

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.

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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. 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 FDMB with actuating mechanism - rectangular



Fig. 2 FDMB with actuating mechanism - round



Fig. 3 FDMB with mechanical control - rectangular



Fig. 4 FDMB - with mechanical control - round



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-CPR-0011/2014
- Declaration of Performance No. PM/PKTM_III/01/16/1
- 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
Maximum pressure difference: 1200 Pa
- b) 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 -30°C to +50°C.

2. Design

2.1. Design with mechanical control

Design .01

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

Fig. 5 Design .01



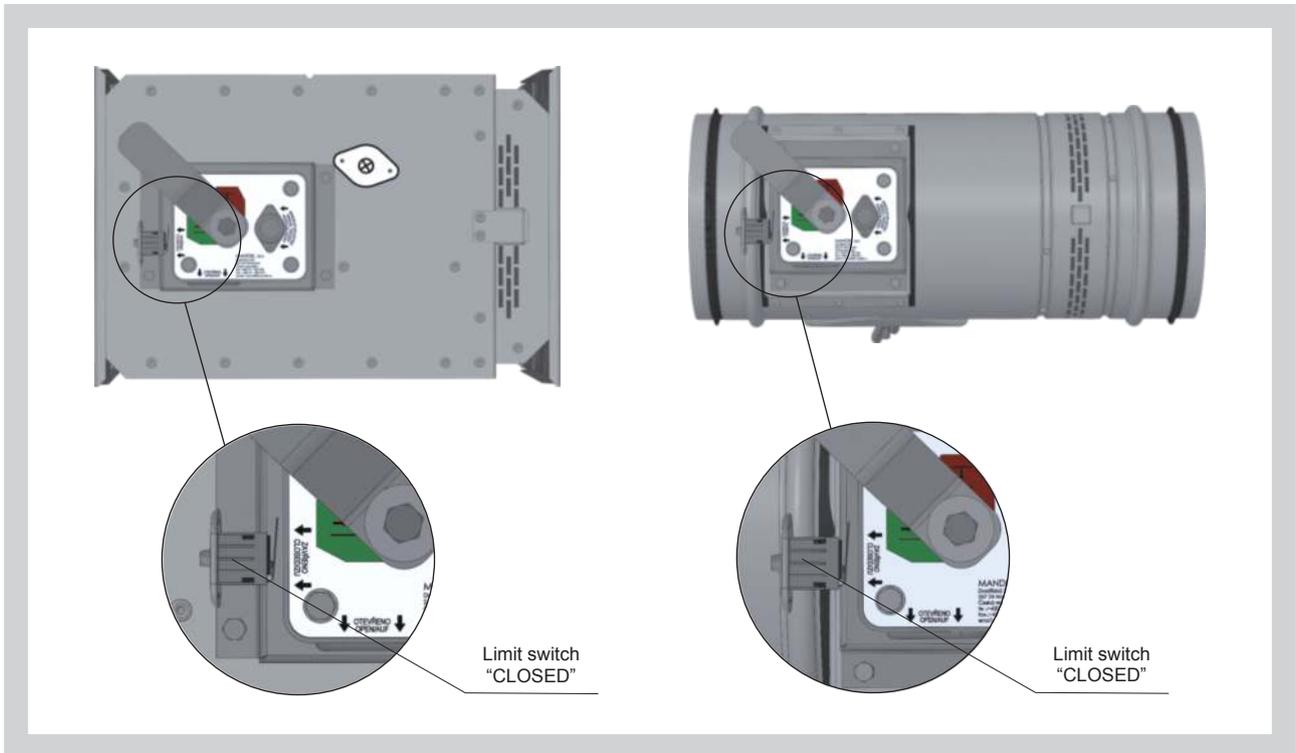
ATTENTION:

Mechanisms are produced in four designs **M1** to **M4**, difference is only in size of inner spring, which closes the fire damper. For the size of fire dampers is always assigned the size of mechanism - **Tab 4.3.1., Tab 4.4.1..** It is not recommended to use different size of mechanism, than given by the manufacturer, otherwise, there is a risk of fire damper destruction.

Design .11

Design .01 with mechanical control can be complemented with a limit switch signalling of the damper blade position "CLOSED". Cable is connected directly to limit switch.

Fig. 6 Design .11



Design .80

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

Fig. 7 Design .80

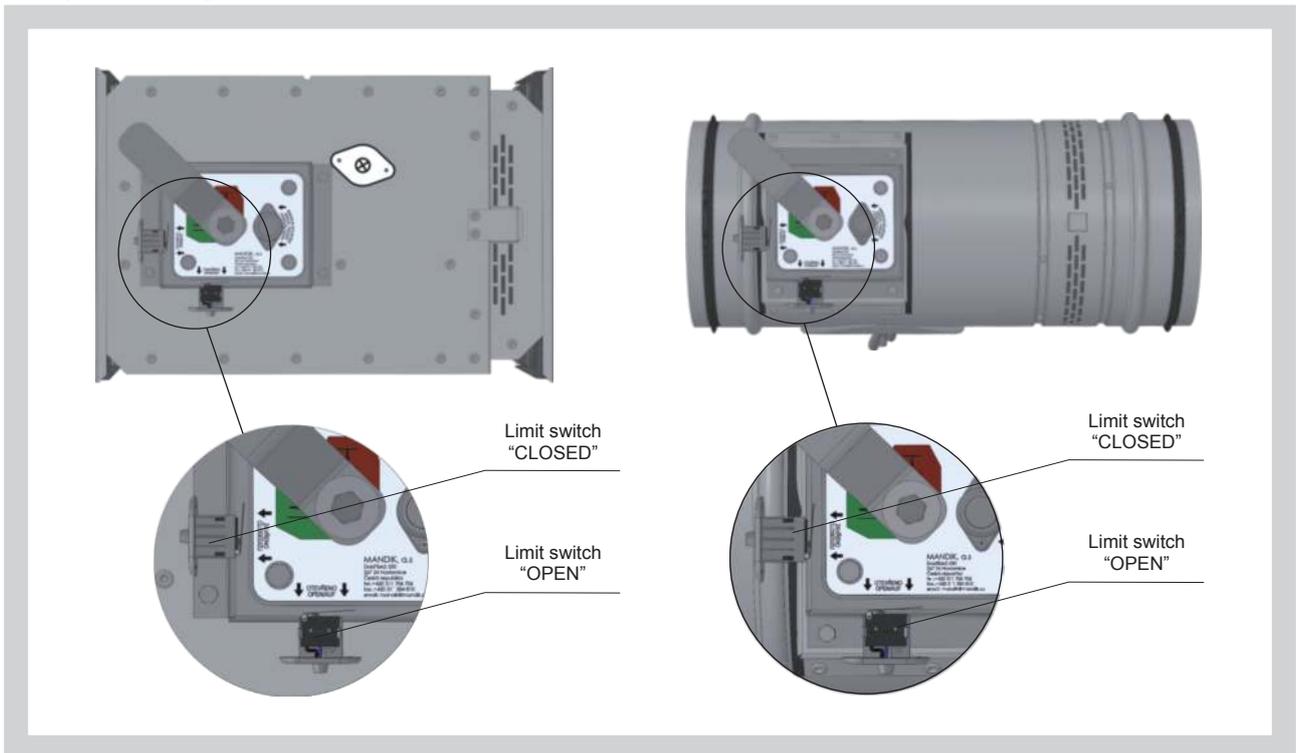


Fig. 8 Limit switch G905-300E03W1

1(COM) - black wire
2(NC) - gray wire
4(NO) - blue wire

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

This limit switch is possible to connect in following two versions:
a) **CUT-OFF** if the arm is moving ... connect wire 1+2
b) **SWITCH-ON** if the arm is moving ... connect wire 1+4

Fig. 9 Change of mechanical design for the motorised one or vice versa - ROUND

Position:
1 Damper
2 Mounting plate
3 Actuator
4 Temperature sensor
5 Mounting plate
6 Mechanics
7 Thermal fuse
8 Sensor sticker

Fig. 10 Change of mechanical design for the motorised one or vice versa - RECTANGULAR

Position:
1 Damper
2 Mounting plate
3 Actuator
4 Temperature sensor
5 Mounting plate
6 Mechanics
7 Thermal fuse
8 Sensor sticker

2.2. Design with actuating mechanism

Design .40, .50

FDMB is always equipped by electric actuating mechanism BFL, BFN, BF 230-TN or BFL, BFN, BF 230-TN (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, 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. 11 Design .40, .50

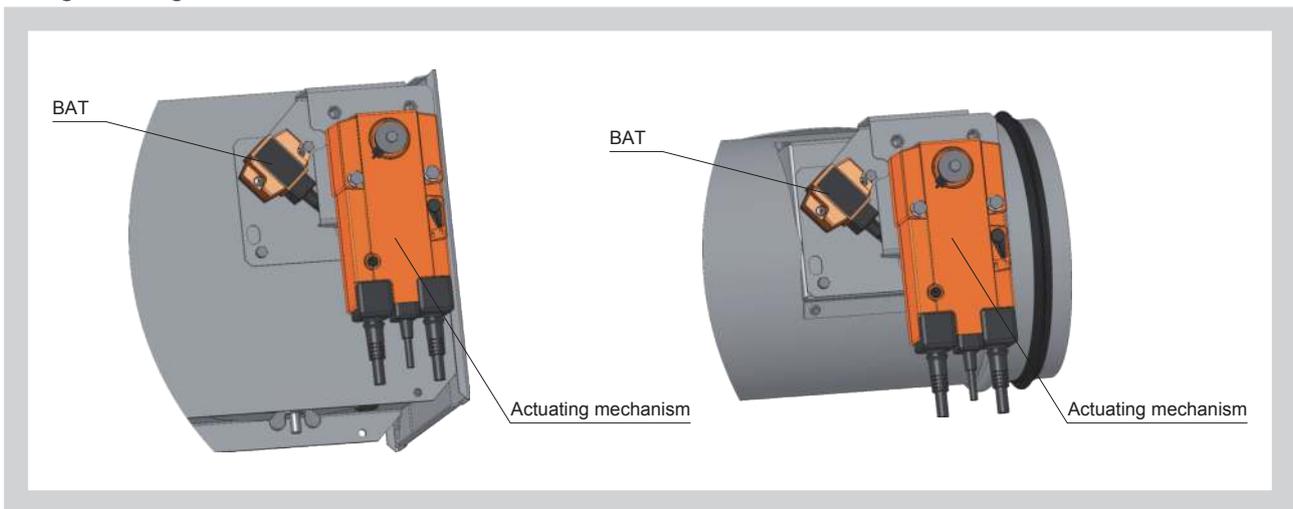


Fig. 12 Actuating mechanism BELIMO BFL (BFN) 230-T

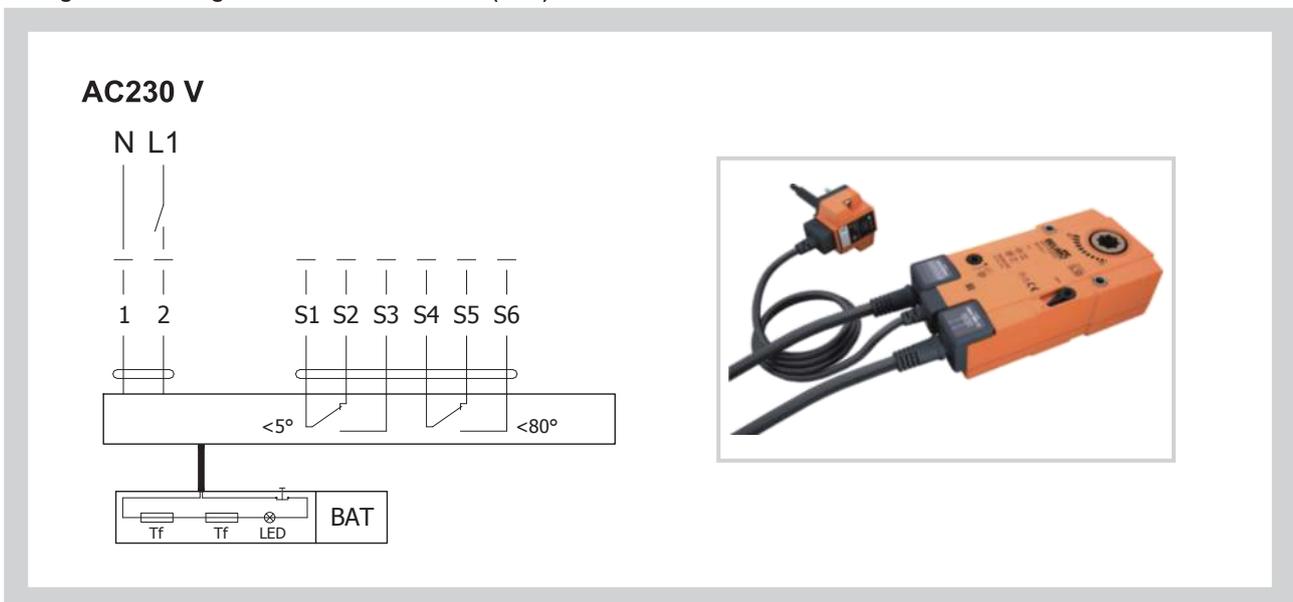
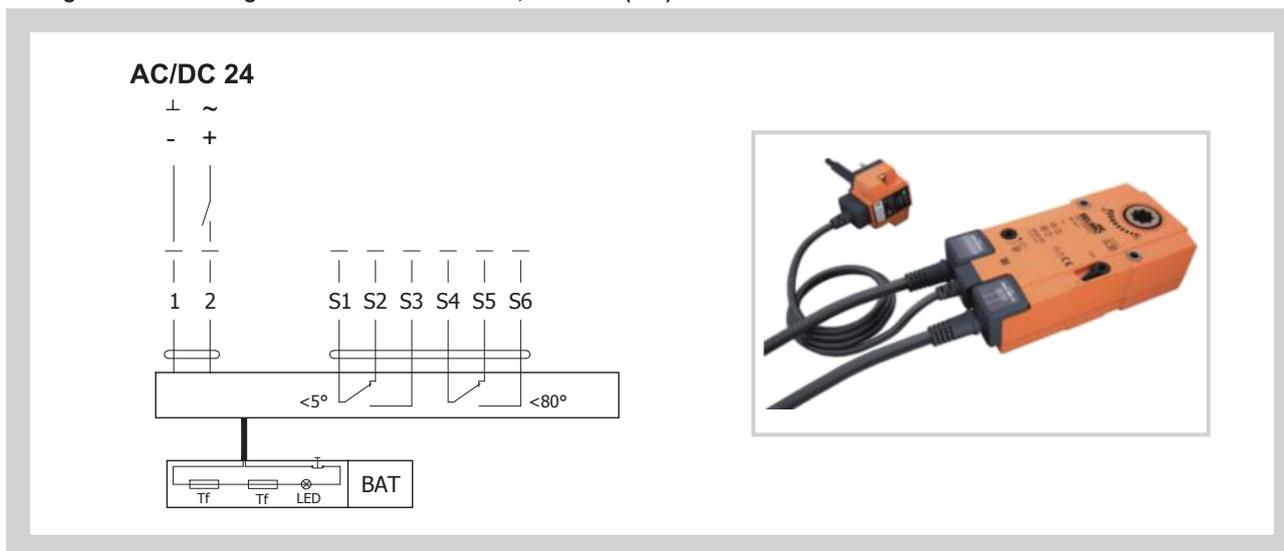


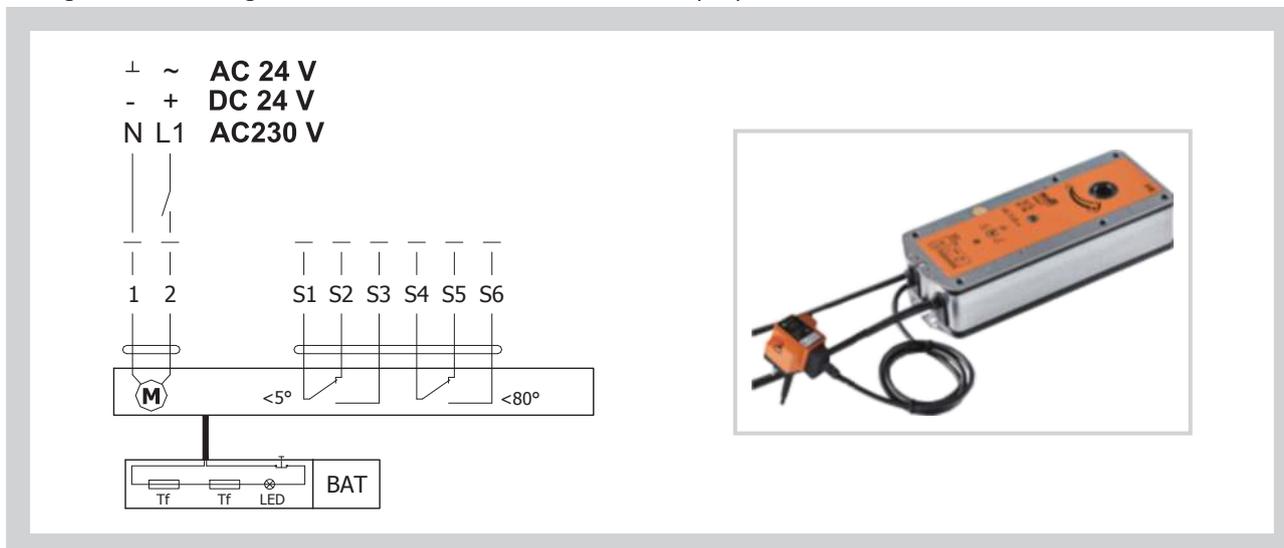
Fig. 13 Actuating mechanism BELIMO BFL, BFN 24-T(-ST)



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	<math><60\text{ s}</math> $\sim 20\text{ s}$	
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 mm ² (BFL/BFN 24-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm ² (BFL/BFN 24-T-ST) with 6-pin plug-in connectors	
Thermal trips	duct outside temperature +72°C duct inside temperature +72°C	

Fig. 14 Actuating mechanism BELIMO BF 230-TN, BF 24-TN (-ST)



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

Actuating mechanism BELIMO	BF 24-TN(-ST)	BF 230-TN
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	-30°C ... +50°C The safe position will be attained up to max. 75°C -40°C ... +50°C	
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm ² cable 1 m, 6 x 0,75 mm ² (BF 24-T-ST) with plug-in connectors	
Thermal trips	Tf1: duct outside temperature Duct +72°C Tf2/Tf3: duct inside temperature Duct +72°C	

Design .41, .51

Design .41 or .51 with actuating mechanism can be complemented with smoke detector ORS 142 K. The voltage can be AC 230 V or 24 V DC. Design with voltage AC 230 V is equipped with Communication and supply device BKN 230-24-MOD and with actuating mechanism BF 24-TN (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 ORS 142 K with the socket 143A

Optical smoke detector	ORS 142 K with socket 143A
Operating voltage	18 ... 28 V DC
Residual ripple	≤ 200 mV
Power Consumption Socket (without actuating mechanism)	max. 22 mA
Degree of protection	IP 42
Ambient temperature	-20°C ... +75°C
Additional temperature sensor	+70°C
Connection - net - motor - communication and supply device BKN	Cabel 1m, connected to terminals 1, 2 and 4 Actuator connected on the terminals 2 and 5 Cabel 1m, connected to terminals 1, 2, 4 and 5

Fig. 15 Smoke detector ORS 142 K and socket 143A

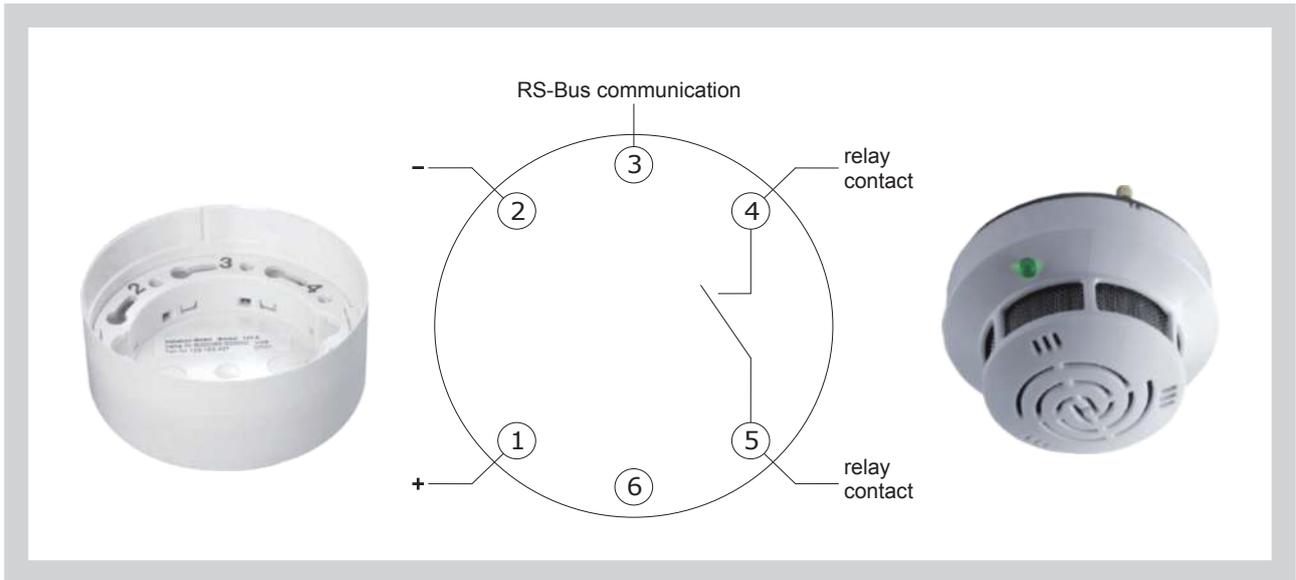


Fig. 16 Design with actuating mechanism BF 24-TN (BFL, BFN 24-T) , with smoke detector ORS 142 K and with communication and supply device BKN 230-24-MOD (voltage AC 230 V)

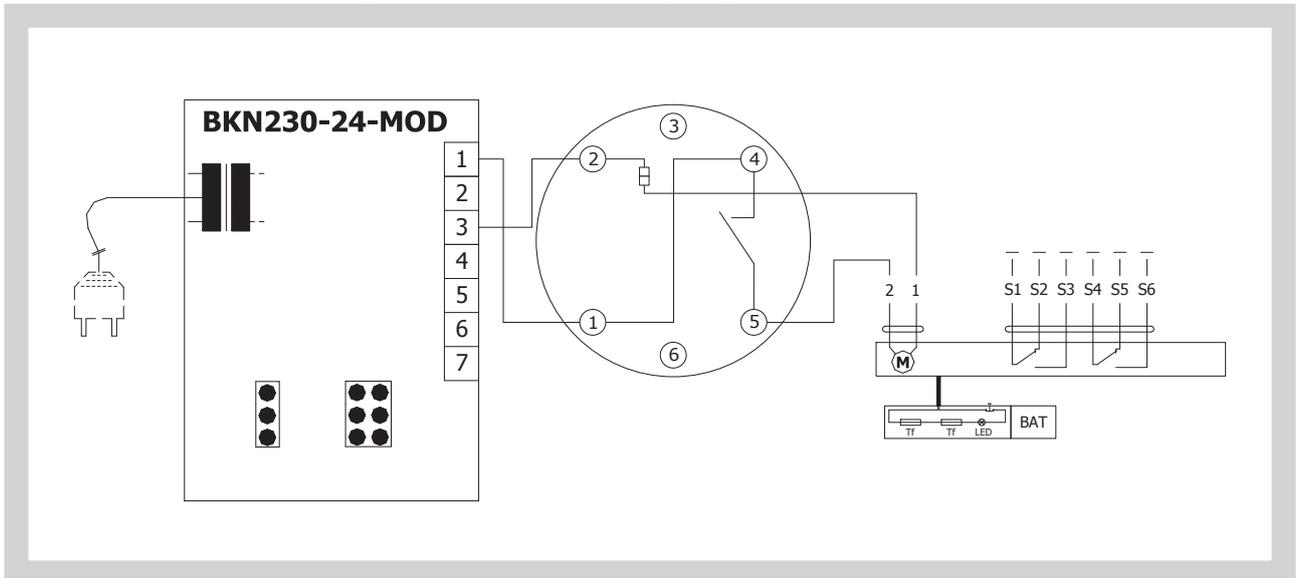
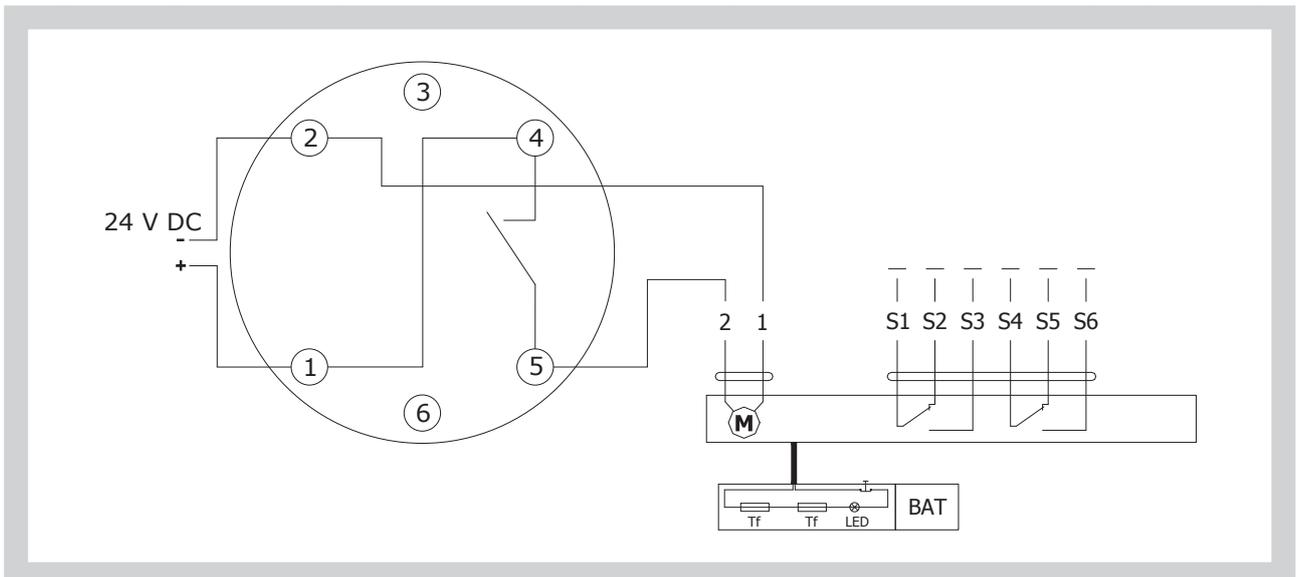


Fig. 17 Design with actuating mechanism BF 24-TN (BFL, BFN 24-T) , with smoke detector ORS 142 K (voltage 24 V DC)



2.3. Design with the communication and supply device

Design .60

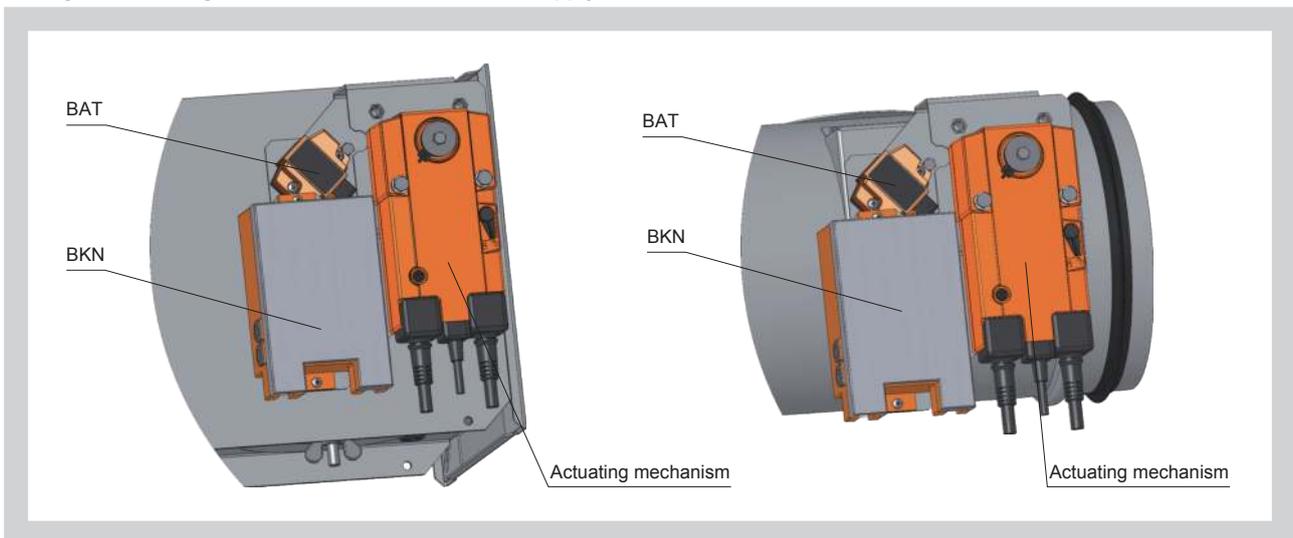
Design with the communication and supply device BKN 230-24 and the actuating mechanism BF 24-TN-ST (BFL 24-T, BFN 24-T). It simplifies electrical wiring and interconnection of fire flap valves. It facilitates on site check and enables central control and checks of fire damper by means of a simple 2-conductor wiring.

BKN 230-24 functions as a decentralized network device for supplying the actuating mechanism BF 24-TN-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-TN-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 BAT 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".

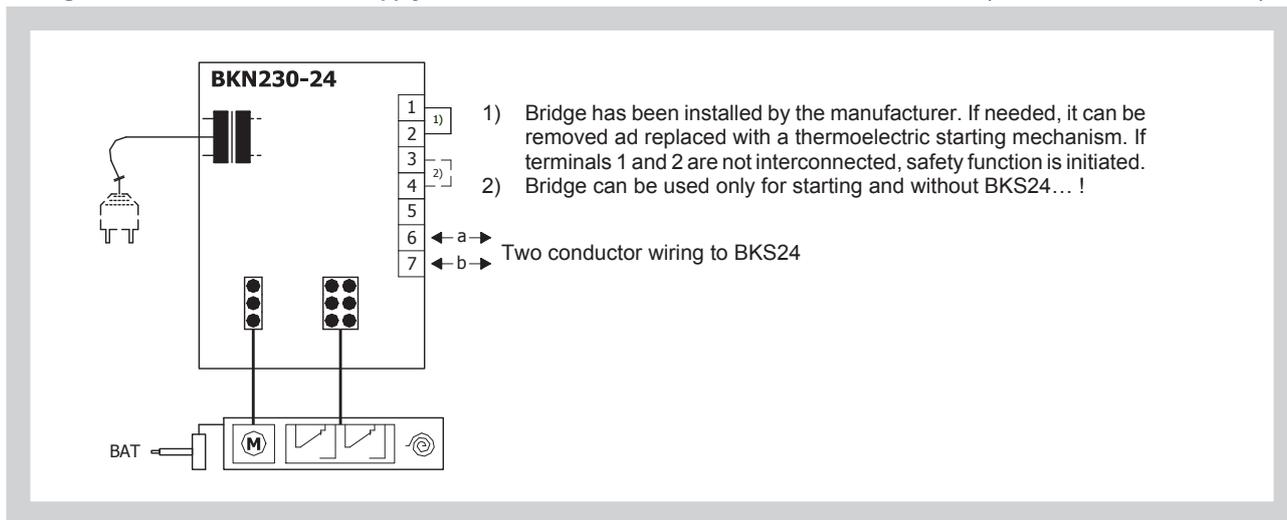
Fig. 18 Design with the communication and supply device BKN 230-24, BKN230-24-C-MP or BKN 230-24-MOD



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 40
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. 19 Communication and supply device BKN 230-24, with act. mechanism BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST)



Design .61

Design .61 with communication and supply device can be complemented with smoke detector ORS 142 K. For supply and communication is used BKN 230-24-C-MP, which together with the BF 24TN-ST (BFL 24T-ST, BFN 24T-ST) enables central control and checks of fire damper by means of a simple 2-conductor wiring and it also allows connection to the system via MP-BUS communication. More information in the Belimo catalog.

Tab. 2.3.2. Communication and supply device BKN 230-24-C-MP

Communication and supply device	BKN 230-24-C-MP
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	10 VA (including actuating mechanism with spring return)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-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. 20 Communication and supply device BKN 230-24-C-MP

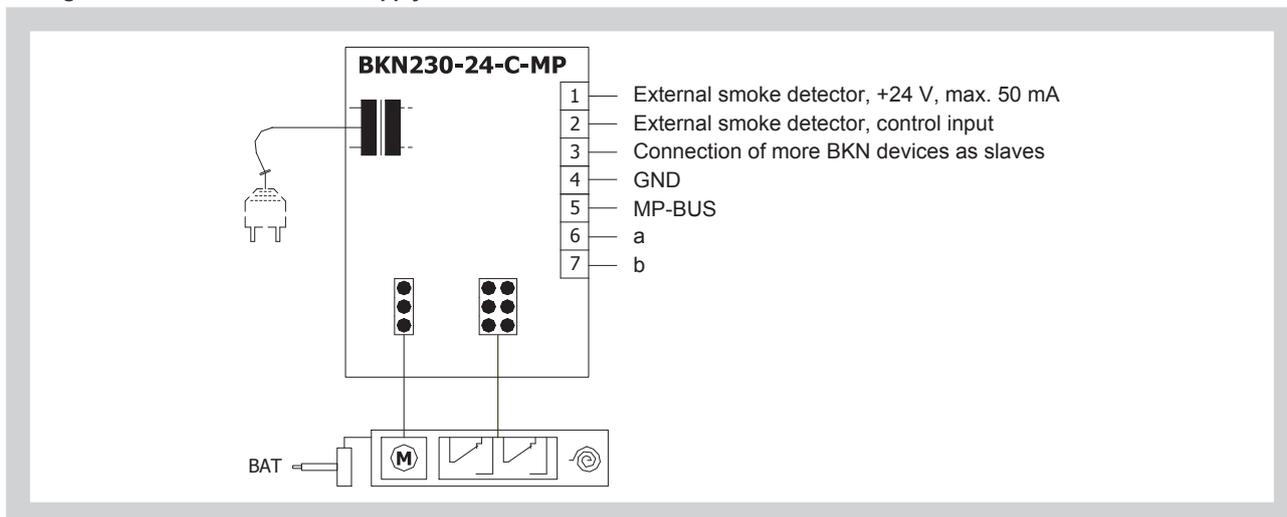
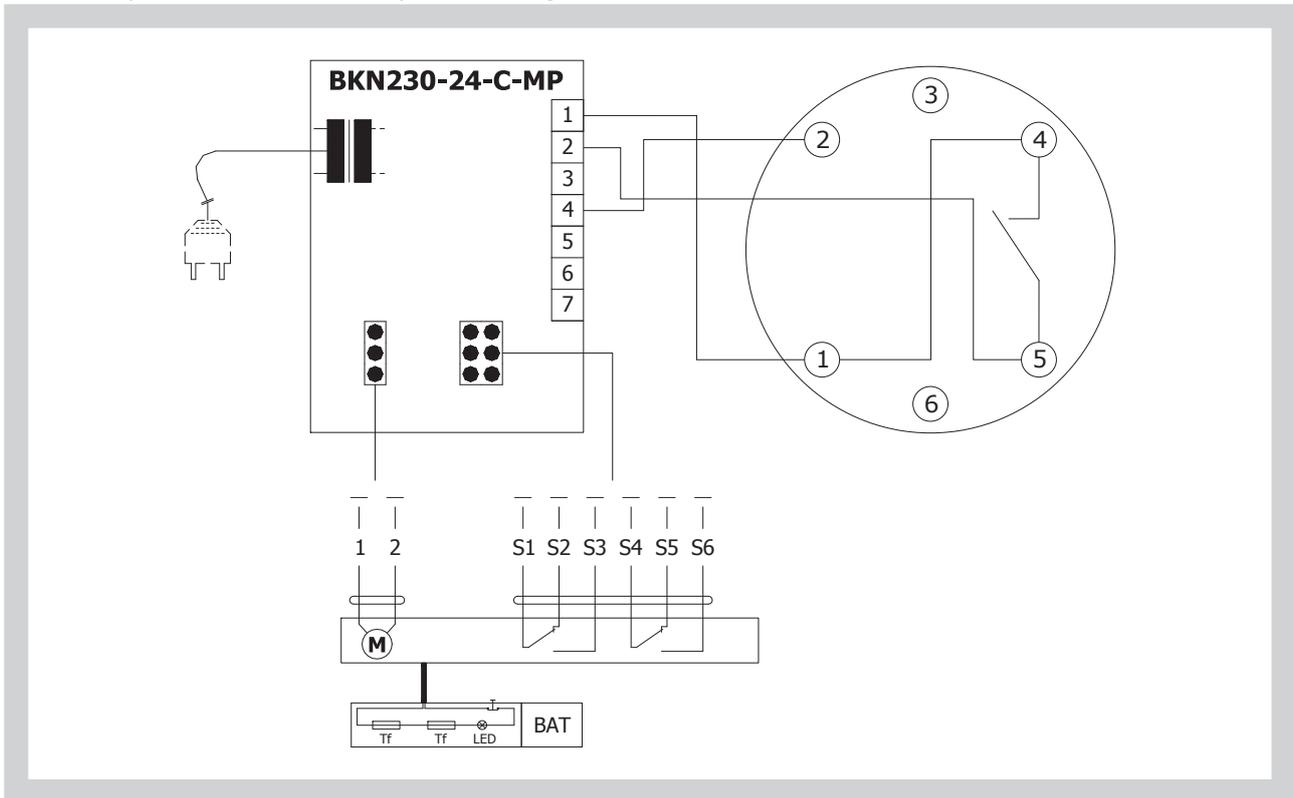


Fig. 21 Design with communication and supply device BKN 230-24-C-MP, with actuating mechanism BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) with actuating mechanism ORS 142 K



Design .63

Design .60 with communication and supply device can be complemented with smoke detector ORS 142 K. For supply and communication is used BKN 230-24-MOD, which is used together with the BF 24TN-ST (BFL 24T-ST, BFN 24T-ST) for communication with control systems using the Modbus RTU or BACnet MS / TP protocol. The wiring of the line is to be carried out in accordance with applicable RS485 regulations. Parameterization of the communication is done using DIL switches. The BKN 230-24-MOD can be installed separately, without a connection to a master control system, in which case the connection bridge between the terminals 1 and 4 must be installed. For more information, see the Belimo catalog.

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

Communication and supply device	BKN 230-24-MOD
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3 W (operating position)
Dimensioning	14 VA (including actuating mechanism with spring return)
Protection Class	II
Degree of protection	IP 40
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. 22 Communication and supply device BKN 230-24-MOD, with act. mechanism BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST)

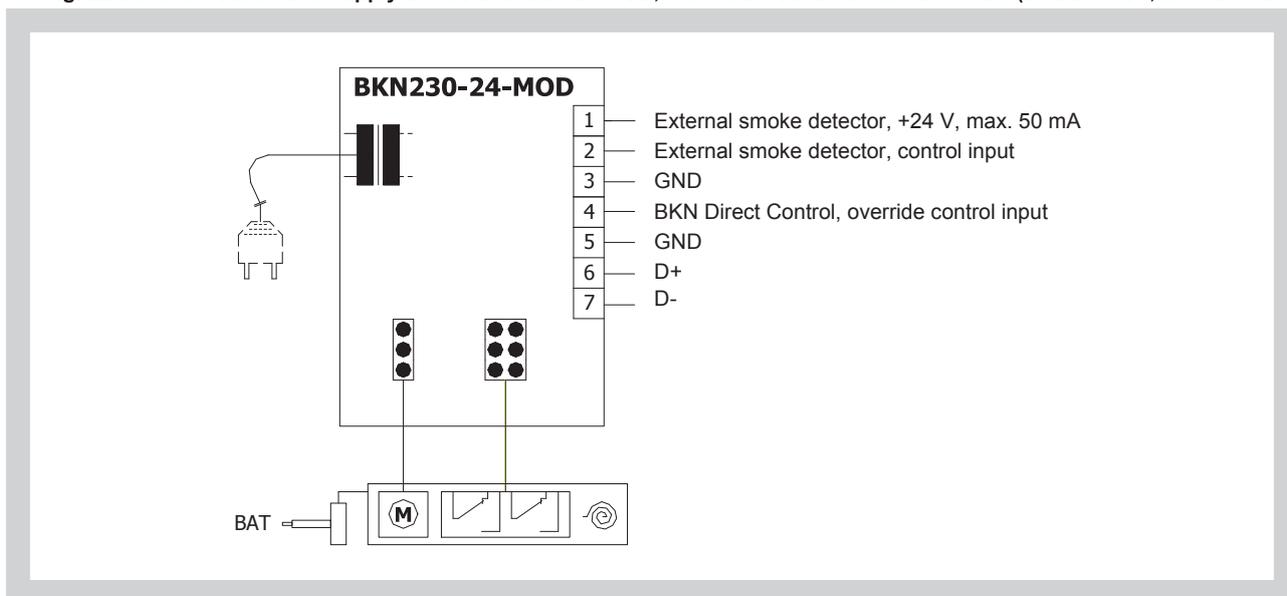
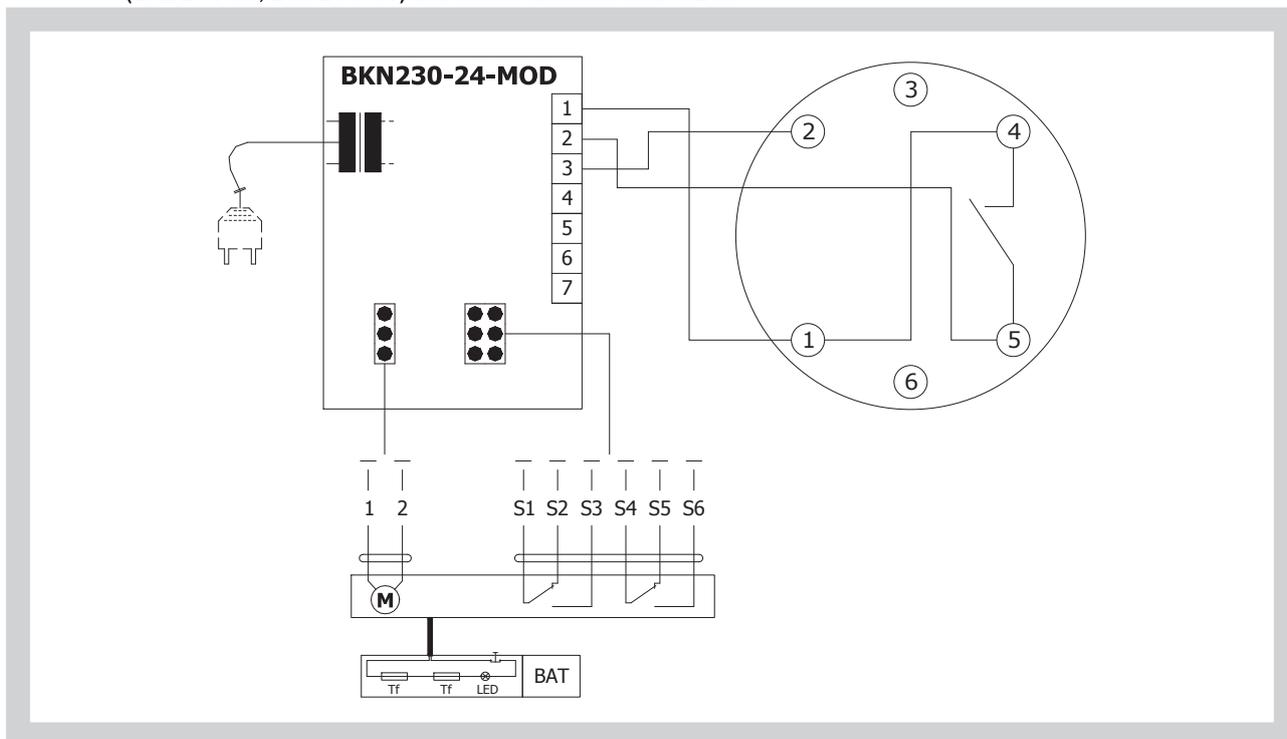


Fig. 23 Design with communication and supply device BKN 230-24-MOD, with actuating mechanism BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) and smoke detector ORS 142 K



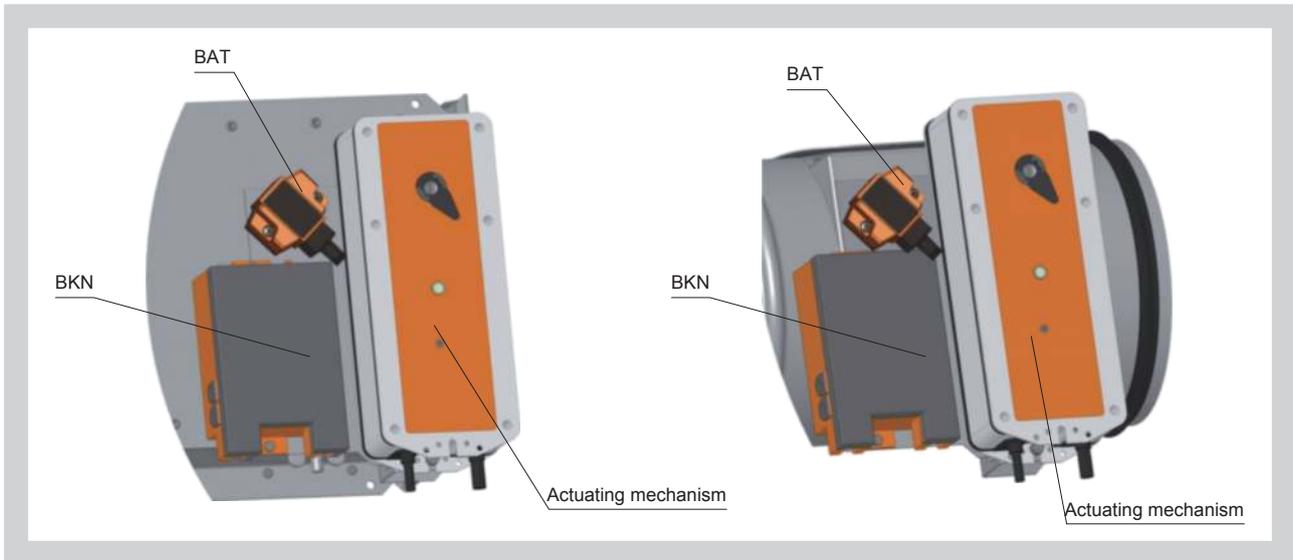
Design .62

Design with the communication and supply device BKN 230-24MP and actuating mechanism BF 24TL-TN-ST for connection to MP-Bus. BKN 230-24MP supplies to intelligent actuating mechanisms of fire dampers BF 24TL-TN-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-TN-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. 24 Design with communication and supply device BKN 230-24MP or BKN 230-24LON and actuating mechanism BF 24TL-TN-ST



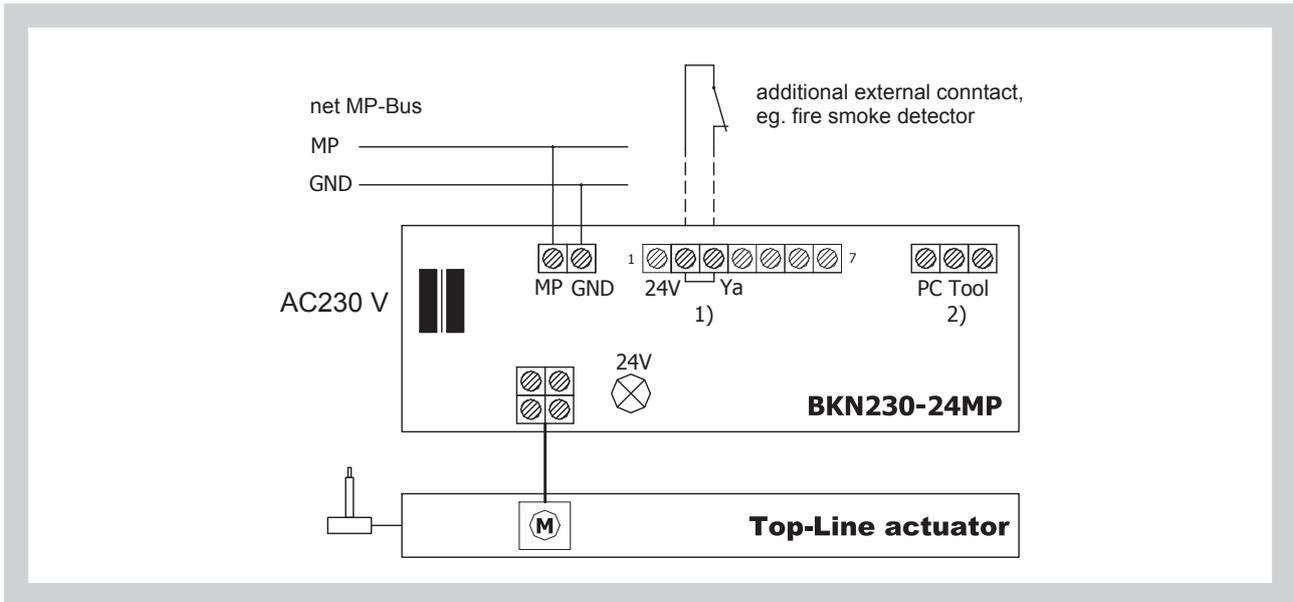
Tab. 2.3.4. Actuating mechanism BELIMO BF 24TL-TN-ST

Actuating mechanism BELIMO	BF 24TL-TN-ST
Nominal voltage	AC 24 V 50/60Hz DC 24 V
Power consumption - motoring - holding	7 W 2 W
Dimensioning	10 VA (I _{max} 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	-30°C ... +50°C -40°C ... +50°C
Connection	Connector for BKN 230-24LON and BKN 230-24MP cable 1 m, 4 x 0,75 mm ² halogen-free

Tab. 2.3.5. 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 (voliteľné) - 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

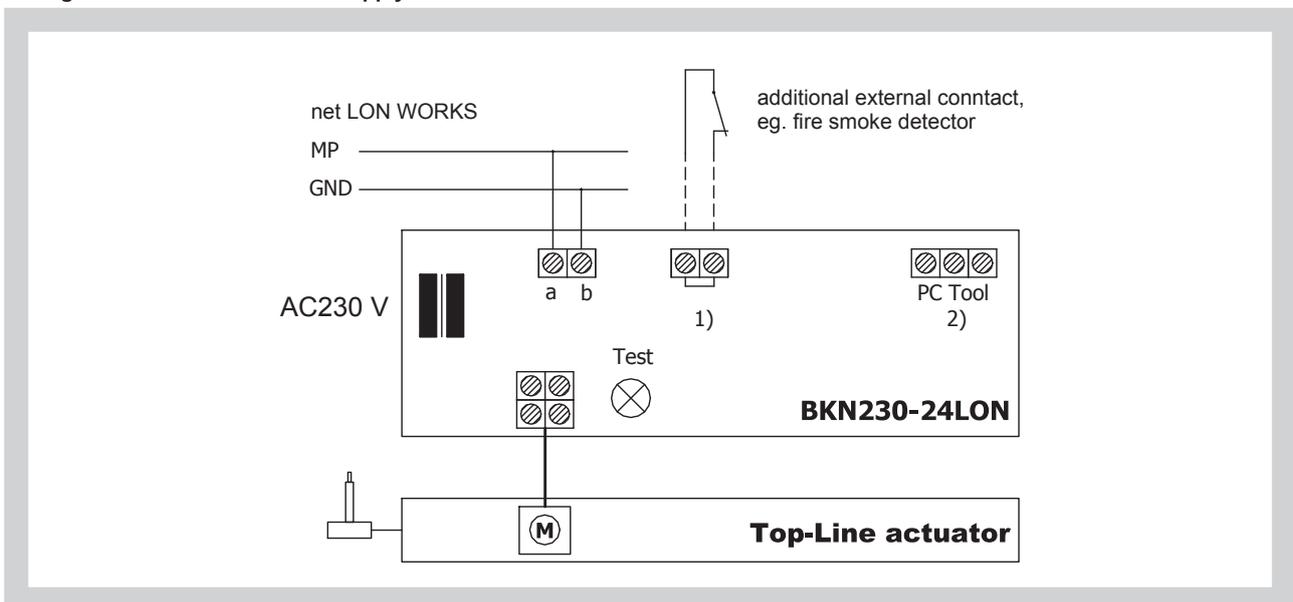
Fig. 25 Communication and supply device BKN 230-24MP



Tab. 2.3.6. 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	-30°C ... +50°C
Non-operating temperature	-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

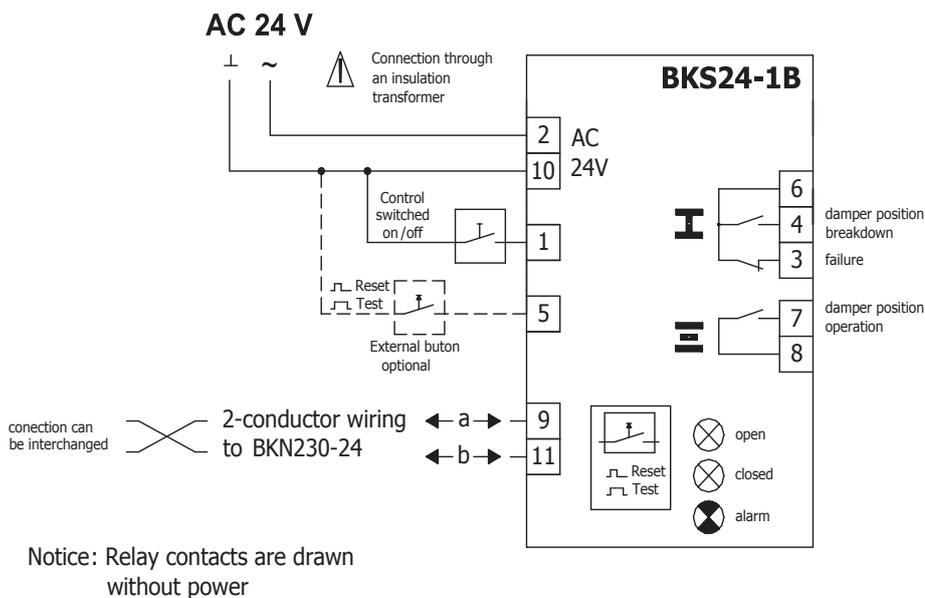
Fig. 26 Communication and supply device BKN 230-24LON



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-TN-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. 27 Communication and control device BKS 24-1B



Signals and diagnosis			
light diodes		contacts	Description
open	closed	alarm	state
open	closed	alarm	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 II

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 mm ²

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-TN-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

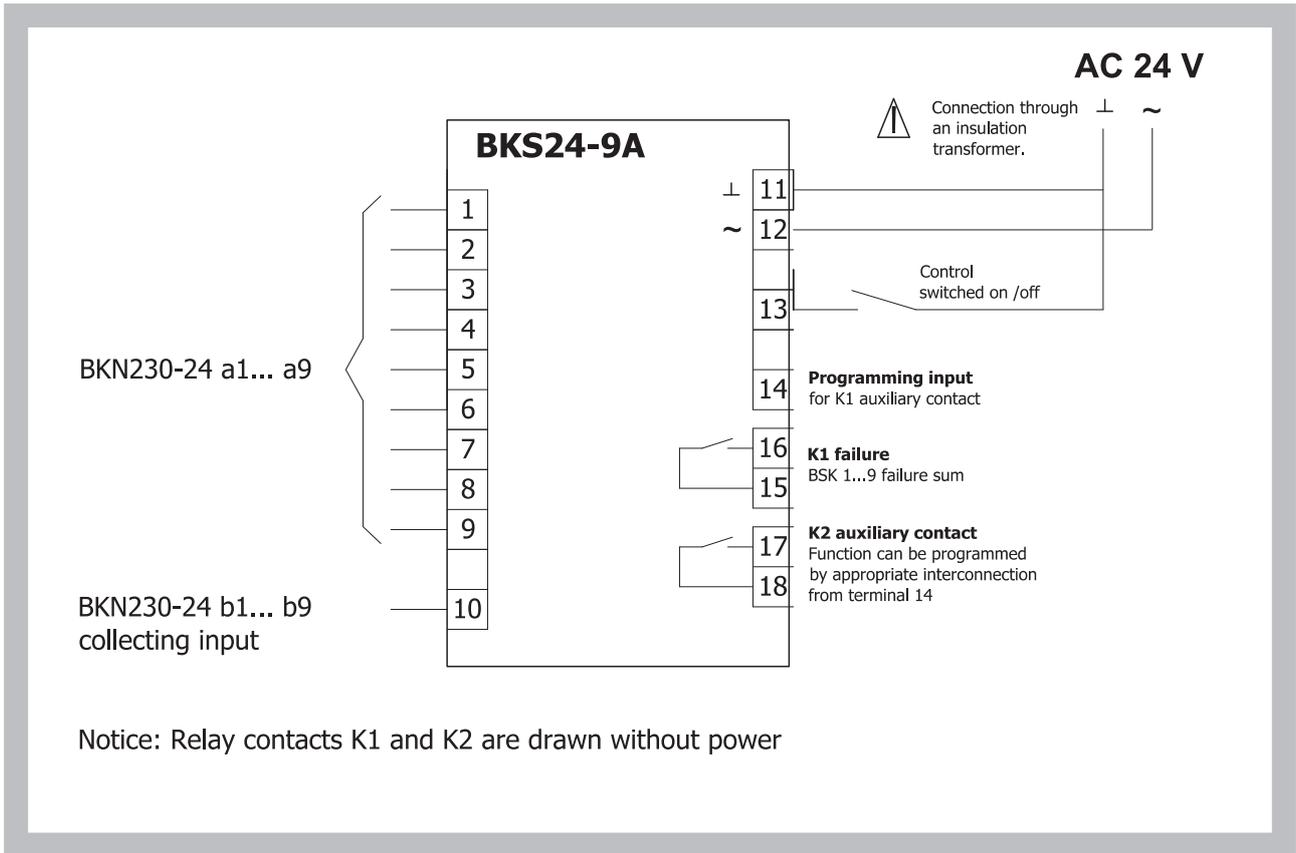
If the fire damper do not reach the given position in time tolerable for displacing, the appropriate light diode FAILURE starts to flash and K1 contact is opened (current failure). In case that the faulty damper finally reaches its given position, K1 is closed and the failure report light shines (the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

Fig. 28 Communication and control device BKS 24-9A



Notice: Relay contacts K1 and K2 are drawn without power

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 mm ²

4. Dimensions, weights and effective area

4.1. Rectangular dampers

Fig. 29 FDMB with mechanical control - rectangular

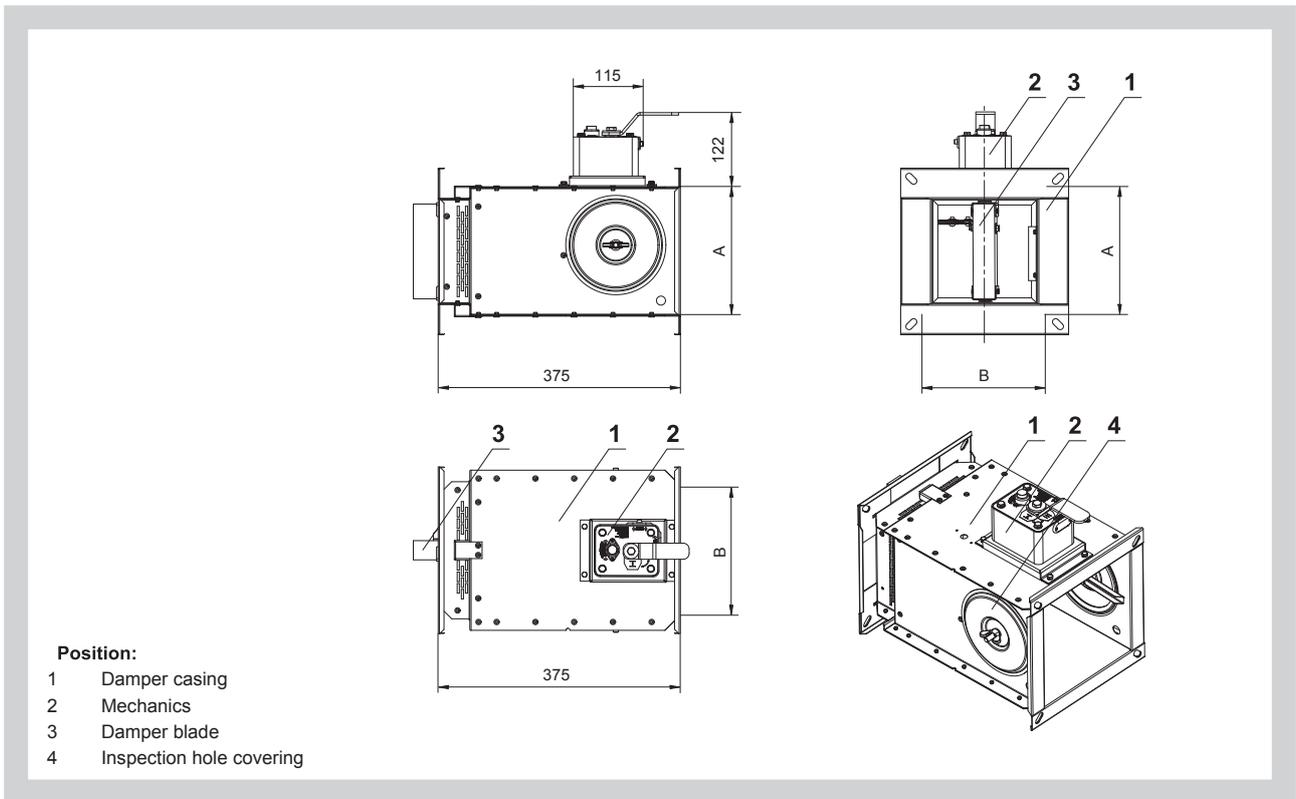
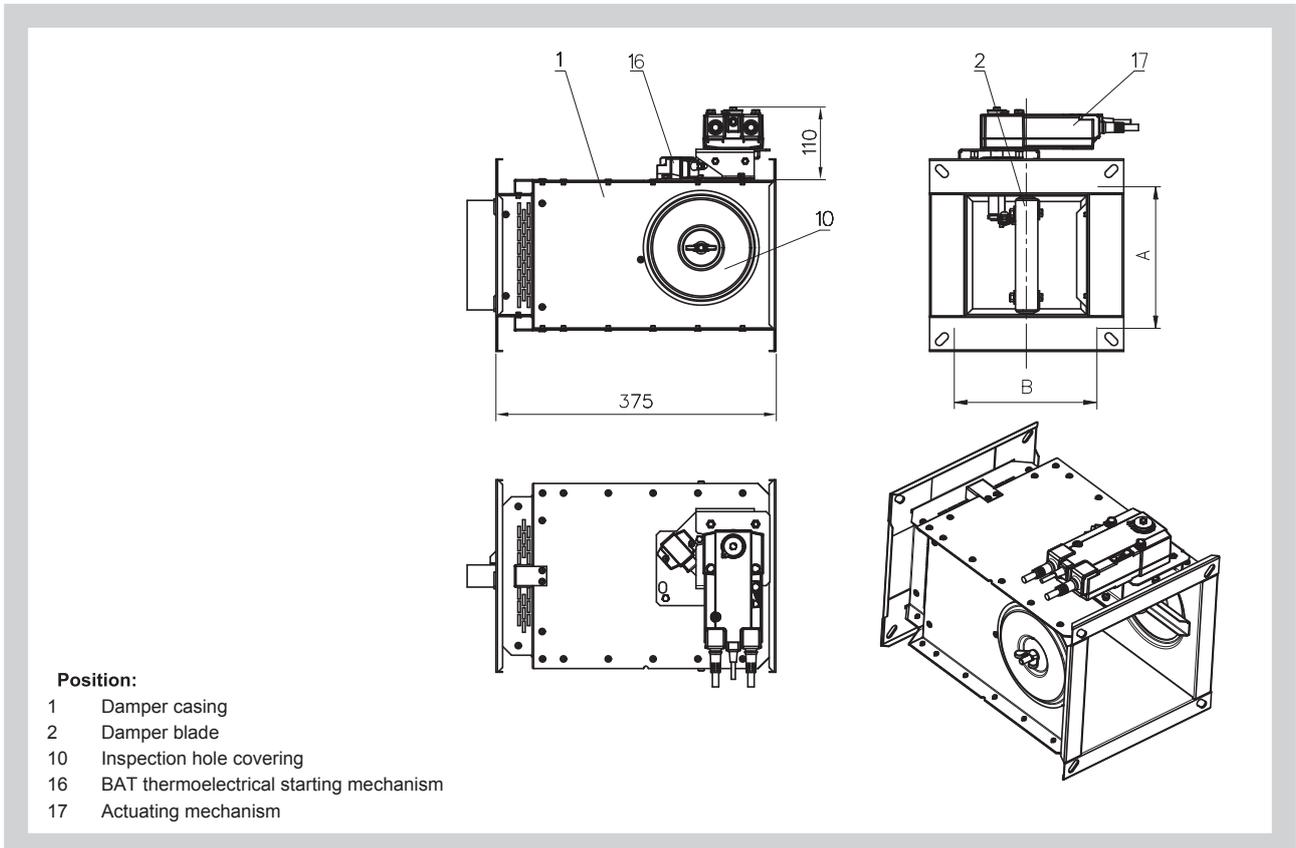
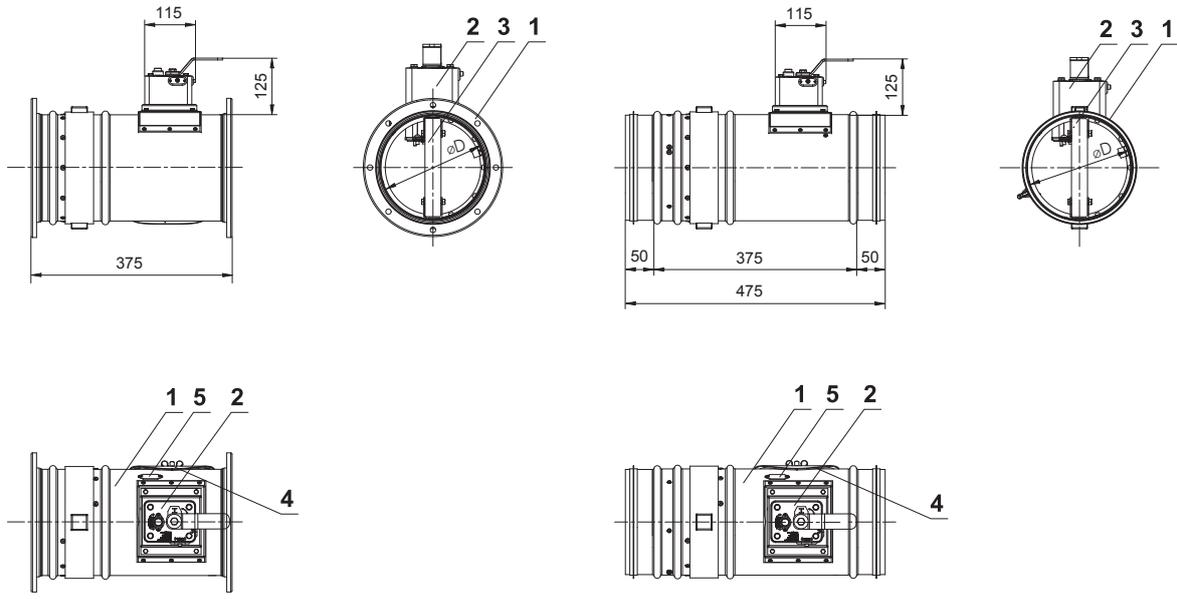


Fig. 30 FDMB with actuating mechanism - rectangular



4.2. Round dampers

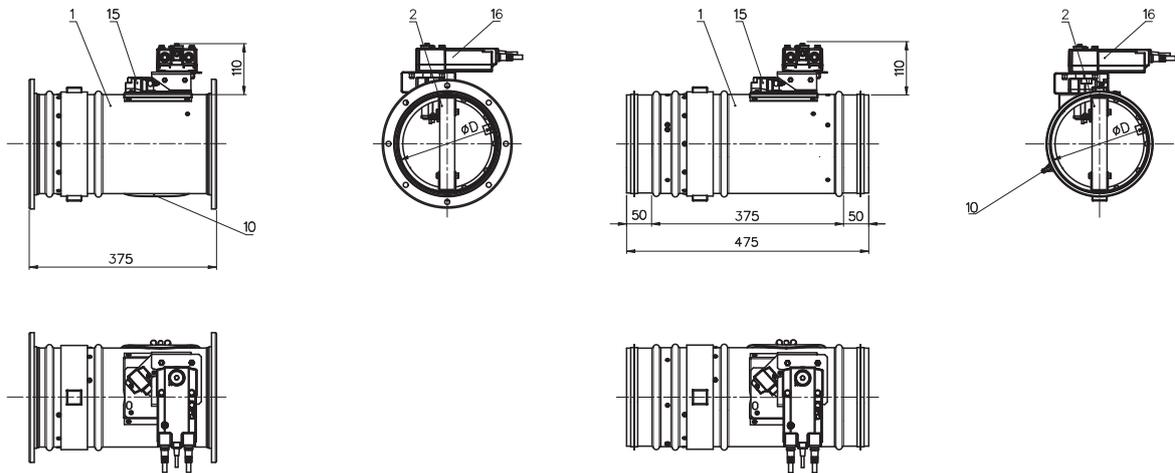
Fig. 31 FDMB with mechanical control - round



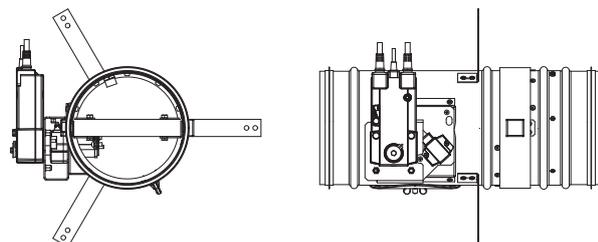
Position:

- 1 Damper casing
- 2 Mechanics
- 3 Damper blade
- 4 Inspection hole covering
- 5 Sensor sticker

Fig. 32 FDMB with actuating mechanism - round



Fire damper with installation holders



Position:

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

4.3. Rectangular dampers - dimensions, weights and effective area

Tab. 4.3.1. Rectangular dampers - dimensions, weights and effective area

A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.	A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.
			Design								Design				
			mech [kg]	servo [kg]							mech [kg]	servo [kg]			
160 x 160	-	20	5,5	7,0	0,0113	BFL	M1	200 x 315	-	97,5	8,0	9,5	0,0398	BFL	M1
160 x 180	-	30	6,0	7,5	0,0137	BFL	M1	200 x 355	-	117,5	9,0	10,5	0,0463	BFL	M1
160 x 200	-	40	6,0	7,5	0,0161	BFL	M1	200 x 400	-	140	9,5	11,0	0,0535	BFL	M1
160 x 225	-	52,5	6,5	8,0	0,0191	BFL	M1	200 x 450	-	165	10,0	13,0	0,0537	BFL	M1
160 x 250	-	65	7,0	8,5	0,0222	BFL	M1	200 x 500	-	190	10,5	13,5	0,0611	BFL	M2
160 x 280	-	80	7,0	8,5	0,0258	BFL	M1	200 x 550	-	215	11,5	14,5	0,0685	BFL	M2
160 x 300	-	90,0	7,5	9,0	0,0282	BFL	M1	200 x 560	-	220	11,5	14,5	0,0700	BFL	M2
160 x 315	-	97,5	7,5	9,0	0,0300	BFL	M1	200 x 600	-	240	12,0	15,0	0,0759	BFL	M2
160 x 355	-	117,5	8,5	10,0	0,0349	BFL	M1	200 x 630	-	255	12,5	15,5	0,0804	BFL	M2
160 x 400	-	140	9,0	10,5	0,0403	BFL	M1	200 x 650	-	265	12,5	15,5	0,0833	BFL	M2
160 x 450	-	165	9,5	11,5	0,0392	BFL	M1	200 x 700	-	290	13,0	16,0	0,0907	BFN	M2
160 x 500	-	190	10,0	13,0	0,0446	BFL	M2	200 x 710	-	295	13,5	16,5	0,0922	BFN	M2
160 x 550	-	215	10,5	13,5	0,0500	BFL	M2	200 x 750	15	315	14,0	17,0	0,0981	BFN	M3
160 x 560	-	220	10,5	13,5	0,0511	BFL	M2	200 x 800	40	340	14,5	17,5	0,1055	BFN	M3
160 x 600	-	240	11,0	14,0	0,0554	BFL	M2	200 x 900	90	390	15,5	18,5	0,1203	BFN	M3
160 x 630	-	255	11,5	14,5	0,0586	BFL	M2	200 x 1000	140	440	17,0	20,0	0,1351	BFN	M4
160 x 650	-	265	11,5	14,5	0,0608	BFL	M2	225 x 160	-	20	6,5	8,0	0,0171	BFL	M1
160 x 700	-	290	12,5	15,5	0,0662	BFL	M2	225 x 180	-	30	7,0	8,5	0,0209	BFL	M1
160 x 710	-	295	12,5	15,5	0,0673	BFL	M2	225 x 200	-	40	7,5	9,0	0,0246	BFL	M1
160 x 750	15	315	13,0	16,0	0,0716	BFN	M3	225 x 225	-	52,5	8,0	9,5	0,0292	BFL	M1
160 x 800	40	340	13,5	16,5	0,0770	BFN	M3	225 x 250	-	65	8,5	10,0	0,0339	BFL	M1
160 x 900	90	390	14,5	17,5	0,0878	BFN	M3	225 x 280	-	80	9,0	10,5	0,0395	BFL	M1
160 x 1000	140	440	20,0	23,0	0,0986	BFN	M4	225 x 300	-	90	9,5	11,0	0,0432	BFL	M1
180 x 160	-	20	6,0	7,5	0,0131	BFL	M1	225 x 315	-	97,5	9,5	11,0	0,0460	BFL	M1
180 x 180	-	30	6,0	7,5	0,0159	BFL	M1	225 x 355	-	117,5	10,0	11,5	0,0534	BFL	M1
180 x 200	-	40	6,5	8,0	0,0187	BFL	M1	225 x 400	-	140	10,5	12,0	0,0618	BFL	M1
180 x 225	-	52,5	6,5	8,0	0,0222	BFL	M1	225 x 450	-	165	11,5	13,0	0,0628	BFL	M1
180 x 250	-	65,0	7,0	8,5	0,0258	BFL	M1	225 x 500	-	190	12,5	14,0	0,0714	BFL	M2
180 x 280	-	80	7,5	9,0	0,0300	BFL	M1	225 x 550	-	215	13,5	15,0	0,0801	BFL	M2
180 x 300	-	90	7,5	9,0	0,0328	BFL	M1	225 x 560	-	220	13,5	15,0	0,0818	BFL	M2
180 x 315	-	97,5	8,0	9,5	0,0349	BFL	M1	225 x 600	-	240	14,0	15,5	0,0887	BFL	M2
180 x 355	-	117,5	8,5	10,5	0,0406	BFL	M1	225 x 630	-	255	14,5	16,0	0,0939	BFN	M2
180 x 400	-	140	9,0	11,0	0,0469	BFL	M1	225 x 650	-	265	15,0	16,5	0,0974	BFN	M2
180 x 450	-	165	10,0	13,0	0,0465	BFL	M1	225 x 700	-	290	16,0	17,5	0,1060	BFN	M2
180 x 500	-	190	10,5	13,5	0,0529	BFL	M2	225 x 710	-	295	16,0	17,5	0,1078	BFN	M2
180 x 550	-	215	11,0	14,0	0,0593	BFL	M2	225 x 750	15	315	16,5	18,0	0,1147	BFN	M3
180 x 560	-	220	11,0	14,0	0,0605	BFL	M2	225 x 800	40	340	17,5	19,0	0,1233	BFN	M3
180 x 600	-	240	11,5	14,5	0,0657	BFL	M2	225 x 900	90	390	19,0	22,0	0,1406	BFN	M3
180 x 630	-	255	12,0	15,0	0,0695	BFL	M2	225 x 1000	140	440	20,5	23,5	0,1579	BF	M3
180 x 650	-	265	12,0	15,0	0,0721	BFL	M2	250 x 160	-	20	6,5	8,0	0,0194	BFL	M1
180 x 700	-	290	13,0	16,0	0,0785	BFN	M2	250 x 180	-	30	7,0	8,5	0,0236	BFL	M1
180 x 710	-	295	13,0	16,0	0,0797	BFN	M2	250 x 200	-	40	7,0	8,5	0,0278	BFL	M1
180 x 750	15	315	13,5	16,5	0,0849	BFN	M3	250 x 225	-	52,5	7,5	9,0	0,0331	BFL	M1
180 x 800	40	340	14,0	17,0	0,0913	BFN	M3	250 x 250	-	65	8,0	9,5	0,0384	BFL	M1
180 x 900	90	390	15,0	18,0	0,1041	BFN	M3	250 x 280	-	80	8,5	10,0	0,0447	BFL	M1
180 x 1000	140	440	20,5	23,5	0,1169	BFN	M4	250 x 300	-	90	8,5	10,0	0,0489	BFL	M1
200 x 160	-	20,0	6,0	7,5	0,0149	BFL	M1	250 x 315	-	97,5	9,0	10,5	0,0521	BFL	M1
200 x 180	-	30,0	6,5	8,0	0,0181	BFL	M1	250 x 355	-	117,5	9,5	11,5	0,0605	BFL	M1
200 x 200	-	40	6,5	8,0	0,0213	BFL	M1	250 x 400	-	140	10,5	12,0	0,0700	BFL	M1
200 x 225	-	52,5	7,0	8,5	0,0253	BFL	M1	250 x 450	-	165	11,0	14,0	0,0719	BFL	M1
200 x 250	-	65	7,5	9,0	0,0294	BFL	M1	250 x 500	-	190	11,5	14,5	0,0818	BFL	M2
200 x 280	-	80	7,5	9,0	0,0342	BFL	M1	250 x 550	-	215	12,5	15,5	0,0917	BFL	M2
200 x 300	-	90	8,0	9,5	0,0374	BFL	M1	250 x 560	-	220	12,5	15,5	0,0937	BFL	M2

A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.	A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.
			Design								Design				
			mech [kg]	servo [kg]							mech [kg]	servo [kg]			
250 x 600	-	240	13,0	16,0	0,1016	BFN	M2	315 x 180	-	30	9,0	10,5	0,0308	BFL	M1
250 x 630	-	255	13,5	16,5	0,1075	BFN	M2	315 x 200	-	40	9,5	11,0	0,0363	BFL	M1
250 x 650	-	265	13,5	16,5	0,1115	BFN	M2	315 x 225	-	52,5	9,5	11,5	0,0432	BFL	M1
250 x 700	-	290	14,5	17,5	0,1214	BFN	M2	315 x 250	-	65	10,0	12,0	0,0501	BFL	M1
250 x 710	-	295	14,5	17,5	0,1234	BFN	M2	315 x 280	-	80	10,5	12,0	0,0584	BFL	M1
250 x 750	15	315	15,0	18,0	0,1313	BFN	M3	315 x 300	-	90	11,0	12,5	0,0639	BFL	M1
250 x 800	40	340	15,5	18,5	0,1412	BFN	M3	315 x 315	-	97,5	11,5	13,0	0,0680	BFL	M1
250 x 900	90	390	17,0	20,0	0,1610	BFN	M3	315 x 355	-	117,5	12,0	13,5	0,0791	BFL	M1
250 x 1000	140	440	18,5	21,5	0,1808	BF	M4	315 x 400	-	140	13,0	14,5	0,0915	BFL	M1
280 x 160	-	20	7,0	8,5	0,0221	BFL	M1	315 x 450	-	165	13,5	16,5	0,0955	BFL	M1
280 x 180	-	30	7,0	9,0	0,0269	BFL	M1	315 x 500	-	190	14,5	17,5	0,1086	BFL	M2
280 x 200	-	40	7,5	9,0	0,0317	BFL	M1	315 x 550	-	215	15,0	18,0	0,1218	BFN	M2
280 x 225	-	52,5	8,0	9,5	0,0377	BFL	M1	315 x 560	-	220	15,0	18,0	0,1244	BFN	M2
280 x 250	-	65	8,5	10,0	0,0438	BFL	M1	315 x 600	-	240	15,5	18,5	0,1349	BFN	M2
280 x 280	-	80	8,5	10,5	0,0510	BFL	M1	315 x 630	-	255	16,0	19,0	0,1428	BFN	M2
280 x 300	-	90	9,0	10,5	0,0558	BFL	M1	315 x 650	-	265	16,5	19,5	0,1481	BFN	M2
280 x 315	-	97,5	9,0	11,0	0,0594	BFL	M1	315 x 700	-	290	17,5	20,5	0,1612	BFN	M2
280 x 355	-	117,5	10,0	12,0	0,0691	BFL	M1	315 x 710	-	295	17,5	20,5	0,1638	BFN	M2
280 x 400	-	140	11,0	12,5	0,0799	BFL	M1	315 x 750	15	315	18,0	21,0	0,1744	BFN	M3
280 x 450	-	165	11,5	14,5	0,0828	BFL	M1	315 x 800	40	340	18,5	21,5	0,1875	BFN	M3
280 x 500	-	190	12,0	15,0	0,0942	BFL	M2	315 x 900	90	390	20,0	23,0	0,2138	BF	M3
280 x 550	-	215	13,0	16,0	0,1056	BFL	M2	315 x 1000	140	440	21,5	24,5	0,2401	BF	M4
280 x 560	-	220	13,0	16,0	0,1078	BFN	M2	355 x 160	-	20	7,5	9,5	0,0288	BFL	M1
280 x 600	-	240	13,5	16,5	0,1170	BFN	M2	355 x 180	-	30	8,0	9,5	0,0352	BFL	M1
280 x 630	-	255	14,0	17,0	0,1238	BFN	M2	355 x 200	-	40	8,5	10,0	0,0415	BFL	M1
280 x 650	-	265	14,5	17,5	0,1284	BFN	M2	355 x 225	-	52,5	9,0	10,5	0,0494	BFL	M1
280 x 700	-	290	15,0	18,0	0,1398	BFN	M2	355 x 250	-	65	9,5	11,0	0,0573	BFL	M1
280 x 710	-	295	15,0	18,0	0,1420	BFN	M2	355 x 280	-	80	10,0	11,5	0,0668	BFL	M1
280 x 750	15	315	15,5	18,5	0,1512	BFN	M3	355 x 300	-	90	10,0	11,5	0,0731	BFL	M1
280 x 800	40	340	16,5	19,5	0,1626	BFN	M3	355 x 315	-	97,5	11,0	12,0	0,0778	BFL	M1
280 x 900	90	390	18,0	21,0	0,1854	BF	M3	355 x 355	-	117,5	11,5	13,0	0,0905	BFL	M1
280 x 1000	140	440	23,5	26,5	0,2082	BF	M4	355 x 400	-	140	12,0	13,5	0,1047	BFL	M1
300 x 160	-	20	7,0	8,5	0,0239	BFL	M1	355 x 450	-	165	13,0	16,0	0,1100	BFL	M1
300 x 180	-	30	7,5	9,0	0,0291	BFL	M1	355 x 500	-	190	13,5	16,5	0,1251	BFN	M2
300 x 200	-	40	7,5	9,5	0,0343	BFL	M1	355 x 550	-	215	14,5	17,5	0,1403	BFN	M2
300 x 225	-	52,5	8,0	9,5	0,0408	BFL	M1	355 x 560	-	220	14,5	17,5	0,1433	BFN	M2
300 x 250	-	65	8,5	10,0	0,0474	BFL	M1	355 x 600	-	240	15,0	18,0	0,1554	BFN	M2
300 x 280	-	80	9,0	10,5	0,0552	BFL	M1	355 x 630	-	255	15,5	18,5	0,1645	BFN	M2
300 x 300	-	90	9,5	11,0	0,0604	BFL	M1	355 x 650	-	265	16,0	19,0	0,1706	BFN	M2
300 x 315	-	97,5	9,5	11,0	0,0643	BFL	M1	355 x 700	-	290	17,0	20,0	0,1857	BFN	M2
300 x 355	-	117,5	10,5	12,0	0,0748	BFL	M1	355 x 710	-	295	17,0	20,0	0,1888	BFN	M2
300 x 400	-	140	11,0	12,5	0,0865	BFL	M1	355 x 750	15	315	17,5	20,5	0,2009	BFN	M3
300 x 450	-	165	12,0	15,0	0,0900	BFL	M1	355 x 800	40	340	18,5	21,5	0,2160	BF	M3
300 x 500	-	190	12,5	15,5	0,1024	BFL	M2	355 x 900	90	390	20,0	23,0	0,2463	BF	M3
300 x 550	-	215	13,5	16,5	0,1148	BFN	M2	355 x 1000	140	440	21,5	24,5	0,2766	BF	M4
300 x 560	-	220	13,5	16,5	0,1173	BFN	M2	400 x 160	-	20	8,0	10,0	0,0329	BFL	M1
300 x 600	-	240	14,0	17,0	0,1272	BFN	M2	400 x 180	-	30	8,5	10,0	0,0401	BFL	M1
300 x 630	-	255	14,5	17,5	0,1347	BFN	M2	400 x 200	-	40	9,0	10,5	0,0473	BFL	M1
300 x 650	-	265	14,5	17,5	0,1396	BFN	M2	400 x 225	-	52,5	9,5	11,0	0,0563	BFL	M1
300 x 700	-	290	15,5	18,5	0,1520	BFN	M2	400 x 250	-	65	10,0	11,5	0,0654	BFL	M1
300 x 710	-	295	15,5	18,5	0,1545	BFN	M2	400 x 280	-	80	10,5	12,0	0,0762	BFL	M1
300 x 750	15	315	16,0	19,0	0,1644	BFN	M3	400 x 300	-	90	10,5	12,5	0,0834	BFL	M1
300 x 800	40	340	17,0	20,0	0,1768	BFN	M3	400 x 315	-	97,5	11,0	12,5	0,0888	BFL	M1
300 x 900	90	390	18,5	21,5	0,2016	BF	M3	400 x 355	-	117,5	12,0	13,5	0,1033	BFL	M1
300 x 1000	140	440	20,0	23,0	0,2264	BF	M4	400 x 400	-	140	13,0	14,5	0,1195	BFL	M1
315 x 160	-	20	8,5	10,5	0,0252	BFL	M1	400 x 450	-	165	13,5	16,5	0,1263	BFL	M1

A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.	A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.
			Design								Design				
			mech [kg]	servo [kg]							mech [kg]	servo [kg]			
400 x 500	-	190	14,5	17,5	0,1437	BFN	M2	500 x 750	15	315	21,0	24,0	0,2970	BF	M3
400 x 550	-	215	15,5	18,5	0,1611	BFN	M2	500 x 800	40	340	22,0	25,0	0,3194	BF	M3
400 x 560	-	220	15,5	18,5	0,1646	BFN	M2	500 x 900	90	390	24,0	27,0	0,3642	BF	M3
400 x 600	-	240	16,0	19,0	0,1785	BFN	M2	500 x 1000	140	440	25,5	28,5	0,4090	BF	M4
400 x 630	-	255	16,5	19,5	0,1890	BFN	M2	550 x 160	-	20	10,0	13,0	0,0364	BFL	M1
400 x 650	-	265	17,0	20,0	0,1959	BFN	M2	550 x 180	-	30	10,5	13,5	0,0463	BFL	M1
400 x 700	-	290	18,0	21,0	0,2133	BFN	M2	550 x 200	-	40	10,5	13,5	0,0563	BFL	M1
400 x 710	-	295	18,0	21,0	0,2168	BFN	M2	550 x 225	-	52,5	11,0	14,0	0,0687	BFL	M1
400 x 750	15	315	18,5	21,5	0,2307	BF	M3	550 x 250	-	65	12,0	15,0	0,0812	BFL	M1
400 x 800	40	340	19,5	22,5	0,2481	BF	M3	550 x 280	-	80	12,5	15,5	0,0961	BFL	M1
400 x 900	90	390	21,0	24,0	0,2829	BF	M3	550 x 300	-	90	13,0	16,0	0,1061	BFL	M1
400 x 1000	140	440	23,0	26,0	0,3177	BF	M4	550 x 315	-	97,5	13,0	16,0	0,1135	BFL	M1
450 x 160	-	20	9,0	10,5	0,0374	BFL	M1	550 x 355	-	117,5	14,5	17,5	0,1335	BFL	M1
450 x 180	-	30	9,0	10,5	0,0456	BFL	M1	550 x 400	-	140	15,0	18,0	0,1559	BFN	M2
450 x 200	-	40	9,5	11,0	0,0538	BFL	M1	550 x 450	-	165	16,0	19,0	0,1808	BFN	M2
450 x 225	-	52,5	10,0	11,5	0,0641	BFL	M1	550 x 500	-	190	17,0	20,0	0,2057	BFN	M2
450 x 250	-	65	10,5	12,0	0,0744	BFL	M1	550 x 550	-	215	18,0	21,0	0,2306	BFN	M2
450 x 280	-	80	11,0	12,5	0,0867	BFL	M1	550 x 560	-	220	18,5	21,5	0,2356	BFN	M2
450 x 300	-	90	11,5	13,0	0,0949	BFL	M1	550 x 600	-	240	19,0	22,0	0,2555	BFN	M2
450 x 315	-	97,5	11,5	13,5	0,1011	BFL	M1	550 x 630	-	255	20,0	23,0	0,2704	BF	M2
450 x 355	-	117,5	13,0	14,5	0,1175	BFL	M1	550 x 650	-	265	20,0	23,0	0,2804	BF	M2
450 x 400	-	140	13,5	15,0	0,1360	BFL	M1	550 x 700	-	290	21,5	24,5	0,3053	BF	M2
450 x 450	-	165	14,5	17,5	0,1445	BFN	M2	550 x 710	-	295	21,5	24,5	0,3103	BF	M2
450 x 500	-	190	15,5	18,5	0,1644	BFN	M2	550 x 750	15	315	22,0	25,0	0,3302	BF	M3
450 x 550	-	215	16,5	19,5	0,1843	BFN	M2	550 x 800	40	340	23,0	26,0	0,3551	BF	M3
450 x 560	-	220	16,5	19,5	0,1883	BFN	M2	550 x 900	90	390	25,0	28,0	0,4049	BF	M3
450 x 600	-	240	17,0	20,0	0,2042	BFN	M2	560 x 160	-	20	10,0	13,0	0,0371	BFL	M1
450 x 630	-	255	17,5	20,5	0,2161	BFN	M2	560 x 180	-	30	10,5	13,5	0,0472	BFL	M1
450 x 650	-	265	18,0	21,0	0,2241	BFN	M2	560 x 200	-	40	11,0	14,0	0,0574	BFL	M1
450 x 700	-	290	19,0	22,0	0,2440	BF	M2	560 x 225	-	52,5	11,5	14,5	0,0701	BFL	M1
450 x 710	-	295	19,0	22,0	0,2480	BF	M2	560 x 250	-	65	12,0	15,0	0,0828	BFL	M1
450 x 750	15	315	20,0	23,0	0,2639	BF	M3	560 x 280	-	80	12,5	15,5	0,0980	BFL	M1
450 x 800	40	340	20,5	23,5	0,2838	BF	M3	560 x 300	-	90	13,0	16,0	0,1082	BFL	M1
450 x 900	90	390	22,5	25,5	0,3236	BF	M3	560 x 315	-	97,5	13,0	16,0	0,1158	BFL	M1
450 x 1000	140	440	24,0	27,0	0,3634	BF	M4	560 x 355	-	117,5	14,5	17,5	0,1361	BFL	M1
500 x 160	-	20	9,5	11,0	0,0419	BFL	M1	560 x 400	-	140	15,5	18,5	0,1590	BFN	M2
500 x 180	-	30	9,5	11,5	0,0511	BFL	M1	560 x 450	-	165	16,5	19,5	0,1844	BFN	M2
500 x 200	-	40	10,0	11,5	0,0603	BFL	M1	560 x 500	-	190	17,5	20,5	0,2098	BFN	M2
500 x 225	-	52,5	10,5	12,5	0,0718	BFL	M1	560 x 550	-	215	18,5	21,5	0,2352	BFN	M2
500 x 250	-	65	11,0	13,0	0,0834	BFL	M1	560 x 560	-	220	18,5	21,5	0,2403	BFN	M2
500 x 280	-	80	11,5	13,5	0,0972	BFL	M1	560 x 600	-	240	19,5	22,5	0,2606	BFN	M2
500 x 300	-	90	12,0	13,5	0,1064	BFL	M1	560 x 630	-	255	20,0	23,0	0,2758	BF	M2
500 x 315	-	97,5	12,5	14,0	0,1133	BFL	M1	560 x 650	-	265	20,5	23,5	0,2860	BF	M2
500 x 355	-	117,5	13,5	15,0	0,1318	BFL	M1	560 x 700	-	290	21,5	24,5	0,3114	BF	M2
500 x 400	-	140	14,5	16,0	0,1525	BFL	M2	560 x 710	-	295	21,5	24,5	0,3165	BF	M2
500 x 450	-	165	15,5	18,5	0,1626	BFN	M2	560 x 750	15	315	22,5	25,5	0,3368	BF	M3
500 x 500	-	190	16,5	19,5	0,1850	BFN	M2	560 x 800	40	340	23,5	26,5	0,3622	BF	M3
500 x 550	-	215	17,0	20,0	0,2074	BFN	M2	600 x 160	-	20	10,5	13,5	0,0400	BFL	M1
500 x 560	-	220	17,5	20,5	0,2119	BFN	M2	600 x 180	-	30	11,0	14,0	0,0510	BFL	M1
500 x 600	-	240	18,0	21,0	0,2298	BFN	M2	600 x 200	-	40	11,0	14,0	0,0619	BFL	M1
500 x 630	-	255	19,0	22,0	0,2433	BFN	M2	600 x 225	-	52,5	12,0	15,0	0,0756	BFL	M1
500 x 650	-	265	19,0	22,0	0,2522	BF	M2	600 x 250	-	65	12,5	15,5	0,0893	BFL	M1
500 x 700	-	290	20,0	23,0	0,2746	BF	M2	600 x 280	-	80	13,0	16,0	0,1058	BFL	M1
500 x 710	-	295	20,5	23,5	0,2791	BF	M2	600 x 300	-	90	13,5	16,5	0,1167	BFL	M1

A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.	A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.
			Design								Design				
			mech [kg]	servo [kg]							mech [kg]	servo [kg]			
600 x 315	-	97,5	14,0	17,0	0,1249	BFL	M1	650 x 750	15	315	24,5	27,5	0,3965	BF	M3
600 x 355	-	117,5	15,0	18,0	0,1469	BFL	M2	700 x 160	-	20	11,5	14,5	0,0473	BFL	M1
600 x 400	-	140	16,0	19,0	0,1715	BFN	M2	700 x 180	-	30	12,0	15,0	0,0603	BFL	M1
600 x 450	-	165	17,0	20,0	0,1989	BFN	M2	700 x 200	-	40	12,5	15,5	0,0732	BFL	M1
600 x 500	-	190	18,0	21,0	0,2263	BFN	M2	700 x 225	-	52,5	13,0	16,0	0,0894	BFL	M1
600 x 550	-	215	19,0	22,0	0,2537	BFN	M2	700 x 250	-	65	13,5	16,5	0,1056	BFL	M1
600 x 560	-	220	19,5	22,5	0,2592	BFN	M2	700 x 280	-	80	14,5	17,5	0,1251	BFL	M1
600 x 600	-	240	20,5	23,5	0,2811	BF	M2	700 x 300	-	90	15,0	18,0	0,1380	BFL	M2
600 x 630	-	255	21,0	24,0	0,2976	BF	M2	700 x 315	-	97,5	15,5	18,5	0,1477	BFL	M2
600 x 650	-	265	21,5	24,5	0,3085	BF	M2	700 x 355	-	117,5	16,5	19,5	0,1737	BFN	M2
600 x 700	-	290	22,5	25,5	0,3359	BF	M2	700 x 400	-	140	17,5	20,5	0,2028	BFN	M2
600 x 710	-	295	22,5	25,5	0,3414	BF	M2	700 x 450	-	165	19,0	22,0	0,2352	BFN	M2
600 x 750	15	315	23,5	26,5	0,3633	BF	M3	700 x 500	-	190	20,5	23,5	0,2676	BFN	M2
600 x 800	40	340	24,5	27,5	0,3907	BF	M3	700 x 550	-	215	22,0	26,5	0,3000	BF	M2
630 x 160	-	20	10,5	13,5	0,0422	BFL	M1	700 x 560	-	220	22,5	27,0	0,3065	BF	M2
630 x 180	-	30	11,0	14,0	0,0538	BFL	M1	700 x 600	-	240	23,5	28,0	0,3324	BF	M2
630 x 200	-	40	11,5	14,5	0,0653	BFL	M1	700 x 630	-	255	24,5	29,0	0,3519	BF	M2
630 x 225	-	52,5	12,0	15,0	0,0798	BFL	M1	700 x 650	-	265	25,0	29,5	0,3648	BF	M2
630 x 250	-	65	13,0	16,0	0,0942	BFL	M1	700 x 700	-	290	26,5	31,0	0,3972	BF	M2
630 x 280	-	80	13,5	16,5	0,1116	BFL	M1	700 x 710	-	295	27,0	31,5	0,4037	BF	M2
630 x 300	-	90	14,0	17,0	0,1231	BFL	M1	710 x 160	-	20	11,5	15,5	0,0480	BFL	M1
630 x 315	-	97,5	14,0	17,0	0,1318	BFL	M1	710 x 180	-	30	12,0	16,0	0,0612	BFL	M1
630 x 355	-	117,5	15,5	18,5	0,1549	BFL	M2	710 x 200	-	40	12,5	15,5	0,0744	BFL	M1
630 x 400	-	140	16,5	19,5	0,1809	BFN	M2	710 x 225	-	52,5	13,0	16,0	0,0908	BFL	M1
630 x 450	-	165	17,5	20,5	0,2098	BFN	M2	710 x 250	-	65	14,0	17,0	0,1073	BFL	M1
630 x 500	-	190	18,5	21,5	0,2387	BFN	M2	710 x 280	-	80	14,5	17,5	0,1270	BFL	M1
630 x 550	-	215	20,0	23,0	0,2676	BFN	M2	710 x 300	-	90	15,0	18,0	0,1402	BFL	M2
630 x 560	-	220	20,0	23,0	0,2734	BFN	M2	710 x 315	-	97,5	15,5	18,5	0,1500	BFL	M2
630 x 600	-	240	21,0	24,0	0,2965	BF	M2	710 x 355	-	117,5	17,0	20,0	0,1763	BFN	M2
630 x 630	-	255	21,5	24,5	0,3139	BF	M2	710 x 400	-	140	18,0	21,0	0,2060	BFN	M2
630 x 650	-	265	22,0	25,0	0,3254	BF	M2	710 x 450	-	165	19,0	22,0	0,2389	BFN	M2
630 x 700	-	290	23,5	26,5	0,3543	BF	M2	710 x 500	-	190	20,0	23,0	0,2718	BFN	M2
630 x 710	-	295	23,5	26,5	0,3601	BF	M2	710 x 550	-	215	21,5	24,5	0,3047	BF	M2
630 x 750	15	315	24,0	27,0	0,3832	BF	M3	710 x 560	-	220	21,5	24,5	0,3112	BF	M2
650 x 160	-	20	11,0	14,0	0,0437	BFL	M1	710 x 600	-	240	22,5	25,5	0,3376	BF	M2
650 x 180	-	30	11,5	14,5	0,0556	BFL	M1	710 x 630	-	255	23,5	26,5	0,3573	BF	M2
650 x 200	-	40	12,0	15,0	0,0676	BFL	M1	710 x 650	-	265	23,5	26,5	0,3705	BF	M2
650 x 225	-	52,5	12,5	15,5	0,0825	BFL	M1	710 x 700	-	290	25,0	28,0	0,4034	BF	M2
650 x 250	-	65	13,0	16,0	0,0975	BFL	M1	750 x 160	-	20	12,0	15,0	0,0510	BFL	M1
650 x 280	-	80	14,0	17,0	0,1154	BFL	M1	750 x 180	-	30	12,5	15,5	0,0649	BFL	M1
650 x 300	-	90	14,0	17,0	0,1274	BFL	M1	750 x 200	-	40	13,0	16,0	0,0789	BFL	M1
650 x 315	-	97,5	14,5	17,5	0,1363	BFL	M2	750 x 225	-	52,5	13,5	16,5	0,0963	BFL	M1
650 x 355	-	117,5	16,0	19,0	0,1603	BFL	M2	750 x 250	-	65	14,5	17,5	0,1138	BFL	M1
650 x 400	-	140	17,0	20,0	0,1872	BFN	M2	750 x 280	-	80	15,0	18,0	0,1347	BFL	M2
650 x 450	-	165	18,0	21,0	0,2171	BFN	M2	750 x 300	-	90	15,5	18,5	0,1487	BFL	M2
650 x 500	-	190	19,0	22,0	0,2470	BFN	M2	750 x 315	-	97,5	16,0	19,0	0,1591	BFL	M2
650 x 550	-	215	20,0	23,0	0,2769	BFN	M2	750 x 355	-	117,5	17,5	20,5	0,1871	BFN	M2
650 x 560	-	220	20,5	23,5	0,2829	BF	M2	750 x 400	-	140	18,5	21,5	0,2185	BFN	M2
650 x 600	-	240	21,5	24,5	0,3068	BF	M2	750 x 450	-	165	19,5	22,5	0,2534	BFN	M2
650 x 630	-	255	22,0	25,0	0,3247	BF	M2	750 x 500	-	190	21,0	24,0	0,2883	BFN	M2
650 x 650	-	265	22,5	25,5	0,3367	BF	M2	750 x 550	-	215	22,0	25,0	0,3232	BF	M2
650 x 700	-	290	23,5	26,5	0,3666	BF	M2	750 x 560	-	220	22,5	25,5	0,3302	BF	M2
650 x 710	-	295	24,0	27,0	0,3726	BF	M2	750 x 600	-	240	23,5	26,5	0,3581	BF	M2

A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.	A x B [mm]	a [mm]	c [mm]	Weight		Effect. area Sef [m ²]	Actu. mech.	Mech. contr.
			Design								Design				
			mech [kg]	servo [kg]							mech [kg]	servo [kg]			
750 x 630	-	255	24,0	27,0	0,3790	BF	M2	900 x 250	-	65	16,5	19,5	0,1382	BFL	M2
750 x 650	-	265	24,5	27,5	0,3930	BF	M2	900 x 280	-	80	17,0	20,0	0,1637	BFL	M2
800 x 160	-	20	12,5	15,5	0,0546	BFL	M1	900 x 300	-	90	17,5	20,5	0,1806	BFL	M2
800 x 180	-	30	13,0	16,0	0,0696	BFL	M1	900 x 315	-	97,5	18,0	21,0	0,1933	BFN	M2
800 x 200	-	40	13,5	16,5	0,0845	BFL	M1	900 x 355	-	117,5	19,5	22,5	0,2273	BFN	M2
800 x 225	-	52,5	14,5	17,5	0,1032	BFL	M1	900 x 400	-	140	21,0	24,0	0,2654	BFN	M2
800 x 250	-	65	15,0	18,0	0,1219	BFL	M2	900 x 450	-	165	22,5	25,5	0,3078	BFN	M2
800 x 280	-	80	16,0	19,0	0,1444	BFL	M2	900 x 500	-	190	23,5	26,5	0,3502	BF	M2
800 x 300	-	90	16,5	19,5	0,1593	BFL	M2	900 x 550	-	215	25,0	28,0	0,3926	BF	M2
800 x 315	-	97,5	16,5	19,5	0,1705	BFL	M2	1000 x 160	-	20	15,0	18,0	0,0692	BFL	M1
800 x 355	-	117,5	18,0	21,0	0,2005	BFN	M2	1000 x 180	-	30	15,5	18,5	0,0882	BFL	M1
800 x 400	-	140	19,5	22,5	0,2341	BFN	M2	1000 x 200	-	40	16,0	19,0	0,1071	BFL	M2
800 x 450	-	165	20,5	23,5	0,2715	BFN	M2	1000 x 225	-	52,5	17,0	20,0	0,1308	BFL	M2
800 x 500	-	190	22,0	25,0	0,3089	BFN	M2	1000 x 250	-	65	17,5	20,5	0,1545	BFL	M2
800 x 550	-	215	23,0	26,0	0,3463	BF	M2	1000 x 280	-	80	18,5	21,5	0,1830	BFL	M2
800 x 560	-	220	23,5	26,5	0,3538	BF	M2	1000 x 300	-	90	19,0	22,0	0,2019	BFN	M2
800 x 600	-	240	24,5	27,5	0,3837	BF	M2	1000 x 315	-	97,5	19,5	22,5	0,2161	BFN	M2
900 x 160	-	20	13,5	16,5	0,0619	BFL	M1	1000 x 355	-	117,5	21,0	24,0	0,2541	BFN	M2
900 x 180	-	30	14,0	17,0	0,0789	BFL	M1	1000 x 400	-	140	22,5	25,5	0,2967	BFN	M2
900 x 200	-	40	15,0	18,0	0,0958	BFL	M1	1000 x 450	-	165	24,0	27,0	0,3441	BFN	M2
900 x 225	-	52,5	15,5	18,5	0,1170	BFL	M2	1000 x 500	-	190	25,5	28,5	0,3915	BF	M2

4.4. Round dampers - dimensions, weights and effective area

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

Nominal size ØD [mm]	a [mm]	c [mm]	f [mm]	Weight		Effective area S _{ef} [m ²]	Actuating mechanism	Mechanical control
				design				
				manual [kg]	act. mech. [kg]			
160	-	-	-	5,6	7,2	0,0132	BFL	M1
180	-	-	-	6,7	8,3	0,0176	BFL	M1
200	-	-	-	7,7	9,3	0,0227	BFL	M1
225	-	12,5	-	8,2	9,8	0,0299	BFL	M1
250	-	25	-	8,7	10,3	0,0380	BFL	M2
280	-	40	-	9,6	11,2	0,0492	BFL	M2
315	-	57,5	7,5	10,6	12,2	0,0639	BFL	M2
355	-	77,5	27,5	12,6	14,2	0,0831	BFL	M2
400	-	100	50	14,5	17,5	0,1078	BFL	M2
450	-	125	75	16,4	19,4	0,1389	BFN	M3
500	-	150	100	19,4	22,4	0,1739	BFN	M3
560	-	180	130	22,3	25,3	0,2211	BFN	M3
630	24	215	165	26,2	29,2	0,2833	BF	M4

4.5. Blades overlaps

Tab. 4.5.1 Blades overlaps

Blades overlaps		Dimension	Overlaps
RECTANGULAR DAMPERS Fig. 33a	Act. mechanism side	"a"	Tab. 4.3.1
	Side without act. mechanism	"c"	Tab. 4.3.1
ROUND DAMPERS Fig. 33b	Act. mechanism side	"a"	Tab. 4.4.1
	Side without act. mechanism	"c"	Tab. 4.4.1
ROUND DAMPERS SPIRO Fig. 33c	Side without act. mechanism	"f"	Tab. 4.4.1

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

Fig. 33a Blade overlaps - rectangular damper

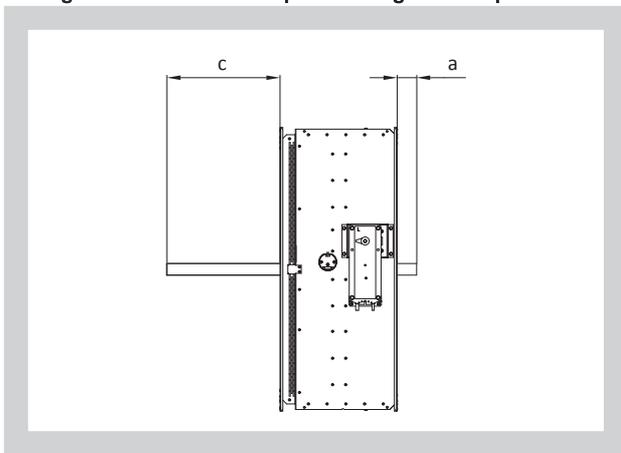


Fig. 33b Blade overlaps - round damper

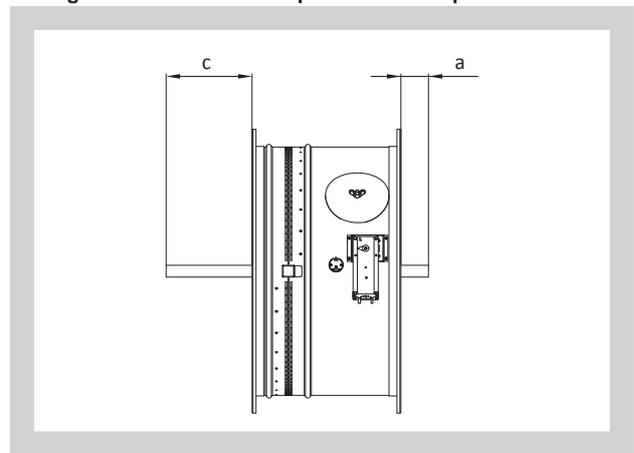


Fig. 33c Blade overlaps - round damper SPIRO

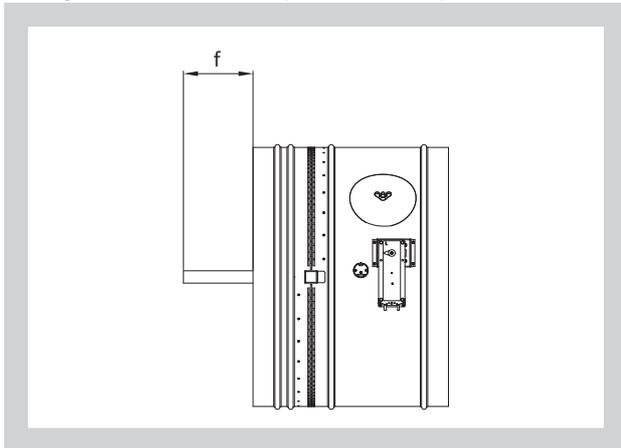
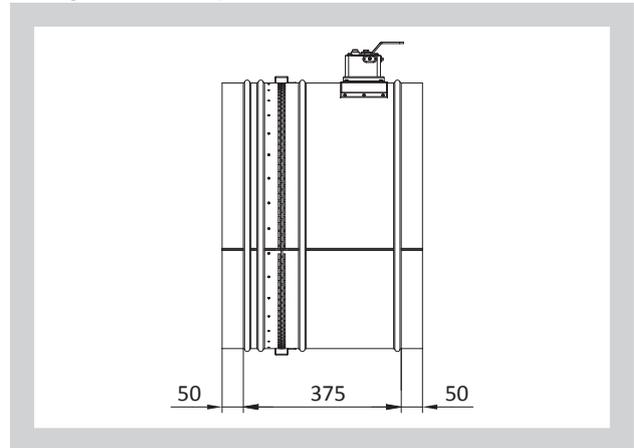


Fig. 33d Damper for SPIRO duct



- 4.6. For the design .60 (with BKN supply and communication device) add to weight of the damper with an actuating mechanism (from the Tab. 4.3.1. and Tab 4.4.1.) the weight of BKN (0.5 kg).
- 4.7. Rectangular dampers can be supplied on the customer's demands in all subdimension of the above mentioned range.
- 4.8. Flanges of rectangular fire dampers are 30 mm wide with oval hole (Fig. 34, 35). 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. 33d).

Fig. 34 Flange of rectangular damper - OPERATORS SIDE

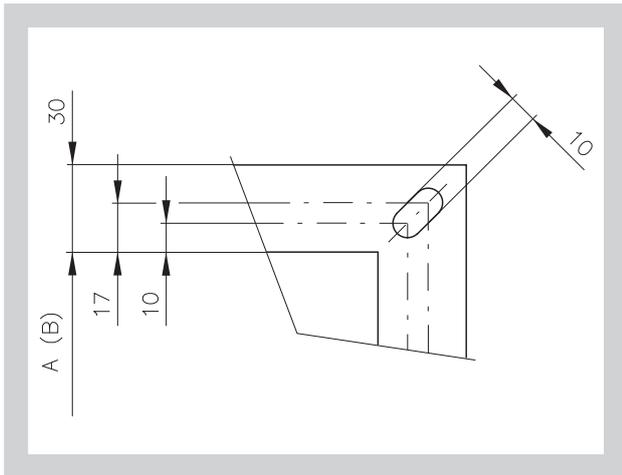
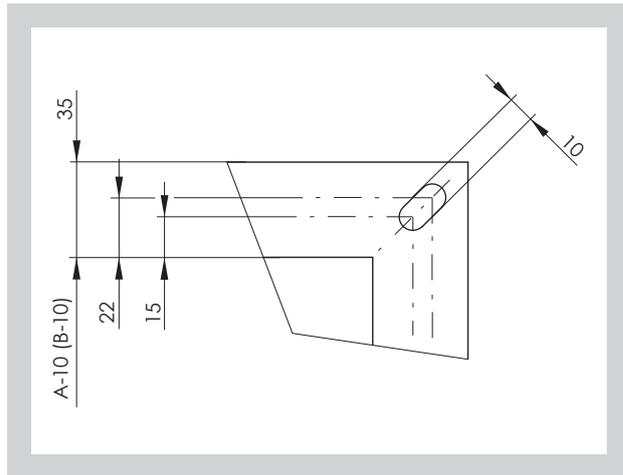


Fig. 35 Flange of rectangular damper - INSTALLATIONS SIDE



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. 36).

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. 36 The distance between the fire damper and the construction

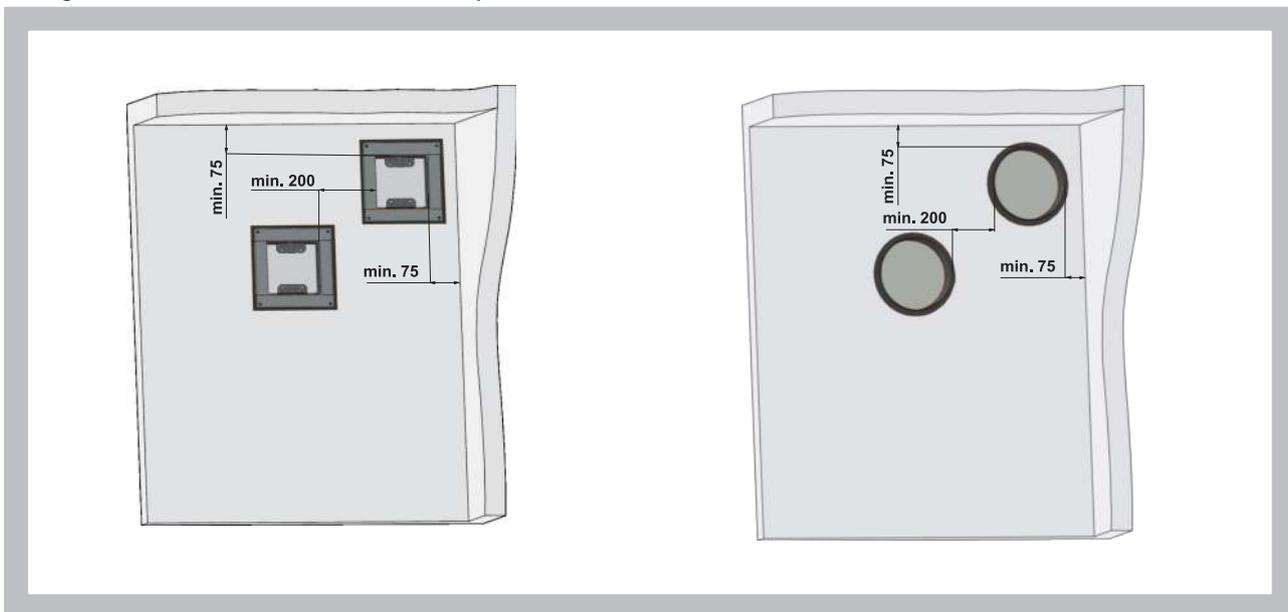


Fig. 37 Built in edge - rectangular dampers

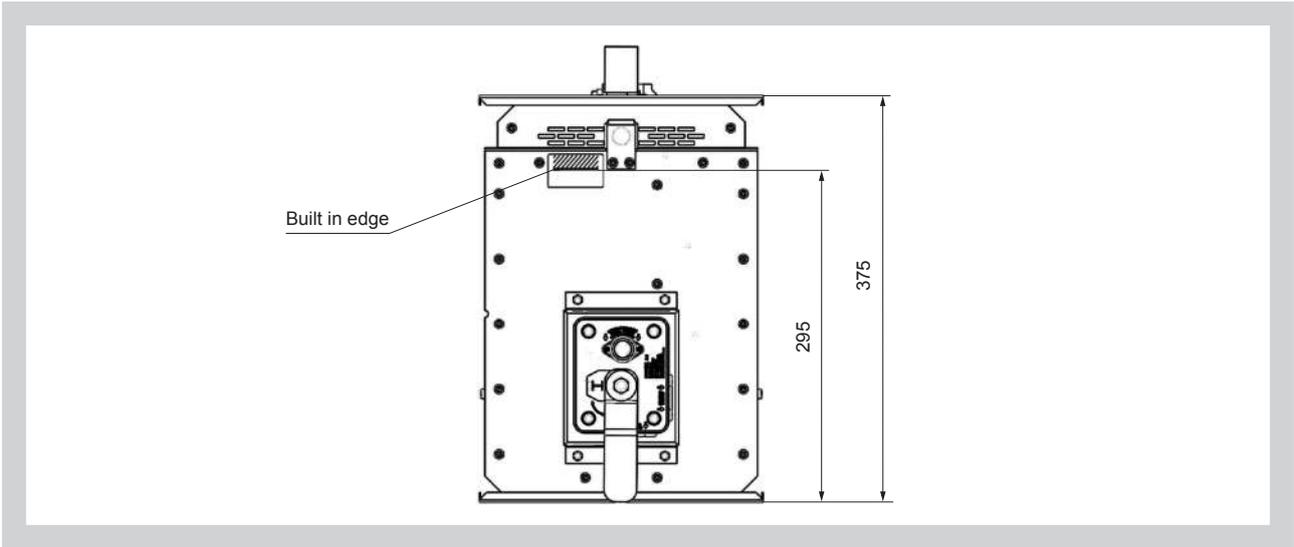
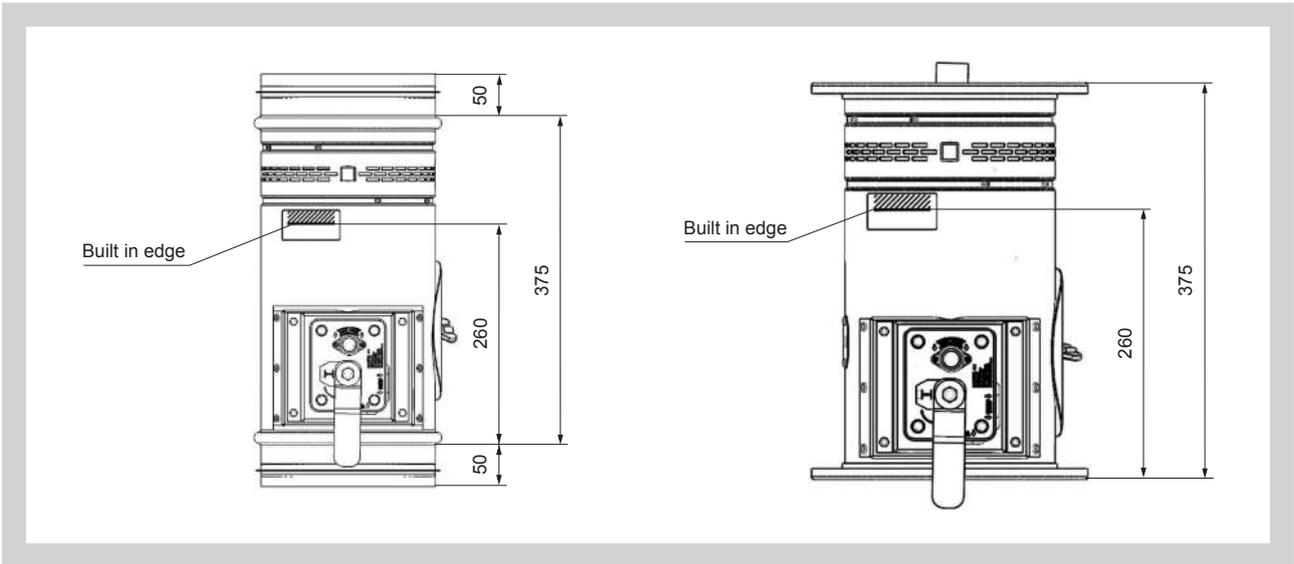


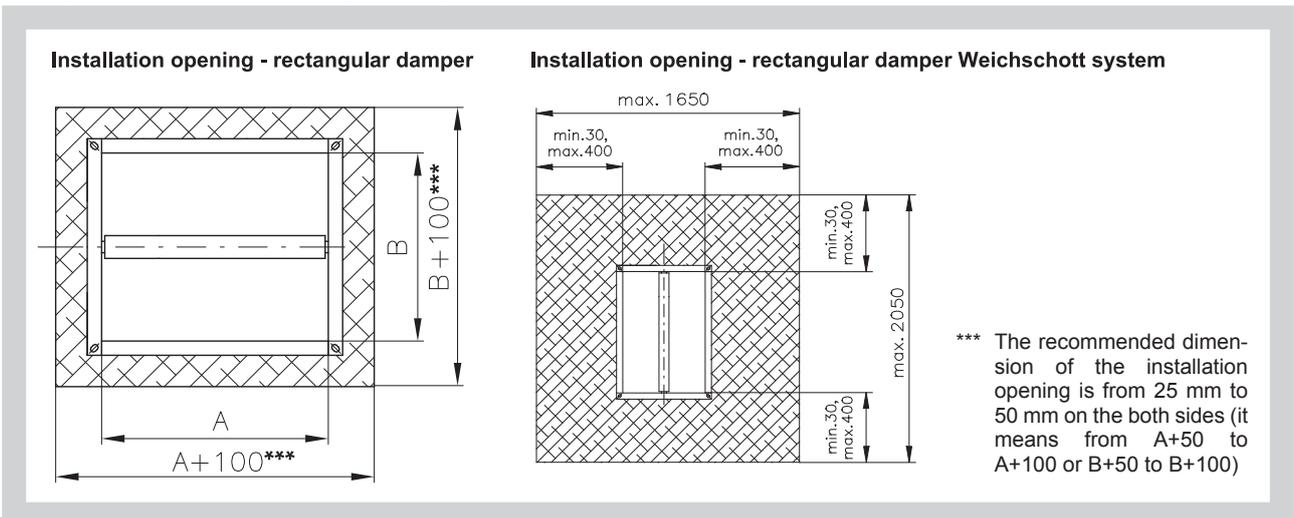
Fig. 38 Built in edge - round dampers



For dampers with installation holders is valid maximal built in edge

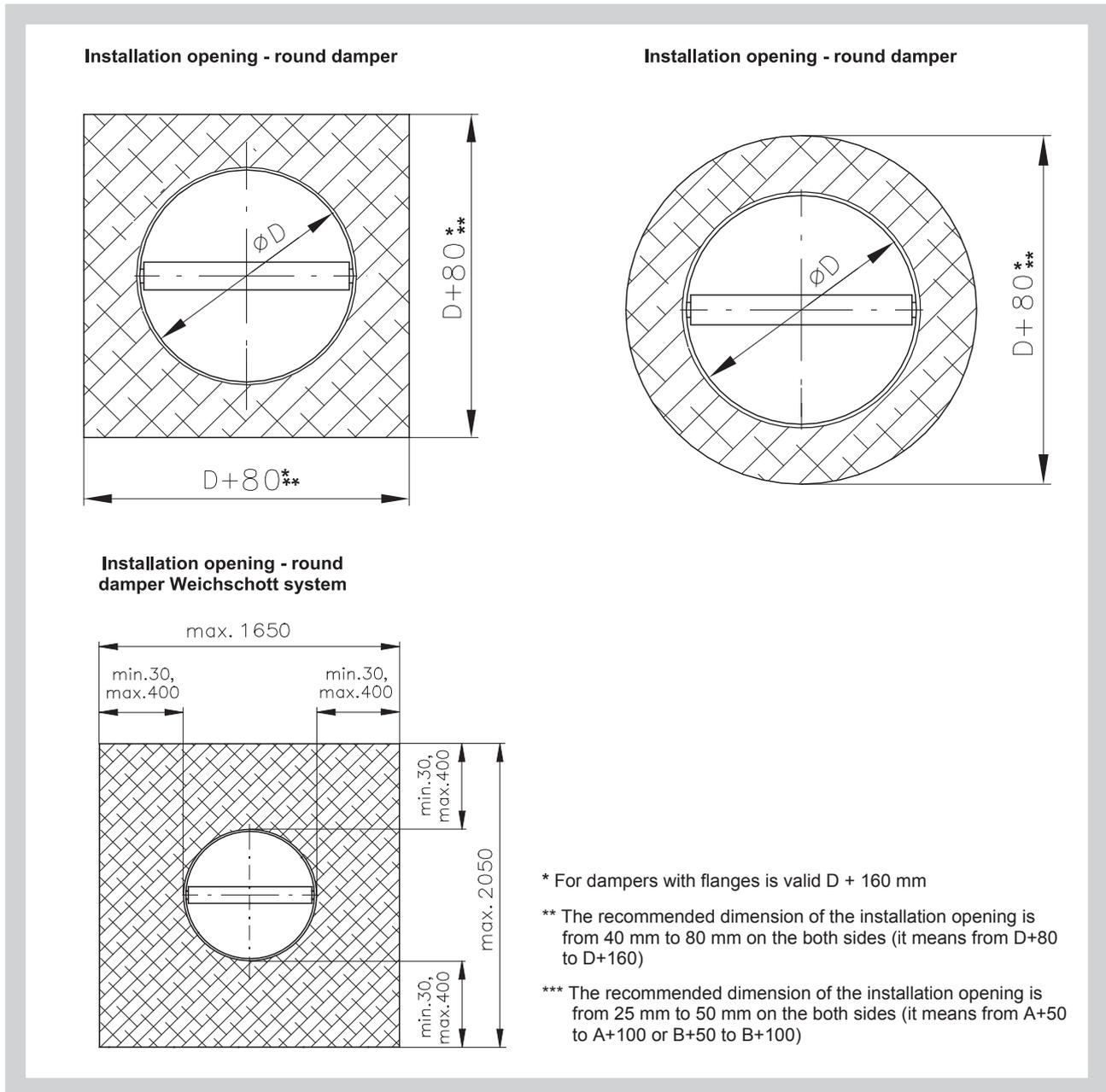
5.2. The control mechanism has to be protected (covered) against damage and pollution during installation process. All fire dampers has to be closed during installation process. The damper body should not be deformed in the course of bricking in. Once the damper is built in, its blade should not grind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

Fig. 39 Installation opening - rectangular damper



*** The recommended dimension of the installation opening is from 25 mm to 50 mm on the both sides (it means from A+50 to A+100 or B+50 to B+100)

Fig. 40 Installation opening - round damper



5.3. 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 EI 120 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

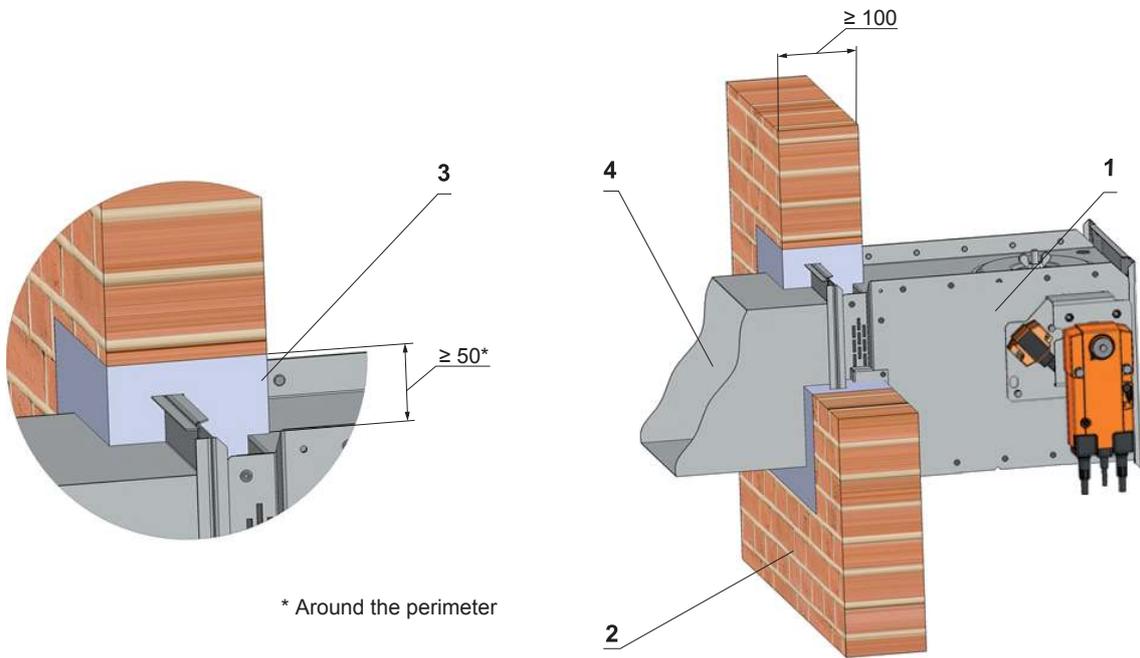
6.1. Statement of installations the fire dampers FDMB

Tab. 6.1.1. Statement of installations

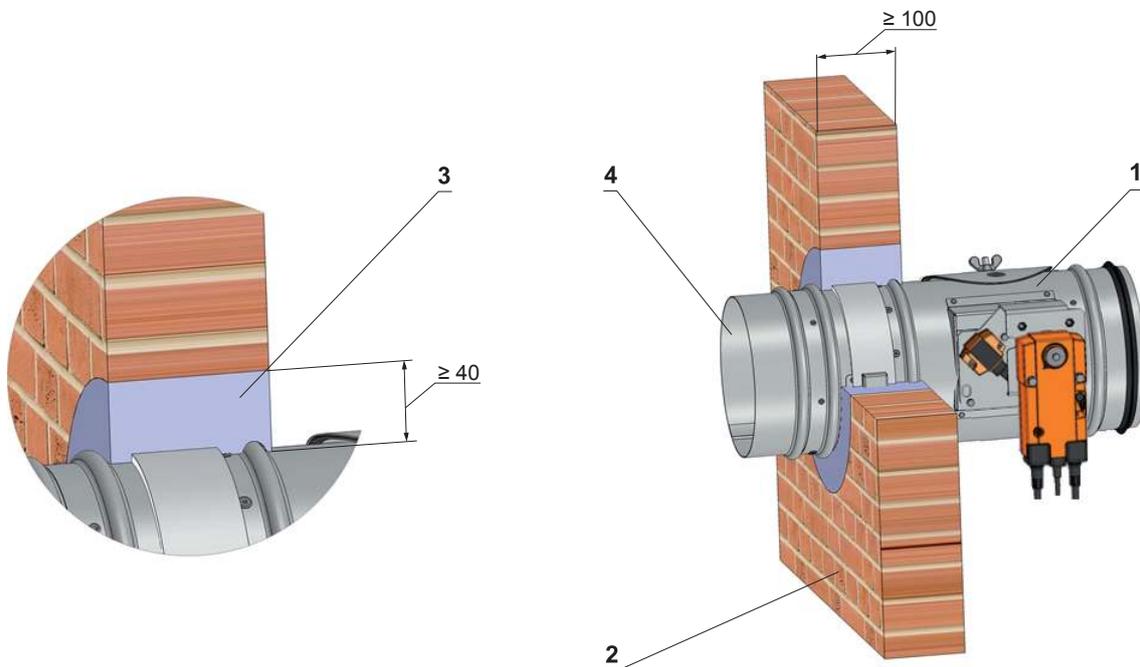
Fire separating construction	Wall/Ceiling	Installation	Fire resistance	Page
	Min. thickness [mm]			
Solid wall construction	100	Mortar or gypsum	EIS 120	32
	100	Stuffing box + mastic and cement lime plate	EIS 90	37
	100	Battery - Mortar or gypsum	EIS 90	33
	100	Installation frame E1, E2, E4, R1, R2, R3, R4, R5	EIS 90	38
	100	Weichschott	EIS 90	39
	100	Installation next to wall - mortar or gypsum and mineral wool	EIS 90	34, 35
	100	Installation next to wall - Installation frame R1, R2, R3, R4, R5 and mineral wool	EIS 90	35, 36
	100	Battery - Installation frame E1, R1	EIS 90	40
	100	Stuffing box with fire protection mastic	EIS 60	43
	100	Fire resistant foam covered by stucco plaster	EIS 60 EIS 45 EIS 30	86
Solid ceiling construction	110	Mortar or gypsum	EIS 120	44
	110	Stuffing box + mastic and cement lime plate	EIS 90	46
	110	Battery - Mortar or gypsum	EIS 90	45
	110	Installation frame E1, E2, E4, R1, R2, R3, R4, R5	EIS 90	47
	110	Weichschott	EIS 90	48
	110	Battery - Installation frame E1, R2	EIS 90	49
	110	Stuffing box with fire protection mastic	EIS 60	53
Gypsum wall construction	100	Mortar or gypsum	EIS 120	54
	100	Stuffing box + mastic and cement lime plate	EIS 90	59
	100	Battery - Mortar or gypsum	EIS 90	55
	100	Installation frame E1, E3, E4, R1, R2, R3, R4, R5	EIS 90	60
	100	Weichschott	EIS 90	61
	100	Installation next to wall - mortar or gypsum and mineral wool	EIS 90	56
	100	Installation next to wall - Installation frame R1, R2, R5 and mineral wool	EIS 90	57, 58
	100	Flexible ceiling - Installation frame E5, R7	EIS 90	65
	100	Battery - Installation frame E1, R1	EIS 90	62
	100	Stuffing box with fire protection mastic	EIS 60	64
Thin shaft wall	100	Mortar or gypsum - rectangular damper	EIS 90	82
	100	Mortar or gypsum - round damper	EIS 90	84
	100	Installation frame E1 - rectangular damper	EIS 90	83
	100	Installation frame R1 - round damper	EIS 90	85
Outside solid wall construction	100	Insulating with cement lime plates Installation frame E6, R6	EIS 90	42
	100	Insulating mineral wool	EIS 90	41
	100	Insulating mineral wool - Mortar or gypsum	EIS 60	88
	100	Insulating mineral wool - stone wool + mastic	EIS 60	89
Outside gypsum wall construction	100	Insulating mineral wool	EIS 90	63
	100	Insulating mineral wool - Mortar or gypsum	EIS 60	90
	100	Insulating mineral wool - stone wool + mastic	EIS 60	91
Outside solid ceiling construction	110	Insulating mineral wool	EIS 90	50
	110	Concrete	EIS 90	51
	110	Concrete with installation frame E4, R5	EIS 90	51
	110	Insulating with cement lime plates Installation frame E6, R6	EIS 90	52
On solid wall construction	100	Installation frame R5	EIS 90	78
On solid ceiling construction	110	Installation frame R5	EIS 90	78
On gypsum wall construction	100	Installation frame R5	EIS 90	78

Fig. 41 Solid wall construction - mortar or gypsum

EIS 120



* Around the perimeter



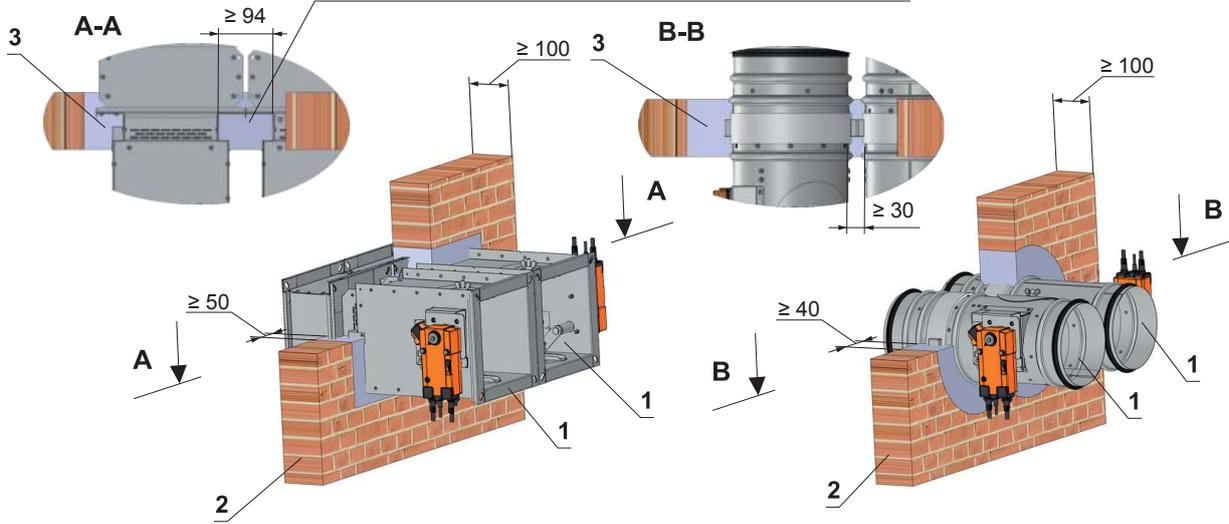
POSITION:

- 1 Fire damper FDMB
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Duct

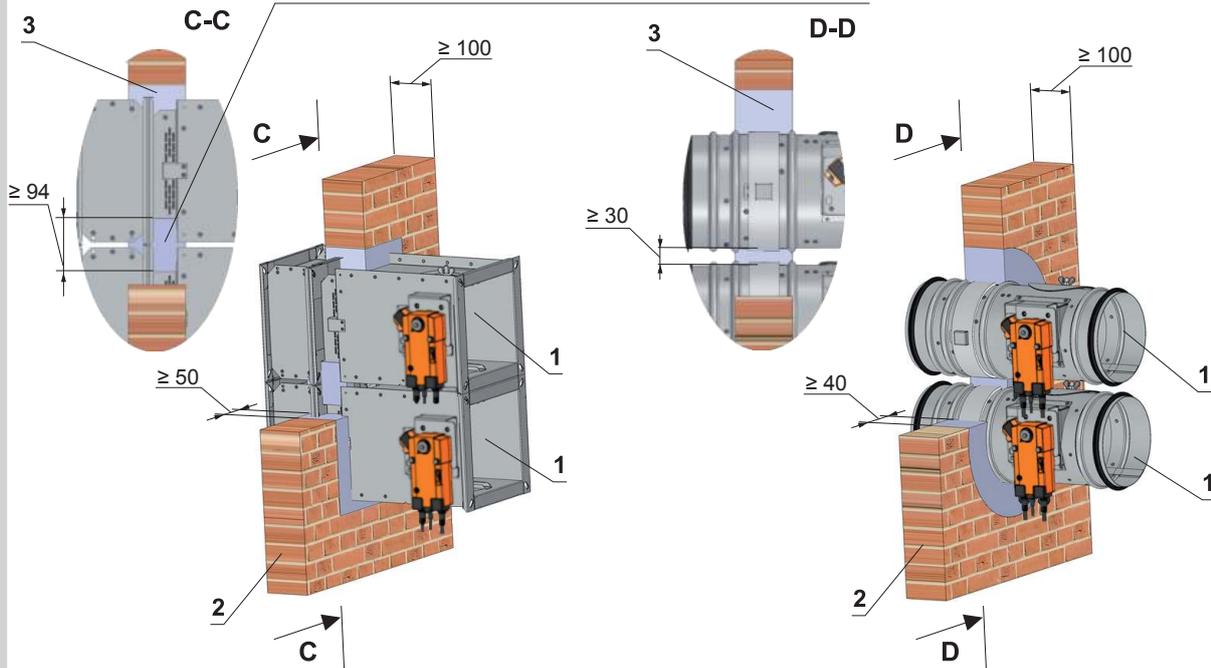
Fig. 42 Solid wall construction - flange to flange - mortar or gypsum

EIS 90

The gap 94 mm between dampers can be filled by mineral stone wool min. density 140 kg/m³. Wool is fixed to damper body by fire protection mastic.



The gap 94 mm between dampers can be filled by mineral stone wool min. density 140 kg/m³. Wool is fixed to damper body by fire protection mastic.



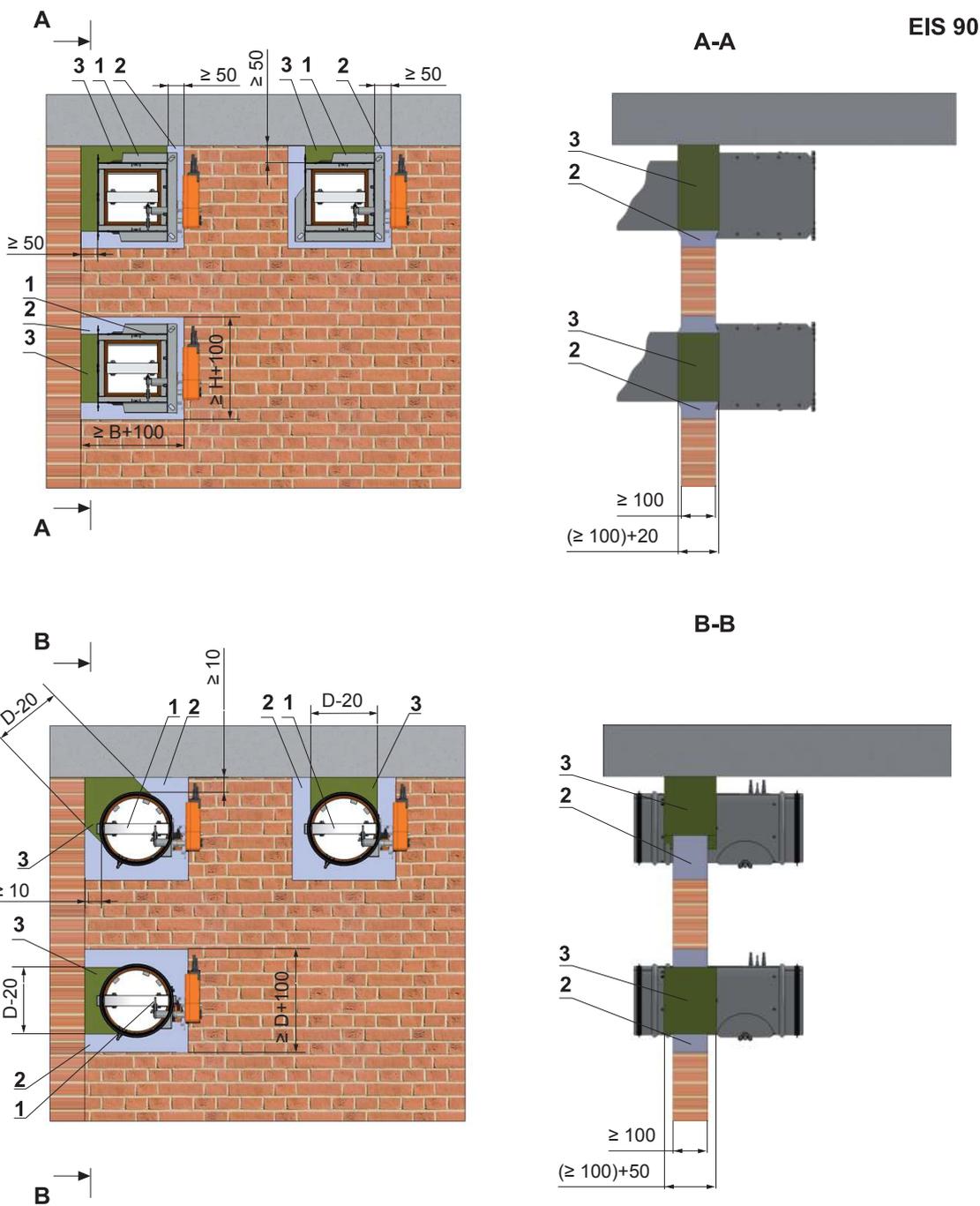
Notice:

- Fire damper FDMB-C - installation opening for each damper has minimal dimensions $a \times b = (A+100) \times (2xB + 100)$ mm or $(2xA+100) \times (B + 100)$ 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
- Flange to flange connection - Up to four dampers can be installed

POSITION:

- 1 Fire damper FDMB
- 2 Solid wall construction
- 3 Mortar or gypsum

Fig. 43 Solid wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool



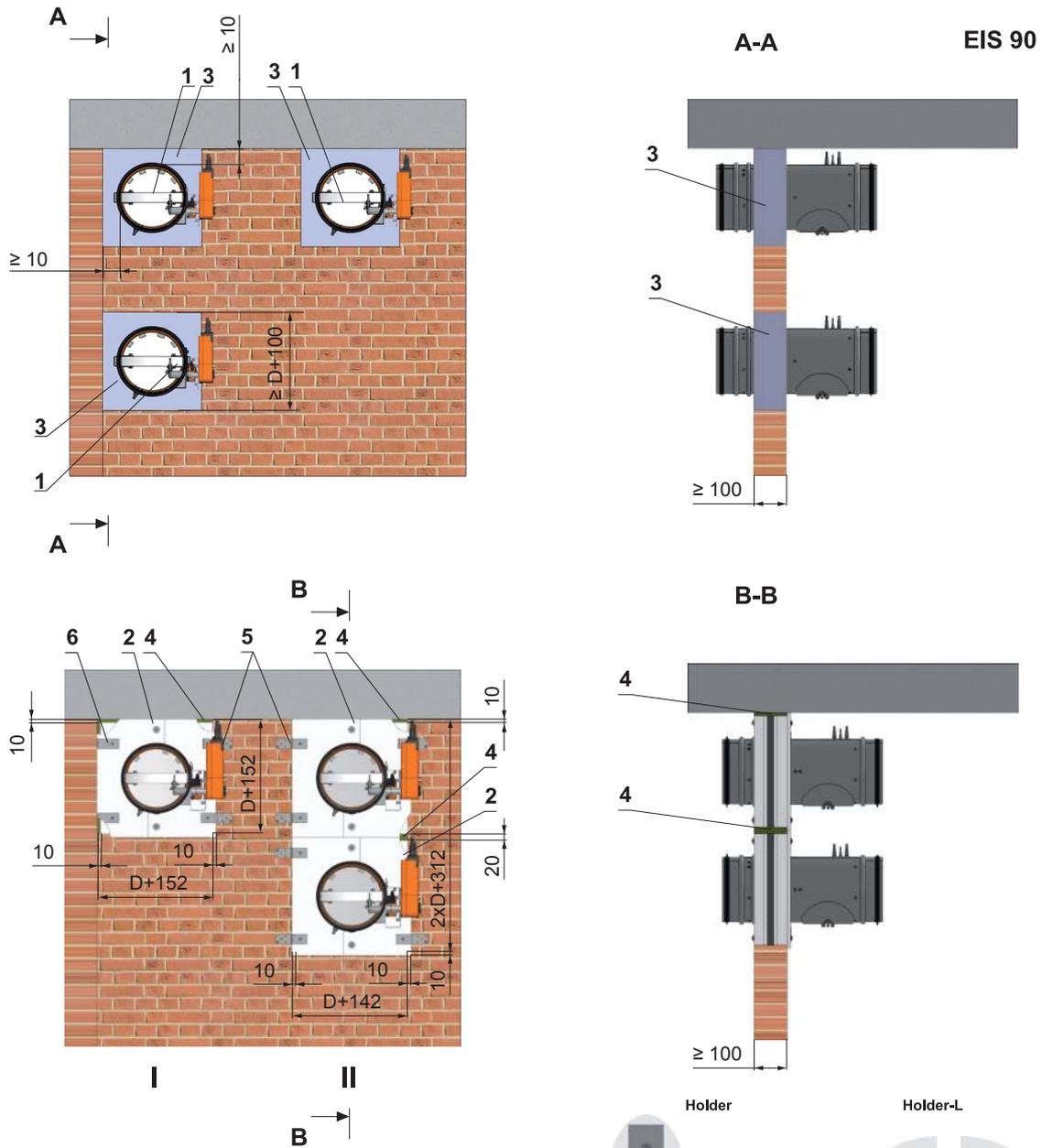
POSITION:

- 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
- Installation is valid for ceiling construction

Fig. 44 Solid wall construction - installation next to wall, ceiling - mortar or gypsum
Solid wall construction - installation next to wall, ceiling - installation frame R1, R2 and mineral wool



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

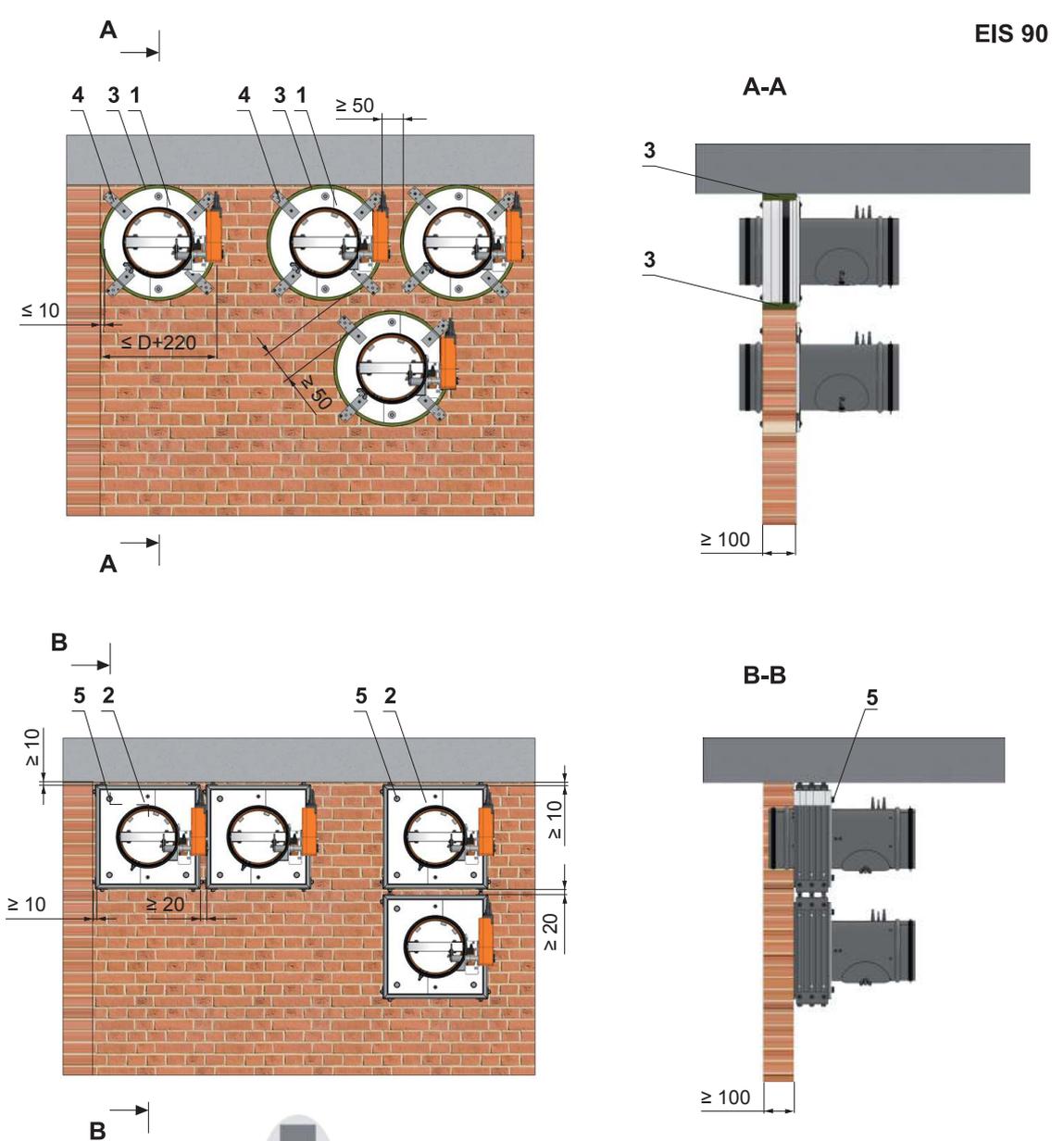
POSITION:

- 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/m³
- 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.
- Installation is valid for ceiling construction

Fig. 45 Solid wall construction - installation next to wall, ceiling - installation frame R3, R4, R5 and mineral wool



It is possible to use corresponding number of holes and screws

Holders No. X
Screws No. Y

Dimensions	Number X	Number Y
$D \leq 400$	4	8
$400 < D \leq 800$	8	16
$800 < D \leq 1000$	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.
- Installation is valid for ceiling construction

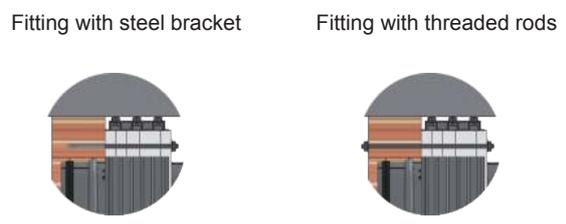
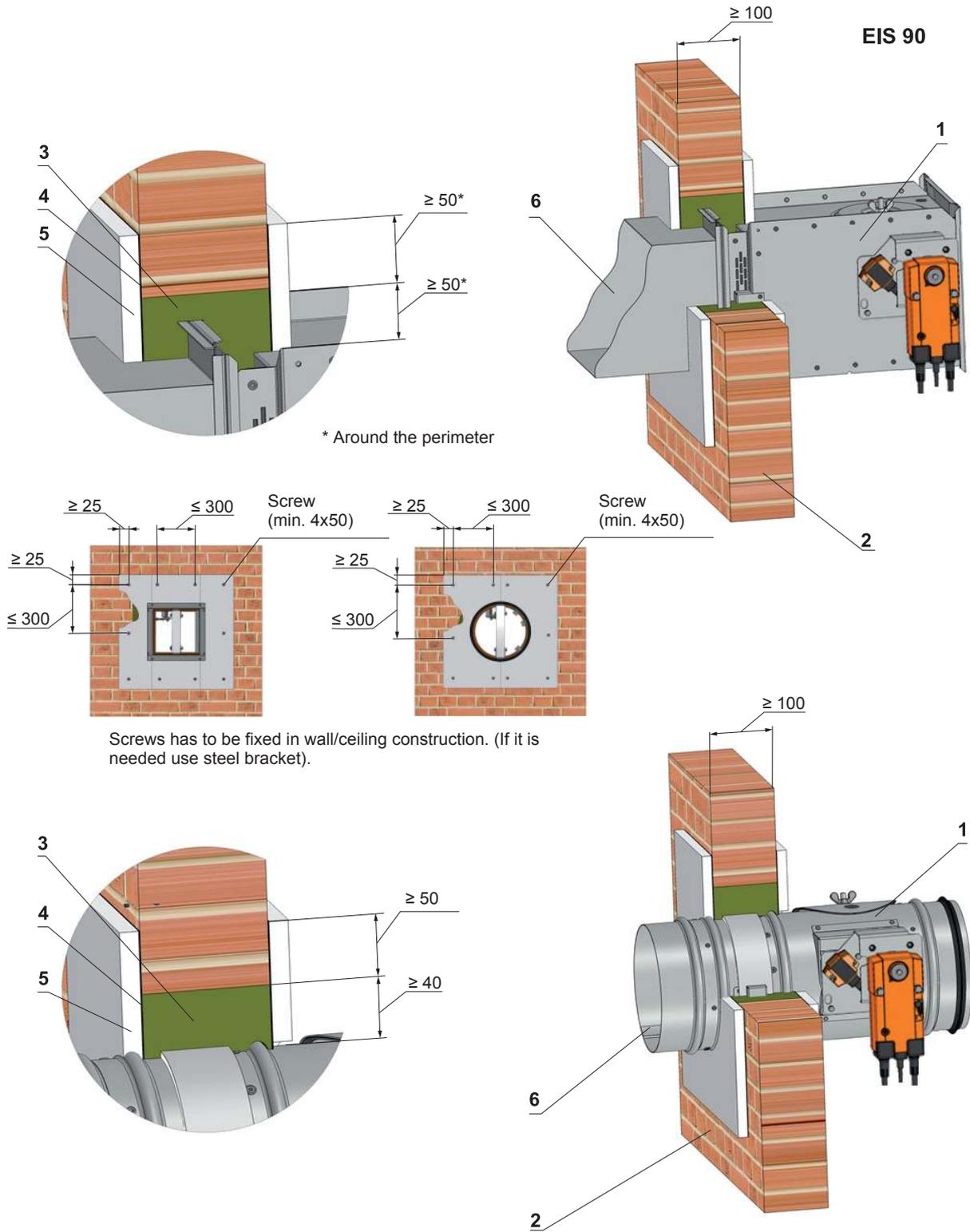


Fig. 46 Solid wall construction - stuffing box, fire protection mastic and cement lime plate



* Around the perimeter

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/m³)
- 4 Fire protection mastic min. thickness 1 mm
- 5 Cement lime plate min. thickness 15 mm (min. density 870 kg/m³)
- 6 Duct

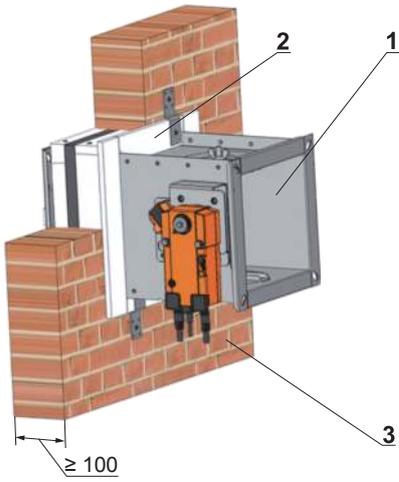
Used materials - example**:

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

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

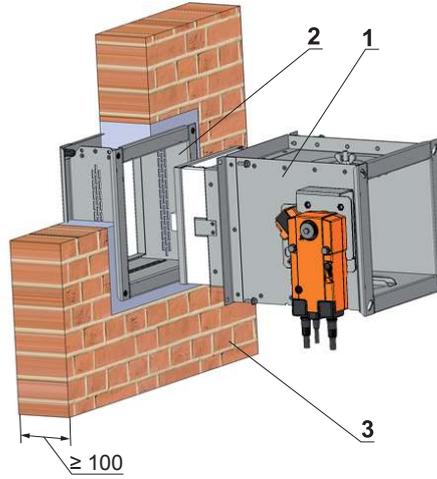
Fig. 47 Solid wall construction - installation frames E1, E2, E4, R1, R2, R3, R4, R5

Installation frame E1

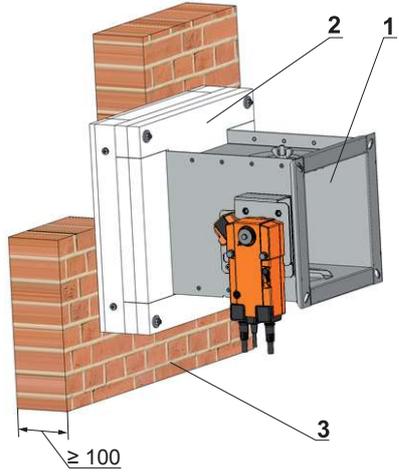


Installation frame E2

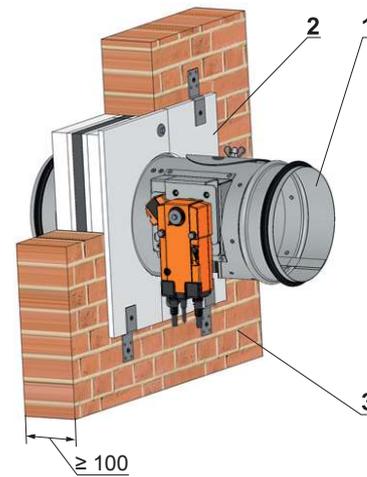
EIS 90



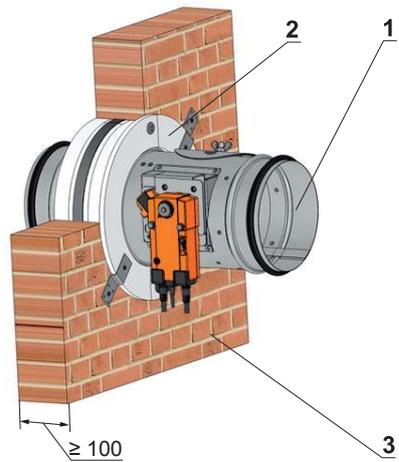
Installation frame E4



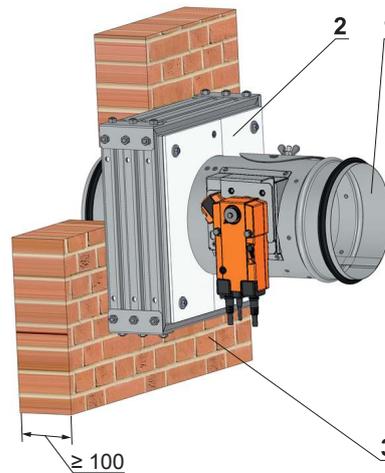
Installation frame R1, R2



Installation frame R3, R4



Installation frame R5

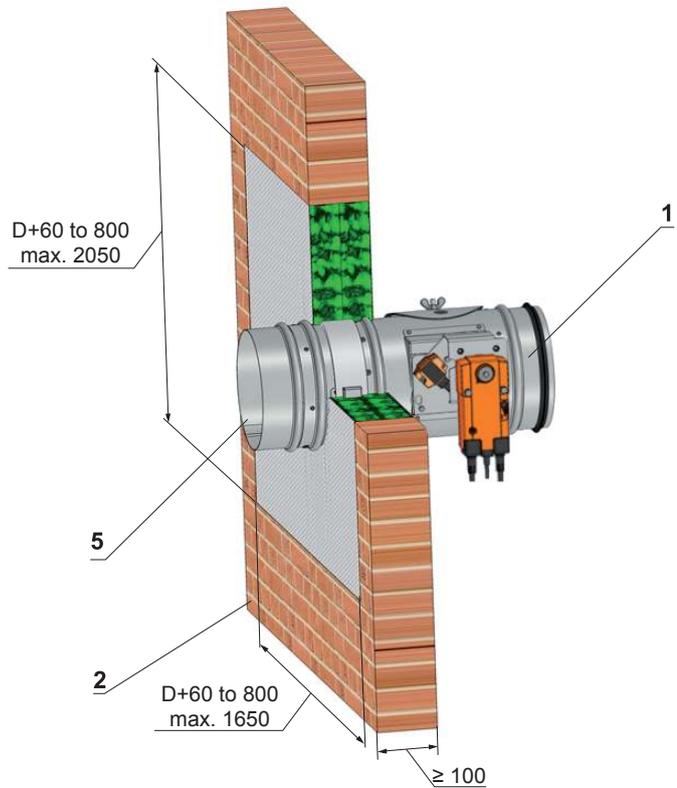
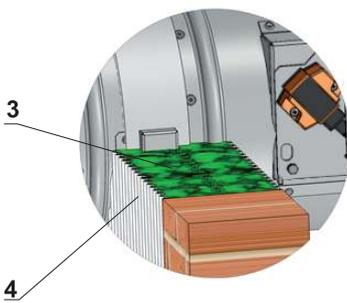
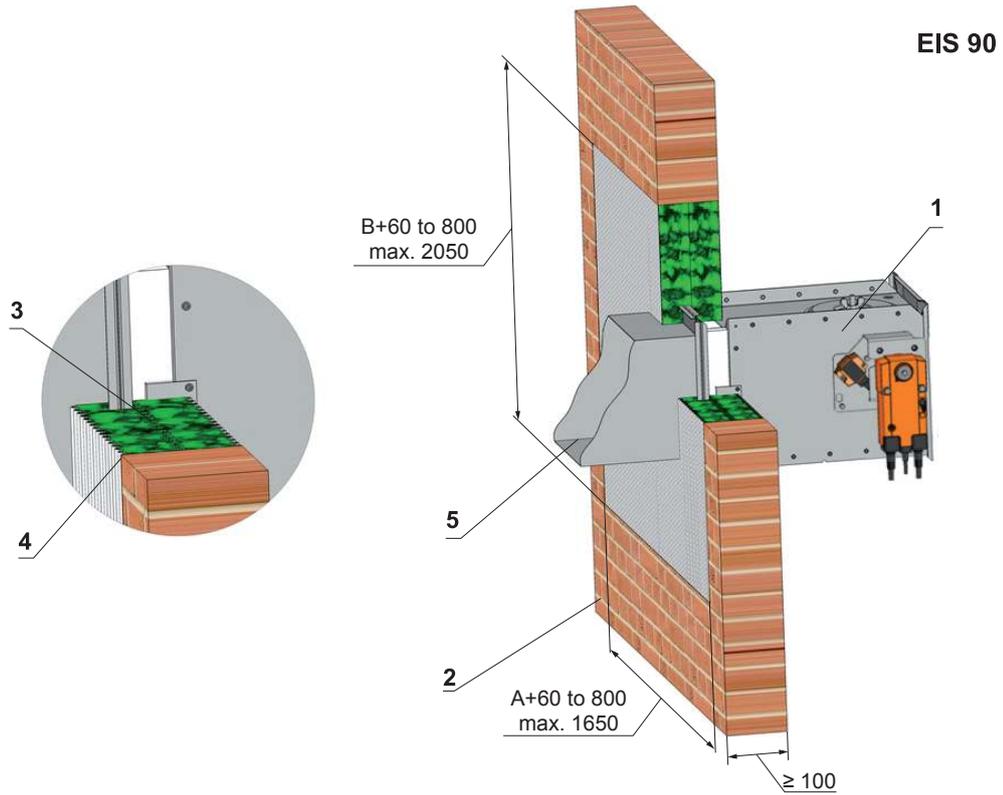


POSITION:

- 1 Fire damper FDMB
- 2 Installation frame
- 3 Solid wall construction

Installation details see chapter 7

Fig. 48 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

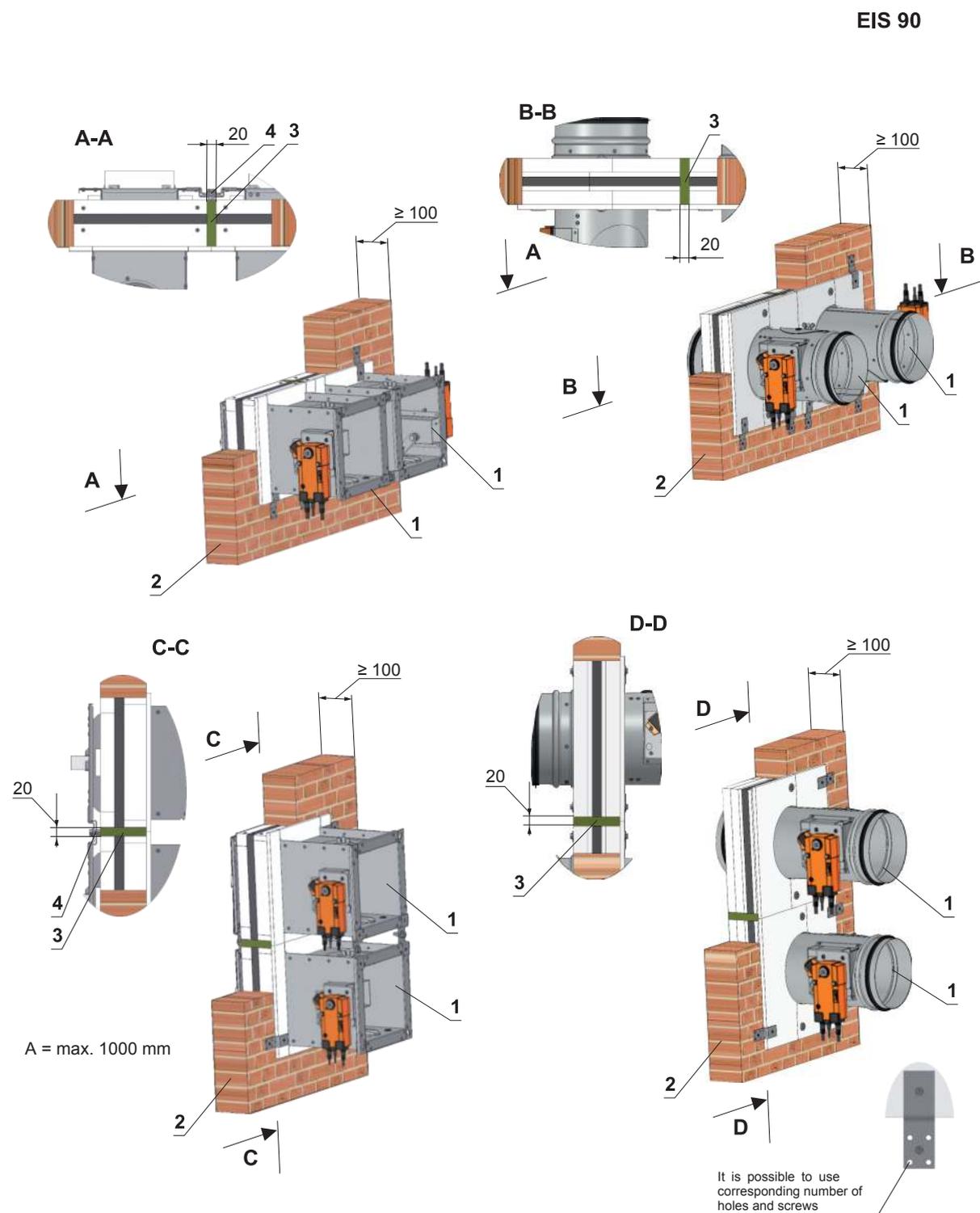
Used materials - example*:

- 3 - Hilti CFS-CT B 1S 140/50
- 4 - Hilti CFS-CT

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. 49 Solid wall construction - flange to flange - installation frame E1, R1



Notice:

- Fire damper FDMB-C - installation opening dimensions $a \times b = (2x(A + 85^{+3}mm) + 20 mm) \times (B + 85^{+3}mm)$ or $a \times b = (A + 85^{+3}mm) \times (2x(B + 85^{+3}mm) + 20 mm)$
- Fire damper FDMB-C - installation opening dimensions $a \times b = (2x(D + 141^{+3}mm) + 20 mm) \times (D + 141^{+3}mm)$ or $a \times b = (D + 141^{+3}mm) \times (2x(D + 141^{+3}mm) + 20 mm)$
- 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
- Flange to flange connection - Up to four dampers can be installed

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

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. 50 Installation outside of solid wall construction - mineral wool

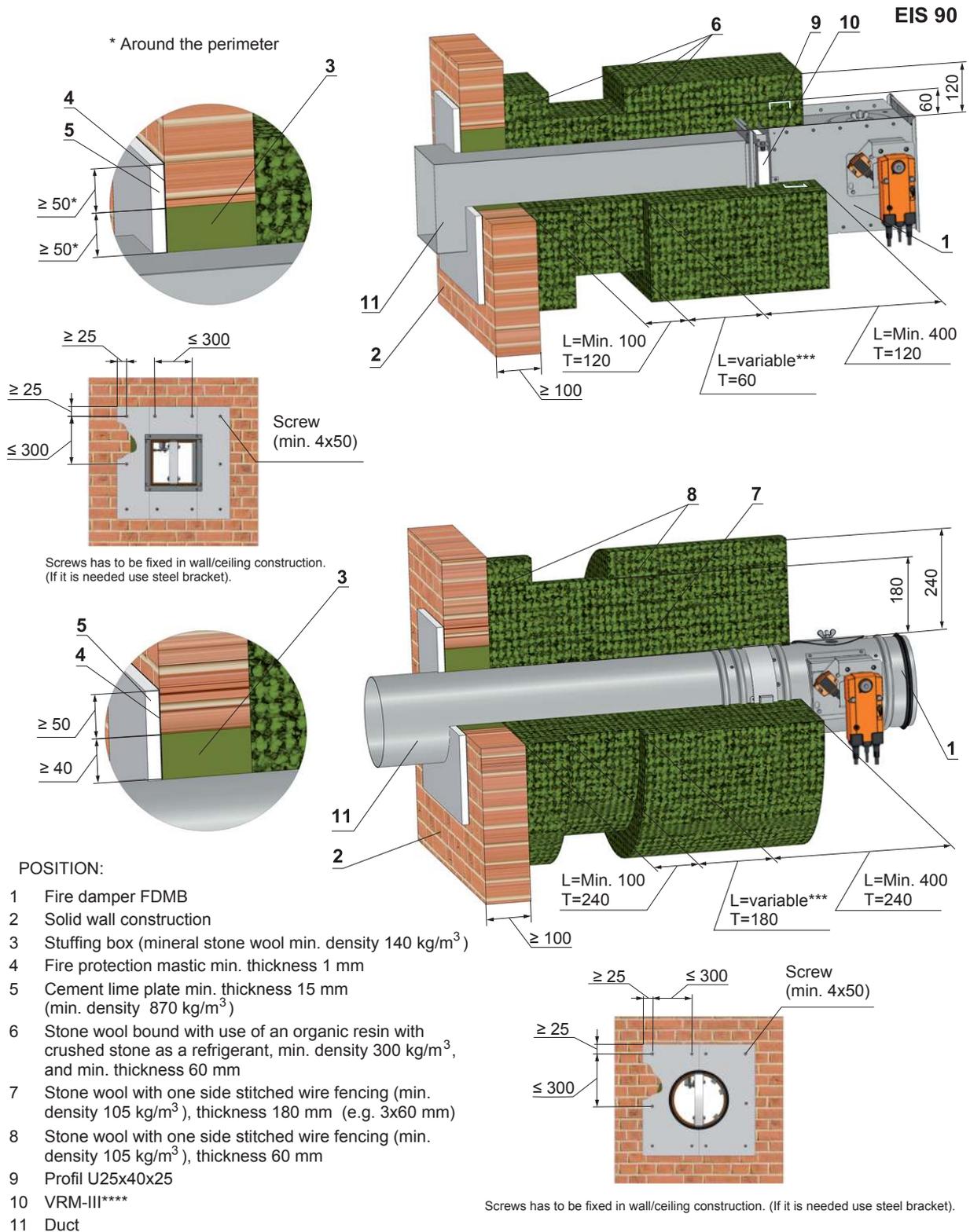
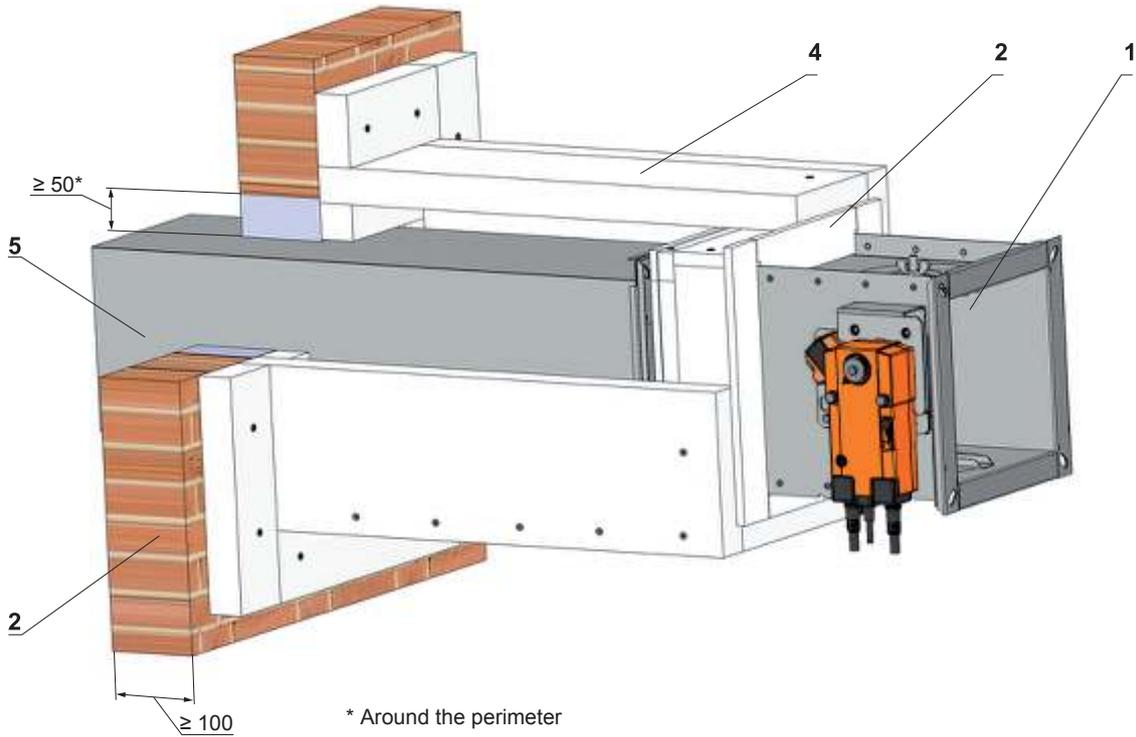


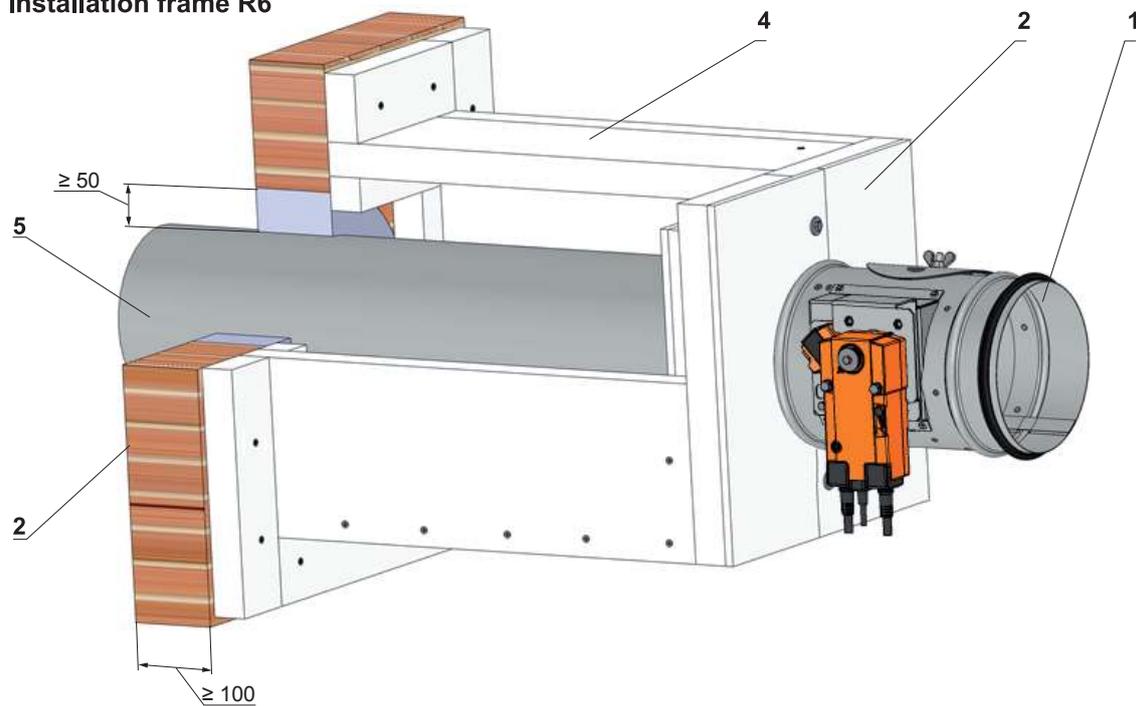
Fig. 51 Installation outside of solid wall construction - installation frame E6, R6 with cement lime plates

Installation frame E6

EIS 90



Installation frame R6

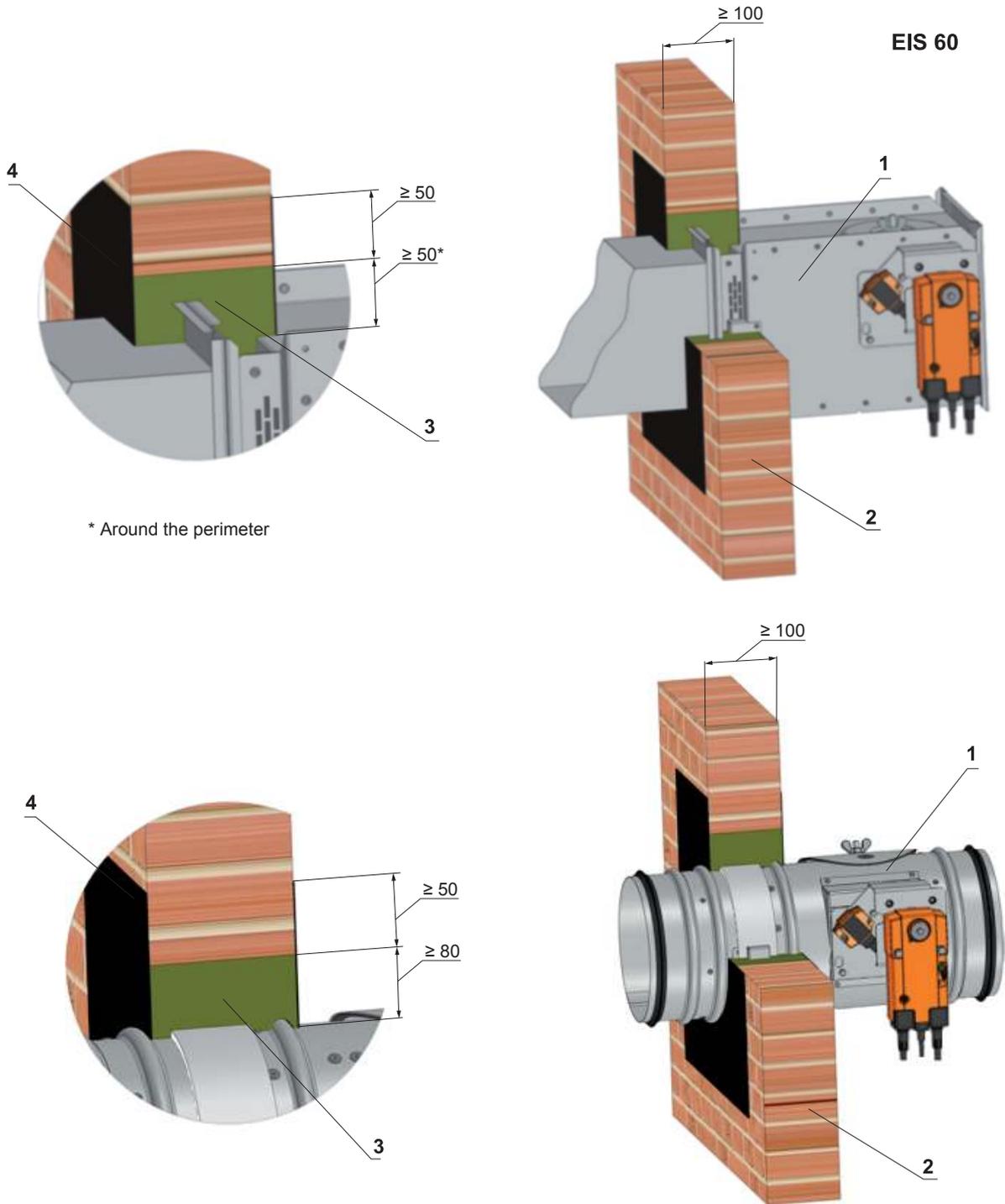


POSITION:

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

Installation details see chapter 7

Fig. 52 Solid wall construction - stuffing box and fire protection mastic



* Around the perimeter

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**:

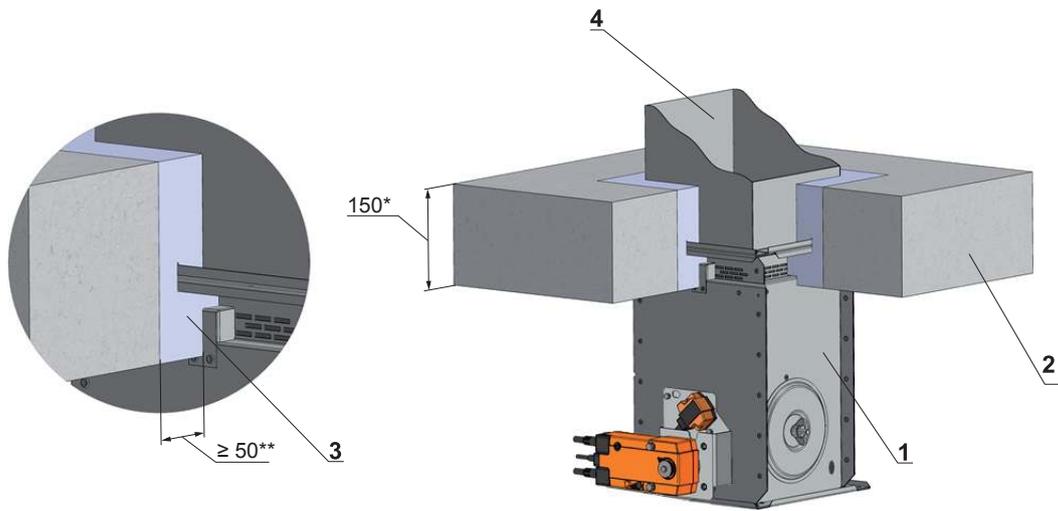
- 3 - Promapyr, Rockwool Steprock HD
- 4 - Promastop - P, K

Notice:

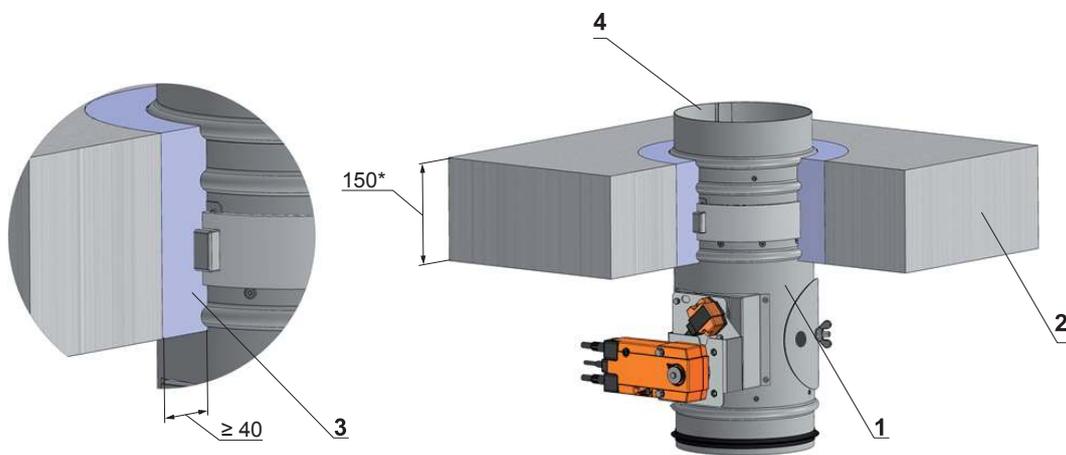
** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 53 Solid ceiling construction - mortar or gypsum

EIS 120



** Around the perimeter



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

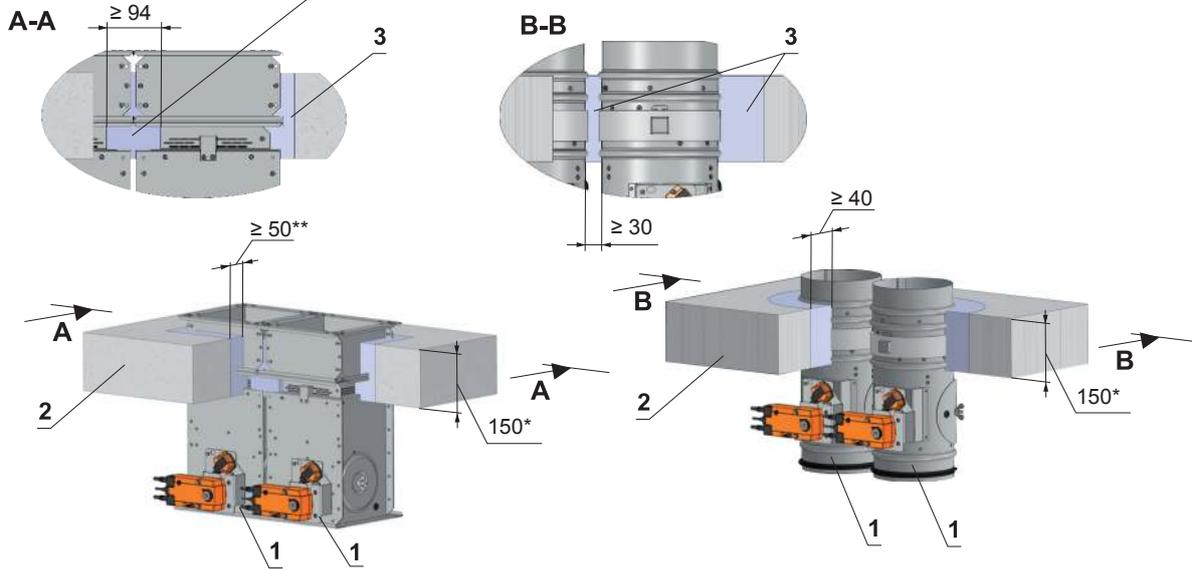
POSITION:

- 1 Fire damper FDMB
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Duct

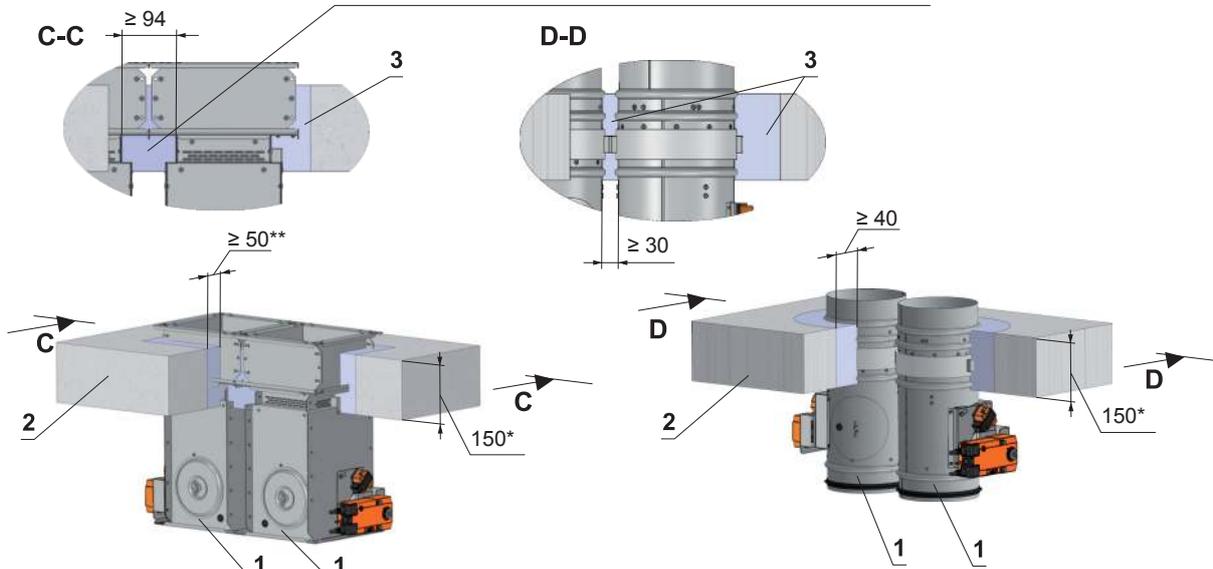
Fig. 54 Solid ceiling construction - flange to flange - mortar or gypsum

EIS 90

The gap 94 mm between dampers can be filled by mineral stone wool min. density 140 kg/m³. Wool is fixed to damper body by fire protection mastic.



The gap 94 mm between dampers can be filled by mineral stone wool min. density 140 kg/m³. Wool is fixed to damper body by fire protection mastic.



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

** Around the perimeter

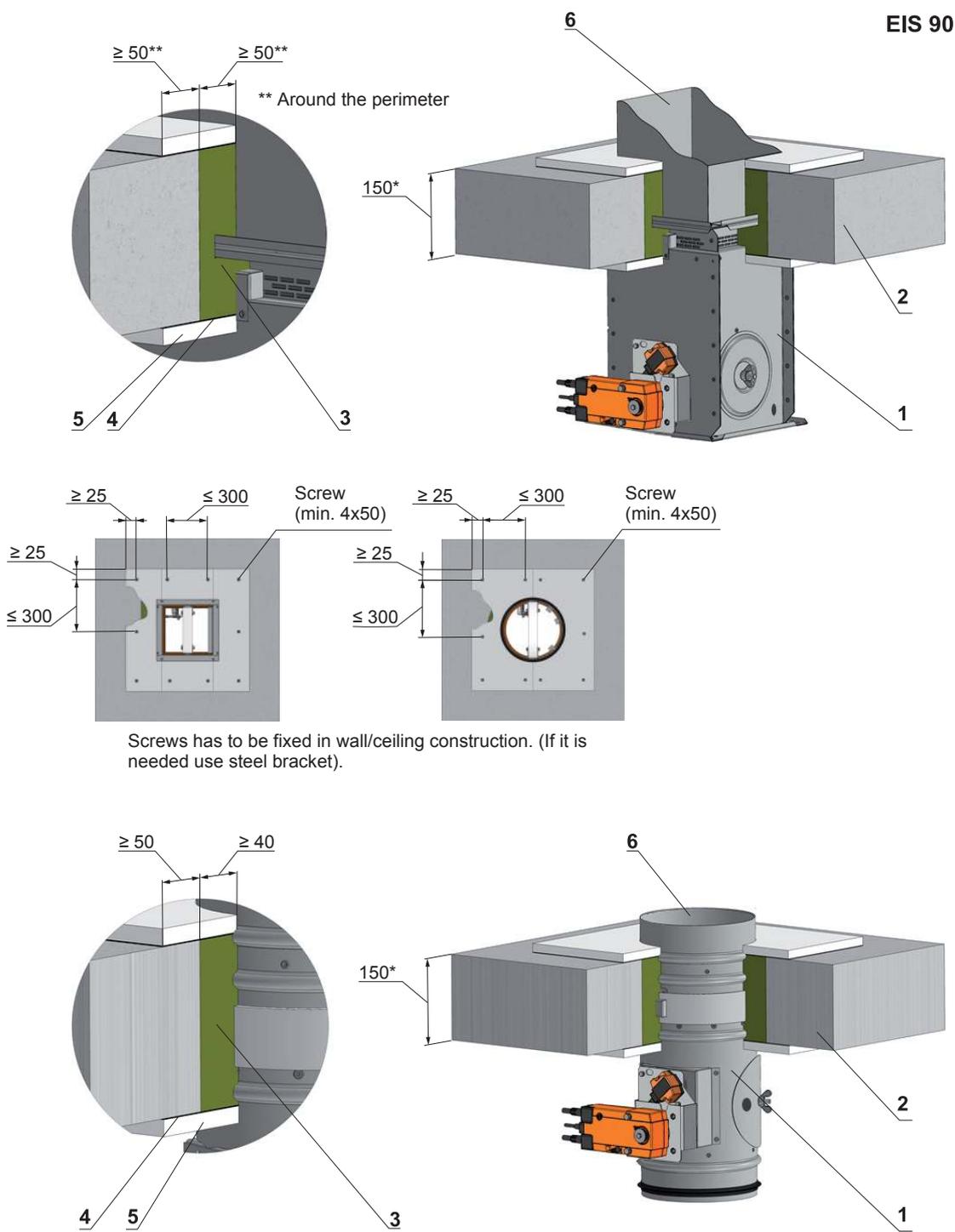
Notice:

- Fire damper FDMB-C - installation opening for each damper has minimal dimensions $a \times b = (A+100) \times (2xB + 100)$ mm or $(2xA+100) \times (B + 100)$ 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
- Flange to flange connection - Up to four dampers can be installed

POSITION:

- 1 Fire damper FDMB
- 2 Solid ceiling construction
- 3 Mortar or gypsum

Fig. 55 Solid ceiling construction - stuffing box, fire protection mastic and cement lime plate



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

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

POSITION:

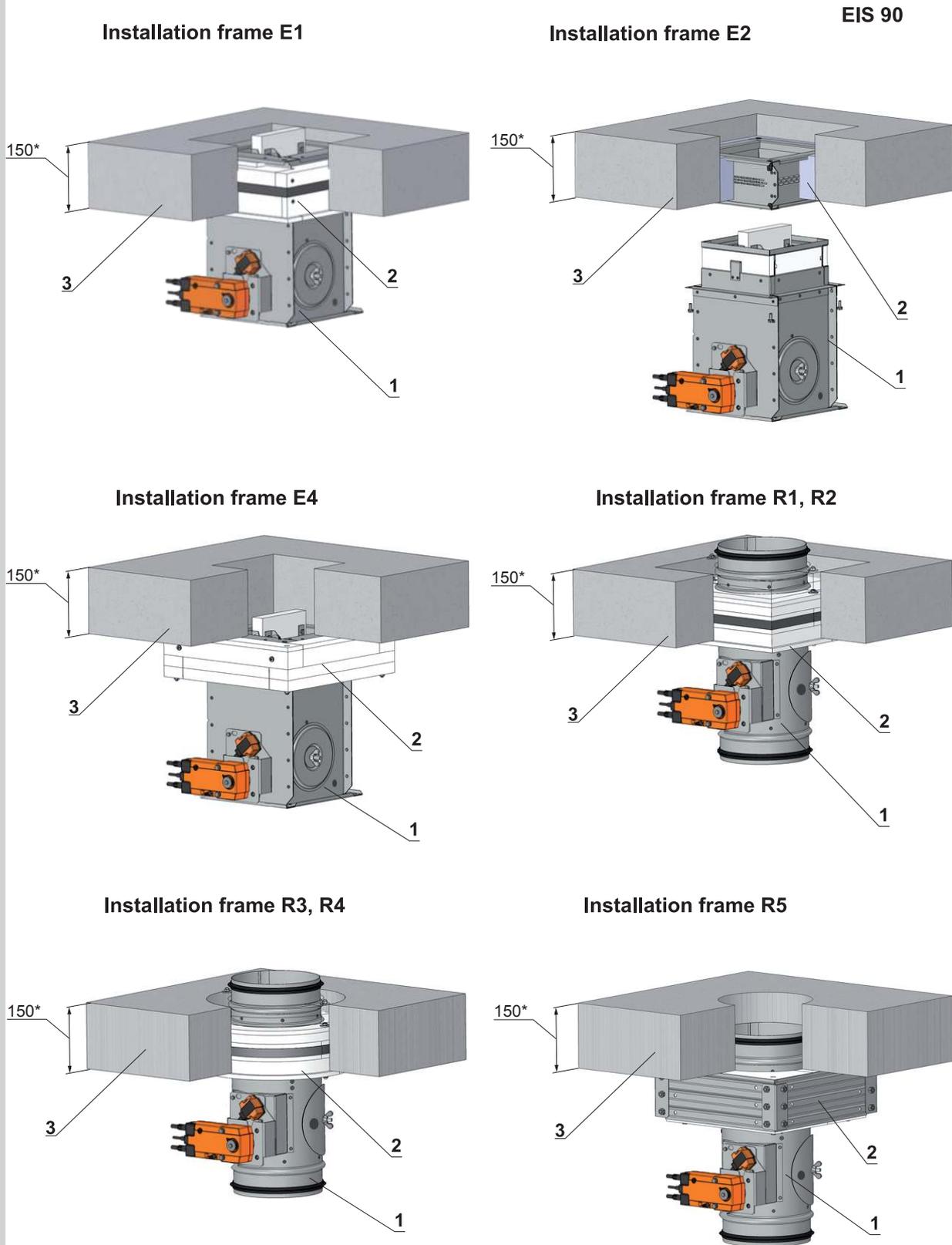
- 1 Fire damper FDMB
- 2 Solid ceiling construction
- 3 Stuffing box (mineral stone wool min. density 140 kg/m³)
- 4 Fire protection mastic min. thickness 1 mm
- 5 Cement lime plate min. thickness 15 mm (min. density 870 kg/m³)
- 6 Duct

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. 56 Solid ceiling construction - installation frame E1, E2, E4, R1, R2, R3, R4, R5



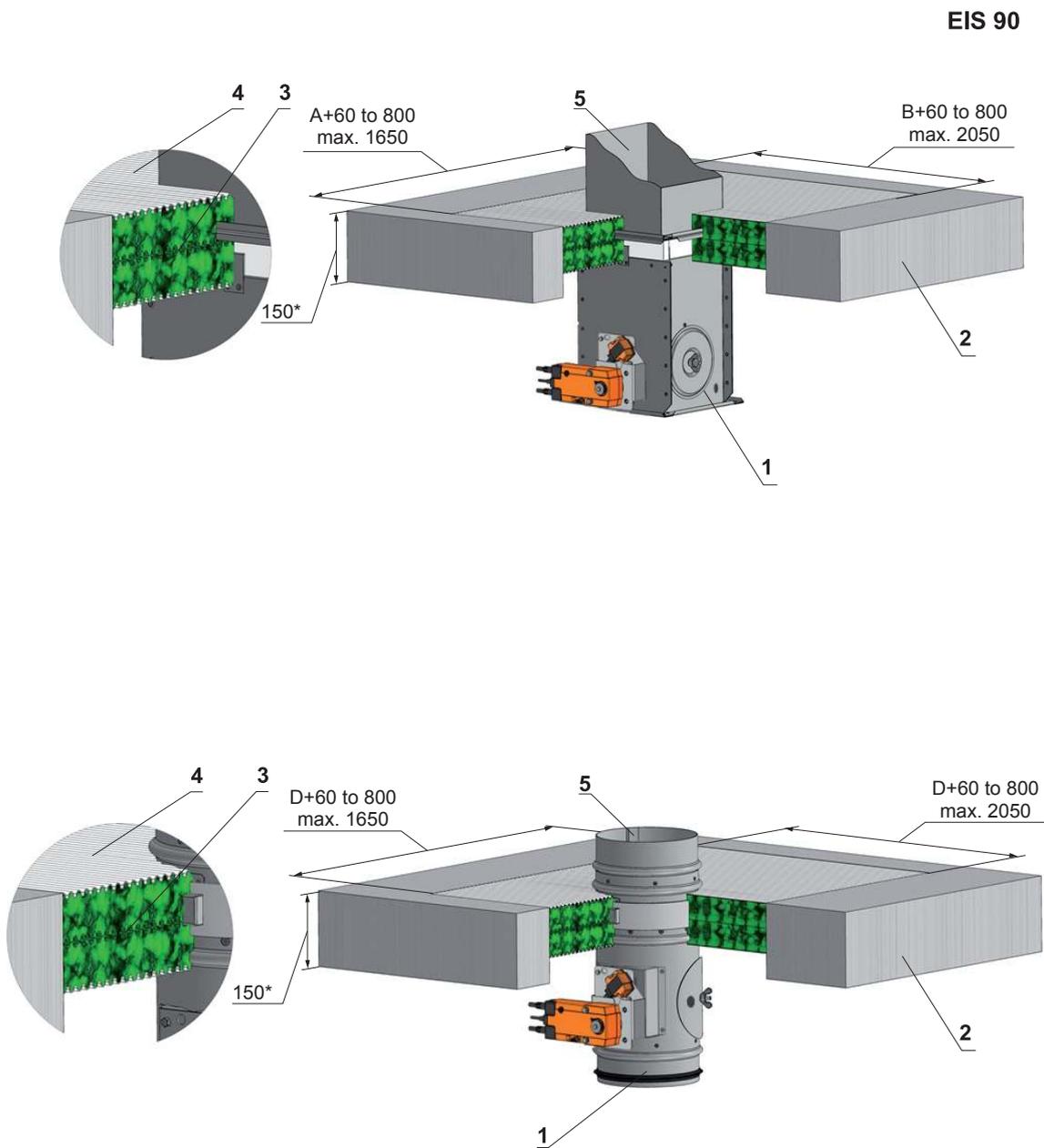
* min. 110 - Concrete/ min. 125 - Aerated concrete

POSITION:

- 1 Fire damper FDMB
- 2 Installation frame
- 3 Solid ceiling construction

Installation details see chapter 7

Fig. 57 Solid ceiling construction - Weichschott



* 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**:

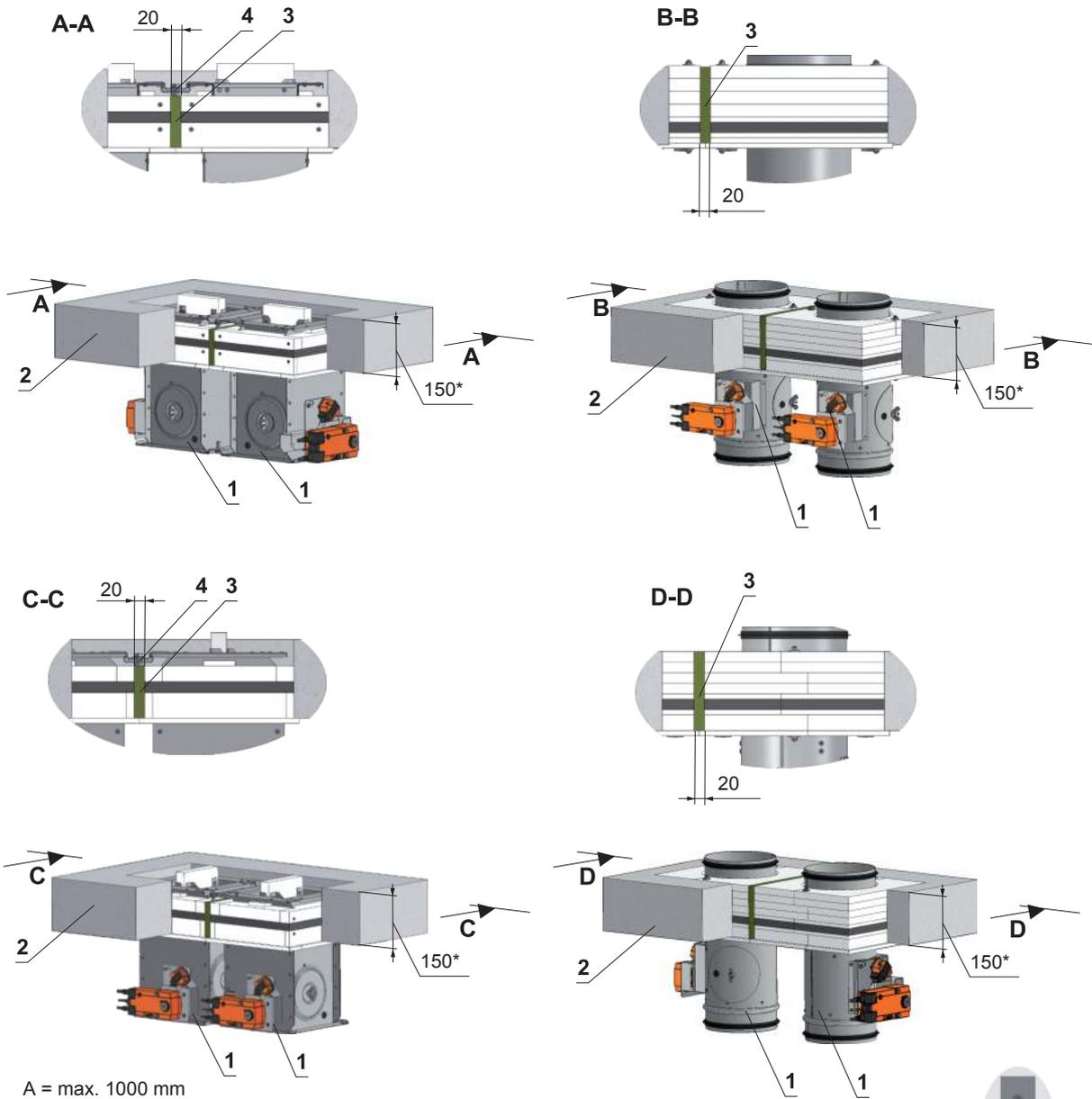
- 3 - Hilti CFS-CT B 1S 140/50
- 4 - Hilti CFS-CT

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. 58 Solid ceiling construction - flange to flange - installation frame E1, R2

EIS 90



A = max. 1000 mm

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

It is possible to use corresponding number of holes and screws

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

POSITION:

- 1 Fire damper FDMB with installation frame E1, R2
- 2 Solid ceiling 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
- Flange to flange connection - Up to four dampers can be installed

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. 59 Installation outside of solid ceiling construction - mineral wool

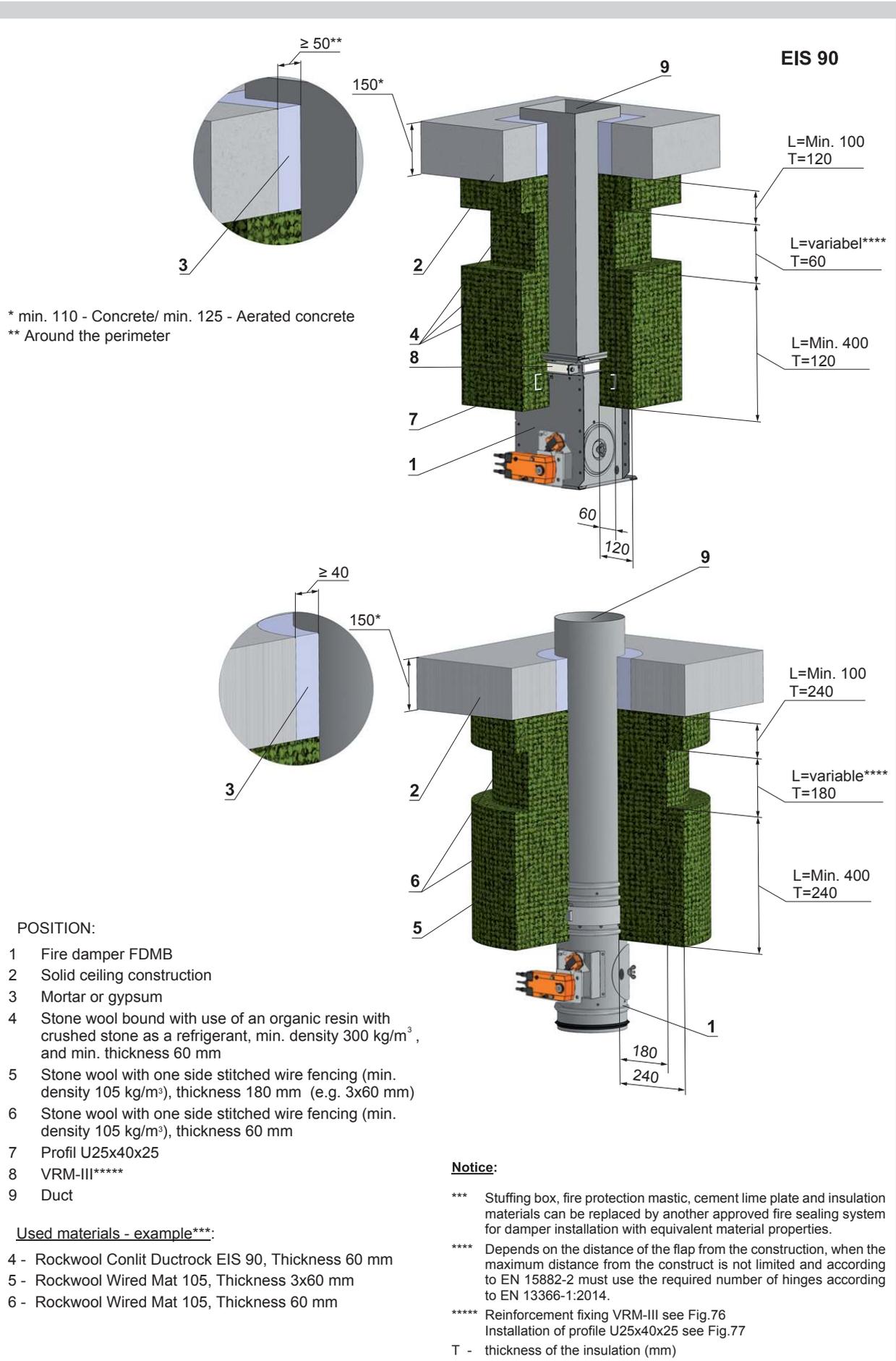


Fig. 60 Installation outside of solid ceiling construction - concrete

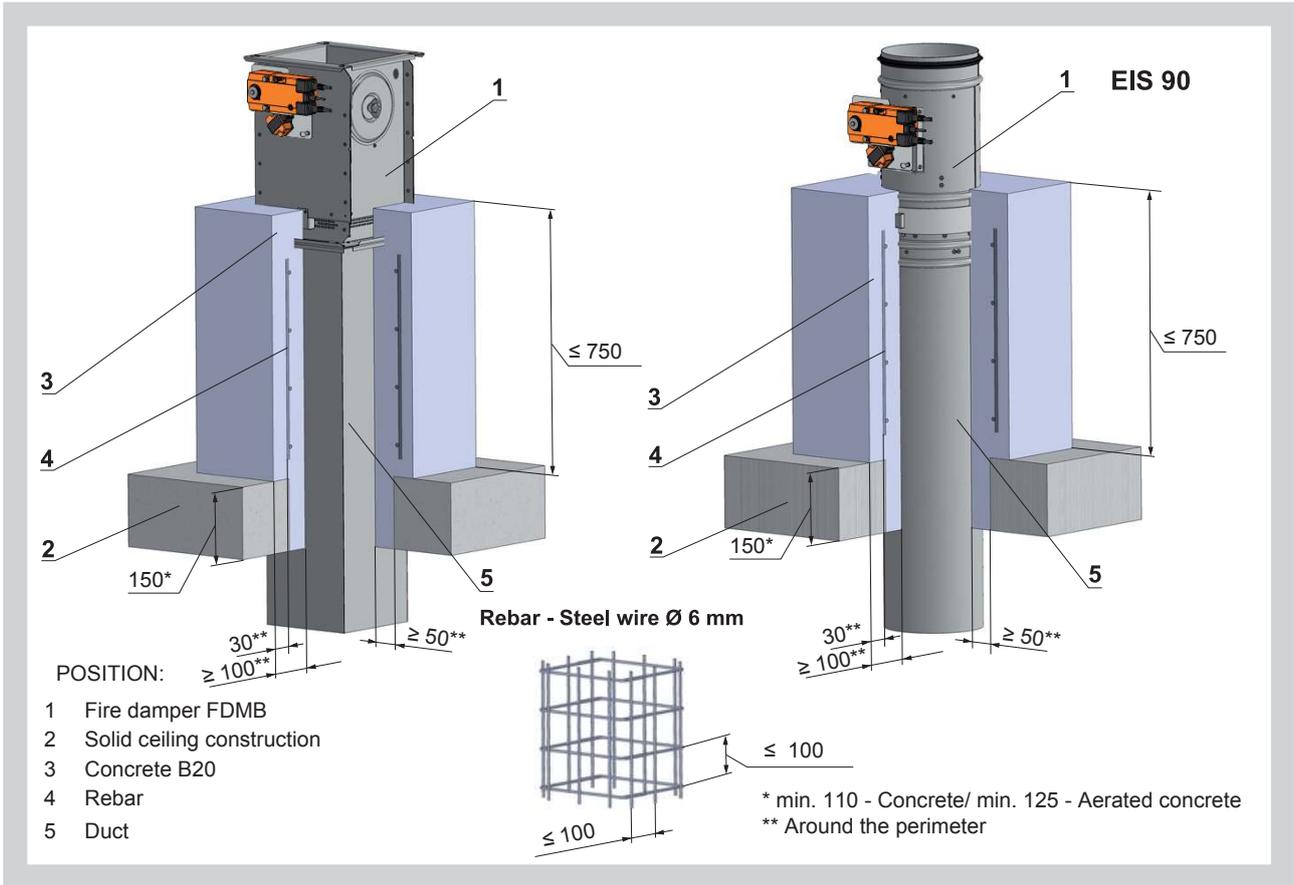


Fig. 61 Installation outside of solid ceiling construction - concrete and installation frame E4, R5

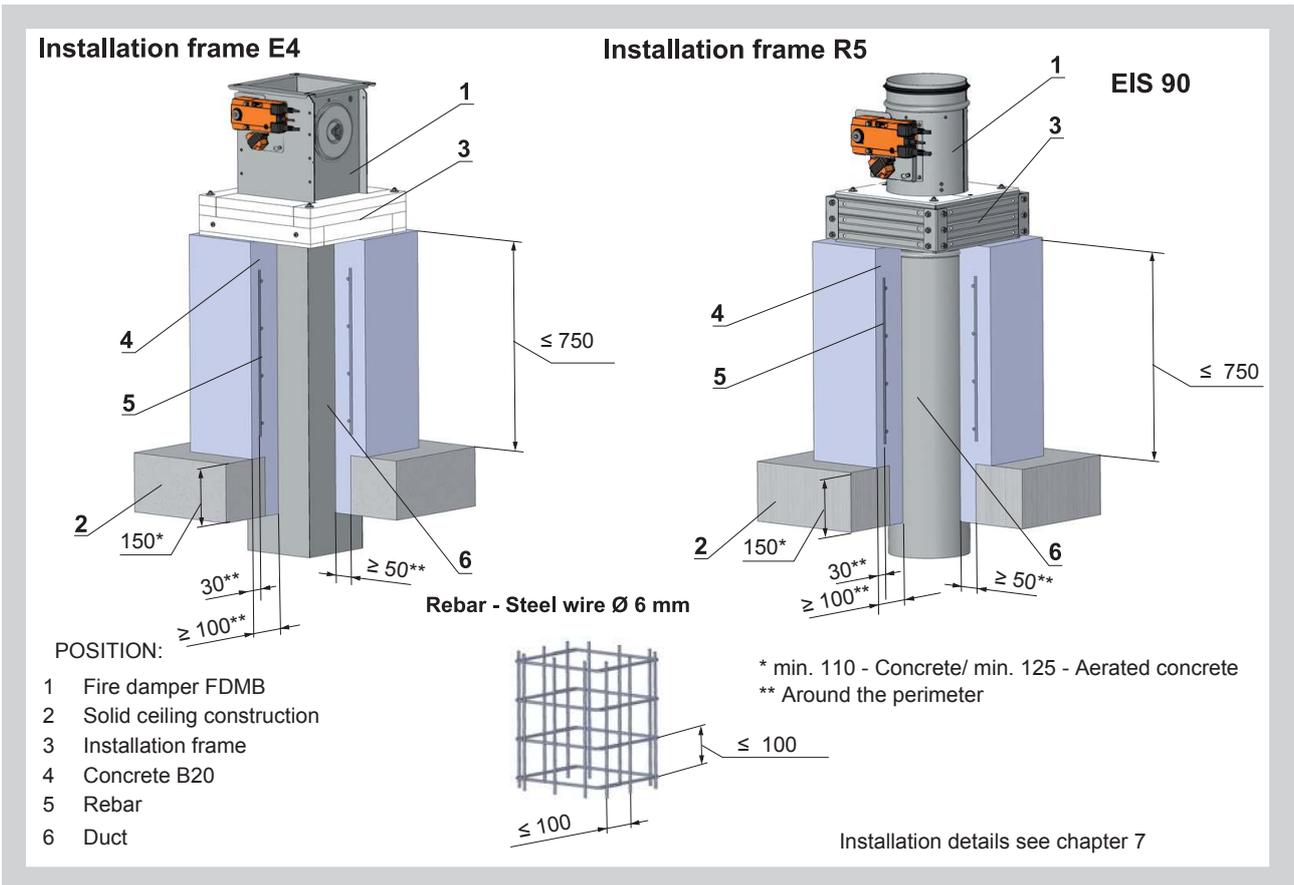
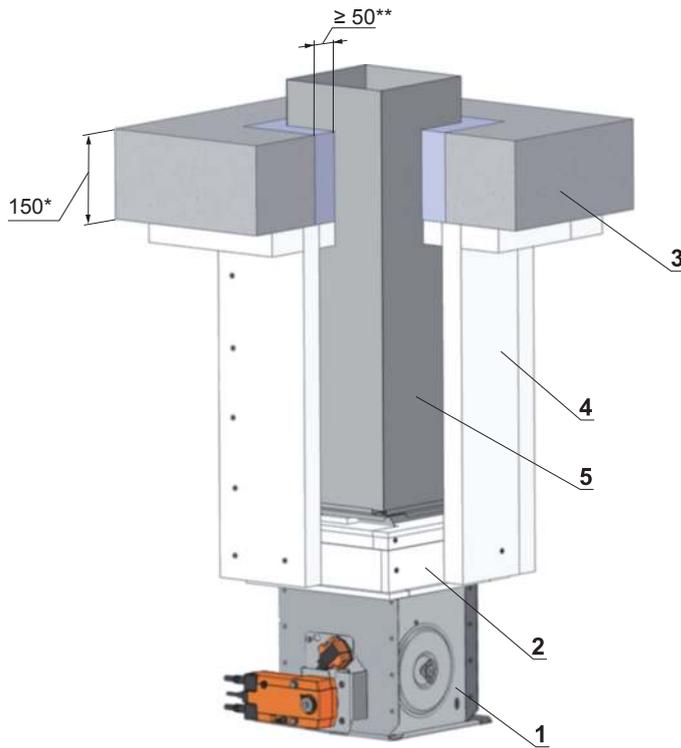


Fig. 62 Installation outside of solid ceiling construction - installation frame E6, R6 with cement lime plates

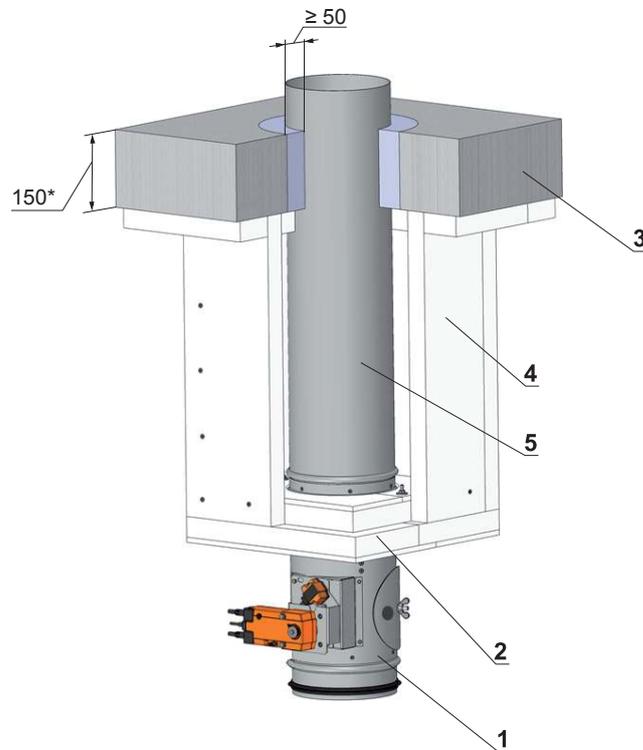
Installation frame E6

EIS 90



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

Installation frame R6

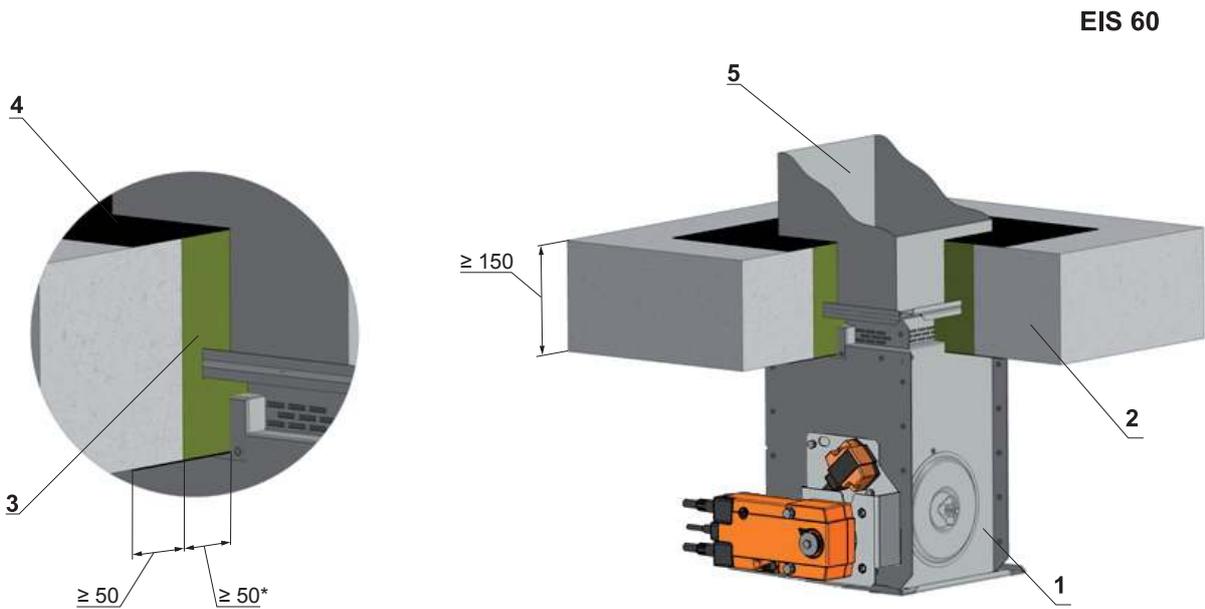


POSITION:

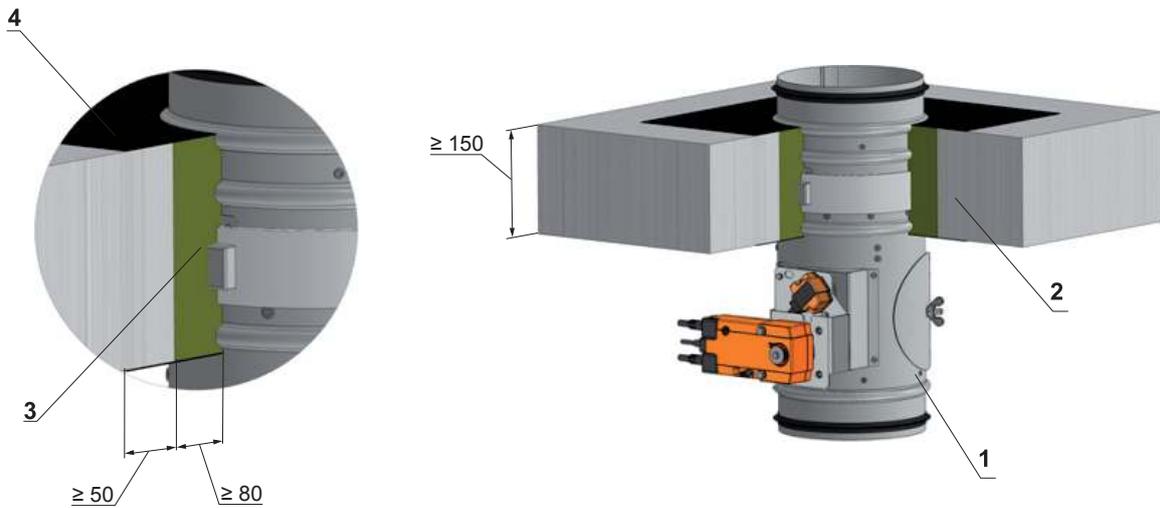
- 1 Fire damper FDMB
- 2 Installation frame
- 3 Solid ceiling construction
- 4 Cement lime plate
- 5 Duct

Installation details see chapter 7

Fig. 63 Solid ceiling construction - stuffing box, fire protection mastic



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



Used materials - example***:

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

LEGENDA:

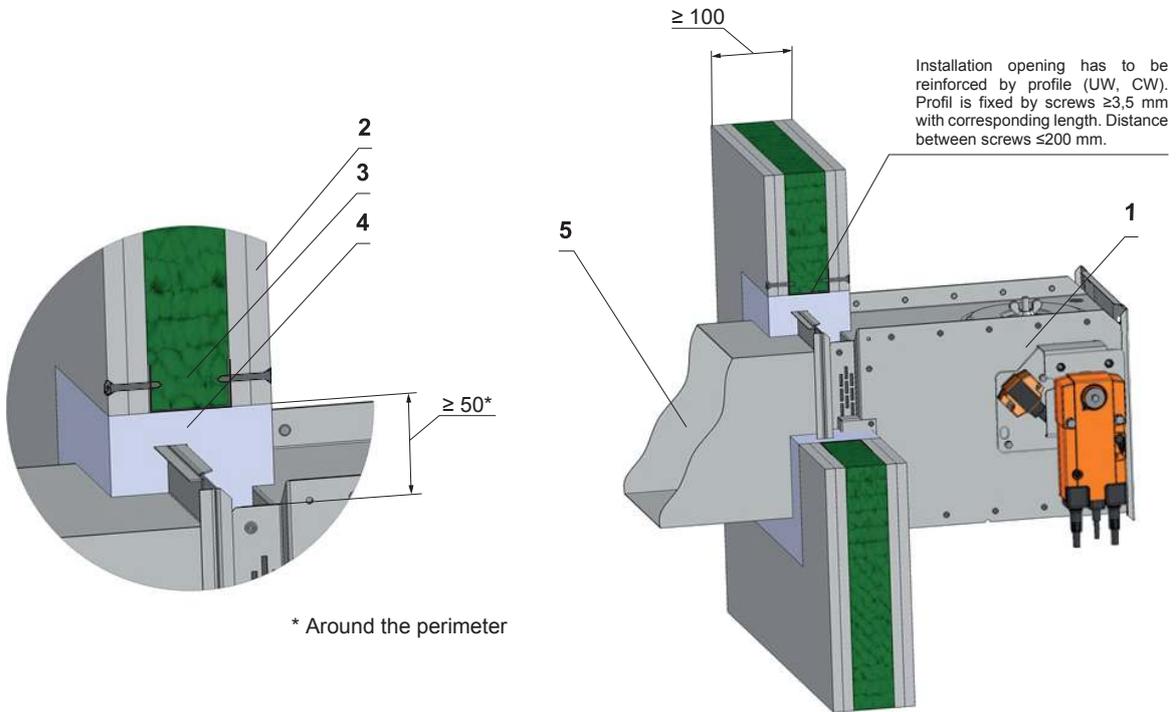
- 1 Fire damper FDMB
- 2 Solid ceiling construction
- 3 Stuffing box (mineral stone wool min. density 140 kg/m³)
- 4 Fire protection mastic min. thickness 1 mm
- 5 Duct

Notice:

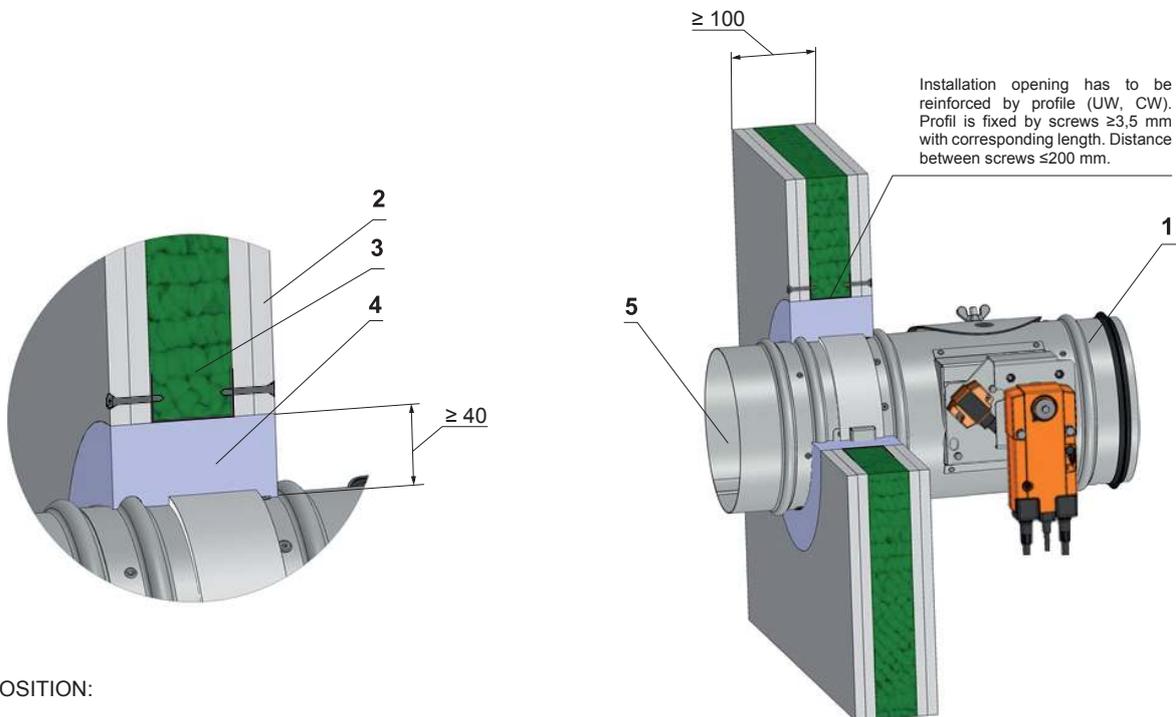
*** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 64 Gypsum wall construction - mortar or gypsum

EIS 120



* Around the perimeter

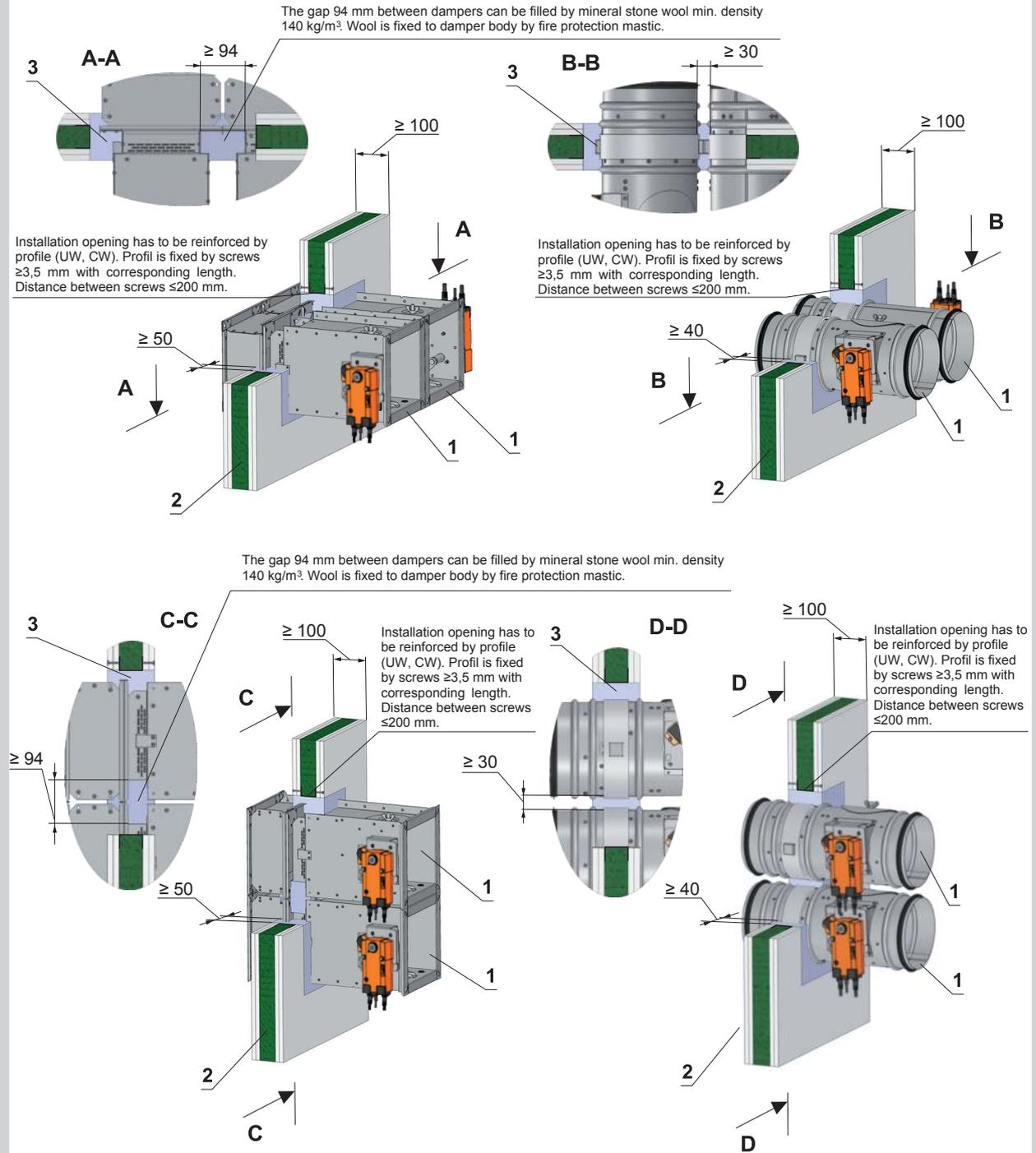


POSITION:

- 1 Fire damper FDMB
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Mortar or gypsum
- 5 Duct

Fig. 65 Gypsum wall construction - flange to flange - mortar or gypsum

EIS 90



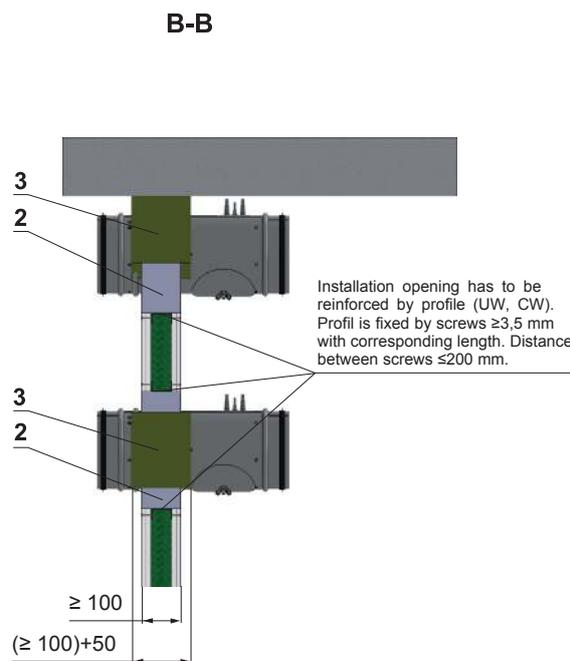
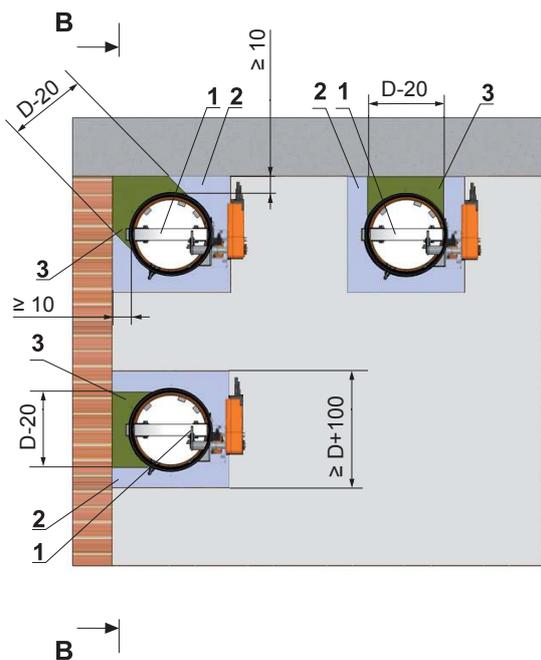
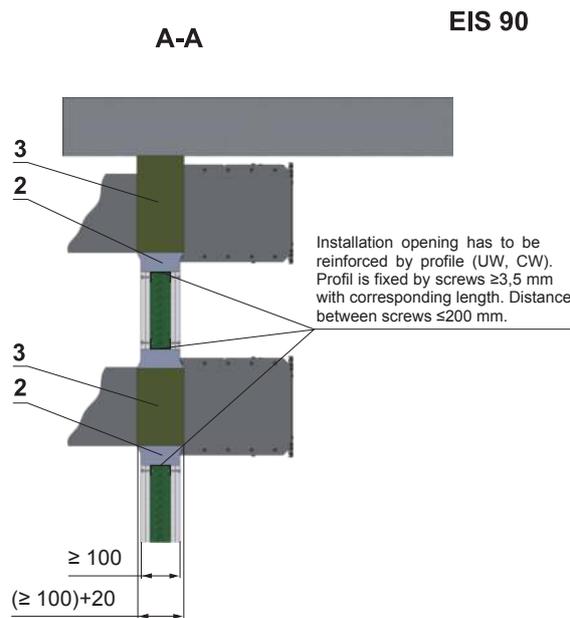
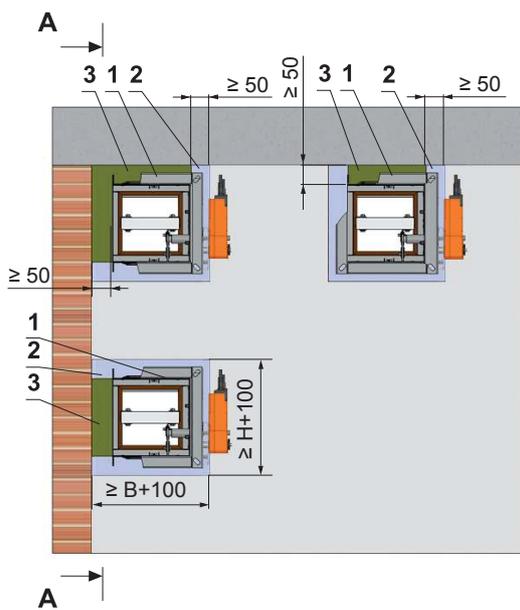
POSITION:

- 1 Fire damper FDMB
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Mortar or gypsum

Notice:

- Fire damper FDMB-C - installation opening for each damper has minimal dimensions
 $a \times b = (A+100) \times (2 \times B + 100)$ mm or $(2 \times A + 100) \times (B + 100)$ 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
- Flange to flange connection - Up to four dampers can be installed

Fig. 66 Gypsum wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool



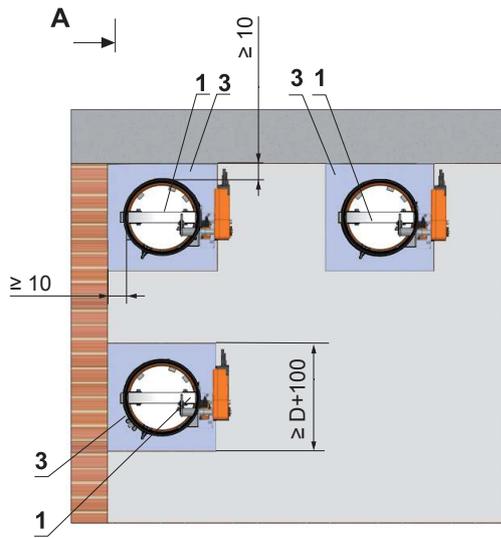
Notice:

- 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
- Installation is valid for ceiling construction

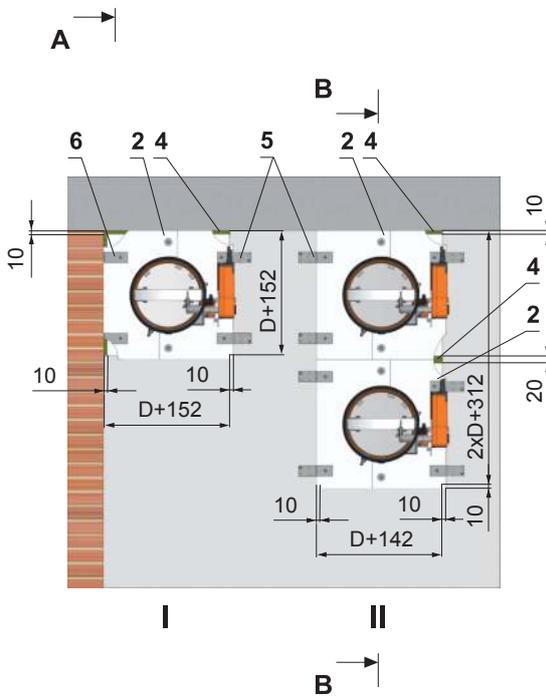
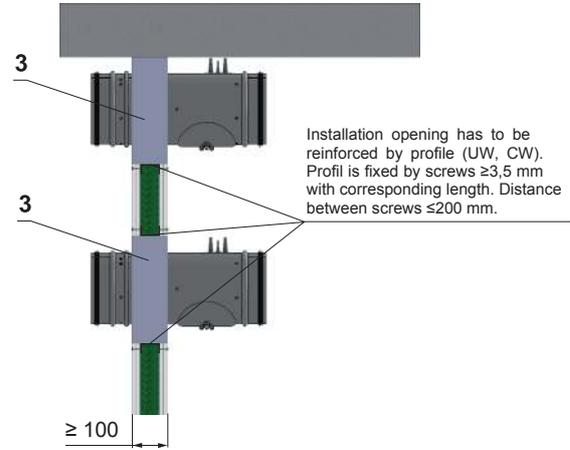
POSITION:

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

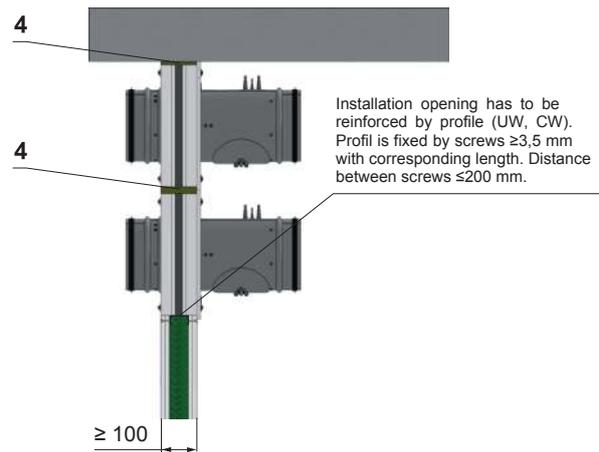
Fig. 67 Gypsum wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool
Gypsum wall construction - installation next to wall, ceiling - installation frame R1, R2 and mineral wool



A-A EIS 90



B-B



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



It is possible to use corresponding number of holes and screws

It is possible to use corresponding number of holes and screws

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/m³
- 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.

Fig. 68 Gypsum wall construction - installation next to wall, ceiling - installation frame R5

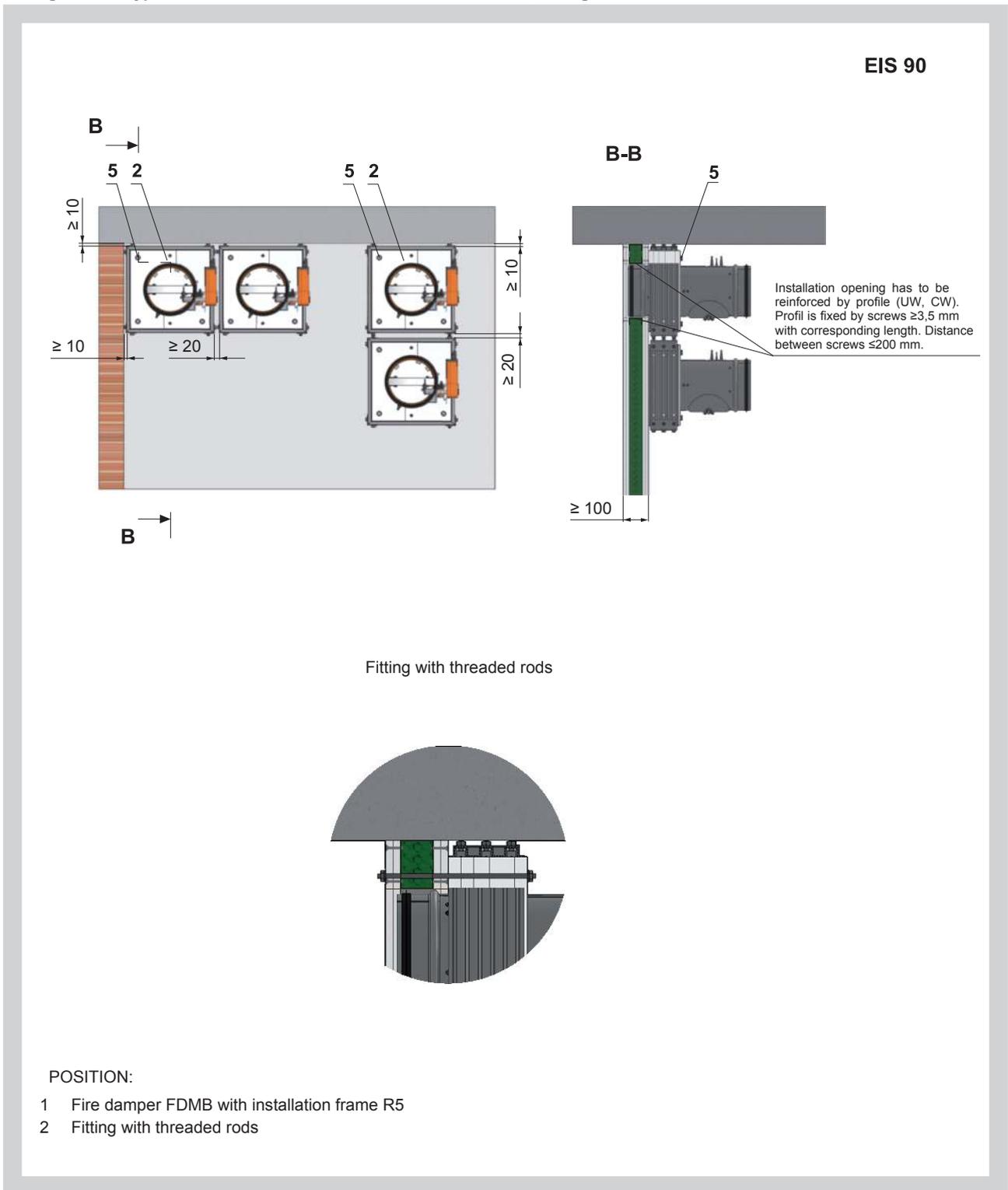
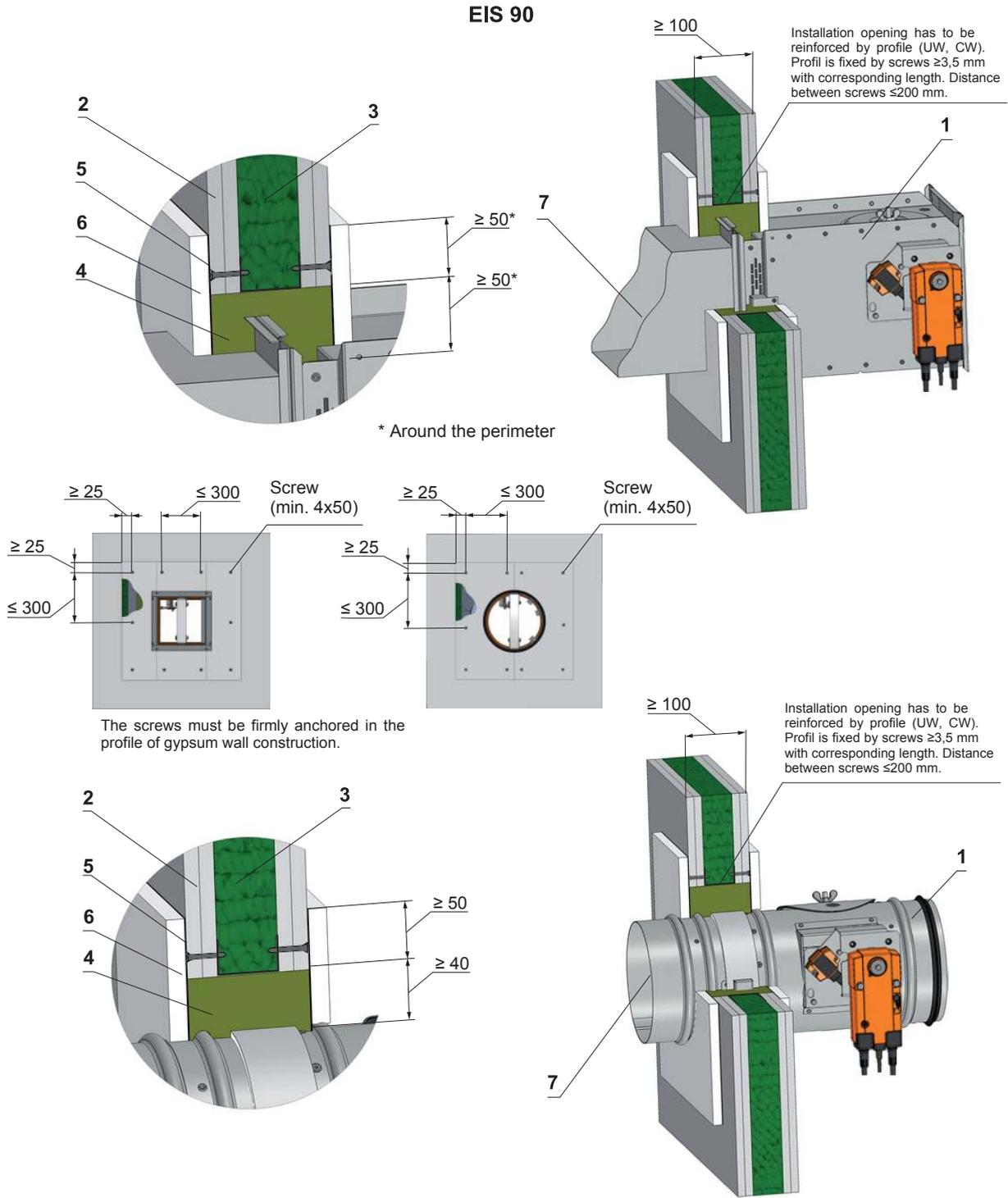


Fig. 69 Gypsum wall construction - stuffing box, fire protection mastic and cement lime plate



POSITION:

- 1 Fire damper FDMB
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 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 Duct

Used materials - example:**

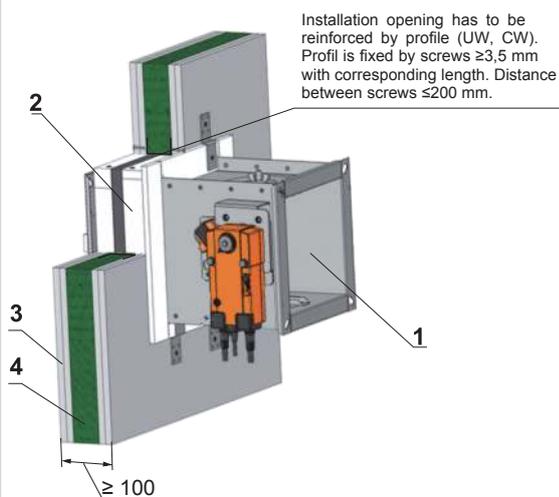
- 3 - Promapyr, Rockwool Steprock HD
- 4 - Promastop - P, K
- 5 - Promatect - H

Notice:

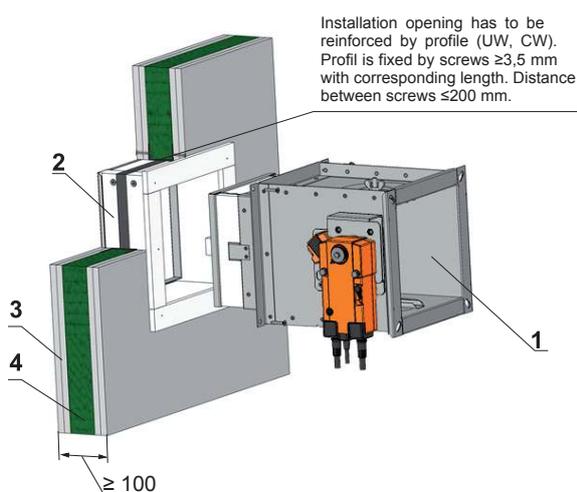
** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 70 Gypsum wall construction - installation frame E1, E3, E4, R1, R2, R3, R4, R5

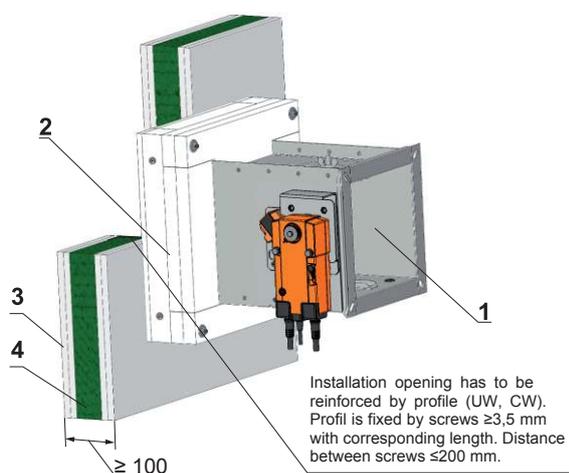
Installation frame E1



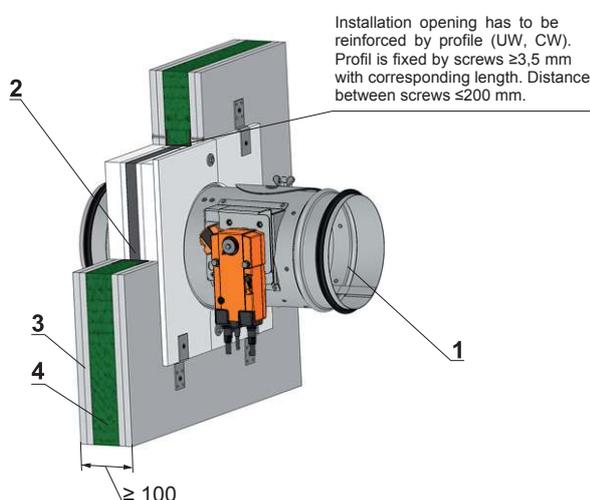
EIS 90 Installation frame E3



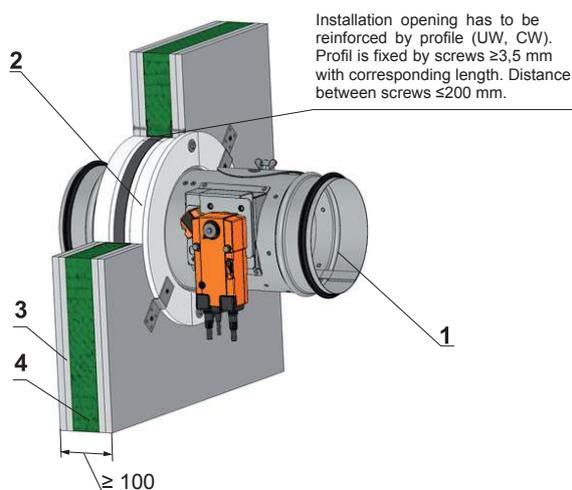
Installation frame E4



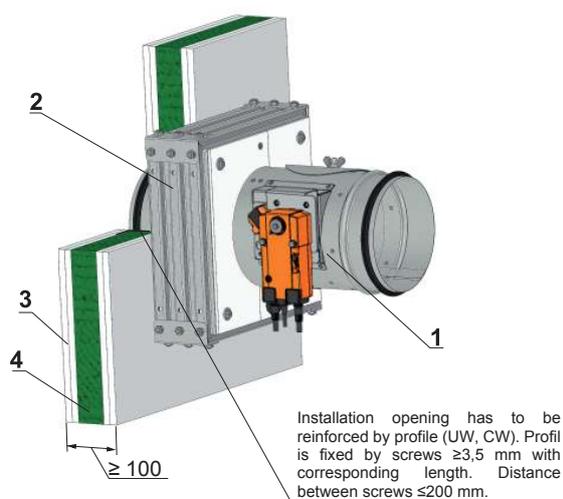
Installation frame R1, R2



Installation frame R3, R4



Installation frame R5



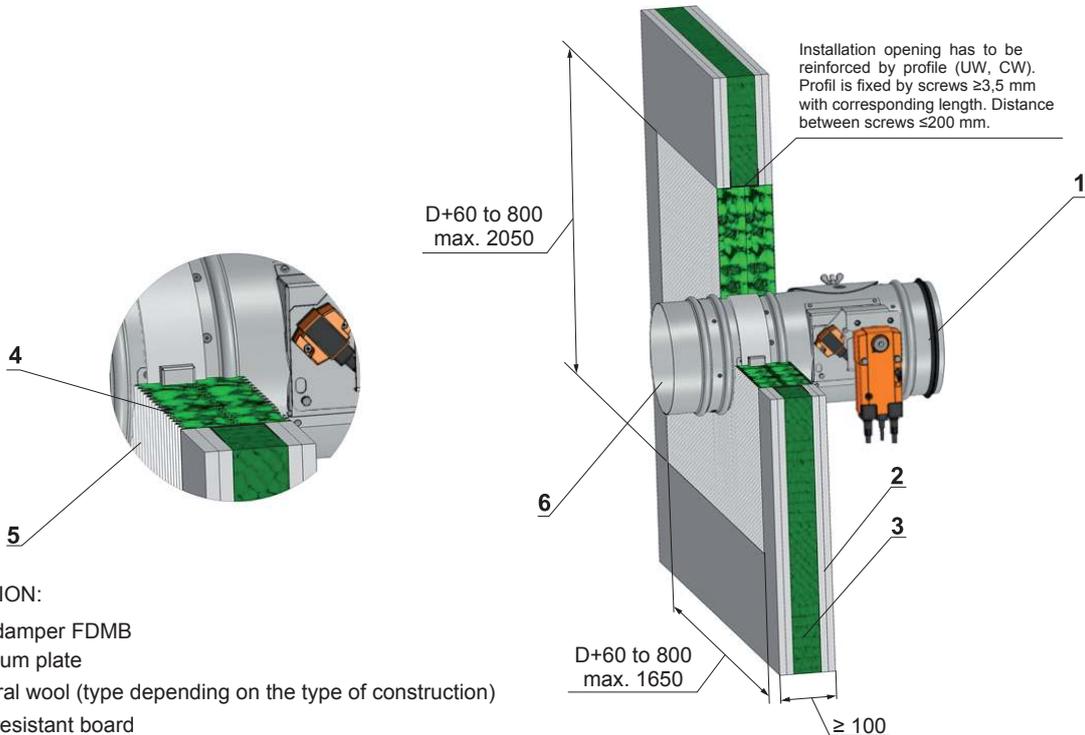
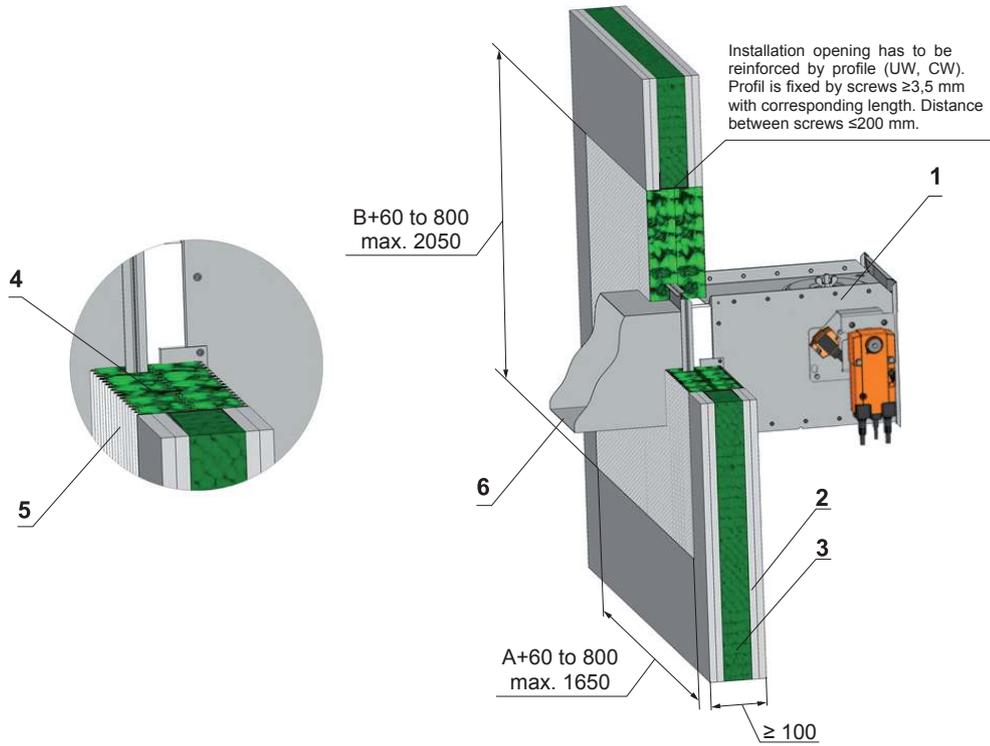
POSITION:

- 1 Fire damper FDMB
- 2 Installation frame
- 3 Gypsum plate
- 4 Mineral wool (type depending on the type of construction)

Installation details see chapter 7

Fig. 71 Gypsum wall construction - Weichschott

EIS 90



POSITION:

- 1 Fire damper FDMB
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Fire resistant board
- 5 Fire stop coating thickness 1 mm
- 6 Duct

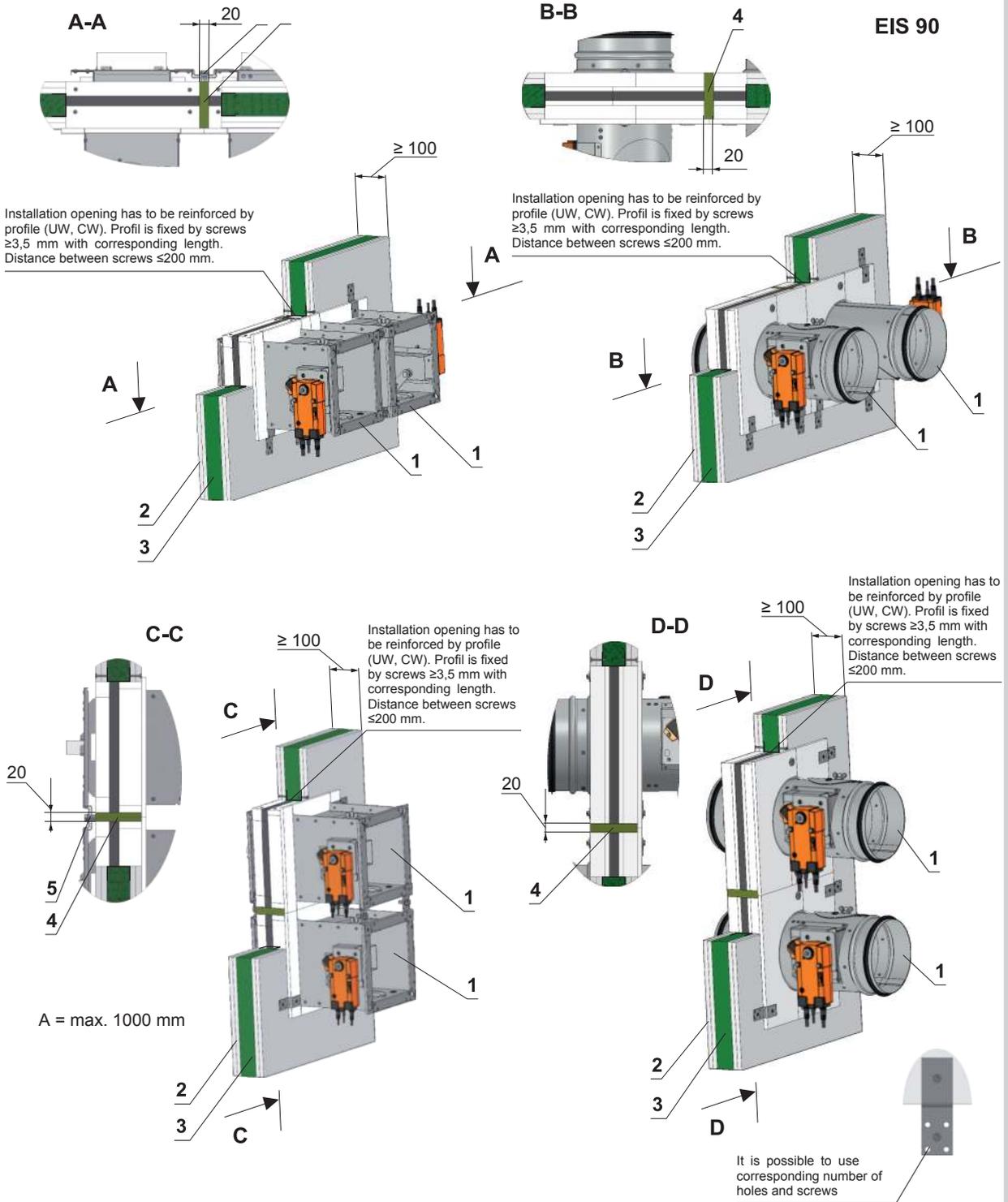
Used materials - example*:

- 4 - Hilti CFS-CT B 1S 140/50
- 5 - Hilti CFS-CT

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. 72 Gypsum wall construction - flange to flange - installation frame E1, R1



POSITION:

- 1 Fire damper FDMB with Installation frame E1, R1
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Mineral stone wool min. density 140 kg/m^3
- 5 Flange connection

Notice:

- Fire damper FDMB-C - installation opening dimensions $a \times b = (2x(A + 85^{+3}\text{mm}) + 20 \text{ mm}) \times (B + 85^{+3}\text{mm})$ or $a \times b = (A + 85^{+3}\text{mm}) \times (2x(B + 85^{+3}\text{mm}) + 20 \text{ mm})$
- Fire damper FDMB-C - installation opening dimensions $a \times b = (2x(D + 141^{+3}\text{mm}) + 20 \text{ mm}) \times (D + 141^{+3}\text{mm})$ or $a \times b = (D + 141^{+3}\text{mm}) \times (2x(D + 141^{+3}\text{mm}) + 20 \text{ mm})$
- 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
- Flange to flange connection - Up to four dampers can be installed

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

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

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

Fig. 73 Installation outside of gypsum wall construction - mineral wool

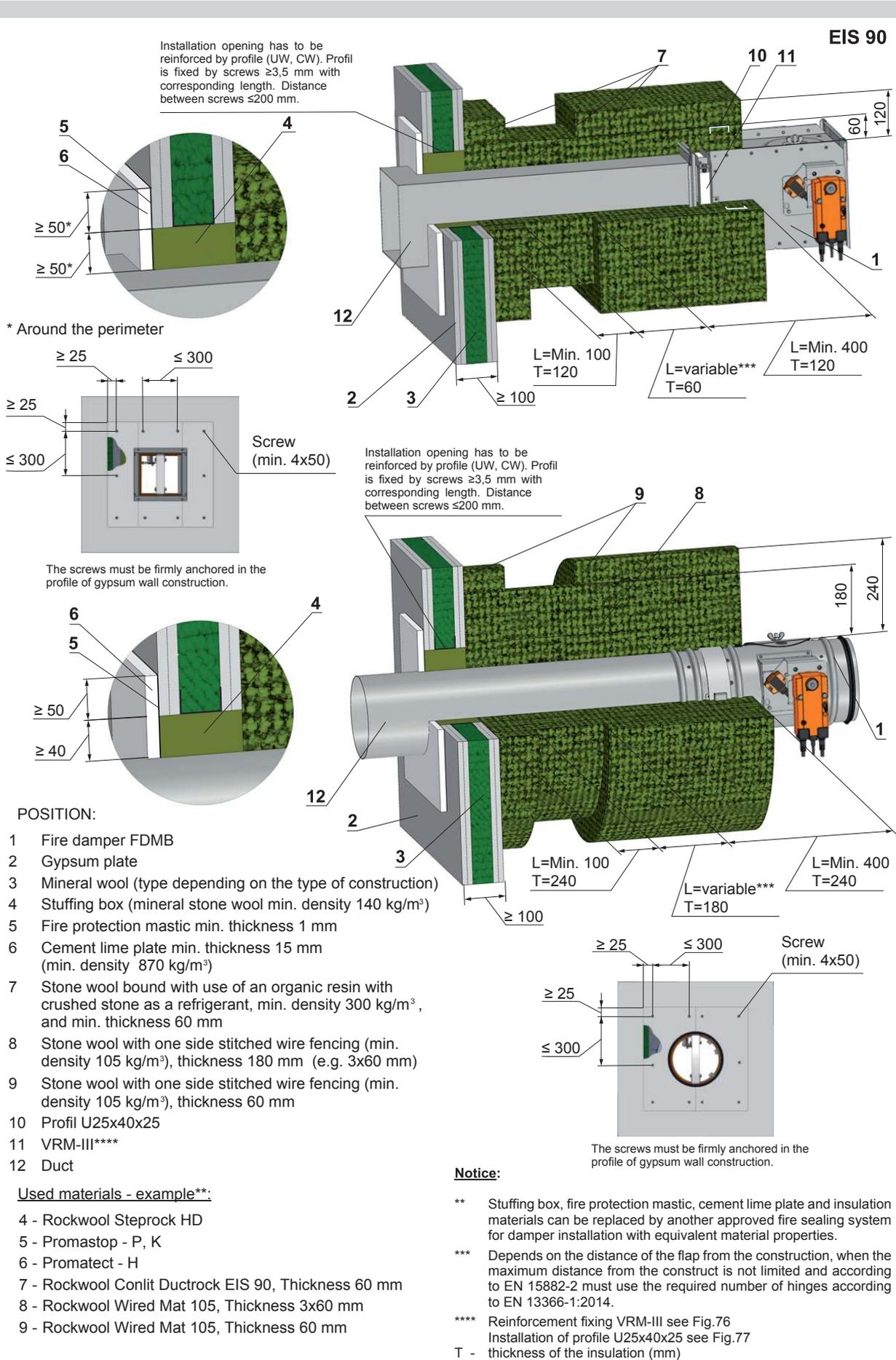
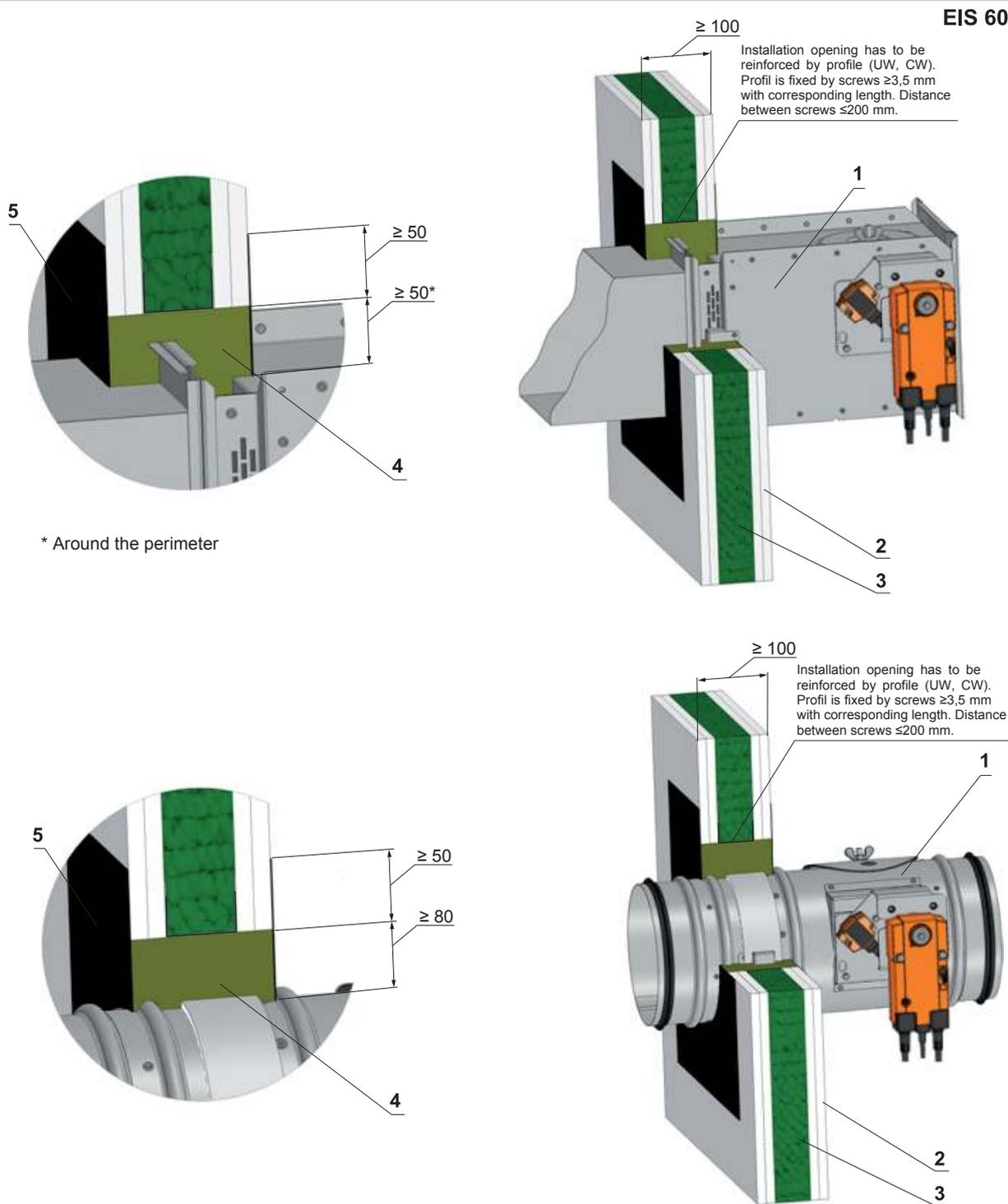


Fig. 74 Gypsum wall construction - stuffing box and fire protection mastic



LEGENDA:

- 1 Fire damper FDMB
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Stuffing box (mineral stone wool min. density 140 kg/m³)
- 5 Fire protection mastic min. thickness 1 mm

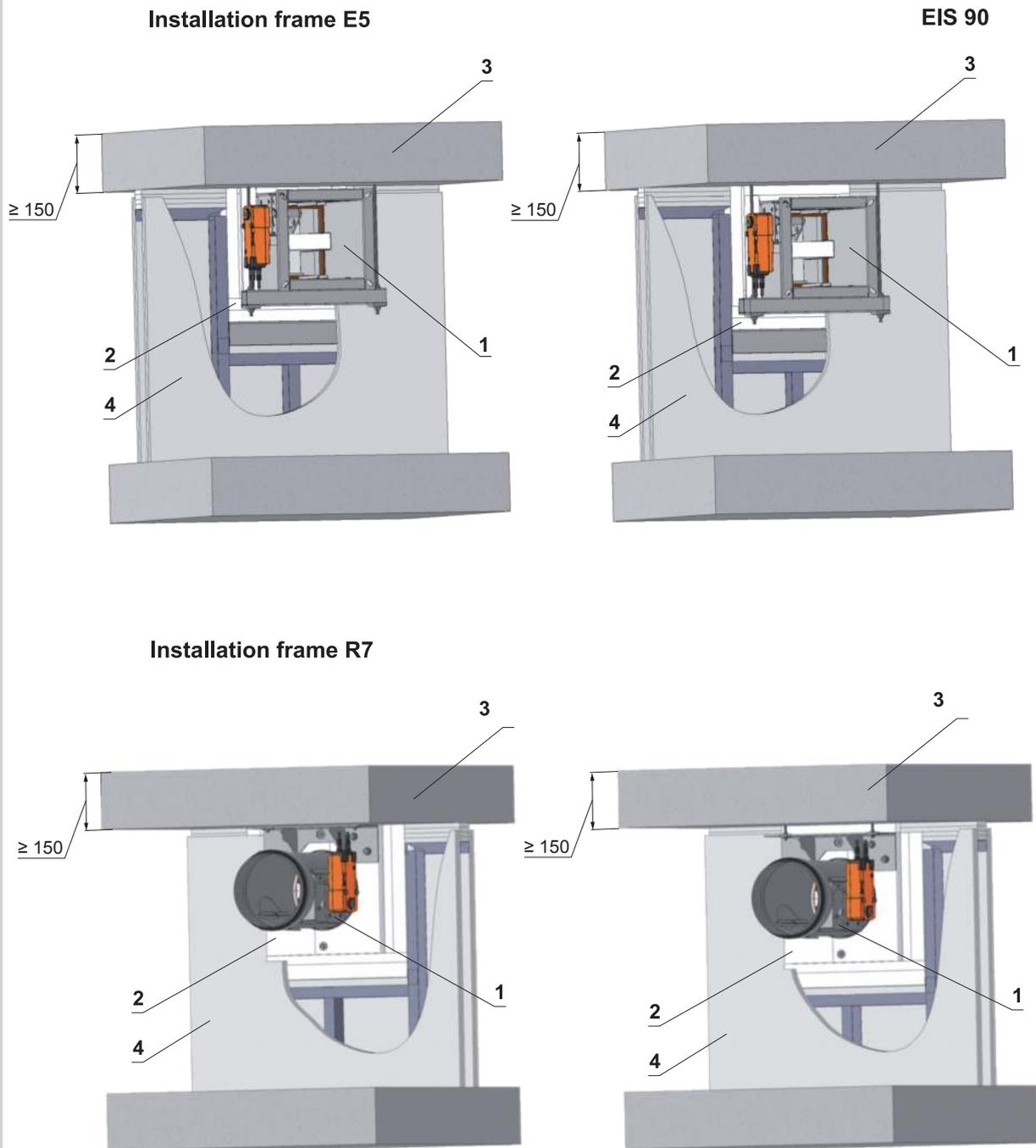
Used materials - example**:

- 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. 75 Gypsum wall construction - flexible ceiling (with possibility to move/to sag) - installation frame E5, R7



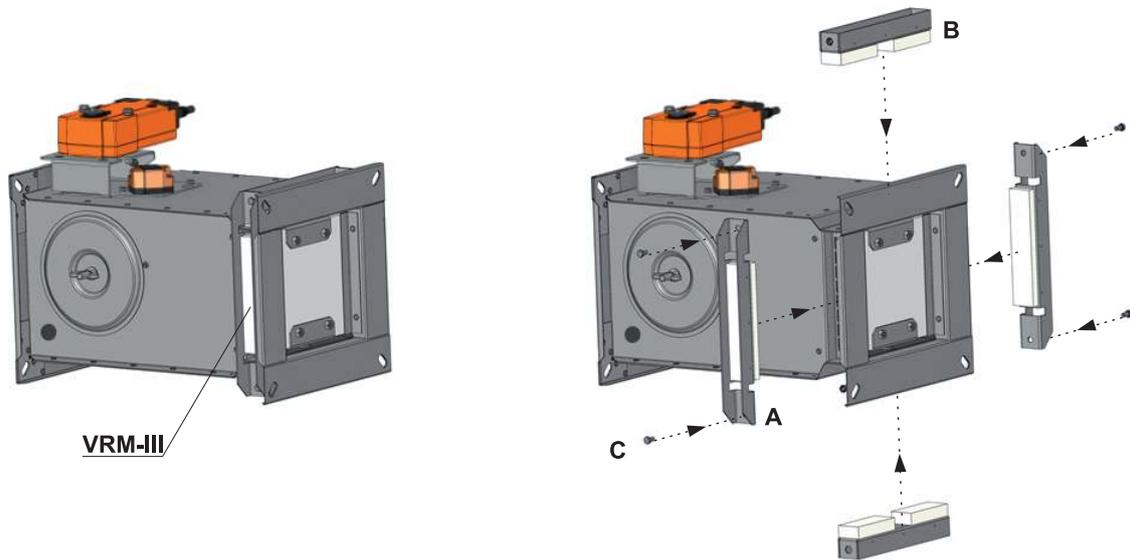
POSITION:

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

Installation details see chapter 7

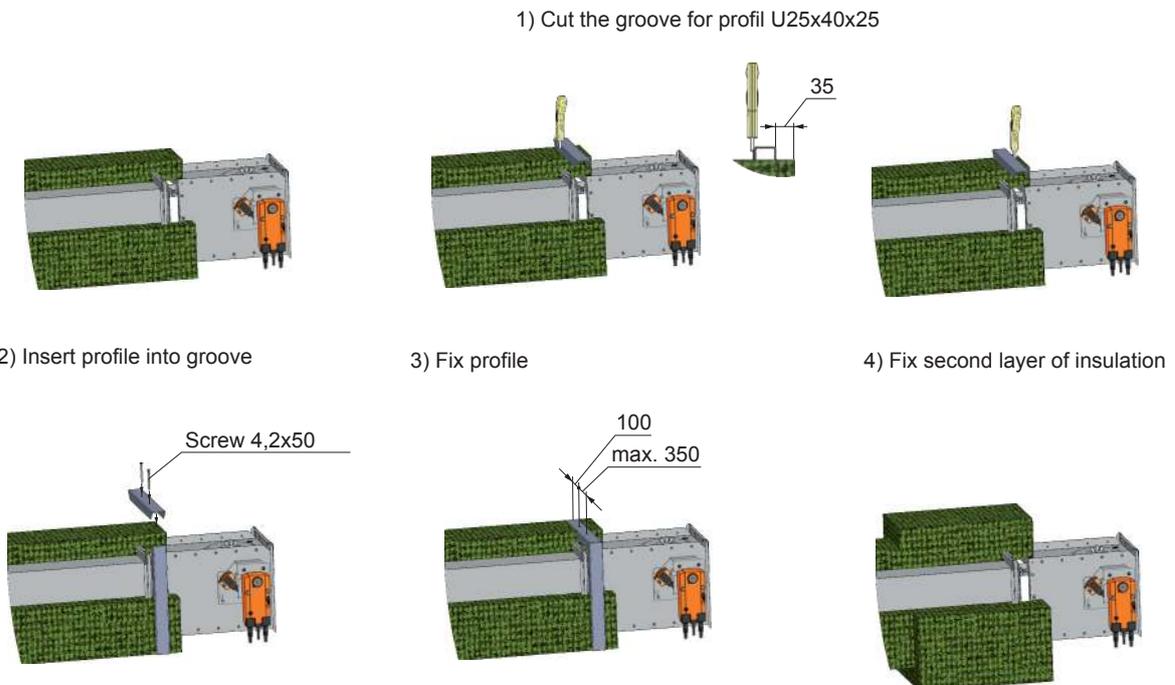
Fig. 76 Fixing of reinforcement to damper body VRM

Important: For lower fire resistance than EI90 the reinforcement VRM is not necessary !!!



- 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. 77



Installation details see chapter 7

7. Installation frames

7.1. Rectangular dampers

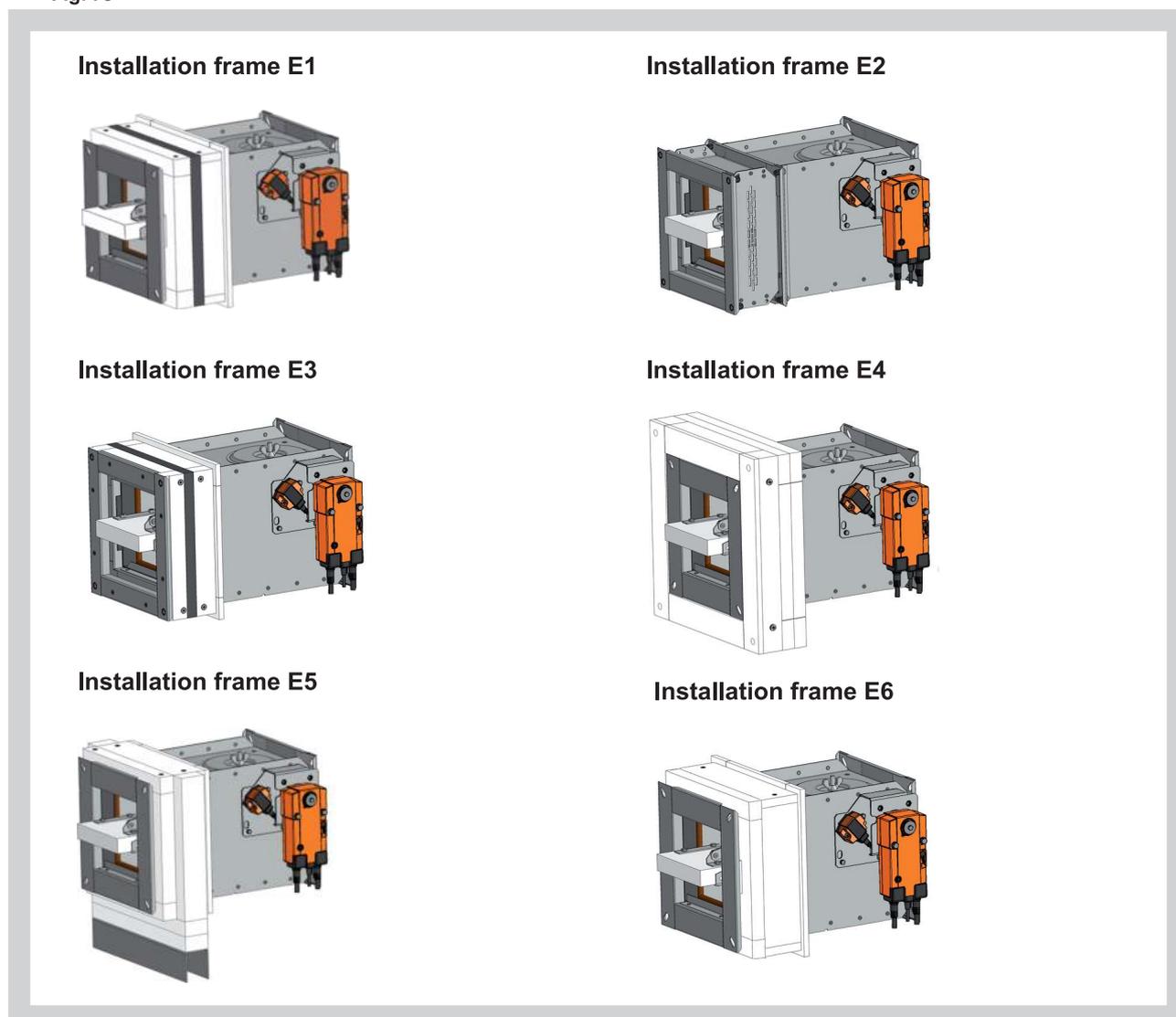
Tab. 7.1.1.

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. 78



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. 79

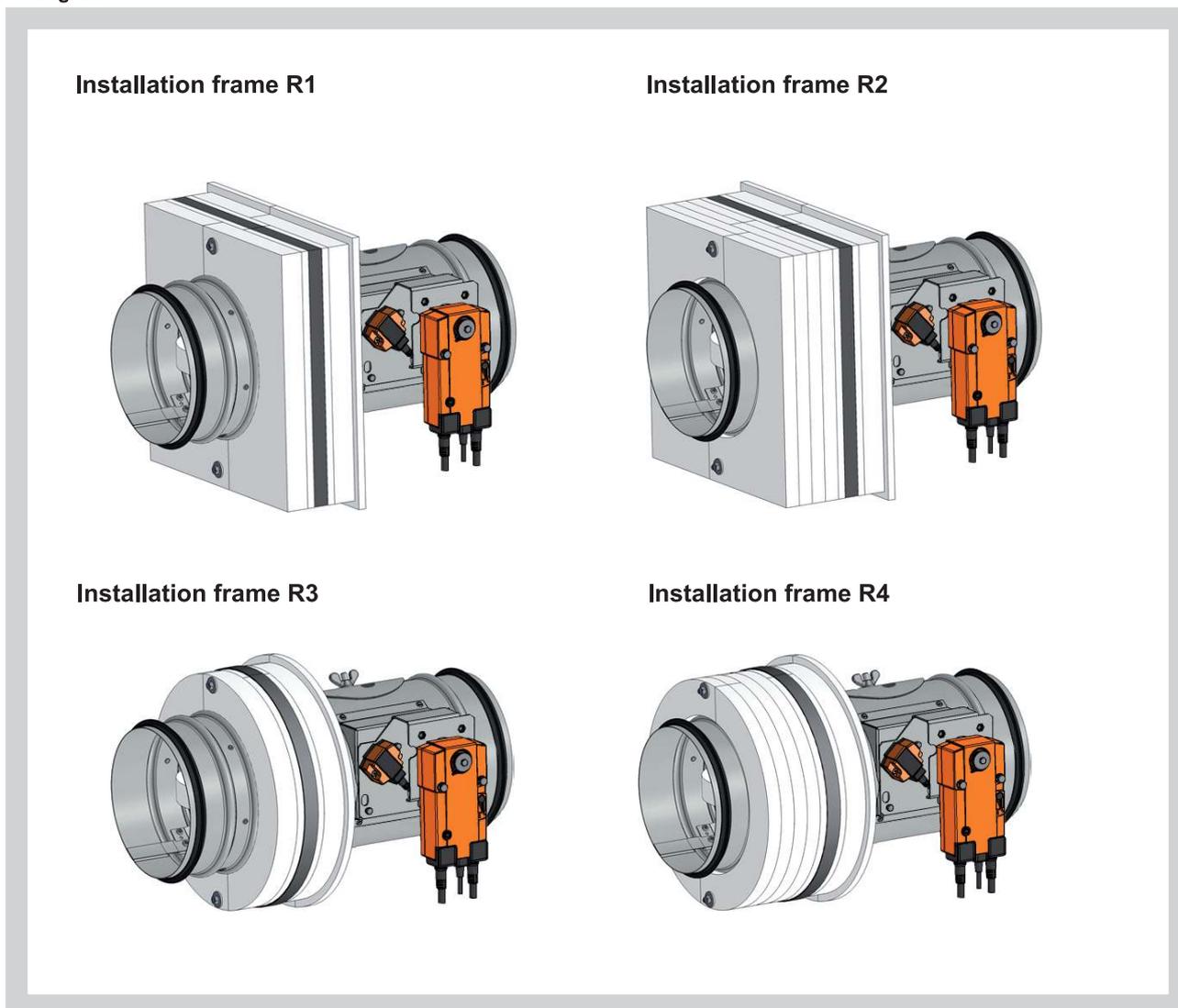
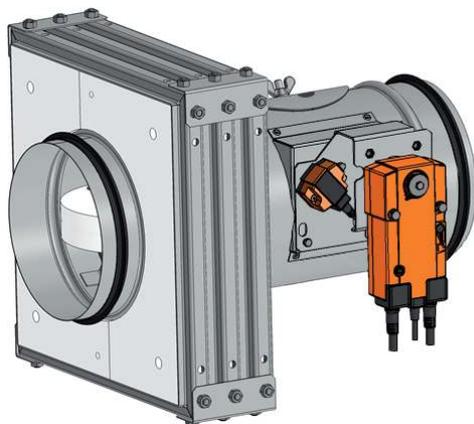
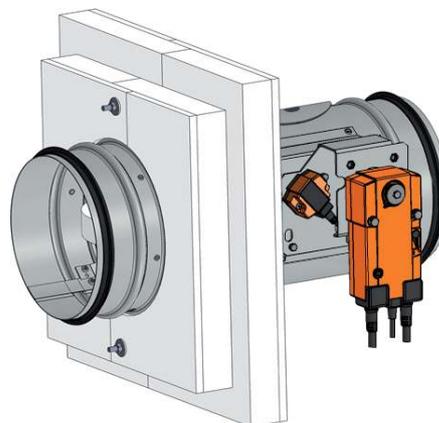


Fig. 80

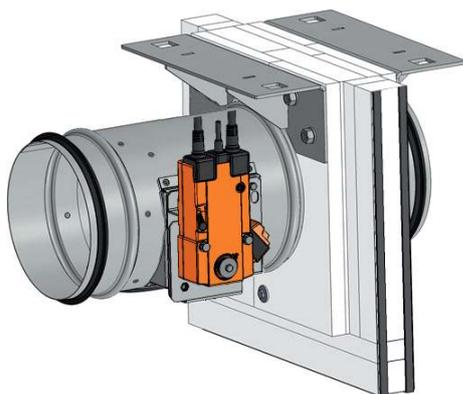
Installation frame R5



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:

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

Fig. 81 Installation frame E1

Solid wall construction

Gypsum wall construction

Solid ceiling construction

* 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/m³
- 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 11

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.

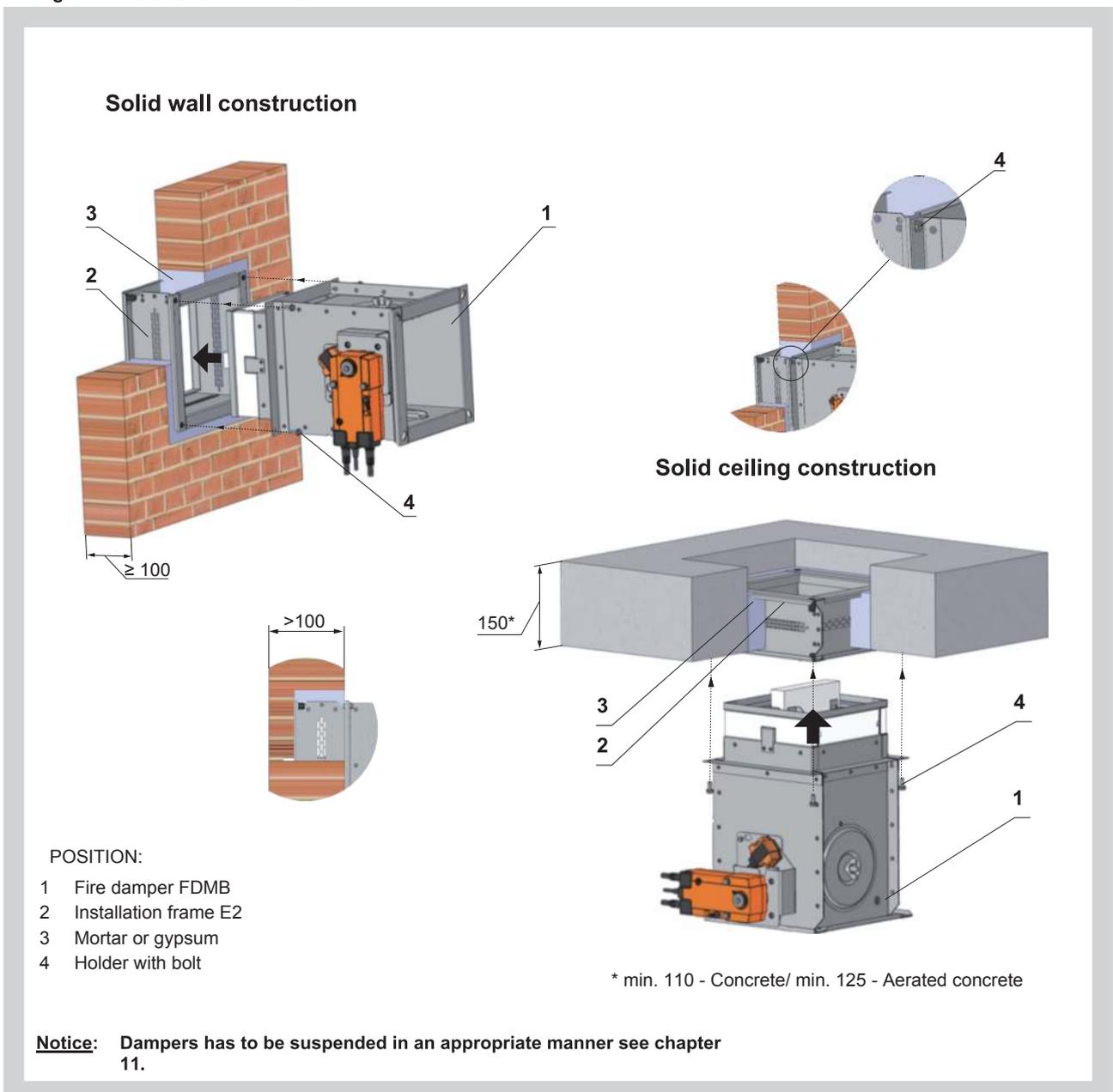
Material:

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

Installation opening:

- $a \times b = (A + 100^{+3} \text{ mm}) \times (B + 100^{+3} \text{ mm})$

Fig. 82 Installation frame E2



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.

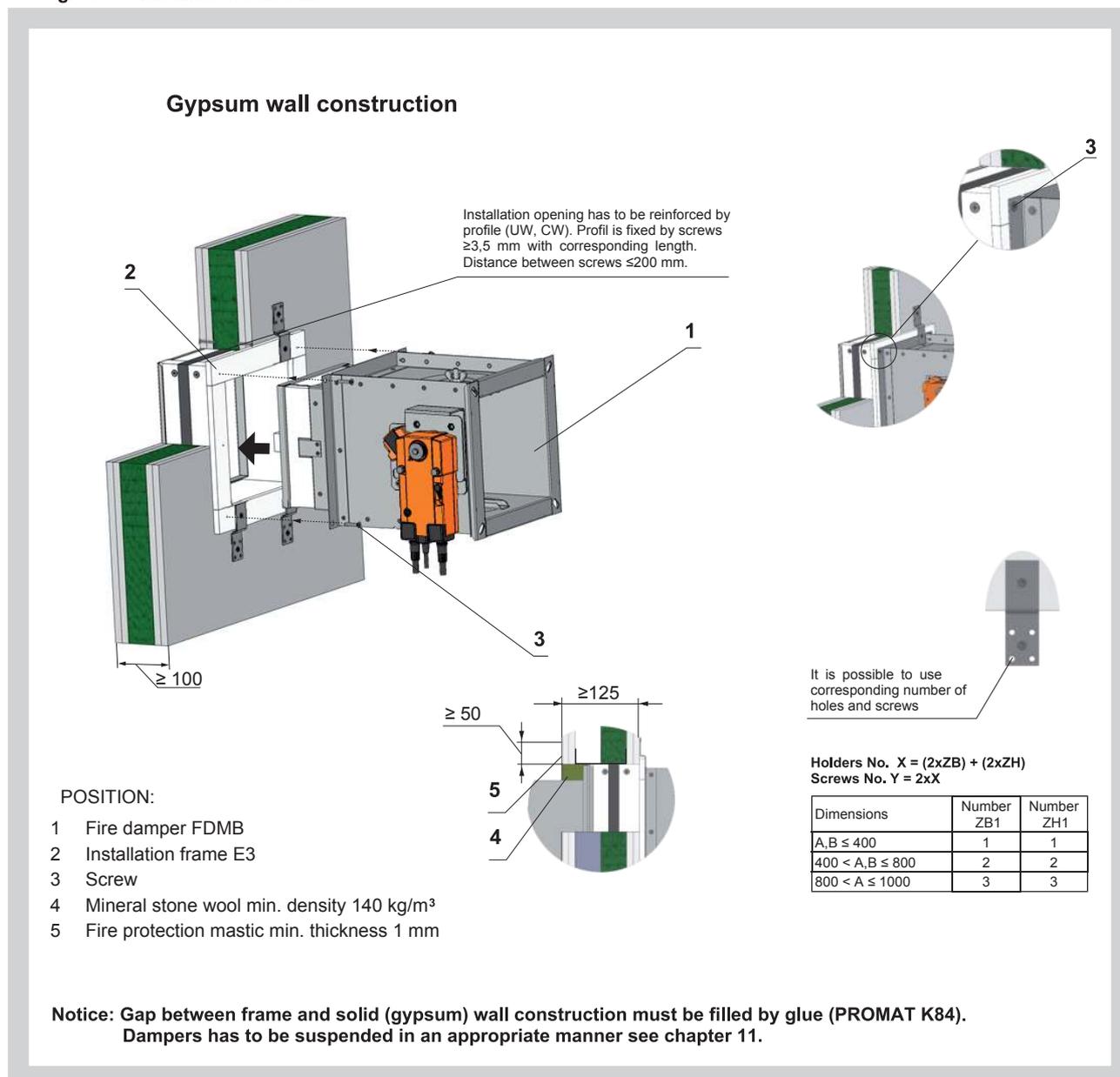
Material:

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

Installation opening:

- $a \times b = (A + 67^{+3} \text{ mm}) \times (B + 67^{+3} \text{ mm})$

Fig. 83 Installation frame E3



Installation frame E4

Installation frame E4 is suitable for:

- Installation on solid wall/ceiling construction
- Installation on gypsum wall construction
- Installation 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.

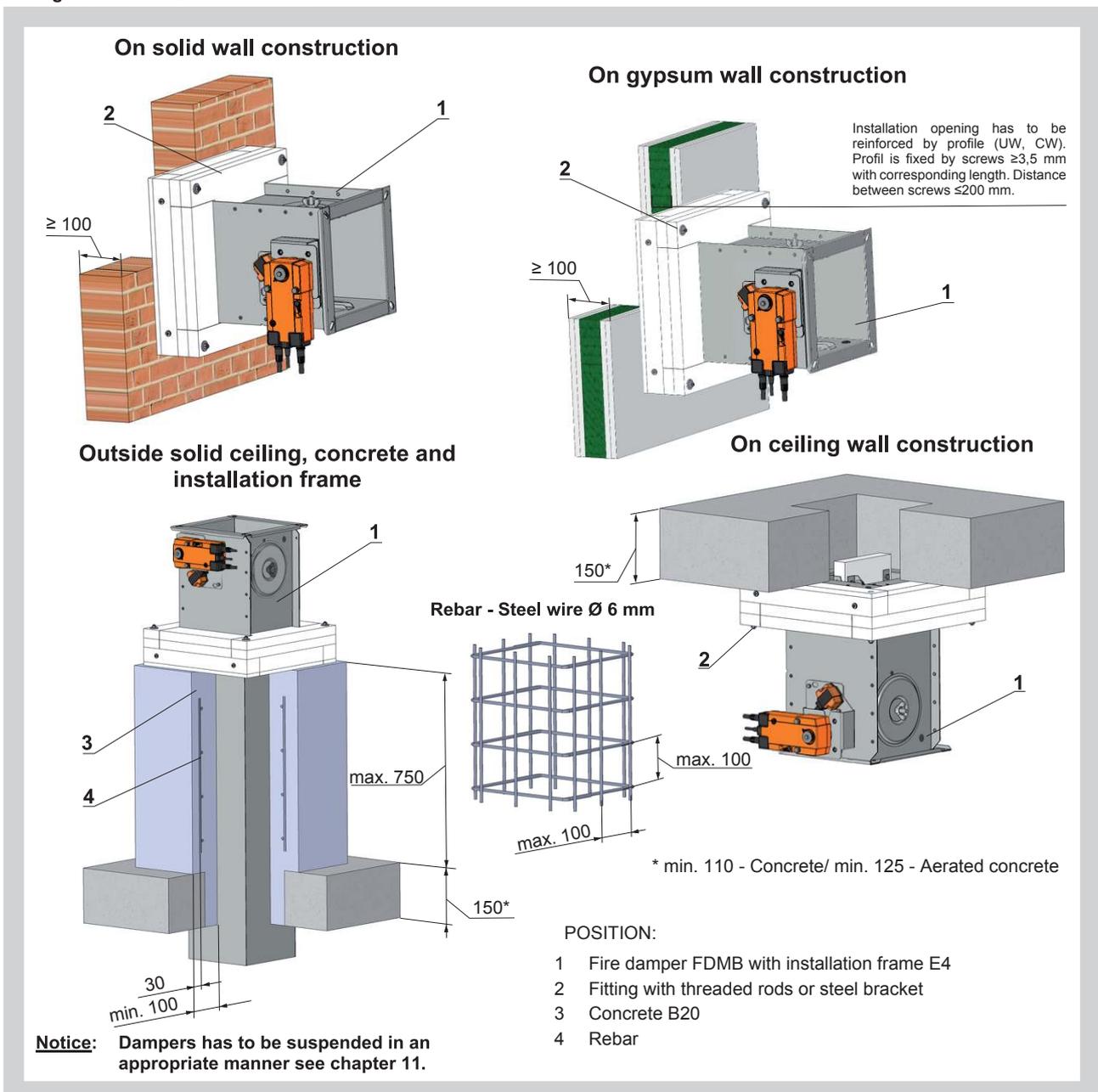
Material:

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

Installation opening:

- $a \times b = (A + 5^{+3} \text{ mm}) \times (B + 5^{+3} \text{ mm})$
- $a \times b = (A + 100^{+3} \text{ mm}) \times (B + 100^{+3} \text{ mm})$ installation with concrete

Fig. 84 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:

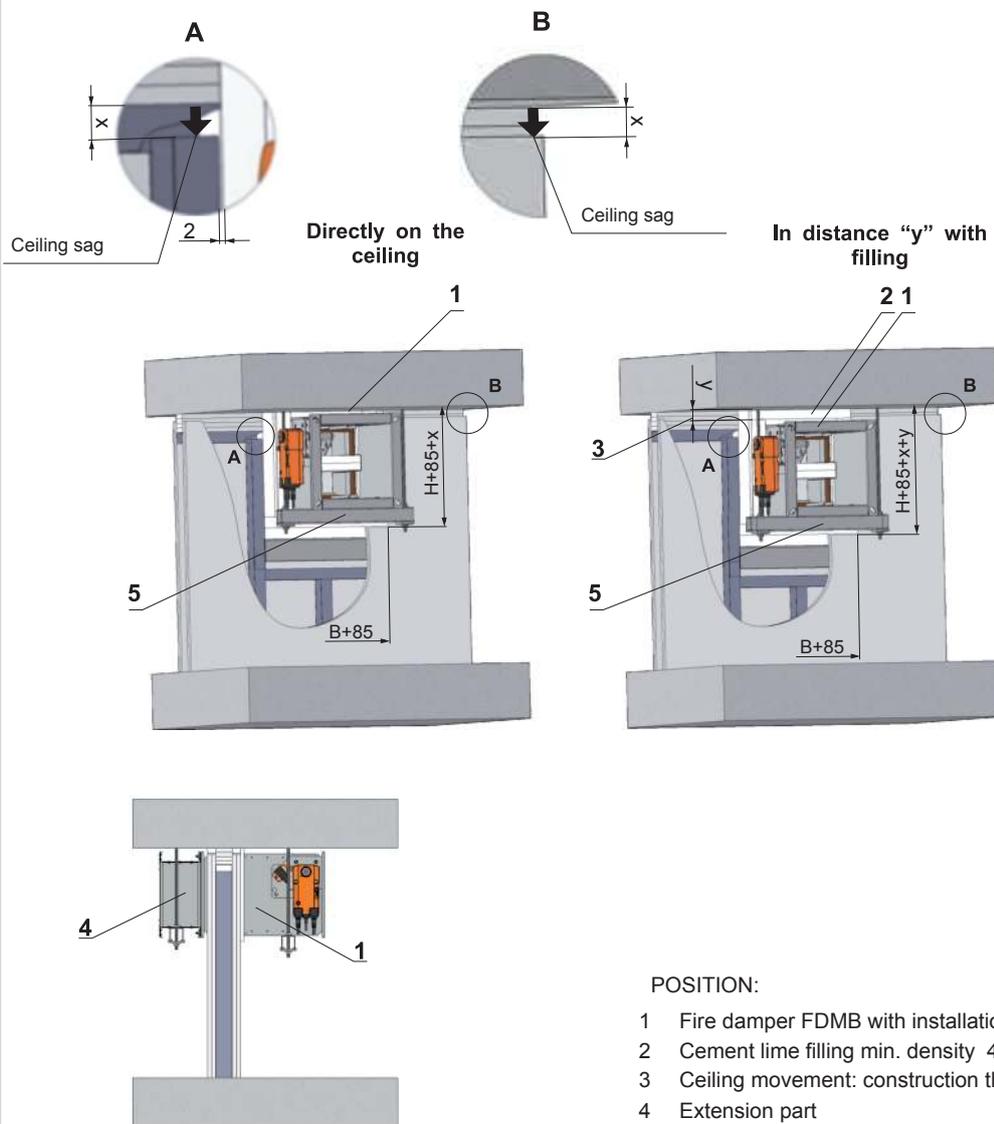
- Installation frame: cement lime plates
- Fasteners: galvanized plate

Notice:

- For ceiling movement ≥ 10 mm

Fig. 85 Installation frame E5

Gypsum wall construction with flexible ceiling (with possibility to move/to sag)



POSITION:

- 1 Fire damper FDMB with installation frame E5
- 2 Cement lime filling min. density 450 kg/m³
- 3 Ceiling movement: construction thickness 100 mm
- 4 Extension part
- 5 Suspension

X = Ceiling movement (max. 40 mm)

Y = Distance of movement (max. 80 mm)

Notice: Fitting with threaded rods or steel bracket

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.

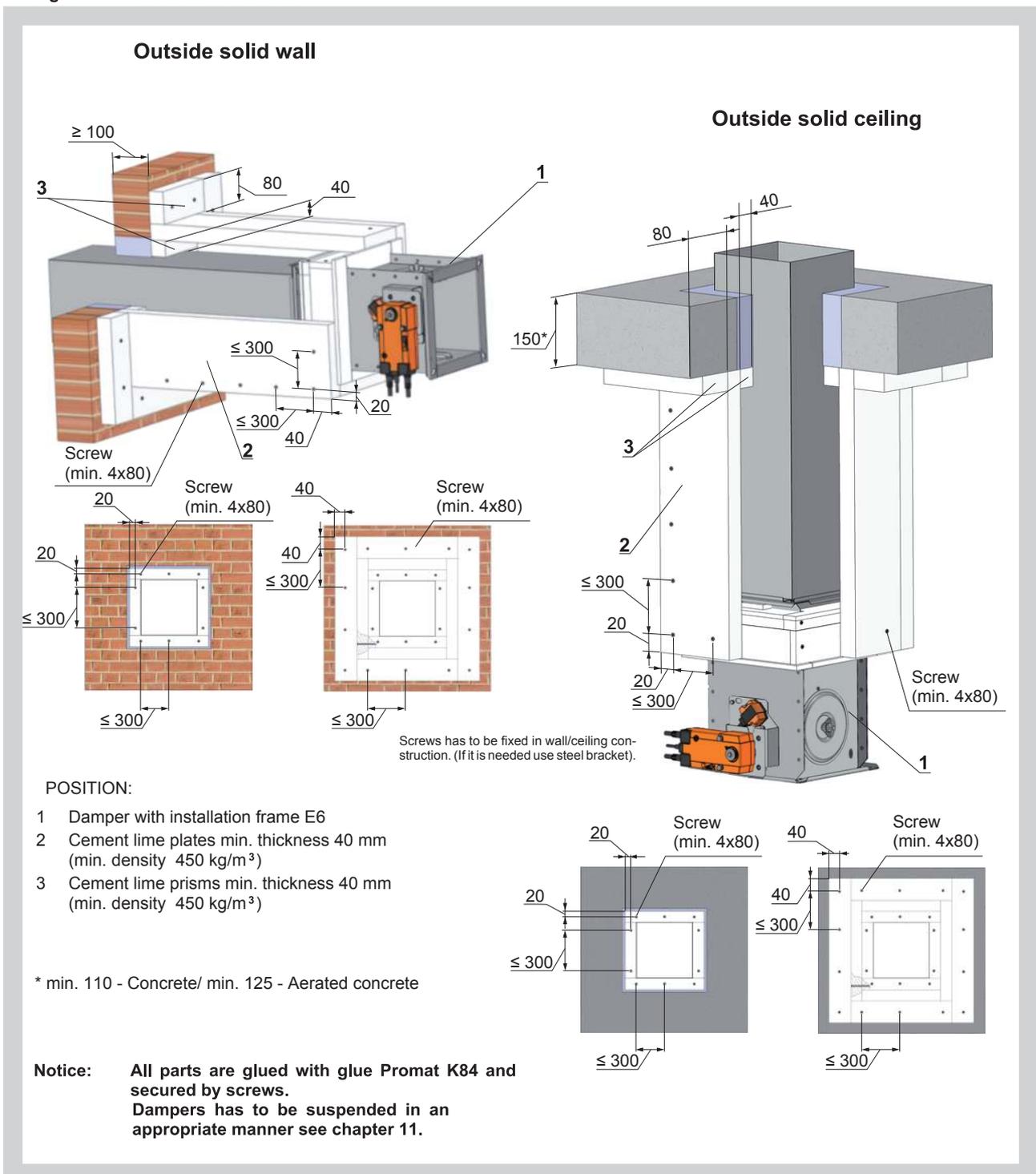
Material:

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

Installation opening:

- $a \times b = (A + 100^{+3}mm) \times (B + 100^{+3}mm)$

Fig. 86 Installation frame E6



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.

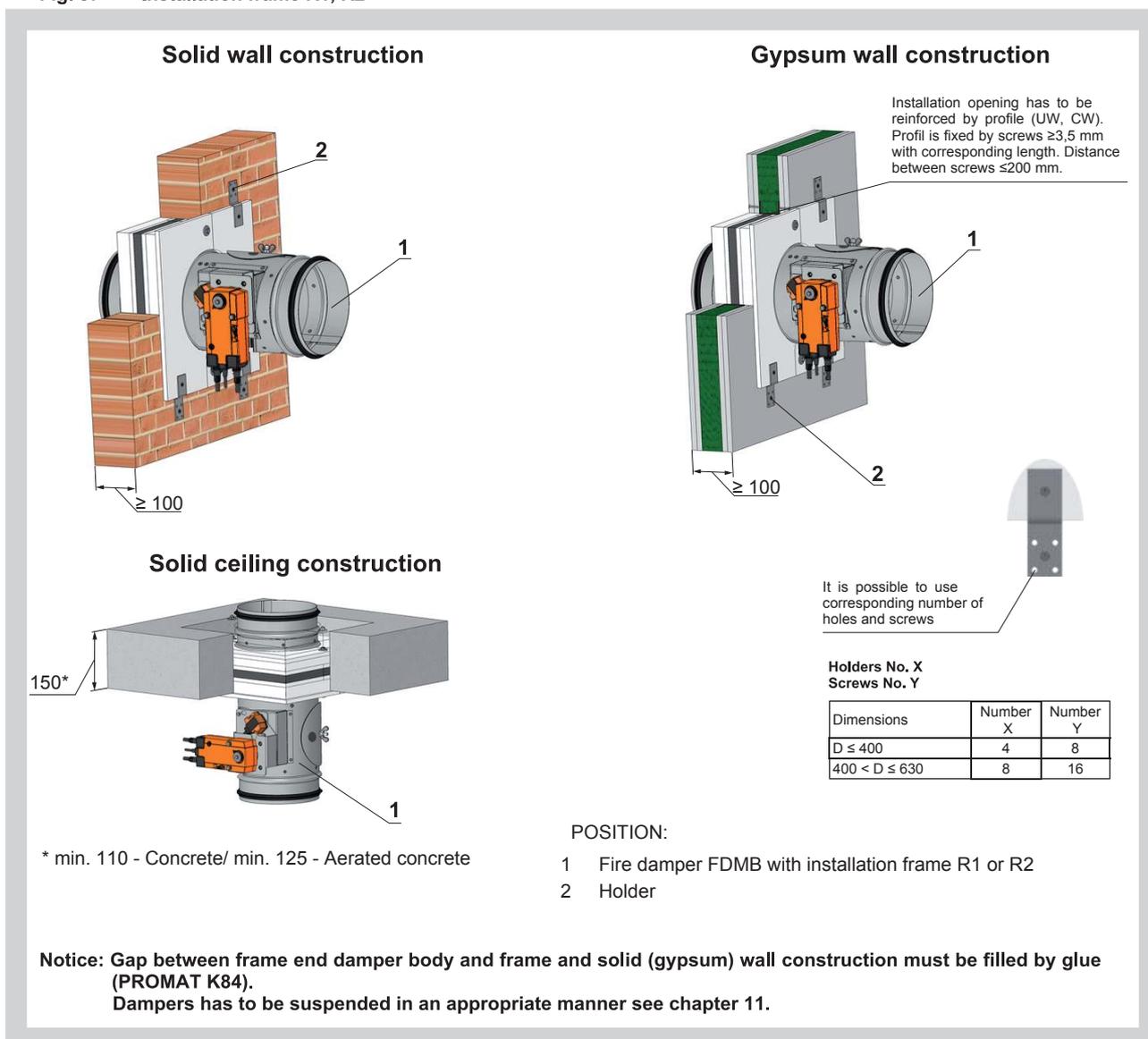
Material:

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

Installation opening:

- $a \times b = (D + 141^{+3} \text{ mm}) \times (D + 141^{+3} \text{ mm})$

Fig. 87 Installation frame R1, R2



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:

- $d = (D + 111^{+3} \text{ mm})$

Fig. 88 Installation frame R3, R4

Solid wall construction

Gypsum wall construction

Installation opening has to be reinforced by profile (UW, CW). Profil is fixed by screws $\geq 3,5$ mm with corresponding length. Distance between screws ≤ 200 mm.

It is possible to use corresponding number of holes and screws

Solid ceiling construction

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

**Holders No. X
Screws No. Y**

Dimensions	Number X	Number Y
$D \leq 400$	4	8
$400 < D \leq 630$	8	16

POSITION:

1 Fire damper FDMB with installation frame R3 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 11.

Installation frame R5

Installation frame R5 is suitable for:

- Installation on solid wall/ceiling construction
- Installation on gypsum wall construction
- Installation 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.

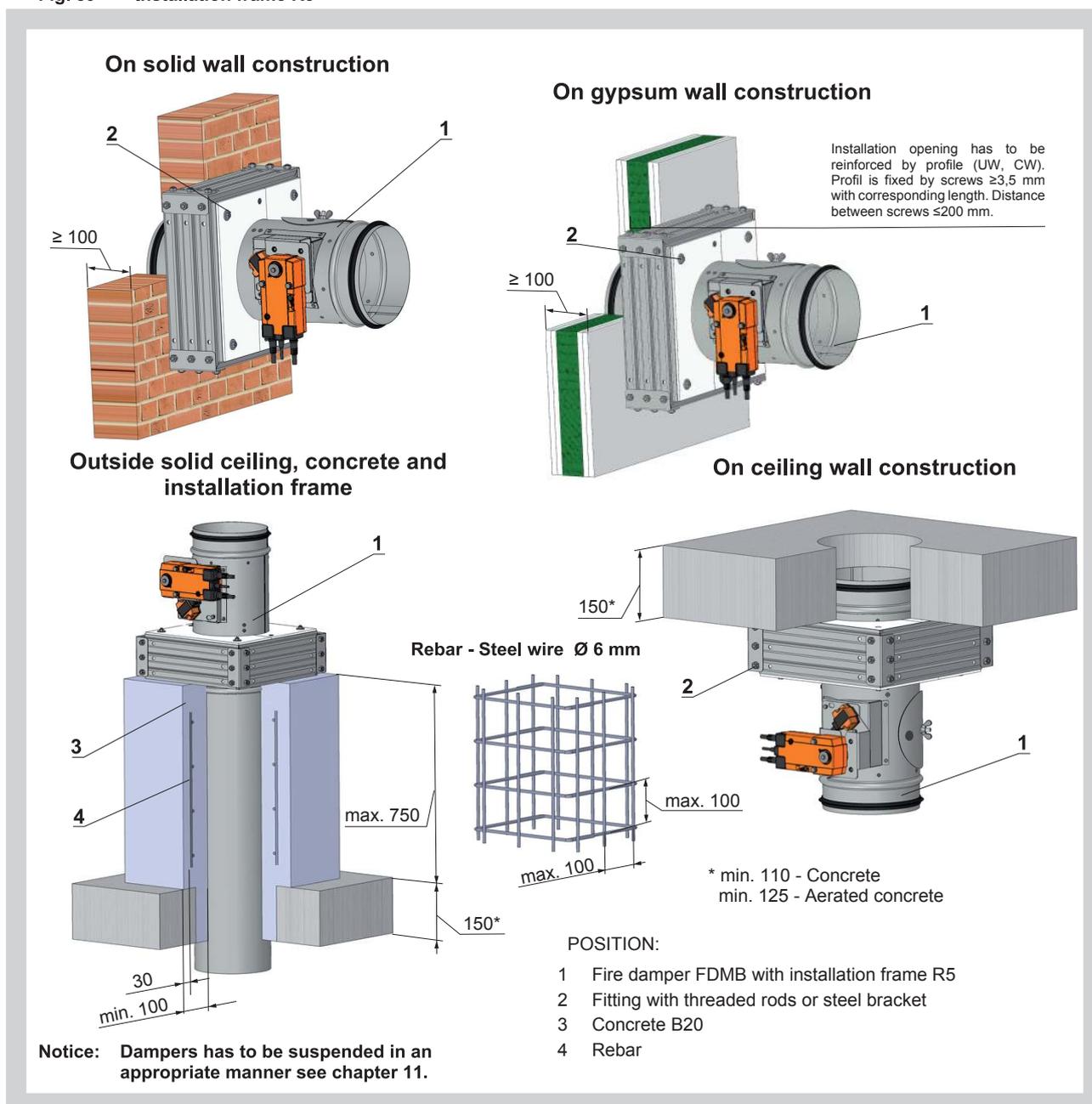
Material:

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

Installation opening:

- $d = (D + 10^{+3} \text{ mm})$
- $d = (D + 100^{+3} \text{ mm})$ installation with concrete

Fig. 89 Installation frame R5



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.

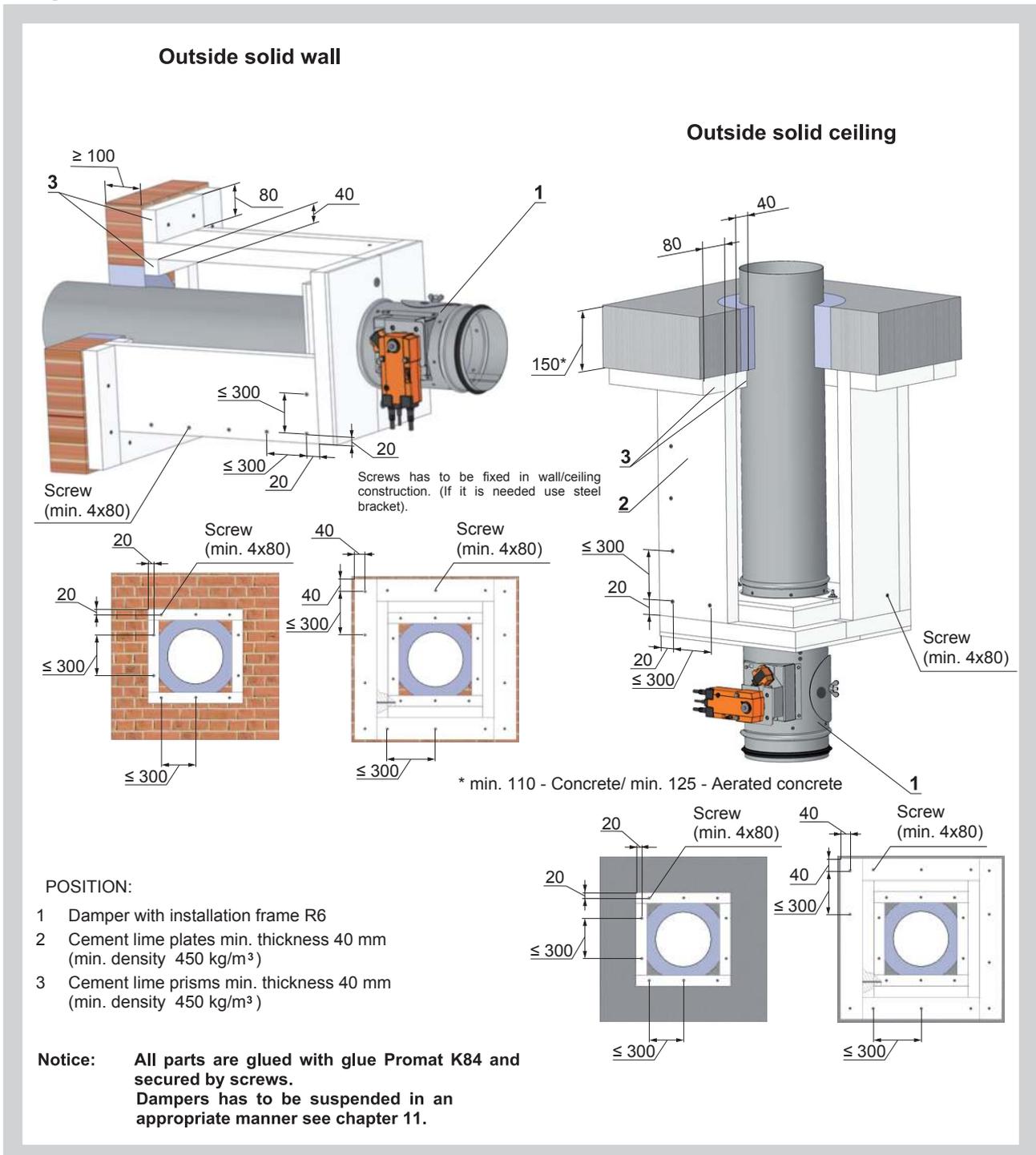
Material:

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

Installation opening:

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

Fig. 90 Installation frame R6



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:

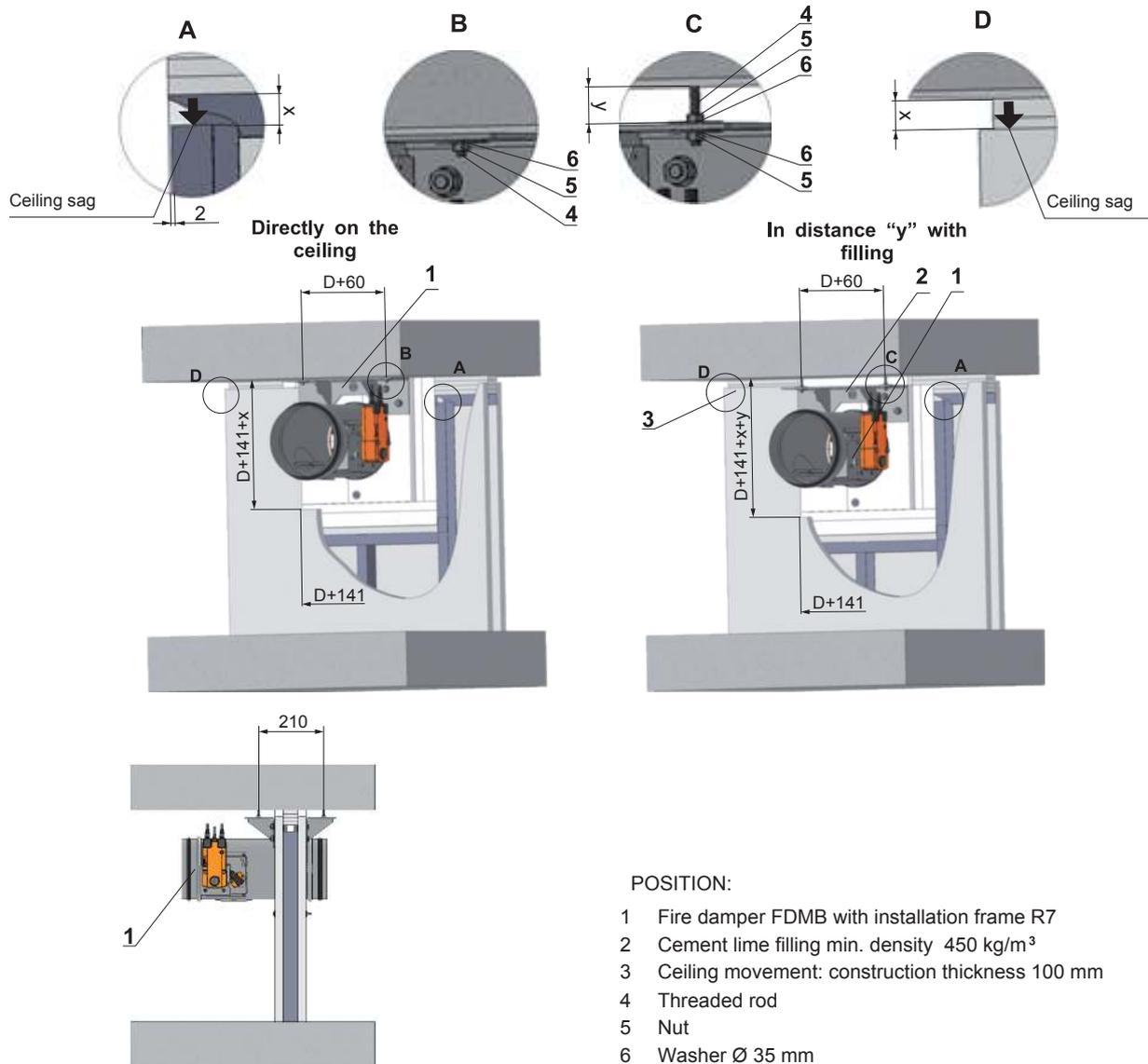
- Installation frame: cement lime plates
- Fasteners: galvanized plate

Notice:

- For ceiling movement ≥ 10 mm

Fig. 91 Installation frame R7

Gypsum wall construction with flexible ceiling (with possibility to move/to sag)



- POSITION:**
- 1 Fire damper FDMB with installation frame R7
 - 2 Cement lime filling min. density 450 kg/m³
 - 3 Ceiling movement: construction thickness 100 mm
 - 4 Threaded rod
 - 5 Nut
 - 6 Washer Ø 35 mm

Notice: Fitting with threaded rods or steel bracket.

X = Ceiling movement (max. 40 mm)
 Y = Distance of movement (max. 80 mm)

8. Thin shaft walls

Thin shaft wall description

Shaft wall is a vertical, non-bearing partition construction meeting the double-sided fire requirements. The shaft wall can be mounted only from one side. No mineral insulation is used in the construction.

First of all, the shaft wall structure must be laid out. Apart from other vertical constructions, the perimeter sections must be fitted with connection sealing made from A1 or A2 fire reaction materials (for instance floor strips Orsil N/PP). The perimeter sections must be anchored using steel plugs \varnothing 6 mm (for example DN6 or ZHOP) with 500 mm span.

Sheathing is carried out using two layers of Glasroc F boards Ridurit with 20 mm thickness, the boards are oriented horizontally. First sheathing layer is fixed with TN 212 screws in spacing 200mm to the support structure. The boards are mounted to tight butt joints without need of cementing. The second sheathing layer is screwed to the first sheathing layer using screws Rodurit in square net 250 mm. Reset of joints of the first and second layer of Ridurit sheathing is set to 600 mm vertically and 300 mm horizontally.

Assembly with support structure

Vertical intermediate R-CW sections are fixed in 1000 mm layout spacing between R-UW sections and vertical perimeter R-CW sections.

Assembly without support structure

Maximum width of the shaft wall is 2 metres in this case (board length). Steel squares made from steel galvanized plate metal 40/20/1 mm are used as perimeter sections, they are anchored to bearing wall using \varnothing 6 mm steel plugs (for example DN6 or ZHOP) with 500 mm spacing.

Fig. 92

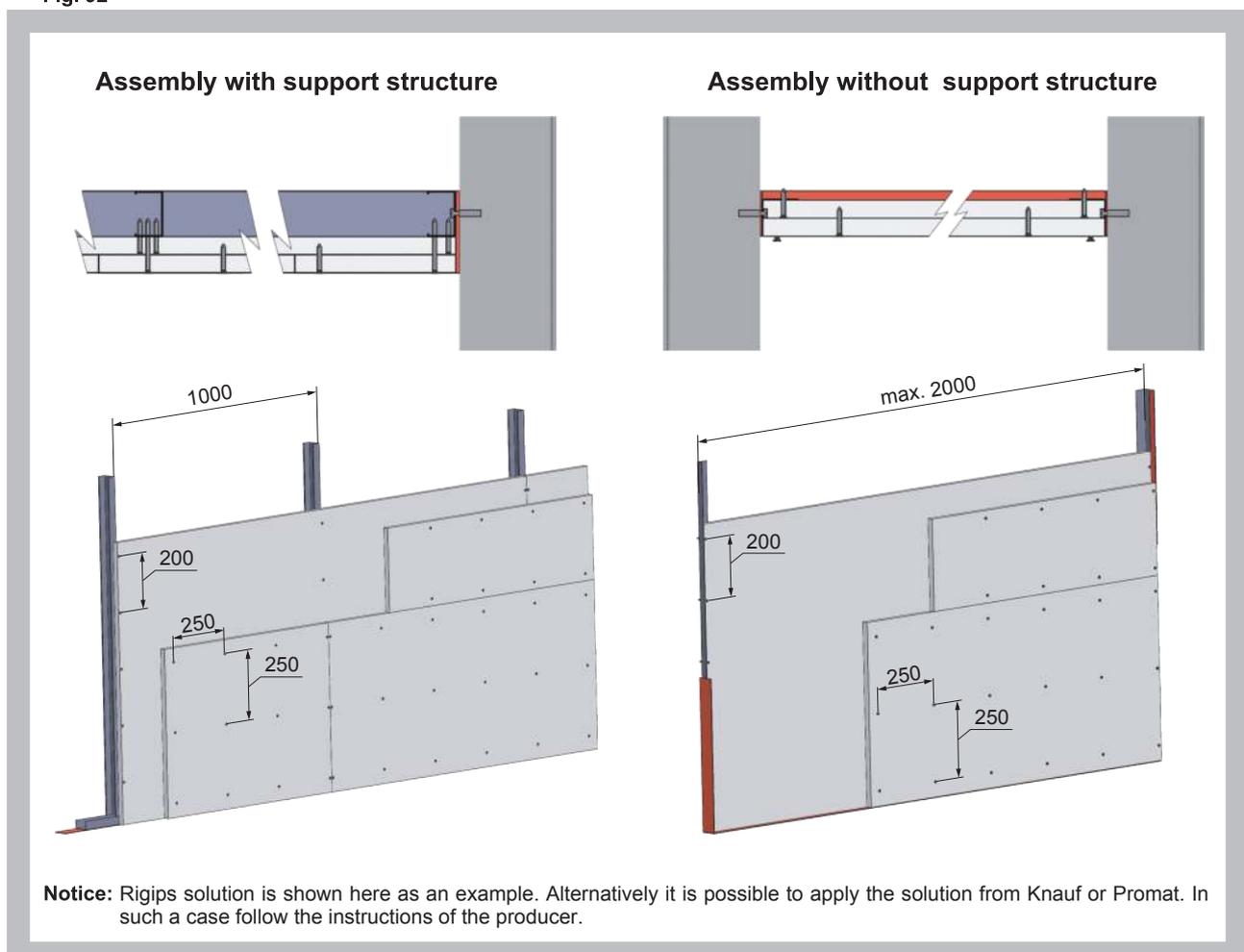


Fig. 93 Thin shaft wall - mortar or gypsum - RECTANGULAR DAMPER

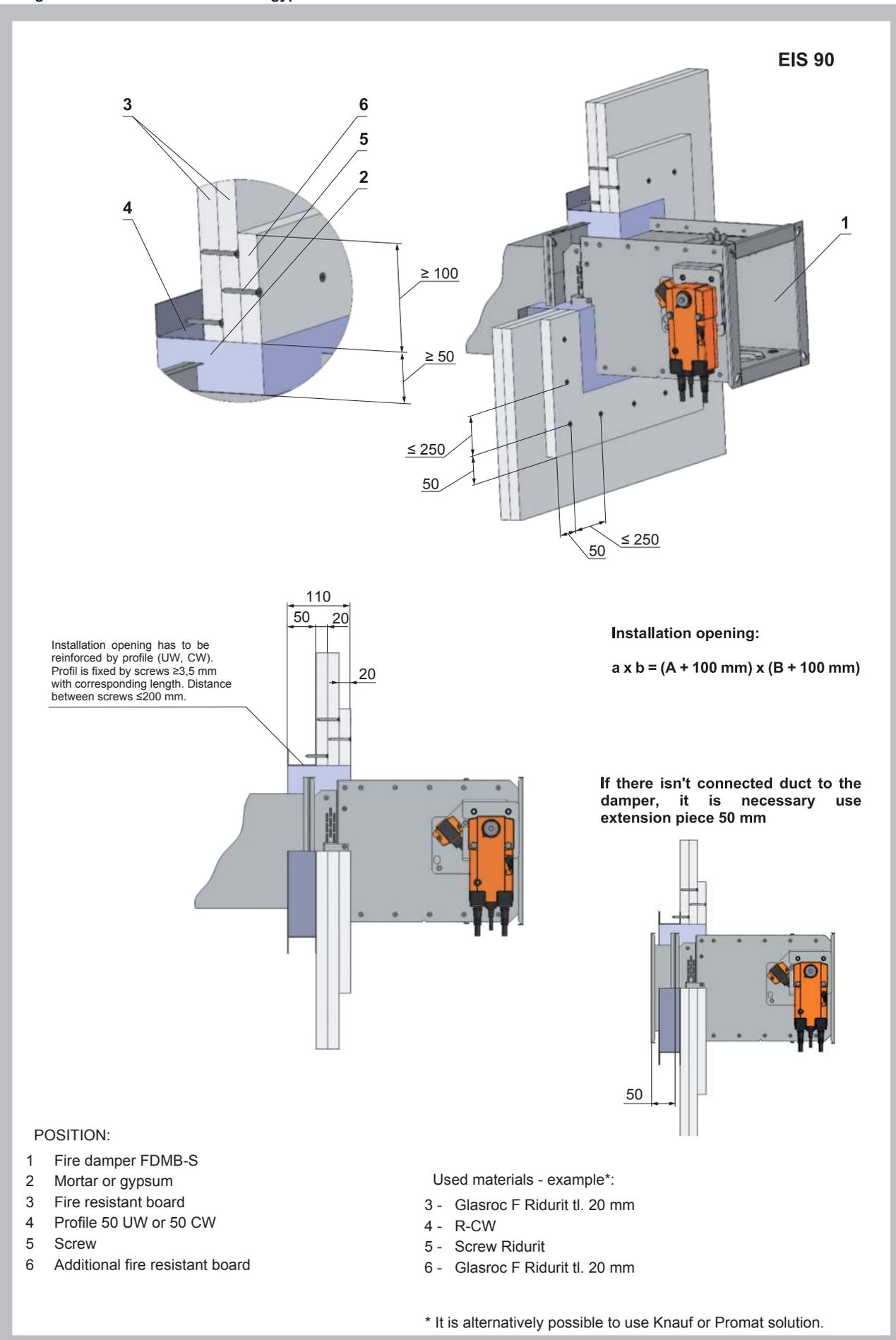
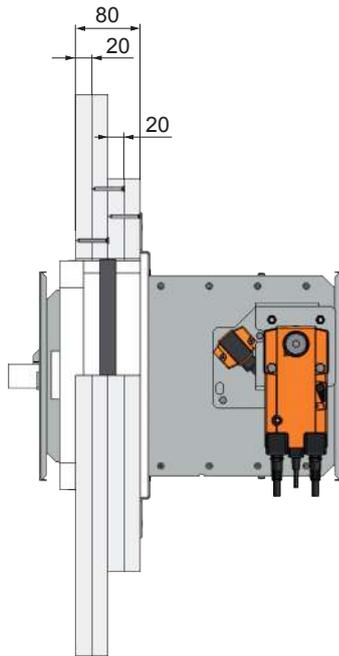
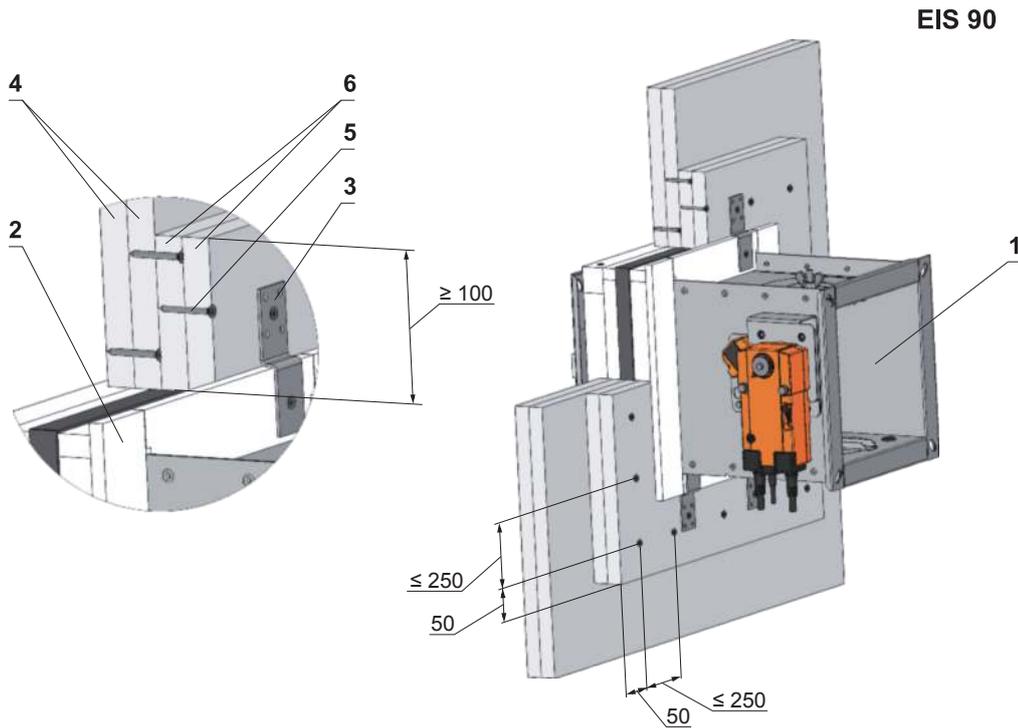
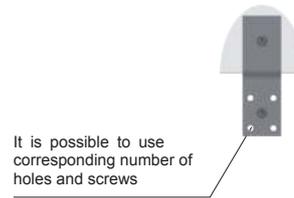


Fig. 94 Thin shaft wall - Installation frame E1 - RECTANGULAR DAMPER



Installation opening:

$$a \times b = (A + 85^{+3} \text{mm}) \times (B + 85^{+3} \text{mm})$$



Holders No. $X = (2 \times ZB) + (2 \times ZH)$
 Screws No. $Y = 2 \times X$

Dimensions	Number ZB1	Number ZH1
$A, B \leq 400$	1	1
$400 < A, B \leq 800$	2	2
$800 < A \leq 1000$	3	3

POSITION:

- 1 Fire damper FDMB-S
- 2 Installation frame E1
- 3 Holder (including in installation frame E1 packing)
- 4 Fire resistant board
- 5 Screw
- 6 Additional fire resistant board

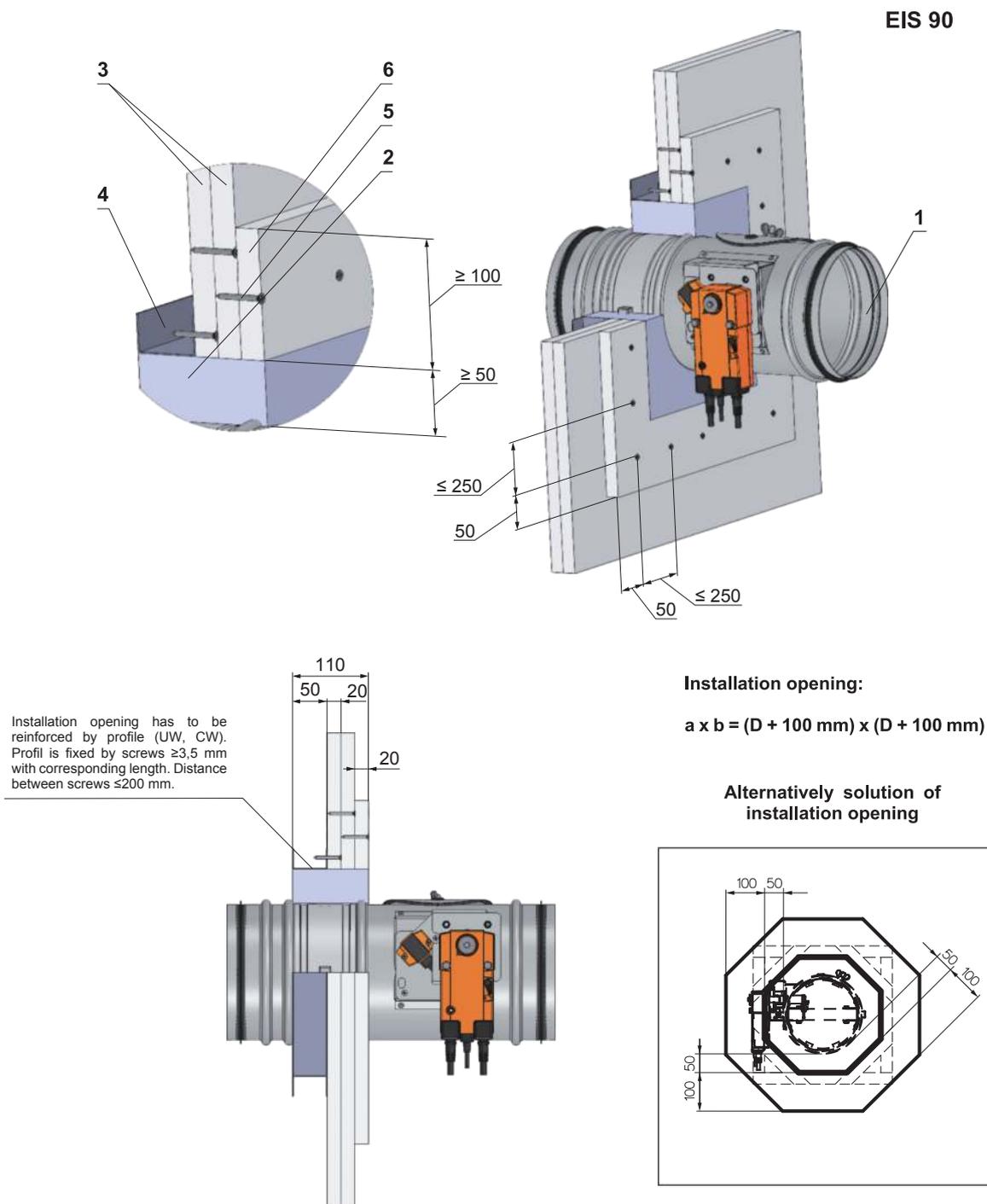
Used materials - example*:

- 4 - Glasroc F Ridurit tl. 20 mm
- 5 - Screw Ridurit
- 6 - Glasroc F Ridurit tl. 20 mm

* It is alternatively possible to use Knauf or Promat solution.

Notice: Gap between frame and thin shaft wall construction must be filled by glue (PROMAT K84).
 Dampers has to be suspended in an appropriate manner see chapter 11.

Fig. 95 Thin shaft wall - mortar or gypsum - ROUND DAMPER



POSITION:

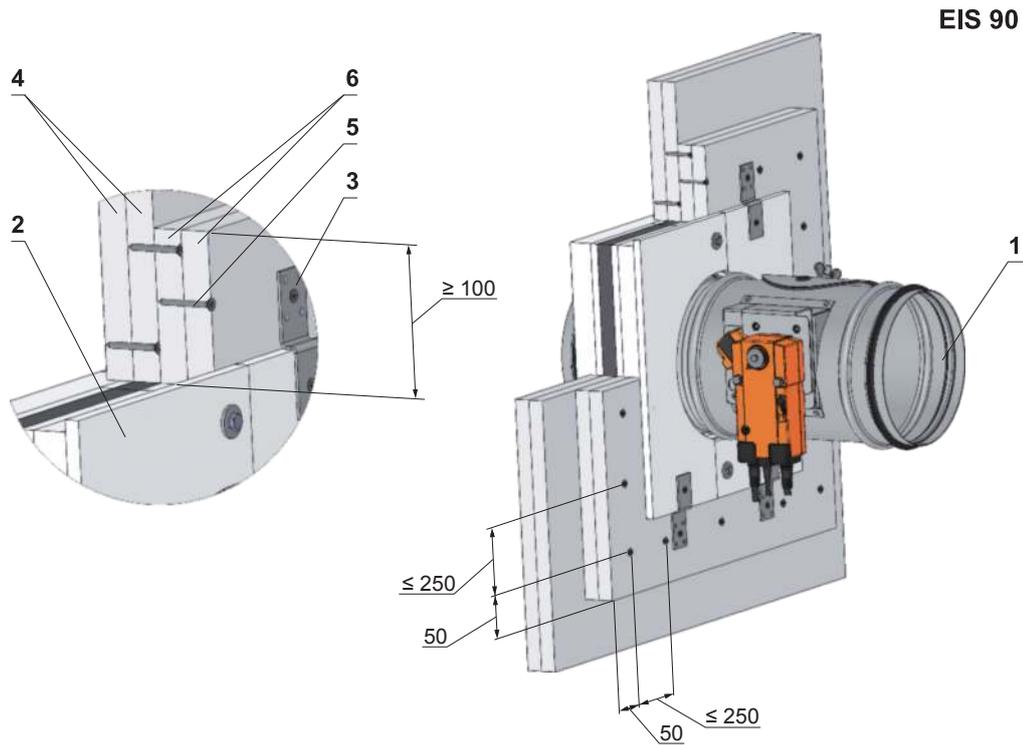
- 1 Fire damper FDMA-R
- 2 Mortar or gypsum
- 3 Fire resistant board
- 4 Profile 50 UW or 50 CW
- 5 Screw
- 6 Additional fire resistant board

Used materials - example*:

- 3 - Glasroc F Ridurit tl. 20 mm
- 4 - R-CW
- 5 - Screw Ridurit
- 6 - Glasroc F Ridurit tl. 20 mm

* It is alternatively possible to use Knauf or Promat solution.

Fig. 96 Thin shaft wall - Installation frame R1 - ROUND DAMPER



EIS 90

Installation opening:

$$a \times b = (D + 141^{+3} \text{ mm}) \times (D + 141^{+3} \text{ mm})$$

It is possible to use corresponding number of holes and screws

Holders No. X
Screws No. Y

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

POSITION:

- 1 Fire damper FDMB-S
- 2 Installation frame R1
- 3 Holder (including in installation frame R1 packing)
- 4 Fire resistant board
- 5 Screw
- 6 Additional fire resistant board

Used materials - example*:

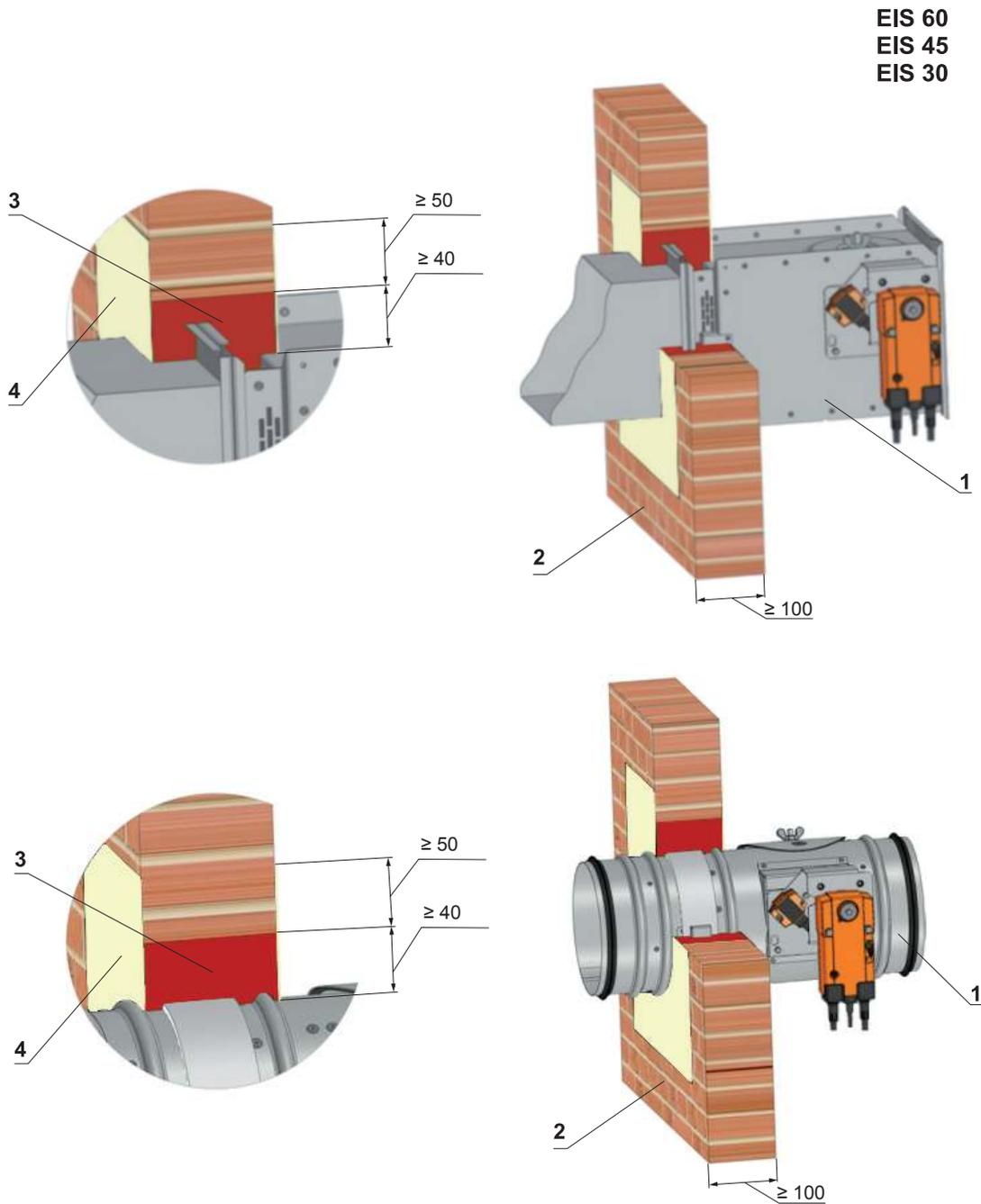
- 4 - Glasroc F Ridurit tl. 20 mm
- 5 - Screw Ridurit
- 6 - Glasroc F Ridurit tl. 20 mm

* It is alternatively possible to use Knauf or Promat solution.

Notice: Gap between frame and thin shaft wall construction must be filled by glue (PROMAT K84).
Dampers has to be suspended in an appropriate manner see chapter 11.

9. Installation in Fire resistant foam

Fig. 97 Solid wall construction - Fire resistant foam covered by stucco plaster



- POSITION:
- 1 Fire damper FDMB
 - 2 Solid wall
 - 3 Fire resistant foam
 - 4 Stucco plaster
 - 5 Duct

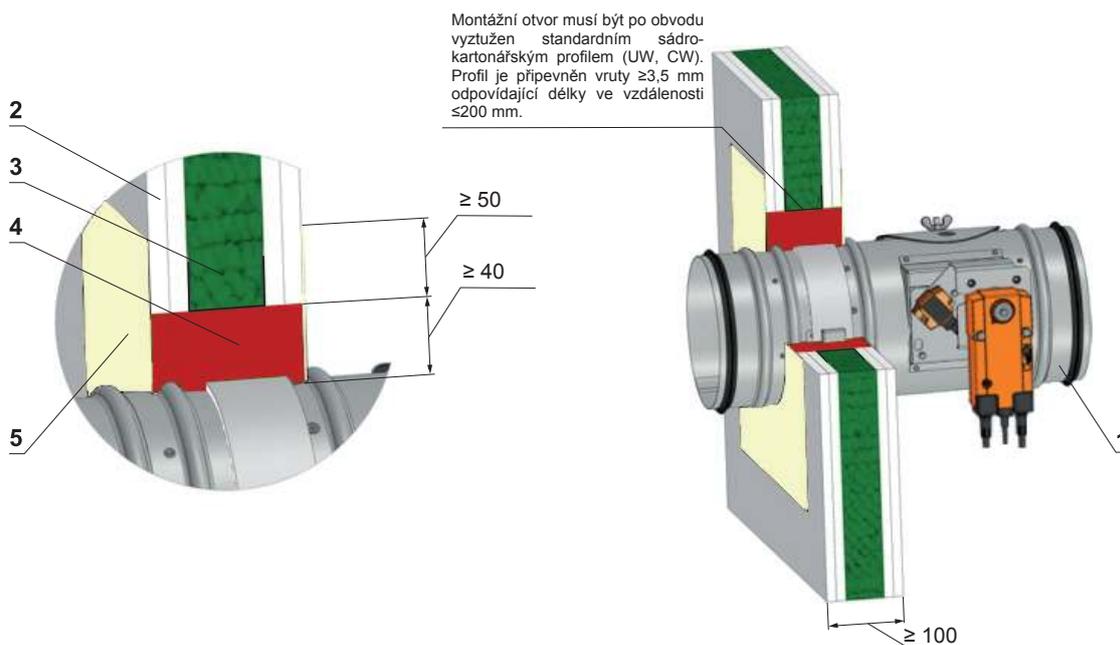
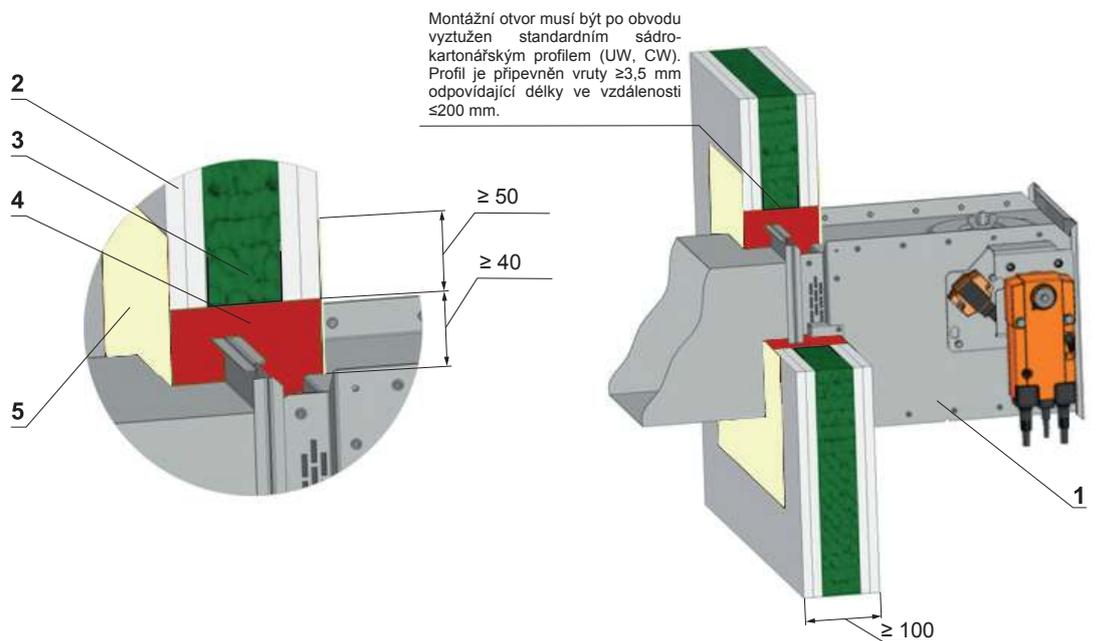
Used materials - example*:

- 3 - HILTI CFS-F FX - EIS 60
- PROMAFOAM-C - EIS 45
- SODAL, Soudafoam FR-B1 - EIS 30
- DenBraven, Fire resistant foam PUR - EIS 30

Maximal damper dimensions:
Square 400 x 400 mm
Round 200 mm

Fig. 98 Gypsum wall construction - Fire resistant foam covered by stucco plaster

EIS 60
EIS 45
EIS 30



POSITION:

- 1 Fire damper FDMB
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Fire resistant foam
- 5 Stucco plaster

Used materials - example*:

- 3 - HILTI CFS-F FX - EIS 60
- PROMAFOAM-C - EIS 45
- SODAL, Soudafoam FR-B1 - EIS 30
- DenBraven, Fire resistant foam PUR - EIS 30

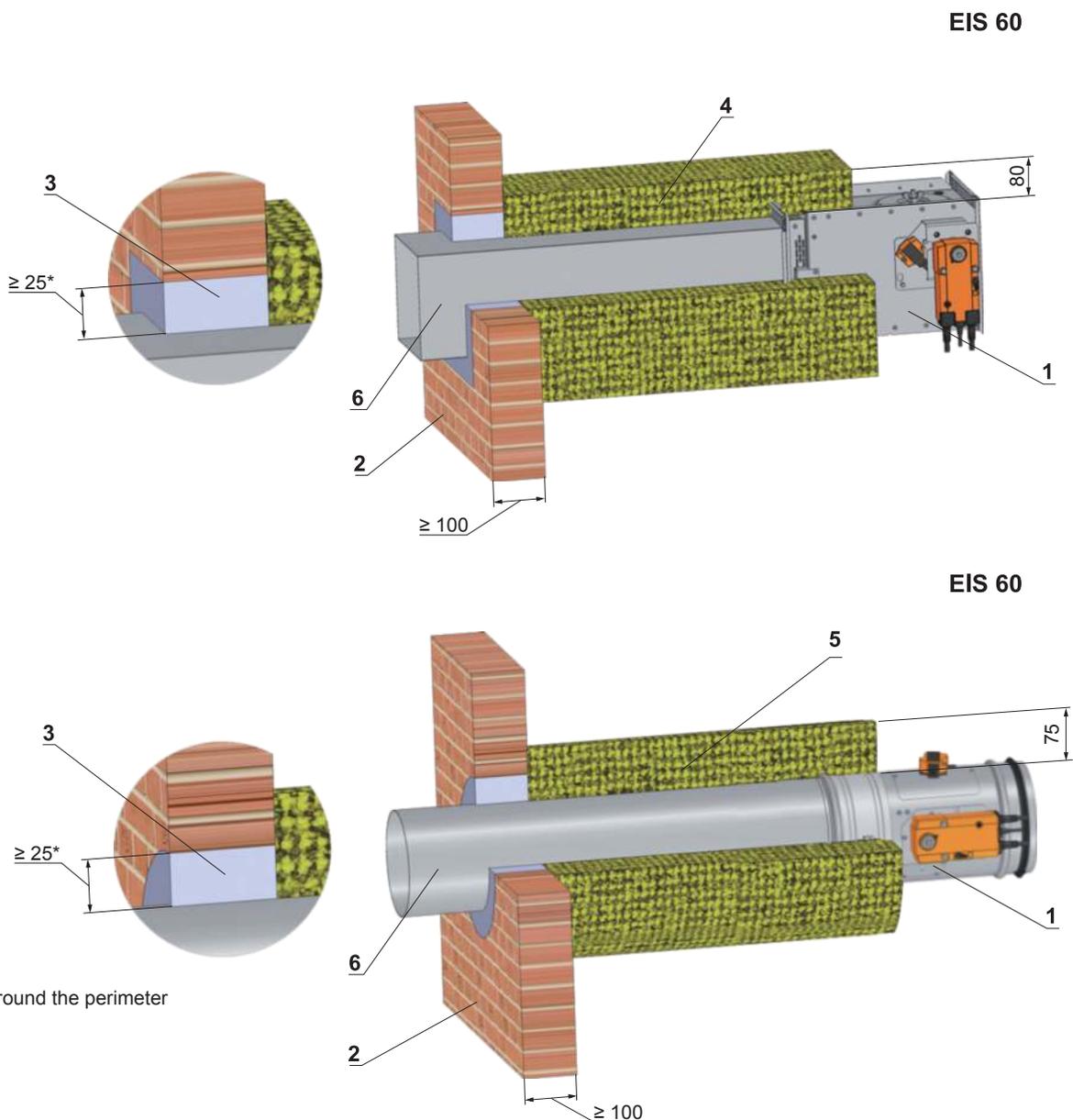
Maximal damper dimensions:

Square 400 x 400 mm

Round 200 mm

10. Installation outside of wall construction EIS60

Fig. 99 Installation outside of solid wall construction - mineral wool



* Around the perimeter

POSITION:

- 1 Fire damper FDMB
- 2 Solid wall
- 3 Mortar or gypsum
- 4 Stone wool with min. density 66 kg/m³ and min. thickness 80 mm
- 5 Stone wool with min. density 66 kg/m³ and min. thickness 75 mm
- 6 Duct

Used materials - example**:

- 4 - Isover Ultimate Protect SLAB 4.0, th. 80 mm ALU1
- 5 - Isover Ultimate Protect Wired MAT 4.0, th. 75 mm ALU1

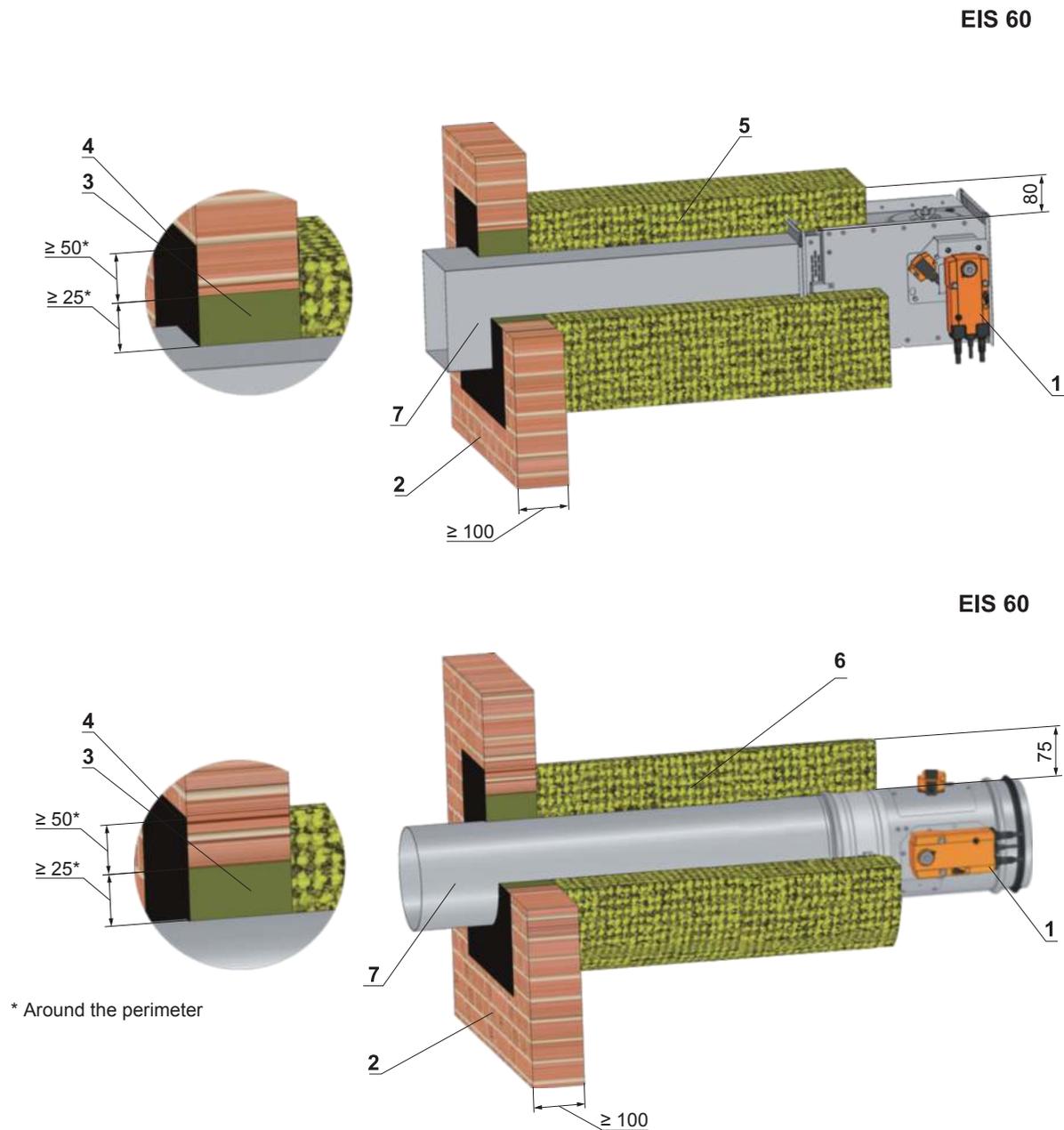
Installation details of wool layers see chapter 11

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.

The maximum distance from the construction of fire dampers is not limited and according to EN 15882-2 must use the required number of hinges according to EN 13366-1:2014.

Fig. 100 Installation outside of solid wall construction - mineral wool - fire protection mastic



POSITION:

- 1 Fire damper FDMB
- 2 Solid wall
- 3 Stuffing box (mineral stone wool min. density 140 kg/m³)
- 4 Fire protection mastic min. thickness 1 mm
- 5 Stone wool with min. density 66 kg/m³ and min. thickness 80 mm
- 6 Stone wool with min. density 66 kg/m³ and min. thickness 75 mm
- 7 Duct

Used materials - example**:

- 3 - Promapyr, Rockwool Steprock HD
- 4 - Promastop - P, K
- 5 - Isover Ultimate Protect SLAB 4.0, th. 80 mm ALU1
- 6 - Isover Ultimate Protect Wired MAT 4.0, th. 75 mm ALU1

Installation details of wool layers see chapter 11

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.

The maximum distance from the construction of fire dampers is not limited and according to EN 15882-2 must use the required number of hinges according to EN 13366-1:2014.

Fig. 101 Installation outside of gypsum wall construction - mineral wool - mortar or gypsum

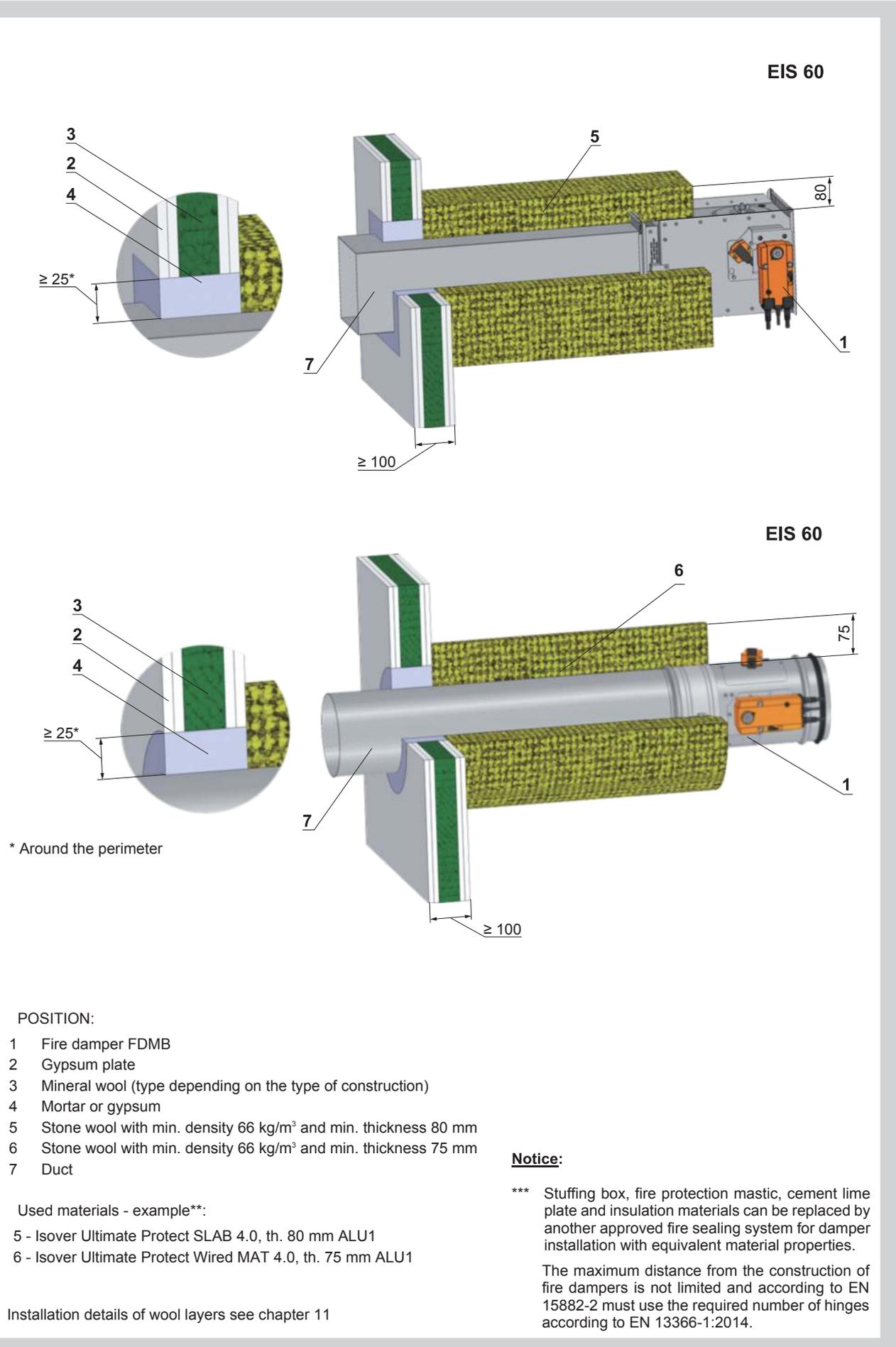
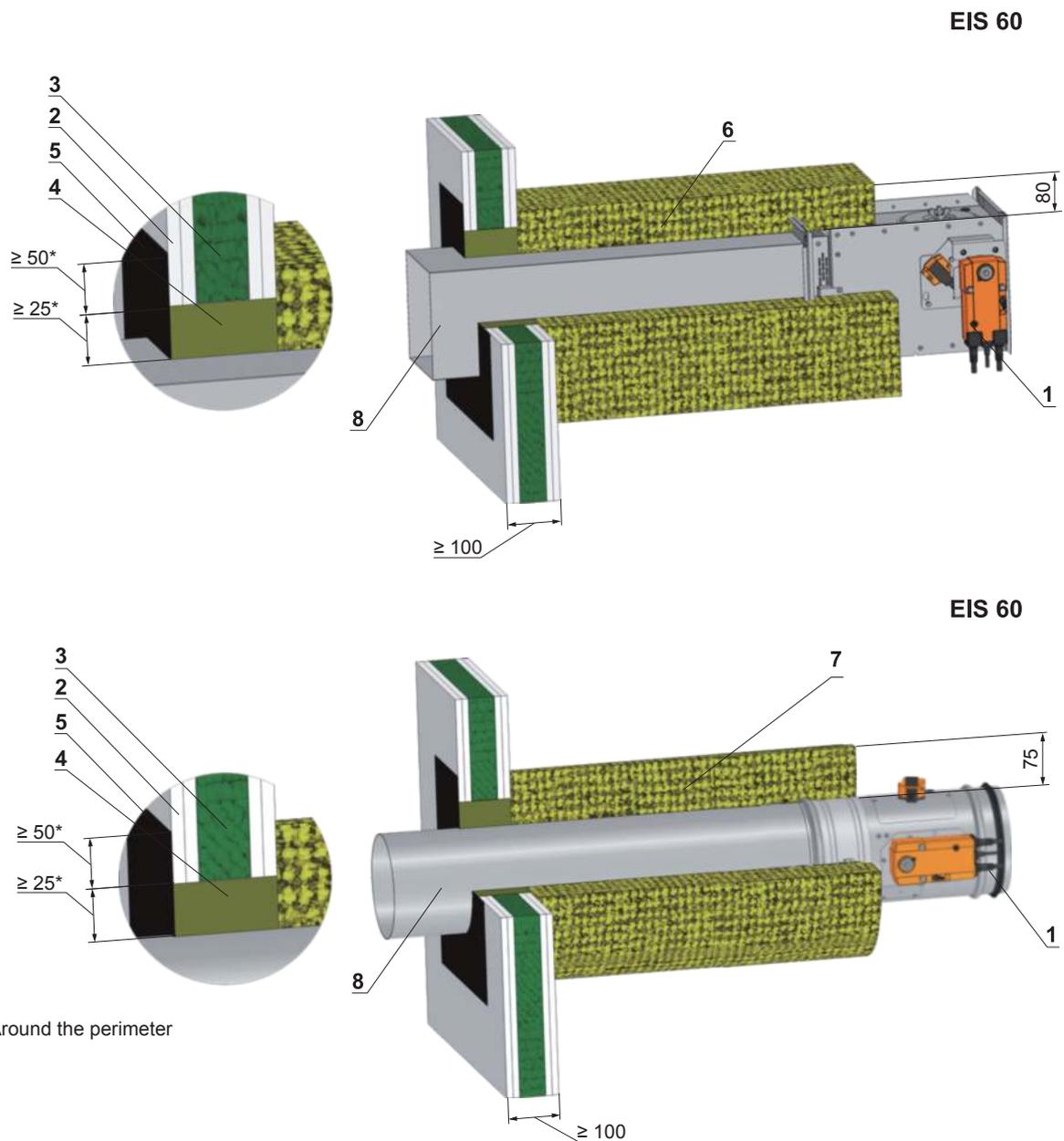


Fig. 102 Installation outside of gypsum wall construction - mineral wool - fire protection mastic



POSITION:

- 1 Fire damper FDMB
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Stuffing box (mineral stone wool min. density 140 kg/m³)
- 5 Fire protection mastic min. thickness 1 mm
- 6 Stone wool with min. density 66 kg/m³ and min. thickness 80 mm
- 7 Stone wool with min. density 66 kg/m³ and min. thickness 75 mm
- 8 Duct

Used materials - example**:

- 4 - Promapyr, Rockwool Steprock HD
- 5 - Promastop - P, K
- 6 - Isover Ultimate Protect SLAB 4.0, th. 80 mm ALU1
- 7 - Isover Ultimate Protect Wired MAT 4.0, th. 75 mm ALU1

Installation details of wool layers see chapter 11

Notice:

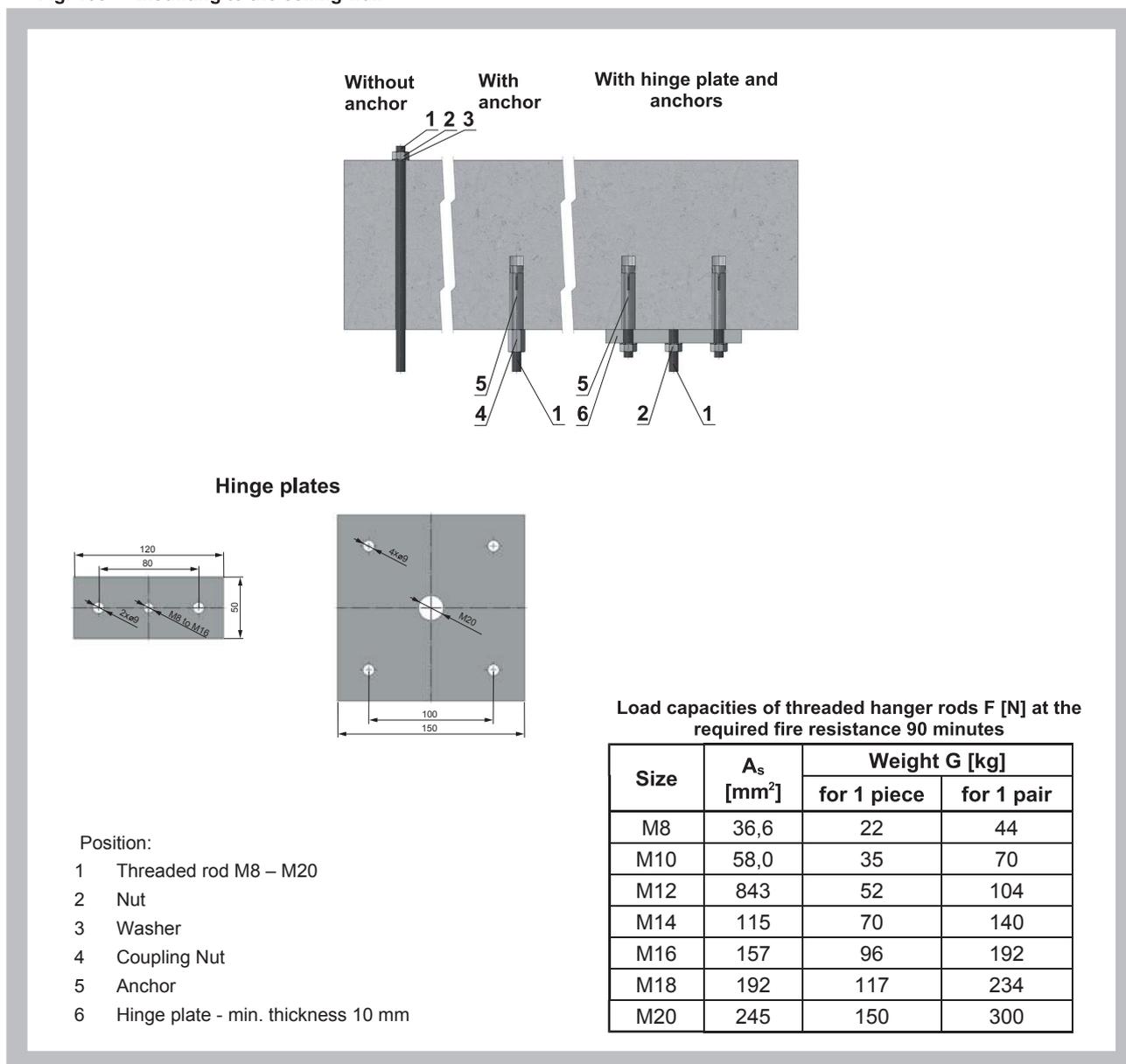
*** Stuffing box, fire protection mastic, cement lime plate and insulation materials can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

The maximum distance from the construction of fire dampers is not limited and according to EN 15882-2 must use the required number of hinges according to EN 13366-1:2014.

11. Suspension systems

11.1. Mounting to the ceiling wall

Fig. 103 Mounting to the ceiling wall



11.2. Horizontal installation

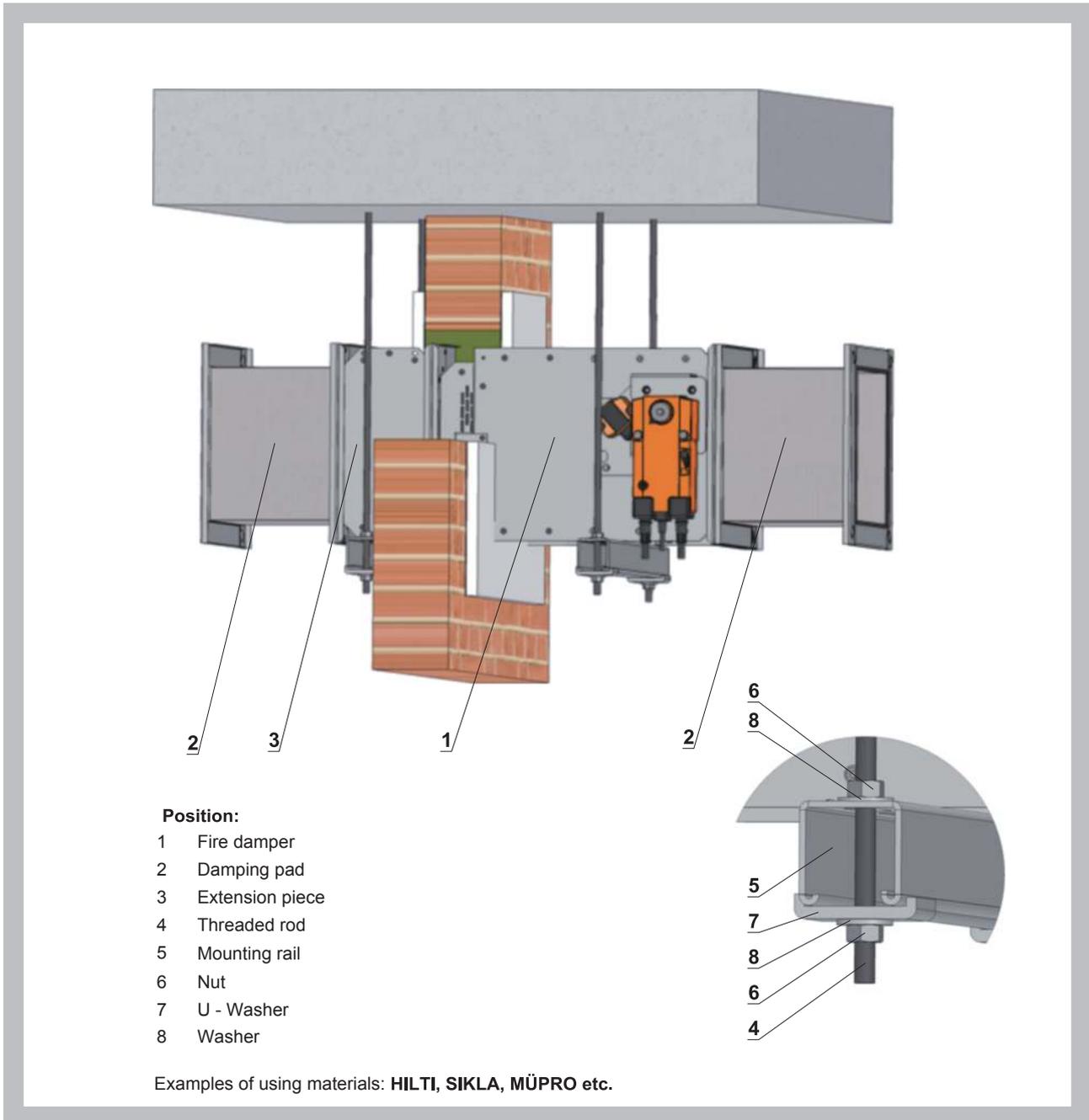
Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

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. 103

Fig. 104 Suspension - horizontal duct



11.3. 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.

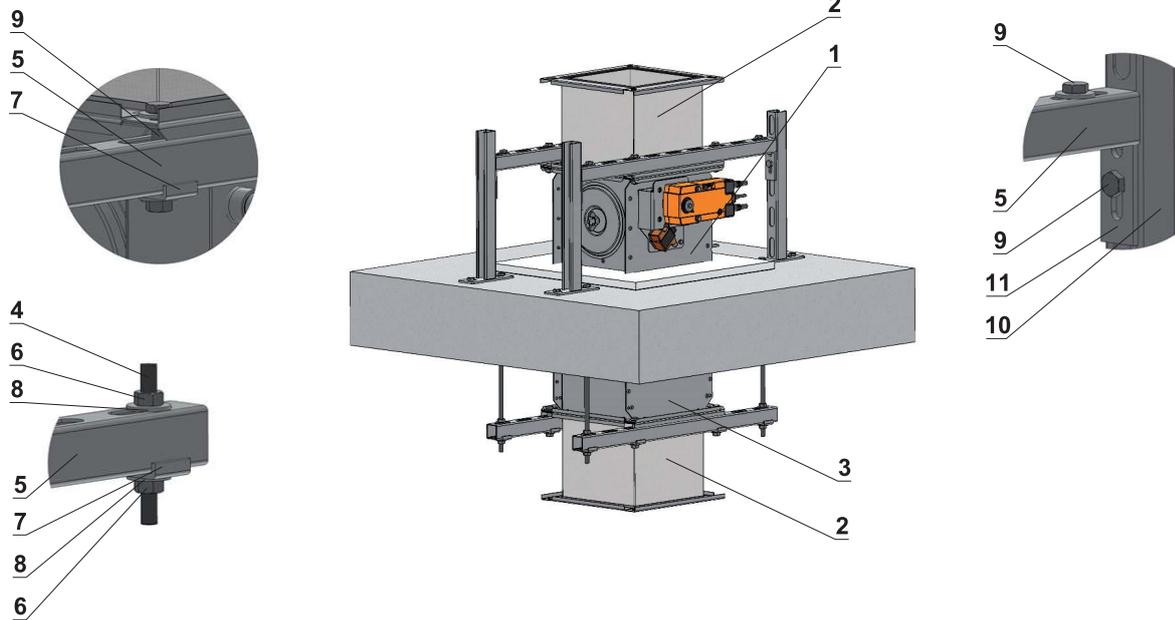
Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

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

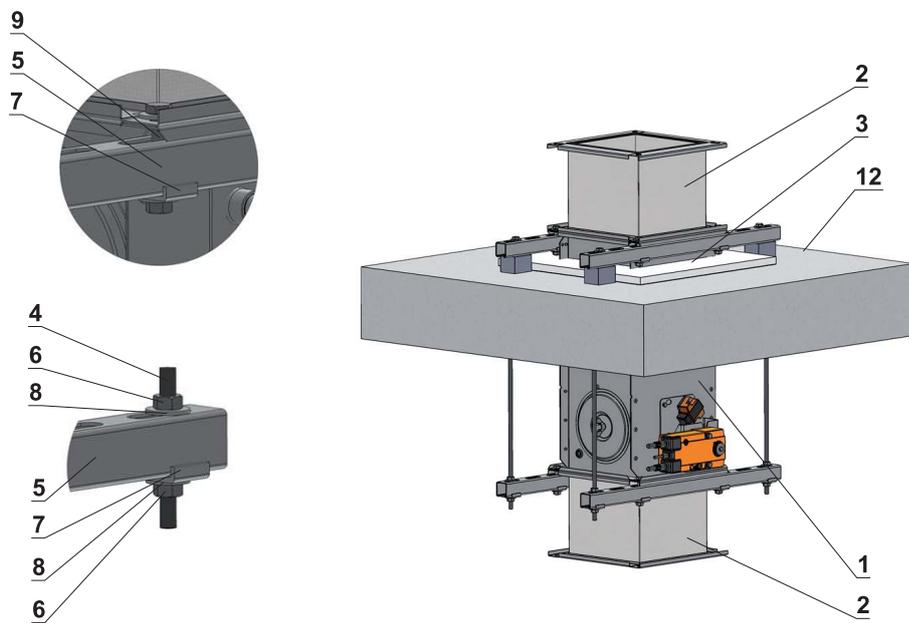
Threaded rod fixing to the ceiling construction - see fig. 103

Fig. 105 Suspension - vertical duct

Actuating mechanism is placed above the ceiling construction



Actuating mechanism is placed under the ceiling construction



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.

11.4. 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.

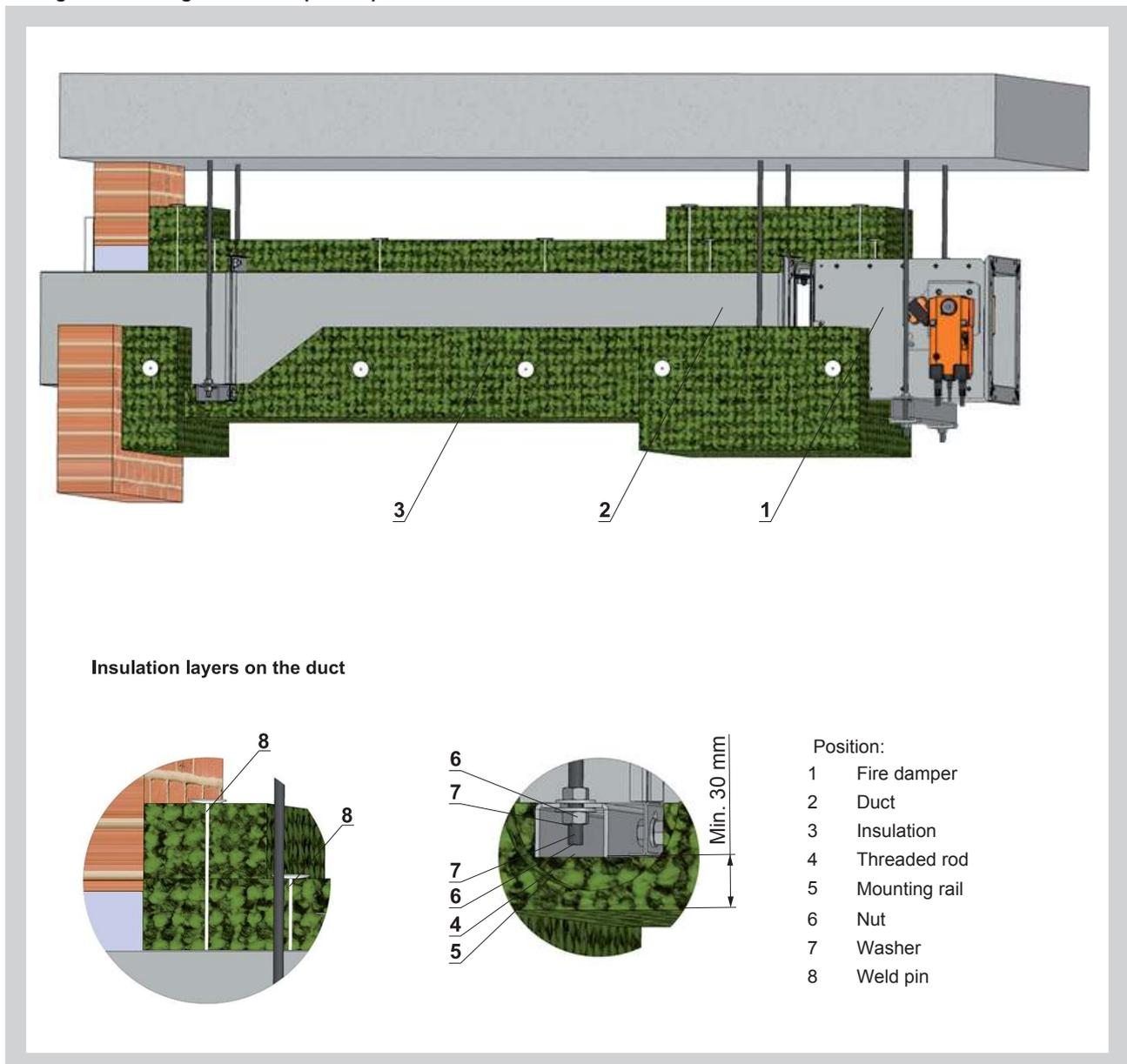
Threaded rods longer than 1,5 m require fire-resistant insulation.

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. 103

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. 106 Rectangular fire damper suspension on the wall - horizontal installation



11.5. Horizontal installation

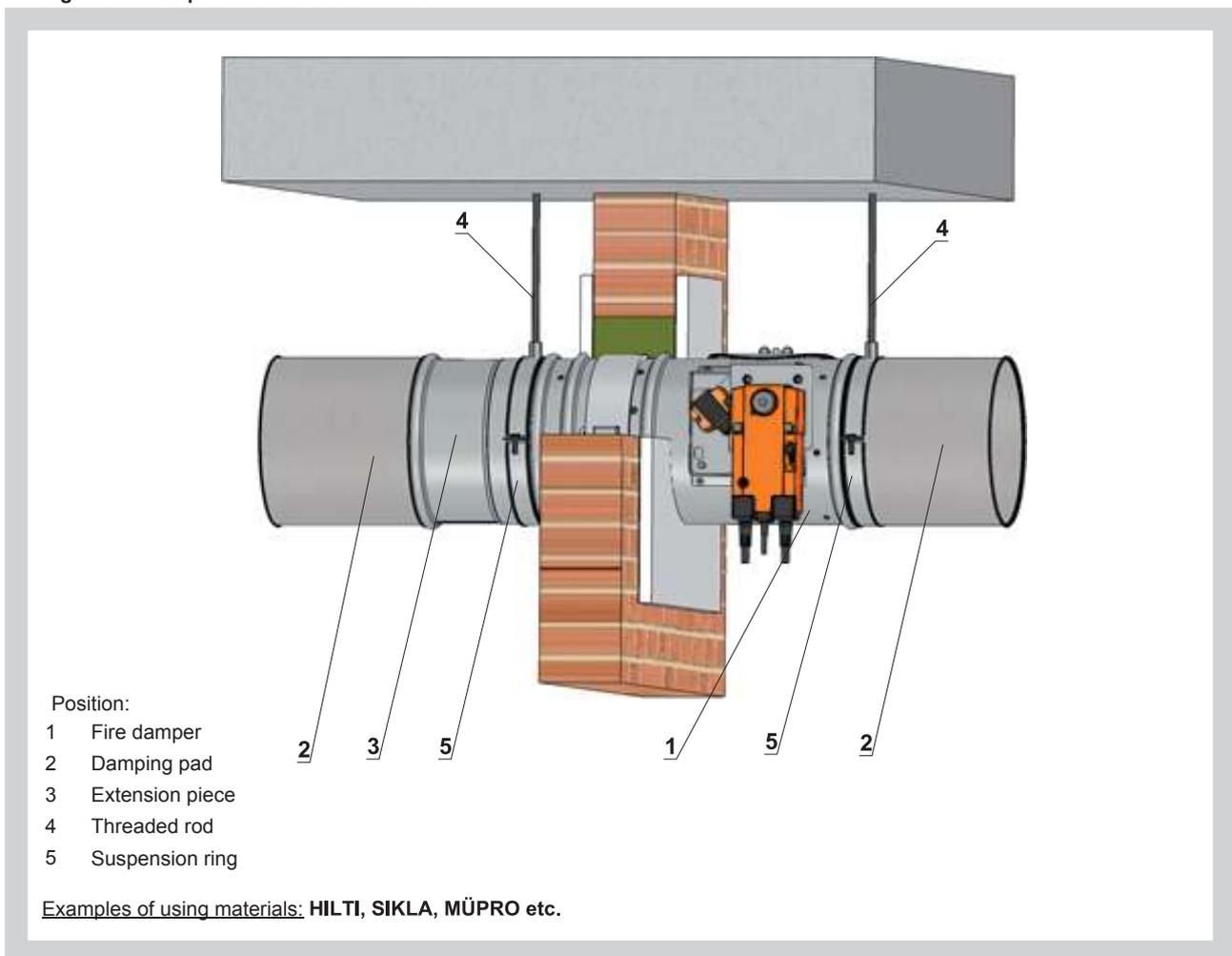
Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

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. 103

Fig. 107 Suspension - horizontal duct



11.6. 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.

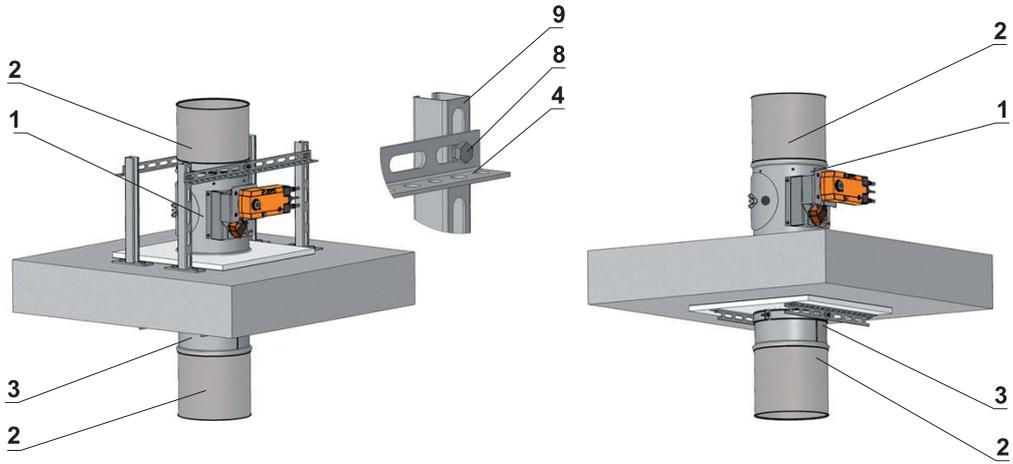
Damper can be suspended from the ceiling construction or supported above the ceiling construction. Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported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

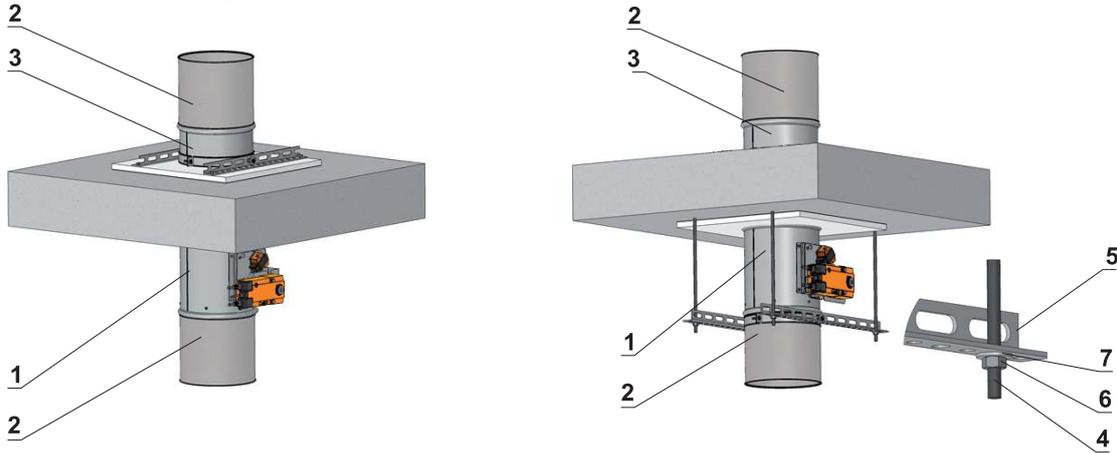
Threaded rod fixing to the ceiling construction - see fig. 103

Fig. 108 Suspension - vertical duct

Actuating mechanism is placed above the ceiling construction

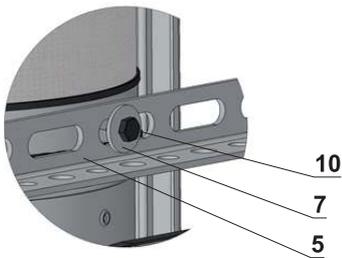


Actuating mechanism is placed under the ceiling construction

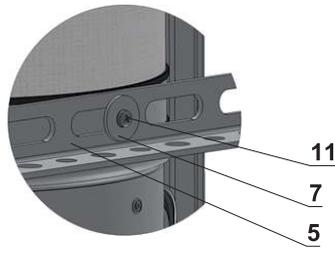


Notice: Damper must be firmly connected with extension piece by screws or rivets.

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

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

11.7. 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.

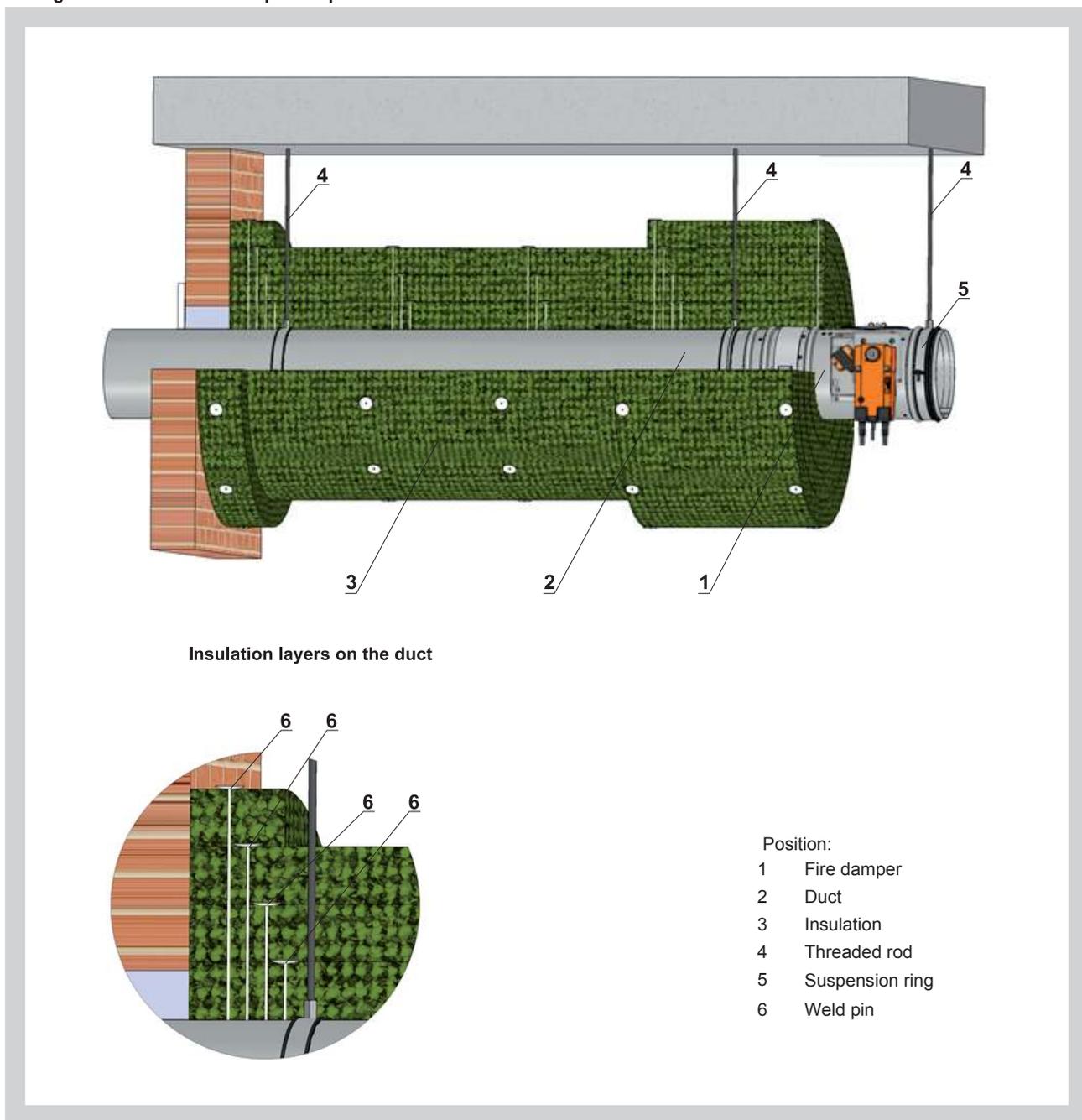
Max. length between two suspension systems is 1500 mm.

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. 103

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. 109 Round fire damper suspension on the wall - horizontal installation



III. TECHNICAL DATA

12. Pressure loss

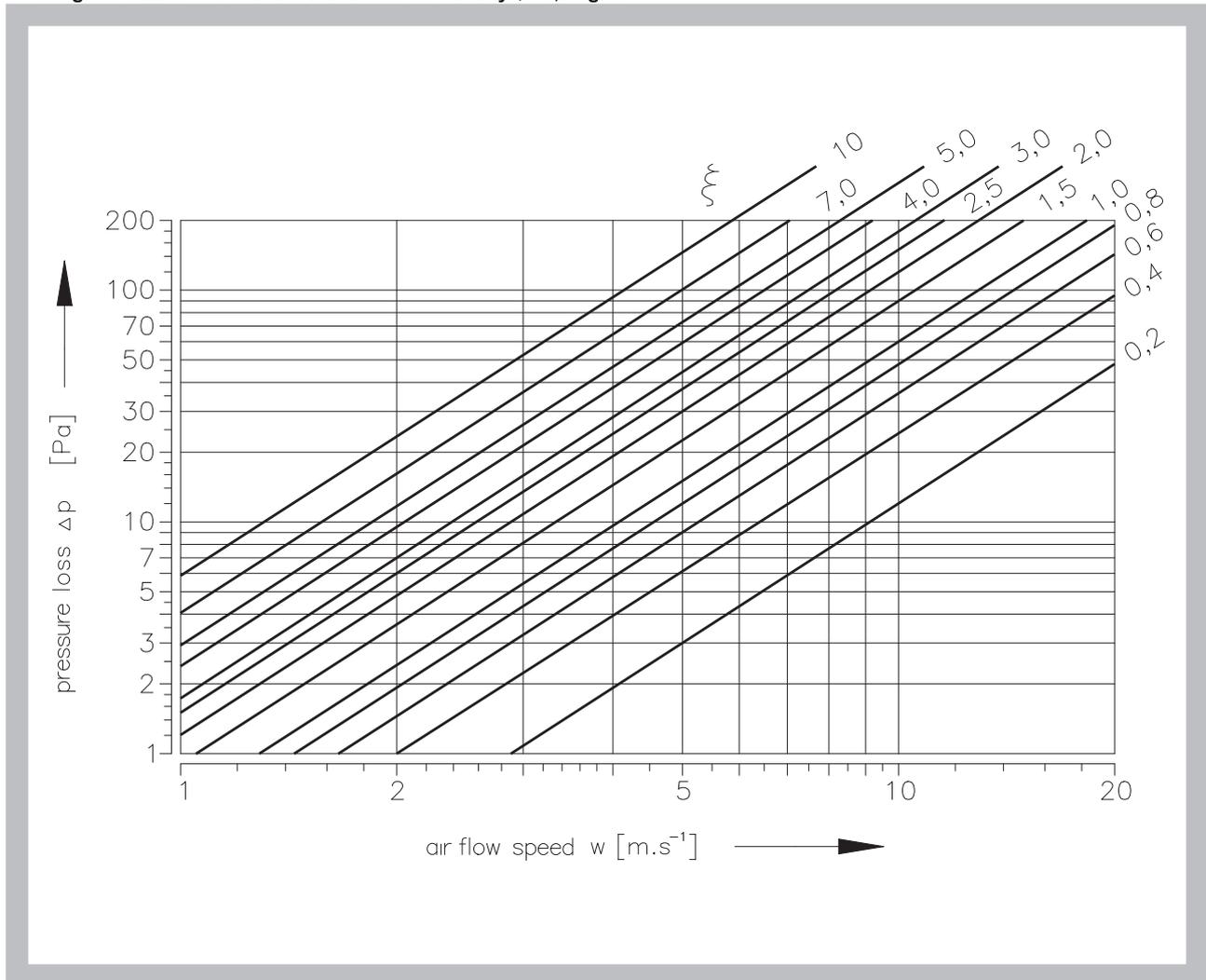
12.1. Pressure loss calculation

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

Δp	[Pa]	pressure loss
w	[m.s ⁻¹]	air flow speed in nominal damper section
ρ	[kg.m ⁻³]	air density
ξ	[-]	coefficient of local pressure loss for the nominal damper section (see Tab. 13.1.1.)

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

Diagram 12.2.1. Pressure losses for air density $\rho=1,2 \text{ kg.m}^{-3}$



13. Coefficient of local pressure loss

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

Tab. 13.1.1. Coefficient of local pressure loss - square dampers

A	B											
	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

A	B										
	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	-	-	-	-	-	-	-	-	-	-

13.2. Coefficient of local pressure loss ξ (-) - round dampers**Tab. 13.2.1. 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

14. Noise data**14.1. 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. 14.3.1. and 14.3.2)

S [m²] duct cross section

K_A [dB] correction to the weight filter A (viz Tab. 14.3.3.)

14.2. 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. 14.3.1. and 14.3.2)

S [m²] duct cross section

L_{rel} [dB] relative level expressing the shape of the spectrum (see Tab. 14.3.4.)

14.3. Table of acoustics values**Tab. 14.3.1. Level of acoustic output L_{W1} [dB] related to the 1 m² section - square dampers**

v [m/s]	[-] ξ														
	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. 14.3.2. Level of acoustic output L_{w1} [dB] related to the 1 m² section - round dampers

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

Tab. 14.3.3. 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. 14.3.4. Relative level expressing the shape of the spectrum L_{rel} - square and round dampers

w [m.s⁻¹]	f [Hz]							
	63	125	250	500	1000	2000	4000	8000
2	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9	-56,4
3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4	-48,9
4	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9
5	-4,0	-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

15. Material

- 15.1.** Damper bodies are supplied in the design made of galvanized plate without any other surface finishing.
Damper blades are made of fire resistant asbestos free boards made of mineral fibres.
Control devices of dampers has cover from mechanically resistant and standing plastic and rest of the parts is galvanized without further surface treatment.
Springs are galvanized.
Thermal protective fuses are made of sheet brass, thickness = 0.5 mm.
Fasteners is galvanized. Fasteners is galvanized.
- 15.2.** According to the customer's requirements, damper body, control, springs and jointing material can be made of stainless material.

V. INSPECTION, TESTING

16. Inspection, testing

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

VI. TRANSPORTATION AND STORAGE

17. Logistic terms

- 17.1.** 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.
- 17.2.** Dampers are stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -30°C to +40°C and maximum relative humidity 95 % (avoid condensation on the damper body). Dampers must be protected against mechanic damages when transported and manipulated.

VII. ASSEMBLY, ATTENDANCE, MAINTENANCE AND REVISIONS

18. Assembly

- 18.1.** Assembly, maintenance and damper function check can be done only by qualified and trained person, i.e. "AUTHORIZED PERSON" according to the manufacturer documentation. All works done on the fire dampers must be done according international and local norms and laws.
- 18.2.** All effective safety standards and directives must be observed during fire damper assembly.
- 18.3.** 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.

19. Entry into service and revisions

- 19.1.** Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out.
Visual inspection of proper damper integration, inside damper area, damper blade, contact surfaces and silicon sealing.
Inspection hole disassembly: release the covering lid by removing the two screws in the corners of inspection hole. Then remove lid from its original position.

- 19.2. Before entering the dampers with manual control (design .01, .11, .80) into operation after their assembly and by sequential checks, checks according 18.1. and following checks must be carried out.

Verification of closing device and thermal fuse:

When you verify functionality of mechanism, follow these steps:

Adjustment of damper blade in position "CLOSED" shall be made following:

- Damper is in „CLOSED“ position.
- By pressing control button mechanism, you close damper in "CLOSED" position.
- Check damper blade adjustment in "CLOSED" position.
- Closing must be strong and control lever must be in "CLOSED" position.
- If closing is not sufficiently strong and damper control lever is not in "CLOSED" position, you must contact manufacturer and order new mechanism.
- Mechanism dimension is marked M1 to M4, according to internal forces of spring.

Adjustment of damper blade in position "OPEN" shall be made following:

- Rotate control lever by 90°.
- Lever get fasten automatically in "OPEN" position.
- Check damper blade adjustment in "OPEN" position.

Checking function and the status of the thermal fuse shall be made following:

- To check the function and the status of the fuse is possible to remove whole mechanism from the body of fire damper - mechanism is attached to the dampers body with four screws M6.
- Removing the thermal fuse from the fuse holder of initiation device, check its correct functionality.
- There must be a release lever, which releases initiation lever of control and mechanism will displace to "CLOSED" position.
- If not, you need to contact the manufacturer and order new mechanism.
- Mechanism dimension is marked M1 to M4, according to internal forces of spring.

- 19.3. Before entering the dampers with actuating mechanism into operation after their assembly and by sequential checks, checks according 18.1. 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 BAT 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).

- 19.4. Manual operation

Without power supply, the damper can be operated manually and fixed in any required position. Release of the locking mechanism can be achieved manually or automatically by applying the supply voltage.

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

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

- 19.7. 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.

20. Spare parts

- 20.1. Spare parts are supplied only on basis of an order.
- 20.2. Control for square damper and round damper is identical.

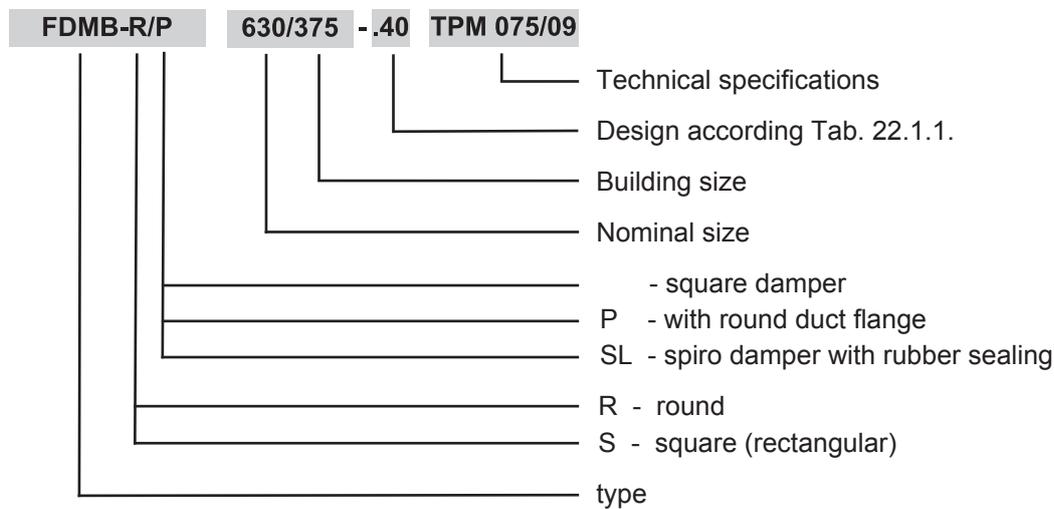
21. Restore function of actuating mechanism after fuses initiation

- 21.1. If fuse Tf1 is initiated (duct outside temperature) than is necessary to change thermoelectrical starting mechanism BAT72B-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.
- 21.2. If fuses Tf2/Tf3 are initiated (duct inside temperature) than is possible change only part ZBAT72 or ZBAT95 (according initiating temperature).

VIII. ORDERING INFORMATION

22. Ordering key

22.1. 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.

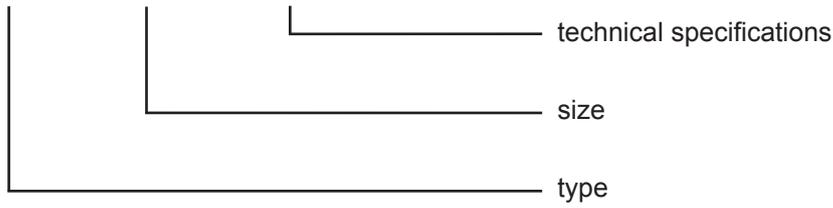
Tab. 22.1.1. Dampers design

Dampers design	Additional digit
Manual and thermal	.01
Manual and thermal with a terminal switch ("CLOSED")	.11
With actuating mechanism BF 230-TN (BFL, BFN 230-T)	.40
With actuating mechanism BF 24-TN (BFL, BFN 24-T) , with smoke detector ORS 142 K and with supply device BKN 230-24-MOD (voltage AC 230 V)	.41
With actuating mechanism BF 24-TN (BFL, BFN 24-T)	.50
With actuating mechanism BF 24-TN (BFL, BFN 24-T) , with smoke detector ORS 142 K (voltage AC/DC 24 V)	.51
With communication and supply device BKN 230-24 and actuating mechanism BF 24-TN-ST (BFL, BFN 24-T-ST)	.60
With communication and supply device BKN 230-24-C-MP, with actuating mechanism BF 24-TN-ST (BFL, BFN 24-T-ST) and with smoke detector ORS 142 K	.61
With communication and supply device BKN 230-24MP and actuating mechanism BF 24TL-TN-ST (Top-Line) for connection to MP-Bus	.62
With communication and supply device BKN 230-24-MOD, with actuating mechanism BF 24-TN-ST (BFL, BFN 24-T-ST) and with smoke detector ORS 142 K	.63
With communication and supply device BKN 230-24LON and with actuating mechanism BF 24TL-TN-ST (Top-Line) for connection to LonWorks	.64
Manual and thermal with two terminal switches ("OPEN", "CLOSED")	.80

Some designs are possible to supply with optical smoke detector ORS 142 K. For more information contact manufacturer.

22.2. Reinforcement - damper placement outside wall or ceiling construction

VRM III 800x400 TPM 075/09

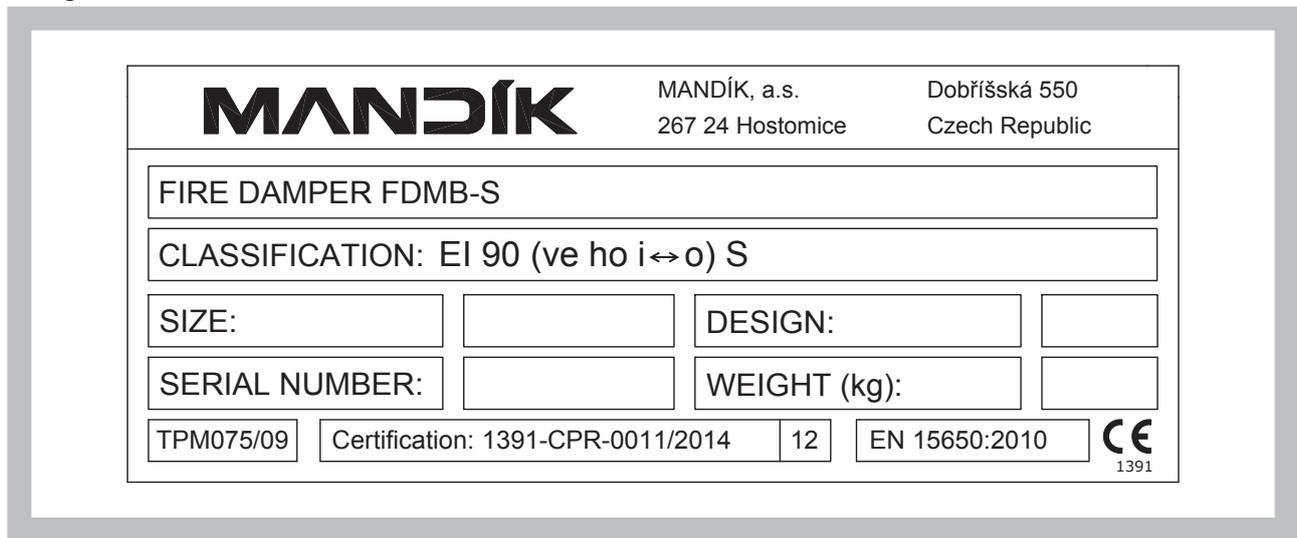


IX. PRODUCT DATA

23. Data label

23.1. Data label is placed on the damper body.

Fig. 110 Data label



MANDÍK, a.s.
Dobříšská 550
26724 Hostomice
Czech Republic
Tel.: +420 311 706 706
E-Mail: mandik@mandik.cz
www.mandik.com

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