with mechanical control and limit switch



Tab. 2.1.1. Limit switch XCKN2118G-11

Limit switch XCKN2118G-11	
Nominal voltage, current	AC 240 V; 3 A DC 250 V; 0,1 A
Degree of protection	IP 65
Ambient temperature	-15 °C … +70 °C

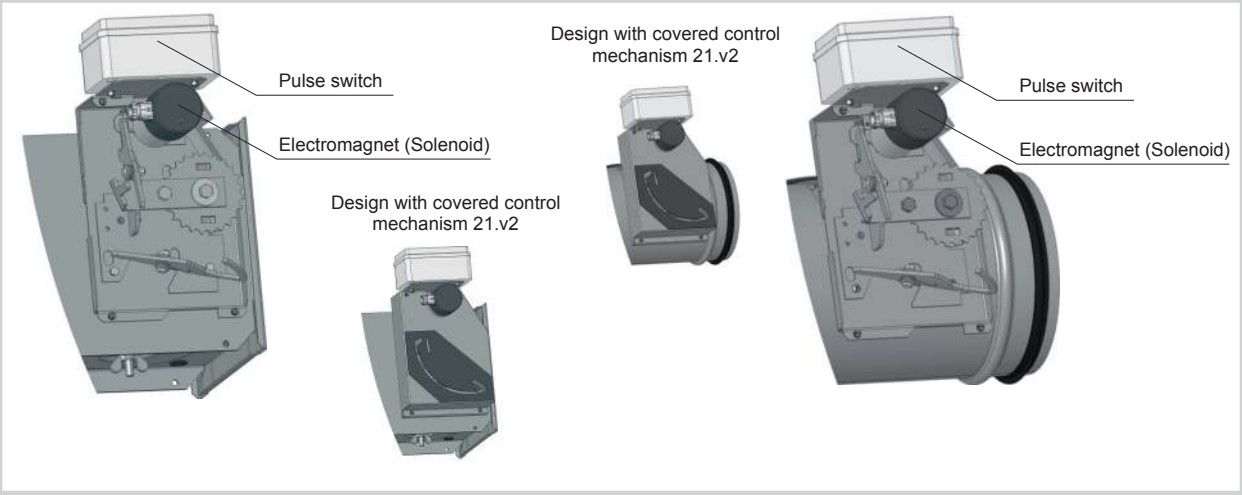
Fig. 9 Limit switch XCKN2118G-11



Design .20, .20v2, .21 and .21v2

Design .01 with mechanical control can be complemented with initiation by means of an electromagnet (solenoid). The voltage of the electromagnet (solenoid) can be AC 230V, AC/DC 24V. By voltage AC 230 V is damper equipped by electromagnet EM230. By voltage AC/DC 24 V is damper equipped by electromagnet EM230 with pre-pulse switch SIEM24. SEIM24 activates the electromagnet after capacitor charge witch is placed inside of SIEM24. It takes about 10 sec. Charging time depends on the current supply. For reliable operation is necessary connect to electromagnet or pre-pulse switch appropriate supply for 20 to 30 sec. After activation of electromagnet is released initiation lever and damper is closed. After activation is initiation lever released. If is damper set up in position "OPEN" is necessary unlock initiation lever by pulling of electromagnet core.

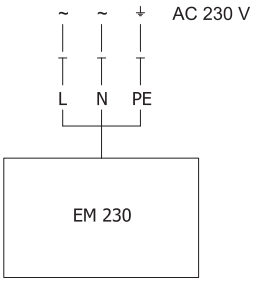
Fig. 10 Design with mechanical control and electromagnet (solenoid)



Tab. 2.1.2. Elektromagnet EM230

Elektromagnet EM230	
Nominal voltage	AC 230 V / 50 Hz
Attraction current	1,2 A
Degree of protection	IP 40
Ambient temperature	-10 °C … +40 °C
Connection	cable 1m, 3x0,75mm²

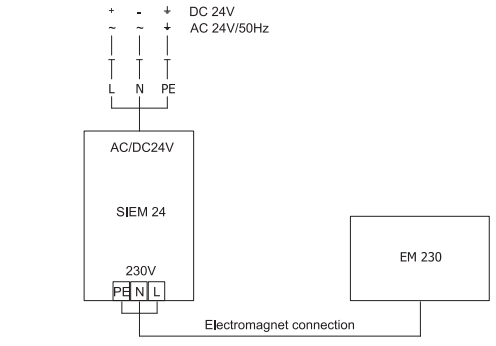
Fig. 11 Elektromagnet EM230



Tab. 2.1.3. Electromagnet EM230 with pulse switch SIEM24

Electromagnet EM230 with pulse switch SIEM24	
Nominal voltage	AC 24 V / 50 Hz DC 24 V
Attraction current	1 A
Degree of protection	IP 40
Ambient temperature	-10 °C … +40 °C
Switching frequency	max. 1x per minute
Connection	cable 1m, 3x0,75mm²

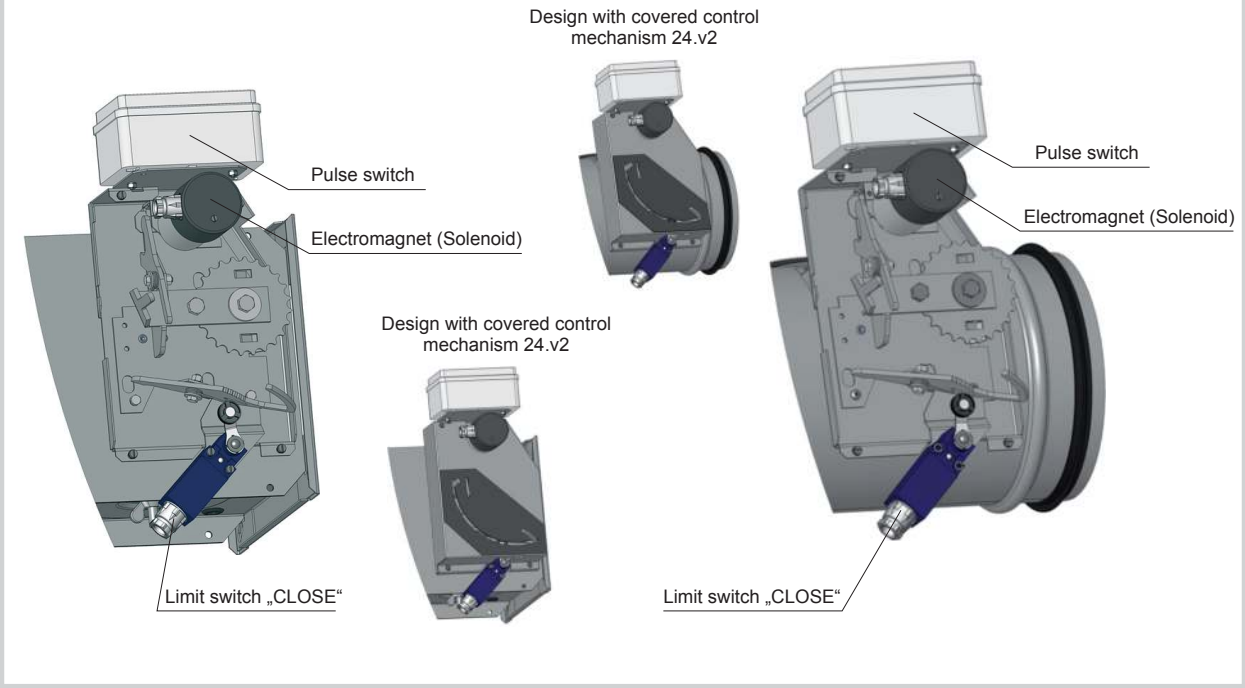
Fig. 12 Electromagnet EM230 with pulse switch SIEM24



Design .23, .23v2, .24 and .24v2

Design .20 or .21 with mechanical control and electromagnet can be complemented with limit switch signaling of the damper blade position "CLOSE".

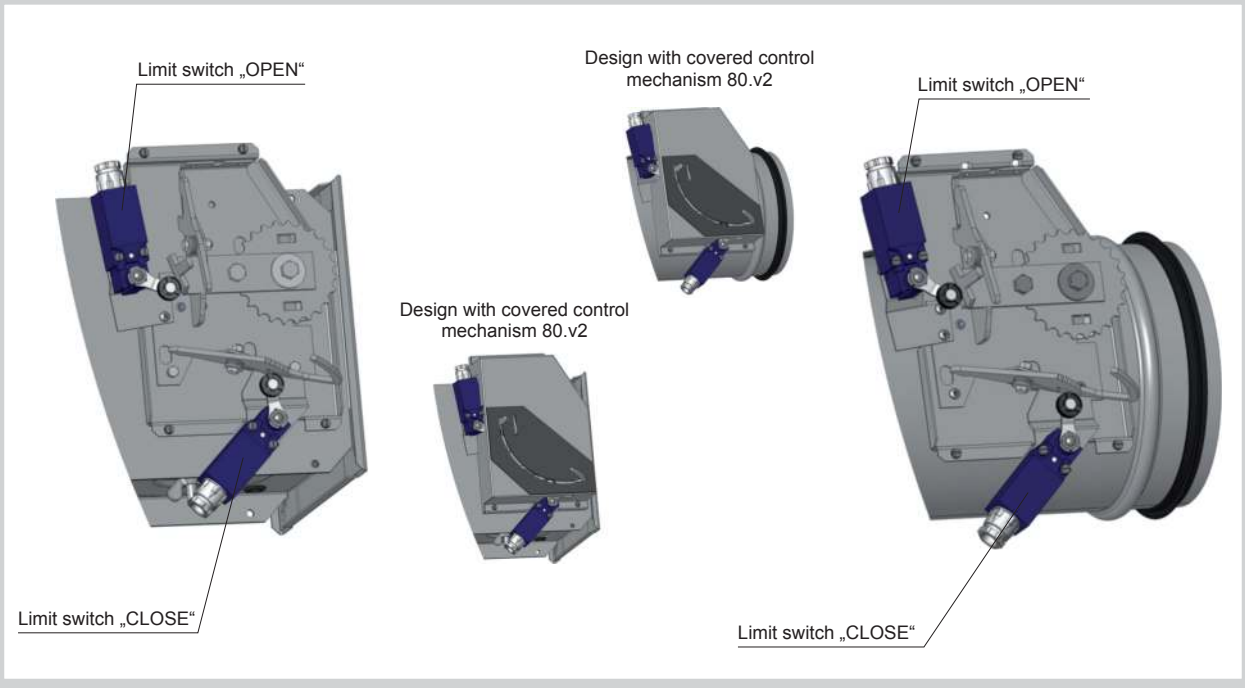
Fig. 13 Design with mechanical control, electromagnet (solenoid) and limit switch



Design .80, .80v2

Design .11 can be complemented with a terminal switch signaling of the damper blade position "OPEN".

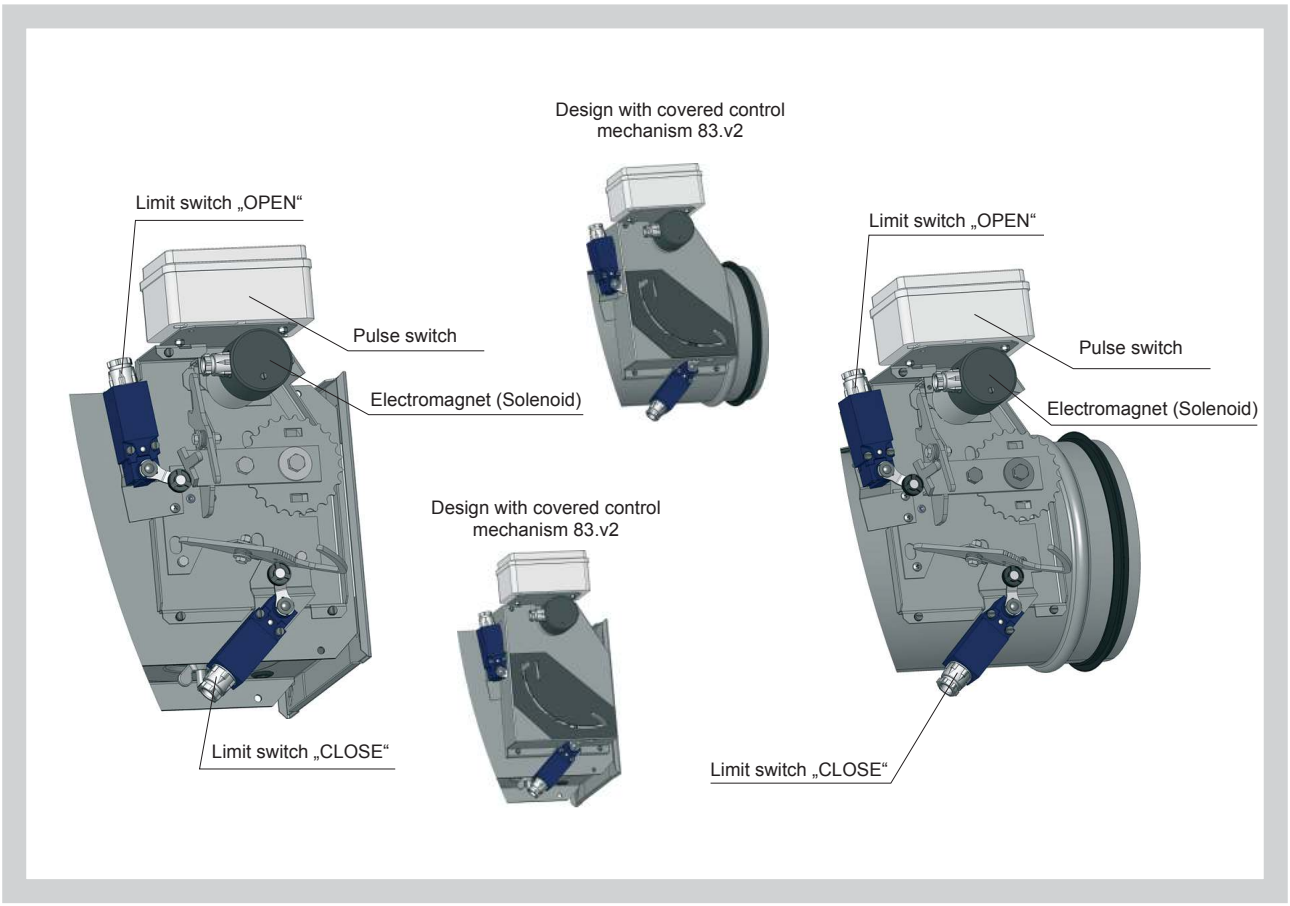
Fig. 14 Design with mechanical control and limit switches



Design .82, .82v2, .83, .83v2

Design .23, or .24 can be complemented with a terminal switch signaling of the damper blade position "OPEN".

Fig. 15 Design with mechanical control, electromagnet (solenoid) and limit switches



2.2. Design with electric actuating mechanism

Design .40, .50

FDMB is always equipped by electric actuating mechanism BFL, BFN, BF 230-T or BFL, BFN, BF 230-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 140 sec. 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 BAT), 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 20 sec. In case that the power supply is restored again (the blade can be in any position), the actuating mechanism starts to re-displace the damper blade into the position "OPEN".
A thermoelectrical starting mechanism BAT, which contains two thermal fuses Tf1 and Tf2, 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 when the temperature inside the air-conditioning piping has been exceeded). After the thermal fuse Tf1 or Tf2 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".

Signalisation of damper blade position "OPEN" a "CLOSE" is provided by two limit switches.

Fig. 16 Design with actuating mechanism

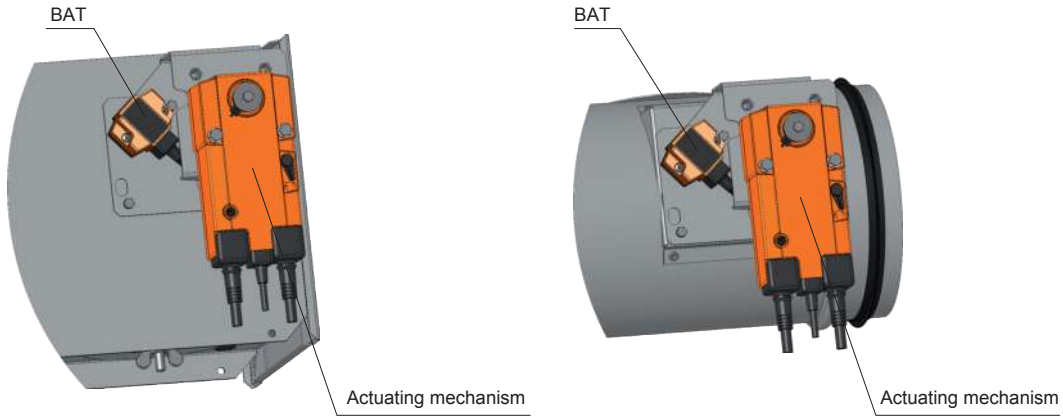


Fig. 17 Actuating mechanism BELIMO BFL, BFN 230-T

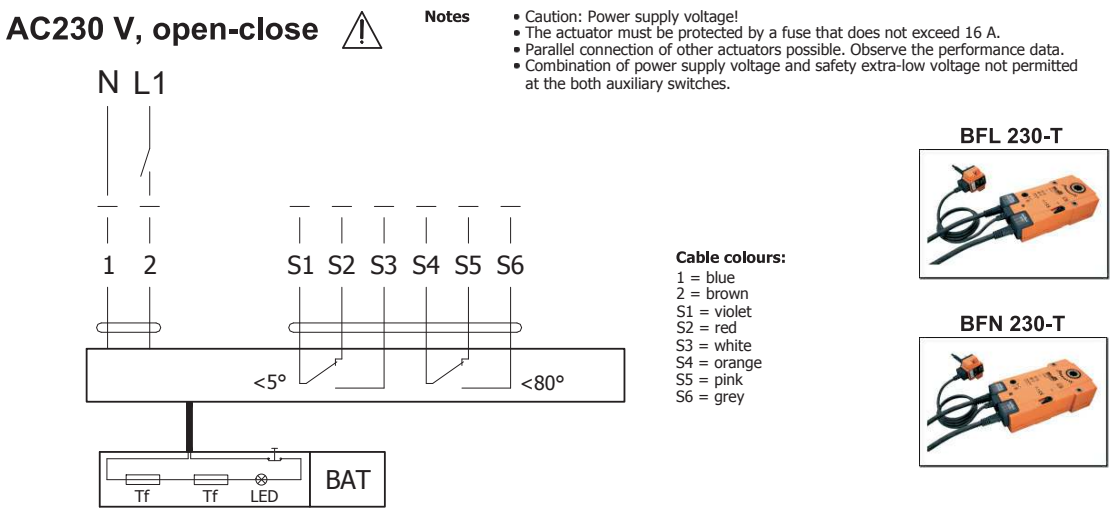
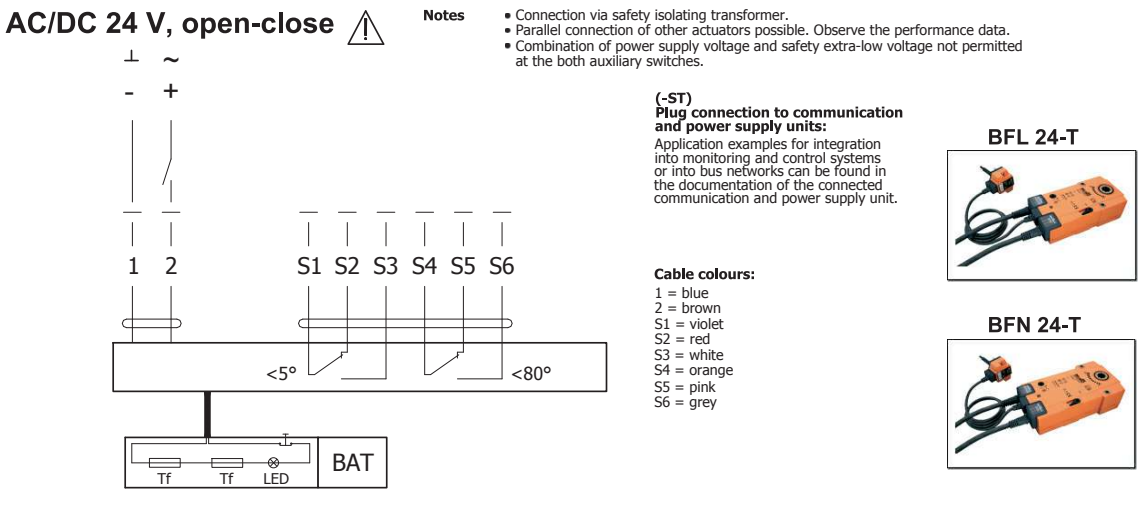


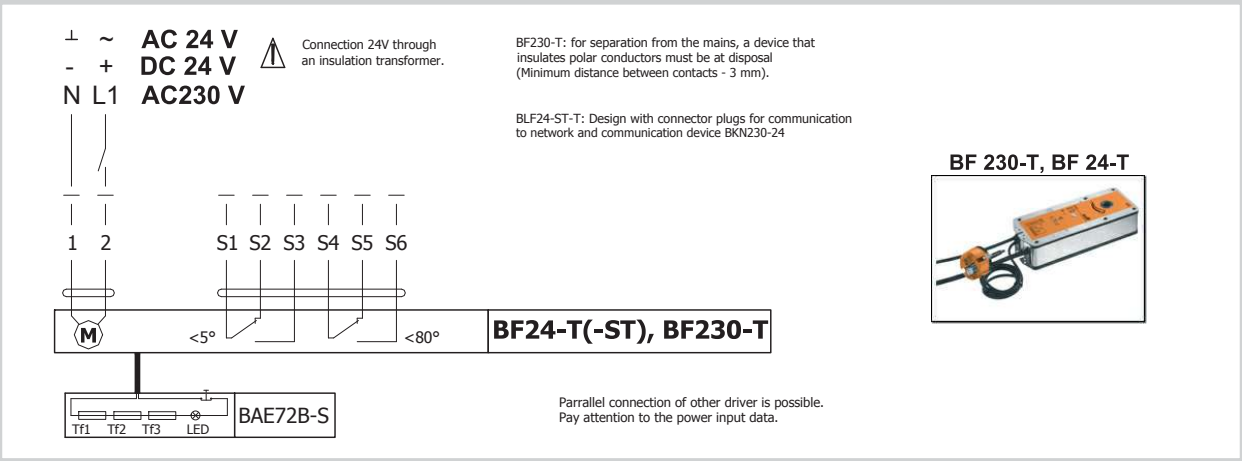
Fig. 18 Actuating mechanism BELIMO BFL, BFN 24-T(-ST)



Tab. 2.2.1. Actuating mechanism BELIMO BFL24-T(-ST), BFN 24-T(-ST), BFL 230-T a BFN 230-T

Actuating mechanism BELIMO	BFL, BFN 230-T	BFL, BFN 24-T(-ST)
Nominal voltage	AC 230 V 50/60 Hz	AC 24 V 50/60 Hz DC 24 V
Power consumption - motoring - holding	3,5/5 W 1,1/2,1 W	2,5/4 W 0,8/1,4 W
Dimensioning	6,5/10 VA (Imax 4 A @ 5 ms)	4/6 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	<60 s ~ 20 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	- 30 °C … 55 °C The safe position will be attained up to max. 75°C - 40 °C … 55 °C	
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm² (BFL/BFN 24-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm² (BFL/BFN 24-T-ST) with 6-pin plug-in connectors	
Thermal trips	duct outside temperature 72 °C duct inside temperature 72 °C	

Fig. 19 Actuating mechanism BELIMO BF 230-T, BF 24-T (-ST)



Tab. 2.2.2. Actuating mechanism BELIMO BF 24-T(-ST), BF 230-T

Actuating mechanism BELIMO	BF 24-T(-ST)	BF 230-T
Nominal voltage	AC 24 V 50/60 Hz DC 24 V	AC 230 V 50/60 Hz
Power consumption - motoring - holding	7 W 2 W	8 W 3 W
Dimensioning	10 VA (Imax 8,3 A @ 5 ms)	12,5 VA (Imax 500 mA @ 5 ms)
Protection class	III	II
Degree of protection	IP 54	
Running time - motor - spring return	140 sec ~ 16 sec	
Ambient Temperature - normal duty - safety duty - non-operating temperature	- 20 °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 mm² cable 1 m, 6 x 0,75 mm² (BF 24-T-ST) with plug-in connectors	
Thermal trips	Tf1: duct outside temperature Duct 72 °C Tf2/Tf3: duct intside temperature Duct 72 °C	

Design .41, .51

Design .41 or .51 with actuating mechanism can be complemented with smoke detector MHG 231. The voltage can be AC 230 V or AC/DC 24 V. Design with voltage AC 230 V is equpped with Communication and supply device BKN 230-24-MA and with actuating mechanism BF 24-T (BFL 24-T, BFN 24-T).

The smoke detector is activated when smoke spreads in air duct system. Deactivation of smoke detector is provided by interruption of supply voltage for min. 2s.

Signalisation of damper blade position "OPEN" a "CLOSE" is provided by two limit switches.

Tab. 2.2.3. Optical smoke detector MHG 231 with the socket MHY 734.031

Optical smoke detector	**MHG 231 with socket MHY 734.031**
Nominal voltage	AC/DC 24 V
Voltage range	AC 18 … 28 V DC 24 … 30 V
Power Consumption Socket (without actuating mechanism)	max. 50mA
Degree of protection	IP 40
Ambient temperature Non-operating temperature	- 25 °C … + 70 °C - 5 °C … + 40 °C
Connection - net - motor - communication and supply device BKN 230-24-MA	Cabel 1m, connected to terminal XT1 Screw terminals on the terminal block XT2 Screw terminals on the terminal block XT1 a XT2

Fig. 20 Socket MHY 734.031

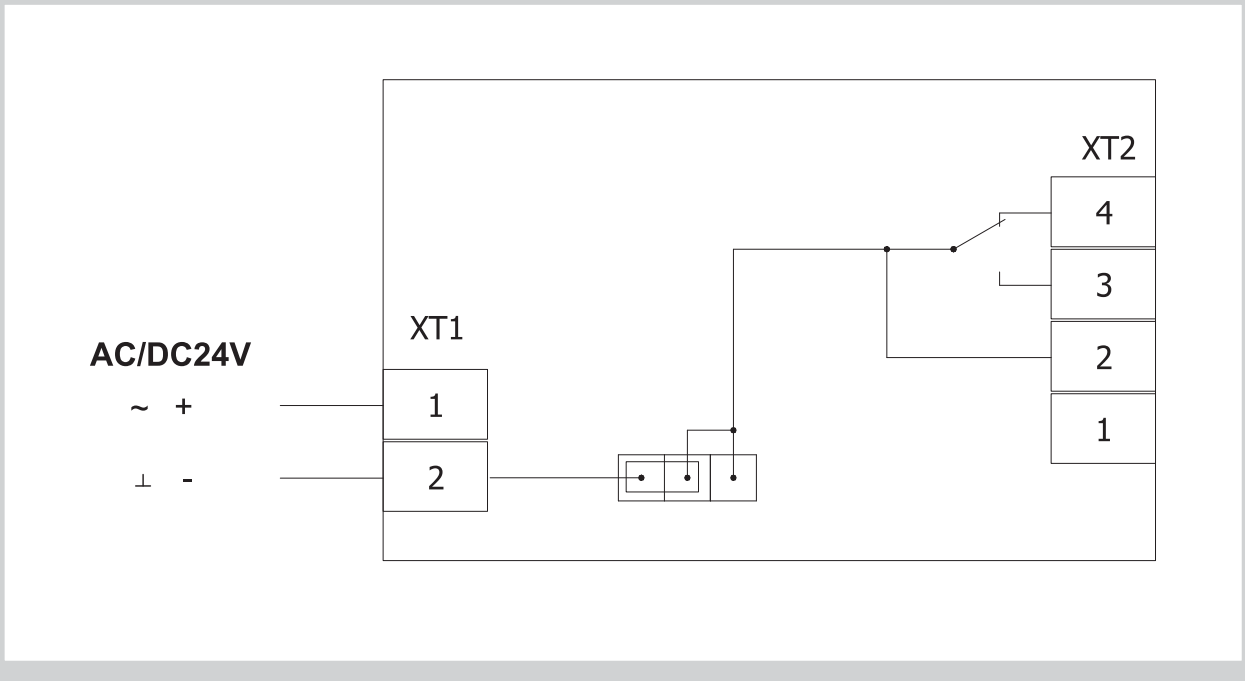


Fig. 21 Design with actuating mechanism BF 24-T (BFL, BFN 24-T) , with smoke detector MHG 231 and with communication and supply device BKN 230-24-MA (voltage AC 230 V)

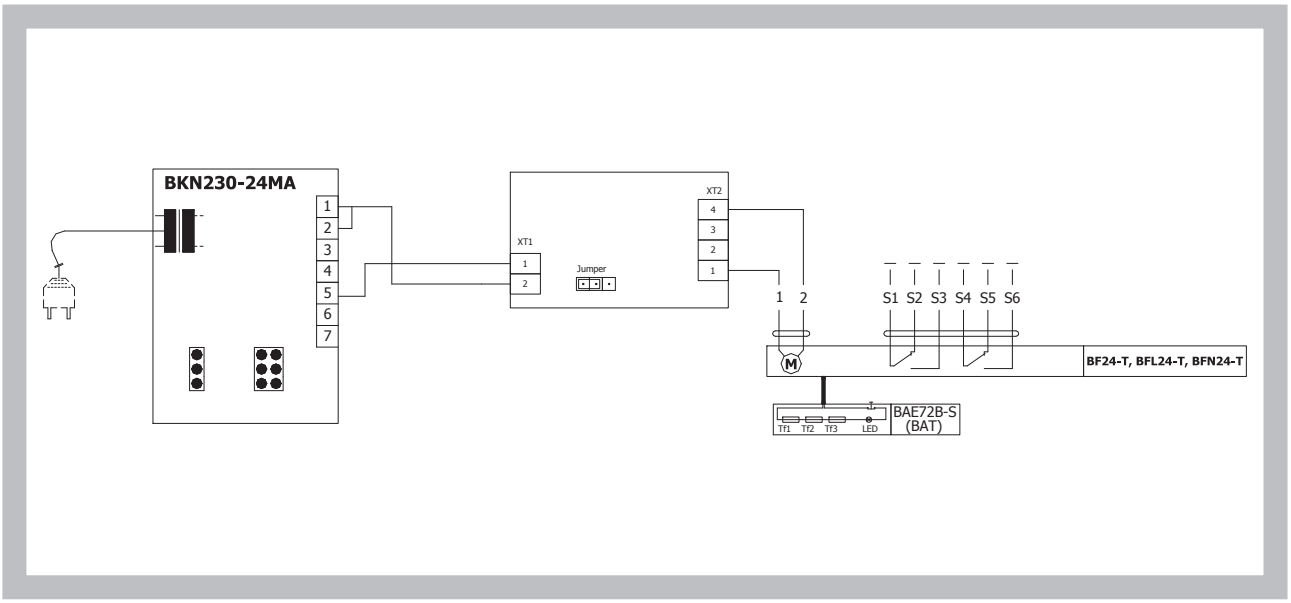
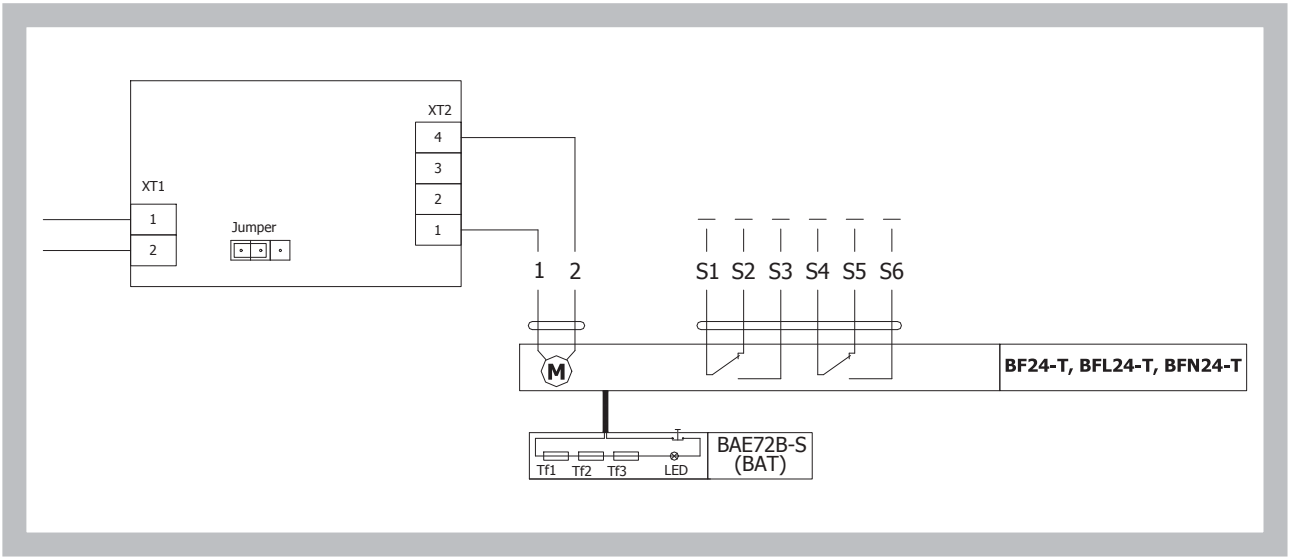


Fig. 22 Design with actuating mechanism BF 24-T (BFL, BFN 24-T) , with smoke detector MHG 231 (voltage AC/DC 24 V)

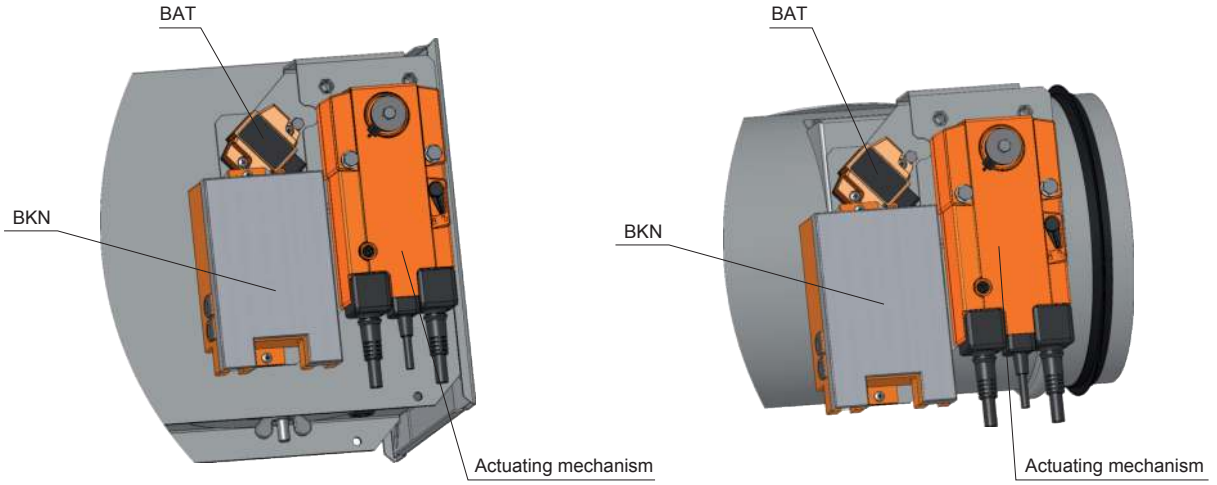


2.3. Design with the communication and supply device

Design .60

Design with the communication and supply device BKN 230-24 and the actuating mechanism BF 24-T-ST (BFL 24-T, BFN 24-T). It simplifies electrical wiring and interconnection of fire flap valves. 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 BF 24-T-ST (BFL 24-T, BFN 24-T) with a spring back drive on one hand and on the other hand it transmits the signal informing about the flap valve 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 BF 24-T-ST (BFL 24-T, BFN 24-T) 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 damper position will be "FAILURE".

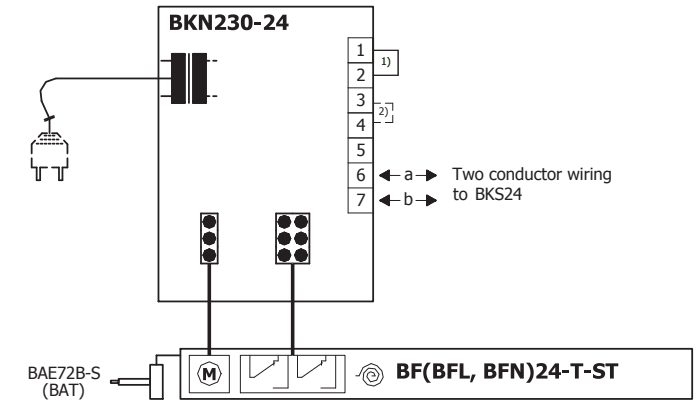
Fig. 23 Design with the communication and supply device



Tab. 2.3.1. Communication and supply device BKN 230-24

Communication and supply device	BKN 230-24
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	11 VA (including actuating mechanism with spring return)
Protection Class	II
Degree of protection	IP 42
Ambient temperature Non-operating temperature	- 20 °C … + 50 °C - 40 °C … + 80 °C
Connection - net - motor - terminal board	cable 0,9 m with EURO plug type 26 6-pole connector, 3-pole connector screw terminals for cable 2x1,5 mm²

Fig. 24 Communication and supply device BKN 230-24



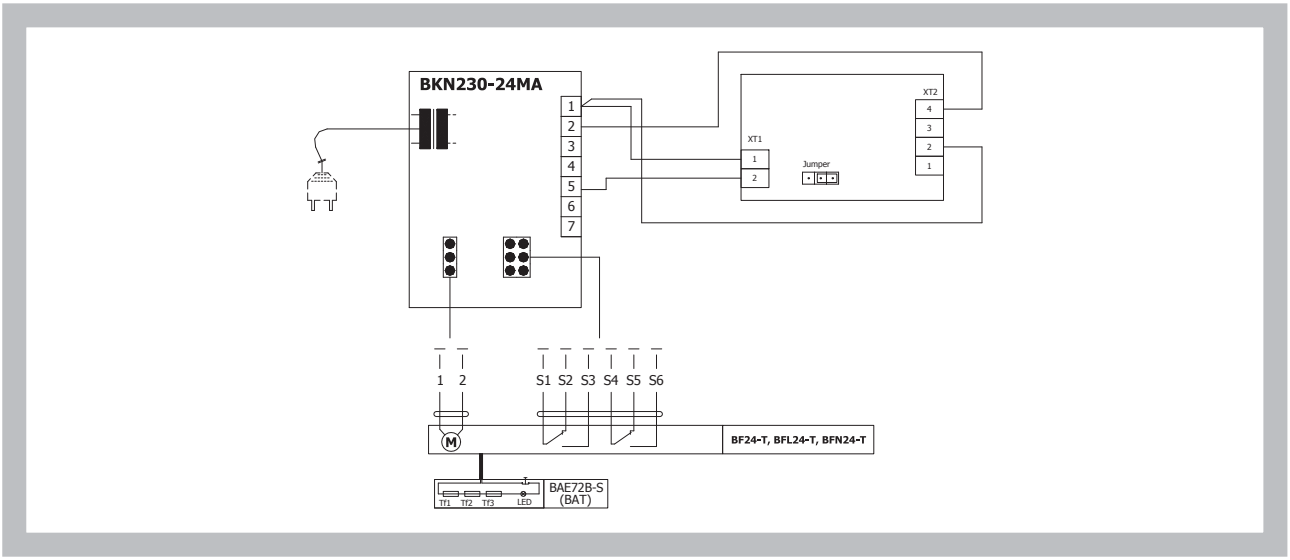
1) Bridge has been installed by the manufacturer. If needed, it can be removed and replaced with a thermoelectrical starting mechanism.
If terminals 1 and 2 are not interconnected, safety function is initiated.

2) Bridge can be used only for starting and without BKS 24!

Design .61

Design .61 with communication and supply device can be complemented with smoke detector MHG 231. For supply and comunnication is used BKN 230-24-MA.

Fig. 25 Design with communication and supply device BKN 230-24-MA, with actuating mechanism BF 24-T-ST (BFL 24-T-ST, BFN 24-T-ST) and smoke detector MHG 231



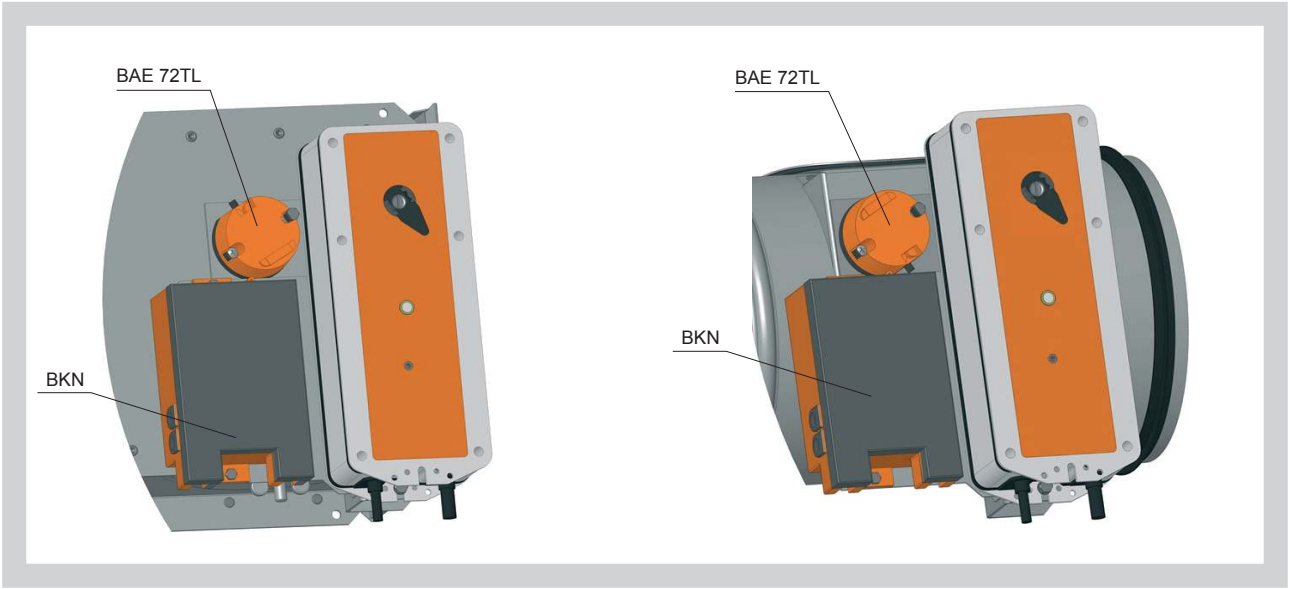
Design .62

Design with the communication and supply device BKN 230-24MP and actuating mechanism BF24TL-T-ST for connection to MP-Bus. BKN 230-24MP supplies to intelligent actuating mechanisms of fire dampers BF 24TL-T-ST decentrally needed power supply. In this way can be realize long MP-Bus communications (up to 800 m). Up to 8 Bus nodes can be parallel connected and controlled by Master device (DDC with interface). More information in Belimo catalogue.

Design .64

Design with the communication and supply device BKN 230-24LON and actuating mechanisms of fire dampers BF 24TL-T-ST for cooperation with control units based on technology LonWorks. BKN 230-24LON complements actuating mechanism for integrated safety function and converts digital protocol MP from actuating mechanism to LonTalk and back. More information in Belimo catalogue.

Fig. 26 Design with communication and supply device BKN 230-24MP or BKN 230-24LON and actuationg mechanism BF 24TL-T-ST



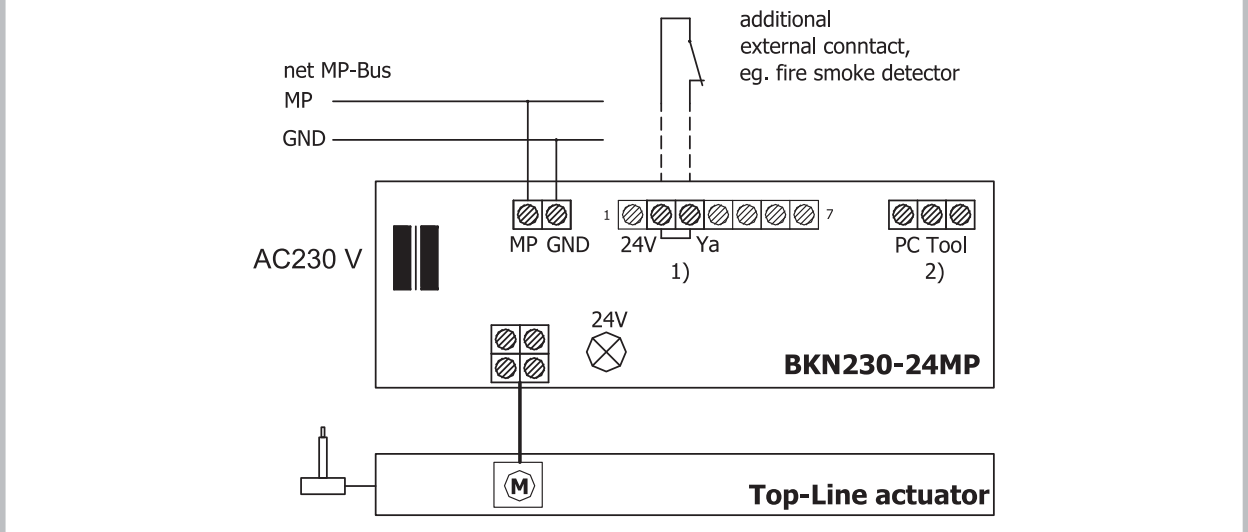
Tab. 2.3.2. Actuating mechanism BELIMO BF 24TL-T-ST

Actuating mechanism BELIMO	BF 24TL-T-ST
Nominal voltage	AC 24 V 50/60Hz DC 24 V
Power consumption - motoring - holding	7 W 2 W
Dimensioning	10 VA (Imax 8,3 A @ 5 ms)
Protection class	III
Degree of protection	IP 54
Running time - motor - spring return	140 sec ~ 16 sec
Ambient temperature Non-operating temperature	- 20 °C … + 50 °C - 40 °C … + 50 °C
Connection	Connector for BKN 230-24LON and BKN 230-24MP cable 1 m, 4 x 0,75 mm² halogen-free

Tab. 2.3.3. Communication and supply device BKN 230-24MP

Communication and supply device	BKN 230-24MP
Nominal voltage	AC 230 V 50/60Hz
Power consumption	11 W (including actuator mechanism)
Dimensioning	13 VA (including actuator mechanism)
Protection Class	II
Degree of protection	IP 40
Ambient temperature Non-operating temperature	- 30 °C … + 50 °C - 40 °C … + 80 °C
Connection - net - motor (BF…-Top) - net MP - starting mechanism (variable) - Top-Line PC-Tool (via ZIP-RS232)	cable 1m, with EURO plug 4-pole connector screw terminal 2-pole screw terminal 2-pole 3-pole connector

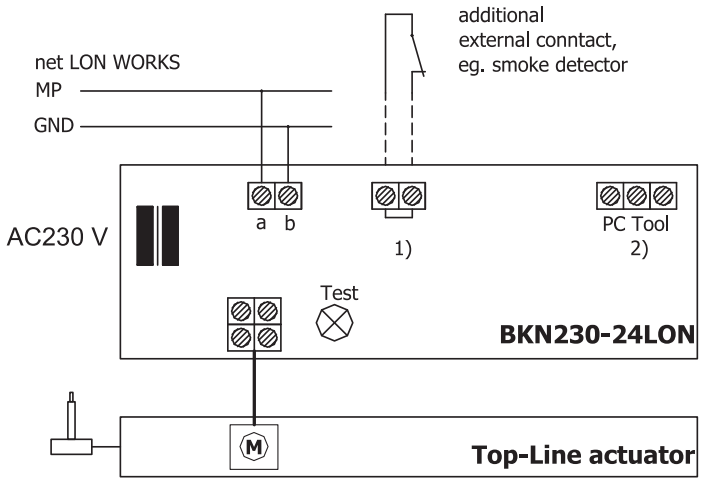
Fig. 27 Communication and supply device BKN 230-24MP



Tab. 2.3.4. Communication and supply device BKN 230-24LON

Communication and supply device	BKN 230-24LON
Nominal voltage	AC 230 V 50/60Hz
Power consumption	14 W (including actuating mechanism)
Dimensioning	16 VA (including actuating mechanism)
Protection Class	II
Degree of protection	IP 40
Ambient temperature Non-operating temperature	- 30 °C … + 50 °C - 40 °C … + 80 °C
Connection - net - actuator (BF…-Top) - net LonWorks® - starting mechanism (optional) - Top-Line PC-Tool (via ZIP-RS232)	cable 1m, with Euro plug 4-pole connector screw terminal 2-pole screw terminal 2-pole 3-pole connector

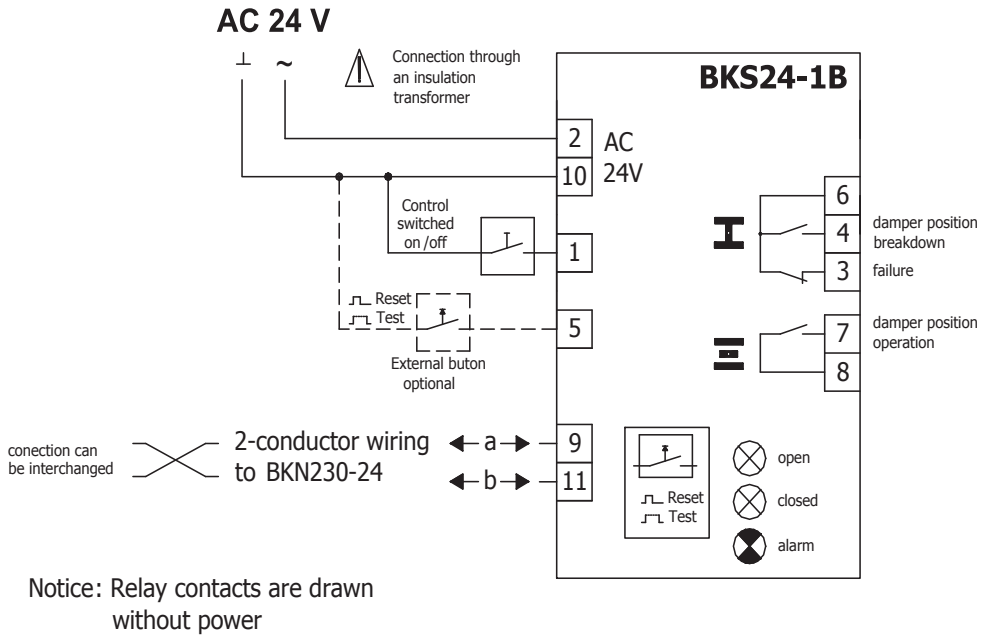
Fig. 28 Communication and supply device BKN 230-24LON



3. Communication and control devices

3.1. BKS 24-1B communication and control device is used for control and checks of fire dampers with the BF 24-T-ST (BFL 24-T-ST, BFN 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. Potentialless auxiliary contacts enable connection to the master control system (signaling of the damper position, failure reports, release of the ventilators etc.).
While a flashing green LED pilot light signalises damper blade motion towards the given position, the same pilot light reports reaching the required position when shining constantly. If the flap blade, 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. Except for reporting failures, other three auxiliary contacts are available. Contacts showing operating and failure position of the damper are active when the damper is in the given position. Function check can be done by pressing and holding the button "RESET/TEST" for longer time. While holding the button, the damper blade moves in the direction of the failure position. Fault function is indicated by the LED pilot light. BKS 24-1B can be connected by means of ZSO-11 11 pole connector for DIN 35 mm panel.

Fig. 29 Communication and control device BKS 24-1B



Signals and diagnosis				
light diodes			contacts	Description
⊗ open	⊗ closed	⊗ alarm	state	Cause/Course
⊗ closed	⊗ closed	⊗ closed	6–3	**Power supply AC 24V**not available
⊗ open	⊗ open	⊗ open	6–3	**Check test cca 35sec**, starting with switching AC 24 on or pressing «Reset/Test» button
⊗ closed	⊗ closed	⊗ flashing	6–3	**Current failure,** possible cause: • short circuit or interruption of 2-conductor wiring or damper failure (at BKN..) • Power supply AC 230V missing • defective thermoelectrical starting • smoke detector activated • exceeded operation time • damper blocked
⊗ closed	⊗ closed	⊗ open	6–3	**Failure saved in memory** • Fault in system signalled, system check should be done
⊗ closed	⊗ flashing	⊗ closed	6–4	Damper (drive) turning into **the direction** of breakdown position
⊗ closed	⊗ open	⊗ closed	6–4	Damper (drive) in **breakdown position** I
⊗ flashing	⊗ closed	⊗ closed	6–7	Damper (drive) turning into **the direction** of operating position
⊗ open	⊗ closed	⊗ closed	6–7	Damper (drive) in **operating position** =

Tab. 3.1.1. 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
Degree of protection	IP 30
Ambient temperature	0 … + 50 °C
Connection	11-pole connector ZSO-11, it is not part of BKS24-1B, ZSO-11 is 11-pole screw terminal 11 x 1,5 mm²

3.2. BKS 24-9A communication and control device is used for group control and checks of 1 to 9 fire dampers with the actuating mechanism BF 24-T-ST (BFL 24-T-ST, BFN 24-T-ST) in connection with the supply and communication device BKN 230-24. Signalisation of the damper position is individual; the damper 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 damper 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 signaling of the flap position to the master device. Function of this auxiliary contact can be programmed through the terminal 14 according to the Tab. 3.2.1.

Tab. 3.2.1. BKS 24 -9A contacts K1 and K2

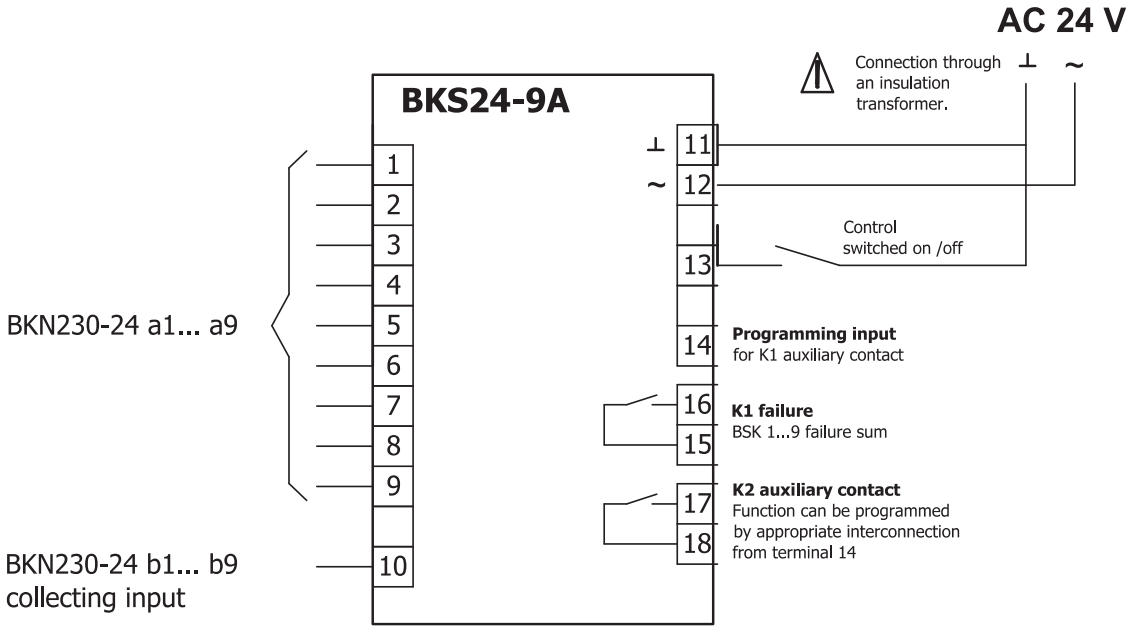
Function contact K1			**Programming K2 Auxiliary Contact**		
situation	**state**		**function**	**interconnection**	**state**
current failure	15 — 16		K2 contact is on if all the flaps are open	14 — 11	17 — 18
no failure	15 — 16		K2 contact is on if the flap No. 1 is open	14 — 12	
			K2 contact is on if all the flaps 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". Assembly and connection BKS 24 - 9A can be made by DIN 35 mm panel. It is connected by two 9-pole plug-in connectors.

Tab. 3.2.2. 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
Dimensioning	5,5 VA
Protection Class	III
Degree of protection	IP 30
Ambient temperature	0 … + 50 °C
Connection	terminal 2 x 1,5 mm²

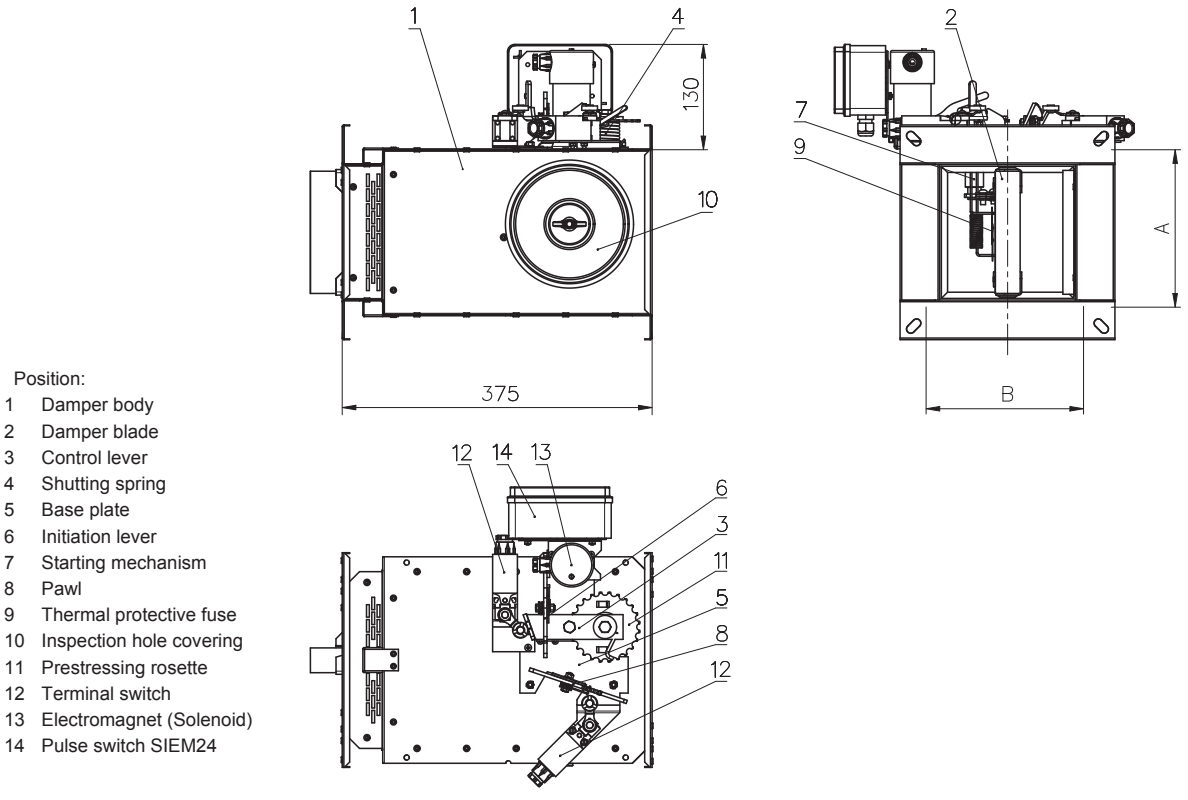
Fig. 30 Communication and control device BKS 24-9A



4. Dimensions, weights

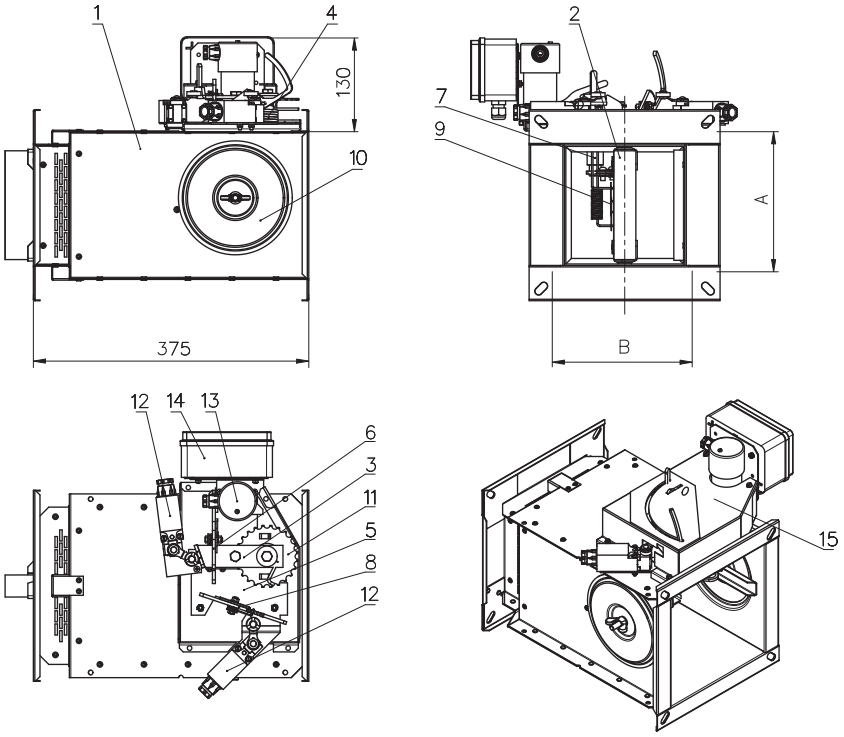
4.1. Rectangular dampers

Fig. 31 FDMB - design manual and thermal



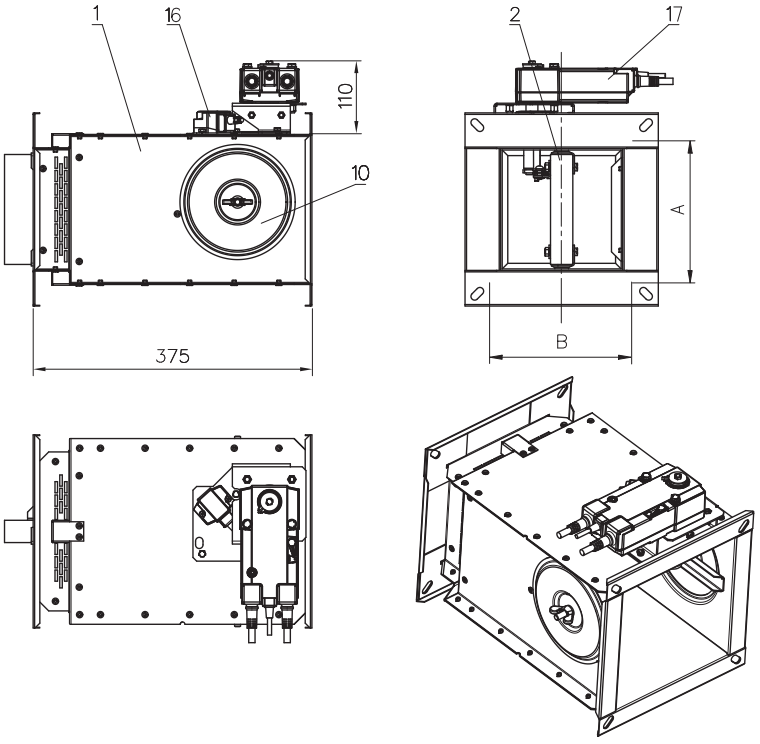
Position:
1 Damper body
2 Damper blade
3 Control lever
4 Shutting spring
5 Base plate
6 Initiation lever
7 Starting mechanism
8 Pawl
9 Thermal protective fuse
10 Inspection hole covering
11 Prestressing rosette
12 Terminal switch
13 Electromagnet (Solenoid)
14 Pulse switch SIEM24

Fig. 32 FDMB with covered control mechanism



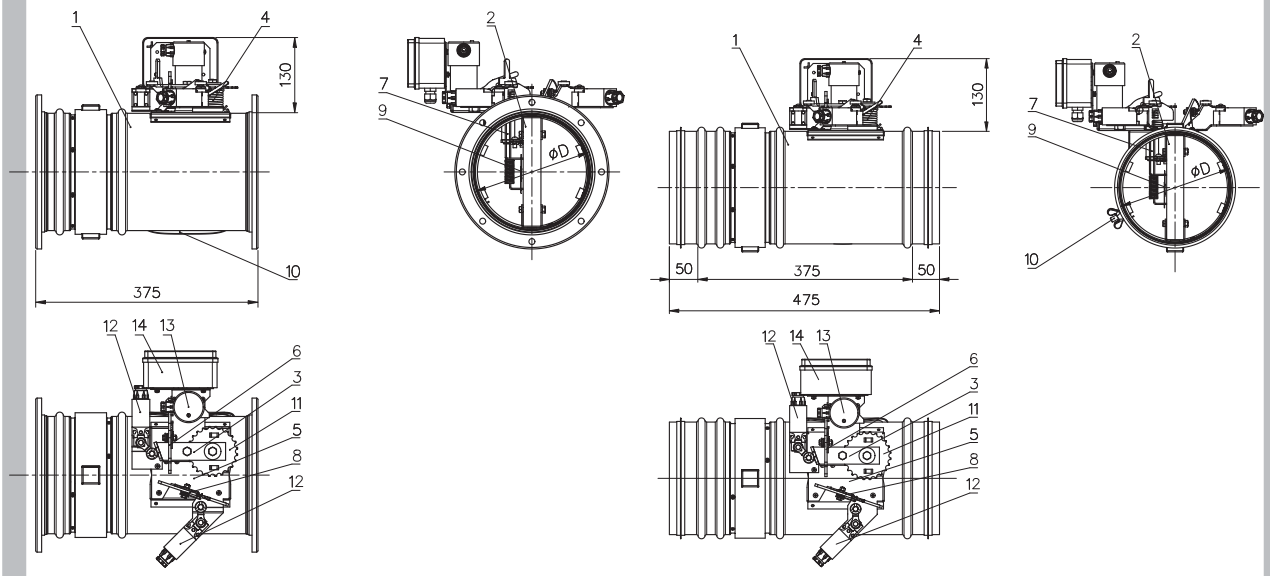
Position:
1 Damper body
2 Damper blade
3 Control lever
4 Shutting spring
5 Base plate
6 Initiation lever
7 Starting mechanism
8 Pawl
9 Thermal protective fuse
10 Inspection hole covering
11 Prestressing rosette
12 Terminal switch
13 Electromagnet (Solenoid)
14 Pulse switch SIEM24
15 Control mechanism cover

Fig. 33 FDMB - design with actuating mechanism



Position:
1 Damper body
2 Damper blade
10 Inspection hole covering
16 BAT thermoelectrical starting mechanism
17 Actuating mechanism

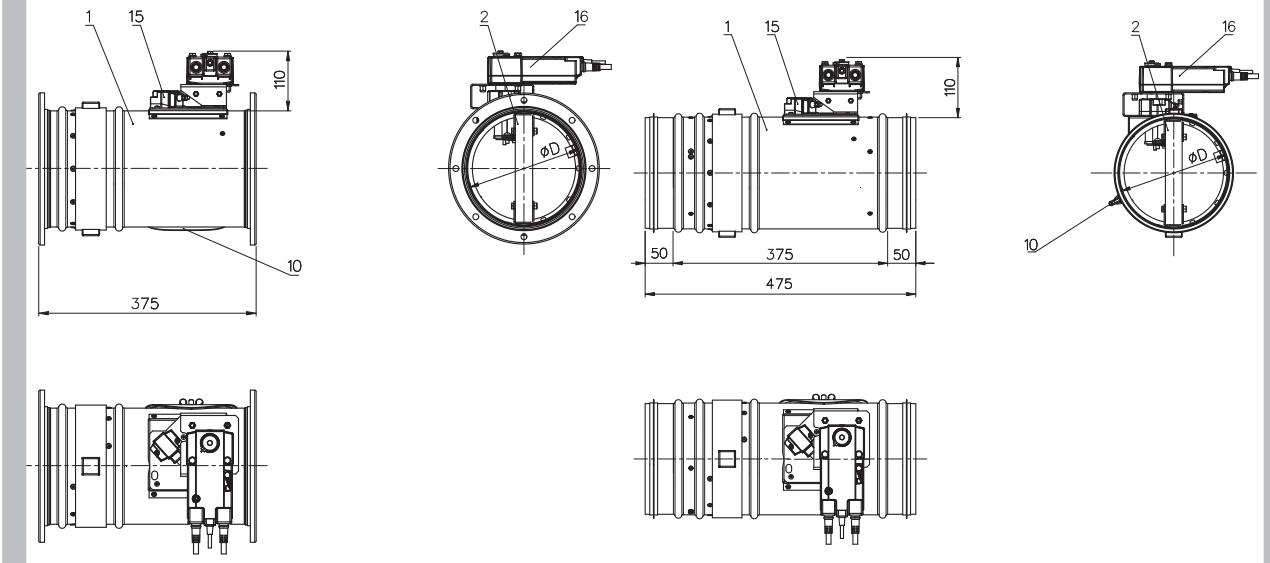
Fig. 34 FDMB - design manual and thermal



Position:

1	Damper body	4	Shutting spring	7	Starting mechanism	10	Inspection hole covering	13	Electromagnet (Solenoid)
2	Damper blade	5	Base plate	8	Pawl	11	Prestressing rosette	14	Pulse switch SIEM24
3	Control lever	6	Initiation lever	9	Thermal protective fuse	12	Terminal switch		

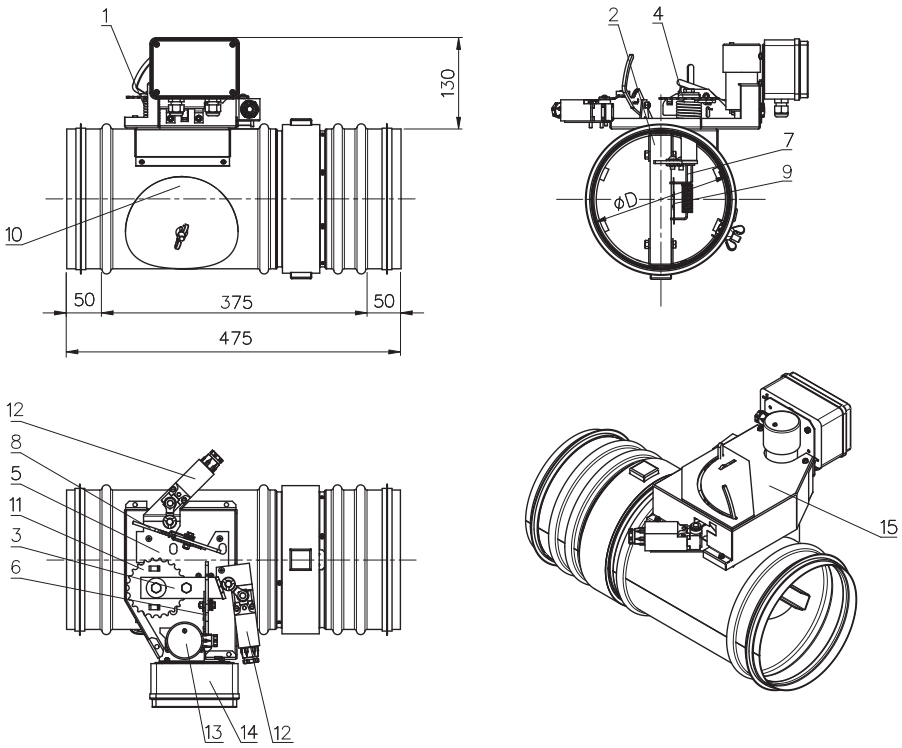
Fig. 35 FDMB - design with actuating mechanism



Position:

1	Damper body	15	BAT thermoelectrical starting mechanism
2	Damper blade	16	Actuating mechanism
10	Inspection hole covering		

Fig. 36 FDMB with covered control mechanism

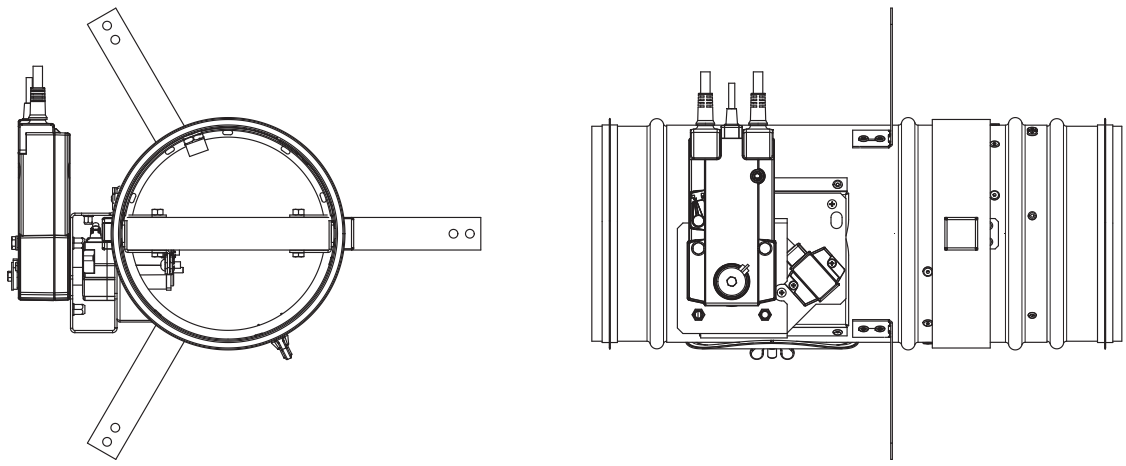


Position:

1 Damper body
2 Damper blade
3 Control lever
4 Shutting spring
5 Base plate
6 Initiation lever
7 Starting mechanism
8 Pawl
9 Thermal protective fuse
10 Inspection hole covering
11 Rosette
12 Limit switch
13 Elektromagnet (solenoid)
14 Pulse swith SIEM24
15 Control mechanism cover

4.3. Optional is possible use installation holders

Fig. 37 Fire damper FDMB - with installation holders



4.4. rectangular dampers - dimensions, weights and effective area

Tab. 4.4.1. rectangular dampers - dimensions, weights and effective area

A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type	A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
160 x 160	-	20	5,5	7,0	0,0113	BFL	**200 x 315**	-	97,5	8,0	9,5	0,0398	BFL
160 x 180	-	30	6,0	7,5	0,0137	BFL	**200 x 355**	-	117,5	9,0	10,5	0,0463	BFL
160 x 200	-	40	6,0	7,5	0,0161	BFL	**200 x 400**	-	140	9,5	11,0	0,0535	BFL
160 x 225	-	52,5	6,5	8,0	0,0191	BFL	**200 x 450**	-	165	10,0	13,0	0,0537	BFL
160 x 250	-	65	7,0	8,5	0,0222	BFL	**200 x 500**	-	190	10,5	13,5	0,0611	BFL
160 x 280	-	80	7,0	8,5	0,0258	BFL	**200 x 550**	-	215	11,5	14,5	0,0685	BFL
160 x 300	-	90,0	7,5	9,0	0,0282	BFL	**200 x 560**	-	220	11,5	14,5	0,0700	BFL
160 x 315	-	97,5	7,5	9,0	0,0300	BFL	**200 x 600**	-	240	12,0	15,0	0,0759	BFL
160 x 355	-	117,5	8,5	10,0	0,0349	BFL	**200 x 630**	-	255	12,5	15,5	0,0804	BFL
160 x 400	-	140	9,0	10,5	0,0403	BFL	**200 x 650**	-	265	12,5	15,5	0,0833	BFL
160 x 450	-	165	9,5	12,0	0,0392	BFL	**200 x 700**	-	290	13,0	16,0	0,0907	BFN
160 x 500	-	190	10,0	13,0	0,0446	BFL	**200 x 710**	-	295	13,5	16,5	0,0922	BFN
160 x 550	-	215	10,5	13,5	0,0500	BFL	**200 x 750**	15	315	14,0	17,0	0,0981	BFN
160 x 560	-	220	10,5	13,5	0,0511	BFL	**200 x 800**	40	340	14,5	17,5	0,1055	BFN
160 x 600	-	240	11,0	14,0	0,0554	BFL	**200 x 900**	90	390	15,5	18,5	0,1203	BFN
160 x 630	-	255	11,5	14,5	0,0586	BFL	**200 x 1000**	140	440	17,0	20,0	0,1351	BFN
160 x 650	-	265	11,5	14,5	0,0608	BFL	**225 x 160**	-	20	6,5	8,0	0,0171	BFL
160 x 700	-	290	12,5	15,5	0,0662	BFL	**225 x 180**	-	30	7,0	8,5	0,0209	BFL
160 x 710	-	295	12,5	15,5	0,0673	BFL	**225 x 200**	-	40	7,5	9,0	0,0246	BFL
160 x 750	15	315	13,0	16,0	0,0716	BFN	**225 x 225**	-	52,5	8,0	9,5	0,0292	BFL
160 x 800	40	340	13,5	16,5	0,0770	BFN	**225 x 250**	-	65	8,5	10,0	0,0339	BFL
160 x 900	90	390	14,5	17,5	0,0878	BFN	**225 x 280**	-	80	9,0	10,5	0,0395	BFL
160 x 1000	140	440	20,0	23,0	0,0986	BFN	**225 x 300**	-	90	9,5	11,0	0,0432	BFL
180 x 160	-	20	6,0	7,5	0,0131	BFL	**225 x 315**	-	97,5	9,5	11,0	0,0460	BFL
180 x 180	-	30	6,0	7,5	0,0159	BFL	**225 x 355**	-	117,5	10,0	11,5	0,0534	BFL
180 x 200	-	40	6,5	8,0	0,0187	BFL	**225 x 400**	-	140	10,5	12,0	0,0618	BFL
180 x 225	-	52,5	6,5	8,0	0,0222	BFL	**225 x 450**	-	165	11,5	13,0	0,0628	BFL
180 x 250	-	65	7,0	8,5	0,0258	BFL	**225 x 500**	-	190	12,5	14,0	0,0714	BFL
180 x 280	-	80	7,5	9,0	0,0300	BFL	**225 x 550**	-	215	13,5	15,0	0,0801	BFL
180 x 300	-	90	7,5	9,0	0,0328	BFL	**225 x 560**	-	220	13,5	15,0	0,0818	BFL
180 x 315	-	97,5	8,0	9,5	0,0349	BFL	**225 x 600**	-	240	14,0	15,5	0,0887	BFL
180 x 355	-	117,5	8,5	10,5	0,0406	BFL	**225 x 630**	-	255	14,5	16,0	0,0939	BFN
180 x 400	-	140	9,0	11,0	0,0469	BFL	**225 x 650**	-	265	15,0	16,5	0,0974	BFN
180 x 450	-	165	10,0	13,0	0,0465	BFL	**225 x 700**	-	290	16,0	17,5	0,1060	BFN
180 x 500	-	190	10,5	13,5	0,0529	BFL	**225 x 710**	-	295	16,0	17,5	0,1078	BFN
180 x 550	-	215	11,0	14,0	0,0593	BFL	**225 x 750**	15	315	16,5	18,0	0,1147	BFN
180 x 560	-	220	11,0	14,0	0,0605	BFL	**225 x 800**	40	340	17,5	19,0	0,1233	BFN
180 x 600	-	240	11,5	14,5	0,0657	BFL	**225 x 900**	90	390	19,0	22,0	0,1406	BFN
180 x 630	-	255	12,0	15,0	0,0695	BFL	**225 x 1000**	140	440	20,5	23,5	0,1579	BF
180 x 650	-	265	12,0	15,0	0,0721	BFL	**250 x 160**	-	20	6,5	8,0	0,0194	BFL
180 x 700	-	290	13,0	16,0	0,0785	BFN	**250 x 180**	-	30	7,0	8,5	0,0236	BFL
180 x 710	-	295	13,0	16,0	0,0797	BFN	**250 x 200**	-	40	7,0	8,5	0,0278	BFL
180 x 750	15	315	13,5	16,5	0,0849	BFN	**250 x 225**	-	52,5	7,5	9,0	0,0331	BFL
180 x 800	40	340	14,0	17,0	0,0913	BFN	**250 x 250**	-	65,0	8,0	9,5	0,0384	BFL
180 x 900	90	390	15,0	18,0	0,1041	BFN	**250 x 280**	-	80	8,5	10,0	0,0447	BFL
180 x 1000	140	440	20,5	23,5	0,1169	BFN	**250 x 300**	-	90	8,5	10,0	0,0489	BFL
200 x 160	-	20	6,0	7,5	0,0149	BFL	**250 x 315**	-	97,5	9,0	10,5	0,0521	BFL
200 x 180	-	30	6,5	8,0	0,0181	BFL	**250 x 355**	-	117,5	9,5	11,5	0,0605	BFL
200 x 200	-	40	6,5	8,0	0,0213	BFL	**250 x 400**	-	140	10,5	12,0	0,0700	BFL
200 x 225	-	52,5	7,0	8,5	0,0253	BFL	**250 x 450**	-	165	11,0	14,0	0,0719	BFL
200 x 250	-	65	7,5	9,0	0,0294	BFL	**250 x 500**	-	190	11,5	14,5	0,0818	BFL
200 x 280	-	80	7,5	9,0	0,0342	BFL	**250 x 550**	-	215	12,5	15,5	0,0917	BFL
200 x 300	-	90	8,0	9,5	0,0374	BFL	**250 x 560**	-	220	12,5	15,5	0,0937	BFL

A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type	A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
250 x 600	-	240	13,0	16,0	0,1016	BFN	**315 x 180**	-	30	9,0	10,5	0,0308	BFL
250 x 630	-	255	13,5	16,5	0,1075	BFN	**315 x 200**	-	40	9,5	11,0	0,0363	BFL
250 x 650	-	265	13,5	16,5	0,1115	BFN	**315 x 225**	-	52,5	9,5	11,5	0,0432	BFL
250 x 700	-	290	14,5	17,5	0,1214	BFN	**315 x 250**	-	65	10,0	12,0	0,0501	BFL
250 x 710	-	295	14,5	17,5	0,1234	BFN	**315 x 280**	-	80	10,5	12,0	0,0584	BFL
250 x 750	15	315	15,0	18,0	0,1313	BFN	**315 x 300**	-	90	11,0	12,5	0,0639	BFL
250 x 800	40	340	15,5	18,5	0,1412	BFN	**315 x 315**	-	97,5	11,5	13,0	0,0680	BFL
250 x 900	90	390	17,0	20,0	0,1610	BFN	**315 x 355**	-	117,5	12,0	13,5	0,0791	BFL
250 x 1000	140	440	18,5	21,5	0,1808	BF	**315 x 400**	-	140	13,0	14,5	0,0915	BFL
280 x 160	-	20	7,0	8,5	0,0221	BFL	**315 x 450**	-	165	13,5	16,5	0,0955	BFL
280 x 180	-	30	7,0	9,0	0,0269	BFL	**315 x 500**	-	190	14,5	17,5	0,1086	BFL
280 x 200	-	40	7,5	9,0	0,0317	BFL	**315 x 550**	-	215	15,0	18,0	0,1218	BFN
280 x 225	-	52,5	8,0	9,5	0,0377	BFL	**315 x 560**	-	220	15,0	18,0	0,1244	BFN
280 x 250	-	65	8,5	10,0	0,0438	BFL	**315 x 600**	-	240	15,5	18,5	0,1349	BFN
280 x 280	-	80	8,5	10,5	0,0510	BFL	**315 x 630**	-	255	16,0	19,0	0,1428	BFN
280 x 300	-	90	9,0	10,5	0,0558	BFL	**315 x 650**	-	265	16,5	19,5	0,1481	BFN
280 x 315	-	97,5	9,0	11,0	0,0594	BFL	**315 x 700**	-	290	17,5	20,5	0,1612	BFN
280 x 355	-	117,5	10,0	12,0	0,0691	BFL	**315 x 710**	-	295	17,5	20,5	0,1638	BFN
280 x 400	-	140	11,0	12,5	0,0799	BFL	**315 x 750**	15	315	18,0	21,0	0,1744	BFN
280 x 450	-	165	11,5	14,5	0,0828	BFL	**315 x 800**	40	340	18,5	21,5	0,1875	BFN
280 x 500	-	190	12,0	15,0	0,0942	BFL	**315 x 900**	90	390	20,0	23,0	0,2138	BF
280 x 550	-	215	13,0	16,0	0,1056	BFL	**315 x 1000**	140	440	21,5	24,5	0,2401	BF
280 x 560	-	220	13,0	16,0	0,1078	BFN	**355 x 160**	-	20	7,5	9,5	0,0288	BFL
280 x 600	-	240	13,5	16,5	0,1170	BFN	**355 x 180**	-	30	8,0	9,5	0,0352	BFL
280 x 630	-	255	14,0	17,0	0,1238	BFN	**355 x 200**	-	40	8,5	10,0	0,0415	BFL
280 x 650	-	265	14,5	17,5	0,1284	BFN	**355 x 225**	-	52,5	9,0	10,5	0,0494	BFL
280 x 700	-	290	15,0	18,0	0,1398	BFN	**355 x 250**	-	65	9,5	11,0	0,0573	BFL
280 x 710	-	295	15,0	18,0	0,1420	BFN	**355 x 280**	-	80	10,0	11,5	0,0668	BFL
280 x 750	15	315	15,5	18,5	0,1512	BFN	**355 x 300**	-	90	10,0	11,5	0,0731	BFL
280 x 800	40	340	16,5	19,5	0,1626	BFN	**355 x 315**	-	97,5	11,0	12,0	0,0778	BFL
280 x 900	90	390	18,0	21,0	0,1854	BF	**355 x 355**	-	117,5	11,5	13,0	0,0905	BFL
280 x 1000	140	440	23,5	26,5	0,2082	BF	**355 x 400**	-	140	12,0	13,5	0,1047	BFL
300 x 160	-	20	7,0	8,5	0,0239	BFL	**355 x 450**	-	165	13,0	16,0	0,1100	BFL
300 x 180	-	30	7,5	9,0	0,0291	BFL	**355 x 500**	-	190	13,5	16,5	0,1251	BFN
300 x 200	-	40	7,5	9,5	0,0343	BFL	**355 x 550**	-	215	14,5	17,5	0,1403	BFN
300 x 225	-	52,5	8,0	9,5	0,0408	BFL	**355 x 560**	-	220	14,5	17,5	0,1433	BFN
300 x 250	-	65	8,5	10,0	0,0474	BFL	**355 x 600**	-	240	15,0	18,0	0,1554	BFN
300 x 280	-	80	9,0	10,5	0,0552	BFL	**355 x 630**	-	255	15,5	18,5	0,1645	BFN
300 x 300	-	90	9,5	11,0	0,0604	BFL	**355 x 650**	-	265	16,0	19,0	0,1706	BFN
300 x 315	-	97,5	9,5	11,0	0,0643	BFL	**355 x 700**	-	290	17,0	20,0	0,1857	BFN
300 x 355	-	117,5	10,5	12,0	0,0748	BFL	**355 x 710**	-	295	17,0	20,0	0,1888	BFN
300 x 400	-	140	11,0	12,5	0,0865	BFL	**355 x 750**	15	315	17,5	20,5	0,2009	BFN
300 x 450	-	165	12,0	15,0	0,0900	BFL	**355 x 800**	40	340	18,5	21,5	0,2160	BF
300 x 500	-	190	12,5	15,5	0,1024	BFL	**355 x 900**	90	390	20,0	23,0	0,2463	BF
300 x 550	-	215	13,5	16,5	0,1148	BFN	**355 x 1000**	140	440	21,5	24,5	0,2766	BF
300 x 560	-	220	13,5	16,5	0,1173	BFN	**400 x 160**	-	20	8,0	10,0	0,0329	BFL
300 x 600	-	240	14,0	17,0	0,1272	BFN	**400 x 180**	-	30	8,5	10,0	0,0401	BFL
300 x 630	-	255	14,5	17,5	0,1347	BFN	**400 x 200**	-	40	9,0	10,5	0,0473	BFL
300 x 650	-	265	14,5	17,5	0,1396	BFN	**400 x 225**	-	52,5	9,5	11,0	0,0563	BFL
300 x 700	-	290	15,5	18,5	0,1520	BFN	**400 x 250**	-	65	10,0	11,5	0,0654	BFL
300 x 710	-	295	15,5	18,5	0,1545	BFN	**400 x 280**	-	80	10,5	12,0	0,0762	BFL
300 x 750	15	315	16,0	19,0	0,1644	BFN	**400 x 300**	-	90	10,5	12,5	0,0834	BFL
300 x 800	40	340	17,0	20,0	0,1768	BFN	**400 x 315**	-	97,5	11,0	12,5	0,0888	BFL
300 x 900	90	390	18,5	21,5	0,2016	BF	**400 x 355**	-	117,5	12,0	13,5	0,1033	BFL
300 x 1000	140	440	20,0	23,0	0,2264	BF	**400 x 400**	-	140	13,0	14,5	0,1195	BFL
315 x 160	-	20	8,5	10,5	0,0252	BFL	**400 x 450**	-	165	13,5	16,5	0,1263	BFL

A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type	A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
400 x 500	-	190	14,5	17,5	0,1437	BFN	**500 x 750**	15	315	21,0	24,0	0,2970	BF
400 x 550	-	215	15,5	18,5	0,1611	BFN	**500 x 800**	40	340	22,0	25,0	0,3194	BF
400 x 560	-	220	15,5	18,5	0,1646	BFN	**500 x 900**	90	390	24,0	27,0	0,3642	BF
400 x 600	-	240	16,0	19,0	0,1785	BFN	**500 x 1000**	140	440	25,5	28,5	0,4090	BF
400 x 630	-	255	16,5	19,5	0,1890	BFN	**550 x 160**	-	20	10,0	13,0	0,0364	BFL
400 x 650	-	265	17,0	20,0	0,1959	BFN	**550 x 180**	-	30	10,5	13,5	0,0463	BFL
400 x 700	-	290	18,0	21,0	0,2133	BFN	**550 x 200**	-	40	10,5	13,5	0,0563	BFL
400 x 710	-	295	18,0	21,0	0,2168	BFN	**550 x 225**	-	52,5	11,0	14,0	0,0687	BFL
400 x 750	15	315	18,5	21,5	0,2307	BF	**550 x 250**	-	65	12,0	15,0	0,0812	BFL
400 x 800	40	340	19,5	22,5	0,2481	BF	**550 x 280**	-	80	12,5	15,5	0,0961	BFL
400 x 900	90	390	21,0	24,0	0,2829	BF	**550 x 300**	-	90	13,0	16,0	0,1061	BFL
400 x 1000	140	440	23,0	26,0	0,3177	BF	**550 x 315**	-	97,5	13,0	16,0	0,1135	BFL
450 x 160	-	20	9,0	10,5	0,0374	BFL	**550 x 355**	-	117,5	14,5	17,5	0,1335	BFL
450 x 180	-	30	9,0	10,5	0,0456	BFL	**550 x 400**	-	140	15,0	18,0	0,1559	BFN
450 x 200	-	40	9,5	11,0	0,0538	BFL	**550 x 450**	-	165	16,0	19,0	0,1808	BFN
450 x 225	-	52,5	10,0	11,5	0,0641	BFL	**550 x 500**	-	190	17,0	20,0	0,2057	BFN
450 x 250	-	65	10,5	12,0	0,0744	BFL	**550 x 550**	-	215	18,0	21,0	0,2306	BFN
450 x 280	-	80	11,0	12,5	0,0867	BFL	**550 x 560**	-	220	18,5	21,5	0,2356	BFN
450 x 300	-	90	11,5	13,0	0,0949	BFL	**550 x 600**	-	240	19,0	22,0	0,2555	BFN
450 x 315	-	97,5	11,5	13,5	0,1011	BFL	**550 x 630**	-	255	20,0	23,0	0,2704	BF
450 x 355	-	117,5	13,0	14,5	0,1175	BFL	**550 x 650**	-	265	20,0	23,0	0,2804	BF
450 x 400	-	140	13,5	15,0	0,1360	BFL	**550 x 700**	-	290	21,5	24,5	0,3053	BF
450 x 450	-	165	14,5	17,5	0,1445	BFN	**550 x 710**	-	295	21,5	24,5	0,3103	BF
450 x 500	-	190	15,5	18,5	0,1644	BFN	**550 x 750**	15	315	22,0	25,0	0,3302	BF
450 x 550	-	215	16,5	19,5	0,1843	BFN	**550 x 800**	40	340	23,0	26,0	0,3551	BF
450 x 560	-	220	16,5	19,5	0,1883	BFN	**550 x 900**	90	390	25,0	28,0	0,4049	BF
450 x 600	-	240	17,0	20,0	0,2042	BFN	**560 x 160**	-	20	10,0	13,0	0,0371	BFL
450 x 630	-	255	17,5	20,5	0,2161	BFN	**560 x 180**	-	30	10,5	13,5	0,0472	BFL
450 x 650	-	265	18,0	21,0	0,2241	BFN	**560 x 200**	-	40	11,0	14,0	0,0574	BFL
450 x 700	-	290	19,0	22,0	0,2440	BF	**560 x 225**	-	52,5	11,5	14,5	0,0701	BFL
450 x 710	-	295	19,0	22,0	0,2480	BF	**560 x 250**	-	65	12,0	15,0	0,0828	BFL
450 x 750	15	315	20,0	23,0	0,2639	BF	**560 x 280**	-	80	12,5	15,5	0,0980	BFL
450 x 800	40	340	20,5	23,5	0,2838	BF	**560 x 300**	-	90	13,0	16,0	0,1082	BFL
450 x 900	90	390	22,5	25,5	0,3236	BF	**560 x 315**	-	97,5	13,0	16,0	0,1158	BFL
450 x 1000	140	440	24,0	27,0	0,3634	BF	**560 x 355**	-	117,5	14,5	17,5	0,1361	BFL
500 x 160	-	20	9,5	11,0	0,0419	BFL	**560 x 400**	-	140	15,5	18,5	0,1590	BFN
500 x 180	-	30	9,5	11,5	0,0511	BFL	**560 x 450**	-	165	16,5	19,5	0,1844	BFN
500 x 200	-	40	10,0	11,5	0,0603	BFL	**560 x 500**	-	190	17,5	20,5	0,2098	BFN
500 x 225	-	52,5	10,5	12,5	0,0718	BFL	**560 x 550**	-	215	18,5	21,5	0,2352	BFN
500 x 250	-	65	11,0	13,0	0,0834	BFL	**560 x 560**	-	220	18,5	21,5	0,2403	BFN
500 x 280	-	80	11,5	13,5	0,0972	BFL	**560 x 600**	-	240	19,5	22,5	0,2606	BFN
500 x 300	-	90	12,0	13,5	0,1064	BFL	**560 x 630**	-	255	20,0	23,0	0,2758	BF
500 x 315	-	97,5	12,5	14,0	0,1133	BFL	**560 x 650**	-	265	20,5	23,5	0,2860	BF
500 x 355	-	117,5	13,5	15,0	0,1318	BFL	**560 x 700**	-	290	21,5	24,5	0,3114	BF
500 x 400	-	140	14,5	16,0	0,1525	BFL	**560 x 710**	-	295	21,5	24,5	0,3165	BF
500 x 450	-	165	15,5	18,5	0,1626	BFN	**560 x 750**	15	315	22,5	25,5	0,3368	BF
500 x 500	-	190	16,5	19,5	0,1850	BFN	**560 x 800**	40	340	23,5	26,5	0,3622	BF
500 x 550	-	215	17,0	20,0	0,2074	BFN	**600 x 160**	-	20	10,5	13,5	0,0400	BFL
500 x 560	-	220	17,5	20,5	0,2119	BFN	**600 x 180**	-	30	11,0	14,0	0,0510	BFL
500 x 600	-	240	18,0	21,0	0,2298	BFN	**600 x 200**	-	40	11,0	14,0	0,0619	BFL
500 x 630	-	255	19,0	22,0	0,2433	BFN	**600 x 225**	-	52,5	12,0	15,0	0,0756	BFL
500 x 650	-	265	19,0	22,0	0,2522	BF	**600 x 250**	-	65	12,5	15,5	0,0893	BFL
500 x 700	-	290	20,0	23,0	0,2746	BF	**600 x 280**	-	80	13,0	16,0	0,1058	BFL
500 x 710	-	295	20,5	23,5	0,2791	BF	**600 x 300**	-	90	13,5	16,5	0,1167	BFL

A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type	A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
600 x 315	-	97,5	14,0	17,0	0,1249	BFL	**650 x 750**	15	315	24,5	27,5	0,3965	BF
600 x 355	-	117,5	15,0	18,0	0,1469	BFL	**700 x 160**	-	20	11,5	14,5	0,0473	BFL
600 x 400	-	140	16,0	19,0	0,1715	BFN	**700 x 180**	-	30	12,0	15,0	0,0603	BFL
600 x 450	-	165	17,0	20,0	0,1989	BFN	**700 x 200**	-	40	12,5	15,5	0,0732	BFL
600 x 500	-	190	18,0	21,0	0,2263	BFN	**700 x 225**	-	52,5	13,0	16,0	0,0894	BFL
600 x 550	-	215	19,0	22,0	0,2537	BFN	**700 x 250**	-	65	13,5	16,5	0,1056	BFL
600 x 560	-	220	19,5	22,5	0,2592	BFN	**700 x 280**	-	80	14,5	17,5	0,1251	BFL
600 x 600	-	240	20,5	23,5	0,2811	BF	**700 x 300**	-	90	15,0	18,0	0,1380	BFL
600 x 630	-	255	21,0	24,0	0,2976	BF	**700 x 315**	-	97,5	15,5	18,5	0,1477	BFL
600 x 650	-	265	21,5	24,5	0,3085	BF	**700 x 355**	-	117,5	16,5	19,5	0,1737	BFN
600 x 700	-	290	22,5	25,5	0,3359	BF	**700 x 400**	-	140	17,5	20,5	0,2028	BFN
600 x 710	-	295	22,5	25,5	0,3414	BF	**700 x 450**	-	165	19,0	22,0	0,2352	BFN
600 x 750	15	315	23,5	26,5	0,3633	BF	**700 x 500**	-	190	20,5	23,5	0,2676	BFN
600 x 800	40	340	24,5	27,5	0,3907	BF	**700 x 550**	-	215	22,0	26,5	0,3000	BF
630 x 160	-	20	10,5	13,5	0,0422	BFL	**700 x 560**	-	220	22,5	27,0	0,3065	BF
630 x 180	-	30	11,0	14,0	0,0538	BFL	**700 x 600**	-	240	23,5	28,0	0,3324	BF
630 x 200	-	40	11,5	14,5	0,0653	BFL	**700 x 630**	-	255	24,5	29,0	0,3519	BF
630 x 225	-	52,5	12,0	15,0	0,0798	BFL	**700 x 650**	-	265	25,0	29,5	0,3648	BF
630 x 250	-	65	13,0	16,0	0,0942	BFL	**700 x 700**	-	290	26,5	31,0	0,3972	BF
630 x 280	-	80	13,5	16,5	0,1116	BFL	**700 x 710**	-	295	27,0	31,5	0,4037	BF
630 x 300	-	90	14,0	17,0	0,1231	BFL	**710 x 160**	-	20	11,5	15,5	0,0480	BFL
630 x 315	-	97,5	14,0	17,0	0,1318	BFL	**710 x 180**	-	30	12,0	16,0	0,0612	BFL
630 x 355	-	117,5	15,5	18,5	0,1549	BFL	**710 x 200**	-	40	12,5	15,5	0,0744	BFL
630 x 400	-	140	16,5	19,5	0,1809	BFN	**710 x 225**	-	52,5	13,0	16,0	0,0908	BFL
630 x 450	-	165	17,5	20,5	0,2098	BFN	**710 x 250**	-	65	14,0	17,0	0,1073	BFL
630 x 500	-	190	18,5	21,5	0,2387	BFN	**710 x 280**	-	80	14,5	17,5	0,1270	BFL
630 x 550	-	215	20,0	23,0	0,2676	BFN	**710 x 300**	-	90	15,0	18,0	0,1402	BFL
630 x 560	-	220	20,0	23,0	0,2734	BFN	**710 x 315**	-	97,5	15,5	18,5	0,1500	BFL
630 x 600	-	240	21,0	24,0	0,2965	BF	**710 x 355**	-	117,5	17,0	20,0	0,1763	BFN
630 x 630	-	255	21,5	24,5	0,3139	BF	**710 x 400**	-	140	18,0	21,0	0,2060	BFN
630 x 650	-	265	22,0	25,0	0,3254	BF	**710 x 450**	-	165	19,0	22,0	0,2389	BFN
630 x 700	-	290	23,5	26,5	0,3543	BF	**710 x 500**	-	190	20,0	23,0	0,2718	BFN
630 x 710	-	295	23,5	26,5	0,3601	BF	**710 x 550**	-	215	21,5	24,5	0,3047	BF
630 x 750	15	315	24,0	27,0	0,3832	BF	**710 x 560**	-	220	21,5	24,5	0,3112	BF
650 x 160	-	20	11,0	14,0	0,0437	BFL	**710 x 600**	-	240	22,5	25,5	0,3376	BF
650 x 180	-	30	11,5	14,5	0,0556	BFL	**710 x 630**	-	255	23,5	26,5	0,3573	BF
650 x 200	-	40	12,0	15,0	0,0676	BFL	**710 x 650**	-	265	23,5	26,5	0,3705	BF
650 x 225	-	52,5	12,5	15,5	0,0825	BFL	**710 x 700**	-	290	25,0	28,0	0,4034	BF
650 x 250	-	65	13,0	16,0	0,0975	BFL	**750 x 160**	-	20	12,0	15,0	0,0510	BFL
650 x 280	-	80	14,0	17,0	0,1154	BFL	**750 x 180**	-	30	12,5	15,5	0,0649	BFL
650 x 300	-	90	14,0	17,0	0,1274	BFL	**750 x 200**	-	40	13,0	16,0	0,0789	BFL
650 x 315	-	97,5	14,5	17,5	0,1363	BFL	**750 x 225**	-	52,5	13,5	16,5	0,0963	BFL
650 x 355	-	117,5	16,0	19,0	0,1603	BFL	**750 x 250**	-	65	14,5	17,5	0,1138	BFL
650 x 400	-	140	17,0	20,0	0,1872	BFN	**750 x 280**	-	80	15,0	18,0	0,1347	BFL
650 x 450	-	165	18,0	21,0	0,2171	BFN	**750 x 300**	-	90	15,5	18,5	0,1487	BFL
650 x 500	-	190	19,0	22,0	0,2470	BFN	**750 x 315**	-	97,5	16,0	19,0	0,1591	BFL
650 x 550	-	215	20,0	23,0	0,2769	BFN	**750 x 355**	-	117,5	17,5	20,5	0,1871	BFN
650 x 560	-	220	20,5	23,5	0,2829	BF	**750 x 400**	-	140	18,5	21,5	0,2185	BFN
650 x 600	-	240	21,5	24,5	0,3068	BF	**750 x 450**	-	165	19,5	22,5	0,2534	BFN
650 x 630	-	255	22,0	25,0	0,3247	BF	**750 x 500**	-	190	21,0	24,0	0,2883	BFN
650 x 650	-	265	22,5	25,5	0,3367	BF	**750 x 550**	-	215	22,0	25,0	0,3232	BF
650 x 700	-	290	23,5	26,5	0,3666	BF	**750 x 560**	-	220	22,5	25,5	0,3302	BF
650 x 710	-	295	24,0	27,0	0,3726	BF	**750 x 600**	-	240	23,5	26,5	0,3581	BF

A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type	A x B	a	c	Weight		Effective area S_{ef} [m²]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
750 x 630	-	255	24,0	27,0	0,3790	BF	**900 x 250**	-	65	16,5	19,5	0,1382	BFL
750 x 650	-	265	24,5	27,5	0,3930	BF	**900 x 280**	-	80	17,0	20,0	0,1637	BFL
800 x 160	-	20	12,5	15,5	0,0546	BFL	**900 x 300**	-	90	17,5	20,5	0,1806	BFL
800 x 180	-	30	13,0	16,0	0,0696	BFL	**900 x 315**	-	97,5	18,0	21,0	0,1933	BFN
800 x 200	-	40	13,5	16,5	0,0845	BFL	**900 x 355**	-	117,5	19,5	22,5	0,2273	BFN
800 x 225	-	52,5	14,5	17,5	0,1032	BFL	**900 x 400**	-	140	21,0	24,0	0,2654	BFN
800 x 250	-	65	15,0	18,0	0,1219	BFL	**900 x 450**	-	165	22,5	25,5	0,3078	BFN
800 x 280	-	80	16,0	19,0	0,1444	BFL	**900 x 500**	-	190	23,5	26,5	0,3502	BF
800 x 300	-	90	16,5	19,5	0,1593	BFL	**900 x 550**	-	215	25,0	28,0	0,3926	BF
800 x 315	-	97,5	16,5	19,5	0,1705	BFL	**1000 x 160**	-	20	15,0	18,0	0,0692	BFL
800 x 355	-	117,5	18,0	21,0	0,2005	BFN	**1000 x 180**	-	30	15,5	18,5	0,0882	BFL
800 x 400	-	140	19,5	22,5	0,2341	BFN	**1000 x 200**	-	40	16,0	19,0	0,1071	BFL
800 x 450	-	165	20,5	23,5	0,2715	BFN	**1000 x 225**	-	52,5	17,0	20,0	0,1308	BFL
800 x 500	-	190	22,0	25,0	0,3089	BFN	**1000 x 250**	-	65	17,5	20,5	0,1545	BFL
800 x 550	-	215	23,0	26,0	0,3463	BF	**1000 x 280**	-	80	18,5	21,5	0,183	BFL
800 x 560	-	220	23,5	26,5	0,3538	BF	**1000 x 300**	-	90	19,0	22,0	0,2019	BFN
800 x 600	-	240	24,5	27,5	0,3837	BF	**1000 x 315**	-	97,5	19,5	22,5	0,2161	BFN
900 x 160	-	20	13,5	16,5	0,0619	BFL	**1000 x 355**	-	117,5	21,0	24,0	0,2541	BFN
900 x 180	-	30	14,0	17,0	0,0789	BFL	**1000 x 400**	-	140	22,5	25,5	0,2967	BFN
900 x 200	-	40	15,0	18,0	0,0958	BFL	**1000 x 450**	-	165	24,0	27,0	0,3441	BFN
900 x 225	-	52,5	15,5	18,5	0,1170	BFL	**1000 x 500**	-	190	25,5	28,5	0,3915	BF

4.5. Round dampers - weight and dimensions

Tab. 4.5.1. Round dampers - weight and dimension

Nominal size ⌀D	a	c	f	Weight		Effective area S_{ef} [m²]	Actuating mechanism type
				design			
				manual	act. mechan.		
160	-	-	-	5,6	7,2	0,0132	BFL
180	-	-	-	6,7	8,3	0,0176	BFL
200	-	-	-	7,7	9,3	0,0227	BFL
225	-	12,5	-	8,2	9,8	0,0299	BFL
250	-	25	-	8,7	10,3	0,0380	BFL
280	-	40	-	9,6	11,2	0,0492	BFL
315	-	57,5	7,5	10,6	12,2	0,0639	BFL
355	-	77,5	27,5	12,6	14,2	0,0831	BFL
400	-	100	50	14,5	17,5	0,1078	BFL
450	-	125	75	16,4	19,4	0,1389	BFN
500	-	150	100	19,4	22,4	0,1739	BFN
560	-	180	130	22,3	25,3	0,2211	BFN
630	24	215	165	26,2	29,2	0,2833	BF

4.6. Blades overlaps

Tab. 4.6.1 Blades overlaps

Blades overlaps		Dimension	Overlaps
RECTANGULAR DAMPERS Fig. 38a	Act. mechanism side	"a"	Tab. 4.4.1
	Side without act. mechanism	"c"	Tab. 4.4.1
ROUND DAMPERS Fig. 38b	Act. mechanism side	"a"	Tab. 4.5.1
	Side without act. mechanism	"c"	Tab. 4.5.1
ROUND DAMPERS SPIRO Fig. 38c	Side without act. mechanism	"f"	Tab. 4.5.1

These values has to be respected when projecting related air-conditioning ducts.

Fig. 38a Blade overlaps - rectangular damper

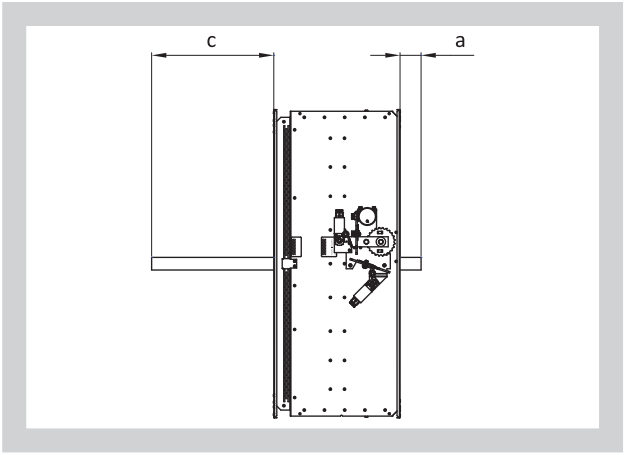


Fig. 38b Blade overlaps - round damper

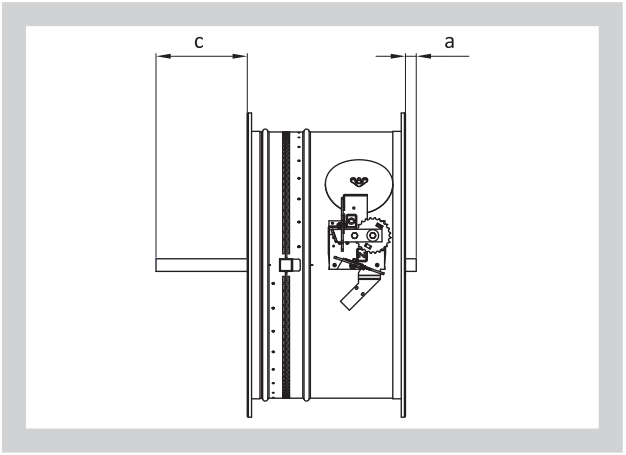
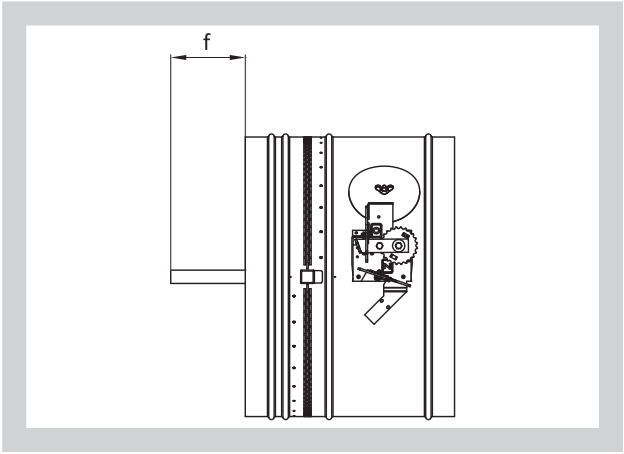


Fig. 38c Blade overlaps - round damper SPIRO



4.7. For the design .60 (with BKN supply and communication device) add to weight of the damper with an actuating mechanism (from the Tab. 4.4.1. and Tab 4.5.1.) the weight of BKN (0.5 kg).

4.8. Rectangular dampers can be supplied on the customer´s demands in all subdimension of the above mentioned range.

4.9. Flanges of rectangular fire dampers are 30 mm wide with oval hole (Fig. 39).
Dimensions of damper connecting flanges are in accordance with EN 12 220.
In case of damper installation into SPIRO duct, round dampers are supplied without the flanges so as it is possible to connect them with external joints (it is necessary to specify this requirement in the order). Damper length for SPIRO duct is 475 mm (Fig. 40).

Fig. 39 Flage of rectangular damper

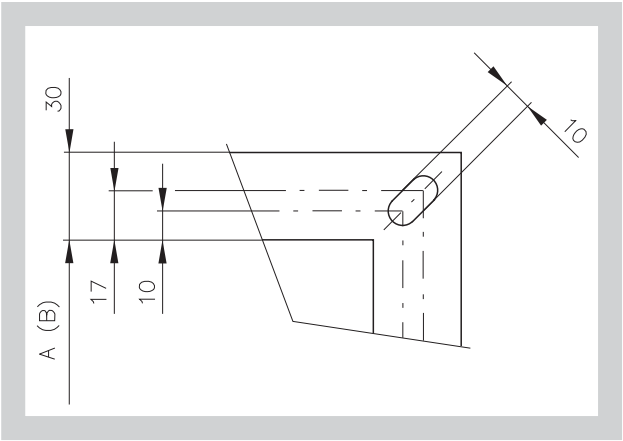
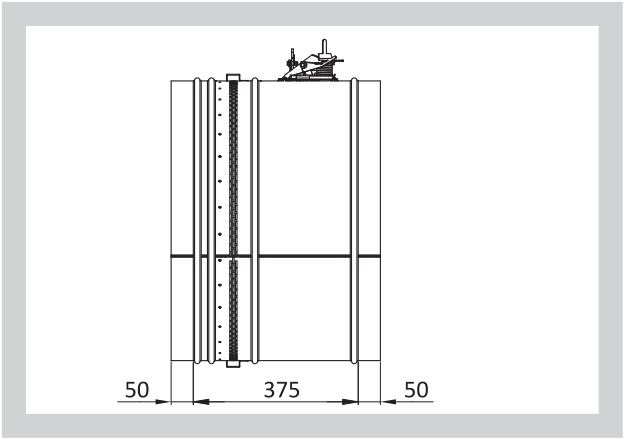


Fig. 40 Damper for SPIRO duct



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.

Damper blade has to be inside of construction (labelled with BUILD IN EDGE on the damper body) after installation. The fire damper can also be installed outside the wall construction. Duct and the damper part between the wall construction and the damper blade (labelled with BUILD IN EDGE on the protective covering) must be protected with firefighting insulation (see fig. 42).

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.
Exceptions are given in chapter 6.

Fig. 41 The distance between the fire damper and the construction

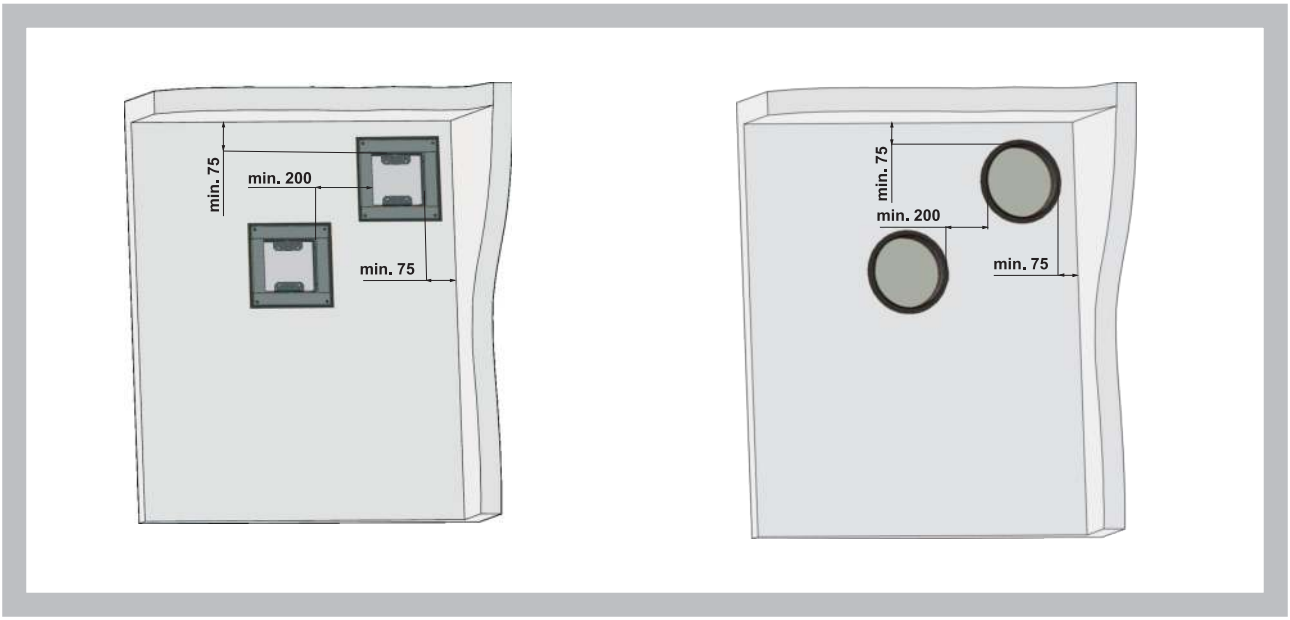


Fig. 42 Built in edge - rectangular dampers

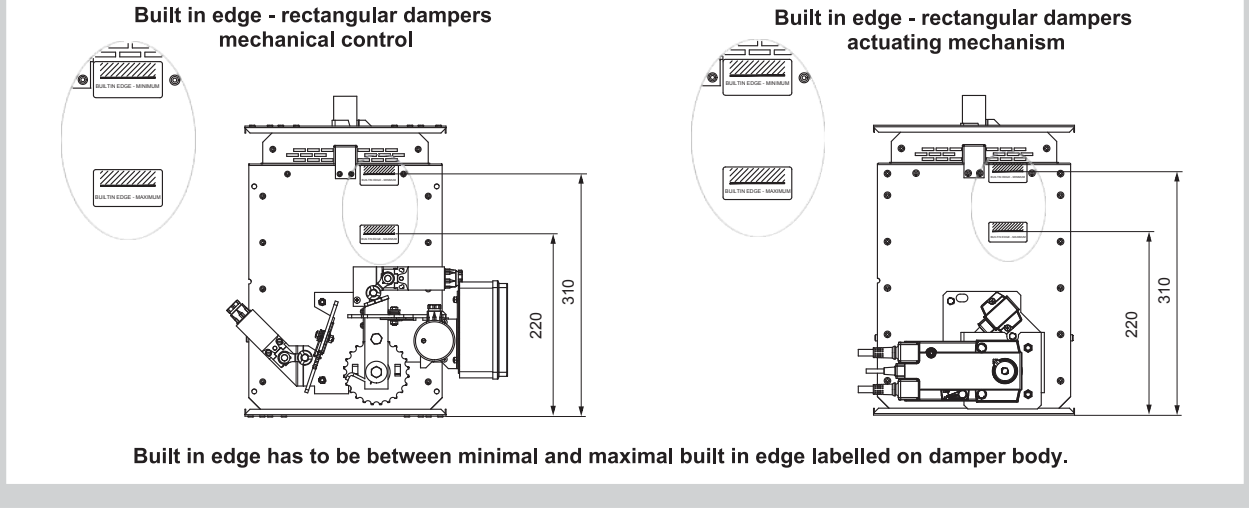
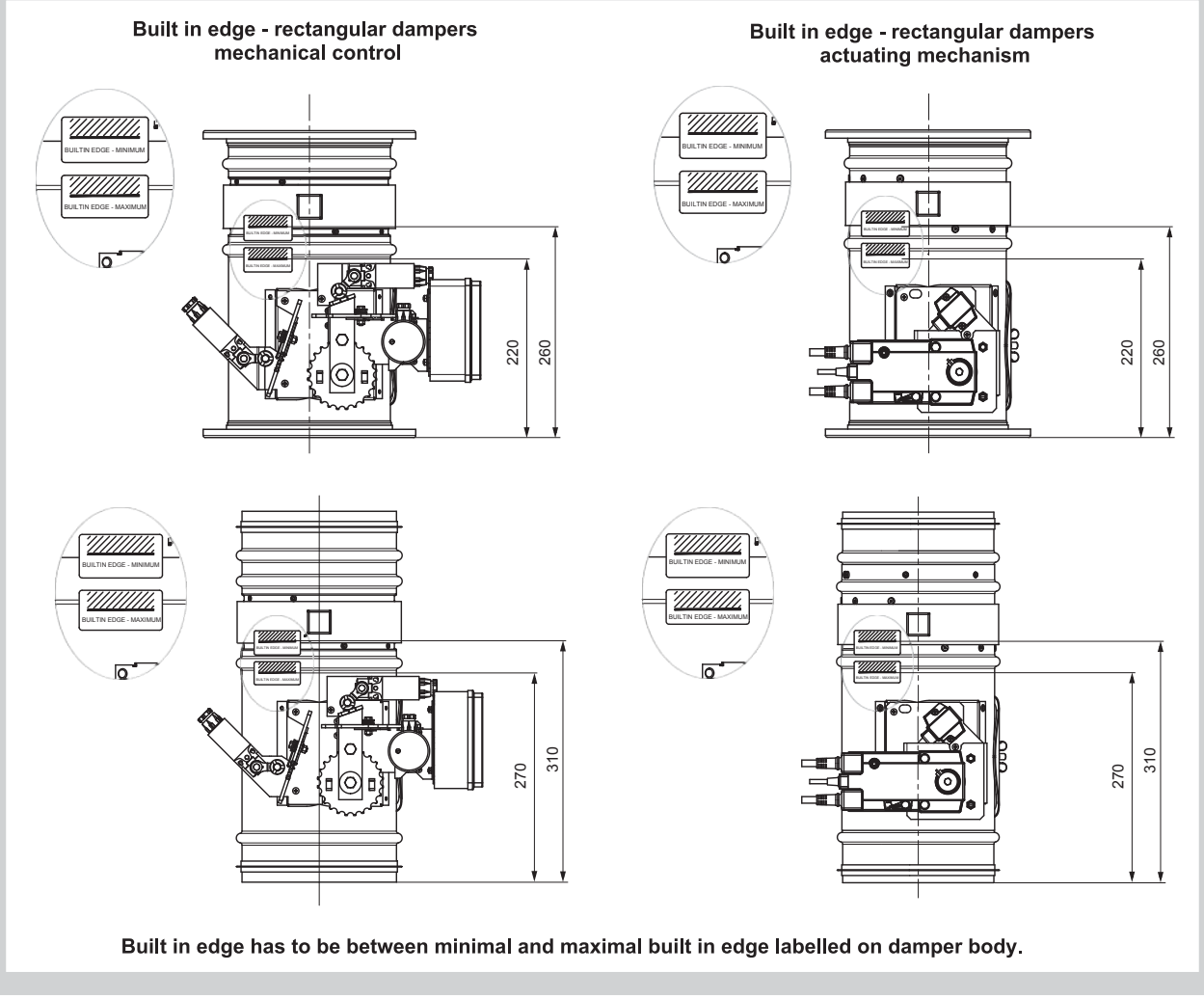


Fig. 43 Built in edge - round dampers



For dampers with installation holders is valid maximal built in edge

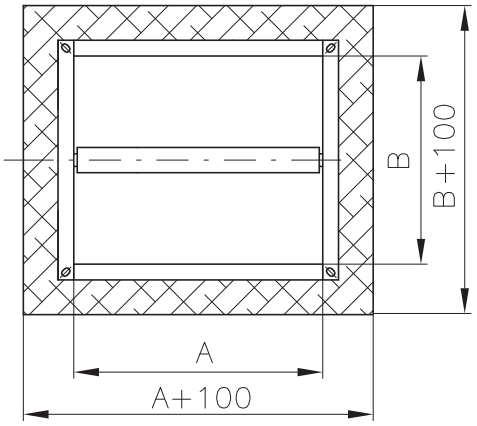
5.2. The control mechanism has to be protected (covered) against damage and pollution during installation process.

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.

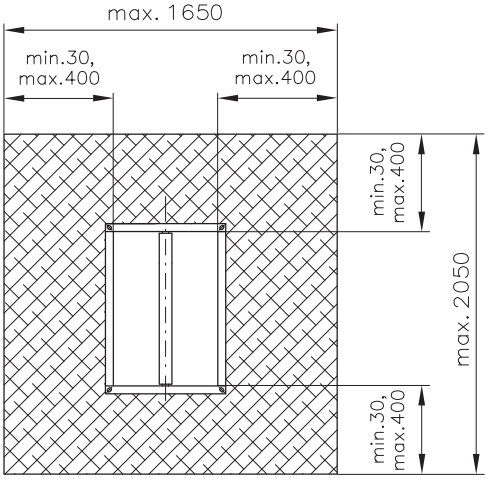
5.3. Installation opening dimensions

Fig. 44 Installation opening dimensions

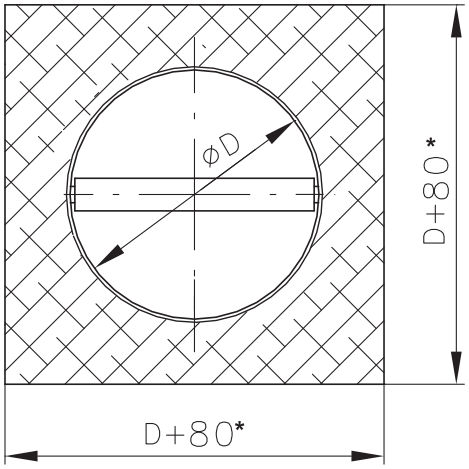
Installation opening - rectangular damper



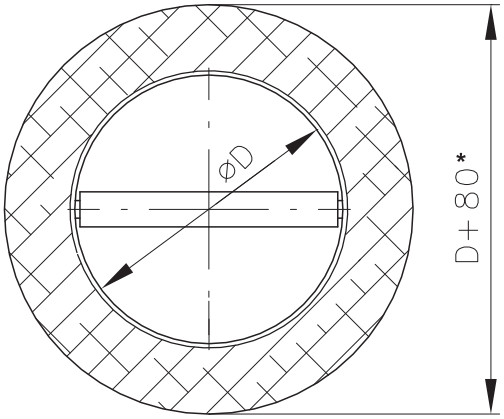
Installation opening - rectangular damper Weichschott system



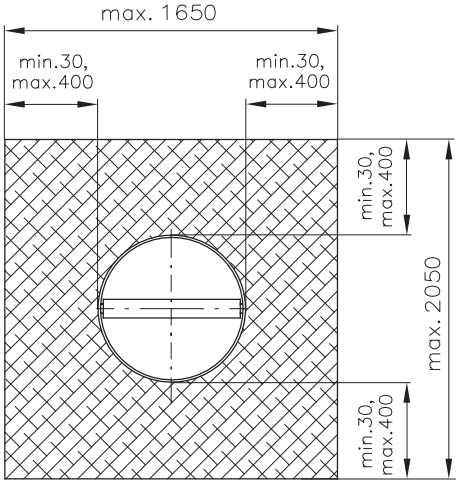
Installation opening - round damper



Installation opening - round damper



Installation opening - round damper Weichschott system



*** For dampers with flanges is valid D + 160 mm**

5.4. Examples of fire damper installing

The fire damper can be integrated into a solid wall construction made e.g. of normal concrete/ masonry, porous concrete with minimum thickness 100 mm or into solid ceiling construction made e.g. of normal concrete with minimum thickness 110 mm or porous concrete with minimum thickness 125 mm.

The fire damper can be integrated into a gypsum wall construction with fire classification EI120 or EI 90.

The fire damper can also be integrated outside the wall construction. Duct and the damper part between the wall construction and the damper blade (labelled with BUILD IN EDGE on the protective covering) must be protected with fire-fighting insulation.

If is square damper installed outside a construction it is necessary to use reinforcement VRM-III.

6. Statement of installations

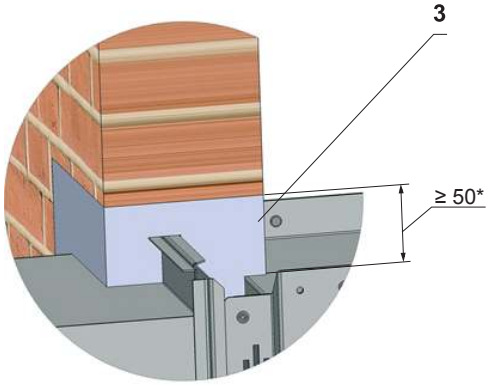
6.1. Statement of installations the fire dampers FDMB and their fire resistance Tab. 6.1.1.

Tab. 6.1.1. Statement of installations

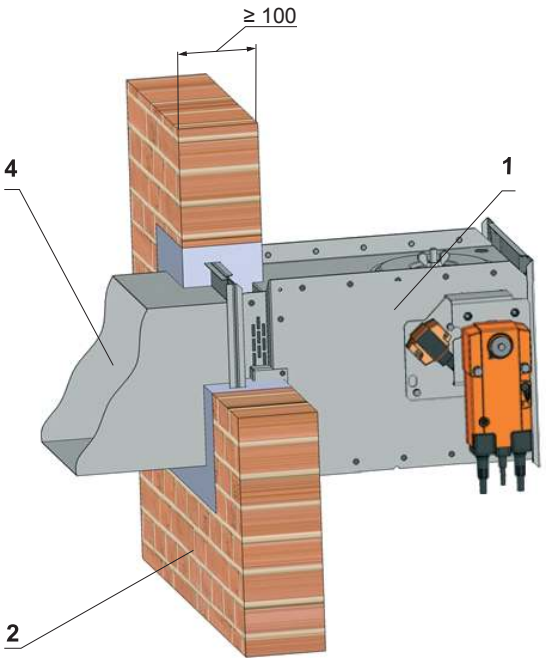
Construction	Installation	Material of stuffing box	Figure
Solid wall construction	Wet	Mortar or gypsum	45
	Wet, battery	Mortar or gypsum	46
	Wet, installation next to wall, ceiling	Mortar or gypsum and mineral wool	47, 48
		Installation frame and mineral wool	49
	Dry	Stuffing box, fire protection mastic and cement lime plate	50
		Stuffing box and fire protection mastic	56
		Installation frame E1, E2, R1, R2, R3, R4	51
		Weichschott	52
		Battery, Installation frame	53
Outside solid wall construction	Dry	Installation frame E4, R5	51
		Insulation mineral wool	54
		Installation frame E6, R6 and cement lime plate	55
Solid ceiling construction	Wet	Mortar or gypsum	57
	Wet, battery	Mortar or gypsum	58
	Dry	Stuffing box, fire protection mastic and cement lime plate	59
		stuffing box and fire protection mastic	67
		Installation frame E1, E2, R1, R2, R3, R4	60
		Weichschott	61
		Battery Installation frame	62
Outside solid ceiling construction	Wet	Concrete	64
		Concrete and Installation frame E4, R5	65
		insulation mineral wool	63
		Installation frame E6, R6 and stuffing box and fire protection mastic	66
	Dry	Installation frame E4, R5	60
Gypsum wall construction	Wet	Mortar or gypsum	68
	Wet, battery	Mortar or gypsum	69
	Wet, installation next to wall, ceiling	Installation frame	72
	Dry, battery	Installation frame E1	76
	Wet, installation next to wall, ceiling	Mortar or gypsum and mineral wool	71, 72
	Dry	Stuffing box, fire protection mastic and cement lime plate	74
		stuffing box and fire protection mastic	79
		Installation frame E1, E3, R1, R2, R3, R4	74
		Weichschott	75
		Battery Installation frame	76
Outside Gypsum wall construction	Dry	Insulation mineral wool	77
Ceiling with movement possibility	Dry	Installation frame E5, R7	79

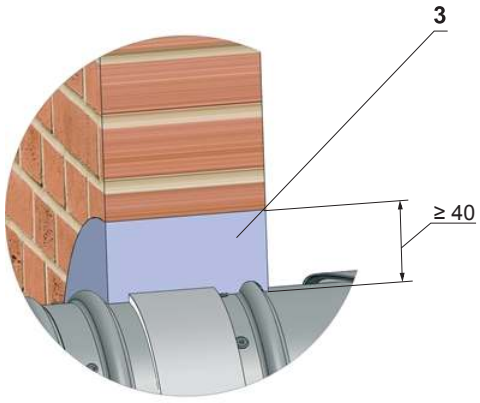
Fig. 45 Solid wall construction - mortar or gypsum

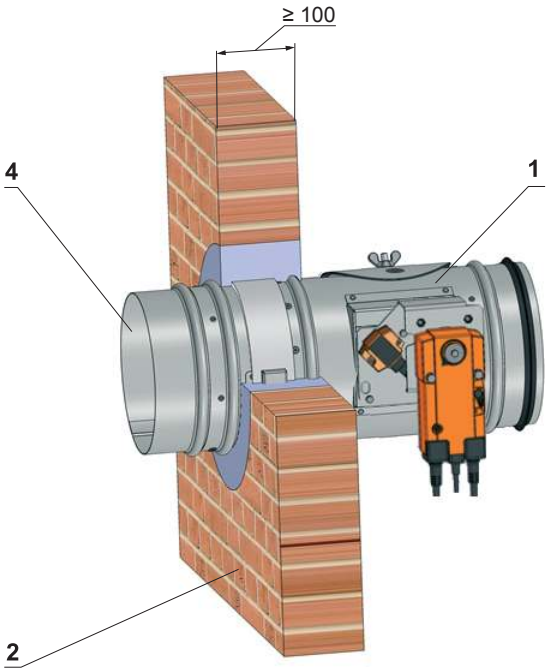
EIS 120



* Around the perimeter







POSITION:

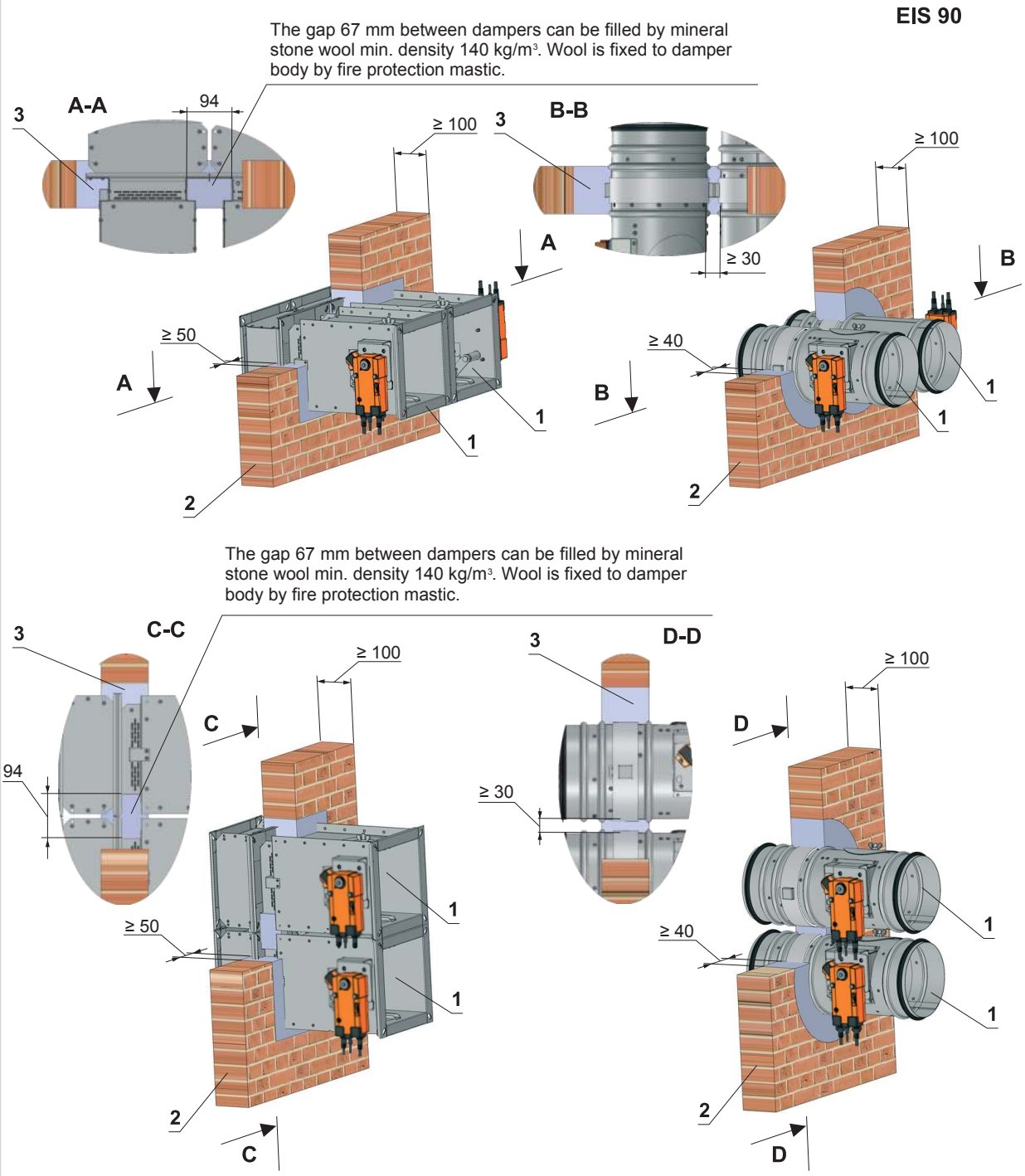
1 Fire damper FDMB

2 Solid wall construction

3 Mortar or gypsum

4 Duct

Fig. 46 Solid wall construction - flange to flange - mortar or gypsum



POSITION:

1 Fire damper FDMB

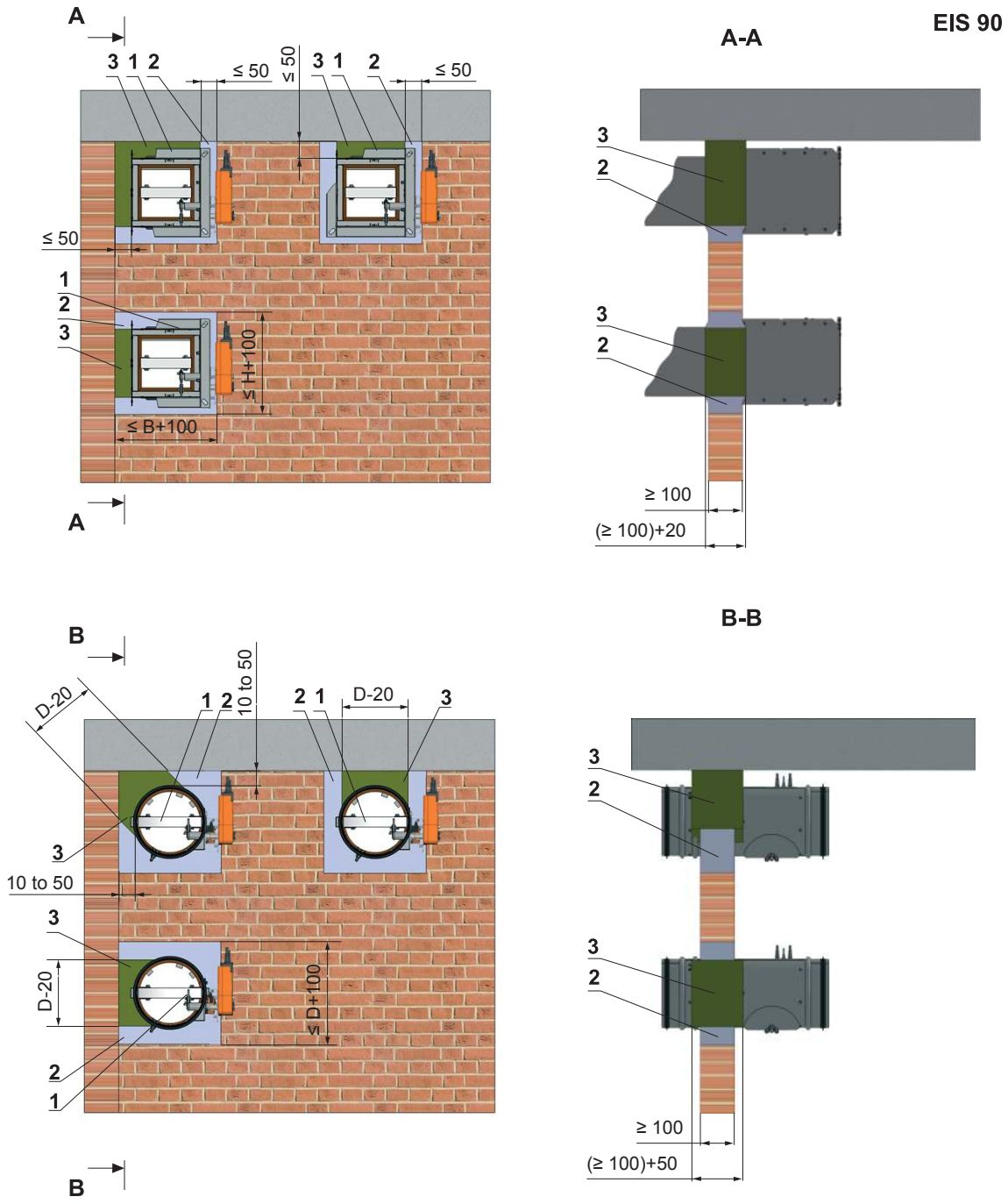
2 Solid wall construction

3 Mortar or gypsum

Notice:

- Fire damper FDMB-C - installation opening for each damper has minimal dimensions a x b = (A+100) x (2xB +100) mm or (2xA+100) x (B +100) mm
- Fire damper FDMB-K - installation opening for each damper has minimal dimensions D+80 mm (D+160 mm for dampers with flanges)
- Gap between damper and construction is filled by mortar or gypsum
- Fire damper FDMB-C - distance between dampers 60 mm
- Fire damper FDMB-K - distance between dampers 70 mm
- Damper axis has to be horizontal
- Flange to flange connection - Up to four dampers can be installed

Fig. 47 Solid wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool



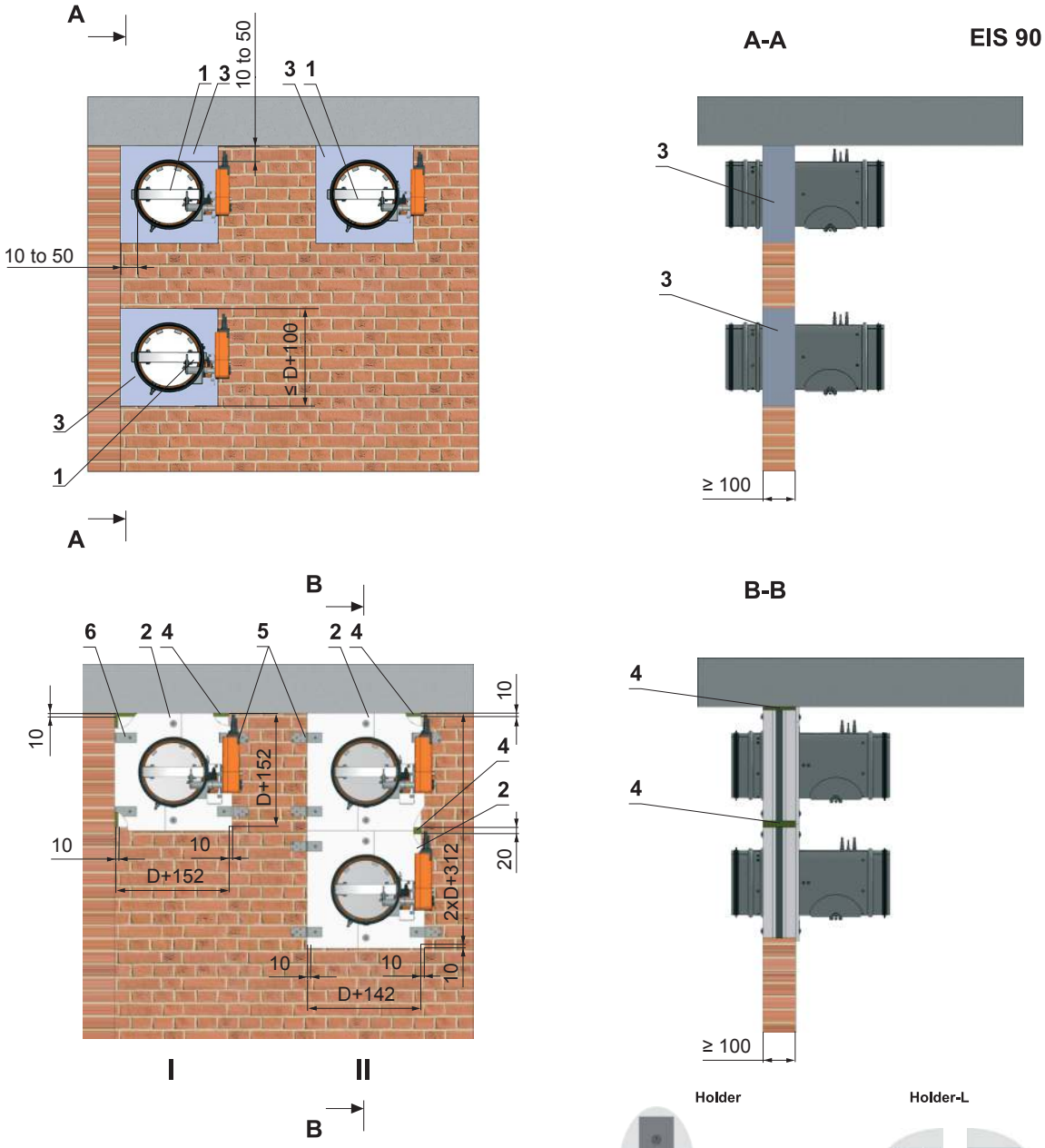
POSITION:

1 Fire damper FDMB
2 Mortar or gypsum
3 Mineral stone wool min. density 140 kg/m³

Notice:

- Gap between damper and construction is filled by mortar or gypsum and mineral wool
- Wool is fixed to damper body and construction by fire protection mastic.
- Mineral wool thickness = construction thickness + 20 mm or 50 mm
- Damper axis has to be horizontal
- Installation is valid for ceiling construction

Fig. 48 **Solid wall construction - installation next to wall, ceiling - mortar or gypsum**
Solid wall construction - installation next to wall, ceiling - installation frame and mineral wool



I
Holders No. X = X1/2
Holders-L No Z = X1/2
Screws No. Y

II
Holders No. X = X1 - Z1
Holders-L No Z = Z1/2
Screws No. Y

Dimensions	Number X1	Number Y	Number Z1
D ≤ 400	4	8	2
400 < D ≤ 800	8	16	4
800 < D ≤ 1000	12	24	6

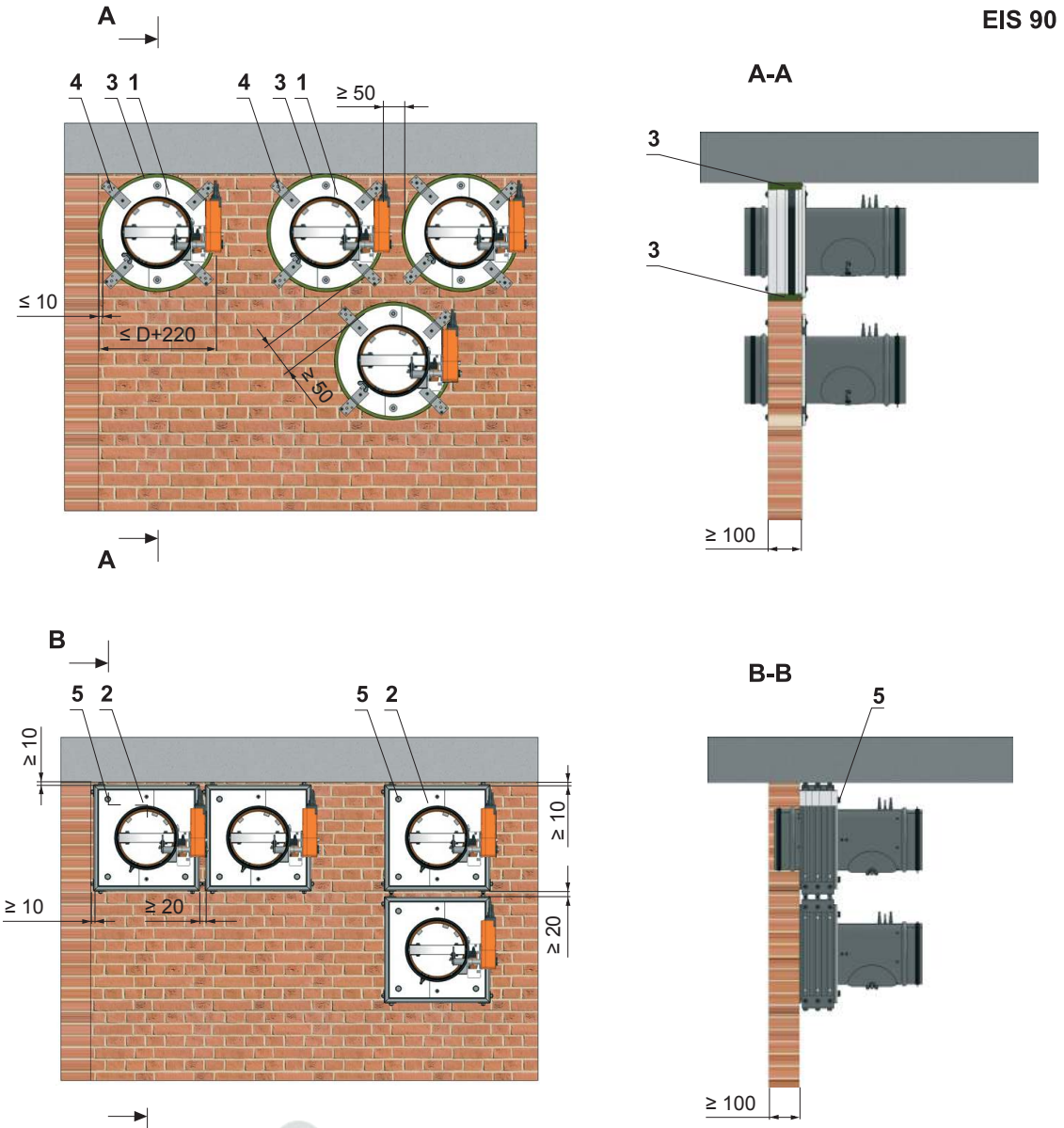
POSITION:

1 Fire damper FDMB
2 Fire damper FDMB with installation frame R1, R2
3 Mortar or gypsum
4 Mineral stone wool min. density 140 kg/m^3
5 Holder
6 Holder L

Notice:

- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84).
- Wool is fixed to installation frame and construction by fire protection mastic.
- Damper axis has to be horizontal
- Installation is valid for ceiling construction

Fig. 49 Solid wall construction - installation next to wall, ceiling - installation frame and mineral wool



Holders No. X
Screws No. Y

Dimensions	Number X	Number Y
D ≤ 400	4	8
400 < D ≤ 800	8	16
800 < D ≤ 1000	12	24

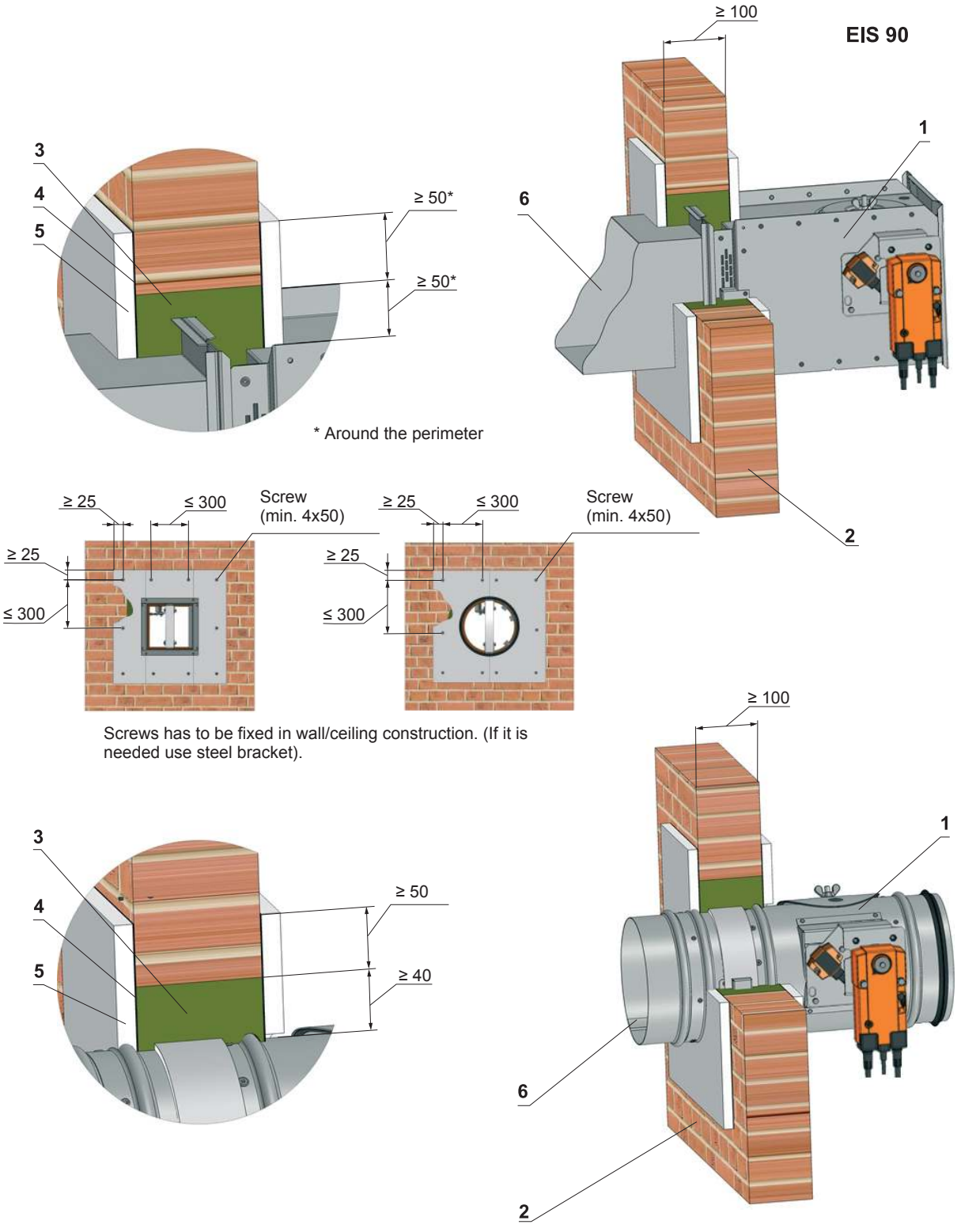
POSITION:

1 Fire damper FDMB with installation frame R3, R4
2 Fire damper FDMB with installation frame R5
3 mineral stone wool min. density 140 kg/m^3
4 Holder
5 Fitting with threaded rods or steel bracket

Notice:

- Wool is fixed to installation frame and construction by fire protection mastic.
- Damper axis has to be horizontal
- Installation is valid for ceiling construction

Fig. 50 Solid wall construction - stuffing box, fire protection mastic and cement lime plate



POSITION:

1 Fire damper FDMB
2 Solid wall construction
3 Stuffing box (mineral stone wool min. density 140 kg/m^3)
4 Fire protection mastic min. thickness 1 mm
5 Cement lime plate min. thickness 15 mm (min. density 870 kg/m^3)
6 Duct

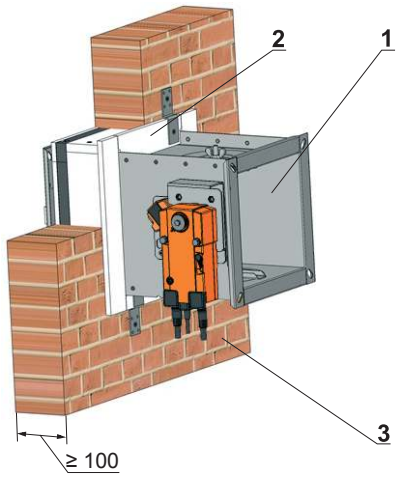
Used materials - example**:

3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K
5 - Promatect - H

** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

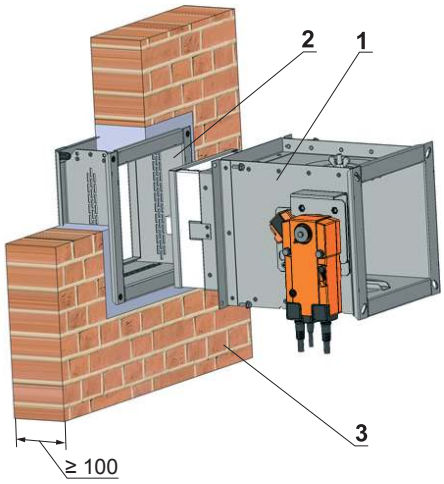
Fig. 51 Solid wall construction - installation frames

Installation frame E1

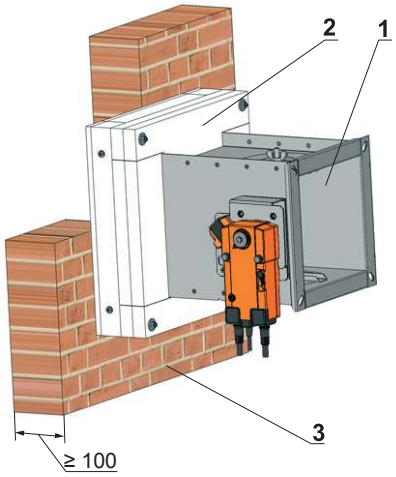


Installation frame E2

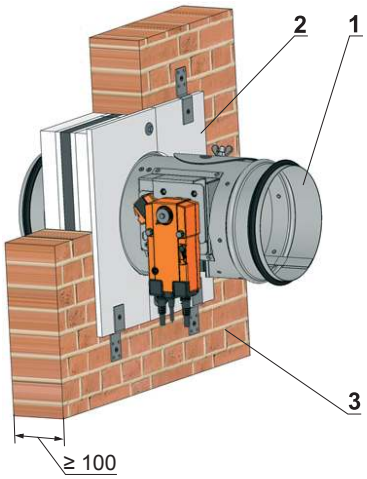
EIS 90



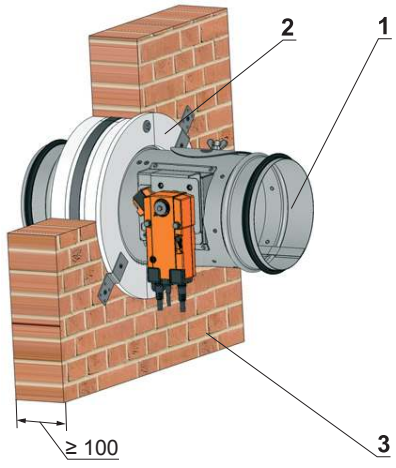
Installation frame E4



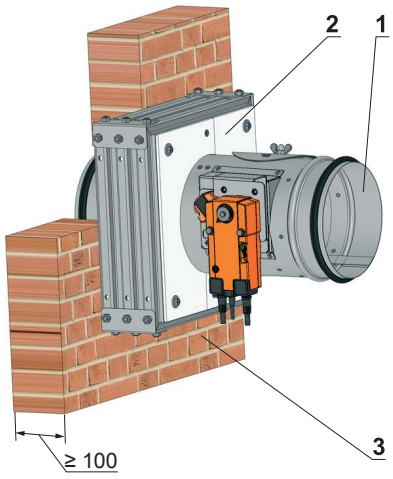
Installation frame R1, R2



Installation frame R3, R4



Installation frame R5

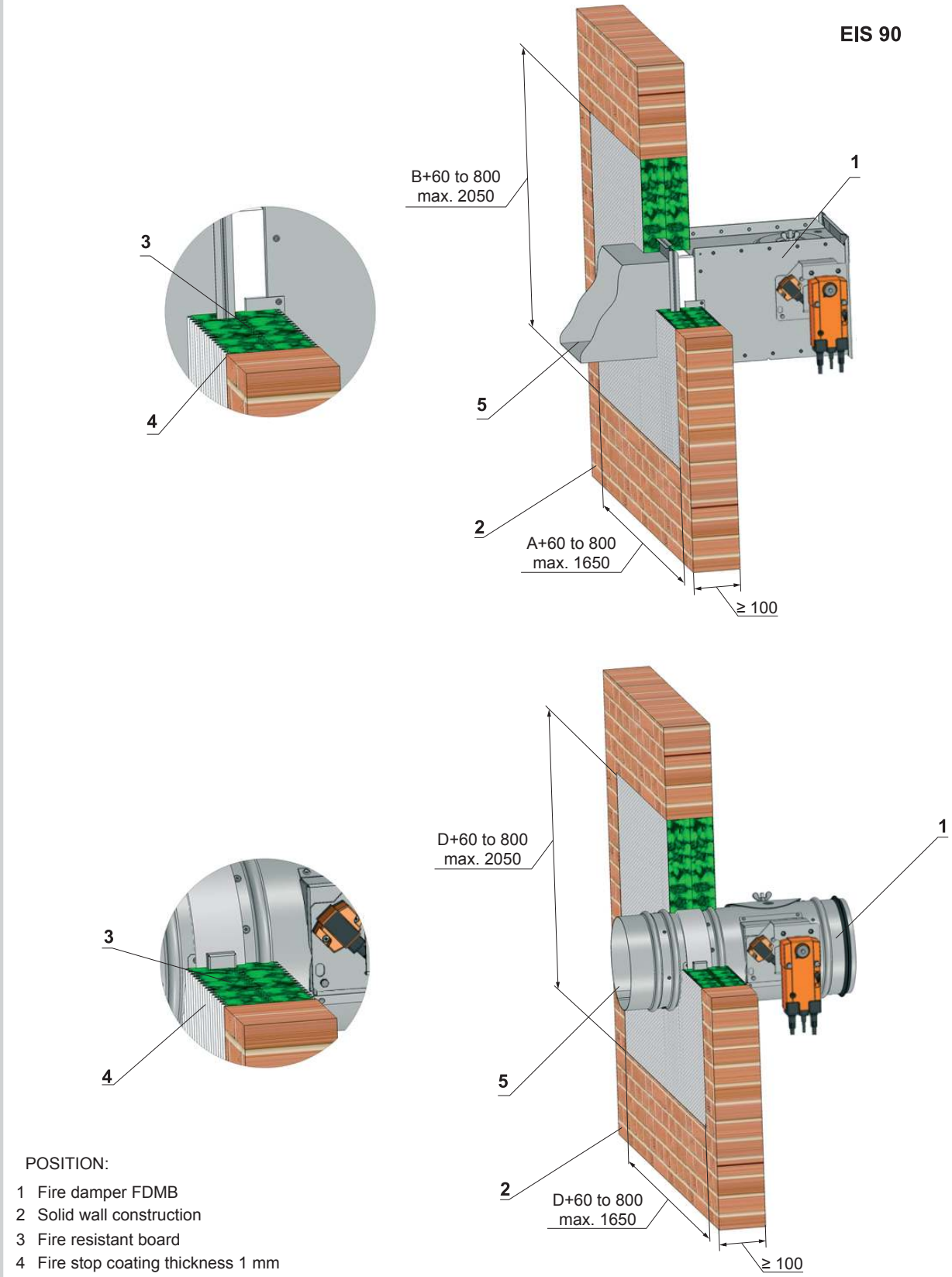


POSITION:

1 Fire damper FDMB
2 Installation frame
3 Solid wall construction

Installation details see chapter 7

Fig. 52 Solid wall construction - Weichschott



POSITION:

1 Fire damper FDMB
2 Solid wall construction
3 Fire resistant board
4 Fire stop coating thickness 1 mm
5 Duct

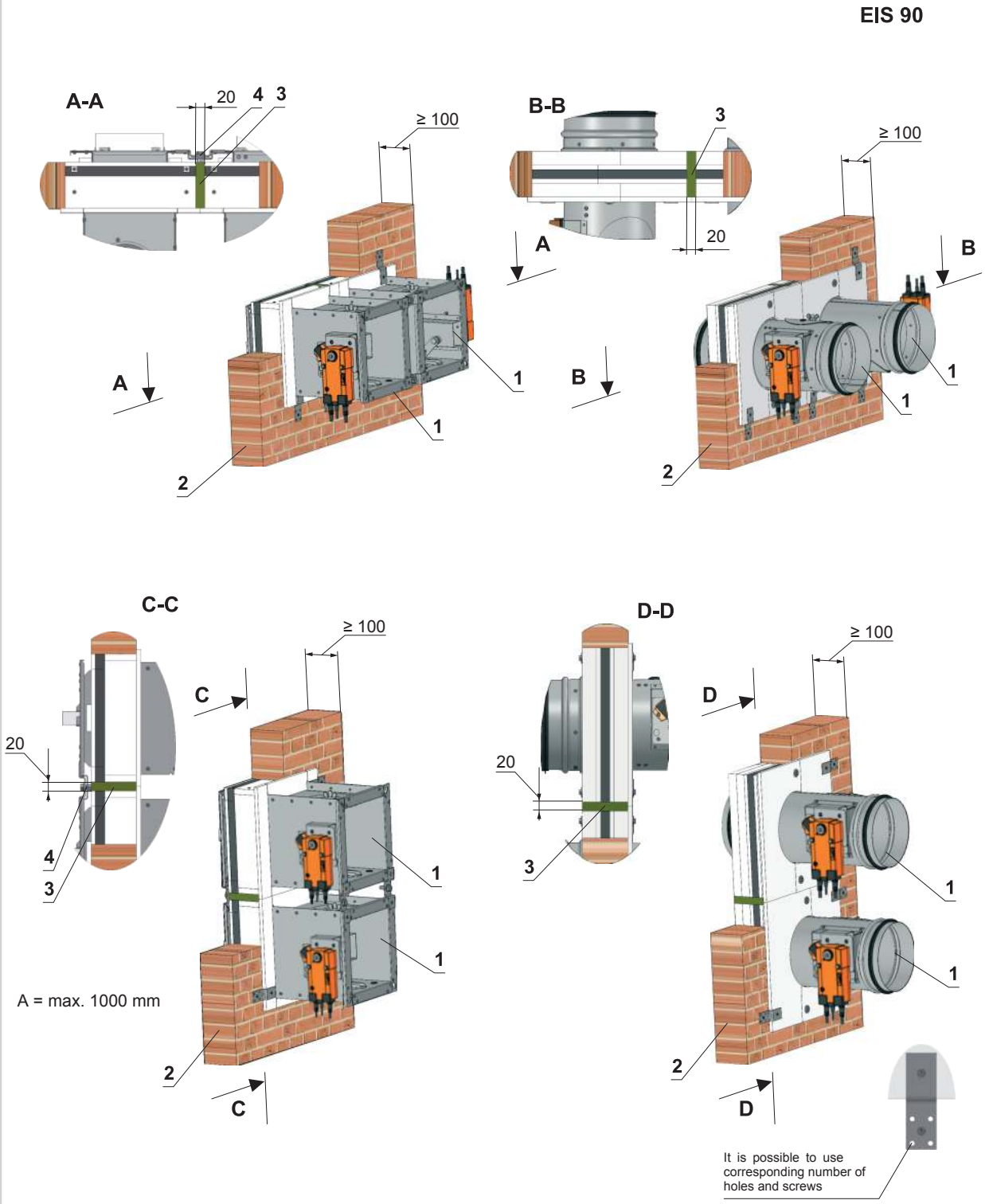
Used materials - example*:

3 - Hilti CP673 PF
4 - Hilti CP673

Notice:

* Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 53 Solid wall construction - flange to flange - installation frame



POSITION:

1 Fire damper FDMB with installation frame E1, R1
2 Solid wall construction
3 Mineral stone wool min. density 140 kg/m³
4 Flange connection

Notice:

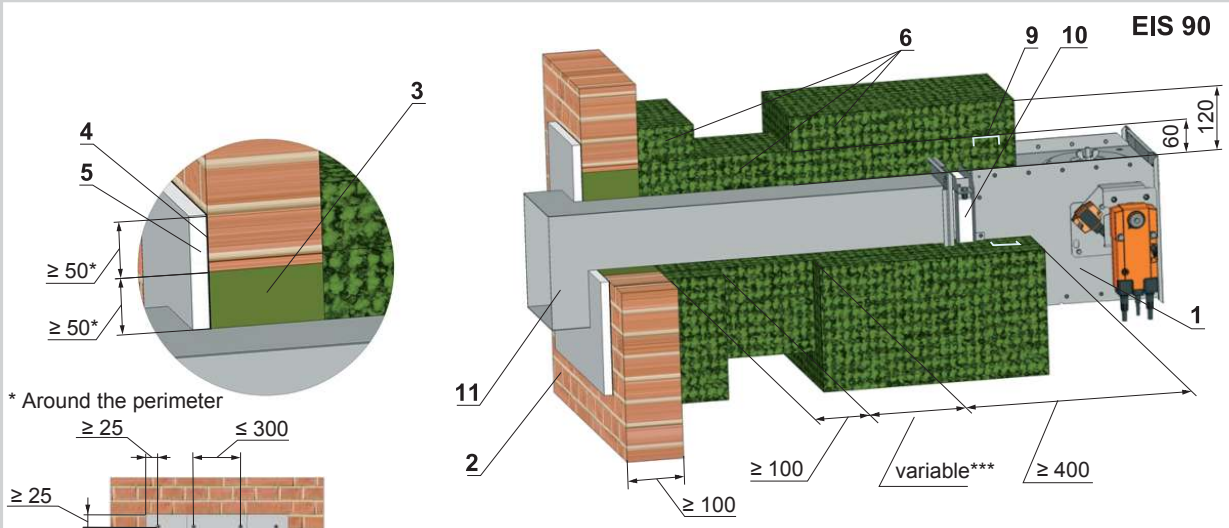
- Fire damper FDMB-C - installation opening dimensions a x b = (2x(A + 85⁺³mm) + 20 mm) x (B + 85⁺³mm) or a x b = (A + 85⁺³mm) x (2x(B + 85⁺³mm) + 20 mm)
- Fire damper FDMB-C - installation opening dimensions a x b = (2x(D + 141⁺³mm) + 20 mm) x (D + 141⁺³mm) or. a x b = (D + 141⁺³mm) x (2x(D + 141⁺³mm) + 20 mm)
- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84)
- Fire damper FDMB-C - distance between dampers 104 mm
- Fire damper FDMB-K - distance between dampers 160 mm
- Damper axis has to be horizontal
- Flange to flange connection - Up to four dampers can be installed

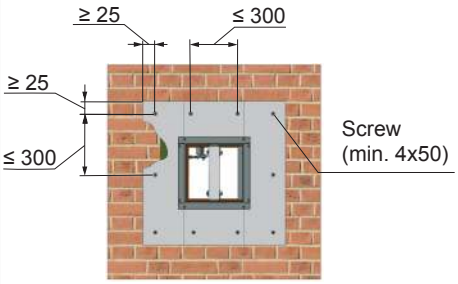
Holders No. X = (2xZB1) + (2xZH1)
Screws No. Y = 2xX

Dimensions	Number ZB1	Number ZH1
A1,B1,D1 ≤ 400	1	1
400 < A1,B1,D1 ≤ 800	2	2
800 < A1,D1 ≤ 1260	3	3
1260 < A1,D1 ≤ 1600	4	4
1600 < A1 ≤ 2000	5	5

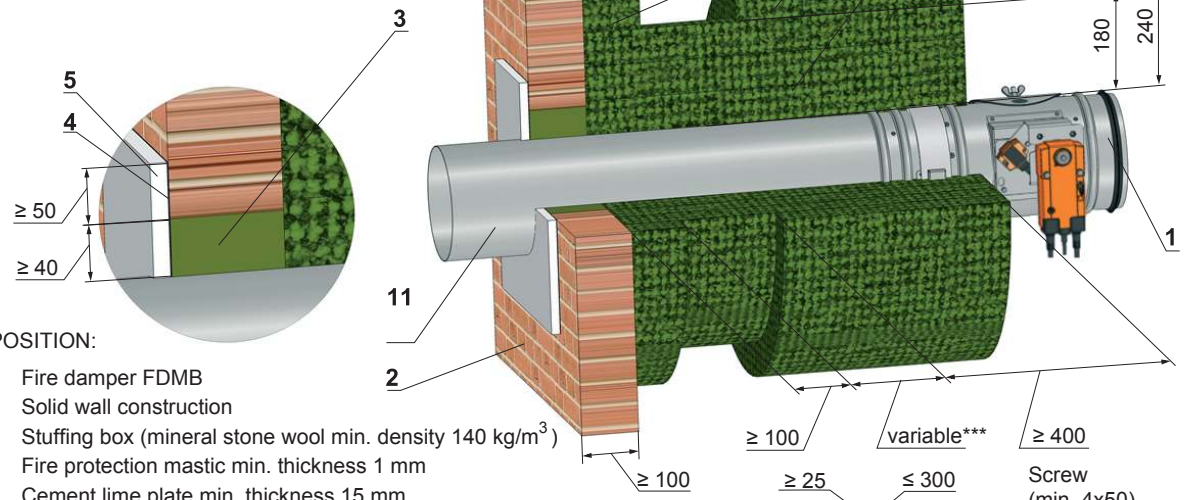
A1 = A or A1 = 2xA
B1 = B or B1 = 2xB
D1 = D or D1 = 2xD

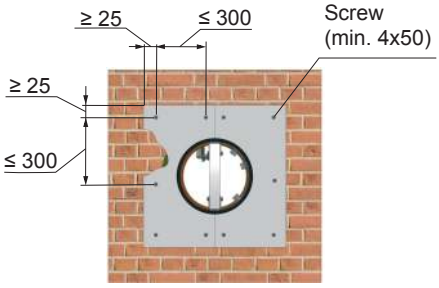
Fig. 54 Installation outside of solid wall construction - mineral wool





Screws has to be fixed in wall/ceiling construction. (If it is needed use steel bracket).





Screws has to be fixed in wall/ceiling construction. (If it is needed use steel bracket).

POSITION:

1 Fire damper FDMB
2 Solid wall construction
3 Stuffing box (mineral stone wool min. density 140 kg/m^3)
4 Fire protection mastic min. thickness 1 mm
5 Cement lime plate min. thickness 15 mm (min. density 870 kg/m^3)
6 Stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m^3), EIS 90, thickness 60 mm
7 Stone wool with one side stitched wire fencing (min. density 105 kg/m^3), thickness 180 mm (e.g. 3x60 mm)
8 Stone wool with one side stitched wire fencing (min. density 105 kg/m^3), thickness 60 mm
9 Profil U25x40x25
10 VRM-III****
11 Duct

Used materials - example**:

3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K
5 - Promatect - H
6 - Rockwool Conlit Ductrock EIS 90, Dicke 60 mm
7 - Rockwool Wired Mat 105 Dicke 3x60 mm
8 - Rockwool Wired Mat 105 Dicke 60 mm

Installation details of wool layers see chapter 8.4

Notice:

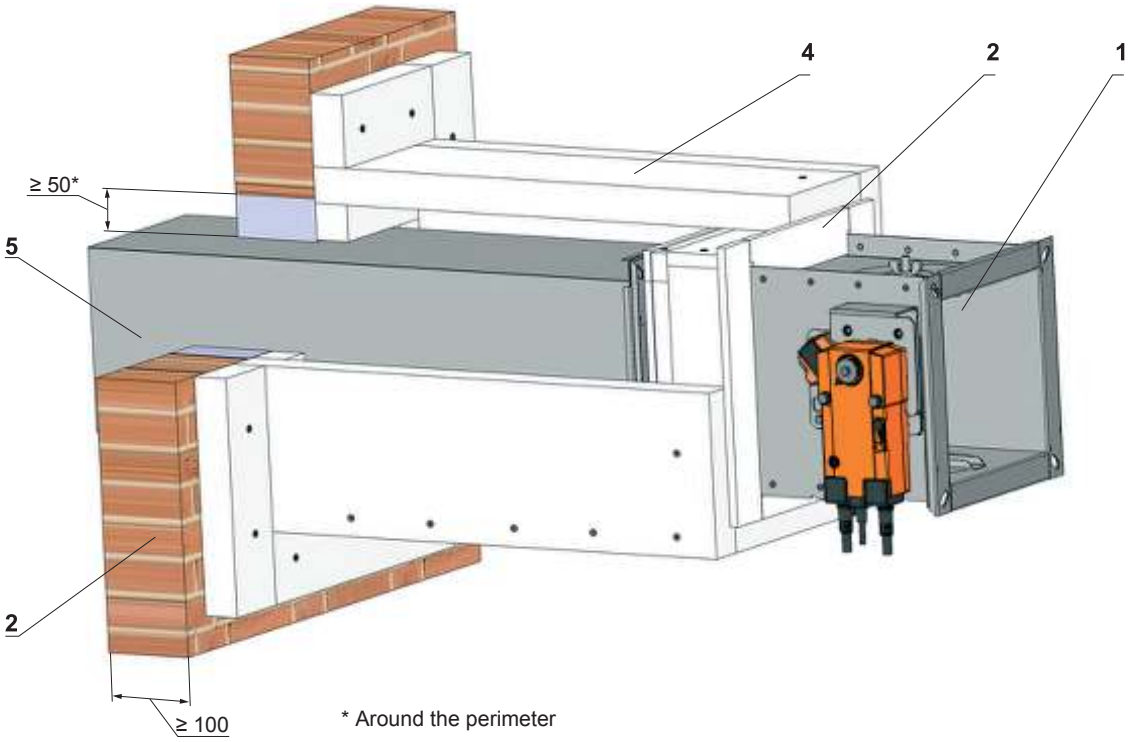
** Stuffing box, fire protection mastic, cement lime plate and insulation materials can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

*** Dependent on the distance between damper and fire separating construction

**** Reinforcement fixing VRM-III see Fig.79
Installation of profile U25x40x25 see Fig.80

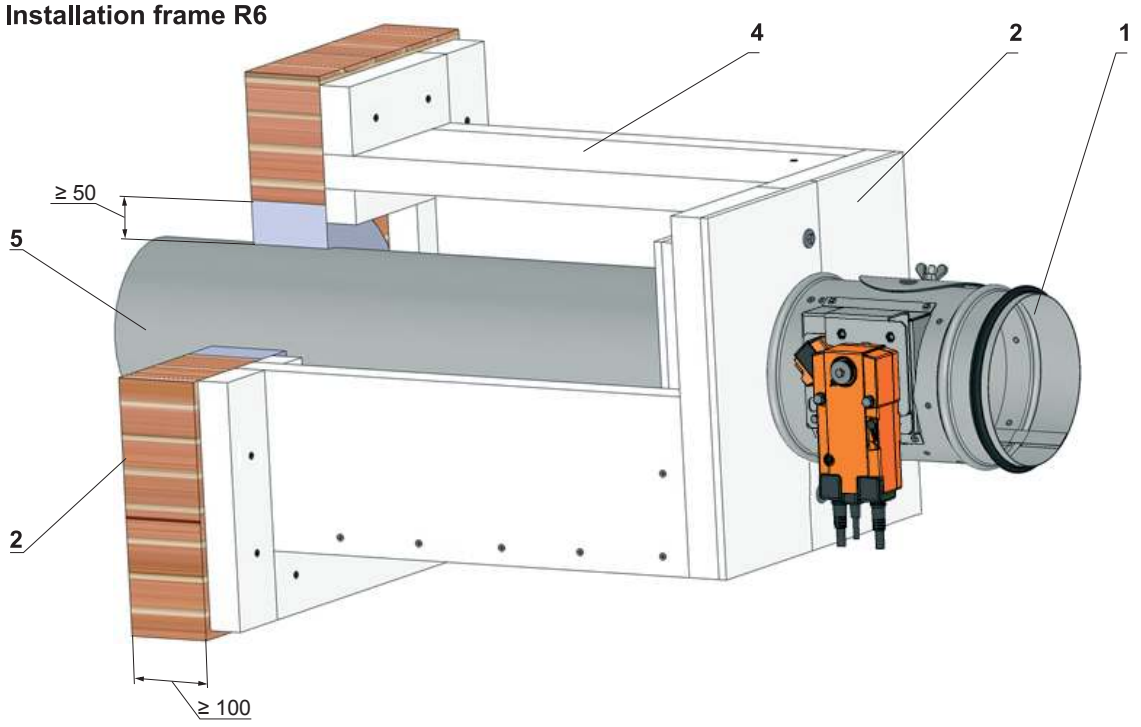
Fig. 55 Installation outside of solid wall construction - installation frame with cement lime plates

Installation frame E6 **EIS 90**



* Around the perimeter

Installation frame R6



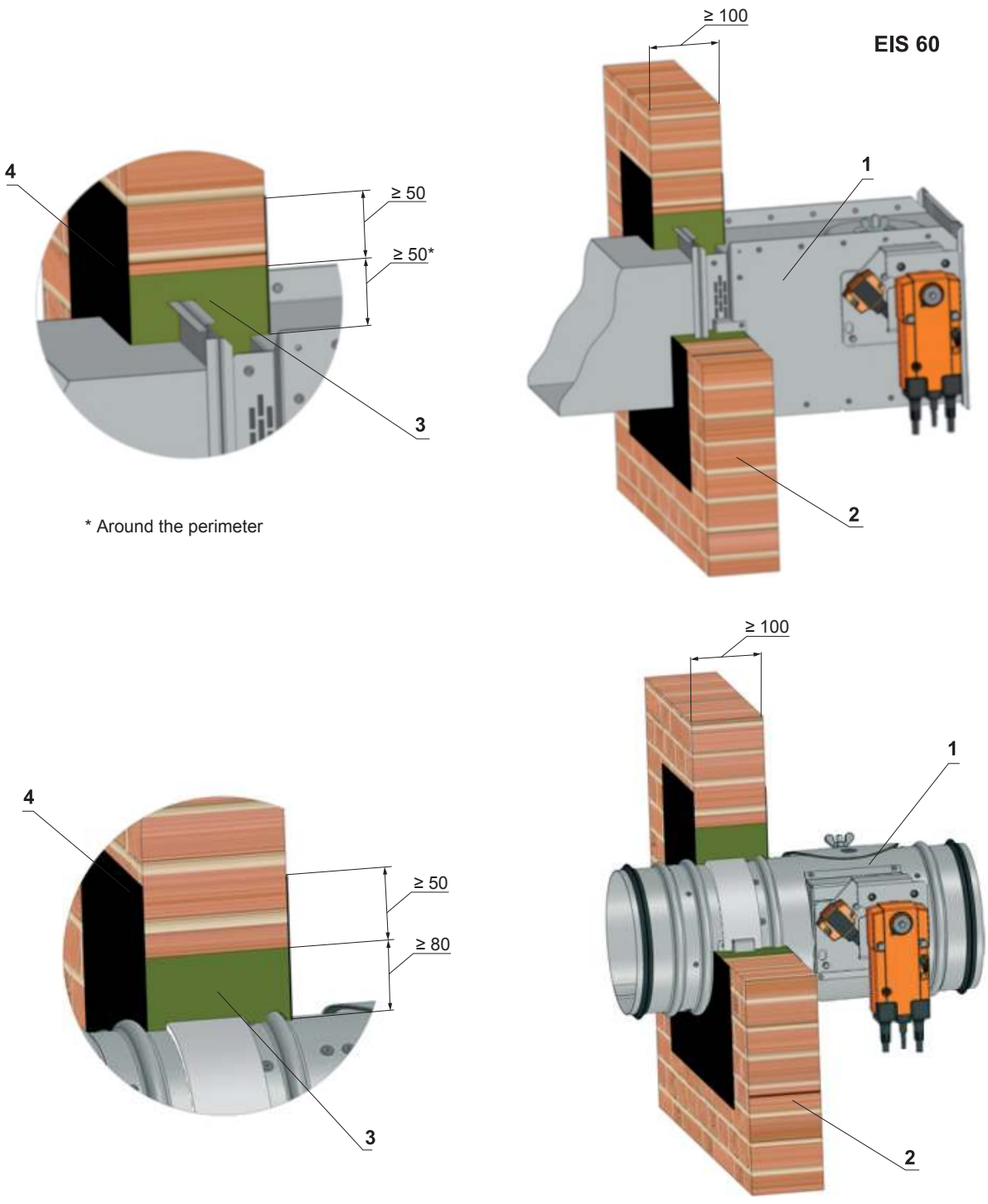
POSITION:

1 Fire damper FDMB
2 Installation frame
3 Solid wall construction
4 Cement lime plate
5 Duct

Installation details see chapter 7

6.2. Damper installation with EIS 60

Fig. 56 Solid wall construction - stuffing box and fire protection mastic



LEGENDA:

1 Fire damper FDMB
2 Solid wall construction
3 Stuffing box (mineral stone wool min. density 140 kg/m³)
4 Fire protection mastic min. thickness 1 mm

Used materials - example**:

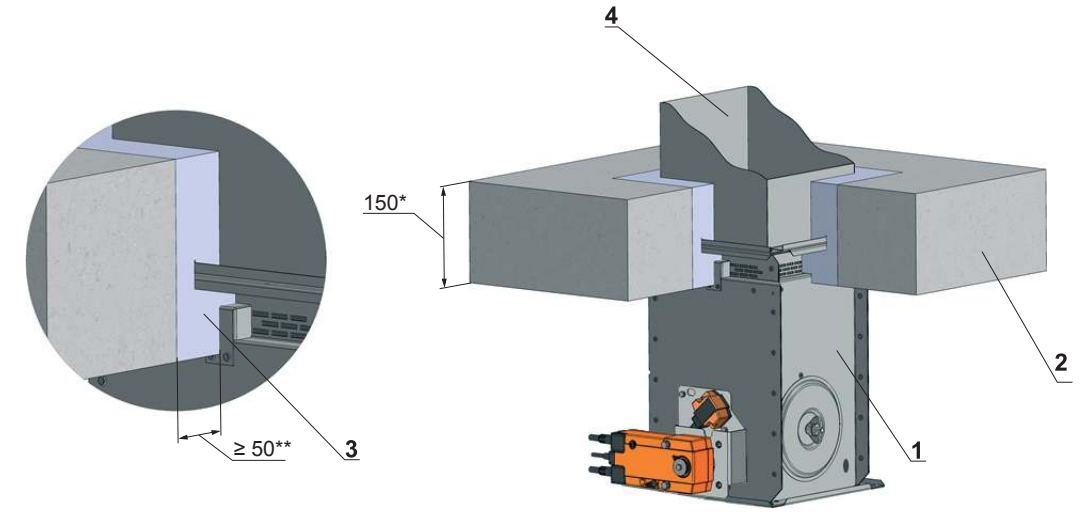
3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K

Notice:

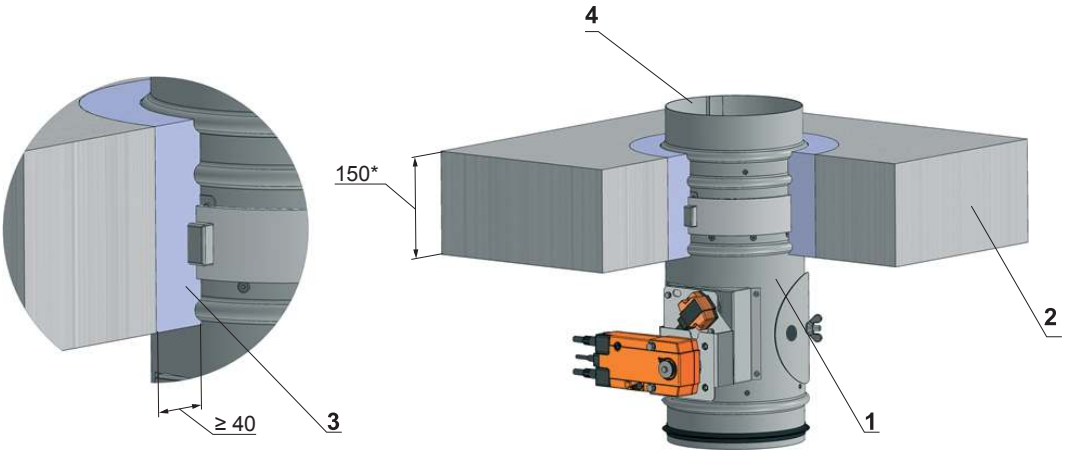
** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 57 Solid ceiling construction - mortar or gypsum

EIS 120



** Around the perimeter



* min. 110 - Concrete/ min. 125 - Aerated concrete

POSITION:

1 Fire damper FDMB

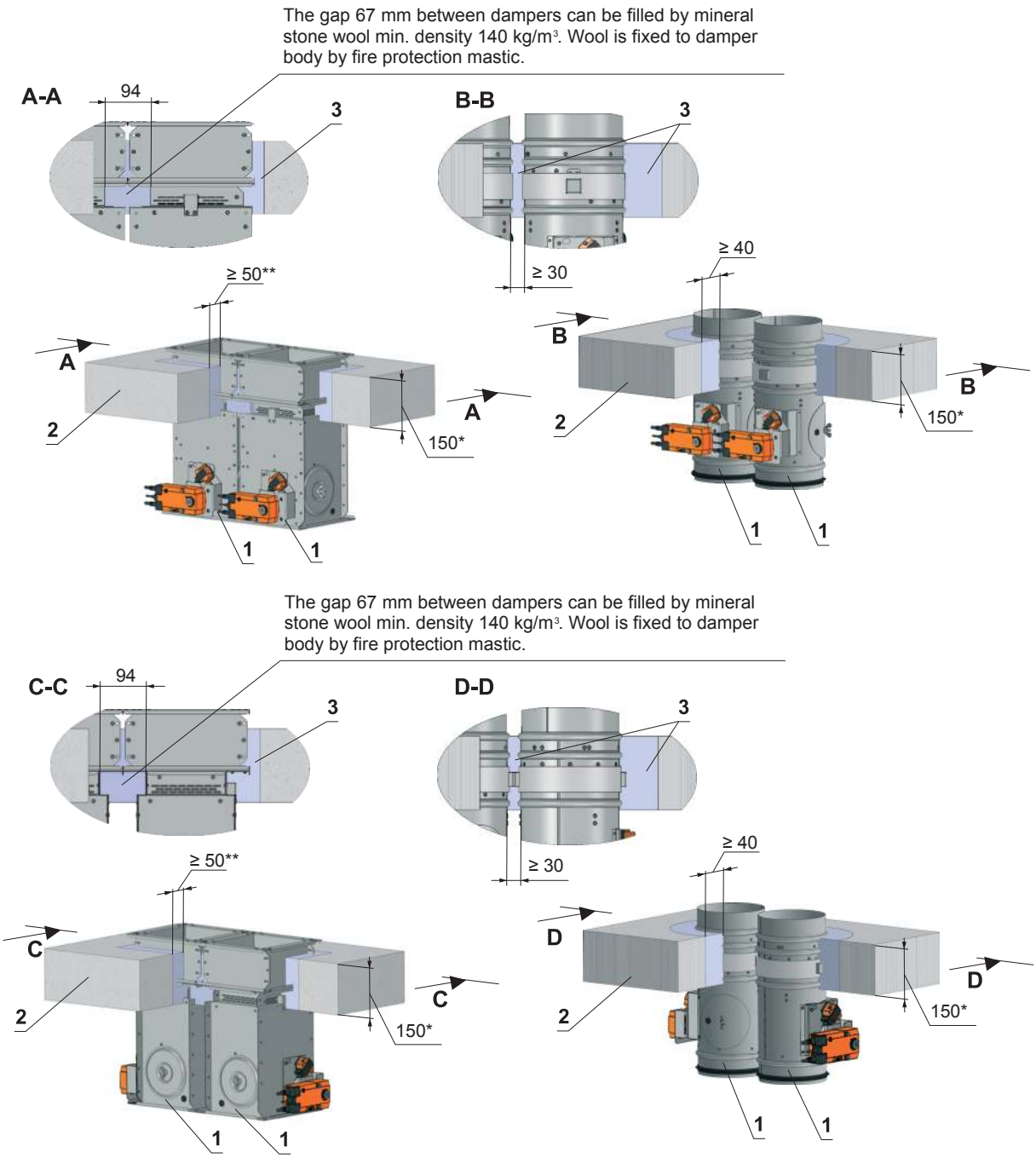
2 Solid ceiling construction

3 Mortar or gypsum

4 Duct

Fig. 58 Solid ceiling construction - flange to flange - mortar or gypsum

EIS 90



* min. 110 - Concrete/ min. 125 - Aerated concrete

** Around the perimeter

POSITION:

1 Fire damper FDMB

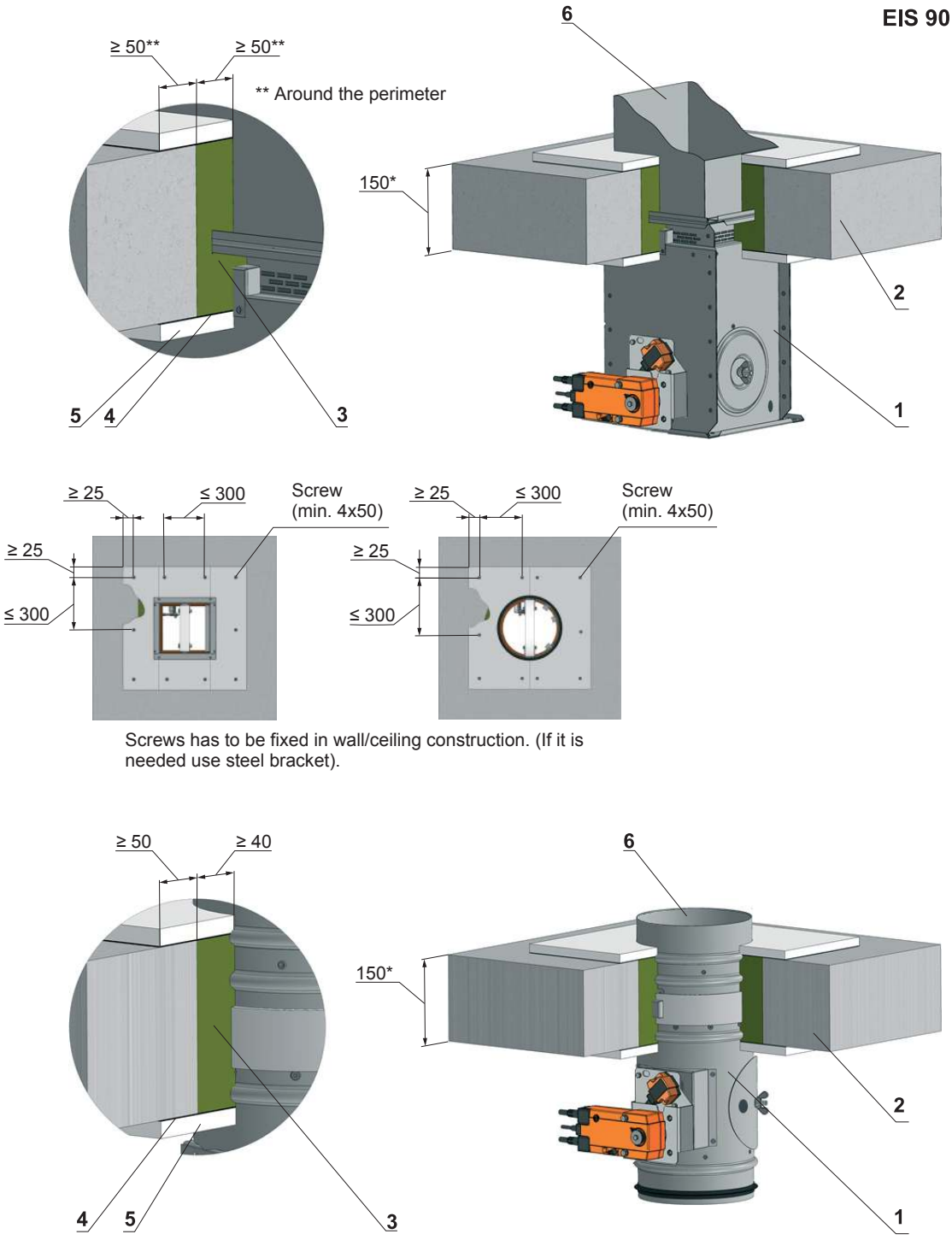
2 Solid ceiling construction

3 Mortar or gypsum

Notice:

- Fire damper FDMB-C - installation opening for each damper has minimal dimensions a x b = (A+100) x (2xB +100) mm or (2xA+100) x (B +100) mm
- Fire damper FDMB-K - installation opening for each damper has minimal dimensions D+80 mm (D+160 mm for dampers with flanges)
- Gap between damper and construction is filled by mortar or gypsum
- Fire damper FDMB-C - distance between dampers 60 mm
- Fire damper FDMB-K - distance between dampers 70 mm
- Damper axis has to be horizontal
- Flange to flange connection - Up to four dampers can be installed

Fig. 59 Solid ceiling construction - stuffing box, fire protection mastic and cement lime plate



POSITION:

1 Fire damper FDMB
2 Solid ceiling construction
3 Stuffing box (mineral stone wool min. density 140 kg/m³)
4 Fire protection mastic min. thickness 1 mm
5 Cement lime plate min. thickness 15 mm (min. density 870 kg/m³)
6 Duct

Used materials - example**:

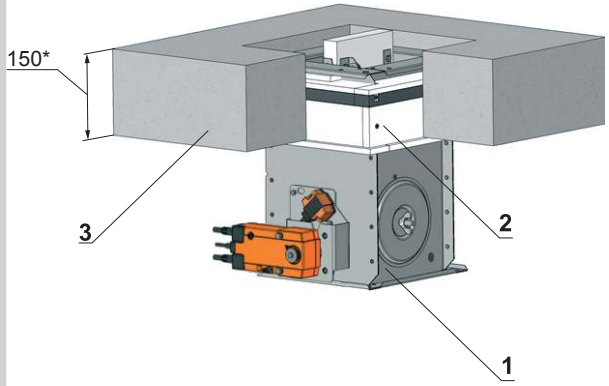
3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K
5 - Promatect - H

** Stuffing box, fire protection mastic, cement lime plate and insulation materials can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

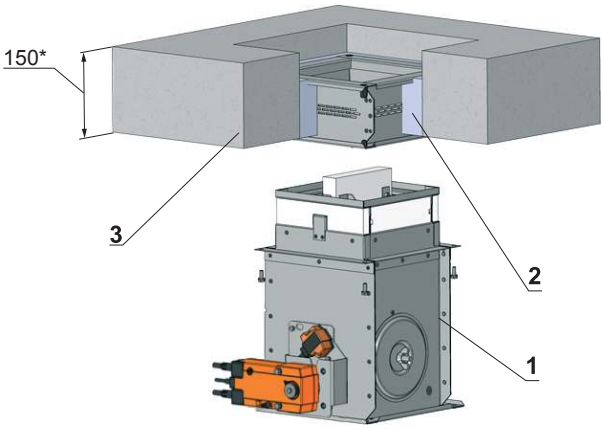
Fig. 60 **Solid ceiling construction - installation frame**

EIS 90

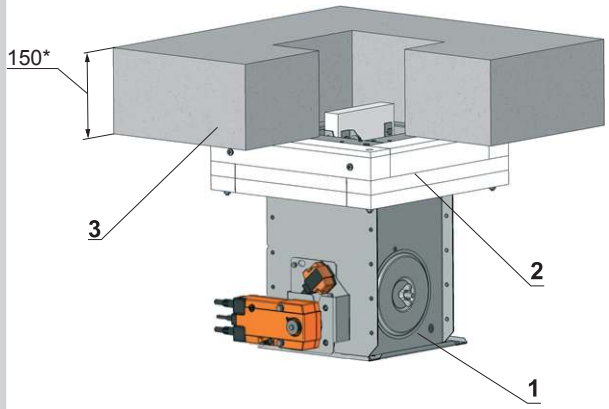
Installation frame E1



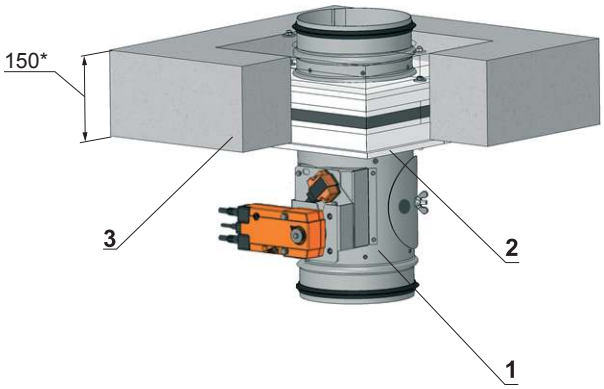
Installation frame E2



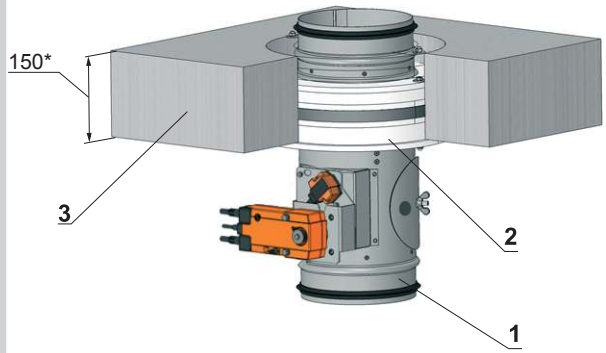
Installation frame E4



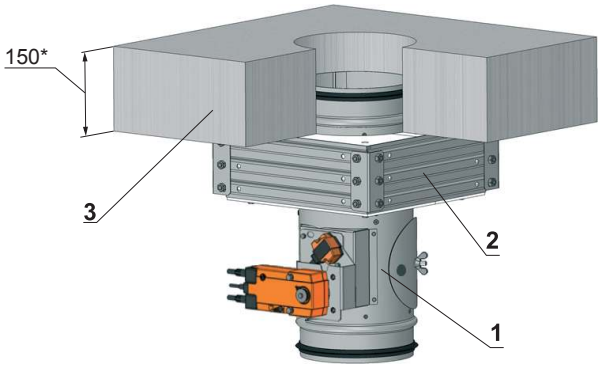
Installation frame R1, R2



Installation frame R3, R4



Installation frame R5



* min. 110 - Concrete/ min. 125 - Aerated concrete

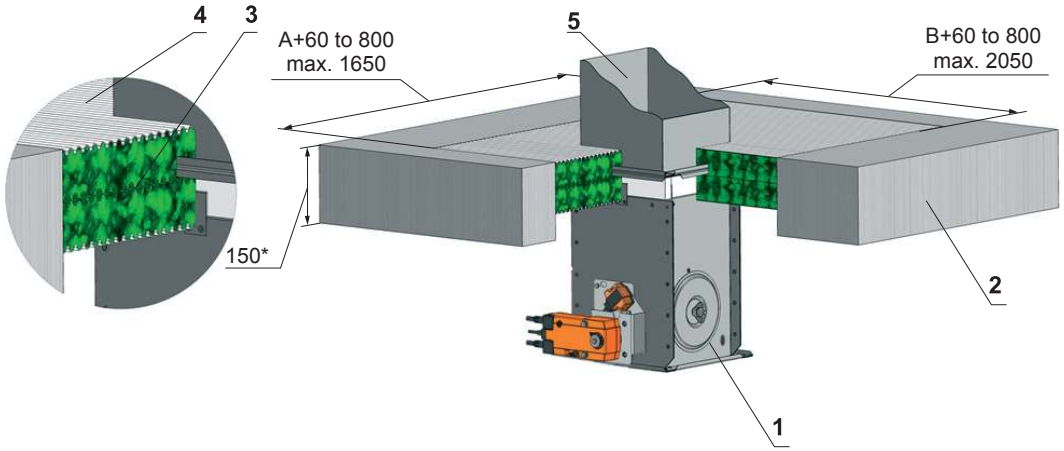
POSITION:

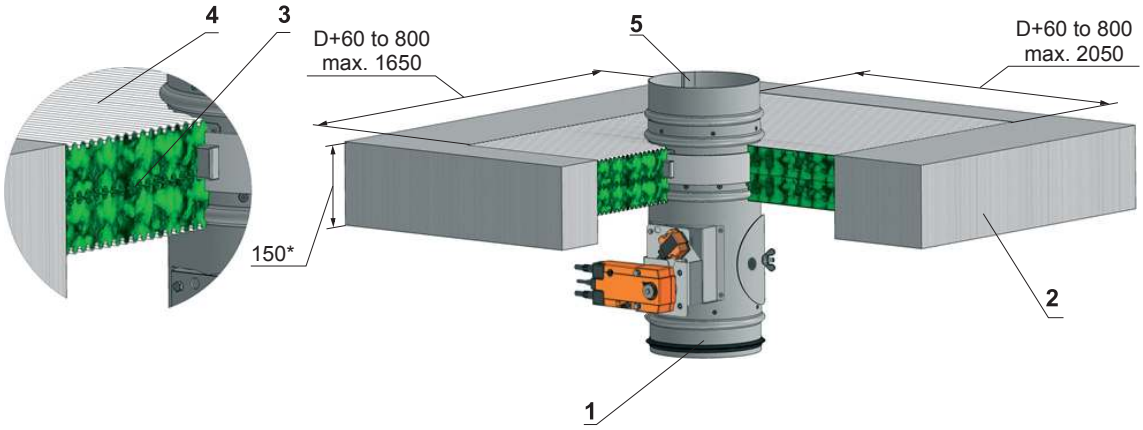
1 Fire damper FDMB
2 Installation frame
3 Solid ceiling construction

Installation details see chapter 7

Fig. 61 Solid ceiling construction - Weichschott

EIS 90





* min. 110 - Concrete/ min. 125 - Aerated concrete

POSITION:

1 Fire damper FDMB
2 Solid ceiling construction
3 Fire resistant board
4 Fire stop coating thickness 1 mm
5 Duct

Used materials - example**:

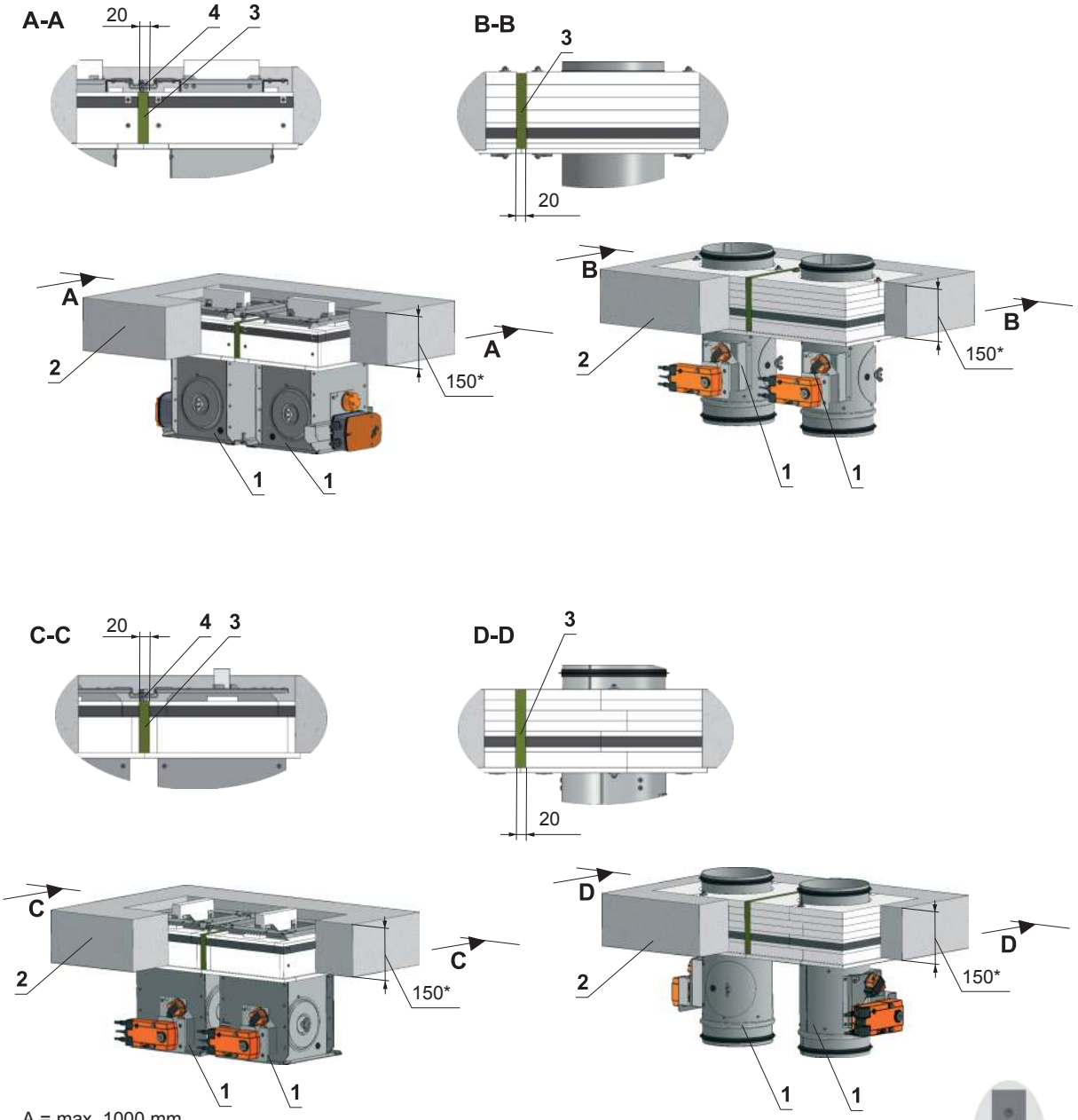
3 - Hilti CP673 PF
4 - Hilti CP673

Notice:

** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

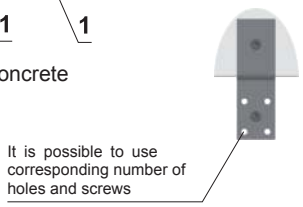
Fig. 62 Solid ceiling construction - flange to flange - installation frame

EIS 90



A = max. 1000 mm

* min. 110 - Concrete/ min. 125 - Aerated concrete



It is possible to use corresponding number of holes and screws

POSITION:

1 Fire damper FDMB with installation frame E1, R2
2 Solid ceiling construction
3 Mineral stone wool min. density 140 kg/m^3
4 Flange connection

Notice:

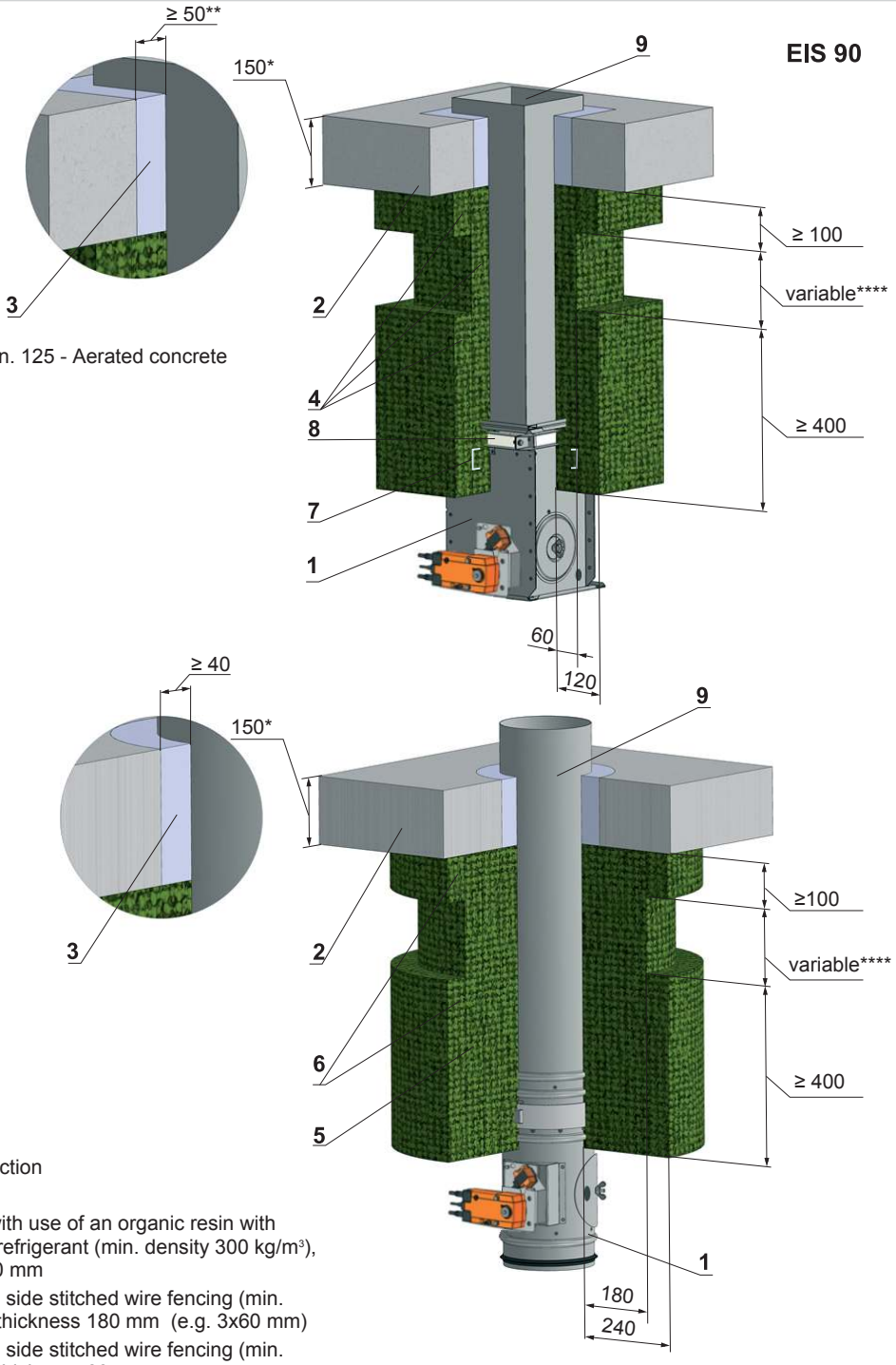
- Fire damper FDMB-C - installation opening dimensions a x b = (2x(A + 85^{+3}mm) + 20 mm) x (B + 85^{+3}mm) or a x b = (A + 85^{+3}mm) x (2x(B + 85^{+3}mm) + 20 mm)
- Fire damper FDMB-C - installation opening dimensions a x b = (2x(D + 141^{+3}mm) + 20 mm) x (D + 141^{+3}mm) or a x b = (D + 141^{+3}mm) x (2x(D + 141^{+3}mm) + 20 mm)
- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84)
- Fire damper FDMB-C - distance between dampers 104 mm
- Fire damper FDMB-K - distance between dampers 160 mm
- Damper axis has to be horizontal
- Flange to flange connection - Up to four dampers can be installed

Holders No. X = (2xZB1) + (2xZH1)
Screws No. Y = 2xX

Dimensions	Number ZB1	Number ZH1
A1,B1,D1 ≤ 400	1	1
400 < A1,B1,D1 ≤ 800	2	2
800 < A1,D1 ≤ 1260	3	3
1260 < A1,D1 ≤ 1600	4	4
1600 < A1 ≤ 2000	5	5

A1 = A or A1 = 2xA
B1 = B or B1 = 2xB
D1 = D or D1 = 2xD

Fig. 63 Installation outside of solid ceiling construction - mineral wool



* min. 110 - Concrete/ min. 125 - Aerated concrete
** Around the perimeter

POSITION:

1 Fire damper FDMB
2 Solid ceiling construction
3 Mortar or gypsum
4 Stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m³), EIS 90, thickness 60 mm
5 Stone wool with one side stitched wire fencing (min. density 105 kg/m³), thickness 180 mm (e.g. 3x60 mm)
6 Stone wool with one side stitched wire fencing (min. density 105 kg/m³), thickness 60 mm
7 Profil U25x40x25
8 VRM-III*****
9 Duct

Used materials - example***:

4 - Rockwool Conlit Ductrock EIS 90, Dicke 60 mm
5 - Rockwool Wired Mat 105 Dicke 3x60 mm
6 - Rockwool Wired Mat 105 Dicke 60 mm

Installation details of wool layers see chapter 8.4

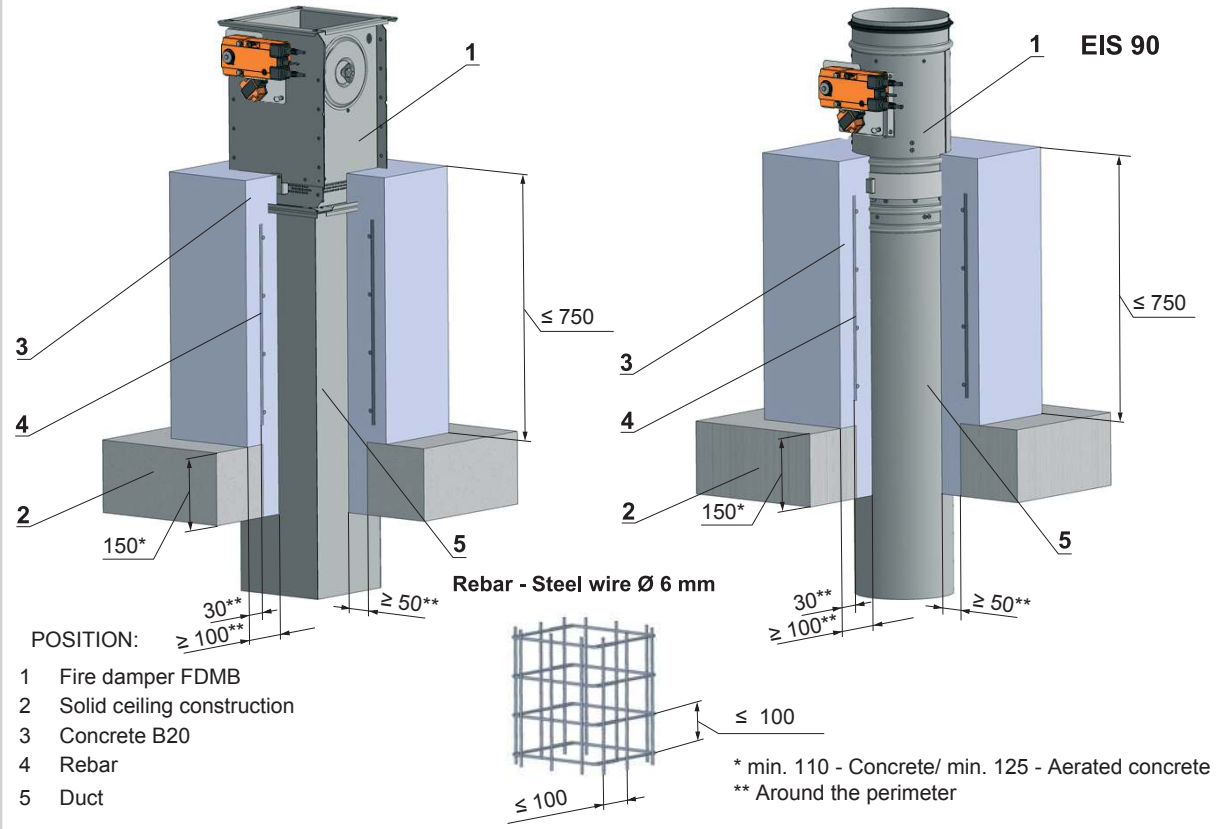
Notice:

** Stuffing box, fire protection mastic, cement lime plate and insulation materials can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

*** Dependent on the distance between damper and fire separating construction

**** Reinforcement fixing VRM-III see Fig.79
Installation of profile U25x40x25 see Fig.80

Fig. 64 **Installation outside of solid ceiling construction - concrete**

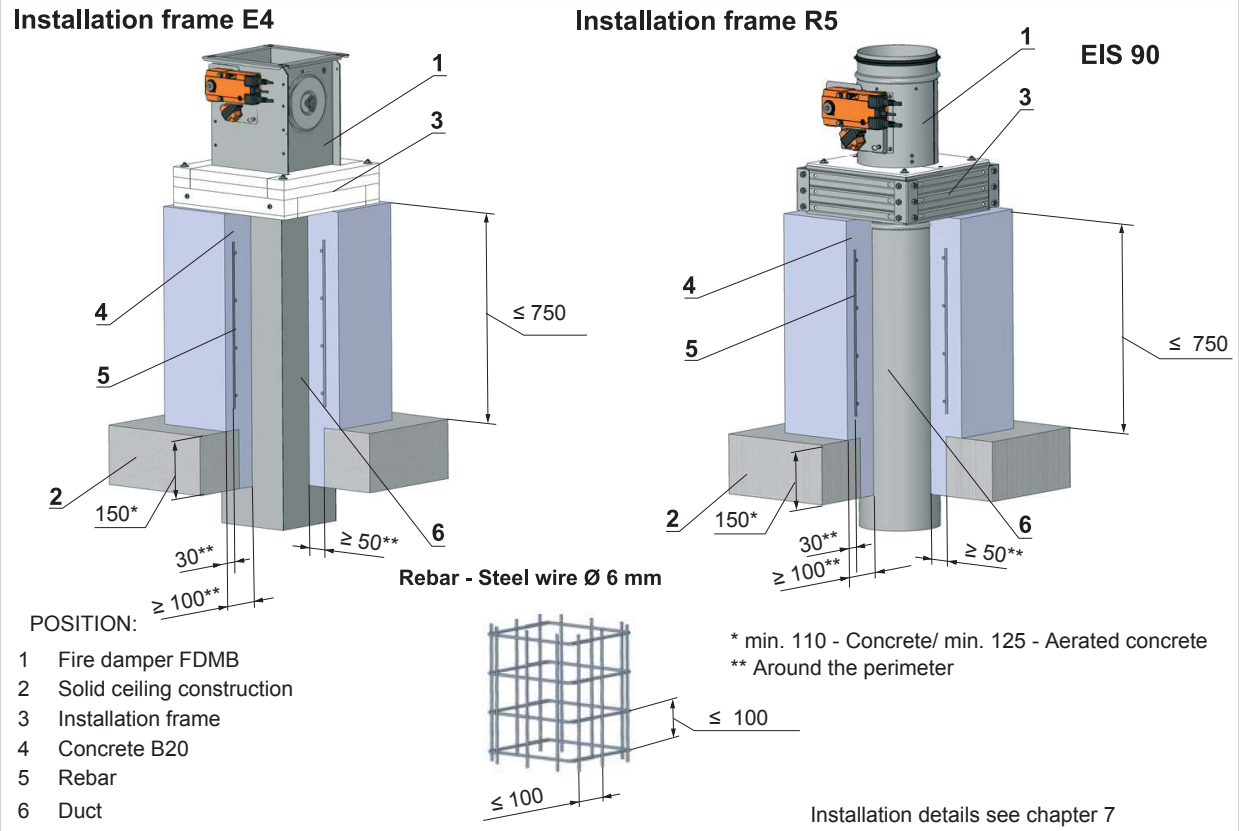


POSITION:

1 Fire damper FDMB
2 Solid ceiling construction
3 Concrete B20
4 Rebar
5 Duct

* min. 110 - Concrete/ min. 125 - Aerated concrete
** Around the perimeter

Fig. 65 **Installation outside of solid ceiling construction - concrete and installation frame**



POSITION:

1 Fire damper FDMB
2 Solid ceiling construction
3 Installation frame
4 Concrete B20
5 Rebar
6 Duct

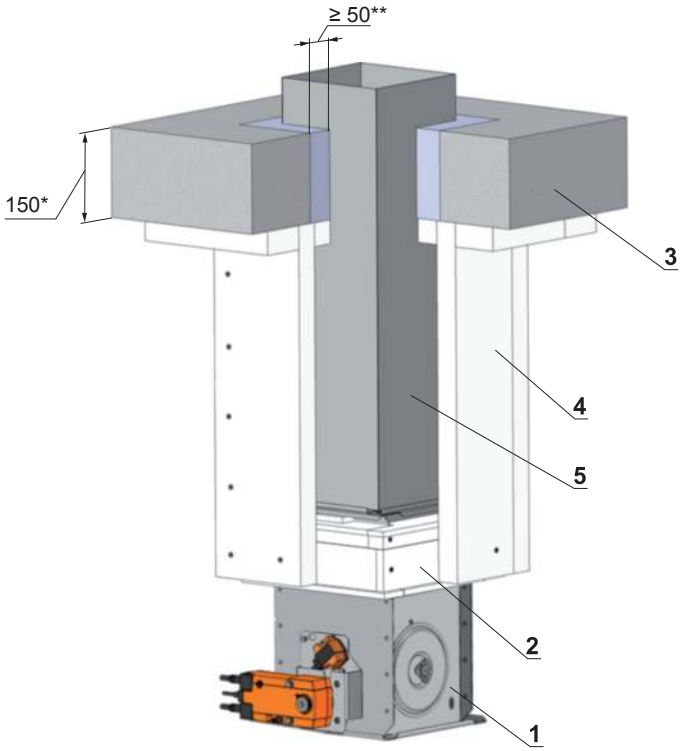
* min. 110 - Concrete/ min. 125 - Aerated concrete
** Around the perimeter

Installation details see chapter 7

Fig. 66 Installation outside of solid ceiling construction - installation frame with cement lime plates

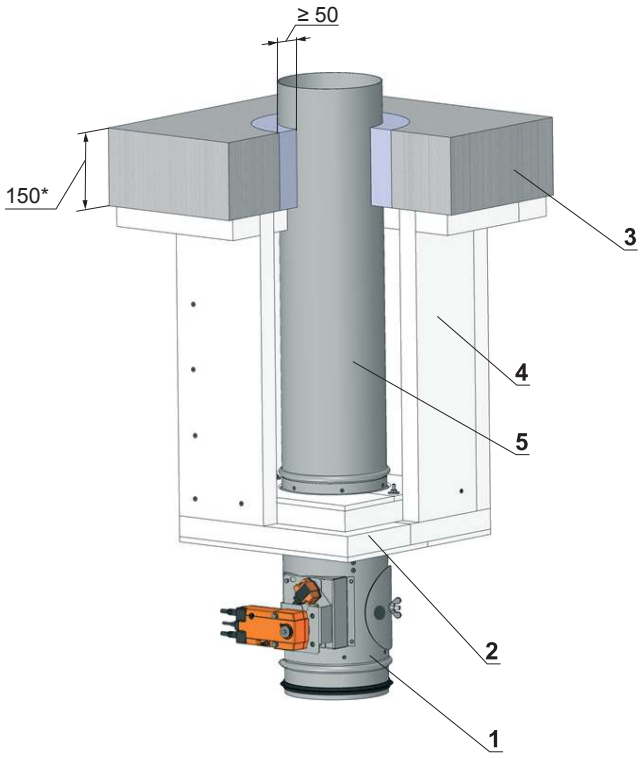
Installation frame E6

EIS 90



* min. 110 - Concrete/ min. 125 - Aerated concrete
** Around the perimeter

Installation frame R6



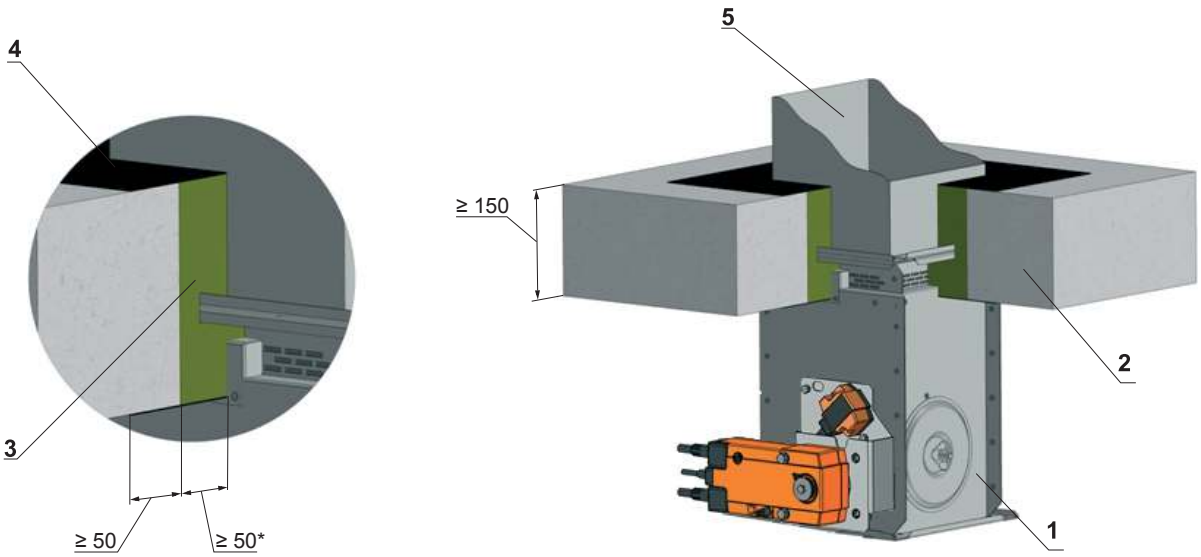
POSITION:

1 Fire damper FDMB
2 Installation frame
3 Solid ceiling construction
4 Cement lime plate
5 Duct

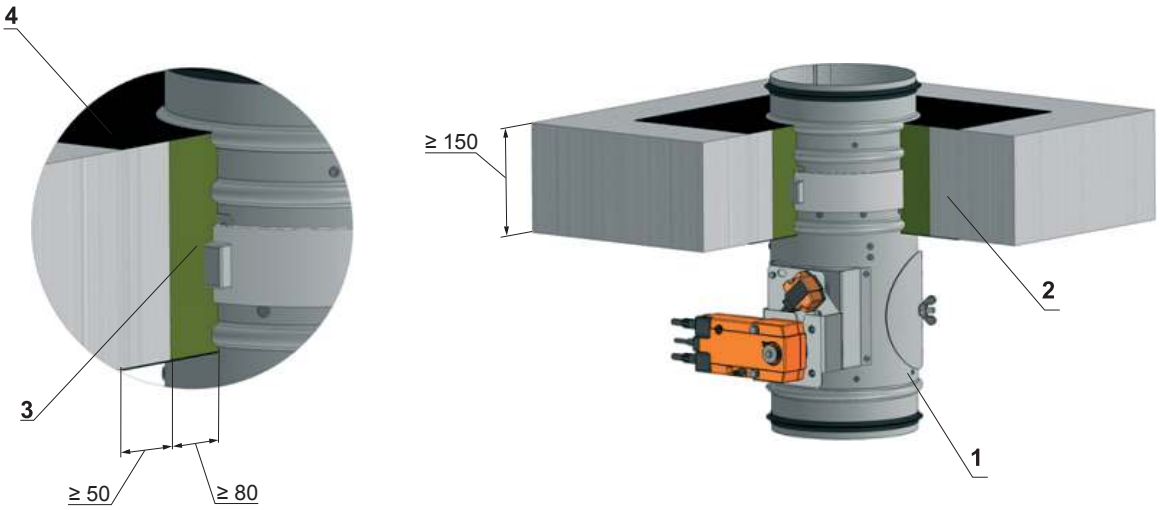
Installation details see chapter 7

Fig. 67 Solid ceiling construction - stuffing box, fire protection mastic and cement lime plate

EIS 60



* min. 110 - Concrete/ min. 125 - Aerated concrete
** Around the perimeter



LEGENDA:

1 Fire damper FDMB
2 Solid ceiling construction
3 Stuffing box (mineral stone wool min. density 140 kg/m^3)
4 Fire protection mastic min. thickness 1 mm
5 Duct

Used materials - example***:

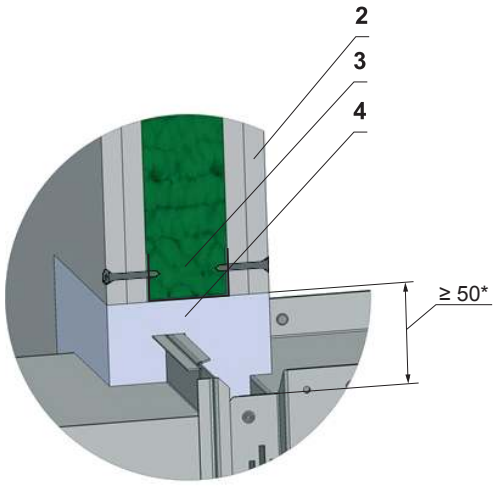
3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K

Notice:

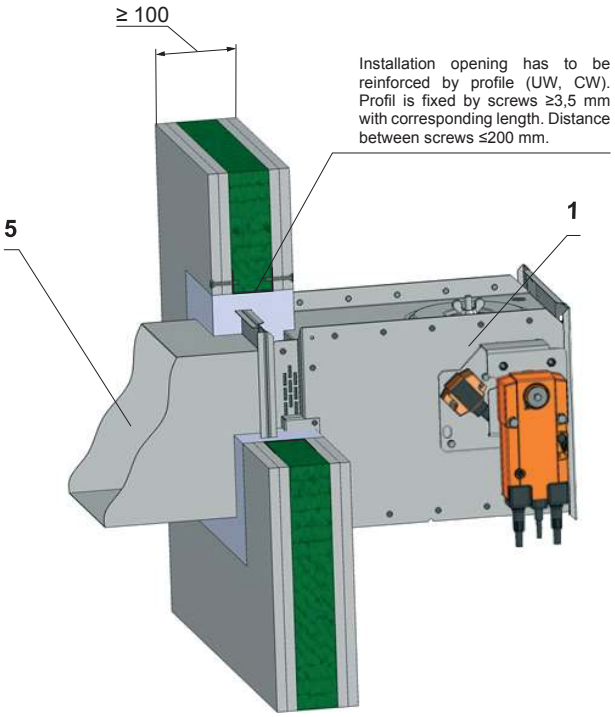
*** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

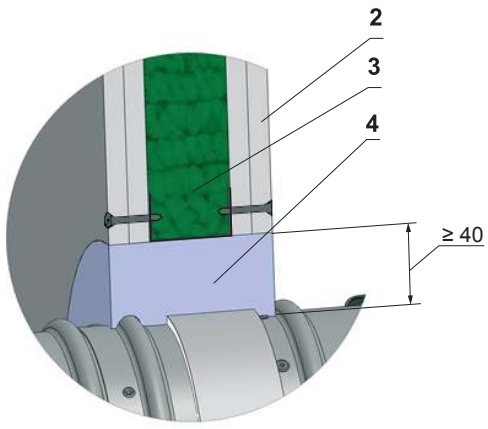
Fig. 68 Gypsum wall construction - mortar or gypsum

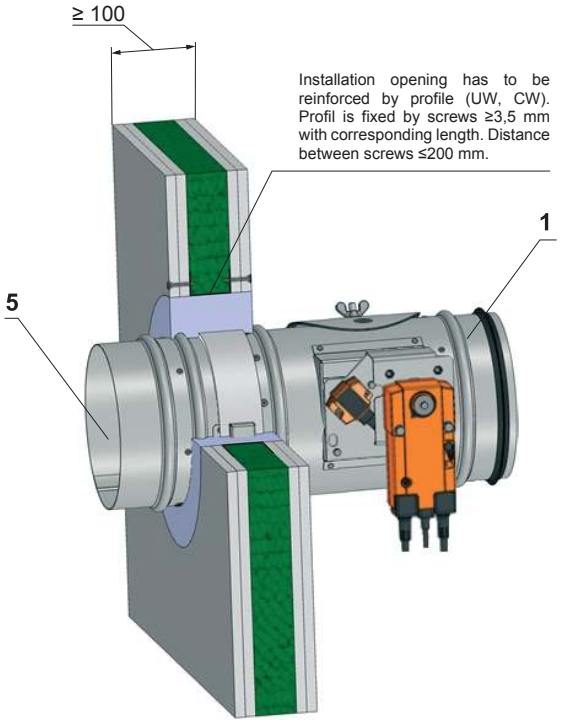
EIS 120



* Around the perimeter







POSITION:

1 Fire damper FDMB

2 Gypsum plate

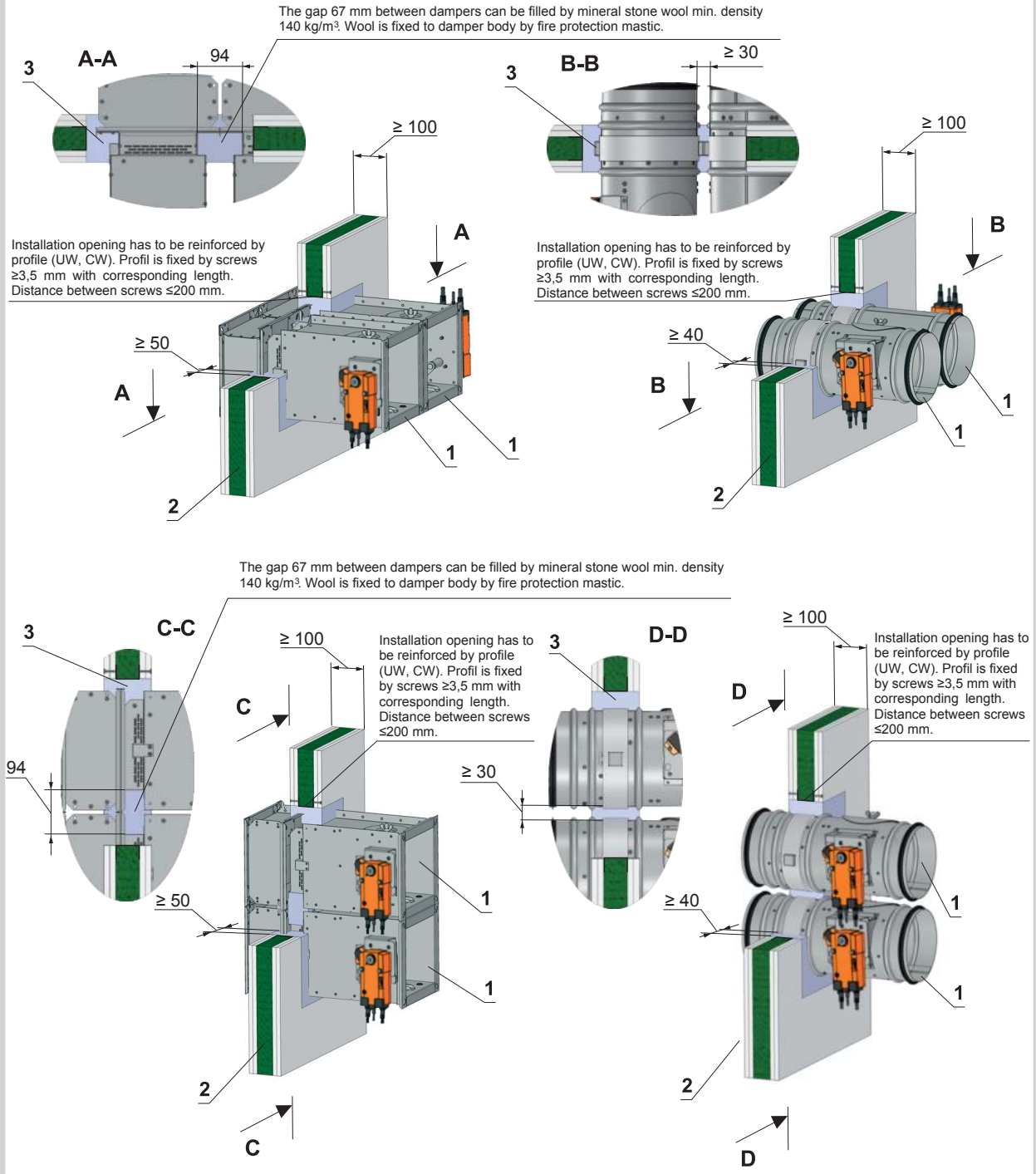
3 Fire resistant insulation

4 Mortar or gypsum

5 Duct

Fig. 69 Gypsum wall construction - flange to flange - mortar or gypsum

EIS 90



POSITION:

1 Fire damper FDMB

2 Gypsum plate

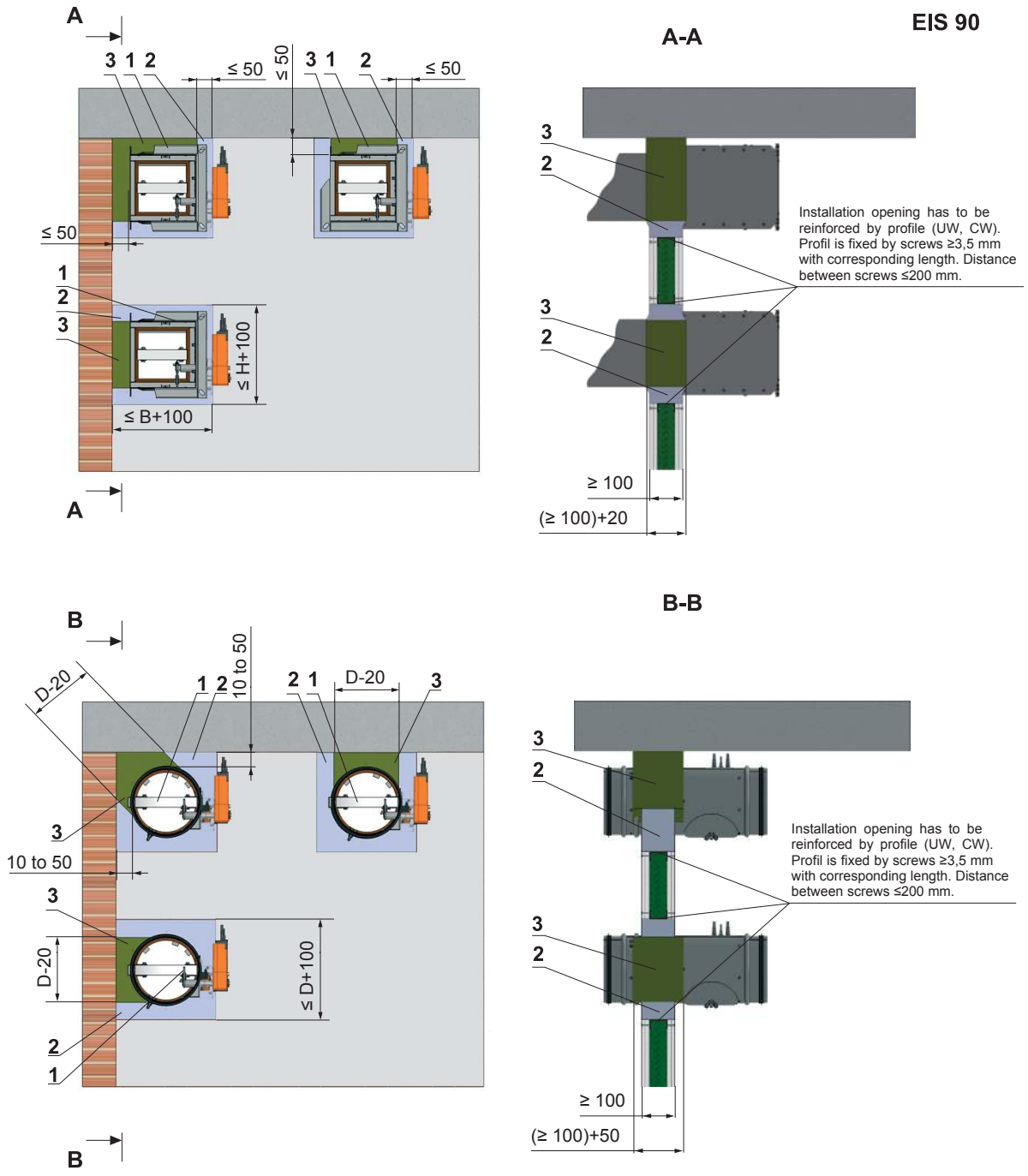
3 Fire resistant insulation

4 Mortar or gypsum

Notice:

- Fire damper FDMB-C - installation opening for each damper has minimal dimensions a x b = (A+100) x (2xB +100) mm or (2xA+100) x (B +100) mm
- Fire damper FDMB-K - installation opening for each damper has minimal dimensions D+80 mm (D+160 mm for dampers with flanges)
- Gap between damper and construction is filled by mortar or gypsum
- Fire damper FDMB-C - distance between dampers 60 mm
- Fire damper FDMB-K - distance between dampers 70 mm
- Damper axis has to be horizontal
- Flange to flange connection - Up to four dampers can be installed

Fig. 70 Gypsum wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool



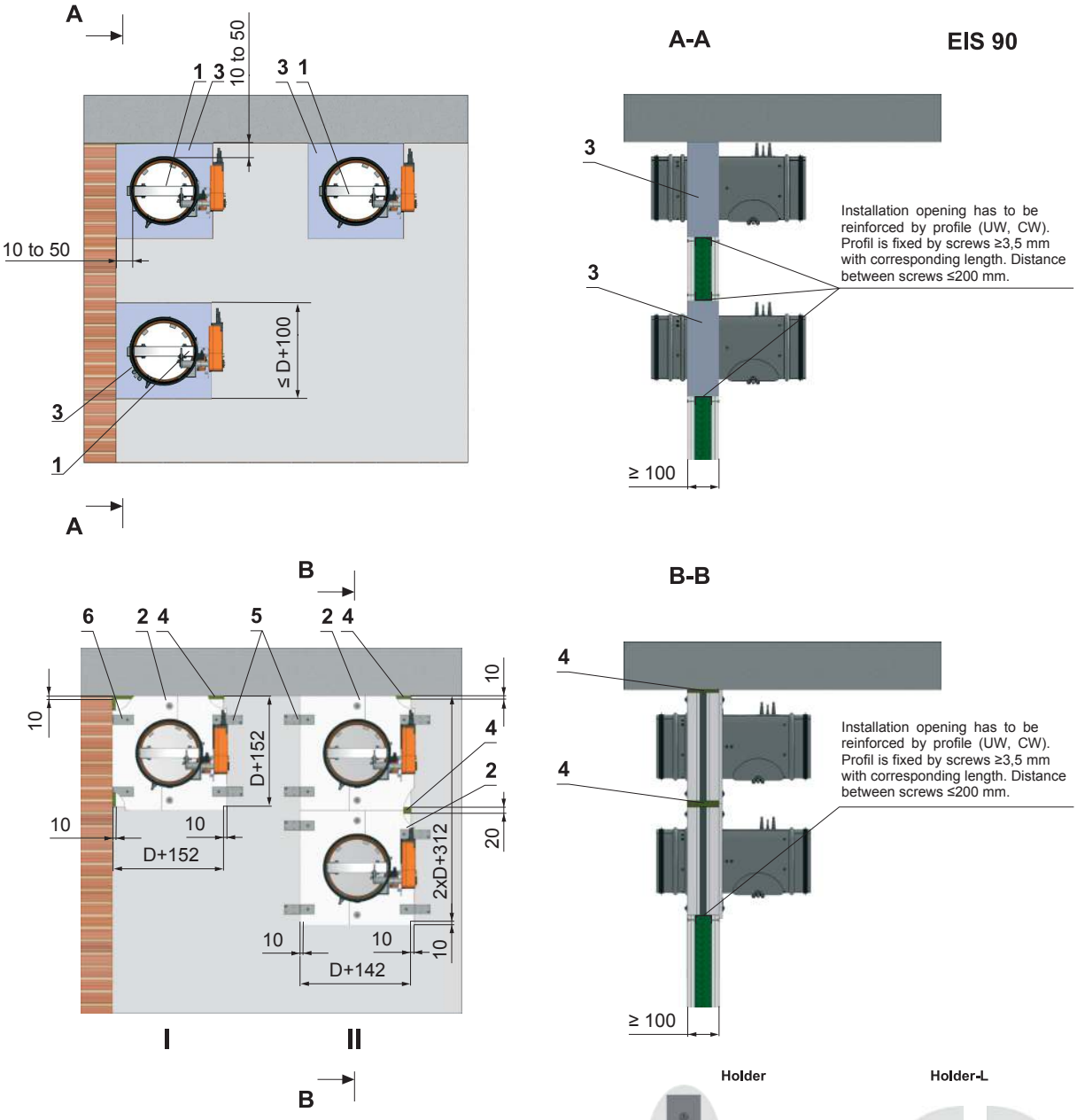
POSITION:

1 Fire damper FDMB
2 Mortar or gypsum
3 Mineral stone wool min. density 140 kg/m³

Notice:

- Gap between damper and construction is filled by mortar or gypsum and mineral wool
- Wool is fixed to damper body and construction by fire protection mastic
- Mineral wool thickness = construction thickness + 20 mm or 50 mm
- Damper axis has to be horizontal
- Installation is valid for ceiling construction

Fig. 71 **Gypsum wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool**
Gypsum wall construction - installation next to wall, ceiling - installation frame and mineral wool



I
Holders No. X = X1/2
Holders-L No Z = X1/2
Screws No. Y

II
Holders No. X = X1 - Z1
Holders-L No Z = Z1/2
Screws No. Y

Dimensions	Number X1	Number Y	Number Z1
D ≤ 400	4	8	2
400 < D ≤ 800	8	16	4
800 < D ≤ 1000	12	24	6

POSITION:

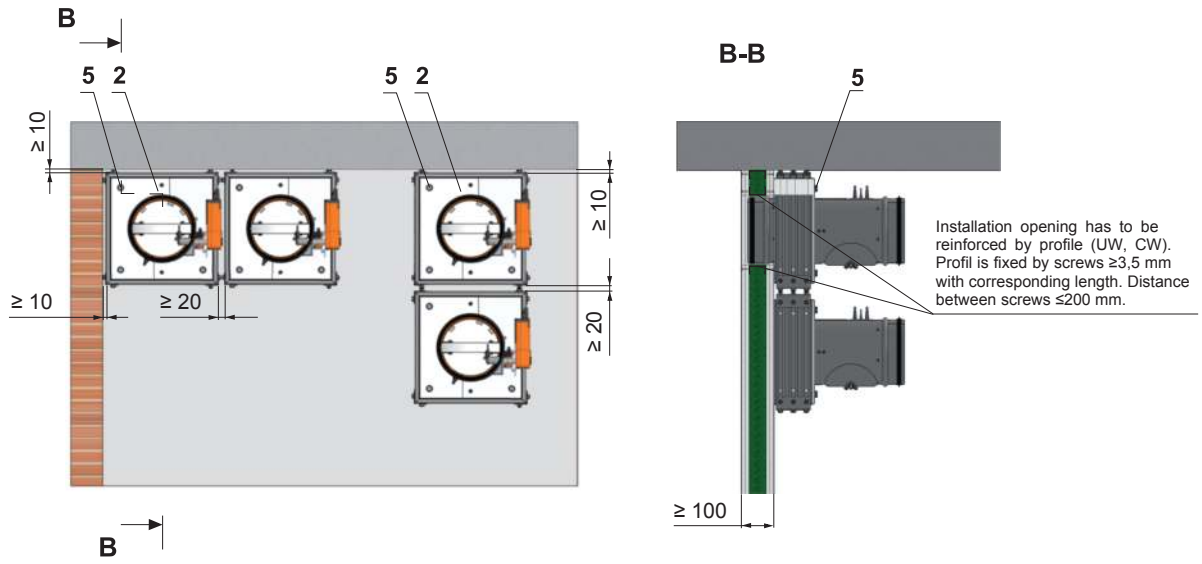
1 Fire damper FDMB
2 Fire damper FDMB with installation frame R1, R2
3 Mortar or gypsum
4 Mineral stone wool min. density 140 kg/m^3
5 Holder
6 Holder L

Notice:

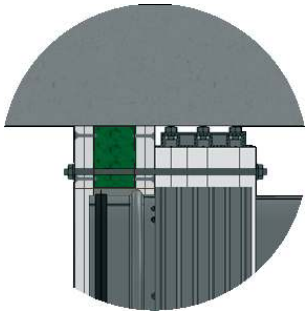
- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84).
- Wool is fixed to installation frame and construction by fire protection mastic.
- Damper axis has to be horizontal

Fig. 72 Gypsum wall construction - installation next to wall, ceiling - installation frame

EIS 90



Fitting with threaded rods



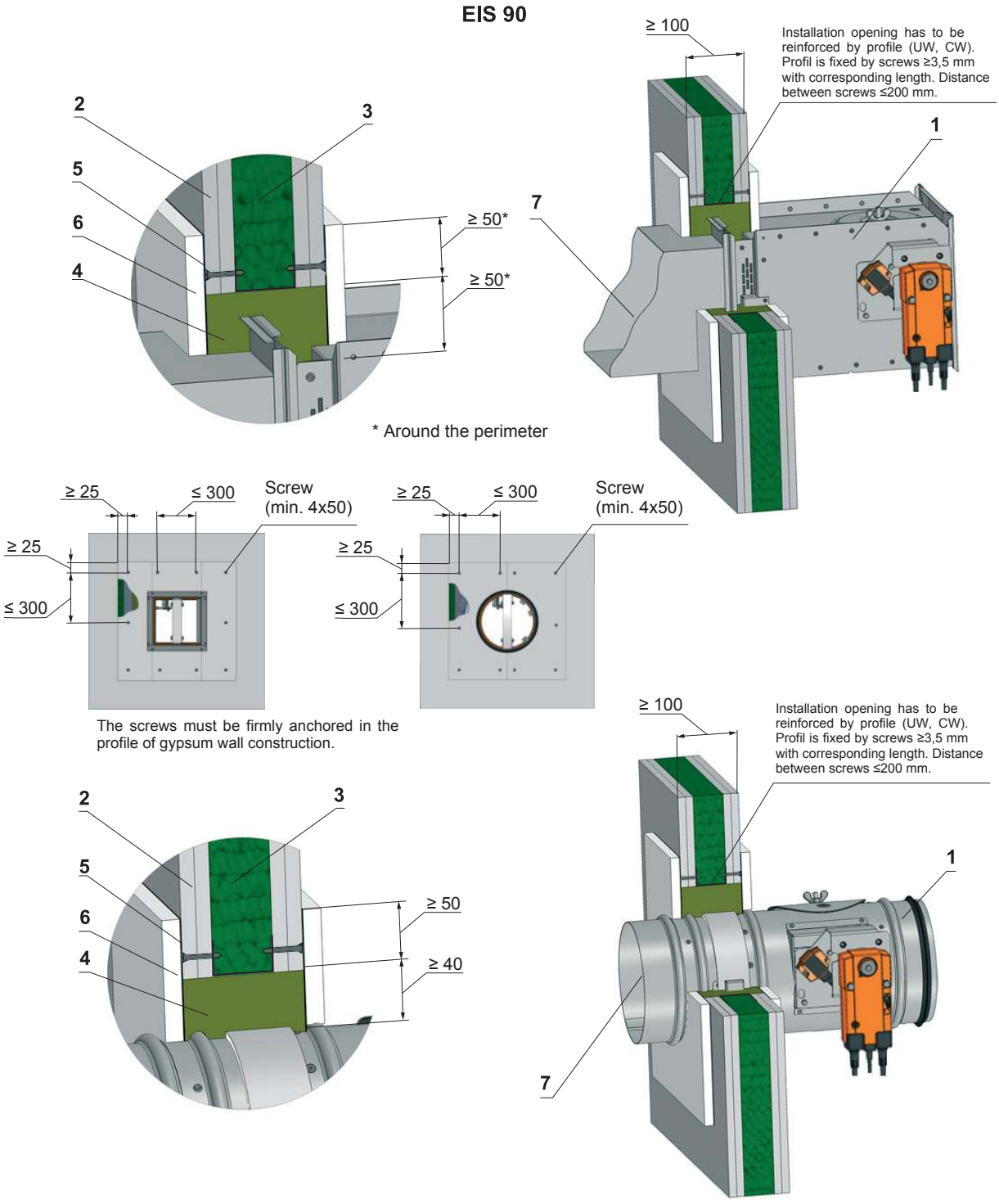
POSITION:

1 Fire damper FDMB with installation frame D5
2 Fitting with threaded rods

Notice:

- Damper axis has to be horizontal

Fig. 73 Gypsum wall construction - stuffing box, fire protection mastic and cement lime plate



POSITION:

1 Fire damper FDMB
2 Gypsum plate
3 Fire resistant insulation
4 Stuffing box (mineral stone wool min. density 140 kg/m^3)
5 Fire protection mastic min. thickness 1 mm
6 Cement lime plate min. thickness 15 mm (min. density 870 kg/m^3)
7 Duct

Used materials - example**:

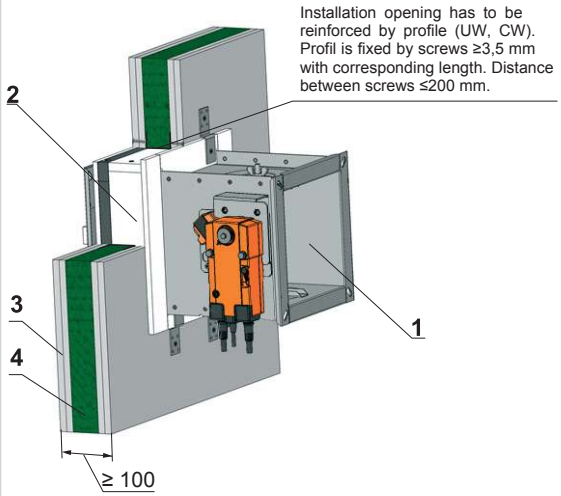
3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K
5 - Promatect - H

Notice:

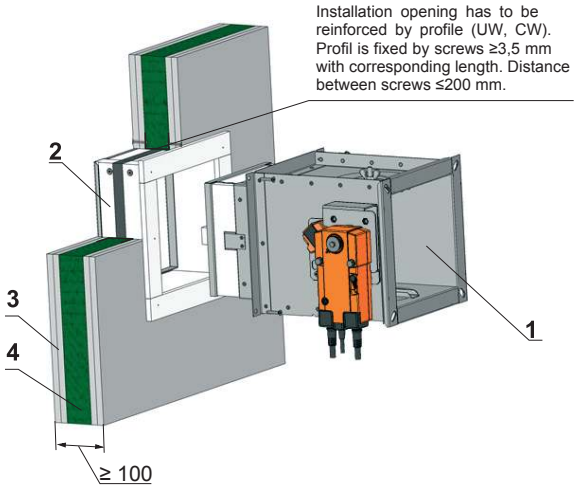
** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 74 Gypsum wall construction - installation frame

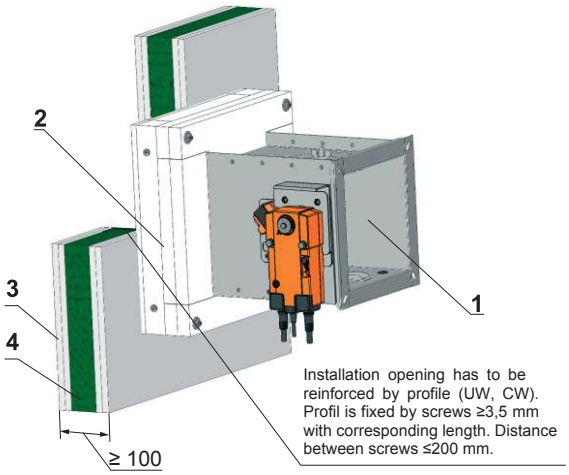
Installation frame E1



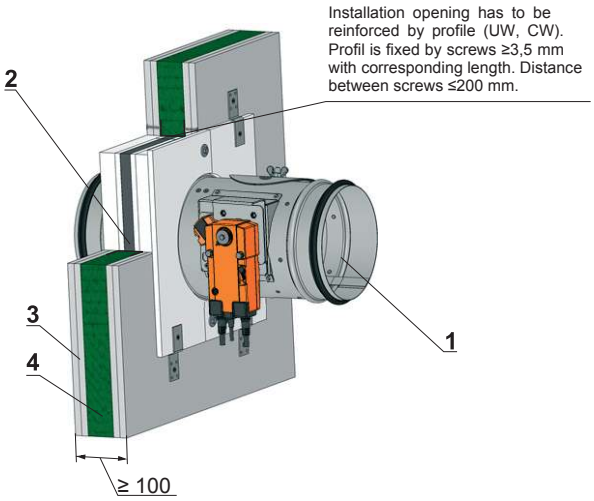
EIS 90 Installation frame E3



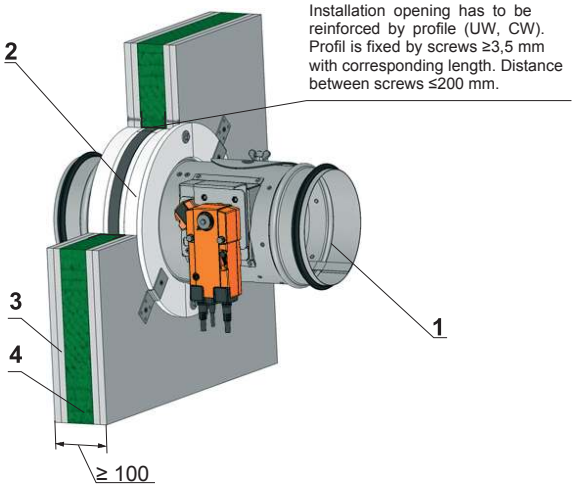
Installation frame E4



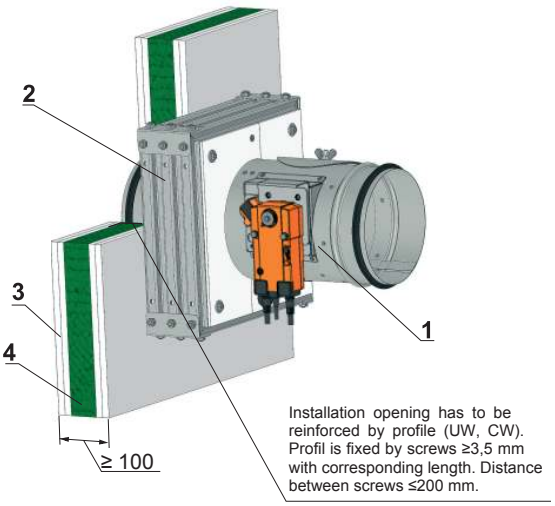
Installation frame R1, R2



Installation frame R3, R4



Installation frame R5



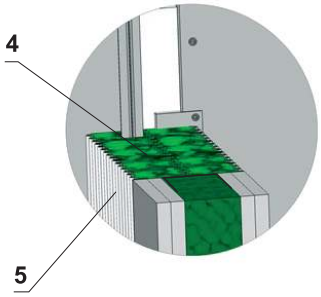
POSITION:

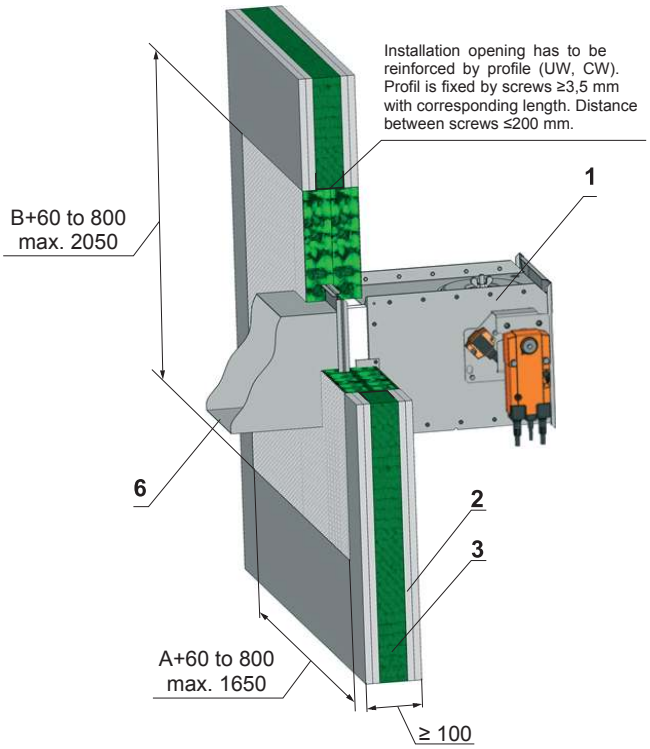
1 Fire damper FDMB
2 Installation frame
3 Gypsum plate
4 Fire resistant insulation

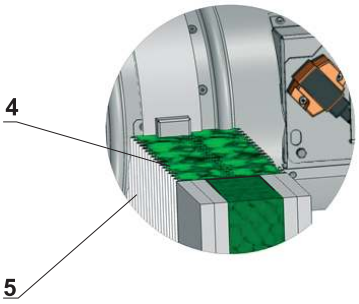
Installation details see chapter 7

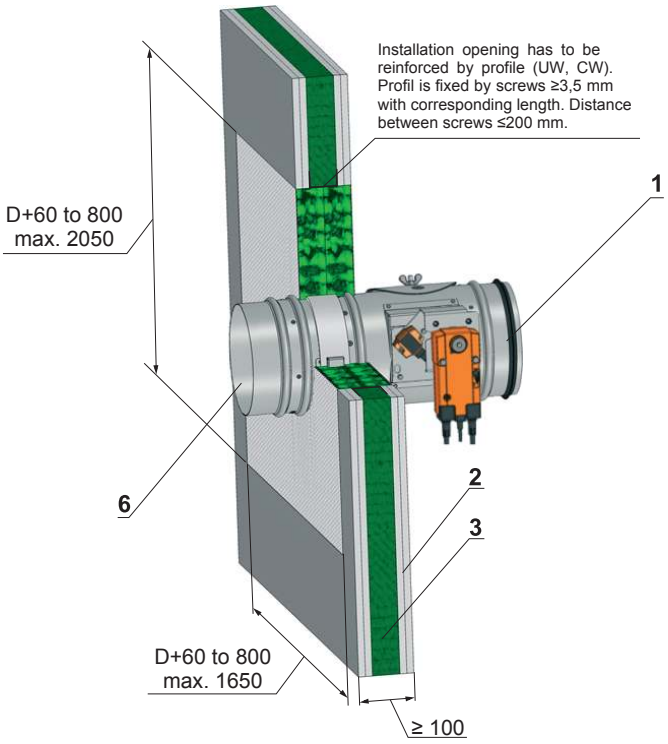
Fig. 75 Gypsum wall construction - Weichschott

EIS 90









POSITION:

1 Fire damper FDMB
2 Gypsum plate
3 Fire resistant insulation
4 Fire resistant board
5 Fire stop coating thickness 1 mm
6 Duct

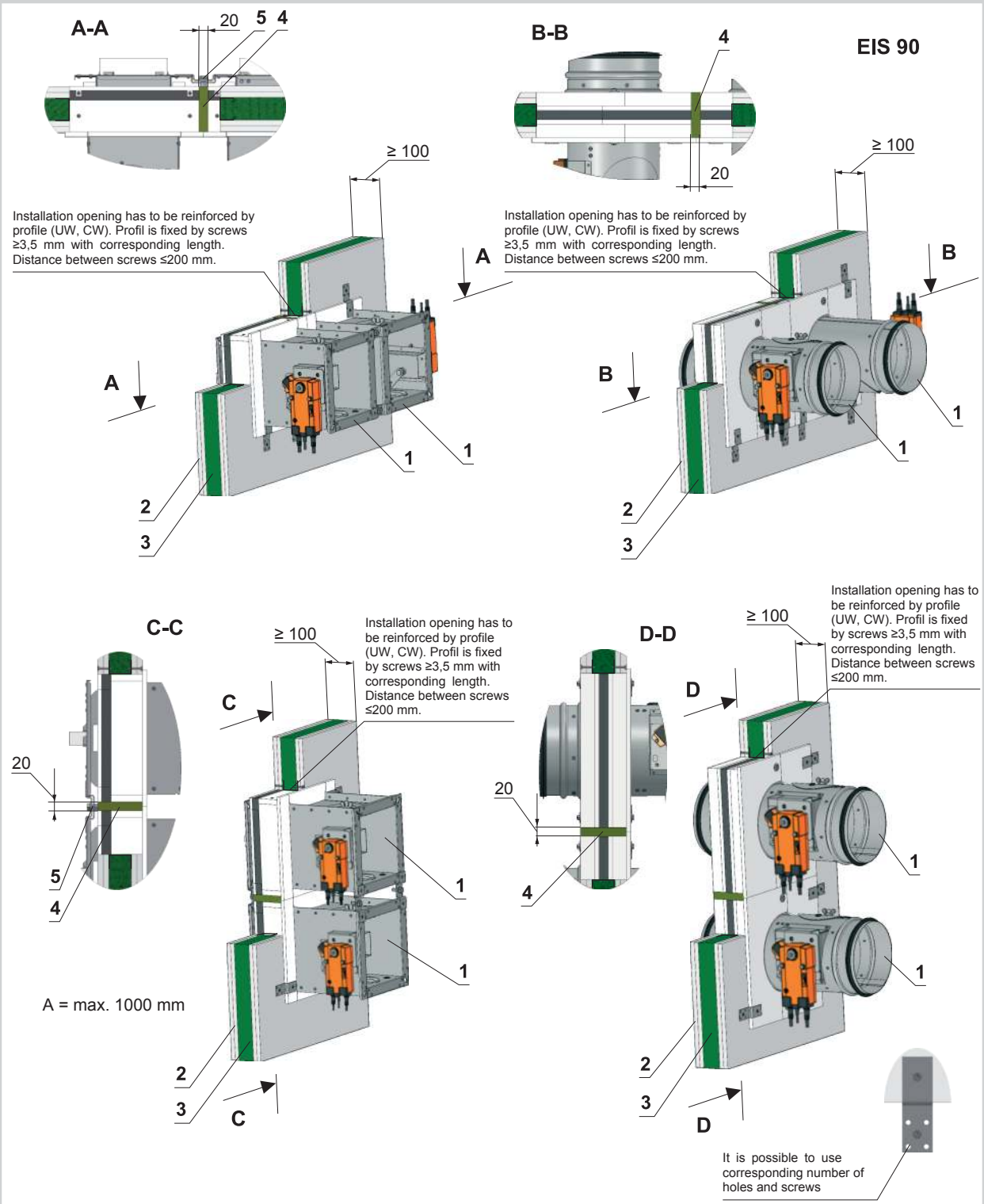
Used materials - example*:

4 - Hilti CP673 PF
5 - Hilti CP673

Notice:

* Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 76 Gypsum wall construction - flange to flange - installation frame



POSITION:

1 Fire damper FDMB with Installation frame E1, R1
2 Gypsum plate
3 Fire resistant insulation
4 Mineral stone wool min. density 140 kg/m³
5 Flange connection

Notice:

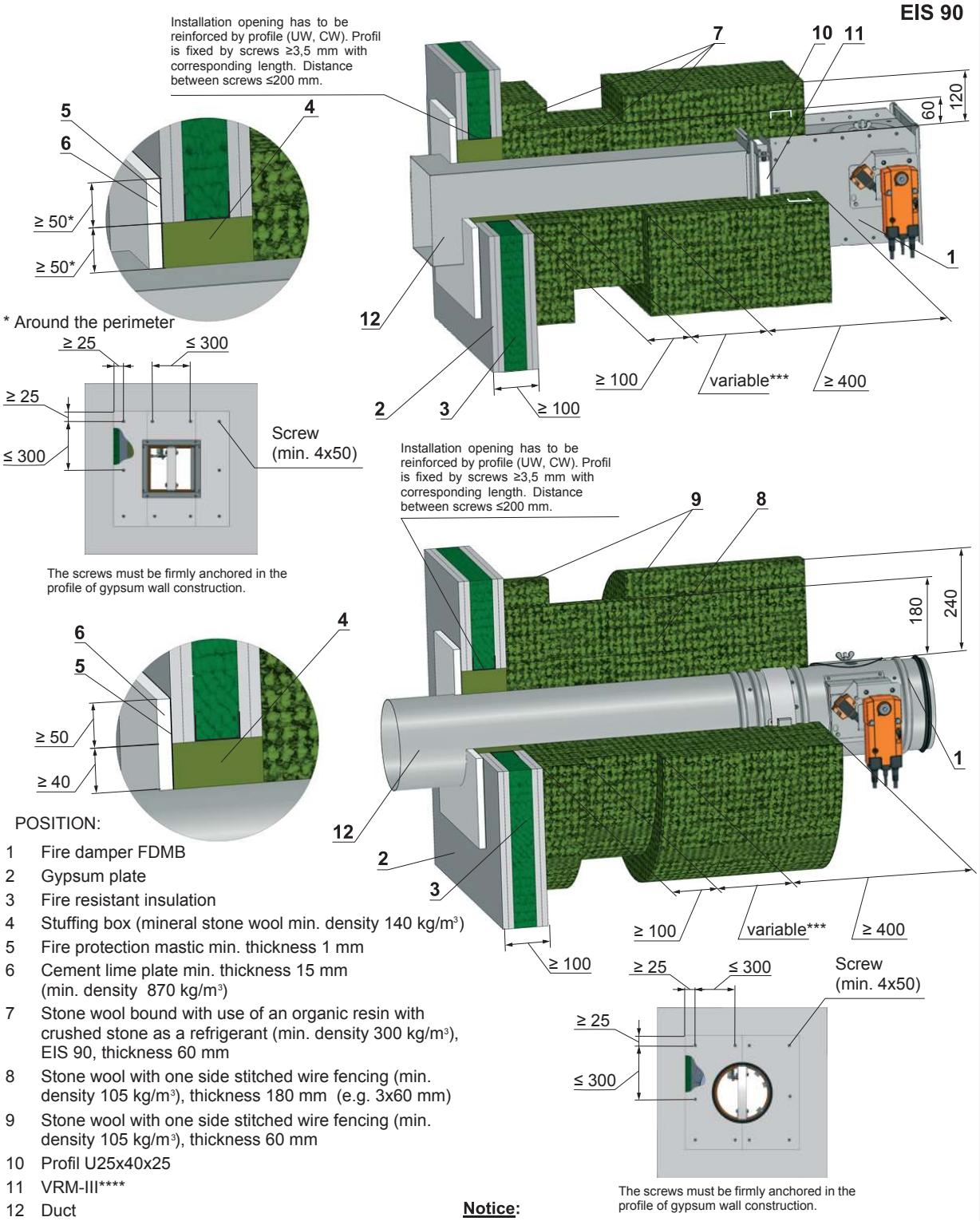
- Fire damper FDMB-C - installation opening dimensions a x b = (2x(A + 85 +3mm) + 20 mm) x (B + 85 +3mm) or a x b = (A + 85 +3mm) x (2x(B + 85 +3mm) + 20 mm)
- Fire damper FDMB-C - installation opening dimensions a x b = (2x(D + 141 +3mm) + 20 mm) x (D + 141 +3mm) or a x b = (D + 141 +3 mm) x (2x(D + 141 +3mm) + 20 mm)
- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84)
- Fire damper FDMB-C - distance between dampers 104 mm
- Fire damper FDMB-K - distance between dampers 160 mm
- Damper axis has to be horizontal
- Flange to flange connection - Up to four dampers can be installed

Holders No. X = (2xZB1) + (2xZH1)
Screws No. Y = 2xX

Dimensions	Number ZB1	Number ZH1
A1,B1,D1 ≤ 400	1	1
400 < B1,H1,D1 ≤ 800	2	2
800 < B1,D1 ≤ 1260	3	3
1260 < B1,D1 ≤ 1600	4	4
1600 < B1 ≤ 2000	5	5

A1 = A or A1 = 2xA
B1 = B or B1 = 2xB
D1 = D or D1 = 2xD

Fig. 77 Installation outside of solid wall construction - mineral wool



POSITION:

1 Fire damper FDMB
2 Gypsum plate
3 Fire resistant insulation
4 Stuffing box (mineral stone wool min. density 140 kg/m³)
5 Fire protection mastic min. thickness 1 mm
6 Cement lime plate min. thickness 15 mm (min. density 870 kg/m³)
7 Stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m³), EIS 90, thickness 60 mm
8 Stone wool with one side stitched wire fencing (min. density 105 kg/m³), thickness 180 mm (e.g. 3x60 mm)
9 Stone wool with one side stitched wire fencing (min. density 105 kg/m³), thickness 60 mm
10 Profil U25x40x25
11 VRM-III****
12 Duct

Used materials - example**:

3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K
5 - Promatect - H
6 - Rockwool Conlit Ductrock EIS 90, Dicke 60 mm
7 - Rockwool Wired Mat 105 Dicke 3x60 mm
8 - Rockwool Wired Mat 105 Dicke 60 mm

Notice:

** Stuffing box, fire protection mastic, cement lime plate and insulation materials can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

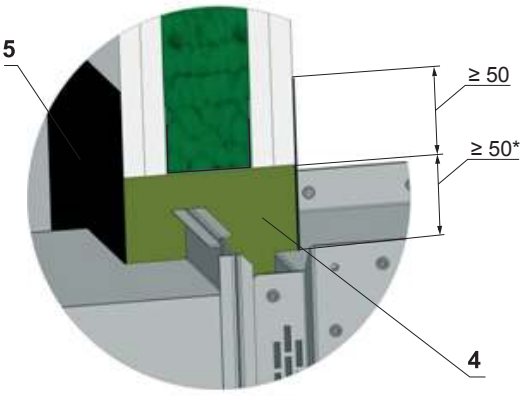
*** Dependent on the distance between damper and fire separating construction

**** Reinforcement fixing VRM-III see Fig.79
Installation of profile U25x40x25 see Fig.80

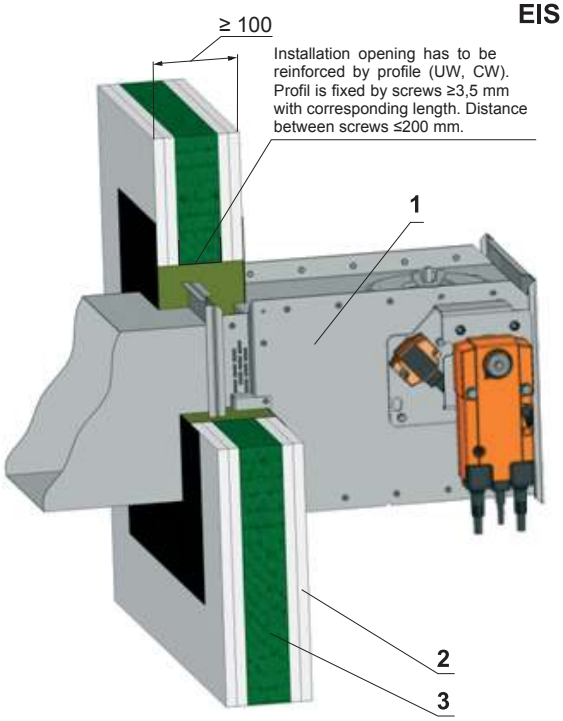
Installation details of wool layers see chapter 8

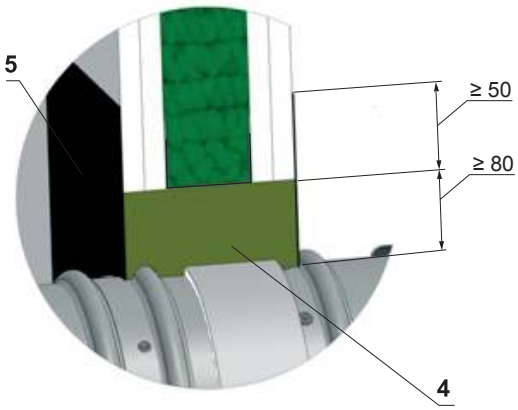
Fig. 78 Gypsum wall construction - stuffing box and fire protection mastic

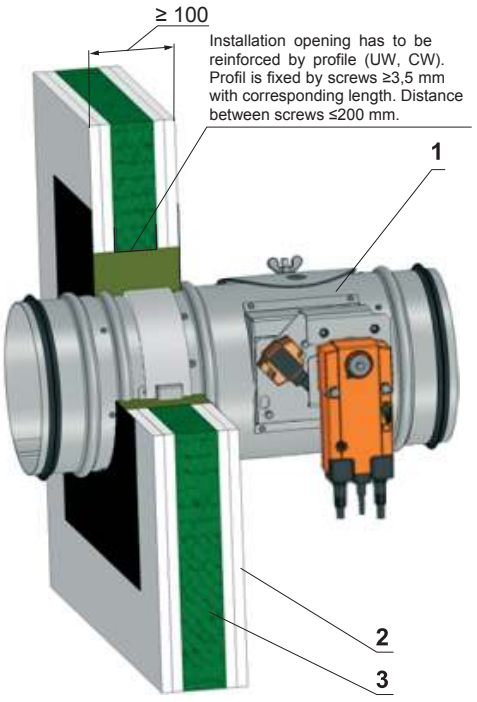
EIS 60



* Around the perimeter







LEGENDA:

1 Fire damper FDMB
2 Gypsum plate
3 Fire resistant insulation
4 Stuffing box (mineral stone wool min. density 140 kg/m³)
5 Fire protection mastic min. thickness 1 mm

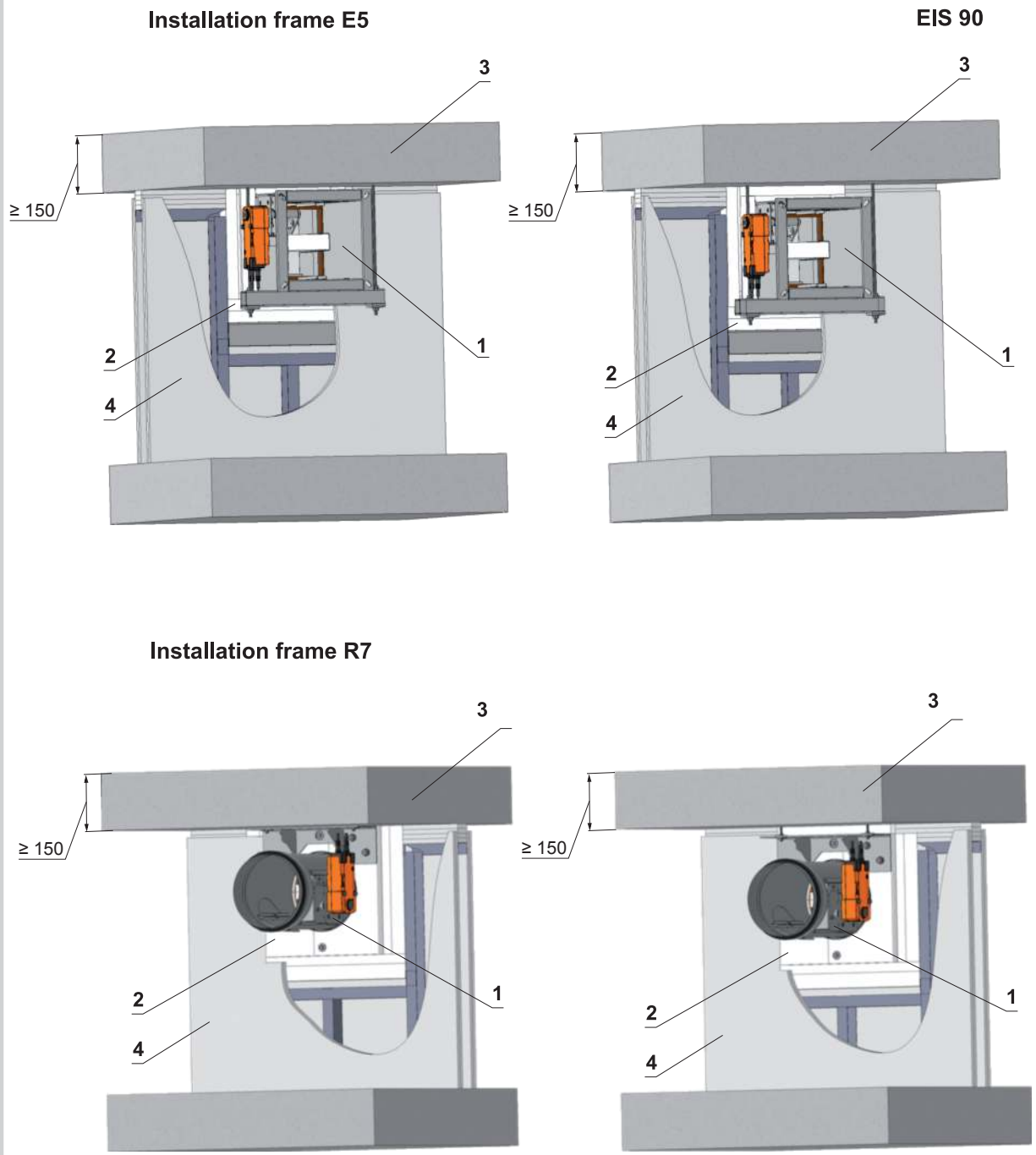
Used materials - example**:

3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K

Notice:

** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 79 Gypsum wall construction - ceiling with movement possibility - installation frame

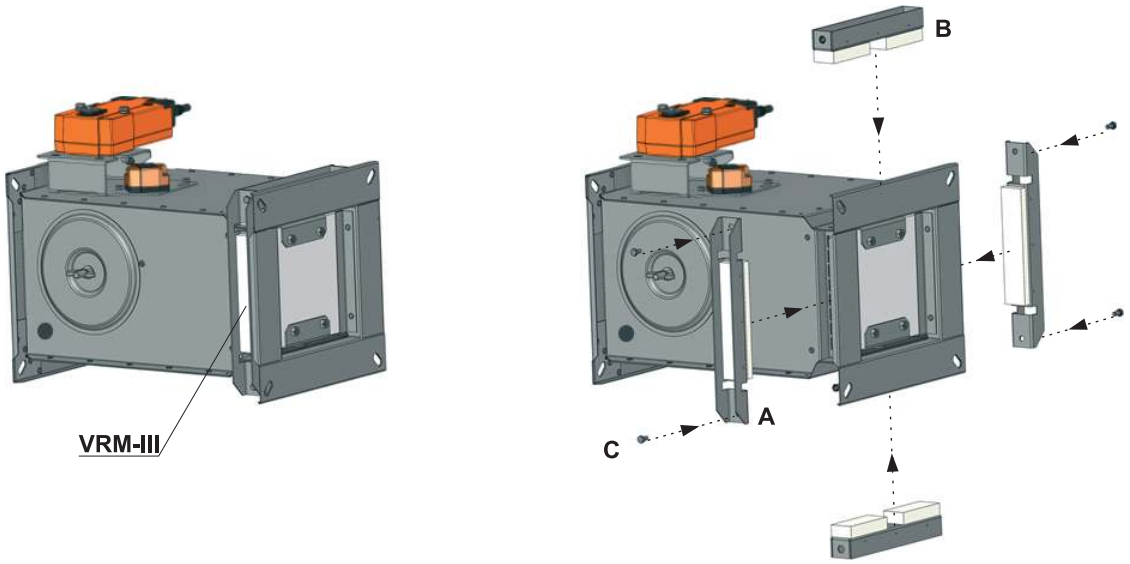


POSITION:

1 Fire damper FDMB
2 Installation frame
3 Solid ceiling construction
4 Wall with possibility of ceiling movement

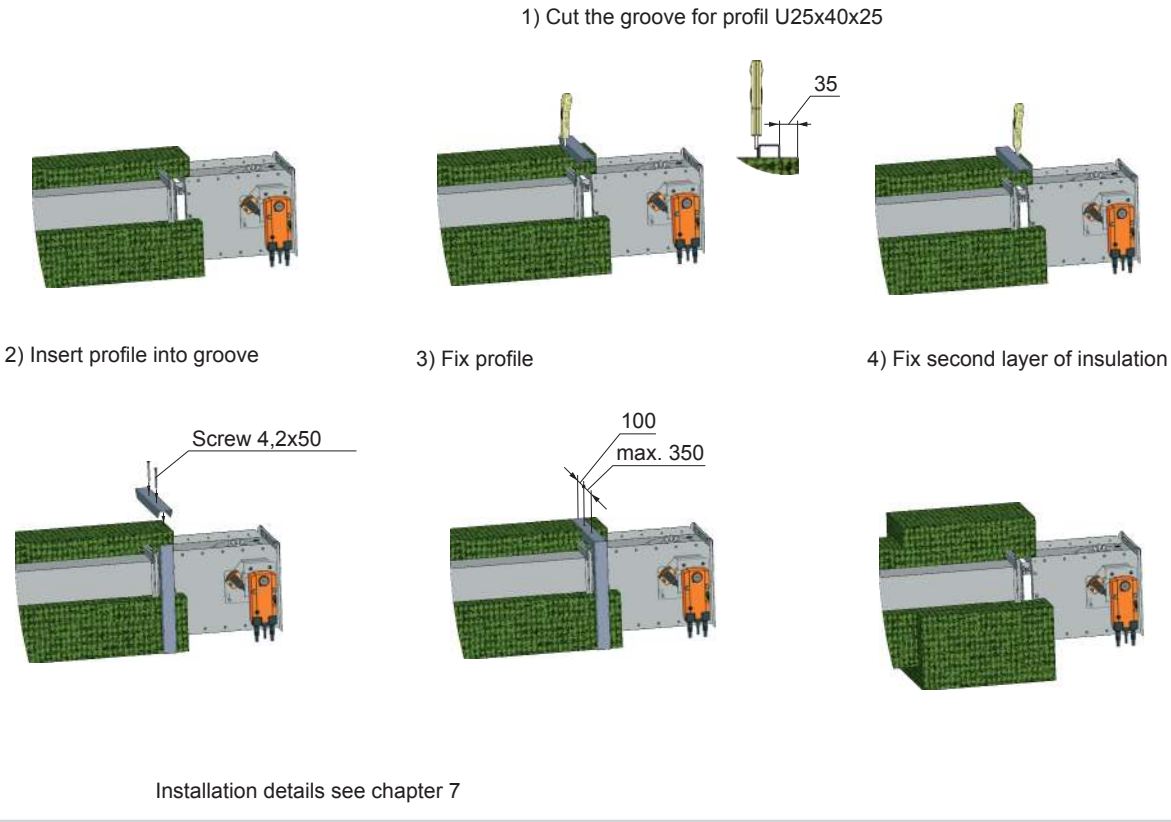
Installation details see chapter 7

Fig. 80 Fixing of reinforcement to damper body



1.) Insert part A, B on body of fire damper in correct position
2.) Lock screw C
3.) It has to be done on each corner of VRM

Fig. 81



Installation details see chapter 7

7. Installation frames

7.1. Rectangular dampers

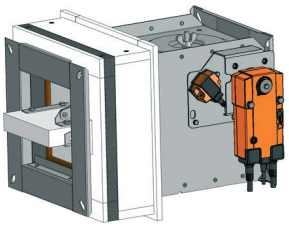
Tab. 7.1.1.

Installation frame											
Type	Material	Installation type									
		Solid wall constr.	Th. [mm]	Solid ceiling const.	Th. [mm]	Gypsum wall constr.	Th. [mm]	Outside solid wall con./solid ceiling con.	Th. [mm]	On solid wall constr./Solid ceiling constr.	Th. [mm]
E1	Cement lime	√	≥100	√	≥150	√	≥100	-	-	-	-
E2	Galvanized plate	√	≥100	√	≥150	-	-	-	-	-	-
E3	Cement lime	-	-	-	-	√	≥100	-	-	-	-
E4	Cement lime	√	≥100	√ *)	≥150	-	-	Solid ceiling construction *)	≥150	√	≥100/ ≥150
E5	Cement lime	-	-	-	-	√ **)	≥100	-	-	-	-
E6	Cement lime	-	-	-	-	-	-	√	≥100/ ≥150	-	-

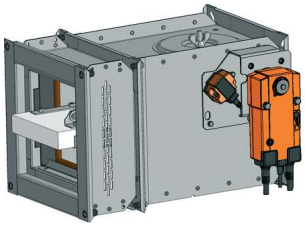
* With concrete
** Ceiling with movement possibility

Fig. 82

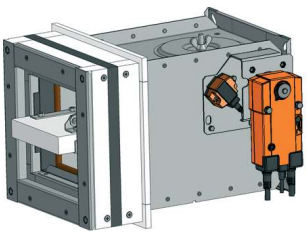
Installation frame E1



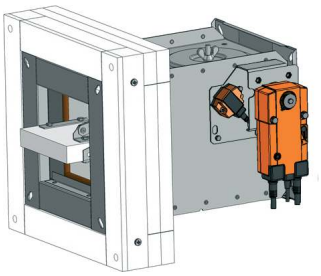
Installation frame E2



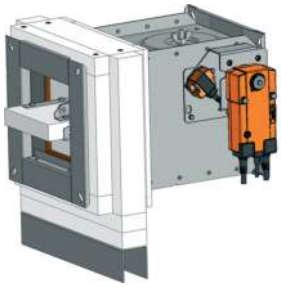
Installation frame E3



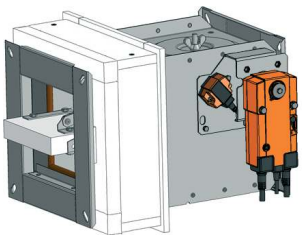
Installation frame E4



Installation frame E5



Installation frame E6



7.2. Round dampers

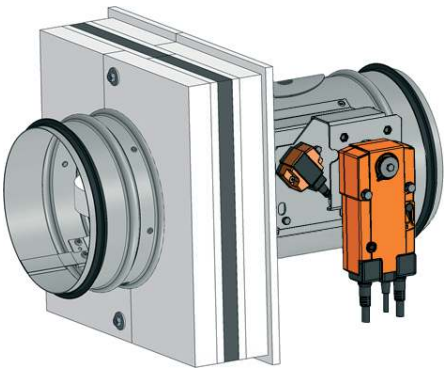
Tab. 7.2.1.

Installation frame											
Type	Material	Installation type									
		Solid wall constr.	Th. [mm]	Solid ceiling const.	Th. [mm]	Gypsum wall constr.	Th. [mm]	Outside solid wall con./solid ceiling con.	Th. [mm]	On solid wall constr./Solid ceiling constr.	Th. [mm]
R1	Cement lime	√	≥100	√	≥150	√	≥100	-	-	-	-
R2	Cement lime	√	≥150	√	≥150	√	≥100	-	-	-	-
R3	Cement lime	√	≥100	√	≥150	√	≥100	-	-	-	-
R4	Cement lime	√	≥150	√	≥150	√	≥100	-	-	-	-
R5	Cement lime	-	-	-	-	-	-	Solid ceiling construction *)	≥150	√	≥100
R6	Cement lime	-	-	-	-	-	-	√	≥100/ ≥150	-	-
R7	Cement lime	-	-	-	-	√ **)	≥100	-	-	-	-

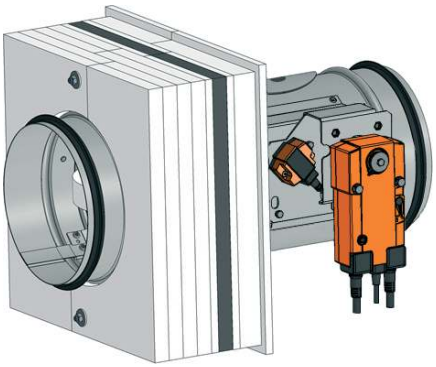
* With concrete
** Ceiling with movement possibility

Fig. 83

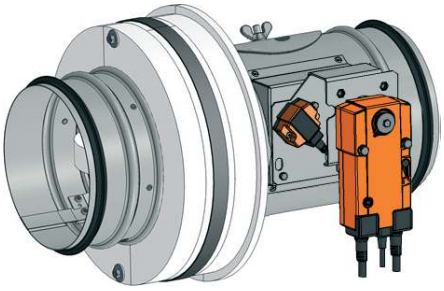
Installation frame R1



Installation frame R2



Installation frame R3



Installation frame R4

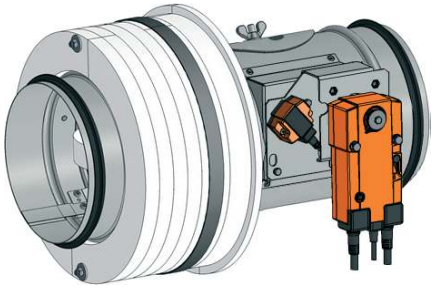
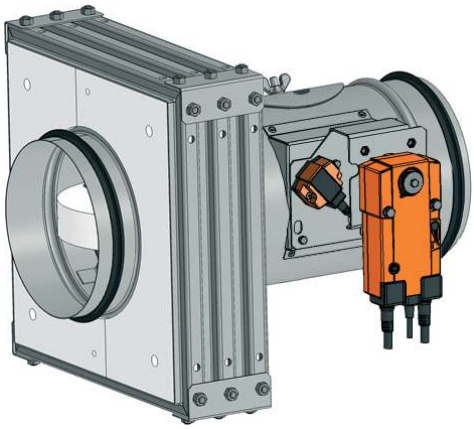
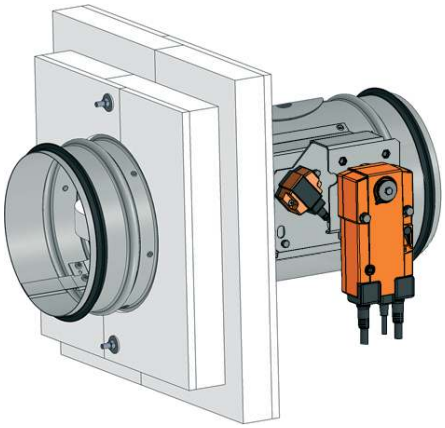


Fig. 84

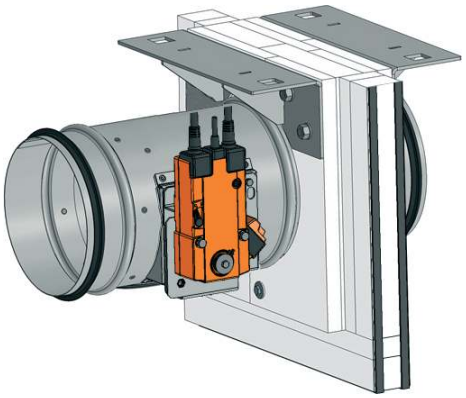
Installation frame R5



Installation frame R6



Installation frame R7



Installation frame can be delivered mounted on the damper body or separately.

Installation frame E1

Installation frame E1 is suitable for:

- Solid wall construction
- Gypsum wall construction
- Solid ceiling construction

On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

Installation:

- Gypsum wall construction has to be installed according manufacture requirements.

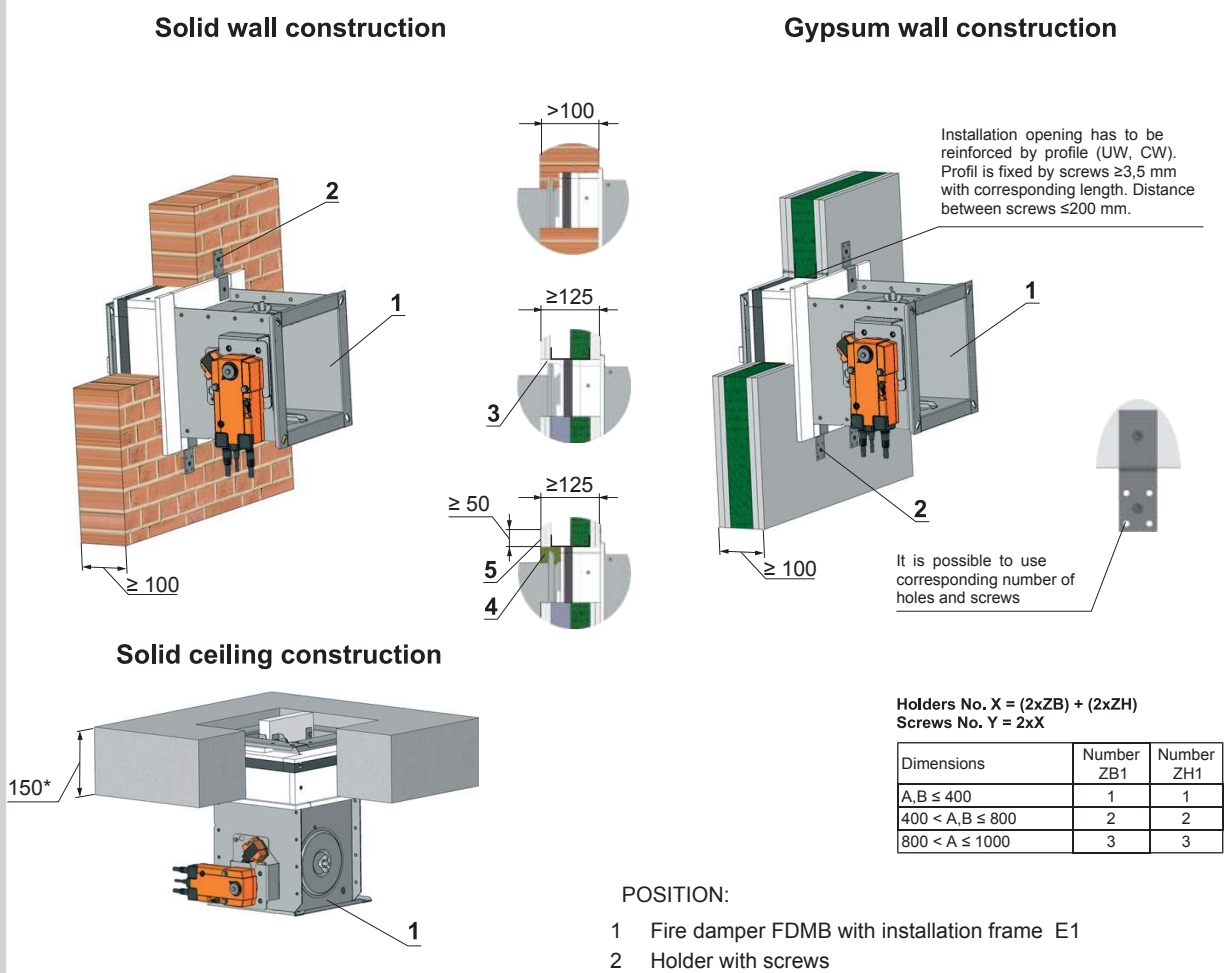
Material:

- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:

- a x b = (A + 85^{+3} mm) x (B + 85 $^{+3}$mm)

Fig. 85 Installation frame E1



* min. 110 - Concrete/ min. 125 - Aerated concrete

Holders No. X = (2xZB) + (2xZH)
Screws No. Y = 2xX

Dimensions	Number ZB1	Number ZH1
A,B ≤ 400	1	1
400 < A,B ≤ 800	2	2
800 < A ≤ 1000	3	3

POSITION:

1 Fire damper FDMB with installation frame E1
2 Holder with screws
3 Gypsum plate
4 Mineral stone wool min. density 140 kg/m^3
5 Fire protection mastic min. thickness 1 mm

Notice: Gap between frame end damper body and frame and solid (gypsum) wall construction must be filled by glue (PROMAT K84).
Dampers has to be suspended in an appropriate manner see chapter 8

Installation frame E2

Installation frame E2 is suitable for:

- Solid wall construction
- Solid ceiling construction

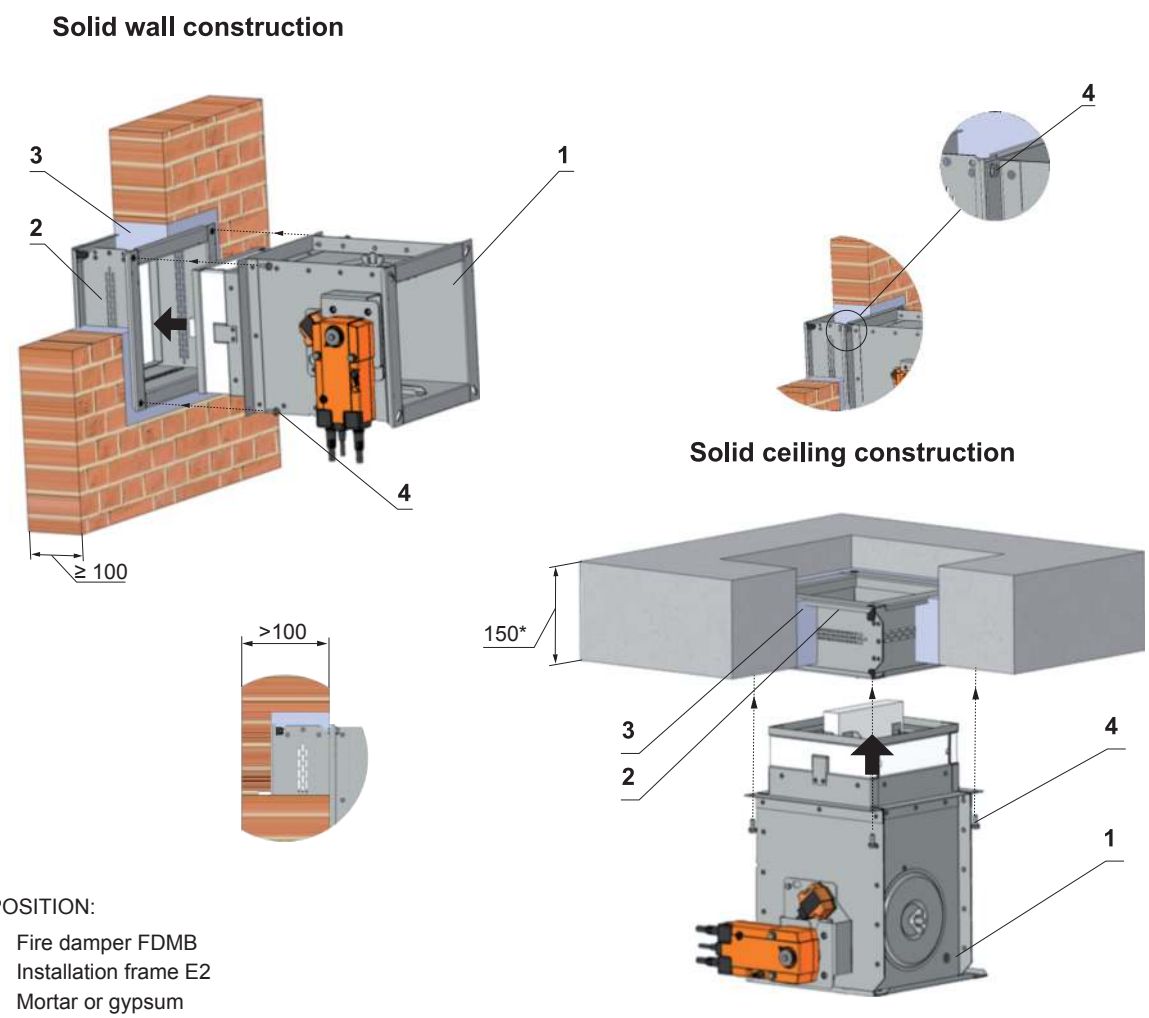
Damper is on the body equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and steel cartridge.

Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates and galvanized plate
- Fasteners: galvanized plate

Installation opening:
- a x b = (A + 100^{+3} mm) x (B + 100^{+3} mm)

Fig. 86 Installation frame E2



POSITION:
1 Fire damper FDMB
2 Installation frame E2
3 Mortar or gypsum
4 Holder with bolt

* min. 110 - Concrete/ min. 125 - Aerated concrete

Notice: Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame E3

Installation frame E3 is suitable for:

- Gypsum wall construction

Damper is on the body equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and cement lime cartridge.
On the outside is cement lime cartridge equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between cement lime cartridge and construction.

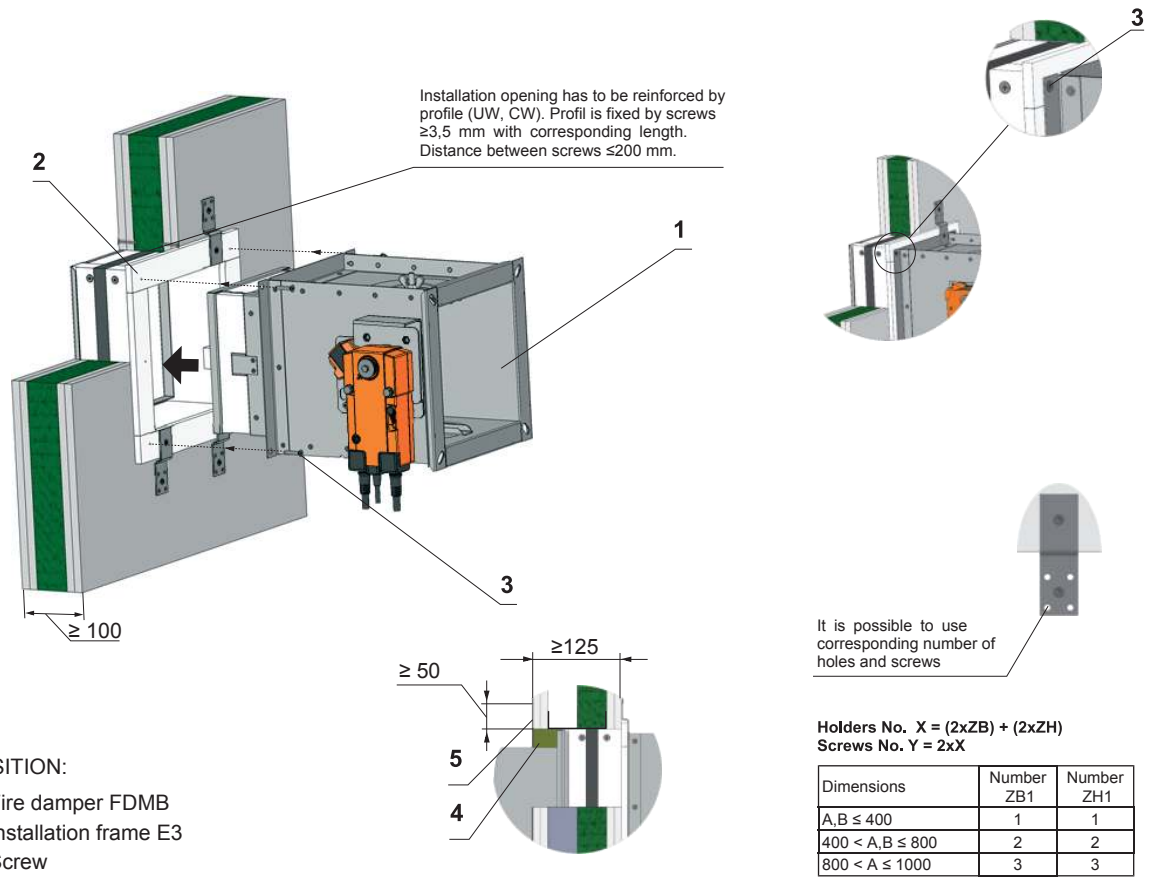
Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:
- a x b = (A + 67^{+3} mm) x (B + 67^{+3} mm)

Fig. 87 Installation frame E3

Gypsum wall construction



POSITION:
1 Fire damper FDMB
2 Installation frame E3
3 Screw
4 Mineral stone wool min. density 140 kg/m³
5 Fire protection mastic min. thickness 1 mm

Holders No. X = (2xZB) + (2xZH)
Screws No. Y = 2xX

Dimensions	Number ZB1	Number ZH1
A,B ≤ 400	1	1
400 < A,B ≤ 800	2	2
800 < A ≤ 1000	3	3

Notice: Gap between frame and solid (gypsum) wall construction must be filled by glue (PROMAT K84). Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame E4

Installation frame E4 is suitable for:
- Instalaci on solid wall/ceiling construction
- Instalaci outside solid ceiling constructions with concrete

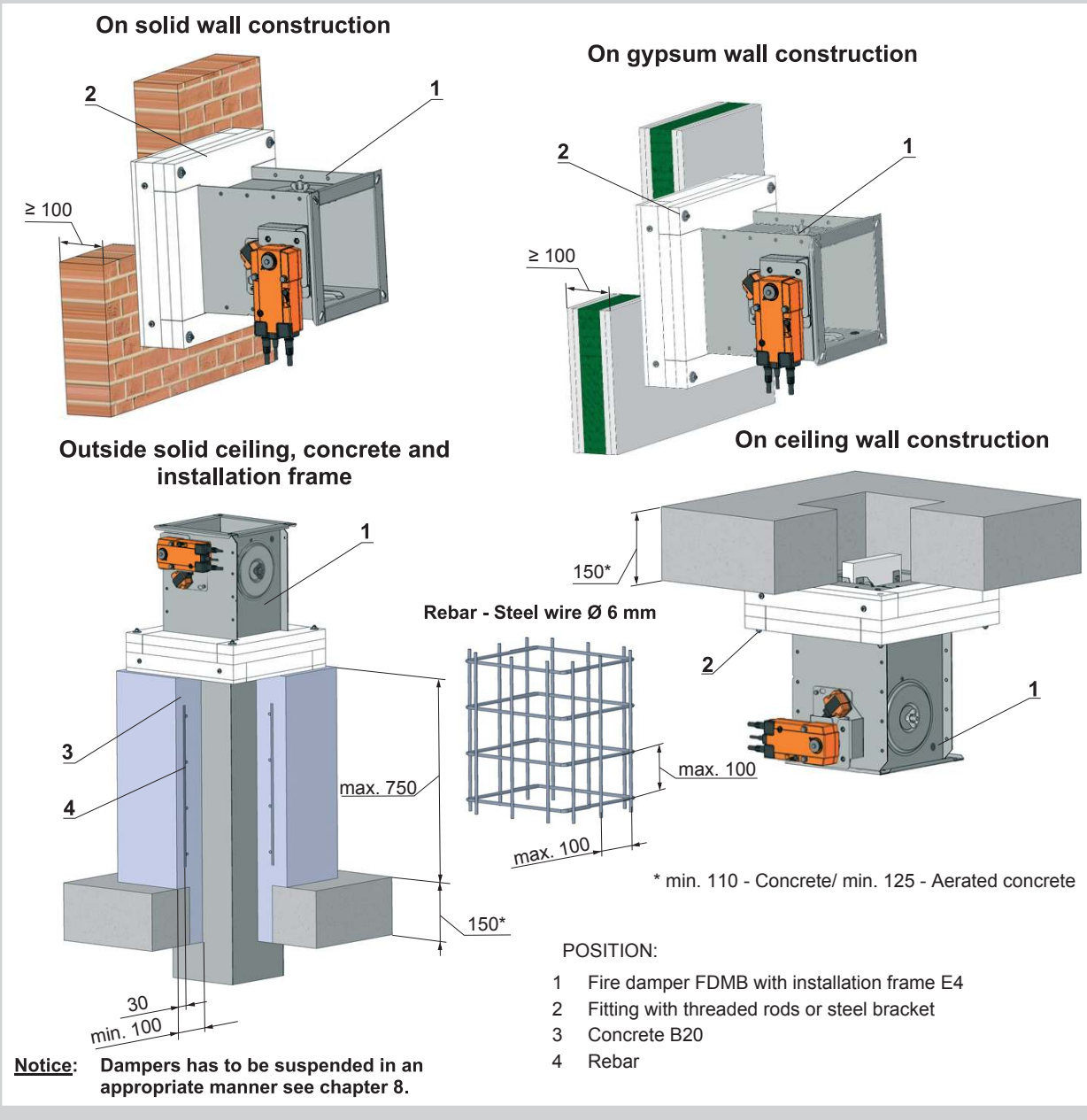
On the inside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between installation frame and damper body.

Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:
- a x b = (A + 5 $^{+3}$ mm) x (B + 5 $^{+3}$ mm)
- a x b = (A + 100 $^{+3}$ mm) x (B + 100 $^{+3}$ mm) installation with concrete

Fig. 88 Installation frame E4



Installation frame E5

Installation frame E5 is suitable for gypsum wall construction with ceiling movement possibility. Distance of movement “x”.
On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

Installation:

Damper position:

- Directly on the ceiling
- In distance from ceiling max. 80 mm

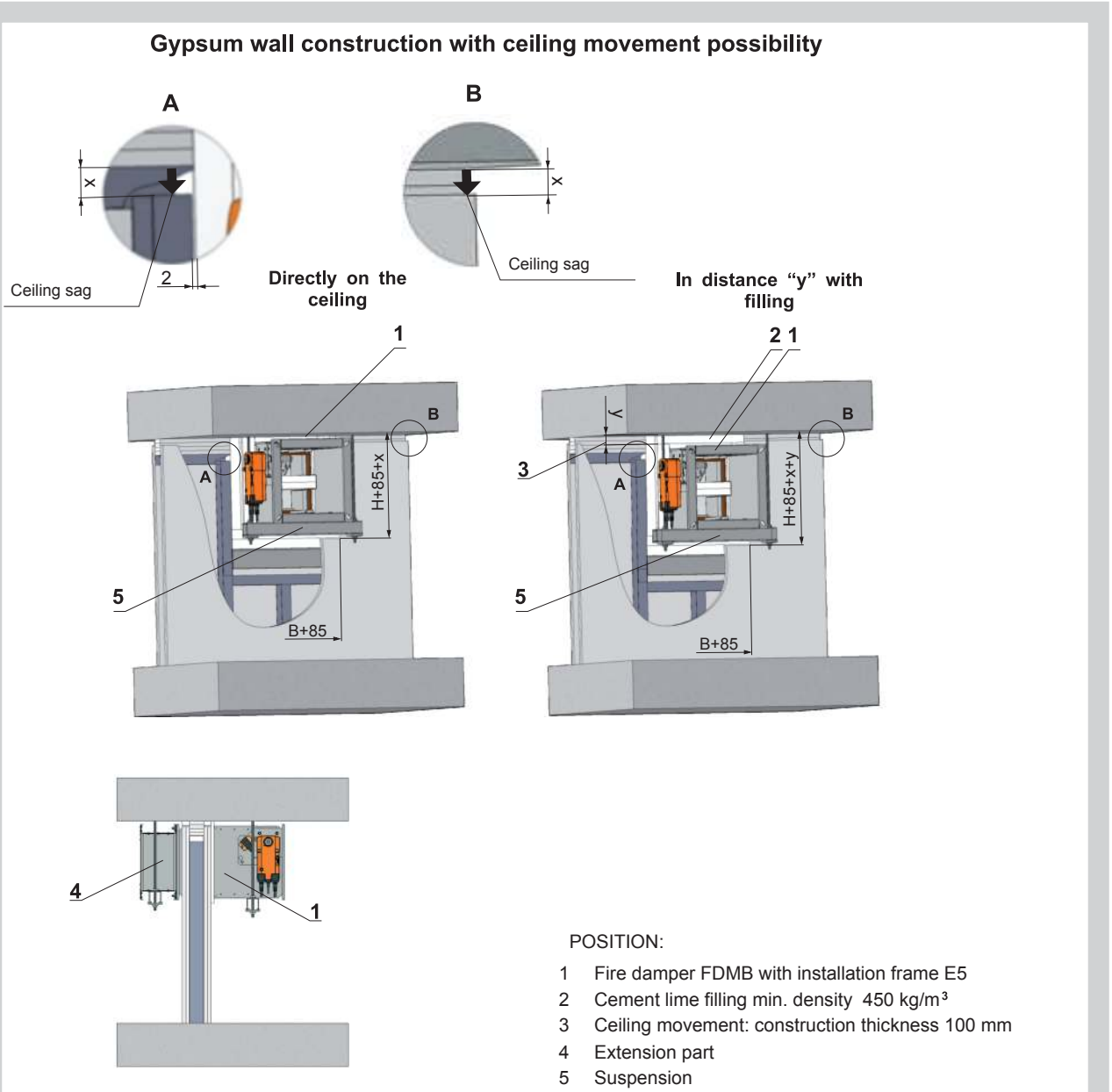
Material:

- Installation frame: cement lime plates
- Fasteners: galvanized plate

Notice:

- For ceiling movement ≥10 mm

Fig. 89 Installation frame E5



Installation frame E6

Installation frame E6 is suitable for:

- Installation outside solid wall/ceiling construction with cement lime plates

On the inside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between installation frame and damper body.

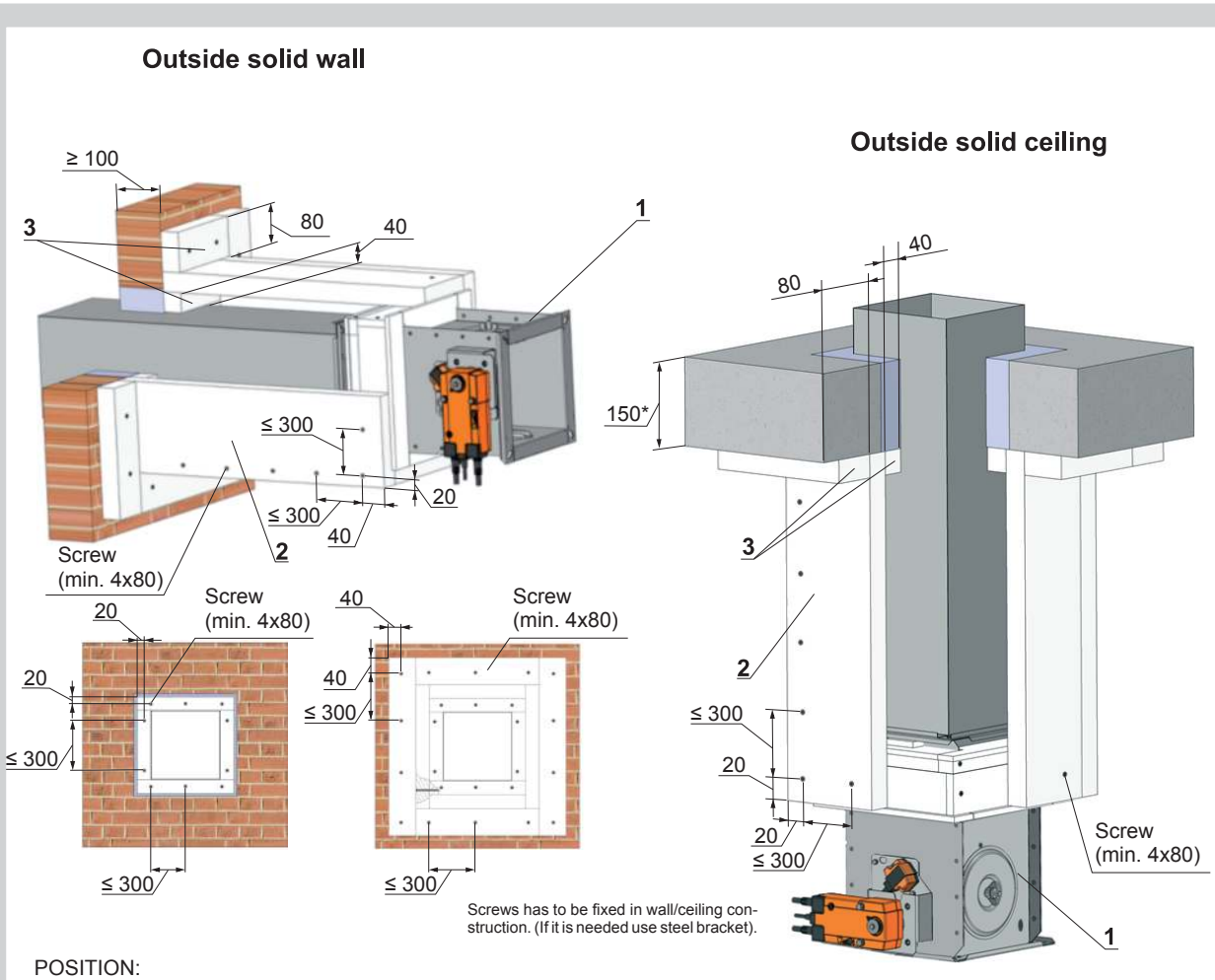
Material:

- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:

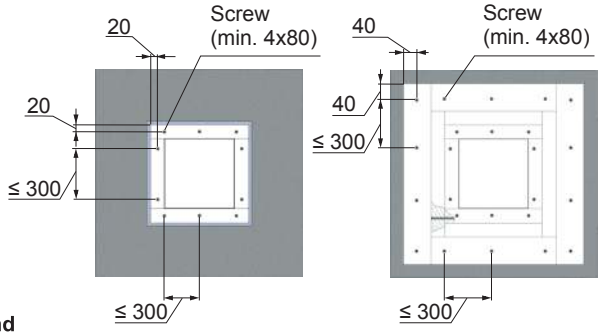
- a x b = (A +100^{+3}mm) x (B +100^{+3}mm)

Fig. 90 Installation frame E6



POSITION:

1 Damper with installation frame E6
2 Cement lime plates min. thickness 40 mm (min. density 450 kg/m^3)
3 Cement lime prisms min. thickness 40 mm (min. density 450 kg/m^3)



* min. 110 - Concrete/ min. 125 - Aerated concrete

Notice: **All parts are glued with glue Promat K84 and secured by screws.**
Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame R1, R2

Installation frames R1, R2 are suitable for:
- Solid wall construction
- Gypsum wall construction
- Solid ceiling construction

On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

Installation frame R1 - solid wall/gypsum wall th. 100mm or solid ceiling th. 150 mm
Installation frame R2 - solid wall/gypsum wall th. 150mm or solid ceiling th. 150 mm

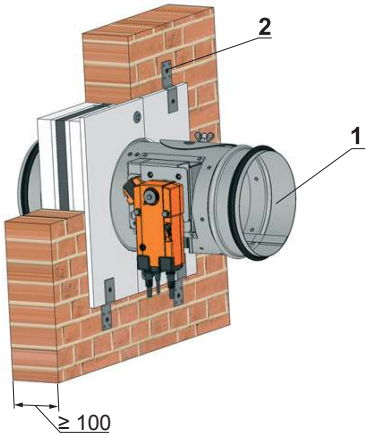
Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates
- Fasteners: galvanized plate

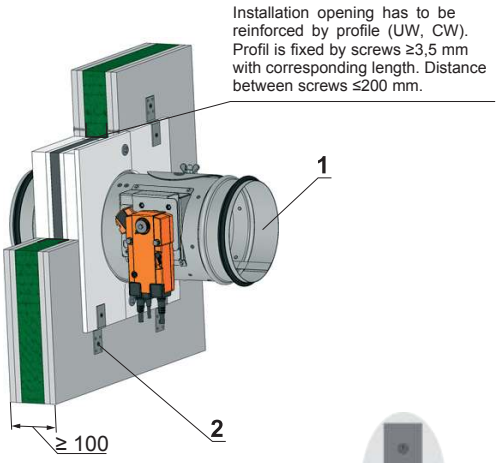
Installation opening:
- a x b = (D + 141^{+3} mm) x (D + 141^{+3} mm)

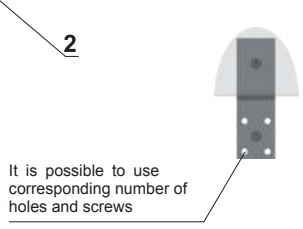
Fig. 91 Installation frame R1, R2

Solid wall construction



Gypsum wall construction

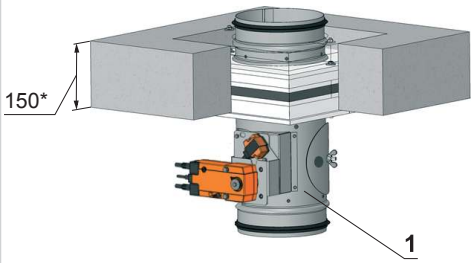




Holders No. X
Screws No. Y

Dimensions	Number X	Number Y
D ≤ 400	4	8
400 < D ≤ 630	8	16

Solid ceiling construction



* min. 110 - Concrete/ min. 125 - Aerated concrete

POSITION:
1 Fire damper FDMB with installation frame R1 or R2
2 Holder

Notice: Gap between frame end damper body and frame and solid (gypsum) wall construction must be filled by glue (PROMAT K84).
Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame R3, R4

Installation frame R3, R4 are suitable for:
- Solid wall construction
- Gypsum wall construction
- Solid ceiling construction

On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

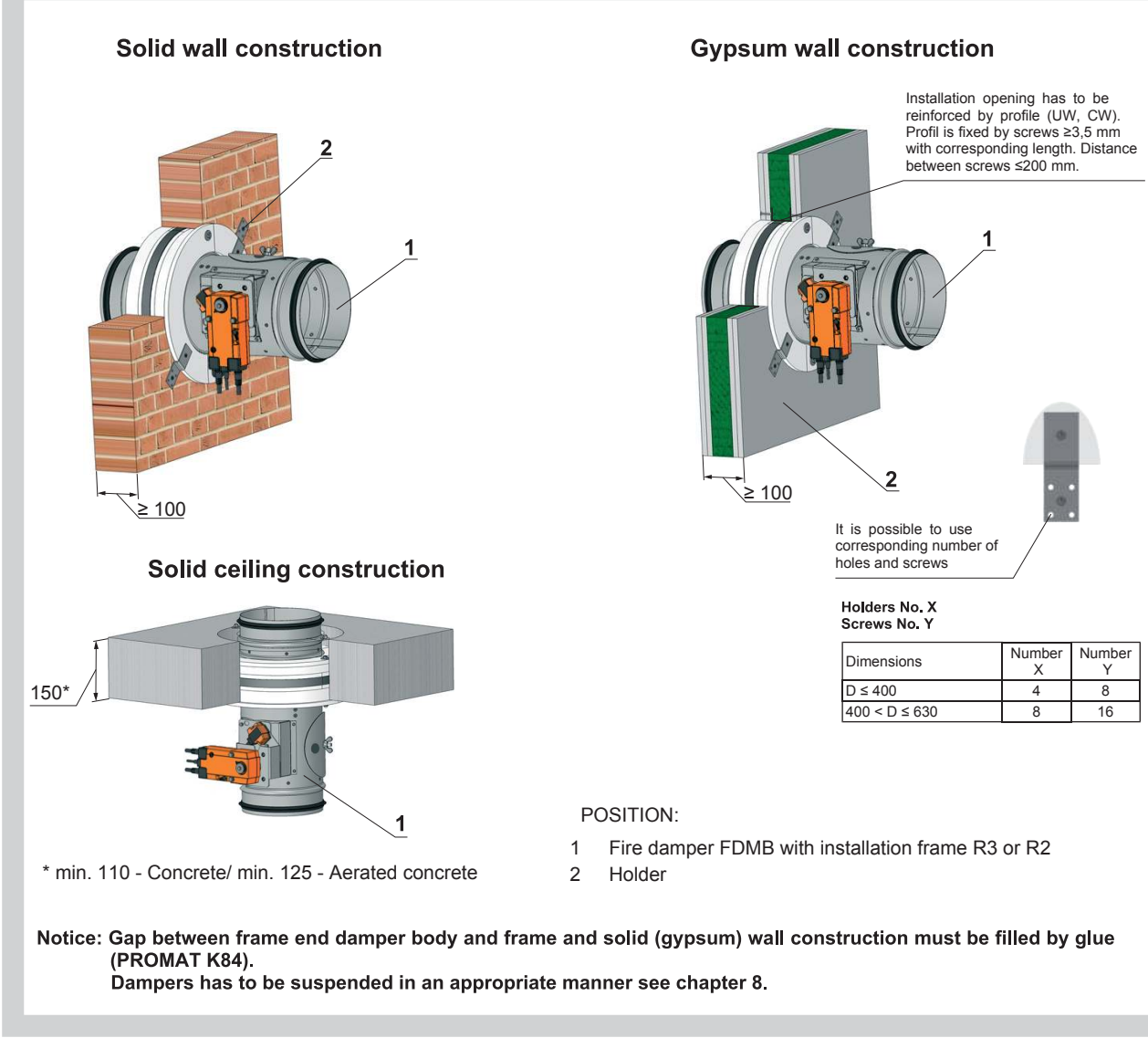
Installation frame R3 - solid wall/gypsum wall th. 100mm or solid ceiling th. 150 mm
Installation frame R4 - solid wall/gypsum wall th. 150mm or solid ceiling th. 150 mm

Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:
- d = (D + 111^{+3} mm)

Fig. 92 Installation frame R3, R4



Notice: Gap between frame end damper body and frame and solid (gypsum) wall construction must be filled by glue (PROMAT K84).
Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame R5

Installation frame R5 is suitable for:
- Instalaci on solid wall/ceiling construction
- Instalaci outside solid ceiling constructions with concrete

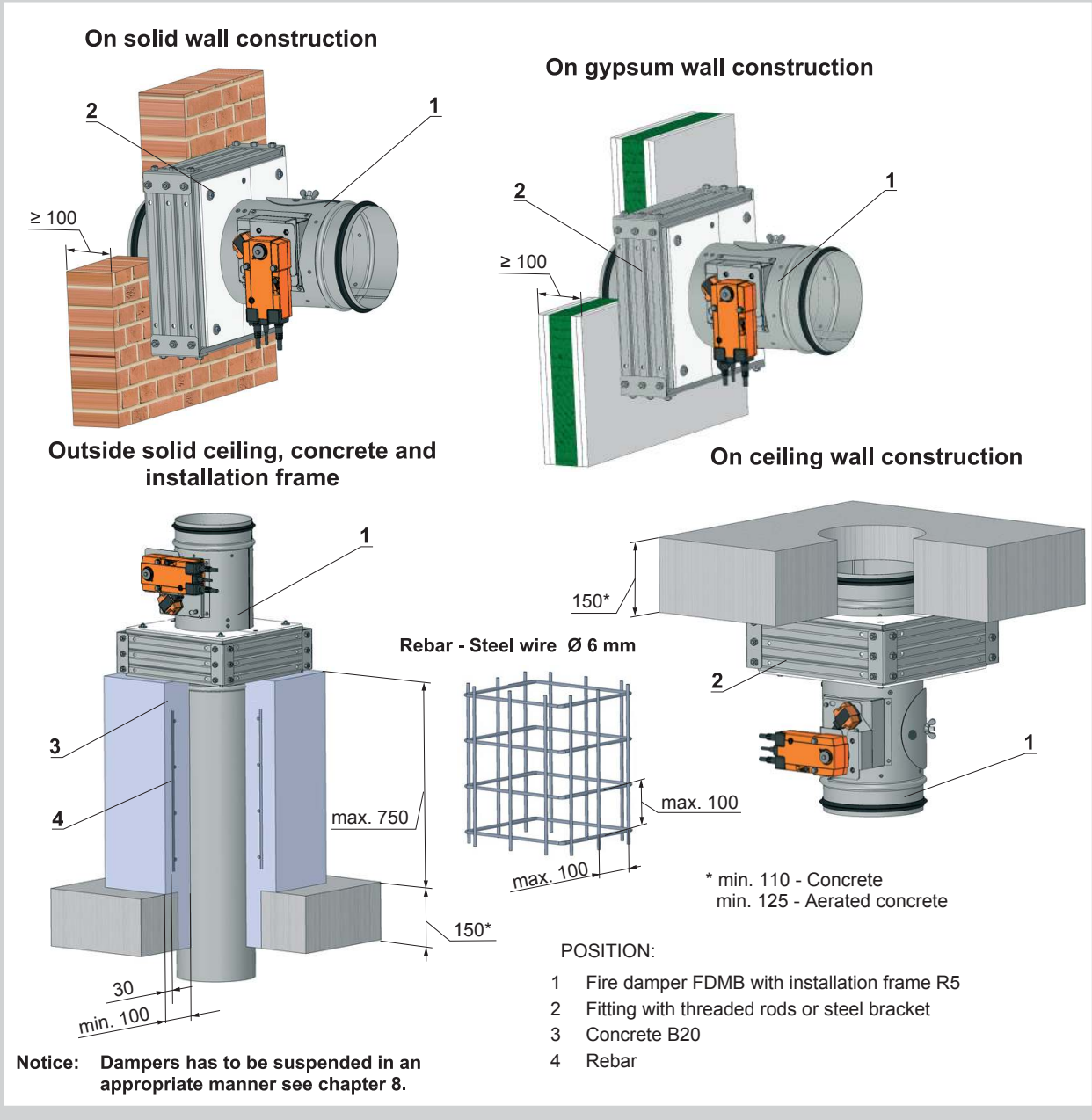
On the inside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between installation frame and damper body.

Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates and galvanized plate
- Fasteners: galvanized plate

Installation opening:
- d = (D + 10^{+3} mm)
- d = (D + 100^{+3} mm) installation with concrete

Fig. 93 Installation frame R5



Notice: Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame R6

Installation frame R6 is suitable for:

- Installation outside solid wall/ceiling construction with cement lime plates

On the inside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between installation frame and damper body.

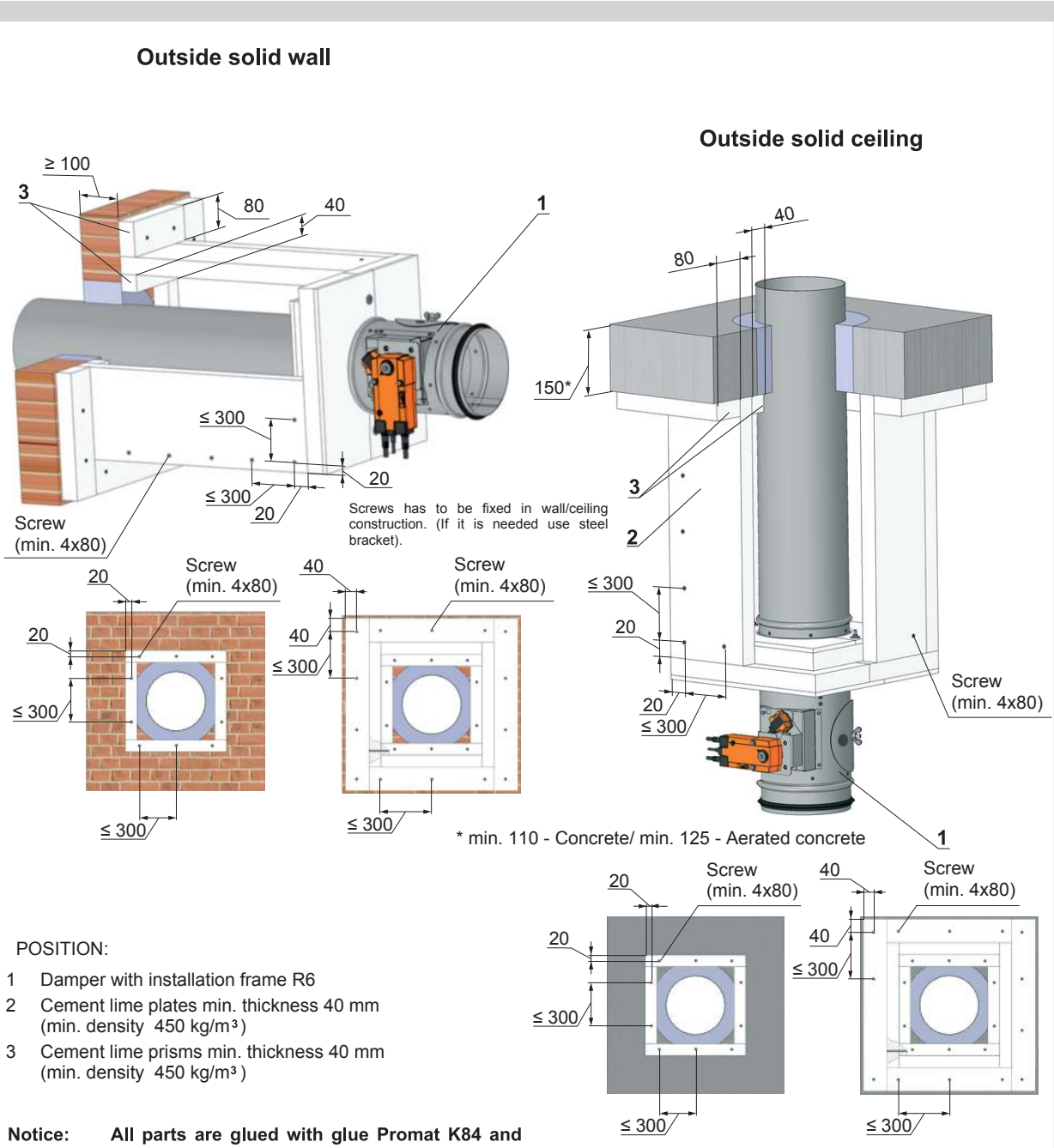
Material:

- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:

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

Fig. 94 Installation frame R6



POSITION:

1 Damper with installation frame R6
2 Cement lime plates min. thickness 40 mm (min. density 450 kg/m^3)
3 Cement lime prisms min. thickness 40 mm (min. density 450 kg/m^3)

Notice: **All parts are glued with glue Promat K84 and secured by screws. Dampers has to be suspended in an appropriate manner see chapter 8.**

Installation frame R7

Installation frame R7 is suitable for gypsum wall construction with ceiling movement possibility. Distance of movement “x”.
On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

Installation:

Damper position:

- Directly on the ceiling
- In distance from ceiling max. 80 mm

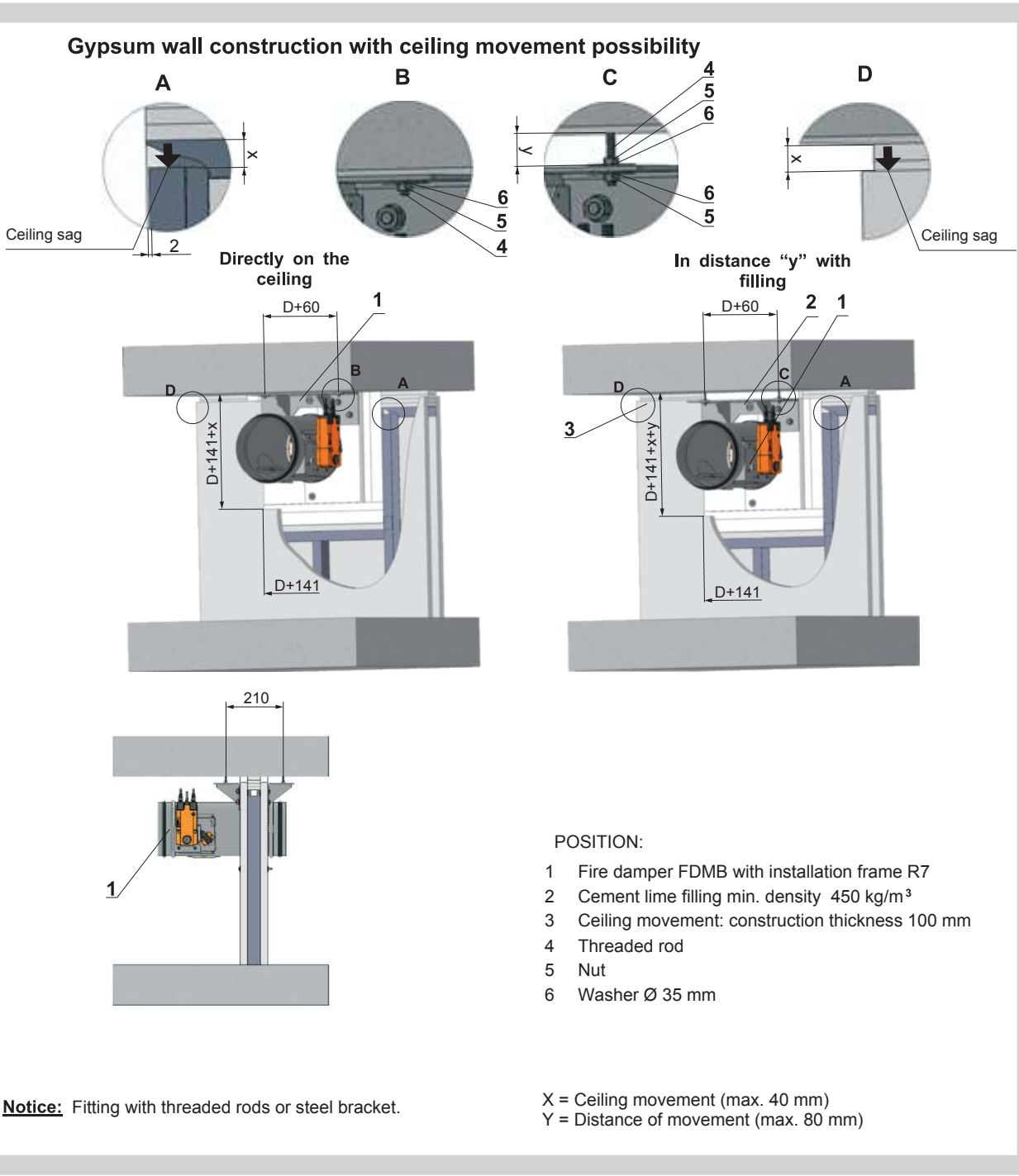
Material:

- Installation frame: cement lime plates
- Fasteners: galvanized plate

Notice:

- For ceiling movement ≥10 mm

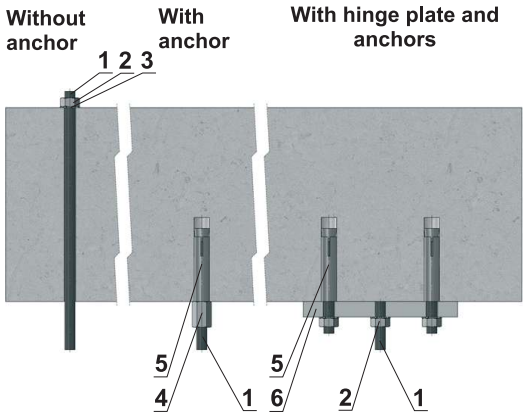
Fig. 95 Installation frame R7



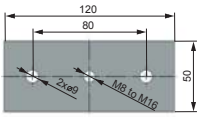
8. Suspension systems

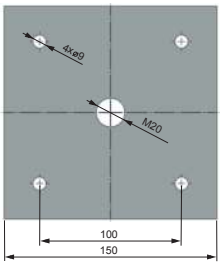
8.1. Mounting to the ceiling wall

Fig. 96 Mounting to the ceiling wall



Hinge plates





Position:

1 Threaded rod M8 – M20
2 Nut
3 Washer
4 Coupling Nut
5 Anchor
6 Hinge plate - min. thickness 10 mm

Load capacities of threaded hanger rods F [N] at the required fire resistance 90 minutes

Size	A_s [mm^2]	Weight G [kg]	
		for 1 piece	for 1 pair
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

8.2. Horizontal installation

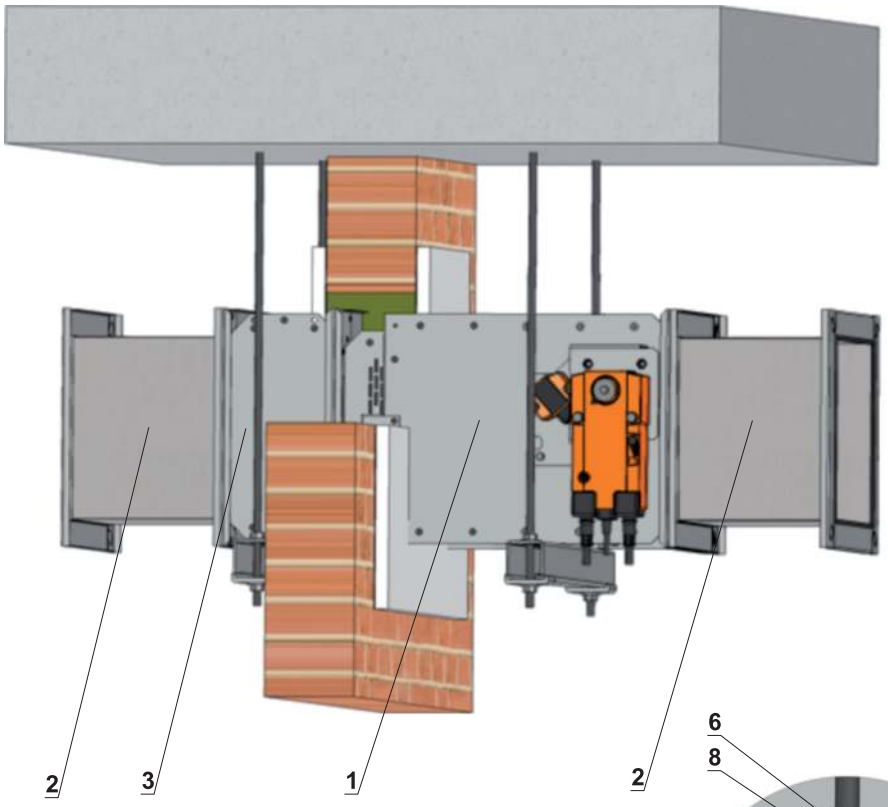
Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

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.

Threaded rods longer than 1,5 m require fire-resistant insulation.

Threaded rod fixing to the ceiling construction - see fig. 96

Fig. 97 Suspension - horizontal duct



Position:

1 Fire damper
2 Damping pad
3 Extension piece
4 Threaded rod
5 Mounting rail
6 Nut
7 U - Washer
8 Washer

Examples of using materials: **HILTI, SIKLA, MÜPRO etc.**

8.3. Vertical installation

Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

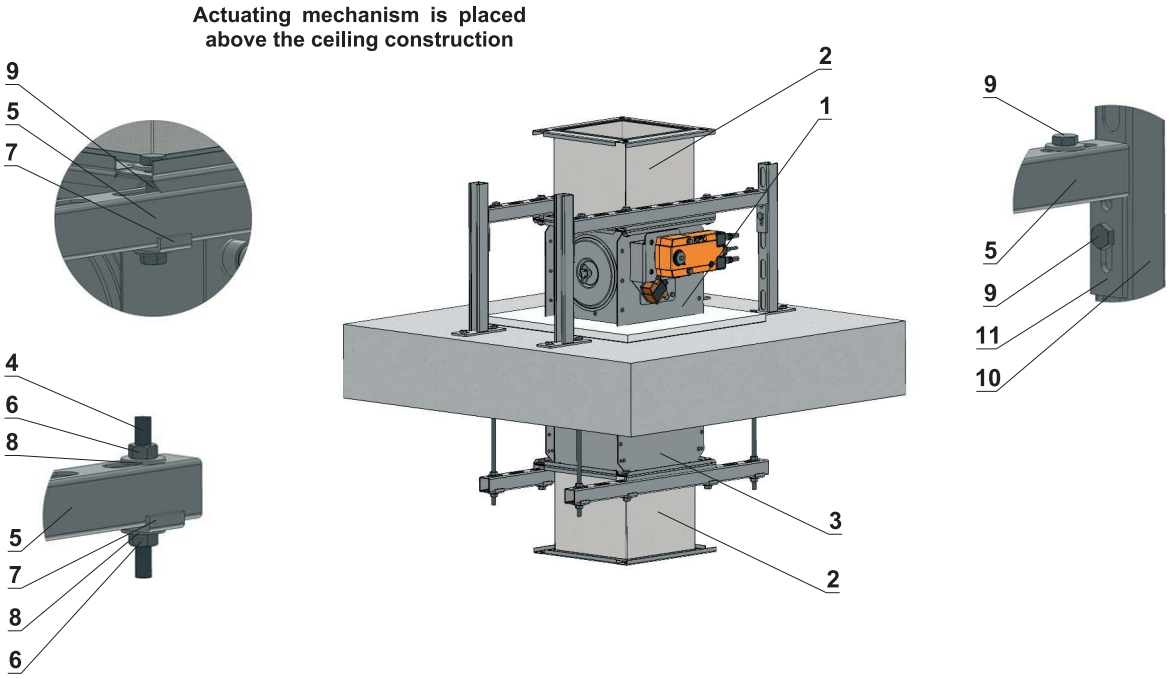
Damper can be suspended from the ceiling construction or supported above the ceiling construction.

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.

Threaded rods longer than 1,5 m require fire-resistant insulation.

Threaded rod fixing to the ceiling construction - see fig. 96

Fig. 98 Suspension - vertical duct



Position:

1	Fire damper
2	Damping pad
3	Extension piece
4	Threaded rod
5	Mounting rail
6	Nut
7	U - Washer
8	Washer
9	Screw connection
10	Mounting profile
11	Mounting bracket
12	Fire-resistant board

The examples of using materials: **HILTI, SIKLA, MÜPRO etc.**

8.4 Rectangular fire damper suspension on the wall - horizontal installation

Duct between fire damper and fire separating construction can be suspended by using threaded rods and mounting profiles. Load the suspension system depend on weight of the fire damper and duct system.

Max. length between two suspension systems is 1500 mm.

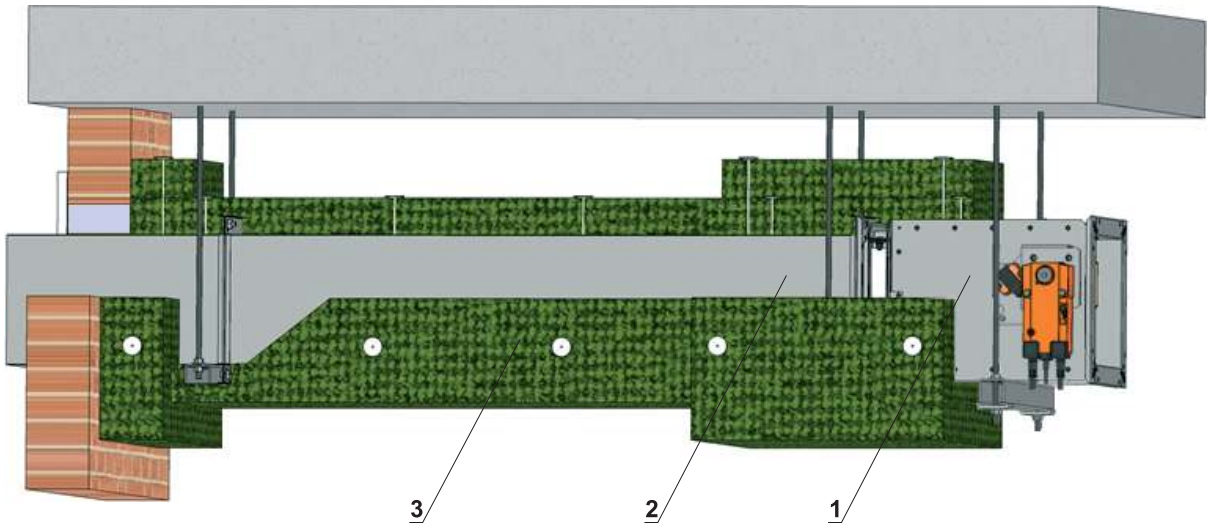
Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

Threaded rods longer than 1,5 m require fire-resistant insulation.
If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm. If the treaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm. Thickness of the insulation under mounting profile must be min. 30 mm.

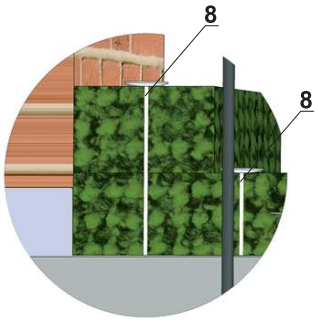
Threaded rod fixing to the ceiling construction - see fig. 96

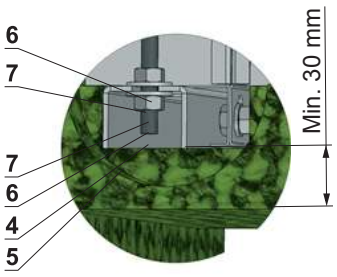
The insulation boards are fastened to the duct by weld pins. Distance between weld pins, distance between weld pins and flanges is dependent on the materials. For more information see documentation of insulation manufacturer.

Fig. 99 Rectangular fire damper suspension on the wall - horizontal installation



Insulation layers on the duct





Position:

1	Fire damper
2	Duct
3	Insulation
4	Threaded rod
5	Mounting rail
6	Nut
7	Washer
8	Weld pin

8.5 Horizontal installation

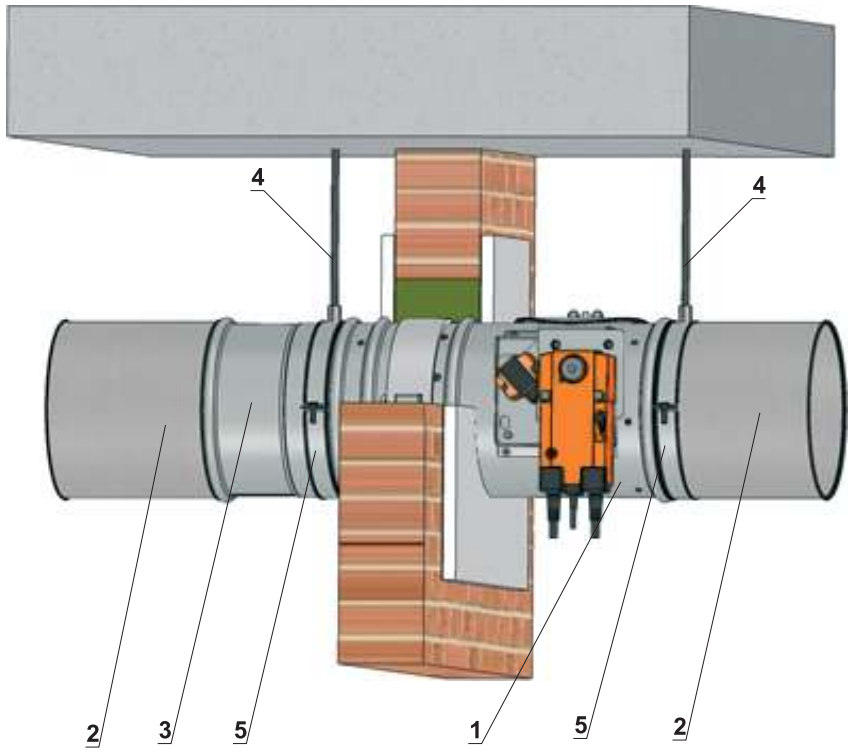
Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

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.

Threaded rods longer than 1,5 m require fire-resistant insulation.

Threaded rod fixing to the ceiling construction - see fig. 96

Fig. 100 Suspension - horizontal duct



Position:

1 Fire damper
2 Damping pad
3 Extension piece
4 Threaded rod
5 Suspension ring

Examples of using materials: **HILTI, SIKLA, MÜPRO etc.**

8.6. Vertical installation

Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

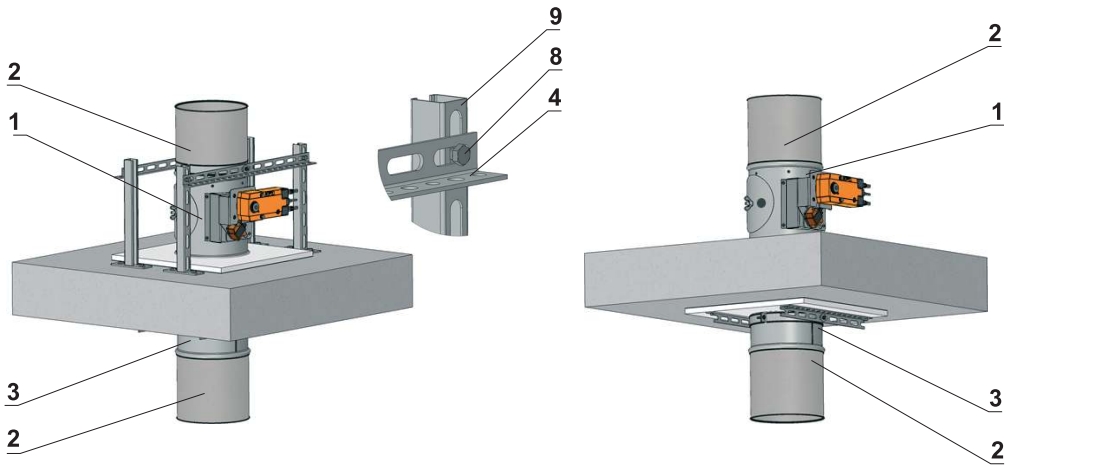
Damper can be suspended from the ceiling construction or supported above the ceiling construction. Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

Threaded rods longer than 1,5 m require fire-resistant insulation.

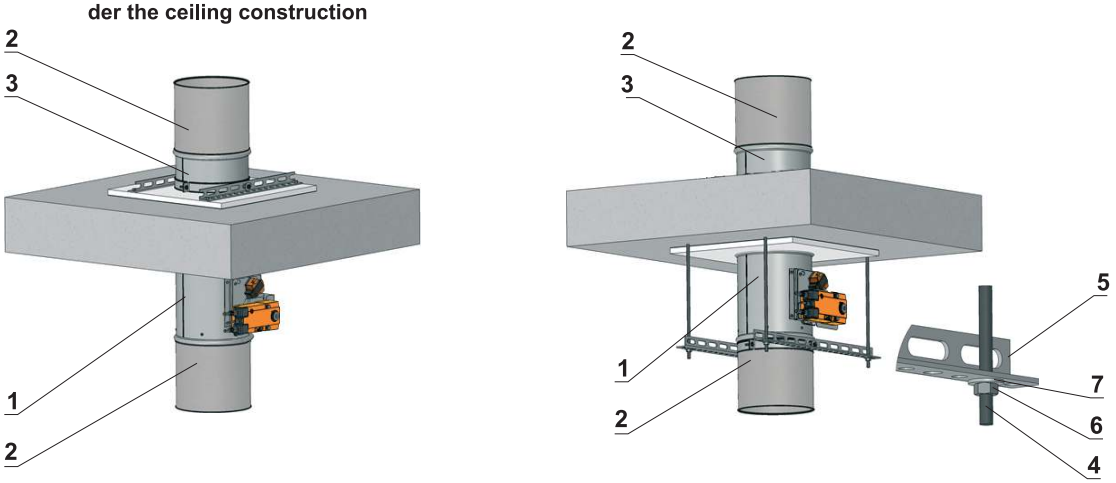
Threaded rod fixing to the ceiling construction - see fig. 95

Fig. 101 Suspension - vertical duct

Actuating mechanism is placed above the ceiling construction

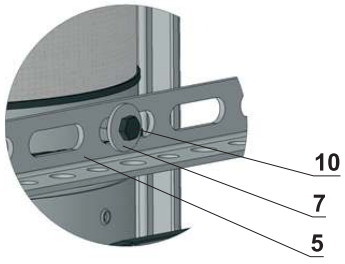


Actuating mechanism is placed under the ceiling construction

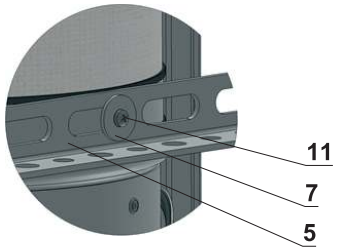


Notice: Damper must be firmly connected with extension piece by screws or rivets.

Suspension ring and mounting rail connected by bolt



Suspension ring and mounting rail connected by screw or rivet



Position:

1	Fire damper
2	Damping pad
3	Extension piece
4	Threaded rod
5	Mounting rail
6	Nut
7	Washer
8	Screw connection
9	Mounting profile
10	Bolt
11	Screw or rivet

Expamples of using materials: **HILTI, SIKLA, MÜPRO etc.**

8.7 Round fire damper suspension on the wall - horizontal installation

Duct between fire damper and fire separating construction can be suspended by using threaded rods and suspension rings. Load the suspension system depend on weight of the fire damper and duct system.

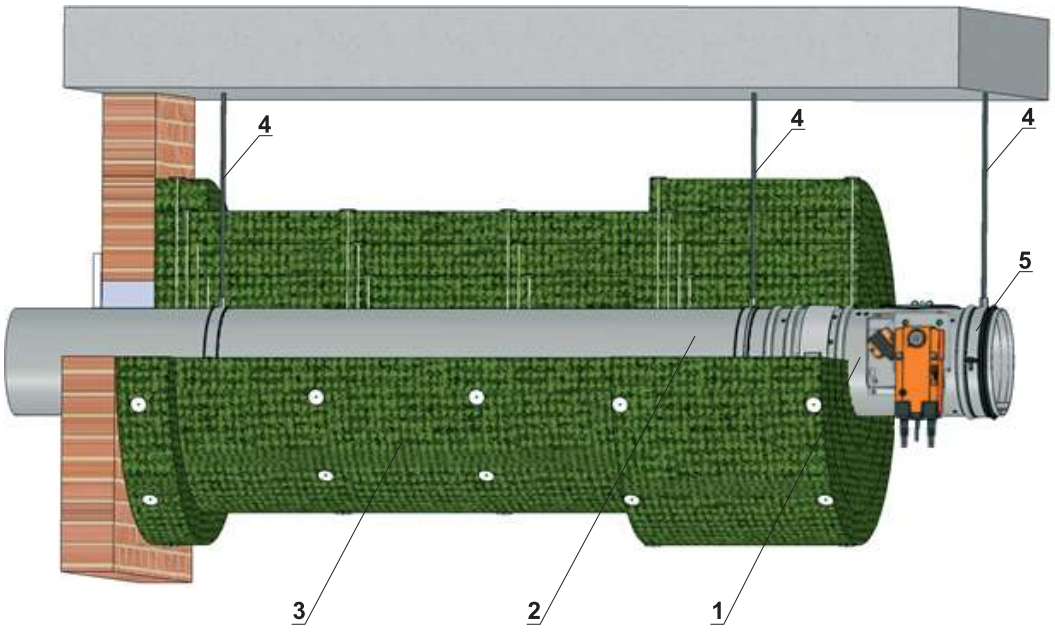
Max. length between two suspension systems is 1500 mm.

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.

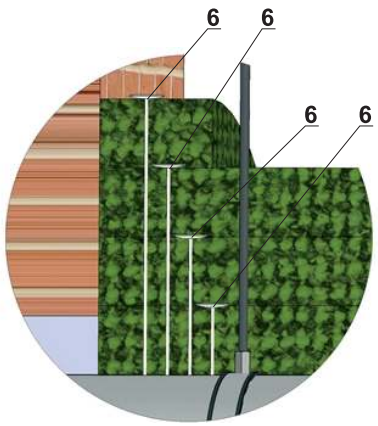
Threaded rod fixing to the ceiling construction - see fig. 96

The insulation boards are fastened to the duct by weld pins. Distance between weld pins, distance between weld pins and flanges is dependent on the materials. For more information see documentation of insulation manufacturer.

Fig. 102 Round fire damper suspension on the wall - horizontal installation



Insulation layers on the duct



Position:

1	Fire damper
2	Duct
3	Insulation
4	Threaded rod
5	Suspension ring
6	Weld pin

III. TECHNICAL DATA

9. Pressure loss

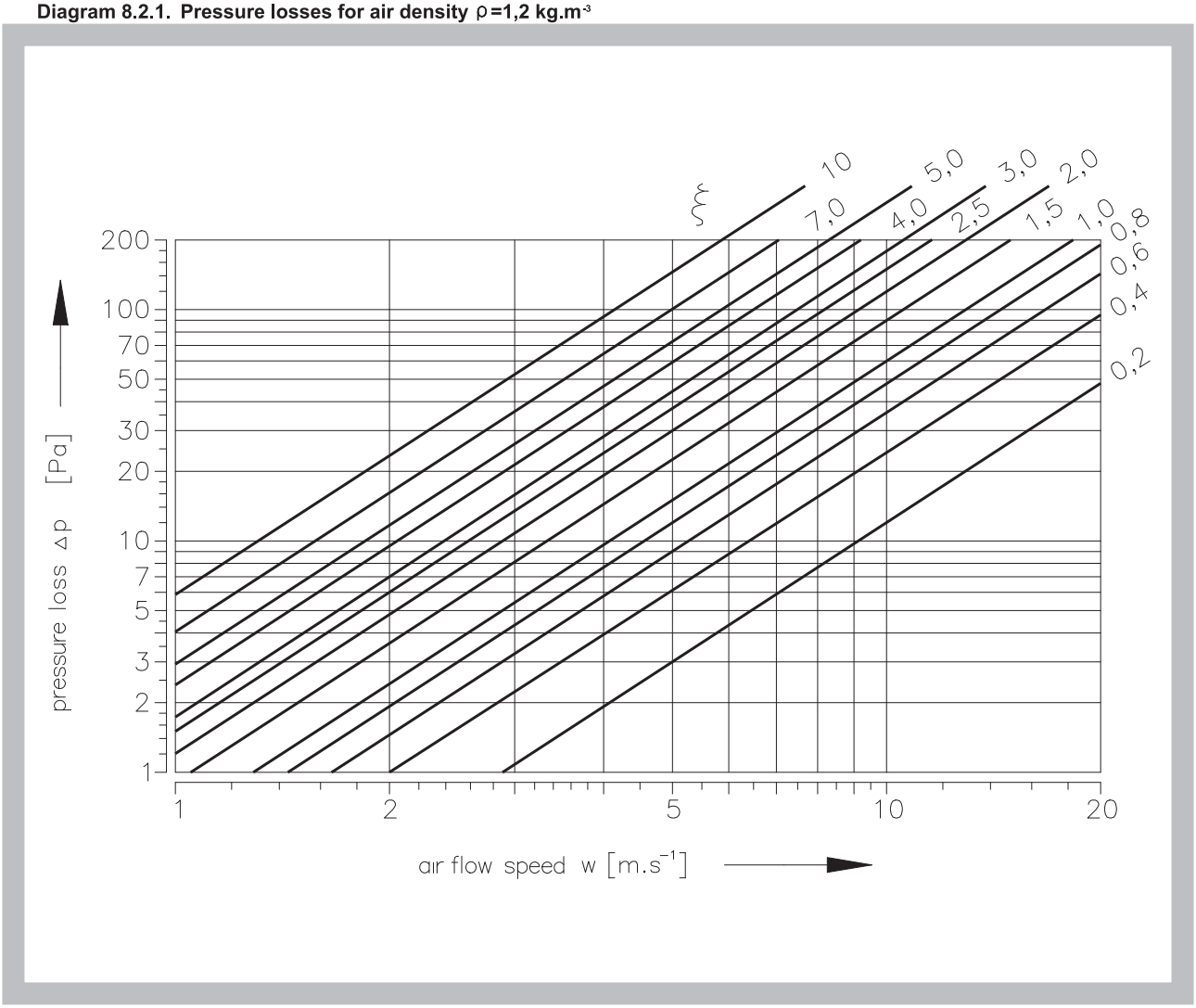
9.1. Pressure loss calculation

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

Δp	[Pa]	presure 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.)

9.2. Determination of pressure loss by using diagram ρ = 1,2 kg.m^{-3}

Diagram 8.2.1. Pressure losses for air density ρ=1,2 kg.m^{-3}



10. Coefficient of local pressure loss

10.1. Coefficient of local pressure loss ξ (-) - square dampers

Tab. 9.1.1. Coefficient of local pressure loss - square dampers

	B											
A	160	180	200	225	250	280	300	315	355	400	450	500
160	4,771	3,458	2,717	2,285	1,813	1,538	1,407	1,327	1,165	1,040	2,025	1,874
180	4,102	3,251	2,351	2,016	1,676	1,342	1,221	1,136	0,986	0,922	1,676	1,548
200	3,701	2,951	2,105	1,867	1,554	1,302	1,113	1,052	0,933	0,801	1,445	1,332
225	3,654	2,873	2,056	1,726	1,475	1,226	1,067	1,029	0,917	0,781	1,239	1,172
250	3,588	2,793	2,005	1,675	1,386	1,155	1,033	0,987	0,893	0,736	1,113	1,021
280	3,411	2,692	1,975	1,599	1,341	1,123	0,986	0,916	0,822	0,713	0,996	0,912
300	3,288	2,599	1,903	1,536	1,315	1,101	0,974	0,911	0,787	0,692	0,937	0,857
315	3,102	2,454	1,833	1,489	1,289	0,988	0,933	0,833	0,721	0,634	0,900	0,822
355	2,955	2,302	1,796	1,412	1,199	0,956	0,902	0,799	0,678	0,588	0,821	0,749
400	2,833	2,159	1,703	1,356	1,126	0,931	0,825	0,711	0,635	0,527	0,757	0,689
450	2,732	2,055	1,623	1,302	1,103	0,852	0,777	0,677	0,599	0,507	0,705	0,640
500	2,670	1,988	1,587	1,251	1,025	0,796	0,725	0,618	0,529	0,460	0,666	0,603
550	4,219	2,941	2,237	1,687	1,402	1,156	1,039	0,968	0,827	0,719	0,635	0,575
560	4,194	2,922	2,222	1,623	1,392	1,147	1,031	0,910	0,820	0,713	0,630	0,570
600	4,104	2,857	2,170	1,573	1,357	1,117	1,004	0,935	0,797	0,692	0,611	0,552
630	4,046	2,814	2,137	1,553	1,334	1,098	0,986	0,918	0,782	0,678	0,598	0,540
650	4,010	2,788	2,116	1,526	1,320	1,086	0,975	0,908	0,773	0,670	0,590	0,533
700	3,975	2,759	2,098	1,515	1,297	1,071	0,965	0,892	0,761	0,656	0,581	0,527
710	3,918	2,720	2,062	1,496	1,284	1,055	0,947	0,881	0,749	0,648	0,571	0,515
750	3,865	2,682	2,032	1,475	1,264	1,037	0,931	0,866	0,736	0,636	0,560	0,504
800	3,808	2,640	1,999	1,445	1,241	1,018	0,913	0,849	0,721	0,623	0,547	0,493
900	3,715	2,572	1,946	1,414	1,205	0,988	0,885	0,822	0,697	0,602	0,528	0,474
1000	3,643	2,519	1,904	1,395	1,177	0,964	0,863	0,801	0,679	0,585	0,512	0,460

	B										
A	550	560	600	630	650	700	710	750	800	900	1000
160	1,761	1,741	1,672	1,627	1,601	1,598	1,532	1,493	1,452	1,386	1,336
180	1,451	1,434	1,375	1,337	1,315	1,289	1,256	1,224	1,180	1,133	1,090
200	1,246	1,232	1,179	1,146	1,126	1,106	1,074	1,046	1,015	0,965	0,928
225	1,075	1,035	0,998	0,965	0,938	0,926	0,905	0,873	0,856	0,822	0,803
250	0,952	0,940	0,898	0,871	0,855	0,831	0,813	0,790	0,765	0,725	0,695
280	0,849	0,880	0,800	0,775	0,760	0,742	0,722	0,701	0,678	0,641	0,613
300	0,797	0,786	0,750	0,726	0,712	0,689	0,675	0,655	0,633	0,599	0,572
315	0,764	0,754	0,718	0,695	0,681	0,662	0,646	0,626	0,605	0,572	0,546
355	0,694	0,685	0,651	0,630	0,617	0,603	0,584	0,566	0,546	0,514	0,490
400	0,637	0,628	0,597	0,577	0,565	0,543	0,534	0,516	0,498	0,468	0,445
450	0,591	0,583	0,553	0,534	0,522	0,503	0,493	0,476	0,458	0,430	0,408
500	0,556	0,548	0,520	0,501	0,490	0,482	0,462	0,446	0,429	0,401	0,380
550	0,529	0,521	0,494	0,476	0,465	0,441	0,437	0,422	0,405	0,379	–
560	0,524	0,517	0,489	0,471	0,461	0,448	0,433	0,418	0,401	–	–
600	0,507	0,500	0,473	0,455	0,445	0,426	0,418	0,403	0,387	–	–
630	0,496	0,489	0,462	0,445	0,435	0,418	0,408	0,393	–	–	–
650	0,490	0,482	0,456	0,439	0,428	0,414	0,402	0,387	–	–	–
700	0,483	0,476	0,444	0,431	0,421	0,409	0,398	0,379	–	–	–
710	0,472	0,465	0,439	0,422	0,412	0,399	–	–	–	–	–
750	0,462	0,455	0,429	0,413	0,403	–	–	–	–	–	–
800	0,451	0,444	0,419	–	–	–	–	–	–	–	–
900	0,434	–	–	–	–	–	–	–	–	–	–

10.2. Coefficient of local pressure loss ξ (-) - round dampers

Tab. 9.2.1. Coefficient of local pressure loss - round dampers

D	160	180	200	225	250	280	315	355	400	450	500	560	630
ξ	1,812	1,380	1,110	0,892	0,747	0,627	0,531	0,455	0,393	0,344	0,307	0,273	0,243

11. Noise data

11.1. 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. 11.3.1. and 11.3.2)
S	[m²]	duct cross section
K_A	[dB]	correction to the weight filter A (viz Tab. 11.3.3.)

11.2. 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. 11.3.1. and 11.3.2)
S	[m²]	duct cross section
L_{rel}	[dB]	relative level expressing the shape of the spectrum (see Tab. 11.3.4.)

11.3. Table of acoustics values

Tab. 11.3.1. Level of acoustic output L_{W1}[dB] related to the 1 m² section - square dampers

	[-] ξ														
v [m/s]	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,5	2,0	2,5	3,0	4,0	5,0
2	15,5	18,7	20,9	22,6	24,0	25,2	26,3	27,2	28,0	31,2	33,4	35,1	36,5	38,8	40,5
3	26,1	29,2	31,5	33,2	34,6	35,8	36,9	37,8	38,6	41,7	44,0	45,7	47,1	49,4	51,1
4	33,6	36,7	39,0	40,7	42,1	43,3	44,3	45,3	46,1	49,2	51,5	53,2	54,6	56,9	58,6
5	39,4	42,5	44,8	46,5	47,9	49,1	50,2	51,1	51,9	55,0	57,3	59,0	60,4	62,7	64,4
6	44,1	47,3	49,5	51,3	52,7	53,9	54,9	55,8	56,6	59,8	62,0	63,8	65,2	67,4	69,2
7	48,2	51,3	53,5	55,3	56,7	57,9	58,9	59,8	60,7	63,8	66,1	67,8	69,2	71,4	73,2
8	51,6	54,8	57,0	58,8	60,2	61,4	62,4	63,3	64,1	67,3	69,5	71,3	72,7	74,9	76,7
9	54,7	57,9	60,1	61,8	63,2	64,4	65,5	66,4	67,2	70,4	72,6	74,3	75,7	78,0	79,7
10	57,4	60,6	62,8	64,6	66,0	67,2	68,2	69,1	70,0	73,1	75,3	77,1	78,5	80,7	82,5
11	59,9	63,1	65,3	67,1	68,5	69,7	70,7	71,6	72,4	75,6	77,8	79,6	81,0	83,2	85,0
12	62,2	65,4	67,6	69,3	70,7	71,9	73,0	73,9	74,7	77,9	80,1	81,8	83,2	85,5	87,2

Tab. 11.3.2. Level of acoustic output L_{W1}[dB] related to the 1 m² section - round dampers

	ξ [-]											
w [m.s^{-1}]	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. 11.3.3. Correction to the weight filter A - square and round dampers

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. 11.3.4. Relative level expressing the shape of the spectrum L_{rel} - square and round dampers

	f [Hz]							
w [m.s^{-1}]	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	-4,0	-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	-4,0	-4,1	-5,9	-9,4	-14,6	-21,5	-30,0
11	-5,9	-4,1	-4,0	-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

IV. MATERIAL, FINISHING

12. Material

12.1. Damper bodies are supplied in the standard design made of galvanized plate without any other surface finish.

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.

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

V. INSPECTION, TESTING

13. Inspection, testing

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

VI. TRANSPORTATION AND STORAGE

14. Logistic terms

14.1. 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.

14.2. 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

15. Assembly

15.1. Assembly, maintenance and damper check can be done only by qualified persons, i.e. "AUTHORIZED PERSONS" that have been trained by the manufacturer.

Trainings are done by the firm MANDÍK that makes out a proficiency "CERTIFICATE" which is valid for 5 years. It can be renewed by the "AUTHORIZED PERSONS" themselves, directly at the manufacturer.

When the "CERTIFICATE" expires, it becomes invalid and is eliminated from the trainer´s registration.

Only professional personnel that undertake guarantee for the completed work can be trained.

15.2. All effective safety standards and directives must be observed during fire damper assembly.

15.3. Flange and screw joints must be conductively connected to protect against dangerous contact. 2 galvanized fan shape pads that are placed under the head of one screw and a fastened nut are used for conductive connection.

15.4. 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.

15.5. 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.

16. Entry into service and revisions

16.1. Before entering the dampers into operation after assembly and after sequential revisions, checks and functionality tests of all designs including operation of the electrical components must be done. After entering into operation, these revisions must be done according to requirement set by national regulations.

In case that dampers are found unable to serve for their function for any cause, it must be clearly marked. The operator is obliged to ensure so that the damper is put into condition in which it is able to function and meanwhile he is obliged to provide the fire protection 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.

16.2. Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out for all designs.

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

Inspection hole 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.

16.3. Before entering the dampers with manual control into operation after their assembly and by sequential checks, checks according 16.2. and following checks must be carried out.

Check of thermal protective fuse and closing mechanism.

Exert pressure on double arm initiation lever with a spring to release the control lever and check its displacement into the "CLOSED" position. Closing must be smart and the control lever must be firmly locked with a pawl. In case that the closing is not smart enough and the control lever is not locked with the pawl in the "CLOSED" position, higher pre-stretch of the closing spring must be set using a ratchet wheel.

Proper function of the thermal fuse can be checked when the fuse is removed from the starting mechanism pin. The pin must be taken out and the initiation lever must be turned over. If this is not possible, then the pin and the starting mechanism spring must be checked or the base plate must be replaced. The base plate is attached to the damper body with three M5 screws and nuts.

Displacing the damper blade into "OPEN" position is done the following way:
Release the pawl exerting pressure and return the control lever into the second outlaying position where the lever is hold by the initiation lever.

In case of the flap valve with an electromagnet check the control lever displacement into the "CLOSED" position after connecting to power supply.

16.4. Before entering the dampers with actuating mechanism into operation after their assembly and by sequential checks, checks according 16.2. 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).

17. Spare parts

17.1. Spare parts are supplied only on basis of an order.

17.2. Control for square damper and round damper is identical.

18. Restore function of actuating mechanism after fuses initiation

18.1. If fuse Tf1 is initiated (duct outside temperature) than is necessary to change thermoelectrical starting mechanism BAE72B-S. Whereas is initiation temperature higher than actuator mechanism operating temperature +50°C, recommended actuating mechanism manufacturer make complete revision or change actuating mechanism and thermoelectrical starting mechanism.

18.2. If fuses Tf2/Tf3 are initiated (duct inside temperature) than is possible change only part ZBAE72, or ZBAE95 (according initiating temperature).

VIII. PRODUCT DATA

19. Data label

19.1. Data label is placed on the damper body.

Fig. 103 Data label

MANDÍK	MANDÍK, a.s. 267 24 Hostomice		Dobříšská 550 Czech Republic
FIRE DAMPER FDMB-S			
CLASSIFICATION: EI 90 (ve ho i↔o) S			
SIZE:		DESIGN:	
SERIAL NUMBER:		WEIGHT (kg):	
TPM075/09	Certification: 1391-CPD-0113/2012	12	EN 15650:2010 CE 1391

20. Quick overview

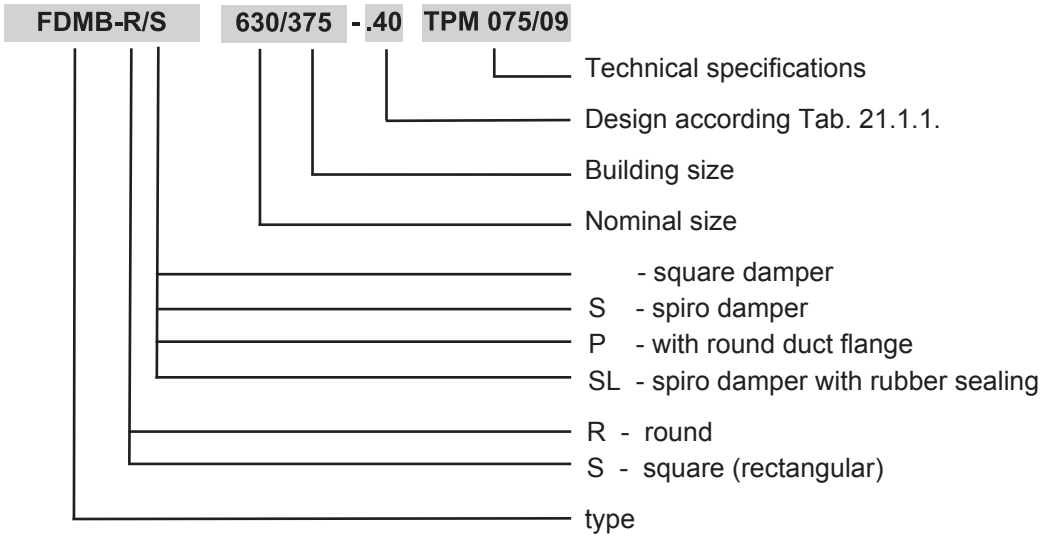
Tab. 19.1.1. Quick Overview

Damper	FDMB			
Fire separating construction	wall/ceiling Min. thickness [mm]	Installation	Fire resistant	Fig.
Solid wall construction	100	Mortar or gypsum	EIS 120	45
	100	Mineral stone wool with mastic and cement lime plate	EIS 90	50
	100	Weichschott	EIS 90	52
	100	Mineral stone wool with mastic	EIS 60	56
	100	Installation frame E1 - square damper	EIS 90	85
	150	Installation frame E2 - square damper	EIS 90	86
	100	Installation frame R1 - round damper	EIS 90	91
	150	Installation frame R2 - round damper	EIS 90	91
	100	Installation frame R1 - round damper	EIS 90	91
	150	Installation frame R2 - round damper	EIS 90	91
	100	installation next to wall mortar or gypsum and mineral wool	EIS 90	47, 48
	100	installation next to wall installation frame and mineral wool	EIS 90	49
	100	Battery installation	EIS 90	46
	100	Battery installation installation frame	EIS 90	53
Gypsum wall construction	100	Mortar or gypsum	EIS 120	68
	100	Mineral stone wool with mastic and cement lime plate	EIS 90	73
	100	Weichschott	EIS 90	75
	100	Mineral stone wool with mastic	EIS 60	78
	100	Installation frame E1 - square damper	EIS 90	85
	100	Installation frame E2 - square damper	EIS 90	87
	100	Installation frame R1 - round damper	EIS 90	91
	150	Installation frame R2 - round damper	EIS 90	91
	100	Installation frame R1 - round damper	EIS 90	91
	150	Installation frame R2 - round damper	EIS 90	91
	100	installation next to wall mortar or gypsum and mineral wool	EIS 90	70, 71
	100	installation next to wall installation frame and mineral wool	EIS 90	72
	100	Battery installation	EIS 90	69
	100	Battery installation installation frame	EIS 90	76
Solid ceiling construction	150	Mortar or gypsum	EIS 120	57
	150	Mineral stone wool with mastic and cement lime plate	EIS 90	59
	150	Weichschott	EIS 90	61
	150	Mineral stone wool with mastic	EIS 60	67
	150	Installation frame E1 - square damper	EIS 90	85
	150	Installation frame E2 - square damper	EIS 90	86
	150	Installation frame R1 - round damper	EIS 90	91
	150	Installation frame R2 - round damper	EIS 90	91
	150	Installation frame R1 - round damper	EIS 90	91
	150	Instalační rám R2 - kruhová klapka	EIS 90	91
	150	Battery installation	EIS 90	58
	150	Battery installationinstallation frame	EIS 90	62
Outside of solid wall construction	100	Mineral stone wool with mastic and cement lime plate	EIS 90	54
	100	Installation frame R6 - round damper	EIS 90	55
Outside of solid ceiling construction	150	Mineral stone wool with mastic and cement lime plate	EIS 90	63
	150	In concrete channel -installation frame E4 - square damper	EIS 90	65
	150	Installation frame E6 - square damper	EIS 90	66
	150	In concrete channel - installation frame R5 - round damper	EIS 90	65
	150	Installation frame R6	EIS 90	94
On the solid wall constructioni	100	Installation frame E4 - square damper	EIS 90	92
	100	Installation frame R5 - round damper	EIS 90	93
On the solid ceiling construction	150	Installation frame R5 - round damper	EIS 90	93
	150	Installation frame E4 - square damper	EIS 90	92

IX. ORDERING INFORMATION

21. Ordering key

21.1. Fire damper



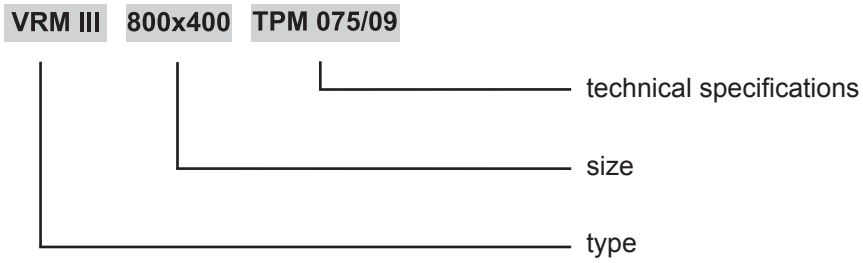
If installation holders, installation frame or design for installation in Weichschott system are requested, it has to be mentioned separately in the order. Installation frame could be fixed to the damper body or supplied separately.

Tab. 21.1.1. Dampers design

Dampers design	Additional digit
Manual and thermal	.01
Manual and thermal with a terminal switch ("CLOSED")	.11
Manual, thermal and with an electromagnet AC 230 V	.20
Manual, thermal and with an electromagnet AC 24 V	.21
Manual, thermal and with an electromagnet DC 24 V	.22
Manual, thermal and with an electromagnet AC 230 V, with a terminal switch ("CLOSED")	.23
Manual, thermal and with an electromagnet AC 24 V, with a terminal switch ("CLOSED")	.24
Manual, thermal and with an electromagnet DC 24 V, with a terminal switch ("CLOSED")	.25
With actuating mechanism BF 230-T (BFL, BFN 230-T)	.40
With actuating mechanism BF 24-T (BFL, BFN 24-T)	.50
With communication and supply device BKN 230-24 and actuating mechanism BF 24-T-ST (BFL, BFN 24-T-ST)	.60
With communication and supply device BKN 230-24MP and actuating mechanism BF 24TL-T-ST (Top-Line) for connection to MP-Bus	.62
With communication and supply device BKN 230-24LON and with actuating mechanism BF 24TL-T-ST (Top-Line) for connection to LonWorks	.64
Manual and thermal with two terminal switches ("OPEN", "CLOSED")	.80
Manual, thermal and with an electromagnet AC 230 V and two terminal switches ("OPEN", "CLOSED")	.82
Manual, thermal and with an electromagnet AC 24 V and two terminal switches ("OPEN", "CLOSED")	.83
Manual, thermal and with an electromagnet DC 24 V and two terminal switches ("OPEN", "CLOSED")	.84

Some designs are possible to supply with optical smoke detector MHG 231. For more information contact manufacturer.

21.2. Reinforcement - damper placement outside wall or ceiling construction



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