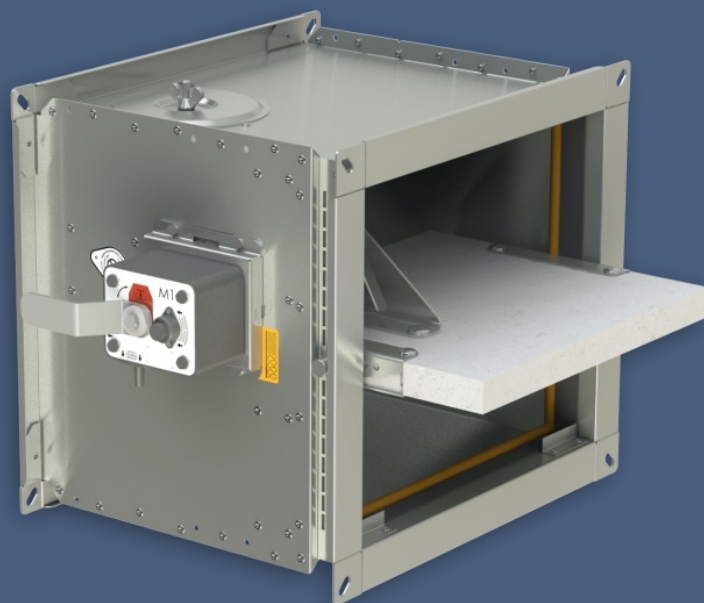
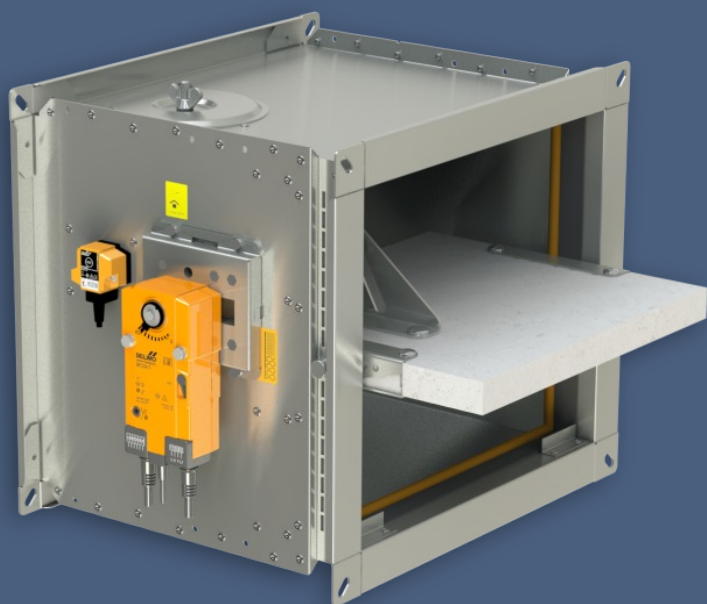


FDMB

Fire damper

Technical Documentation

Installation, Commissioning, Operation, Maintenance and Service Manual



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

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I. GENERAL

Description

Fire dampers are shutters in ducts of air-conditioning devices that prevent the spread of fire and combustion products from one fire segment to the other one by means of closing the duct in the points of fire separating constructions.

Damper blade automatically closes air duct using a closing spring or a spring return actuator. The closing spring is actuated by pressing a button on the manual control or by melting a thermal fuse.

The return spring of the actuator is actuated when a thermoelectric activation device BAT is activated, when a test button on BAT is pressed or when power supply of the actuator is interrupted.

After closing the blade, the damper is sealed with silicon against smoke penetration. On request by customer, the damper can be supplied silicon-free. In the closed position, the damper is also sealed with material which increases its volume due to increasing temperature and air proofs the air duct.



FDMB with spring return actuator



FDMB with manual control

Damper characteristics

- CE certified acc. to EN 15650
- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3+A1
- External casing leakage for size: A<160 or B<160 class B, A≥160 a B≥160 class C, Internal leakage class 2 acc. to EN 1751
- Cycling test in class C₁₀₀₀₀ acc. to EN 15650
- Corrosion resistant acc. to EN 15650
- Certificate of constancy of performance No. 1391-CPR-XXXX/XXXX
- Declaration of Performance No. PM/FDMB/01/XX/X
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

Working conditions

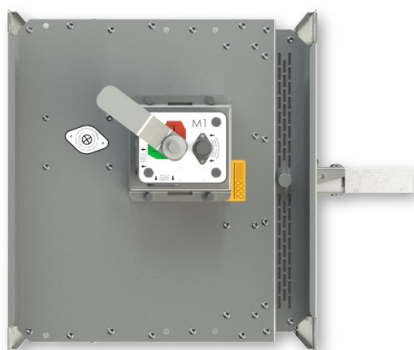
- Exact damper function is provided under the following conditions:
 - maximum air velocity 12 m/s
 - maximum pressure difference 1200 Pa
 - the air circulation in the whole damper section must be secured steady over the entire surface.
- Dampers can be installed in arbitrary position
- Dampers are suitable for systems without abrasive, chemical and adhesive particles.
- Dampers are designed for macroclimatic areas with mild climate according to EN IEC 60 721-3-3 ed.2., class 3K22. (Environment 3K22 is typically protected place with regulated temperature)
- Temperature in the place of installation is permitted to range from -30°C to +50°C.

II. DESIGN

Design with manual control

Design .01

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



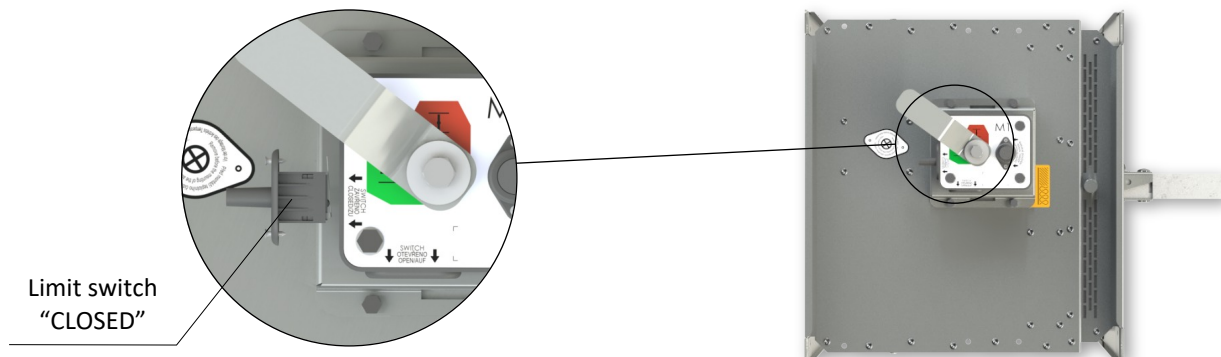
Design .01

ATTENTION:

- Manual controls are produced in three sizes M1 to M3, difference is only in size of a closing spring, which closes the fire damper.
- For the size of fire dampers is always assigned the size of the manual control → see pages 20 to 25
- It is not recommended to use different size of the manual control than given by the manufacturer, otherwise there is a risk of damaging the fire damper.

Design .11

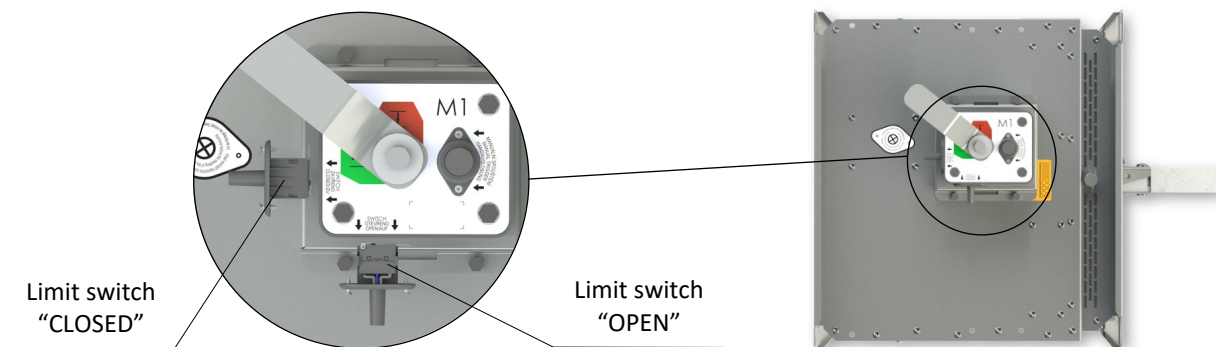
- Design .01 with manual control can be complemented with a limit switch signaling of the damper blade position "CLOSED".
- Cable is connected directly to limit switch.
- Limit switch detail → see page 5



Design .11

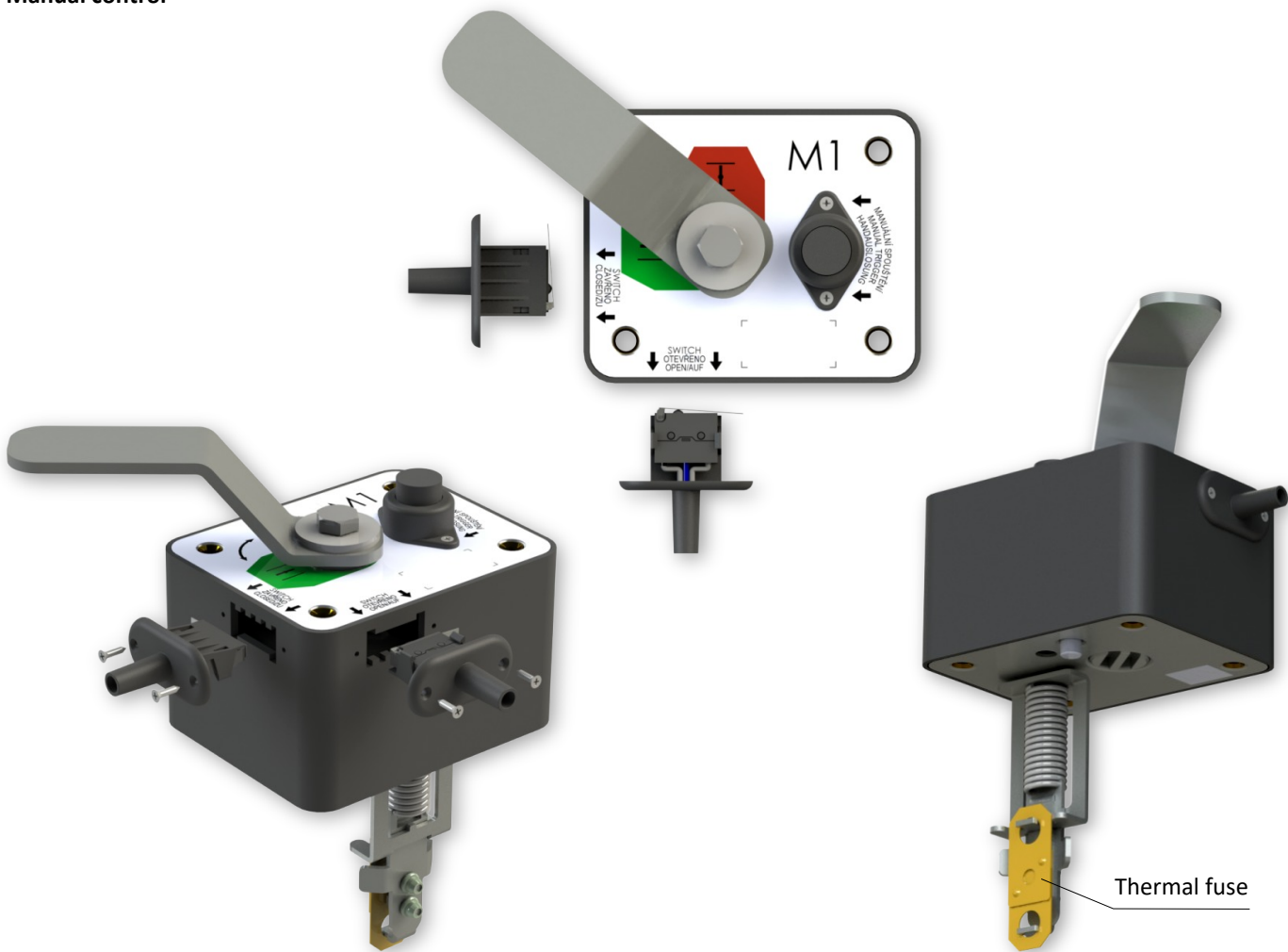
Design .80

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



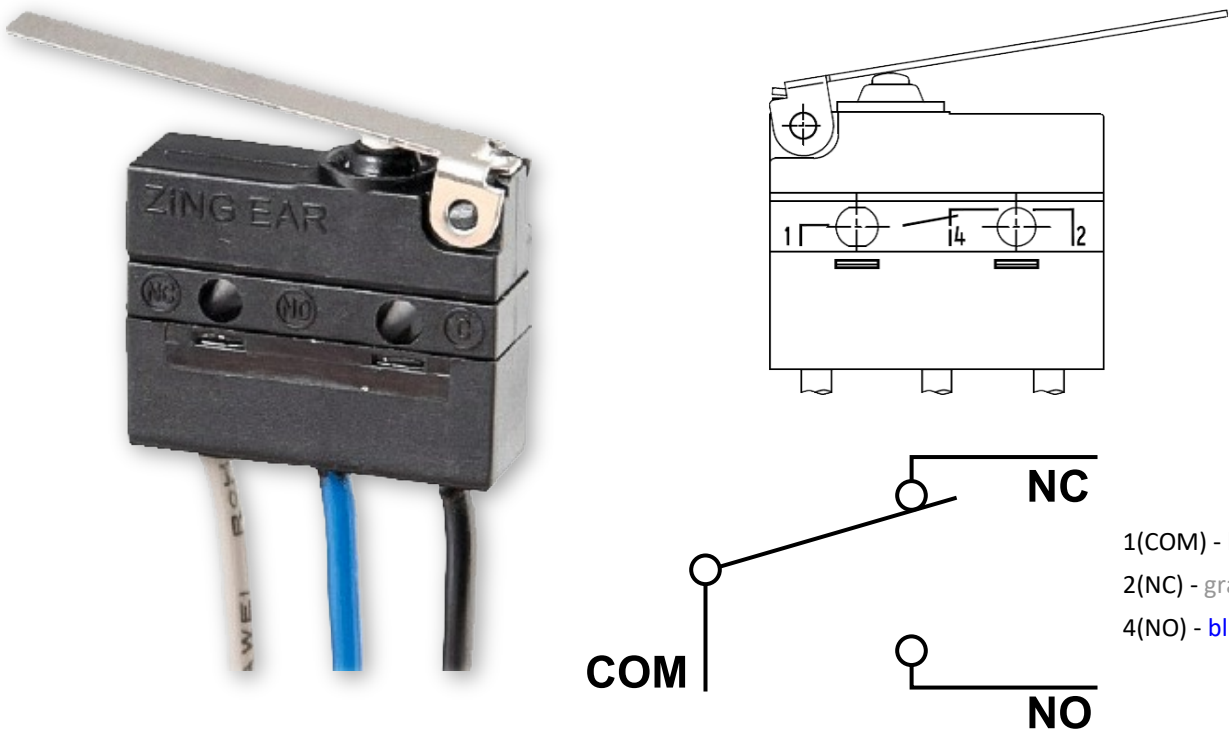
Design .80

Manual control



Thermal fuse

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

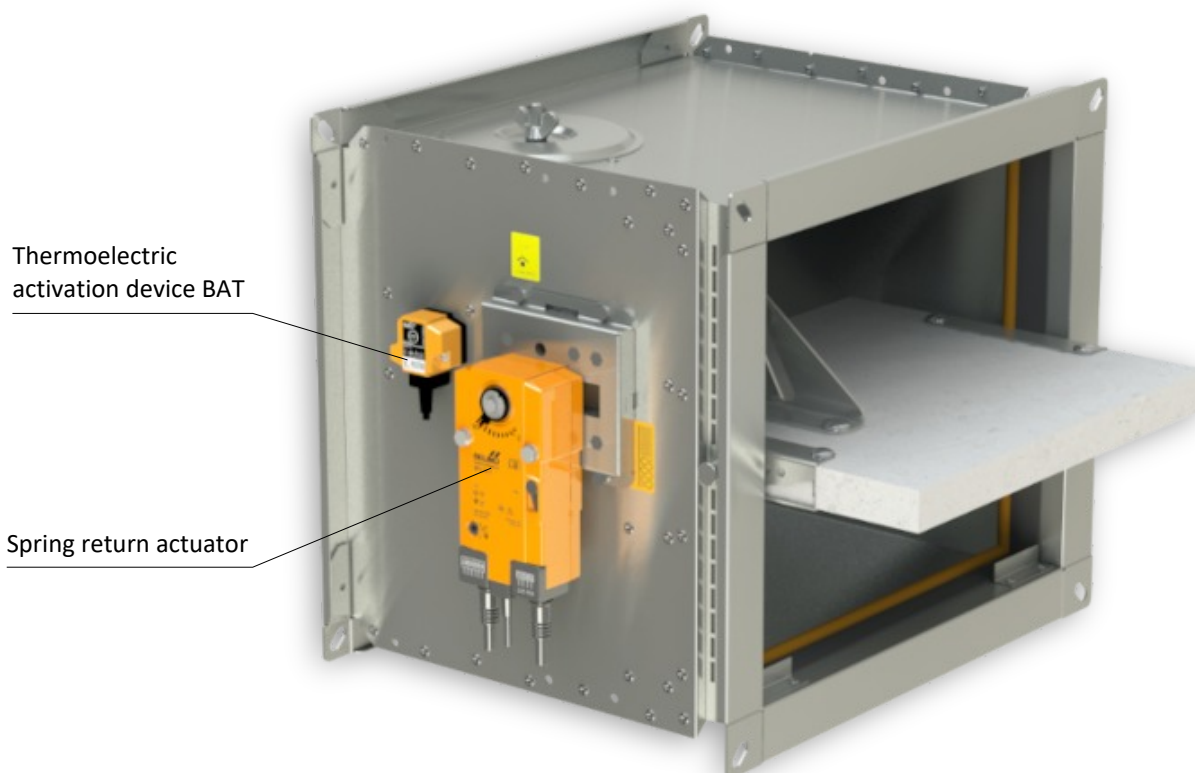
This limit switch is possible to connect in two following ways

- CUT-OFF if the arm is moving ... connect wire 1+2
- SWITCH-ON if the arm is moving ... connect wire 1+4

Design with spring return actuator

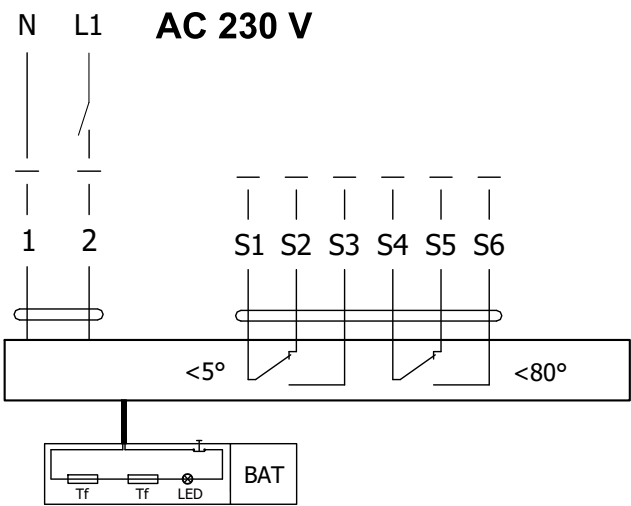
Design .40 and .50

- The fire dampers are equipped with Belimo spring return actuators with thermoelectric activation device BAT. The spring return actuator types are BFL, BFN or BF depending on the damper size. (Further mentioned as „actuator“).
- After being connected to power supply 230V or AC/DC 24V, the actuator rotates the damper blade to the operating position "OPEN" and at the same time pre-stretches its return spring.
- When the actuator is power supplied, the damper blade is in the position "OPEN" and the return spring is pre-stretched.
- Time needed for full opening of the damper blade from the position "CLOSED" to the position "OPEN" is maximum 120 sec. If the actuator power supply is interrupted (due to loss of supply voltage, or pressing a test button on the thermoelectric activation device BAT), the actuator rotates the damper blade to the breakdown position "CLOSED".
- The time of closing the damper blade from the position "OPEN" to the position "CLOSED" takes maximum 20 sec.
- In case that the power supply is restored again (the blade can be in any position), the actuator starts to rotate the damper blade back to the position "OPEN".
- A thermoelectric activation device BAT, which contains two thermal fuses Tf1 and Tf2, is an integral part of the actuator.
- These fuses are activated when temperature +72°C has been reached (the fuse Tf1 due to temperature outside the duct and the fuse Tf2 due to temperature inside the duct). The thermoelectric activation device can also be equipped with a Tf2 thermal fuse type ZBAT 95/120/140 (must be specified in the order). In this case, the activation temperature inside the duct is +95°C, +120°C or +140°C (depending on the type).
- After the thermal fuse Tf1 or Tf2 has been activated, the power supply is permanently and irreversibly interrupted and the actuator, by means of the pre-stretched spring, rotates the damper blade into the breakdown position "CLOSED".
- Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two microswitches.

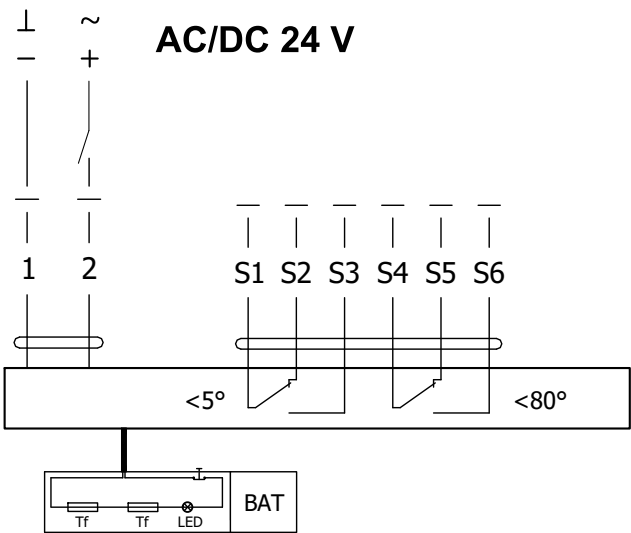


Design .40 and .50

Actuator BELIMO BFL 230-T



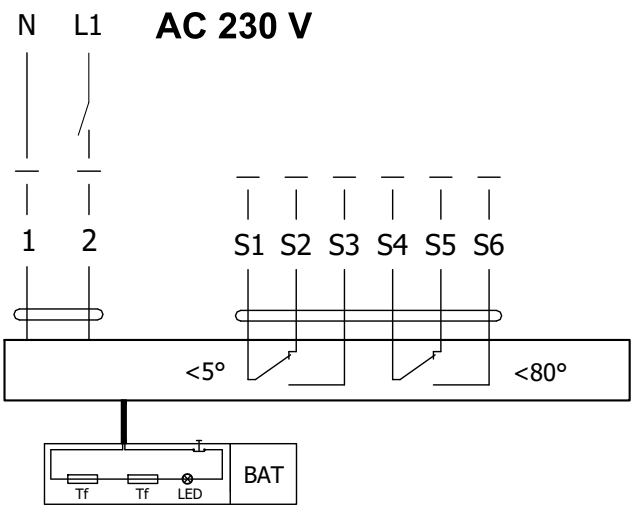
Actuator BELIMO BFL 24-T(-ST)



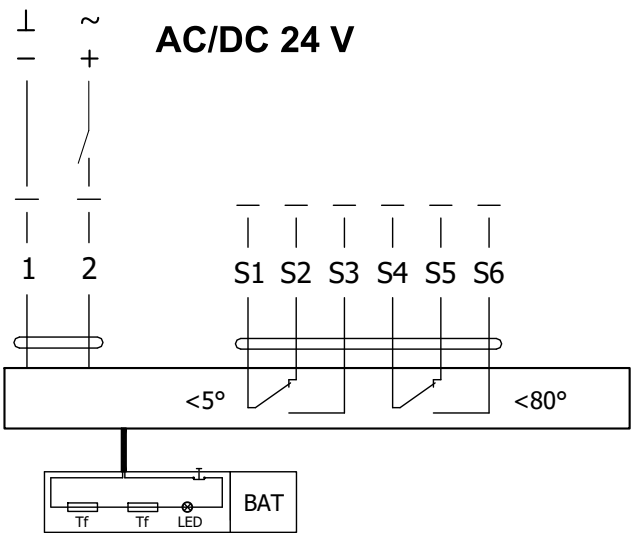
Actuator BELIMO BFL 230-T(-ST), BFL 24-T(-ST)

Actuator BELIMO - 4 Nm/ 3 Nm Spring	BFL 230-T(-ST)	BFL 24-T(-ST)
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	3,5 W 1,1 W	2,5 W 0,8 W
Dimensioning	6,5 VA (Imax 4 A @ 5 ms)	4 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	< 60 s ~ 20 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	-30°C ... +55°C The safe position will be attained up to max. +75°C -40°C ... +55°C	
Connection - supply/control - auxiliary switch	cable 1 m, 2 x 0,75 mm ² (BFL 2xx-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm ² (BFL 2xx-T-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

Actuator BELIMO BFN 230-T

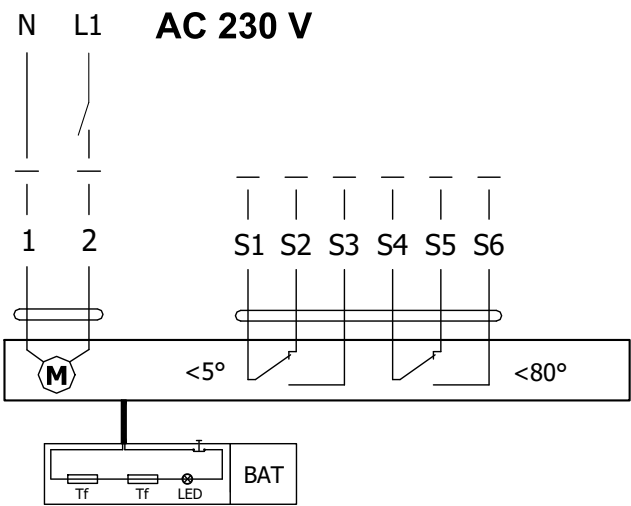


Actuator BELIMO BFN 24-T(-ST)

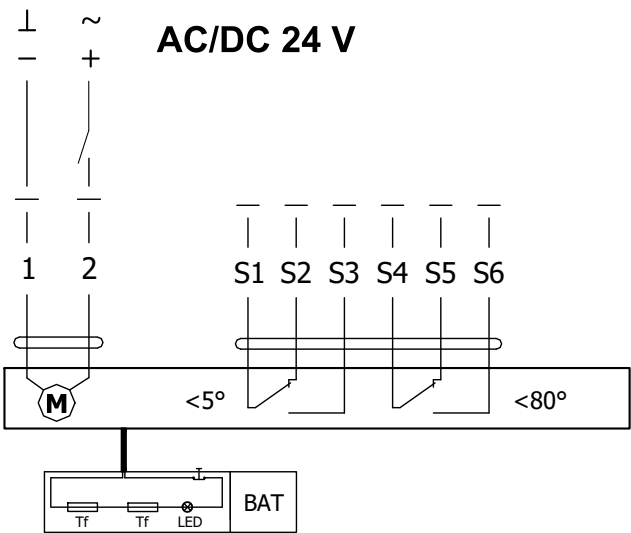


Actuator BELIMO BFN 230-T(-ST), BFN 24-T(-ST)		
Actuator BELIMO - 9 Nm/ 7 Nm Spring	BFN 230-T(-ST)	BFN 24-T(-ST)
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	5 W 2,1 W	4 W 1,4 W
Dimensioning	10 VA (Imax 4 A @ 5 ms)	6 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	< 60 s ~ 20 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	-30°C ... +55°C The safe position will be attained up to max. +75°C -40°C ... +55°C	
Connection - supply/control - auxiliary switch	cable 1 m, 2 x 0,75 mm ² (BFN 2xx-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm ² (BFN 2xx-T-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

Actuator BELIMO BF 230-TN



Actuator BELIMO BF 24-TN (-ST)

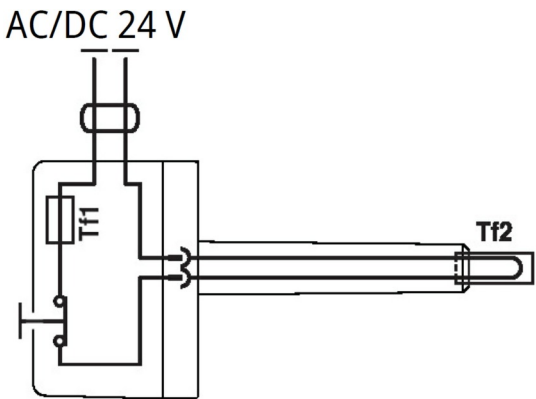


Actuator BELIMO BF 230-TN(-ST), BF 24-TN(-ST)

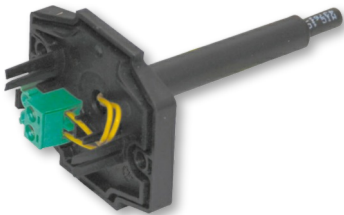
Actuator BELIMO - 18 Nm/ 12 Nm Spring	BF 230-TN(-ST)	BF 24-TN(-ST)
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	8,5 W 3 W	7 W 2 W
Dimensioning	11 VA (Imax 8,3 A @ 5 ms)	10 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	120 s ~ 16 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	-30°C ... +50°C The safe position will be attained up to max. +75°C -40°C ... +50°C	
Connection - supply/control - auxiliary switch	cable 1 m, 2 x 0,75 mm ² (BF 2xx-TN-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm ² (BF 2xx-TN-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

Thermoelectric activation device BAT

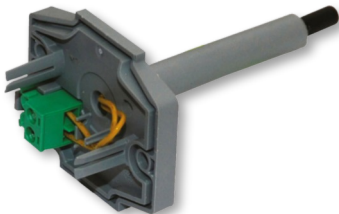
- If the thermal fuse Tf1 is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. Thermoelectric activation device BAT is integral part of the actuator.
 - If the thermal fuse Tf2 is interrupted (due to temperature inside the duct), only the spare part ZBAT 72 (95/120/140) needs to be replaced (acc.to the activation temperature).
- When one of the thermal fuses responds, the supply voltage is interrupted permanently and irreversibly.
 - The function (interruption of the supply voltage) can be checked by pressing the test button.
 - Installation is carried out with the pre-assembled, self-tapping screws.



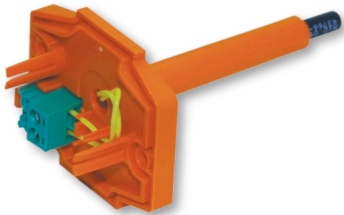
BELIMO ZBAT 72
Black (BK) = 72°C (standard)



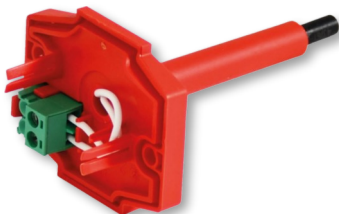
BELIMO ZBAT 95
Grey (GY) = 95°C



BELIMO ZBAT 120
Orange (OG) = 120°C



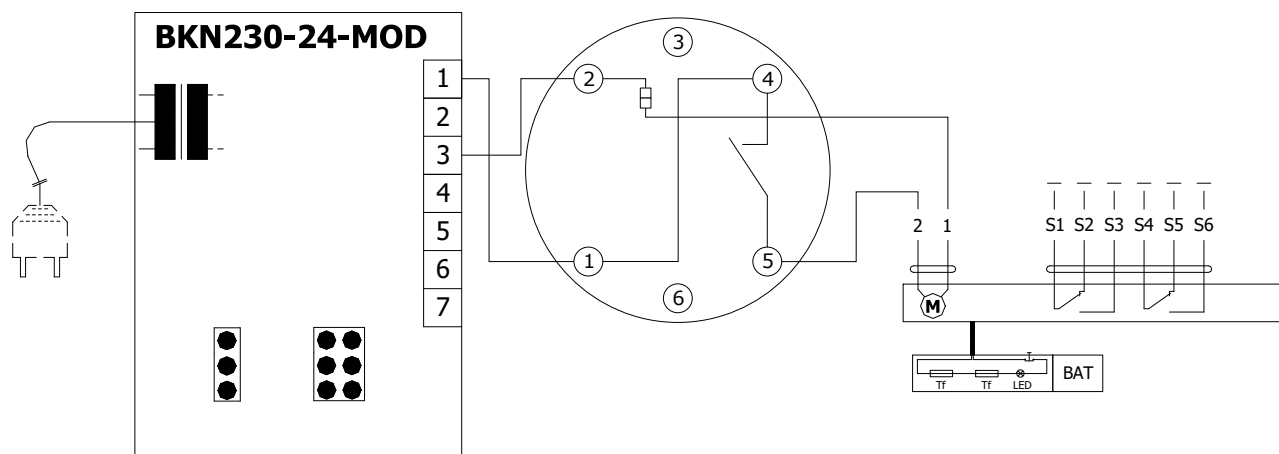
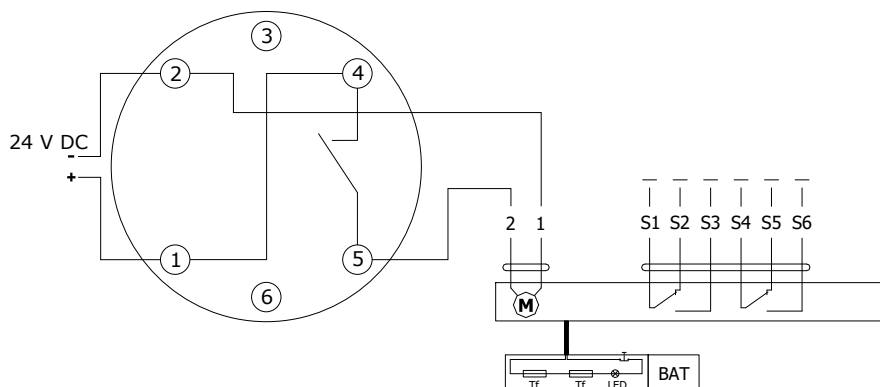
BELIMO ZBAT 140
Red (RD) = 140°C



Thermoelectric activation device BAT 72 (95/120/140)	
Power voltage	AC/DC 24 V 50/60Hz
Rated current	1 A
AC/DC throughput resistance	<1 Ω
Protection class	III
Degree of protection	IP 54
Probe length	65 mm
Ambient temperature	-30°C ... +50°C
Storage temperature	-40°C ... +50°C
Ambient humidity	Max. 95% RH, non-condensing
Connection supply	Cable 1 m, 2 x 0.5 mm², Betaflam cable heatresistant up to 145°C
Response temperature thermal fuse	Duct inside temperature +72 (95/120/140)°C Duct outside temperature +72 (95/120/140)°C

Design .41 and .51

- Design .41 or .51 with actuator and smoke detector ORS 142 K. The voltage can be AC 230 V or 24 V DC. Design .41 with voltage AC 230 V is equipped with communication and supply device BKN 230-24-MOD and with actuator BF 24-TN (BFL 24-T, BFN 24-T).
- The smoke detector is activated when smoke spreads in air duct system. Deactivation of the smoke detector alarm status is provided by interruption of supply voltage for min. 2s.
- Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two microswitches.
- For sizes A<160 mm or B<160 mm, the optical smoke detector ORS 142 K is not part of the fire damper and is supplied separately.

Design .41 with actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K and with supply device BKN 230-24-MOD (voltage AC 230 V)**Design .51 with actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K (voltage 24 V DC)****Communication and supply device BKN 230-24-MOD**

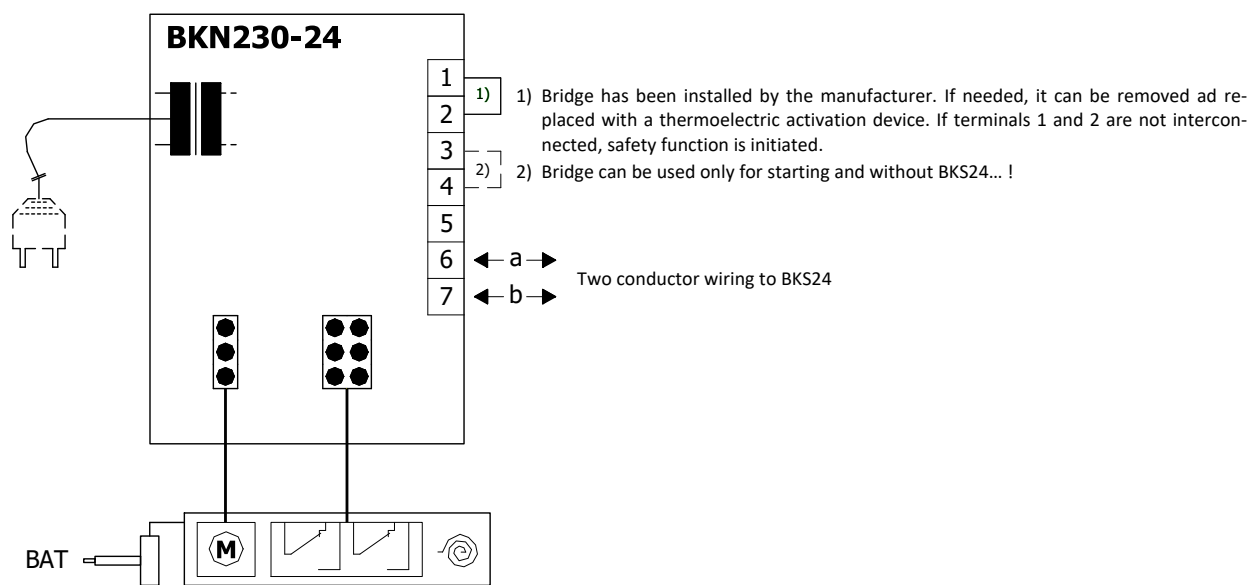
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3 W (operating position)
Dimensioning	14 VA (including actuator)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-40°C ... +80°C
Connection - net	cable 0,9 m with EURO plug type 26
- motor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

Design with the communication and supply device

Design .60

- Design with the communication and supply device BKN 230-24 and actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST). It simplifies electrical wiring and interconnection of fire dampers. It facilitates on site check and enables central control and checks of fire dampers by means of a simple 2-conductor wiring.
- BKN 230-24 functions as a decentralized network device for supplying the actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) further it transmits the signal informing about the damper blade 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 actuator.
- To simplify the connection, the actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) is equipped with connecting plugs that are inserted directly to BKN 230-24. BKN 230-24 is supplied with a conductor and an EURO plug to be connected to the 230V mains. 2-conductor wiring is connected to BKN 230-24 by means of terminals 6 and 7. If the actuator 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 on BKN 230-24 is on when voltage is present in the drive (AC 24V).
- If the test button on BAT is pressed or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION) is disconnected, the damper blade position will be "FAILURE".

Communication and supply device BKN 230-24, with actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST)



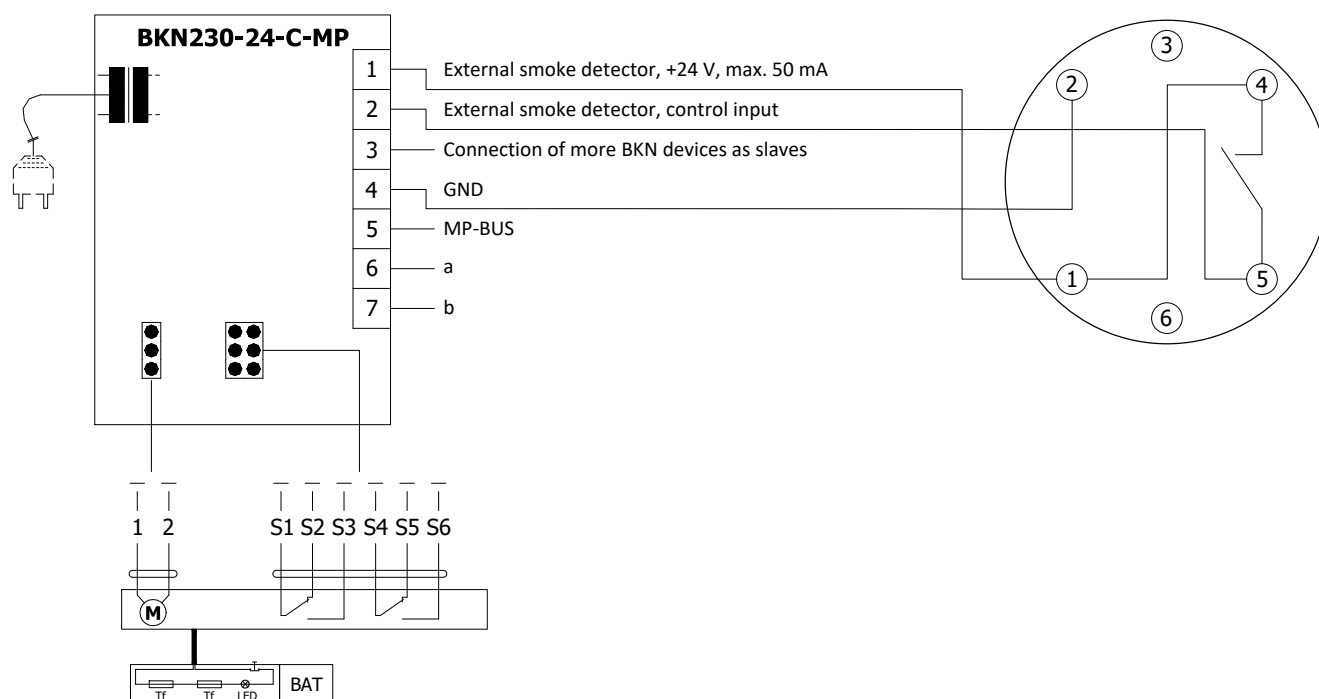
Communication and supply device BKN 230-24

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

Design .61, 61S

- Design with the communication and supply device BKN 230-24-C-MP, and actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST). It simplifies electrical wiring and interconnection of fire dampers. Enables central control and checks of fire dampers by means of a simple 2-conductor wiring and it also allows connection to the system via MP-BUS communication. Design 61. can be extended with an optical smoke detector ORS 142 K (design .61S).
- BKN 230-24-C-MP functions as a decentralized network device for supplying the actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) further it transmits the signal informing about the damper blade position OPERATION and FAILURE through 2-conductor wiring to the central.
- Control command SWITCHED ON - SWITCHED OFF from the central through BKN 230-24-C-MP goes through the same wiring to the actuator.
- To simplify the connection, the actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) is equipped with connecting plugs that are inserted directly to BKN 230-24-C-MP. BKN 230-24-C-MP 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-C-MP by means of terminals 6 and 7. If the actuator 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 on BKN 230-24-C-MP is on when voltage is present in the drive (AC 24V).
- If the test button on BAT is pressed or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION) is disconnected, the damper blade position will be "FAILURE".
- For design .61S the smoke detector is activated when smoke spreads in air duct system. Deactivation of the smoke detector alarm status is provided by interruption of supply voltage for min. 2s.
- For sizes A<160 mm or B<160 mm, the optical smoke detector ORS 142 K is not part of the fire damper and is supplied separately.

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



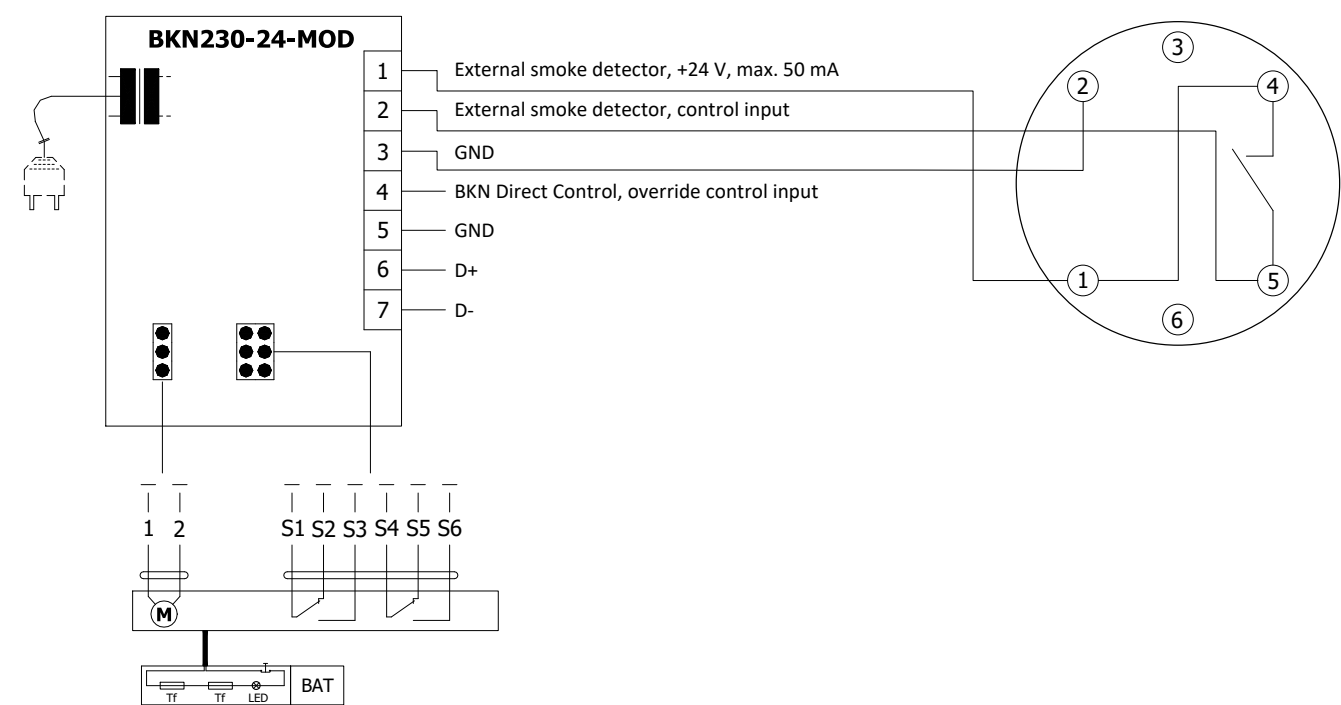
Communication and supply device BKN 230-24-C-MP

Nominal voltage	AC 230 V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	10 VA (including actuator)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-40°C ... +80°C
Connection - net	cable 0,9 m with EURO plug type 26
- motor	6-pole connector, 3-pole connector
- terminal board	screw terminals for cable 2x1,5 mm²

Design .63, 63S

- Design with the communication and supply device BKN 230-24-MOD and actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) for communication with control systems using the Modbus RTU or BACnet MS / TP. Design 63. can be extended with an optical smoke detector ORS 142 K (design .63S).
- The wiring of the line is to be carried out in accordance with applicable RS485 regulations.
- Parameterization of the communication is done using DIL switches.
- BKN 230-24-MOD can be installed separately, without a connection to a master control system, in which case the connection bridge between the terminals 1 and 4 must be installed.
- If the test button on BAT is pressed or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION) is disconnected, the damper blade position will be "FAILURE".
- For design .63S the smoke detector is activated when smoke spreads in air duct system. Deactivation of the smoke detector alarm status is provided by interruption of supply voltage for min. 2s.
- For sizes A<160 mm or B<160 mm, the optical smoke detector ORS 142 K is not part of the fire damper and is supplied separately.

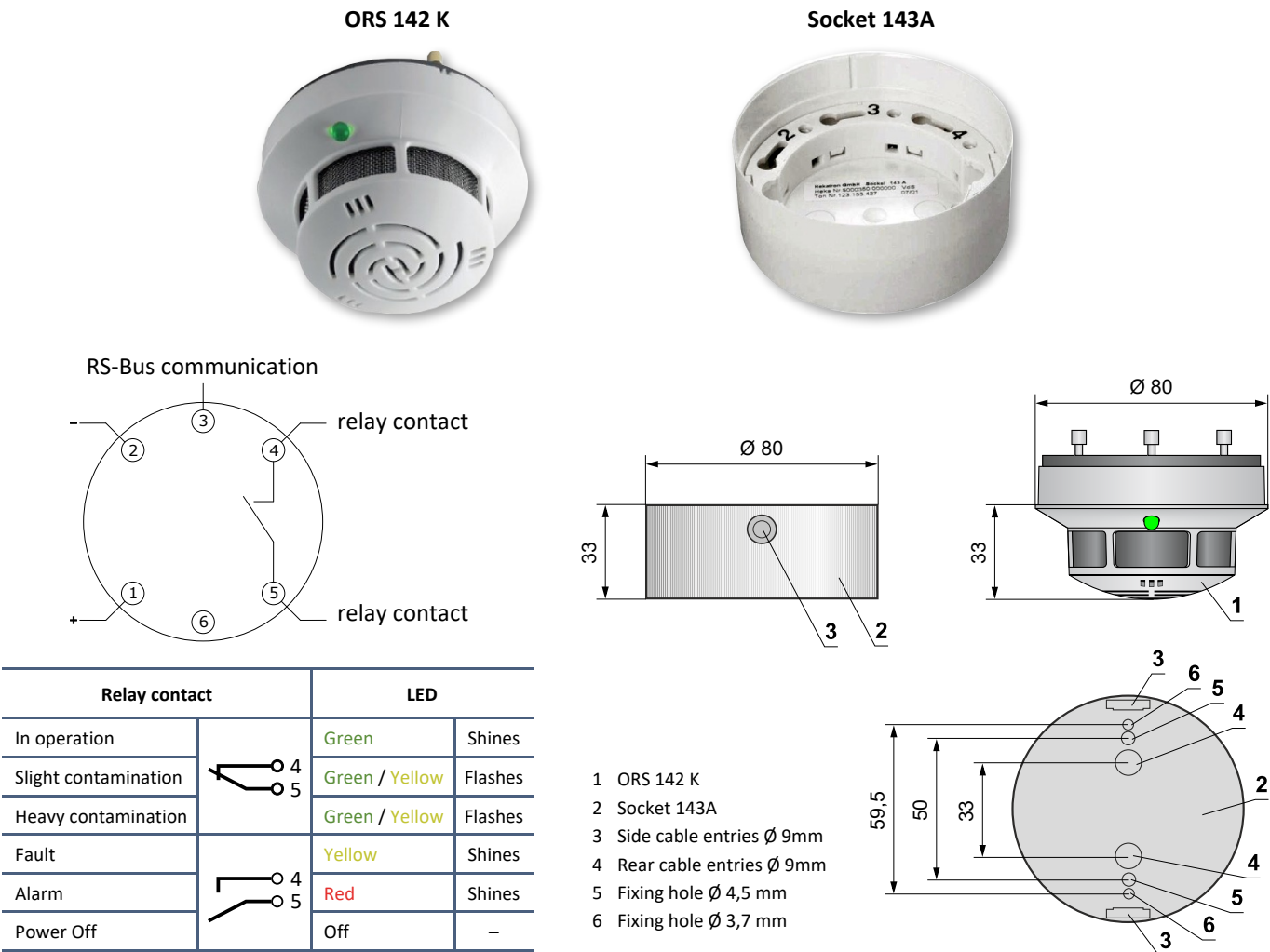
Design with communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) and smoke detector ORS 142 K



Communication and supply device BKN 230-24-MOD	
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3 W (operating position)
Dimensioning	14 VA (including actuator)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-40°C ... +80°C
Connection - net	cable 0,9 m with EURO plug type 26
- motor	6-pole connector, 3-pole connector
- terminal board	screw terminals for cable 2x1,5 mm²

Optical smoke detector ORS 142 K with the socket 143A

- The smoke detector ORS 142 K is used for early smoke detection in rooms or inside the ventilation system.
 - The sensor operates on the light scatter principle. Inside the scanning chamber is a light source and a light sensor, in the normal state the light from the source does not fall on the sensor. Only when smoke enters the scanning chamber the light is scattered and falls on the sensor.
 - The smoke detector can be connected directly to the actuator (design .41 and .51) which, in case of smoke detection, passes to the safety position, or to the BKN communication and supply device (design .61, .63).
 - By early detection of smoke, it can be effectively prevented from spreading of smoke through the ventilation system. In addition to smoke detection, the sensor can distinguish and signal slight
- and heavy contamination, e.g. the presence of large amounts of dust.
 - The ORS 142 K smoke detector has an alarm memory, i.e. if the alarm is triggered, the safety relay opens and stays in this state even if the smoke disappears from the scanning chamber. The sensor remains in the alarm state until the power supply is briefly reset.
 - On the pin 3, an external device can be connected via RS-Bus communication to report the status of the sensor.
 - Pin 6 has no connection to the detector and is designed as a load-bearing structure in the base.

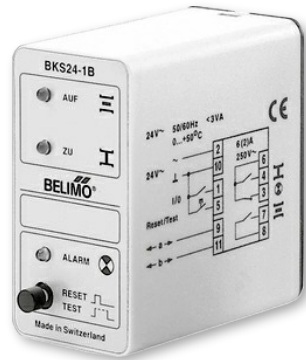
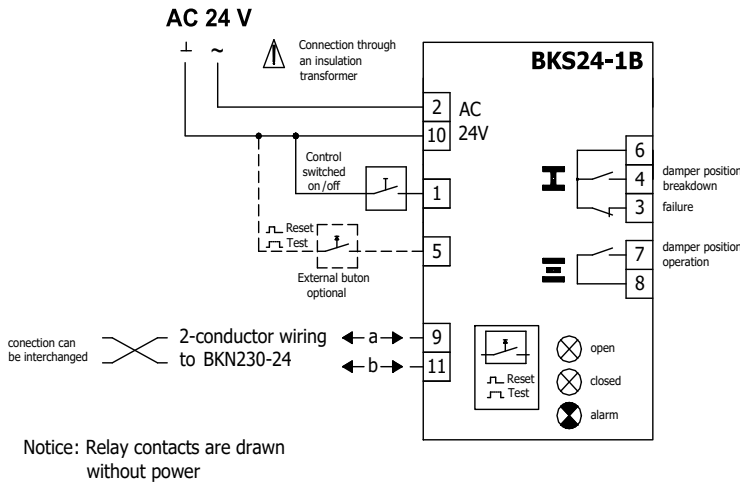


Optical smoke detector ORS 142 K with the socket 143A	
Operating voltage	18 ... 28 V DC
Residual ripple	≤ 200 mV
Power Consumption Socket (without actuator)	max. 22 mA
Degree of protection	IP 42
Ambient temperature	-20°C ... +75°C
Additional temperature sensor	+70°C
Connection - net	Cabel 1m, connected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

Communication and control device BKS 24-1B and BKS 24-9A

Communication and control device BKS 24-1B

- 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) actuator in conjunction with the BKN 230-24 supply and communication device.
- BKS 24-1B receives information about the situation of the fire damper through 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 damper 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 rotates 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.



Signals and diagnosis				
light diodes			contacts	Description
open	closed	alarm	state	Cause/Course
⊗	⊗	⊗	[6]—[3]	Power supply AC 24V not available
⊗	⊗	⊗	[6]—[3]	Check test cca 35sec , starting with switching AC 24 on or pressing «Reset/Test» button
⊗	⊗	⊗	[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
⊗	⊗	⊗	[6]—[3]	Failure saved in memory • Fault in system signalled, system check should be done
⊗	⊗	⊗	[6]—[4]	Damper (drive) turning into the direction of breakdown position
⊗	⊗	⊗	[6]—[4]	Damper (drive) in breakdown position I
⊗	⊗	⊗	[6]—[7]	Damper (drive) turning into the direction of operating position
⊗	⊗	⊗	[6]—[7]	Damper (drive) in operating position I

Communication and control device BKS 24-1B

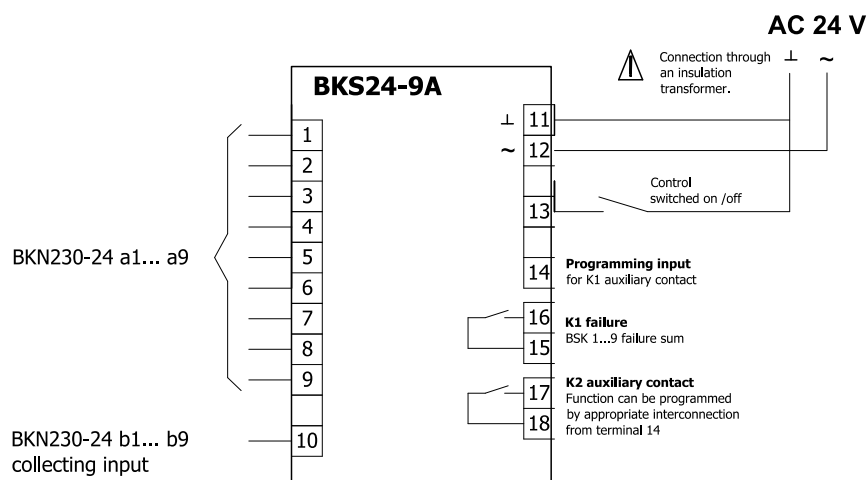
Nominal voltage	AC 24 V 50/60Hz
Power consumption	2,5 W (operating position)
Dimensioning	5 VA
Protection Class	III
Degree of protection	IP 30
Ambient temperature	0°C ... +50°C
Connection	11-pole connector ZSO-11, it is not part of BKS24-1B, ZSO-11 is 11-pole screw terminal 11 x 1,5 mm ²

Communication and control device BKS 24-9A

- BKS 24-9A communication and control device is used for group control and checks of 1 to 9 fire dampers with the actuator 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 damper blade position to the master device.
- Function of this auxiliary contact can be programmed through the terminal 14.

Function contact K1		Programming K2 Auxiliary Contact		
situation	state	function	interconnection	state
current failure	15 ——— 16	K2 contact is on if all dampers are open	14 ——— 11	
no failure	15 ——— 16	K2 contact is on if damper No. 1 is open	14 ——— 12	17 ——— 18
		K2 contact is on if all dampers are closed	14 open	

- Function check can be done in the position OPERATION by means of pressing the TEST button.
- While the test button is pressed, damper blade is rotating 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.



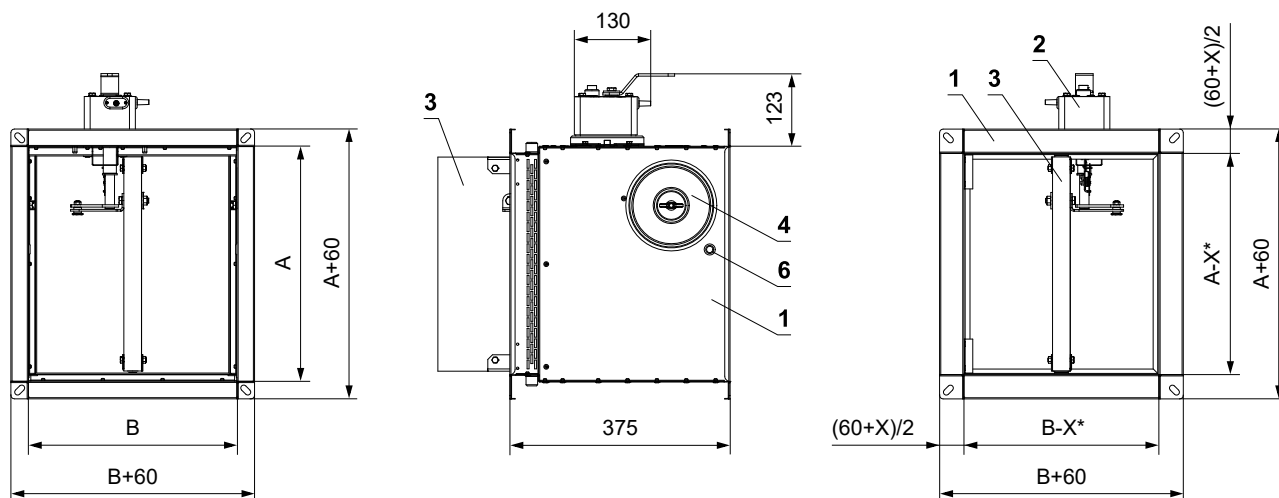
Notice: Relay contacts K1 and K2 are drawn without power

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°C ... +50°C
Connection	terminal 2 x 1,5 mm ²

III. DIMENSIONS

FDMB with manual control

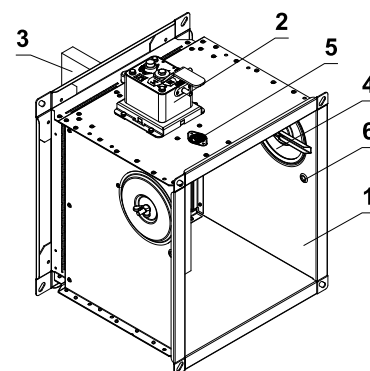
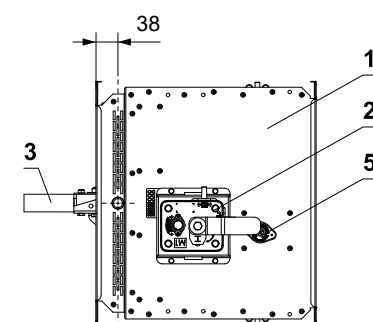


* X=14 (A<160 or B<160)

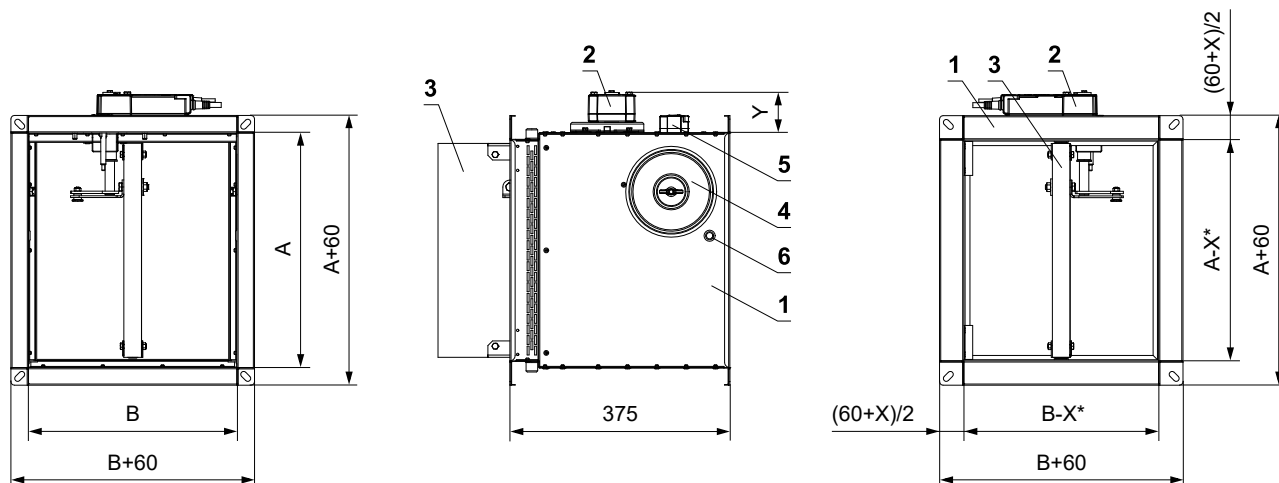
* X=23 (AxB≤500x400)

* X=36 (AxB>500x400)

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



FDMB with spring return actuator



* X=14 (A<160 or B<160)

* X=23 (AxB≤500x400)

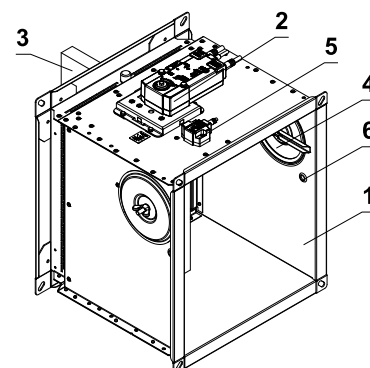
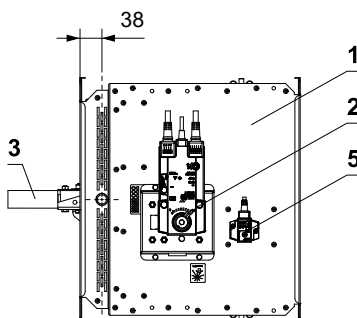
* X=36 (AxB>500x400)

Y=72 (BFL)

Y=76 (BFN)

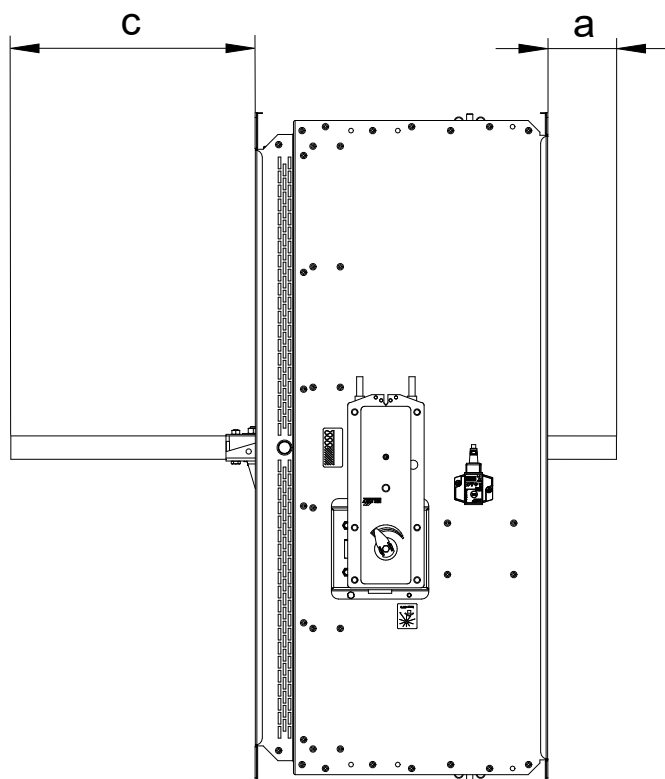
Y=83 (BF)

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



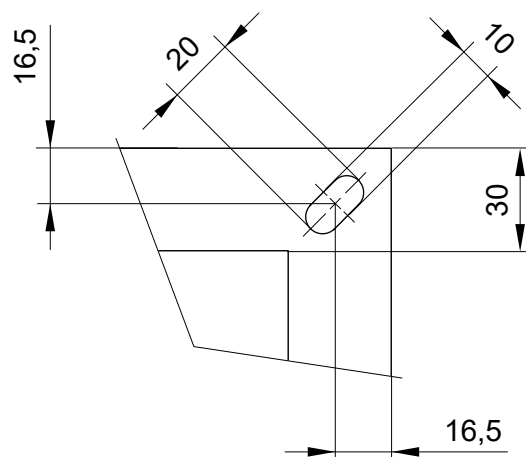
Damper blade overlaps

- Open damper blade overlaps the damper casing by the value "a" or "c". These values are specified in chapter Technical parameters → see pages 20 to 25

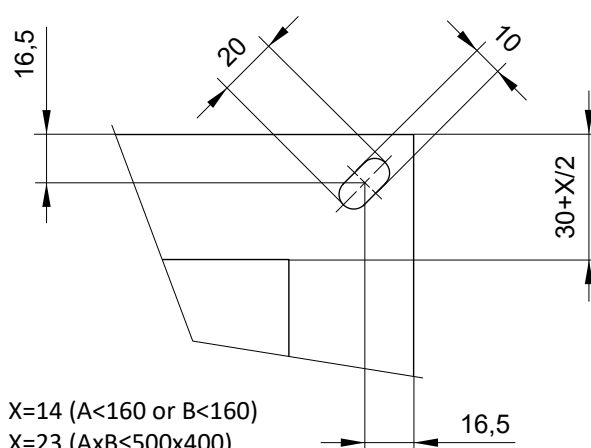


Values "a" and "c" has to be respected when projecting following air-conditioning duct.

Flange of a damper - CONTROL SIDE



Flange of a damper - INSTALLATION SIDE



X=14 (A<160 or B<160)

X=23 (AxB≤500x400)

X=36 (AxB>500x400)

*30 mm wide flanges are fitted
with oval holes in the corners*

Technical parameters

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control				
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*							
100 x	100	-	-	4,8	4,9	0,0030	BFL	M1	150 x	250	-	75	6,9	7,0	0,0234	BFL	M1		
	110	-	5	4,9	5,0	0,0037				280	-	90	7,2	7,3	0,0271				
	125	-	12	5,1	5,2	0,0048			160 x	100	-	-	5,6	5,7	0,0055	BFL	M1		
	140	-	20	5,2	5,3	0,0059				110	-	5	5,7	5,8	0,0069				
	150	-	25	5,3	5,4	0,0066				125	-	12	5,9	6,0	0,0088				
	160	-	30	5,4	5,5	0,0073				140	-	20	6,0	6,1	0,0108				
	180	-	40	5,6	5,7	0,0088				150	-	25	6,1	6,2	0,0121				
	200	-	50	5,8	5,9	0,0102				160	-	30	6,5	6,6	0,0113				
	225	-	62	6,0	6,1	0,0120				180	-	40	6,7	6,8	0,0137				
	250	-	75	6,2	6,3	0,0138				200	-	50	7,0	7,1	0,0161				
	280	-	90	6,5	6,6	0,0160				225	-	62	7,2	7,3	0,0191				
	110 x	100	-	-	4,9	5,0				0,0034	BFL	M1	250	-	75			7,5	7,6
110		-	5	5,0	5,1	0,0043	280	-	90	7,8			7,9	0,0258					
125		-	12	5,2	5,3	0,0055	300	-	90	8,3			8,4	0,0282					
140		-	20	5,3	5,4	0,0067	315	-	97,5	8,5			8,6	0,0300					
150		-	25	5,4	5,5	0,0075	355	-	117,5	9,4			9,5	0,0349					
160		-	30	5,5	5,6	0,0084	400	-	140	9,9			10,0	0,0403					
180		-	40	5,7	5,8	0,0100	450	-	165	10,5			10,6	0,0392					
200		-	50	5,9	6,0	0,0116	500	-	190	11,0			11,1	0,0446					
225		-	62	6,1	6,2	0,0137	550	-	215	11,4			11,5	0,0500					
250		-	75	6,4	6,5	0,0157	560	-	220	11,5			11,6	0,0511					
280		-	90	6,6	6,7	0,0182	600	-	240	11,9			12,0	0,0554					
125 x		100	-	-	5,1	5,2	0,0041	BFL	M1	630			-	255	12,3	12,4	0,0586	BFL	M2
	110	-	5	5,2	5,3	0,0050	650			-	265	12,5	12,6	0,0608					
	125	-	12	5,3	5,4	0,0065	700			-	290	13,1	13,2	0,0662					
	140	-	20	5,5	5,6	0,0080	710			-	295	13,2	13,3	0,0673					
	150	-	25	5,6	5,7	0,0089	750			15	315	13,6	14,0	0,0716					
	160	-	30	5,7	5,8	0,0099	800			40	340	14,2	14,6	0,0770					
	180	-	40	5,9	6,0	0,0118	900			90	390	15,3	15,7	0,0878					
	200	-	50	6,1	6,2	0,0138	1000			140	440	16,4	16,8	0,0986					
	225	-	62	6,3	6,4	0,0162	180 x			100	-	-	5,8	5,9	0,0064	BFL	M1		
	250	-	75	6,6	6,7	0,0186				110	-	5	5,9	6,0	0,0079				
	280	-	90	6,9	7,0	0,0215				125	-	12	6,1	6,2	0,0102				
	140 x	100	-	-	5,2	5,3				0,0047	BFL	M1	140	-	20				
110		-	5	5,3	5,4	0,0058		150	-	25			6,4	6,5	0,0140				
125		-	12	5,5	5,6	0,0075		160	-	30			6,7	6,8	0,0131				
140		-	20	5,6	5,7	0,0092		180	-	40			7,0	7,1	0,0159				
150		-	25	5,7	5,8	0,0103		200	-	50			7,2	7,3	0,0187				
160		-	30	5,8	5,9	0,0114		225	-	62			7,5	7,6	0,0222				
180		-	40	6,0	6,1	0,0137		250	-	75			7,7	7,8	0,0258				
200		-	50	6,2	6,3	0,0159	280	-	90	8,1			8,2	0,0300					
225		-	62	6,5	6,6	0,0187	300	-	90	8,6			8,7	0,0328					
250		-	75	6,8	6,9	0,0215	315	-	97,5	8,8			8,9	0,0349					
280		-	90	7,1	7,2	0,0249	355	-	117,5	9,7			9,8	0,0406					
150 x		100	-	-	5,3	5,4	0,0051	BFL	M1	400			-	140	10,2	10,3	0,0469	BFL	M2
	110	-	5	5,4	5,5	0,0063	450			-	165	10,8	10,9	0,0465					
	125	-	12	5,6	5,7	0,0082	500			-	190	11,4	11,5	0,0529					
	140	-	20	5,7	5,8	0,0100	550			-	215	11,8	11,9	0,0593					
	150	-	25	5,8	5,9	0,0112	560			-	220	11,9	12,0	0,0605					
	160	-	30	5,9	6,0	0,0124	600			-	240	12,4	12,5	0,0657					
	180	-	40	6,2	6,3	0,0149	630			-	255	12,7	12,8	0,0695					
	200	-	50	6,4	6,5	0,0173	650			-	265	12,9	13,0	0,0721					
	225	-	62	6,6	6,7	0,0204	700			-	290	13,5	13,9	0,0785					
															BFL				

Sizes in increments of 5 mm can be manufactured on request.
* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control						
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*									
180 x	710	-	295	13,6	14,0	0,0797	BFN	M2	710	-	295	14,7	15,1	0,1078	BFN	M2					
	750	15	315	14,1	14,5	0,0849			750	15	315	15,2	15,6	0,1147							
	800	40	340	14,7	15,1	0,0913			800	40	340	15,8	16,2	0,1233							
	900	90	390	15,9	16,3	0,1041			900	90	390	17,1	17,5	0,1406							
	1000	140	440	17,0	17,4	0,1169			1000	140	440	18,4	20,5	0,1579							
200 x	100	-	-	6,0	6,1	0,0072	BFL	M1	100	-	-	6,4	6,5	0,0093	BFL	M1					
	110	-	5	6,1	6,2	0,0089			110	-	5	6,6	6,7	0,0115							
	125	-	12	6,3	6,4	0,0115			125	-	12	6,8	6,9	0,0149							
	140	-	20	6,4	6,5	0,0141			140	-	20	7,0	7,1	0,0182							
	150	-	25	6,6	6,7	0,0158			150	-	25	7,1	7,2	0,0204							
	160	-	30	7,0	7,1	0,0149			160	-	30	7,5	7,6	0,0194							
	180	-	40	7,2	7,3	0,0181			180	-	40	7,7	7,8	0,0236							
	200	-	50	7,4	7,5	0,0213			200	-	50	8,0	8,1	0,0278							
	225	-	62	7,7	7,8	0,0253			225	-	62	8,3	8,4	0,0331							
	250	-	75	8,0	8,1	0,0294			250	-	75	8,6	8,7	0,0384							
	280	-	90	8,3	8,4	0,0342			280	-	90	9,0	9,1	0,0447							
	300	-	90	8,9	9,0	0,0374			300	-	90	9,6	9,7	0,0489							
	315	-	97,5	9,1	9,2	0,0398			315	-	97,5	9,8	9,9	0,0521							
	355	-	117,5	10,0	10,1	0,0463			355	-	117,5	10,7	10,8	0,0605							
	400	-	140	10,5	10,6	0,0535			400	-	140	11,3	11,4	0,0700							
	450	-	165	11,2	11,3	0,0537			450	-	165	12,0	12,1	0,0719							
	500	-	190	11,8	11,9	0,0611			500	-	190	12,7	12,8	0,0818							
	550	-	215	12,1	12,2	0,0685			550	-	215	13,1	13,2	0,0917							
	560	-	220	12,3	12,4	0,0700			560	-	220	13,2	13,3	0,0937							
	600	-	240	12,8	12,9	0,0759			600	-	240	13,8	14,2	0,1016							
	630	-	255	13,1	13,2	0,0804			630	-	255	14,2	14,6	0,1075							
	650	-	265	13,4	13,5	0,0833			650	-	265	14,4	14,8	0,1115							
	700	-	290	14,0	14,4	0,0907			700	-	290	15,1	15,5	0,1214							
	710	-	295	14,1	14,5	0,0922			710	-	295	15,2	15,6	0,1234							
	750	15	315	14,6	15,0	0,0981			750	15	315	15,8	16,2	0,1313							
	800	40	340	15,2	15,6	0,1055			800	40	340	16,5	16,9	0,1412							
	900	90	390	16,4	16,8	0,1203			900	90	390	17,8	18,2	0,1610							
	1000	140	440	17,6	18,0	0,1351			1000	140	440	19,1	21,2	0,1808							
	225 x	100	-	-	6,2	6,3			0,0083	BFL	M1	100	-	-			6,7	6,8	0,0106	BFL	M1
		110	-	5	6,3	6,4			0,0102			110	-	5			6,8	6,9	0,0131		
		125	-	12	6,5	6,6			0,0132			125	-	12			7,1	7,2	0,0169		
		140	-	20	6,7	6,8			0,0162			140	-	20			7,3	7,4	0,0207		
150		-	25	6,8	6,9	0,0181	150	-	25			7,4	7,5	0,0232							
160		-	30	7,2	7,3	0,0171	160	-	30			7,8	7,9	0,0221							
180		-	40	7,5	7,6	0,0209	180	-	40			8,1	8,2	0,0269							
200		-	50	7,7	7,8	0,0246	200	-	50			8,3	8,4	0,0317							
225		-	62	8,0	8,1	0,0292	225	-	62			8,7	8,8	0,0377							
250		-	75	8,3	8,4	0,0339	250	-	75			9,0	9,1	0,0438							
280		-	90	8,7	8,8	0,0395	280	-	90			9,1	9,2	0,0510							
300		-	90	9,2	9,3	0,0432	300	-	90			9,4	9,5	0,0558							
315		-	97,5	9,4	9,5	0,0460	315	-	97,5			10,0	10,1	0,0594							
355		-	117,5	10,3	10,4	0,0534	355	-	117,5			10,2	10,3	0,0691							
400		-	140	10,9	11,0	0,0618	400	-	140			11,2	11,3	0,0799							
450		-	165	11,6	11,7	0,0628	450	-	165			11,8	11,9	0,0828							
500		-	190	12,2	12,3	0,0714	500	-	190			12,5	12,6	0,0942							
550		-	215	12,6	12,7	0,0801	550	-	215			13,2	13,3	0,1056							
560		-	220	12,8	12,9	0,0818	560	-	220			13,7	14,1	0,1078							
600		-	240	13,3	13,4	0,0887	600	-	240			13,8	14,2	0,1170							
630		-	255	13,7	14,1	0,0939	630	-	255			14,4	14,8	0,1238							
650		-	265	13,9	14,3	0,0974	650	-	265			14,8	15,2	0,1284							
700		-	290	14,5	14,9	0,1060	700	-	290			15,1	15,5	0,1398							

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

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

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control						
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*									
280 x	710	-	295	15,8	16,2	0,1420	BFN	M2	710	-	295	16,7	17,1	0,1638	BFN	M2					
	750	15	315	15,9	16,3	0,1512			750	15	315	17,3	17,7	0,1744							
	800	40	340	16,5	16,9	0,1626	BF	M3	800	40	340	18,1	18,5	0,1875	BF	M3					
	900	90	390	17,2	19,3	0,1854			900	90	390	19,6	21,7	0,2138							
	1000	140	440	18,6	20,7	0,2082			1000	140	440	21,0	23,1	0,2401							
300 x	100	-	-	6,9	7,0	0,0114	BFL	M1	100	-	-	7,7	7,8	0,0137	BFL	M1					
	110	-	5	7,0	7,1	0,0141			110	-	5	7,9	8,0	0,0170							
	125	-	12	7,3	7,4	0,0182			125	-	12	8,1	8,2	0,0219							
	140	-	20	7,5	7,6	0,0223			140	-	20	8,4	8,5	0,0268							
	150	-	25	7,6	7,7	0,0250			150	-	25	8,5	8,6	0,0301							
	160	-	30	8,0	8,1	0,0239			160	-	30	8,6	8,7	0,0288							
	180	-	40	8,3	8,4	0,0291			180	-	40	8,9	9,0	0,0352							
	200	-	50	8,6	8,7	0,0343			200	-	50	9,2	9,3	0,0415							
	225	-	62	8,9	9,0	0,0408			225	-	62	9,6	9,7	0,0494							
	250	-	75	9,3	9,4	0,0474			250	-	75	10,0	10,1	0,0573							
	280	-	90	9,7	9,8	0,0552			280	-	90	10,4	10,5	0,0668							
	300	-	90	10,3	10,4	0,0604			300	-	90	11,0	11,1	0,0731							
	315	-	97,5	10,5	10,6	0,0643			315	-	97,5	11,3	11,4	0,0778							
	355	-	117,5	11,5	11,6	0,0748			355	-	117,5	12,3	12,4	0,0905							
	400	-	140	12,1	12,2	0,0865			400	-	140	13,0	13,1	0,1047							
	450	-	165	12,9	13,0	0,0900			450	-	165	13,8	13,9	0,1100							
	500	-	190	13,6	13,7	0,1024			500	-	190	14,6	15,0	0,1251							
	550	-	215	14,1	14,5	0,1148			550	-	215	15,1	15,5	0,1403							
	560	-	220	14,2	14,6	0,1173			560	-	220	15,3	15,7	0,1433							
	600	-	240	14,8	15,2	0,1272			600	-	240	15,9	16,3	0,1554							
	630	-	255	15,2	15,6	0,1347	BFN	M2	630	-	255	16,4	16,8	0,1645	BFN	M2					
	650	-	265	15,5	15,9	0,1396			650	-	265	16,7	17,1	0,1706							
	700	-	290	16,2	16,6	0,1520			700	-	290	17,5	17,9	0,1857							
	710	-	295	16,4	16,8	0,1545			710	-	295	17,7	18,1	0,1888							
	315 x	750	15	315	17,0	17,4	0,1644	BF	M3	750	15	315	18,3	18,7	0,2009	BF	M3				
		800	40	340	17,7	18,1	0,1768			800	40	340	19,1	21,2	0,2160						
		900	90	390	19,2	21,3	0,2016			900	90	390	20,6	22,7	0,2463						
		1000	140	440	20,6	22,7	0,2264			1000	140	440	22,2	24,3	0,2766						
100		-	-	7,0	7,1	0,0121	100			-	-	8,2	8,3	0,0156							
315 x	110	-	5	7,2	7,3	0,0149	BFL	M1	110	-	5	8,4	8,5	0,0193	BFL	M1					
	125	-	12	7,4	7,5	0,0192			125	-	12	8,6	8,7	0,0249							
	140	-	20	7,6	7,7	0,0235			140	-	20	8,9	9,0	0,0305							
	150	-	25	7,8	7,9	0,0264			150	-	25	9,0	9,1	0,0342							
	160	-	30	8,2	8,3	0,0252			160	-	30	9,1	9,2	0,0329							
	180	-	40	8,5	8,6	0,0308			180	-	40	9,4	9,5	0,0401							
	200	-	50	8,7	8,8	0,0363			200	-	50	9,7	9,8	0,0473							
	225	-	62	9,1	9,2	0,0432			225	-	62	10,1	10,2	0,0563							
	250	-	75	9,5	9,6	0,0501			250	-	75	10,5	10,6	0,0654							
	280	-	90	9,9	10,0	0,0584			280	-	90	11,0	11,1	0,0762							
	300	-	90	10,5	10,6	0,0639			BFN	M2	400 x	300	-	90			11,7	11,8	0,0834	BFN	M2
	315	-	97,5	10,7	10,8	0,0680					315	-	97,5	11,9			12,0	0,0888			
	355	-	117,5	11,7	11,8	0,0791					355	-	117,5	13,0			13,1	0,1033			
	400	-	140	12,3	12,4	0,0915					400	-	140	13,7			13,8	0,1195			
	450	-	165	13,2	13,3	0,0955					450	-	165	14,6			14,7	0,1263			
	500	-	190	13,9	14,0	0,1086					500	-	190	15,4			15,8	0,1437			
	550	-	215	14,4	14,8	0,1218					550	-	215	16,0			16,4	0,1611			
	560	-	220	14,5	14,9	0,1244					560	-	220	16,2			16,6	0,1646			
	600	-	240	15,1	15,5	0,1349					600	-	240	16,9			17,3	0,1785			
	630	-	255	15,6	16,0	0,1428					630	-	255	17,4			17,8	0,1890			
	650	-	265	15,9	16,3	0,1481	650	-			265	17,7	18,1	0,1959							
	700	-	290	16,6	17,0	0,1612	700	-			290	18,5	18,9	0,2133							

Sizes in increments of 5 mm can be manufactured on request.
* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control			
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*						
400 x	710	-	295	18,7	19,1	0,2168	BFN	M2	500 x 1000	140	440	26,5	28,6	0,4090	BF	M3		
	750	15	315	19,4	21,5	0,2307	BF	M3	125	-	12	10,3	10,4	0,0350	BFL	M1		
	800	40	340	20,2	22,3	0,2481			140	-	20	10,5	10,6	0,0428				
	900	90	390	21,9	24,0	0,2829			150	-	25	10,7	10,8	0,0480				
	1000	140	440	23,5	25,6	0,3177			160	-	30	10,8	10,9	0,0364				
450 x	125	-	12	9,2	9,3	0,0283	BFL	M1	180	-	40	11,1	11,2	0,0463			BFL	M1
	140	-	20	9,4	9,5	0,0346			200	-	50	11,5	11,6	0,0563				
	150	-	25	9,6	9,7	0,0388			225	-	62	12,0	12,1	0,0687				
	160	-	30	9,6	9,7	0,0374			250	-	75	12,5	12,6	0,0812				
	180	-	40	10,0	10,1	0,0456			280	-	90	13,1	13,2	0,0961				
	200	-	50	10,3	10,4	0,0538			300	-	90	13,8	13,9	0,1061				
	225	-	62	10,7	10,8	0,0641			315	-	97,5	14,1	14,2	0,1135				
	250	-	75	11,2	11,3	0,0744			355	-	117,5	15,3	15,4	0,1335				
	280	-	90	11,7	11,8	0,0867			550 x 400	-	140	16,2	16,6	0,1559				
	300	-	90	12,3	12,4	0,0949			450	-	165	17,2	17,6	0,1808				
	315	-	97,5	12,6	12,7	0,1011	500	-	190	18,2	18,6	0,2057						
	355	-	117,5	13,7	13,8	0,1175	550	-	215	18,9	19,3	0,2306						
	400	-	140	14,5	14,6	0,1360	560	-	220	19,1	19,5	0,2356						
	450	-	165	15,5	15,9	0,1445	600	-	240	19,9	20,3	0,2555						
	500	-	190	16,4	16,8	0,1644	630	-	255	20,5	22,6	0,2704						
	550	-	215	17,0	17,4	0,1843	650	-	265	20,9	23,0	0,2804						
	560	-	220	17,2	17,6	0,1883	700	-	290	21,9	24,0	0,3053						
	600	-	240	17,9	18,3	0,2042	710	-	295	22,1	24,2	0,3103						
	630	-	255	18,4	18,8	0,2161	750	15	315	23,0	25,1	0,3302						
	650	-	265	18,8	19,2	0,2241	800	40	340	24,0	26,1	0,3551						
	700	-	290	19,7	21,8	0,2440	900	90	390	26,0	28,1	0,4049						
	710	-	295	19,8	21,9	0,2480	BF	M3	125	-	12	10,4	10,5	0,0356	BFL	M1		
	750	15	315	20,6	22,7	0,2639			140	-	20	10,7	10,8	0,0436				
	800	40	340	21,5	23,6	0,2838			150	-	25	10,8	10,9	0,0489				
	900	90	390	23,2	25,3	0,3236			160	-	30	10,9	11,0	0,0371				
1000	140	440	25,0	27,1	0,3634	180			-	40	11,2	11,3	0,0472					
500 x	125	-	12	9,7	9,8	0,0316	BFL	M1	200	-	50	11,6	11,7	0,0574			BFL	M1
	140	-	20	10,0	10,1	0,0387			225	-	62	12,1	12,2	0,0701				
	150	-	25	10,2	10,3	0,0434			250	-	75	12,6	12,7	0,0828				
	160	-	30	10,1	10,2	0,0419			280	-	90	13,2	13,3	0,0980				
	180	-	40	10,5	10,6	0,0511			300	-	90	13,9	14,0	0,1082				
	200	-	50	10,9	11,0	0,0603			315	-	97,5	14,2	14,3	0,1158				
	225	-	62	11,3	11,4	0,0718			355	-	117,5	15,4	15,5	0,1361				
	250	-	75	11,8	11,9	0,0834			560 x 400	-	140	16,3	16,7	0,1590				
	280	-	90	12,3	12,4	0,0972			450	-	165	17,4	17,8	0,1844				
	300	-	90	13,0	13,1	0,1064			500	-	190	18,4	18,8	0,2098				
	315	-	97,5	13,3	13,4	0,1133	550	-	215	19,1	19,5	0,2352						
	355	-	117,5	14,5	14,6	0,1318	560	-	220	19,3	19,7	0,2403						
	400	-	140	15,3	15,4	0,1525	600	-	240	20,1	20,5	0,2606						
	450	-	165	16,3	16,7	0,1626	630	-	255	20,8	22,9	0,2758						
	500	-	190	17,3	17,7	0,1850	650	-	265	21,2	23,3	0,2860						
	550	-	215	18,0	18,4	0,2074	700	-	290	22,2	24,3	0,3114						
	560	-	220	18,1	18,5	0,2119	710	-	295	22,4	24,5	0,3165						
	600	-	240	18,9	19,3	0,2298	750	15	315	23,2	25,3	0,3368						
	630	-	255	19,5	19,9	0,2433	800	40	340	24,2	26,3	0,3622						
	650	-	265	19,9	22,0	0,2522	BF	M2	140	-	20	11,1	11,2	0,0469	BFL	M1		
	700	-	290	20,8	22,9	0,2746			150	-	25	11,3	11,4	0,0526				
	710	-	295	21,0	23,1	0,2791			160	-	30	11,3	11,4	0,0400				
	750	15	315	21,8	23,9	0,2970			180	-	40	11,7	11,8	0,0510				
	800	40	340	22,7	24,8	0,3194			200	-	50	12,1	12,2	0,0619				
	900	90	390	24,6	26,7	0,3642			225	-	62	12,6	12,7	0,0756				

Sizes in increments of 5 mm can be manufactured on request.
* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control				
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*							
600 x	250	-	75	13,1	13,2	0,0893	BFL	M1	650 x	630	-	255	22,7	24,8	0,3247	BF	M2		
	280	-	90	13,7	13,8	0,1058				650	-	265	23,1	25,2	0,3367				
	300	-	90	14,5	14,6	0,1167				700	-	290	24,2	26,3	0,3666				
	315	-	97,5	14,8	14,9	0,1249				710	-	295	24,5	26,6	0,3726				
	355	-	117,5	16,1	16,2	0,1469				750	15	315	25,4	27,5	0,3965				
	400	-	140	17,0	17,4	0,1715	BFN	M2	700 x	150	-	25	12,4	12,5	0,0618	BFL	M1		
	450	-	165	18,0	18,4	0,1989				160	-	30	12,4	12,5	0,0473				
	500	-	190	19,1	19,5	0,2263				180	-	40	12,8	12,9	0,0603				
	550	-	215	19,9	20,3	0,2537				200	-	50	13,3	13,4	0,0732				
	560	-	220	20,1	20,5	0,2592				225	-	62	13,9	14,0	0,0894				
	600	-	240	21,0	23,1	0,2811	BF	M3		250	-	75	14,4	14,5	0,1056				
	630	-	255	21,6	23,7	0,2976				280	-	90	15,1	15,2	0,1251				
	650	-	265	22,0	24,1	0,3085				300	-	90	15,9	16,0	0,1380				
	700	-	290	23,1	25,2	0,3359				315	-	97,5	16,2	16,3	0,1477				
	710	-	295	23,3	25,4	0,3414				355	-	117,5	17,6	18,0	0,1737				
	750	15	315	24,2	26,3	0,3633			400	-	140	18,6	19,0	0,2028	BFN				
	800	40	340	25,2	27,3	0,3907			450	-	165	19,8	20,2	0,2352					
630 x	140	-	20	11,5	11,6	0,0494	BFL	M1	710 x	500	-	190	20,9	21,3	0,2676	BF	M2		
	150	-	25	11,7	11,8	0,0554				550	-	215	21,9	24,0	0,3000				
	160	-	30	11,6	11,7	0,0422				560	-	220	22,1	24,2	0,3065				
	180	-	40	12,1	12,2	0,0538				600	-	240	23,0	25,1	0,3324				
	200	-	50	12,5	12,6	0,0653				630	-	255	23,8	25,9	0,3519				
	225	-	62	13,0	13,1	0,0798				650	-	265	24,2	26,3	0,3648				
	250	-	75	13,5	13,6	0,0942				700	-	290	25,4	27,5	0,3972				
	280	-	90	14,2	14,3	0,1116				710	-	295	25,6	27,7	0,4037				
	300	-	90	14,9	15,0	0,1231	BFN	M2		150	-	25	12,6	12,7	0,0627				
	315	-	97,5	15,2	15,3	0,1318				160	-	30	12,5	12,6	0,0480				
	355	-	117,5	16,5	16,6	0,1549			180	-	40	12,9	13,0	0,0612					
	400	-	140	17,5	17,9	0,1809			200	-	50	13,4	13,5	0,0744					
	450	-	165	18,6	19,0	0,2098			225	-	62	14,0	14,1	0,0908					
	500	-	190	19,7	20,1	0,2387			250	-	75	14,6	14,7	0,1073					
	550	-	215	20,5	20,9	0,2676			280	-	90	15,2	15,3	0,1270					
	560	-	220	20,7	21,1	0,2734			300	-	90	16,0	16,1	0,1402					
	600	-	240	21,6	23,7	0,2965			315	-	97,5	16,4	16,5	0,1500					
	630	-	255	22,3	24,4	0,3139			BF	M3	355	-	117,5	17,7	18,1	0,1763			
	650	-	265	22,7	24,8	0,3254	400	-			140	18,8	19,2	0,2060					
	700	-	290	23,8	25,9	0,3543	450	-			165	20,0	20,4	0,2389					
710	-	295	24,0	26,1	0,3601	500	-	190			21,1	21,5	0,2718						
750	15	315	24,9	27,0	0,3832	550	-	215			22,1	24,2	0,3047						
650 x	140	-	20	11,7	11,8	0,0510	BFL	M1	750 x	560	-	220	22,3	24,4	0,3112	BF	M2		
	150	-	25	11,9	12,0	0,0572				600	-	240	23,3	25,4	0,3376				
	160	-	30	11,8	11,9	0,0437				630	-	255	24,0	26,1	0,3573				
	180	-	40	12,3	12,4	0,0556				650	-	265	24,4	26,5	0,3705				
	200	-	50	12,7	12,8	0,0676				700	-	290	25,6	27,7	0,4034				
	225	-	62	13,3	13,4	0,0825				BFN	M2	150	-	25	13,0			13,1	0,0664
	250	-	75	13,8	13,9	0,0975						160	-	30	12,9			13,0	0,0510
	280	-	90	14,4	14,5	0,1154	180	-				40	13,4	13,5	0,0649				
	300	-	90	15,2	15,3	0,1274	200	-				50	13,9	14,0	0,0789				
	315	-	97,5	15,5	15,6	0,1363	225	-				62	14,5	14,6	0,0963				
	355	-	117,5	16,8	16,9	0,1603	BF	M2	250	-	75	15,1	15,2	0,1138					
	400	-	140	17,8	18,2	0,1872			280	-	90	15,8	15,9	0,1347					
	450	-	165	18,9	19,3	0,2171			300	-	90	16,6	16,7	0,1487					
	500	-	190	20,0	20,4	0,2470			315	-	97,5	16,9	17,0	0,1591					
	550	-	215	20,9	21,3	0,2769			355	-	117,5	18,3	18,7	0,1871					
	560	-	220	21,1	23,2	0,2829			400	-	140	19,4	19,8	0,2185	BFN				
	600	-	240	22,0	24,1	0,3068			450	-	165	20,6	21,0	0,2534					

Sizes in increments of 5 mm can be manufactured on request.
* For designs with BKN a weight of 0.5 kg must be added.

A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control		
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					
750 x	500	-	190	21,9	22,3	0,2883	BFN	900 x	200	-	50	15,6	15,7	0,0958	M1		
	550	-	215	22,8	24,9	0,3232	BF		225	-	62	16,3	16,4	0,1170			
	560	-	220	23,1	25,2	0,3302			250	-	75	17,0	17,1	0,1382			
	600	-	240	24,1	26,2	0,3581			280	-	90	17,8	17,9	0,1637			
	630	-	255	24,8	26,9	0,3790			300	-	90	18,7	18,8	0,1806			
	650	-	265	25,3	27,4	0,3930			315	-	97,5	19,1	19,5	0,1933		M2	
800 x	150	-	25	13,6	13,7	0,0710	M1	355	-	117,5	20,6	21,0	0,2273	BFN			
	160	-	30	13,4	13,5	0,0546		400	-	140	21,8	22,2	0,2654				
	180	-	40	13,9	14,0	0,0696		450	-	165	23,2	23,6	0,3078				
	200	-	50	14,4	14,5	0,0845		500	-	190	24,6	26,7	0,3502				
	225	-	62	15,1	15,2	0,1032		550	-	215	25,7	27,8	0,3926				
	250	-	75	15,7	15,8	0,1219	BFL	160	-	30	15,6	15,7	0,0692	M1			
	280	-	90	16,5	16,6	0,1444		180	-	40	16,2	16,3	0,0882				
	300	-	90	17,3	17,4	0,1593		200	-	50	16,8	16,9	0,1071				
	315	-	97,5	17,7	17,8	0,1705		225	-	62	17,5	17,6	0,1308				
	355	-	117,5	19,1	19,5	0,2005		250	-	75	18,2	18,3	0,1545				
	400	-	140	20,2	20,6	0,2341	BFN	280	-	90	19,1	19,2	0,1830	M2			
450	-	165	21,5	21,9	0,2715	300		-	90	20,0	20,4	0,2019					
500	-	190	22,8	23,2	0,3089	315		-	97,5	20,5	20,9	0,2161					
550	-	215	23,8	25,9	0,3463	355		-	117,5	22,1	22,5	0,2541					
560	-	220	24,1	26,2	0,3538	400		-	140	23,4	23,8	0,2967					
600	-	240	25,1	27,2	0,3837	BF	450	-	165	24,9	25,3	0,3441	BFN				
900 x	160	-	30	14,5	14,6		0,0619	BFL	M1	500	-	190		26,4	28,5	0,3915	BF
	180	-	40	15,1	15,2		0,0789										

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

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

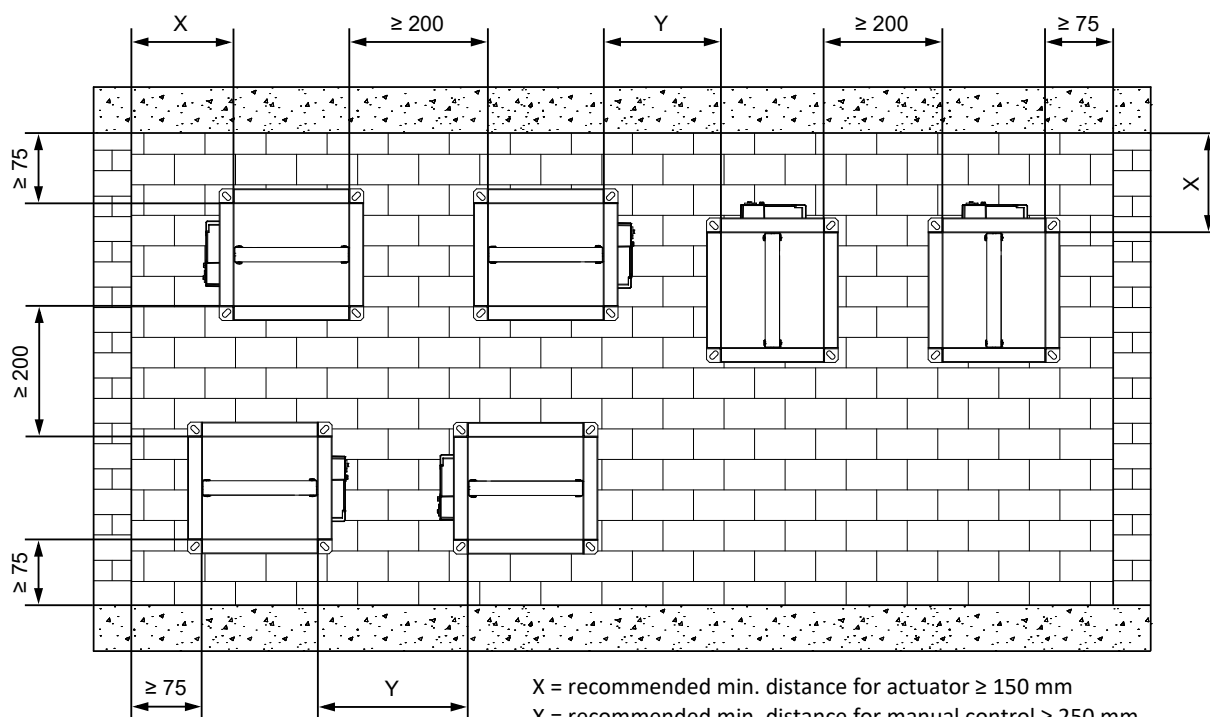
IV. INSTALLATION

Placement and installation

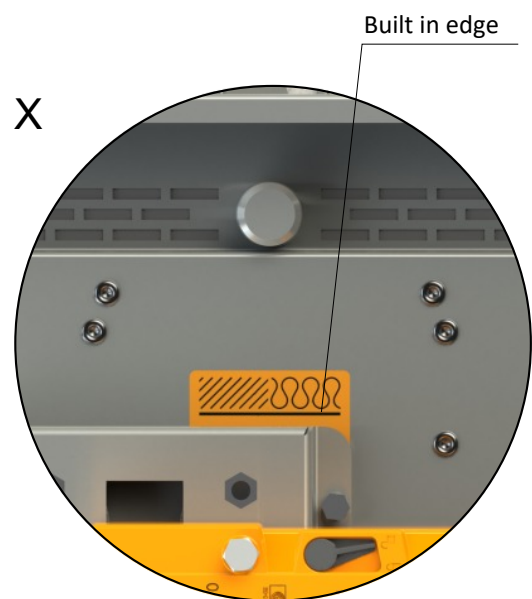
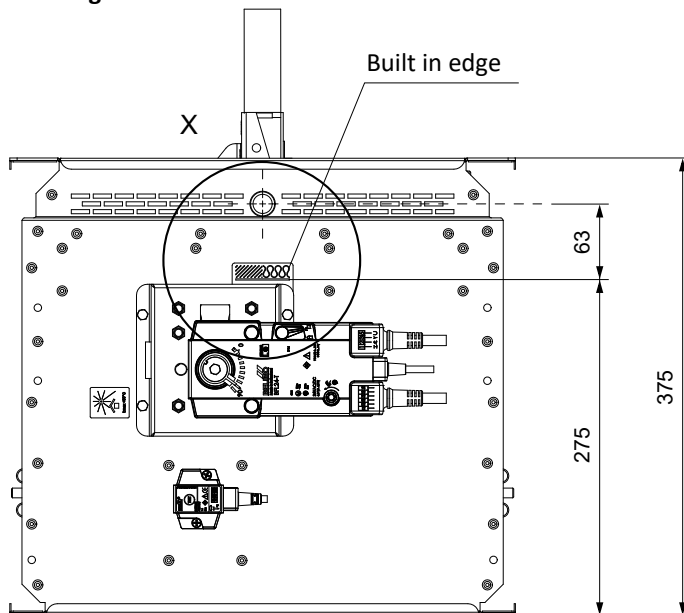
- The fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating constructions. The damper installation procedures must be done so that all load transfer from the fire separating constructions to the damper is absolutely excluded. Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. The gap between the installed damper and the fire separating construction must be perfectly filled with approved material.
- The damper must be installed so that the damper blade (in closed position) is situated in the fire separating construction - marked by the label BUILT-IN EDGE on the damper casing. If such solution is not possible, the duct between the fire separating construction and the damper blade must be protected according to the certified installation method → see pages 29 to 76
- During the installation and plastering process, the actuating mechanism must be protected (covered)
- The distance between the fire damper and the construction (wall, ceiling) must be 75 mm at the minimum, according to EN 1366-2. If two or more dampers are to be installed in one fire separating construction, the distance between adjacent dampers must be 200 mm at the minimum, according to EN 1366-2.
- Fire dampers can be installed without following duct on one or both sides. Installation without following duct is only possible in vertical constructions. In this case, the fire dampers must be installed with cover grilles (additional extension parts may be required due to overlapping of the damper blade → see pages 20 to 25). The damper must be installed so that the activation device (thermal fuse/thermoelectric activation device/smoke detector) is located at the highest possible point of the damper (top of the casing).

Minimum distance between the fire dampers and the construction

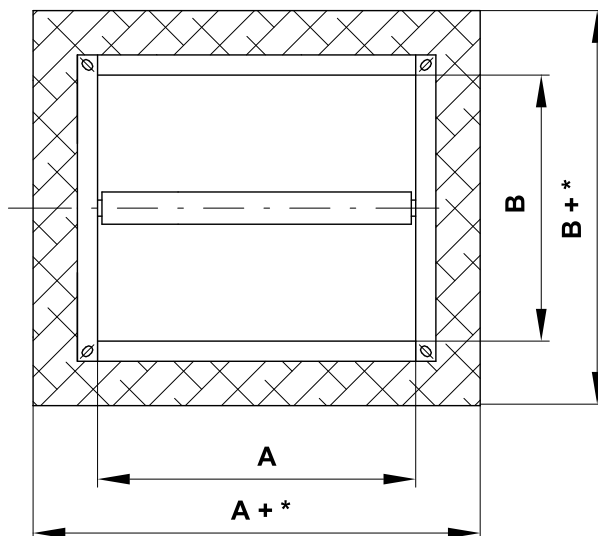
- minimum distance 200 mm between dampers, according to EN 1366-2
- minimum distance 75 mm between damper and construction (wall/ceiling), according to EN 1366-2
- recommended minimum distance 150 mm necessary for access to the actuator
- recommended minimum distance 250 mm necessary for access to the manual control



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

Built in edge

""BUILT IN EDGE label"" indicates the recommended edge of installation of a fire damper in the fire separating construction (wall/ceiling). The damper must be installed so that the entire damper blade (in the closed position) is located in the fire separating construction (wall/ceiling) and at the same time the actuating mechanism and inspection openings are freely accessible.

Dimensions of an installation opening*** Mortar or gypsum**

- min. A(B)+100
- max. A(B)+300

*** Weichschott**

- min. A(B)+80
- max. A(B)+800

*** Fire protective foam**

- min. A(B)+80
- max. A(B)+150

*** Stuffing box with fire protective boards**

- min. A(B)+80
- max. A(B)+220

*** Weichschott (in shaft wall construction)**

- min. A(B)+80
- max. A(B)+260

Examples of constructions for fire damper installation

- The fire damper can be installed into:
 - Solid wall construction made e.g. of normal concrete/masonry or porous concrete with min. thickness 100 mm.
 - Gypsum wall construction with min. thickness 100 mm
 - Solid ceiling construction made e.g. of normal concrete or porous concrete, with minimum thickness according to EN 1366-2.
 - Outside the wall/ceiling construction. The duct and damper must be protected by fire insulation.

Statement of installations

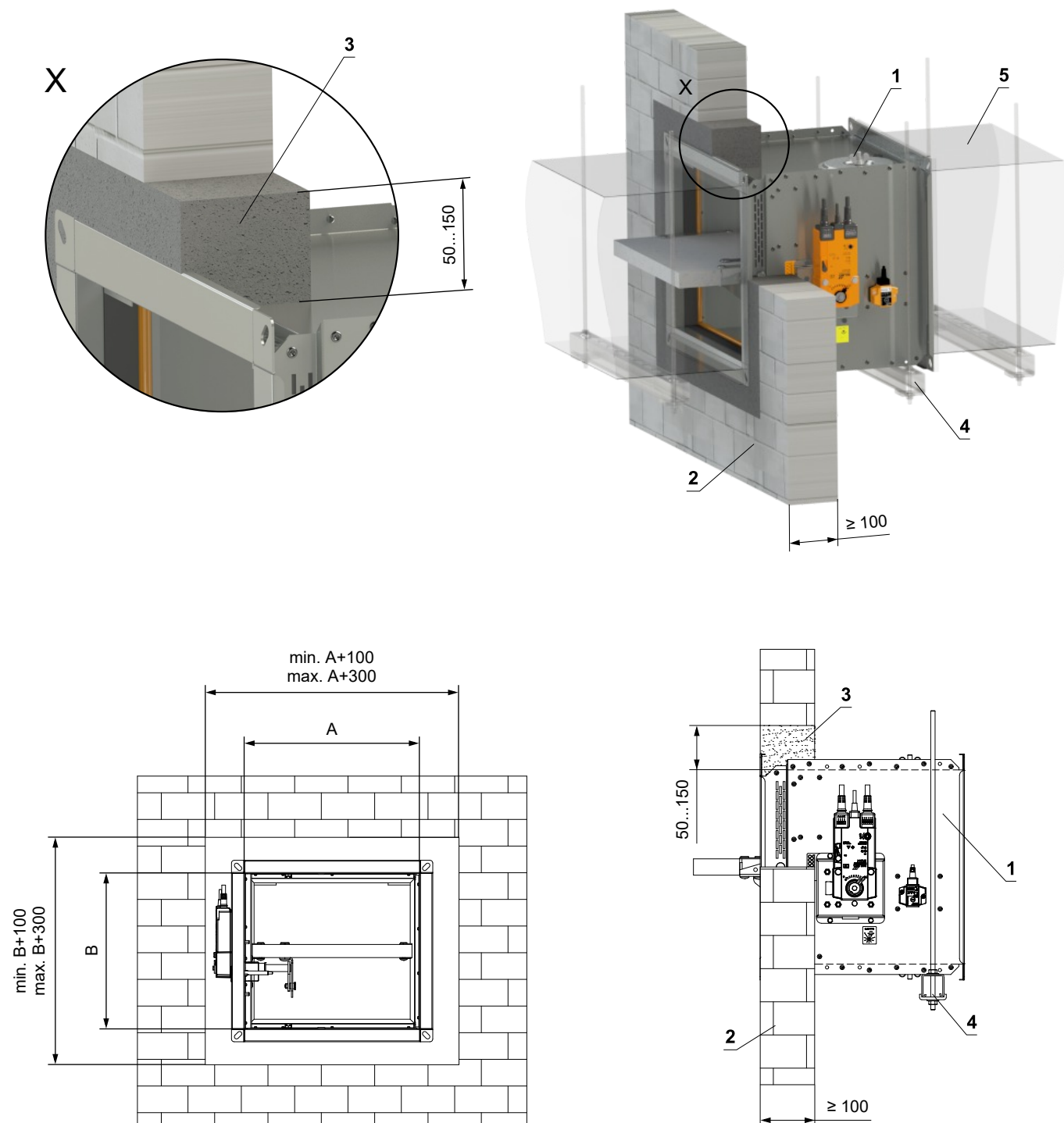
Placement	wall/ceiling min. thickness [mm]	Method of installation	Fire resistance	Page
In solid wall construction	100	Mortar or gypsum	EI 120 (v _e i↔o) S	29
		2 dampers in battery - mortar or gypsum		30
		Weichschott system	EI 90 (v _e i↔o) S	31
		Mineral wool with fire-resistant coating and fire-resistant boards		32
		Fire-resistant foam with stucco plaster	EI 60 (v _e i↔o) S	33
		Installation next to the wall/ceiling - mortar or gypsum + mineral wool	EI 90 (v _e i↔o) S	34
Outside solid wall construction	100	ISOVER Ultimate Protect - Mortar or gypsum	EI 60 (v _e i↔o) S	35
		ISOVER Ultimate Protect - Weichschott system		36
		ISOVER Ultimate Protect - Weichschott system	EI 90 (v _e i↔o) S	37
		Mineral wool ROCKWOOL - Mineral wool with fire-resistant coating and fireresistant board	EI 90 (v _e i↔o) S EI 120 (v _e i↔o) S	38
In gypsum wall construction	100	Mortar or gypsum	EI 120 (v _e i↔o) S	39
		2 dampers in battery - mortar or gypsum	EI 90 (v _e i↔o) S	40
		Weichschott system 100 mm	EI 60 (v _e i↔o) S EI 90 (v _e i↔o) S	41
	75	Weichschott system 50 mm	EI 30 (v _e i↔o) S EI 45 (v _e i↔o) S	42
		Mineral wool with fire-resistant coating and fire-resistant boards	EI 90 (v _e i↔o) S	43
	100	Fire-resistant foam with stucco plaster	EI 60 (v _e i↔o) S	44
		Installation next to the wall/ceiling - mortar or gypsum + mineral wool	EI 90 (v _e i↔o) S	45
Outside gypsum wall constrution	100	ISOVER Ultimate Protect - Mortar or gypsum	EI 60 (v _e i↔o) S	46
		ISOVER Ultimate Protect - Weichschott system		47
		ISOVER Ultimate Protect - Weichschott system	EI 90 (v _e i↔o) S	48
		Mineral wool ROCKWOOL - Mineral wool with fire-resistant coating and fireresistant board	EI 90 (v _e i↔o) S EI 120 (v _e i↔o) S	49
In shaft wall construction	85	Weichschott system	EI 60 (v _e i↔o) S EI 90 (v _e i↔o) S	50
In solid ceiling construction	110 - Concrete 125 - Aerated concrete	Mortar or gypsum	EI 120 (h _o i↔o) S	51
		2 dampers in battery - mortar or gypsum		52
		Weichschott system	EI 90 (h _o i↔o) S	53
		Mineral wool with fire-resistant coating and fire-resistant boards		54
Outside solid ceiling construction	110 - Concrete 125 - Aerated concrete	Mineal wool ROCKWOOL - Mortar or gypsum	EI 90 (h _o i↔o) S EI 120 (h _o i↔o) S	55
		Concreting	EI 90 (h _o i↔o) S	56
Installation frame in solid wall construction	100	Installation frame E1		59
		Installation frame E2	EI 90 (v _e i↔o) S	63
		Installation frame E4		68
Installation frame outside solid wall construction	100	Insulation from fire-resistant boards - mortar or gypsum - Installation frame E6	EI 90 (v _e i↔o) S	75
Installation frame in gypsum wall construction	100	Installation frame E1		60
		Installation frame E3	EI 90 (v _e i↔o) S	66
		Flexible ceiling - Installation frame E5		72-73
Installation frame in solid ceiling construction	110 - Concrete 125 - Aerated concrete	Installation frame E1		61
		Installation frame E2	EI 90 (h _o i↔o) S	64
		Installation frame E4		69
Installation frame outside solid ceiling construction	110 - Concrete 125 - Aerated concrete	Concreting - Installation frame E4		70
		Insulation from fire-resistant boards - mortar or gypsum - Installation frame E6	EI 90 (h _o i↔o) S	76

In solid wall construction

In solid wall construction - mortar or gypsum

EI 120 (v_e i↔o) S

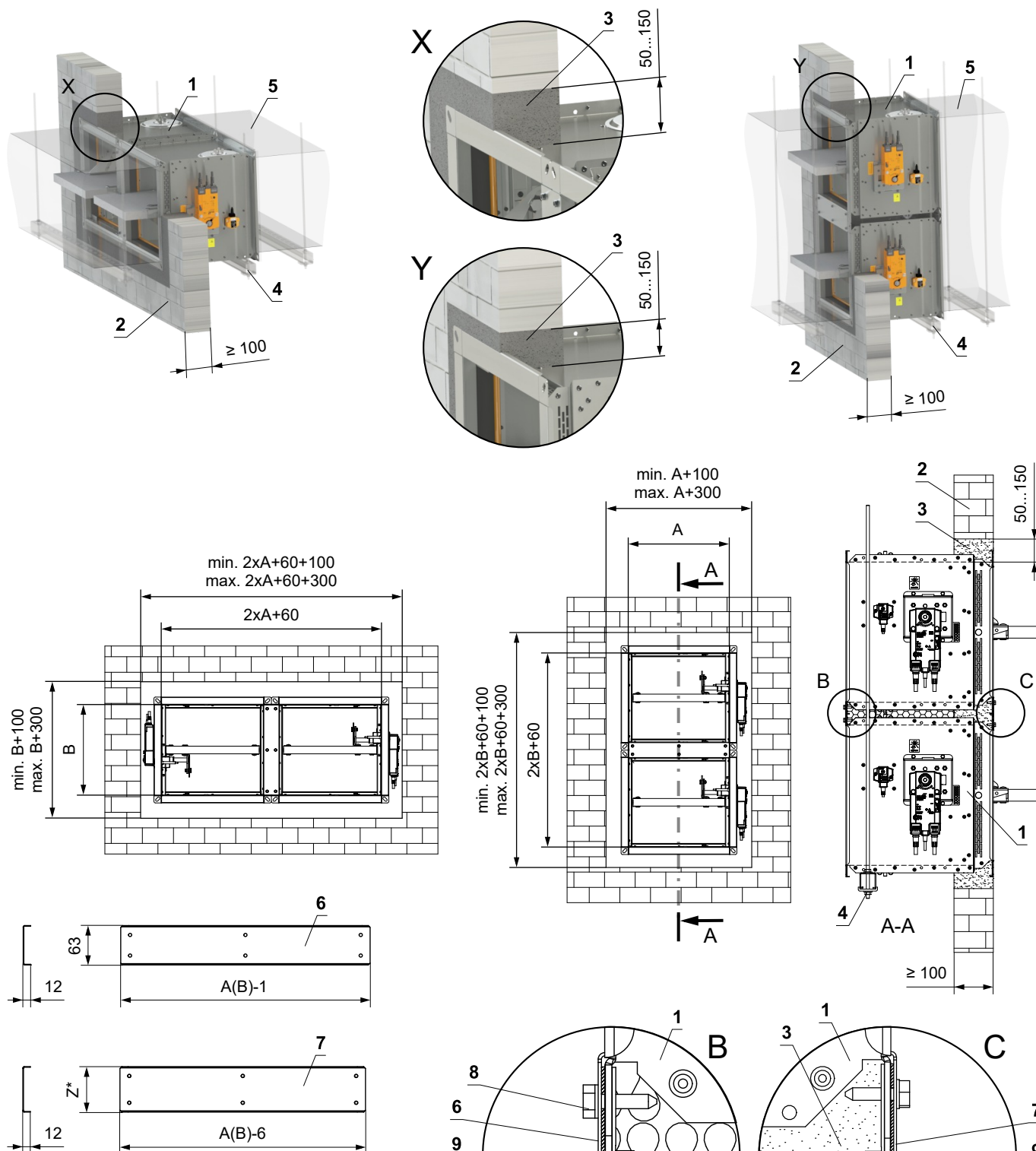
- For connection of following duct → see page 81



- 1 FDMB
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct

In solid wall construction - 2 dampers in battery - mortar or gypsum

EI 90 ($v_e i \leftrightarrow o$) S



- 1 FDMB
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

* Z=86 (A≤500 and B≤400)

* Z=99 (A>500 or B>400)

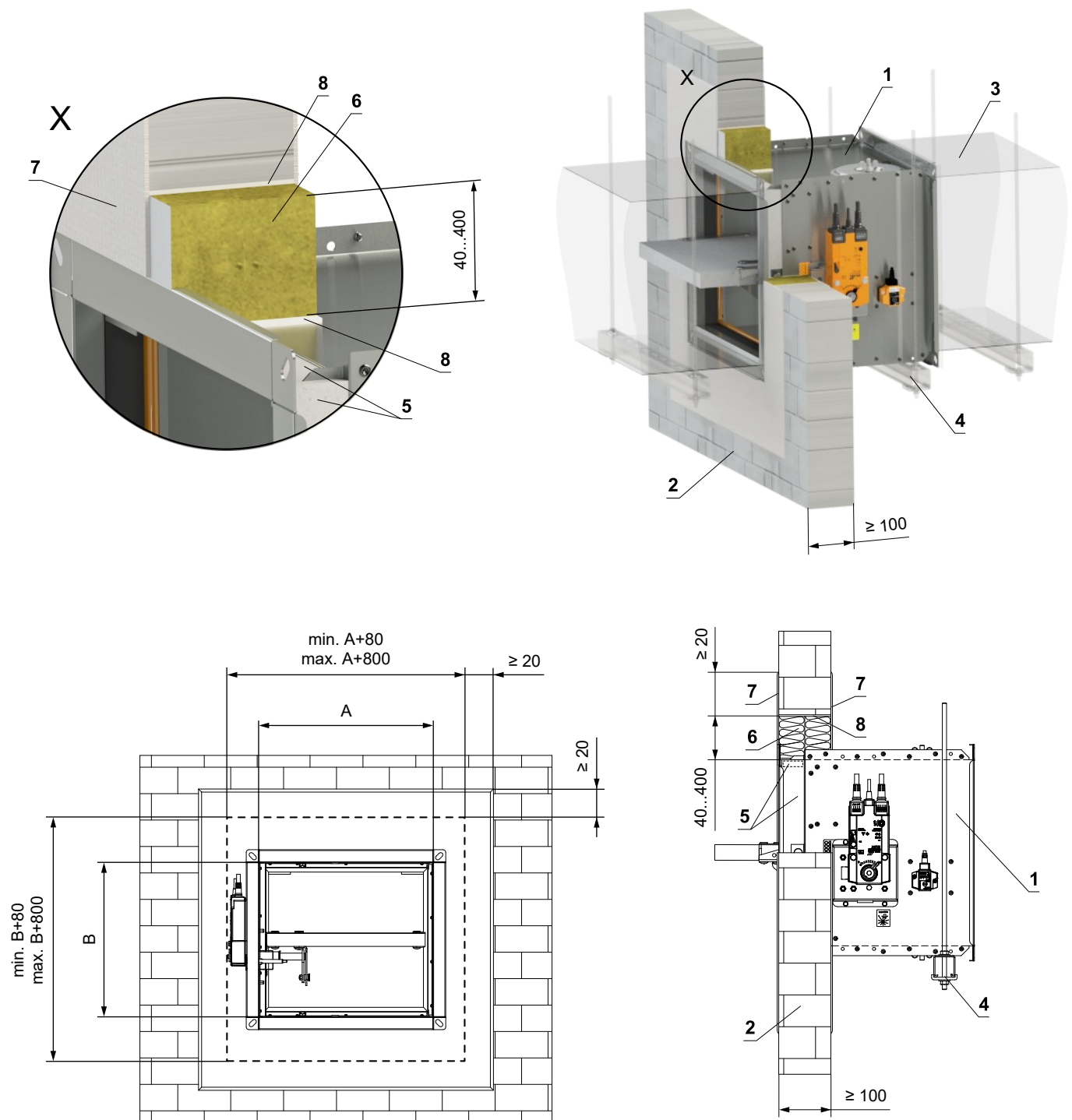
■ For connection of following duct → see page 81

■ The gap between the damper and construction is filled with mortar or gypsum

In solid wall construction - Weichschott system

EI 90 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81



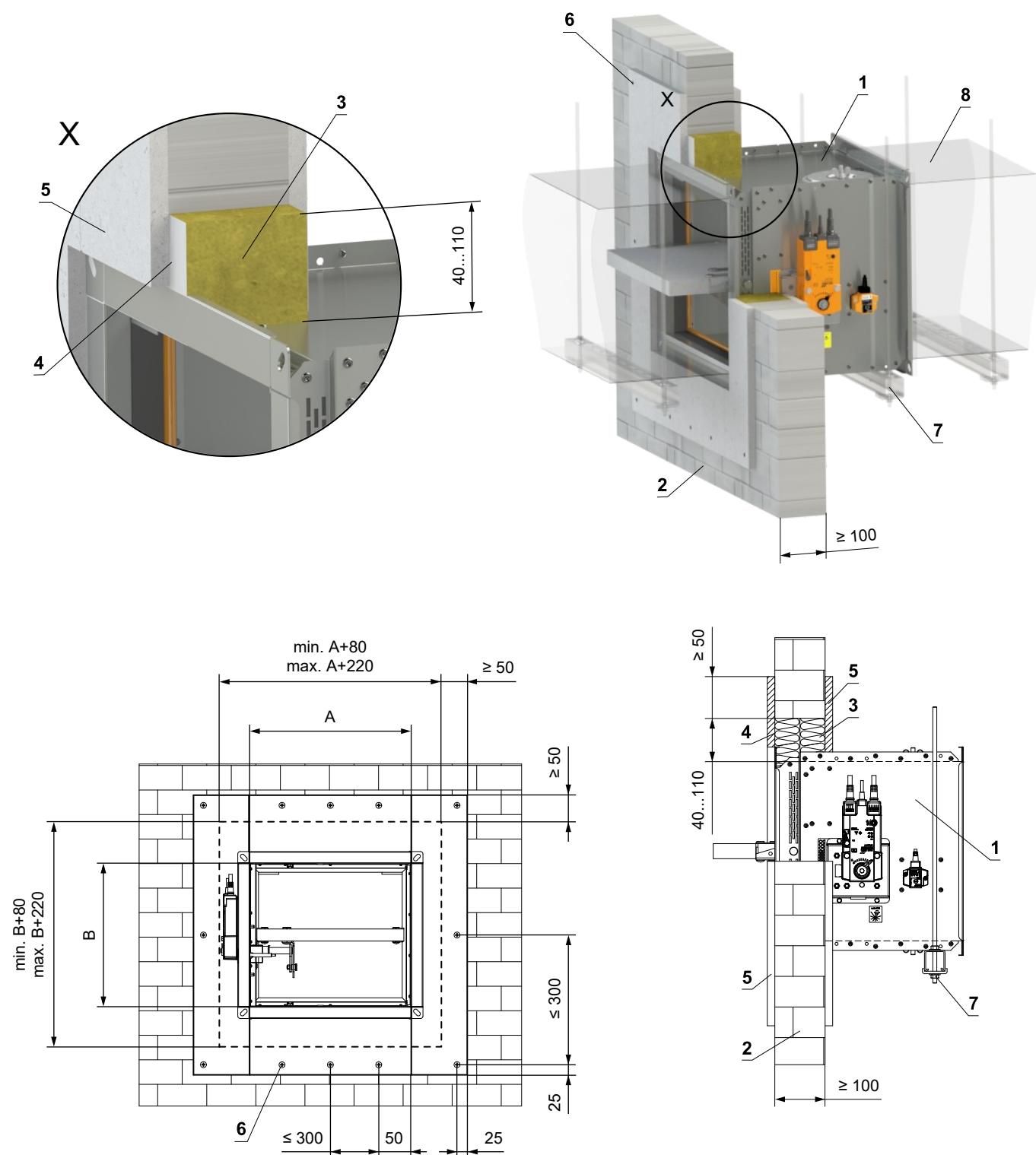
- 1 FDMB
- 2 Solid wall construction
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Protective cladding board - min. th. 10 mm, min. density 870 kg/m³ (e.g. PROMATECT-H) → see page 91
- Weichschott system HILTI*
- 6 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 7 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 8 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In solid wall construction - mineral wool with fire-resistant coating and fire-resistance boards

EI 90 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81

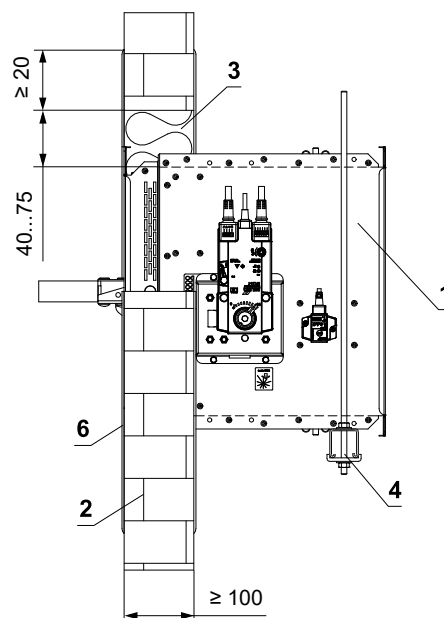
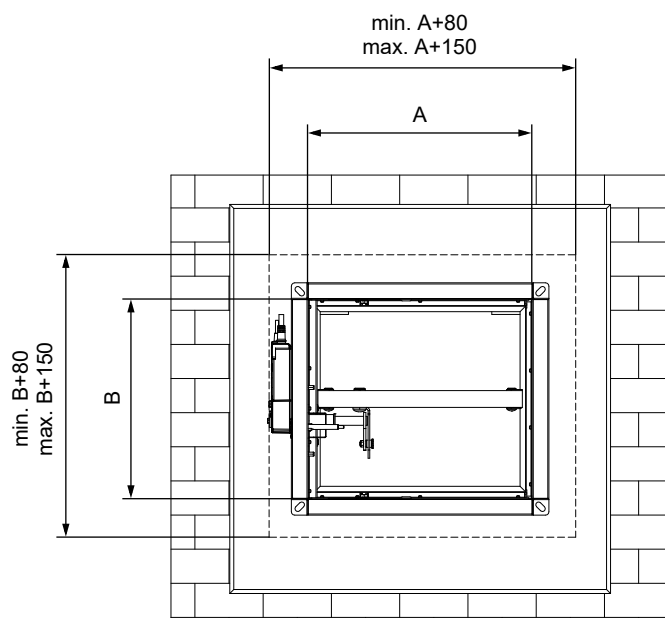
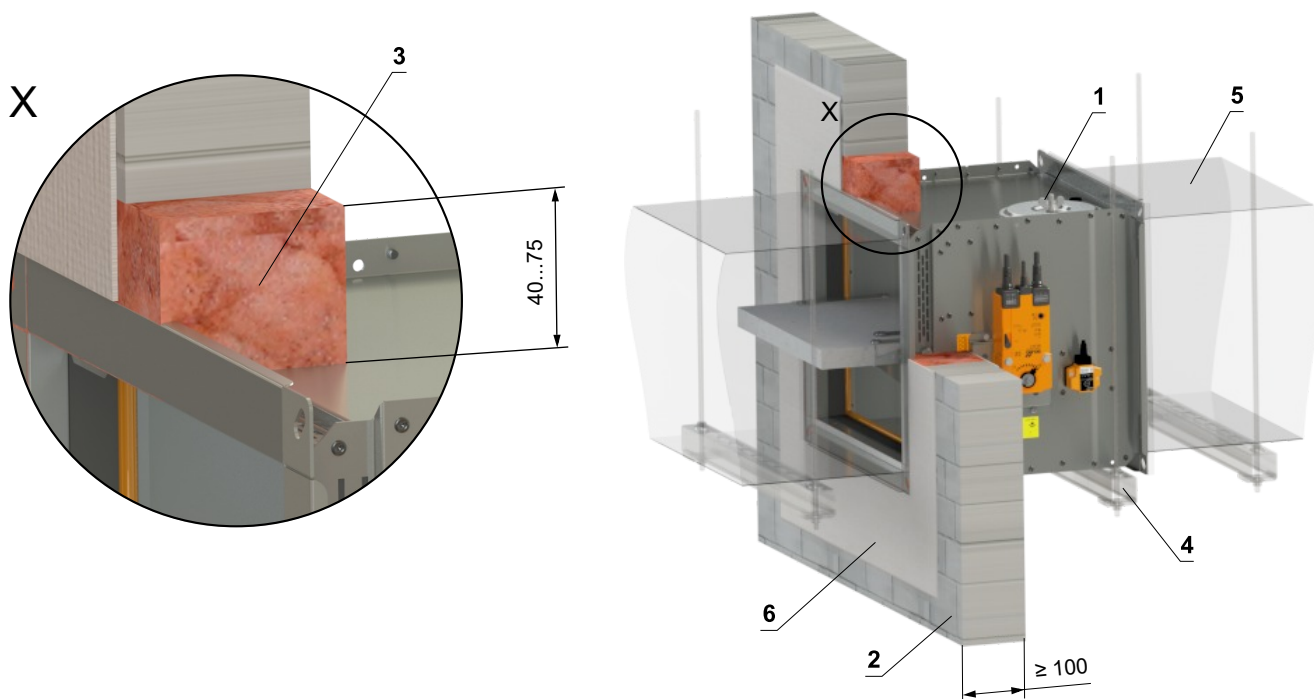


- 1 FDMB
- 2 Solid wall construction
- 3 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPLOCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 Profile with threaded rod → see pages 77 to 80
- 8 Duct

In solid wall construction - fire-resistant foam with stucco plaster

EI 60 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81
- This installation is only possible for maximum size of the fire damper 400x400 mm

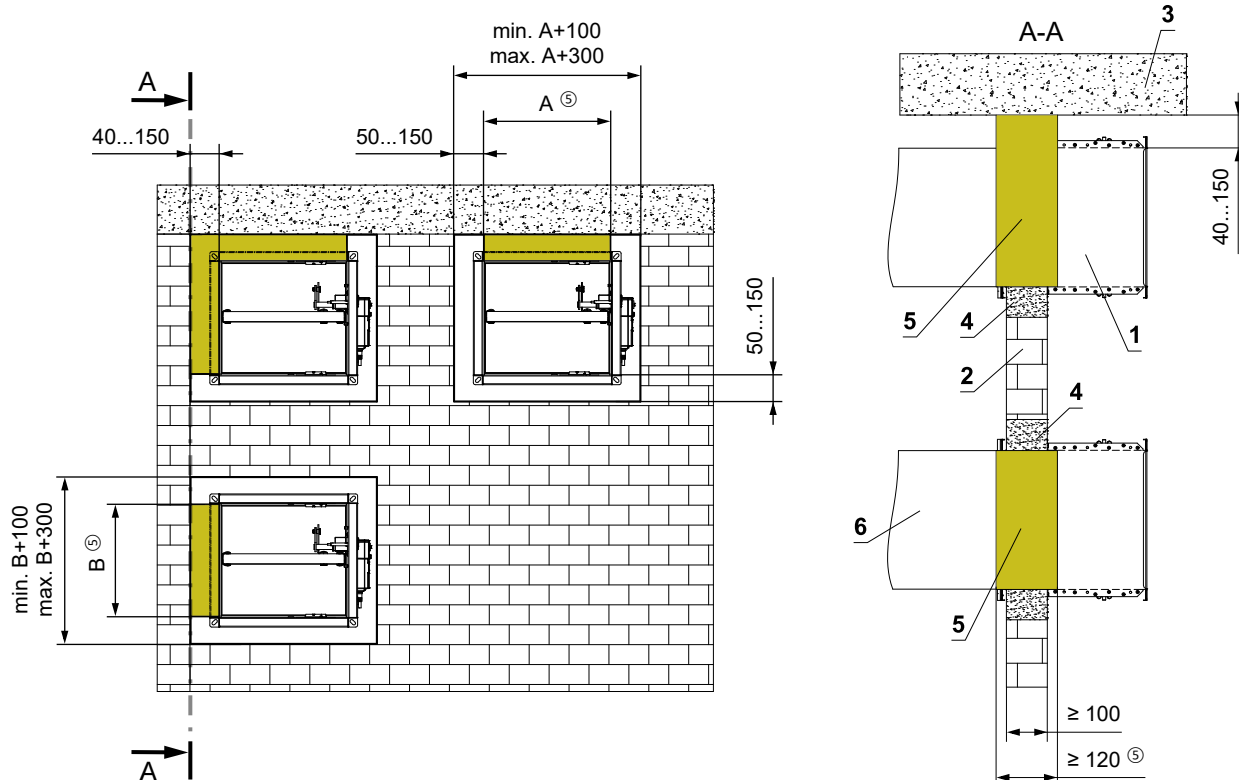
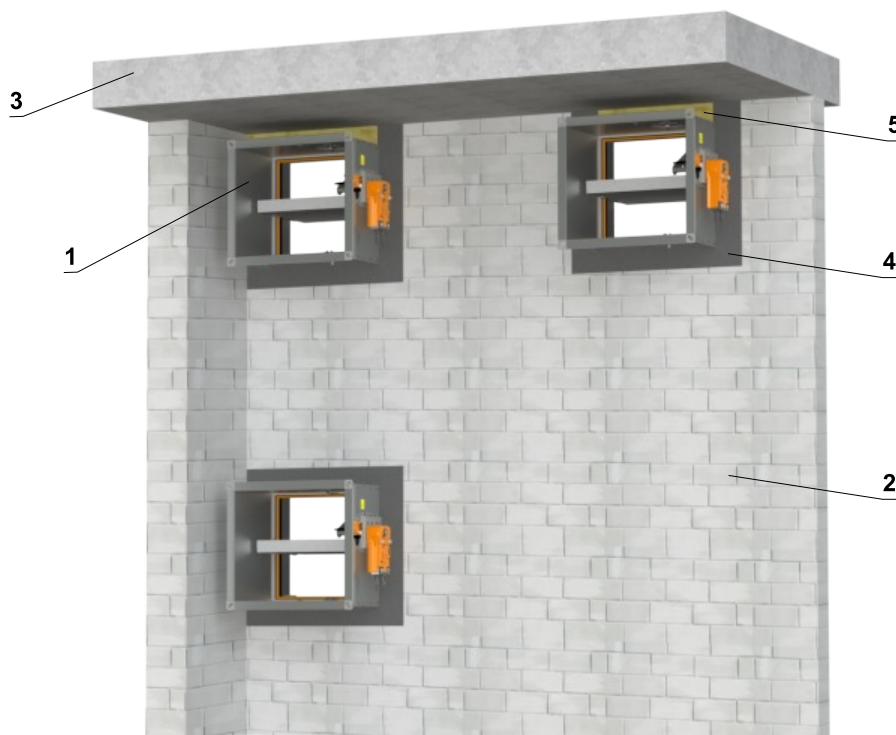


- 1 FDMB
- 2 Solid wall construction
- 3 Fire-resistant foam HILTI CFS-F FX
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct
- 6 Stucco plaster

In solid wall construction - installation next to the wall/ceiling - mortar or gypsum + mineral wool

EI 90 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81
- Conditions of this installation are also valid for the installation in **Solid ceiling construction**
- Penetration is filled with mortar or gypsum + mineral wool (shape, according to the location of the damper). Fix the mineral wool with glue (e.g. Promat K84 or equivalent) to the construction and damper casing



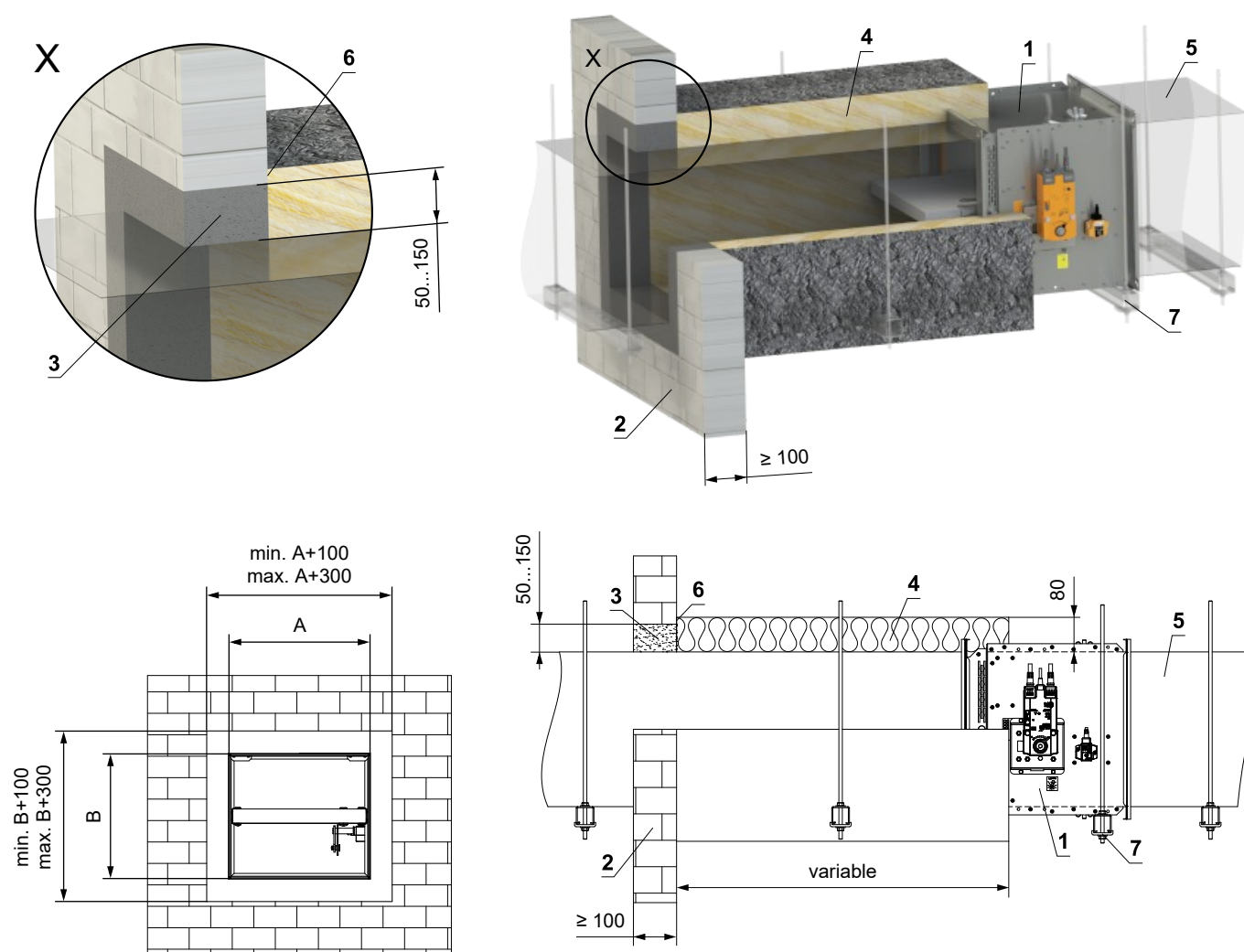
- 1 FDMB
- 2 Solid wall construction
- 3 Solid ceiling construction
- 4 Mortar or gypsum
- 5 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
- 6 Duct

Installation outside solid wall construction

Outside solid wall construction - ISOVER Ultimate Protect - mortar or gypsum

EI 60 (v_e i↔o) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ISOVER manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm

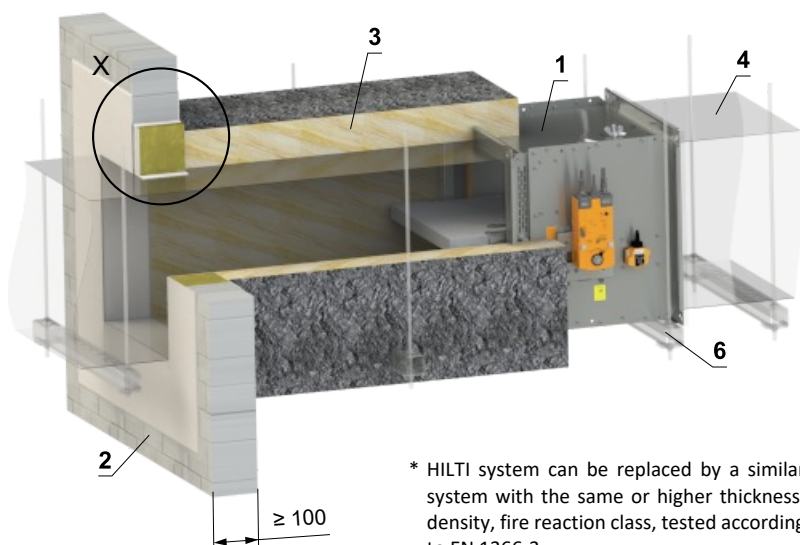
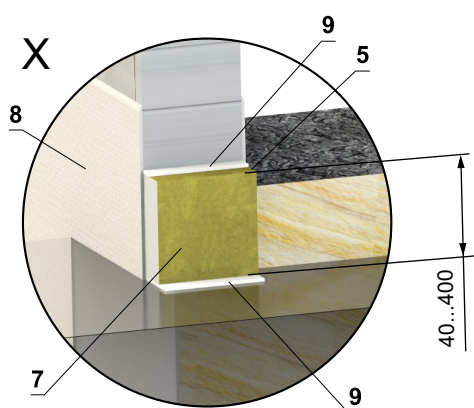


- 1 FDMB
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Insulation board made of mineral wool, with a surface treatment of aluminum foil, min. thickness 80 mm, min. density 66 kg/m³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)
- 5 Standard air duct, made of galvanized sheet metal, thickness according to damper size
- 6 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction
- 7 Profile with threaded rod → see pages 77 to 80

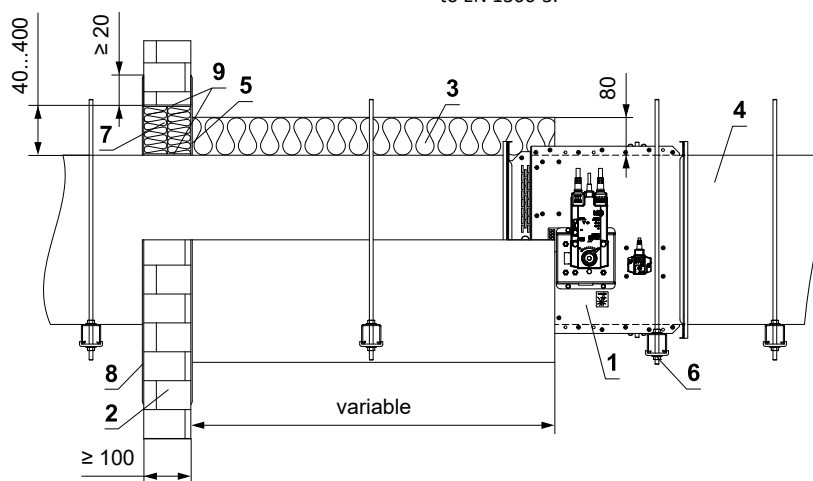
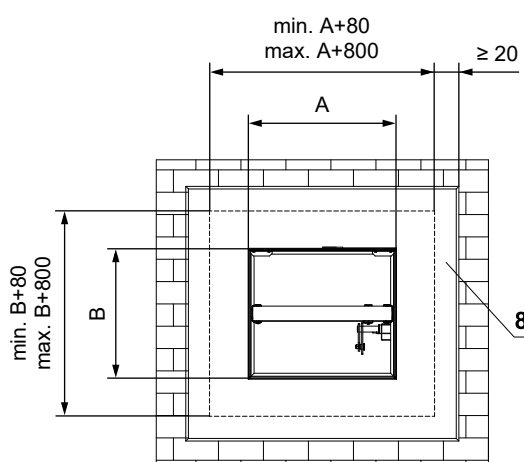
Outside solid wall constrution - ISOVER Ultimate Protect - Weichschott system

EI 60 (v_e i↔o) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ISOVER manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm



* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.



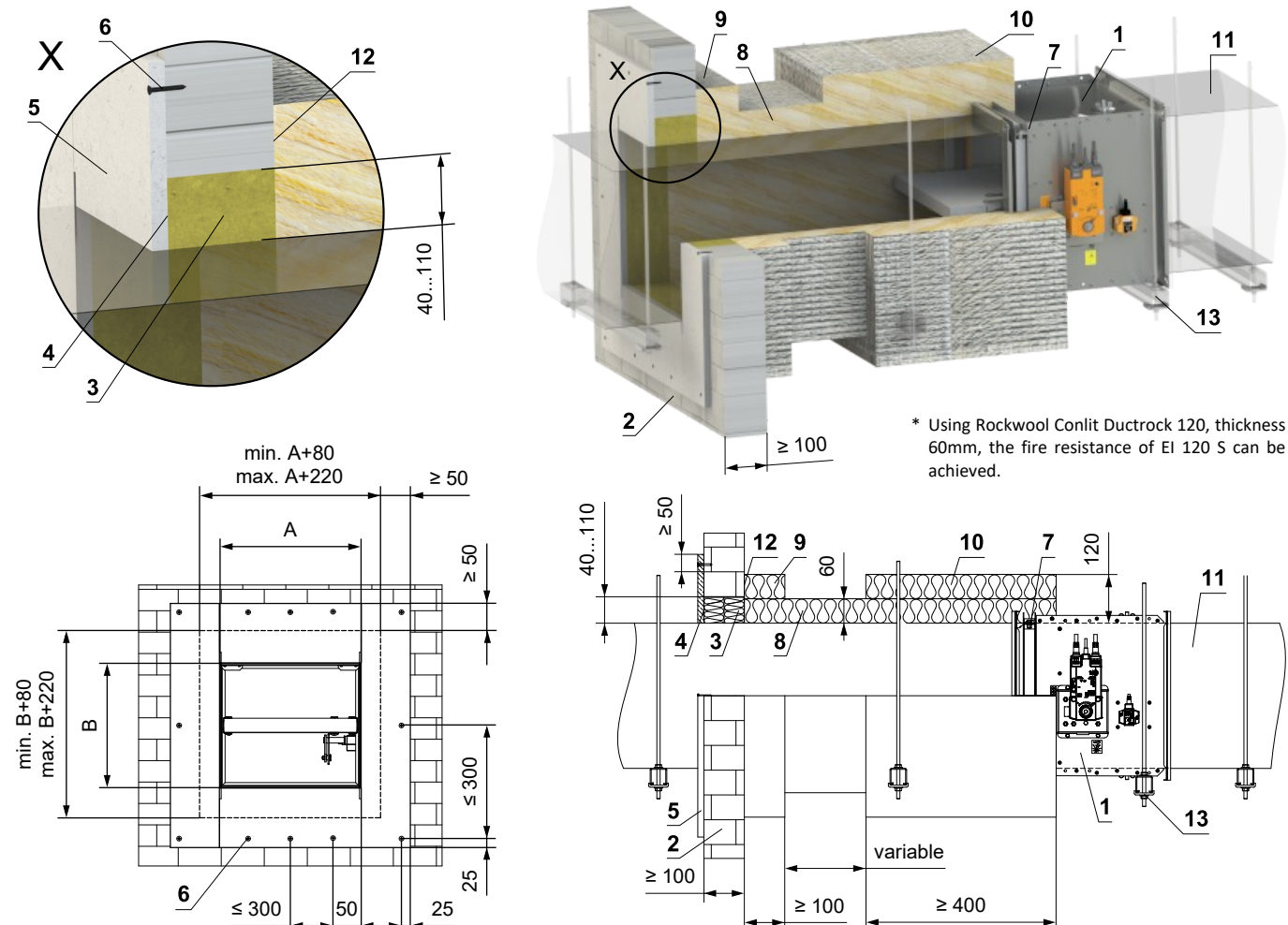
- 1 FDMB
- 2 Solid wall construction
- 3 Insulation board made of mineral wool, with a surface treatment of aluminum foil, min. thickness 80 mm, min. density 66 kg/m³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)
- 4 Standard air duct, made of galvanized sheet metal, thickness according to damper size
- 5 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction
- 6 Profile with threaded rod → see pages 77 to 80
Weichschott system HILTI*
- 7 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 8 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 9 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

Outside solid wall construction - mineral wool ROCKWOOL - mineral wool with fire-resistant coating and fire-resistant board

EI 90 ($v_e i \leftrightarrow o$) S

*EI 120 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ROCKWOOL manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- For this installation VRM-B reinforcement frame must be used → see page 89



* Using Rockwool Conlit Ductrock 120, thickness 60mm, the fire resistance of EI 120 S can be achieved.

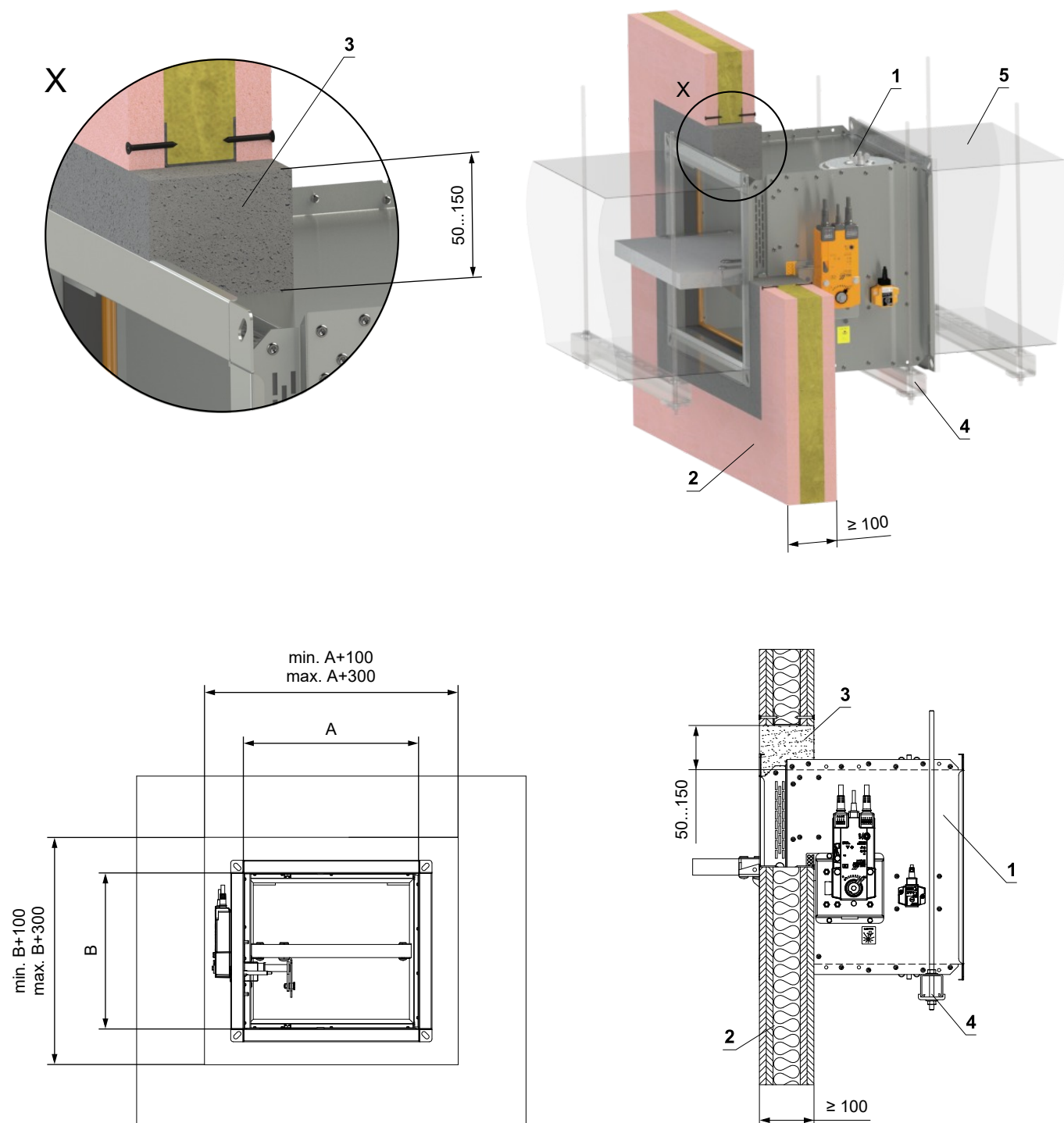
- | | | | |
|---|---|----|---|
| 1 | FDMB | 8 | Insulation board made of mineral wool, with a surface treatment of aluminum foil - th. 60 mm, min. density 300 kg/m ³ - (System ROCKWOOL Conlit Ductrock 90(120*)) |
| 2 | Solid wall construction | 9 | Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90(120*)) - glued (pos. 12) and fixed with screws to the wall construction |
| 3 | Mineral wool board - min. density 140 kg/m ³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD) | 10 | Insulation collar of the damper and duct connection - th. 60 mm (System ROCKWOOL Conlit Ductrock 90(120*)) |
| 4 | Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I) | 11 | Standard air duct, made of galvanized sheet metal, thickness according to damper size |
| 5 | Fire-resistant board - min. th. 15 mm, min. density 870 kg/m ³ (e.g. PROMATECT-H) | 12 | ROCKWOOL Firepro glue - apply on the insulation and fix it to the fire separation construction |
| 6 | Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary | 13 | Profile with threaded rod → see pages 77 to 80 |
| 7 | VRM-B → see page 89 | | |

In gypsum wall construction

In gypsum wall construction - mortar or gypsum

EI 120 ($v_e i \leftrightarrow o$) S

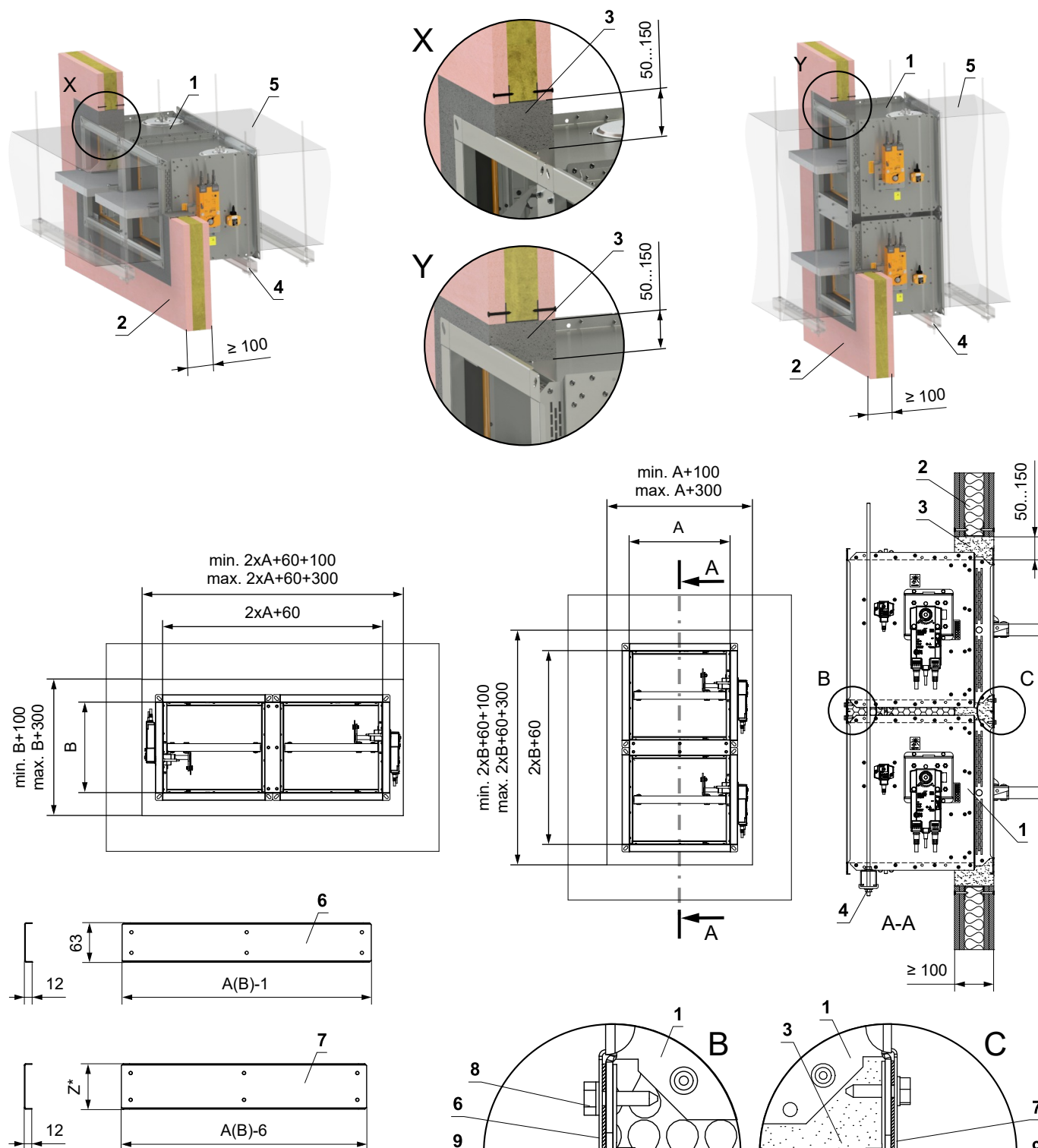
- For connection of following duct → see page 81



- 1 FDMB
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct

In gypsum wall construction - 2 dampers in battery - mortar or gypsum

EI 90 ($v_e i \leftrightarrow o$) S



- 1 FDMB
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

* Z=86 ($A \leq 500$ and $B \leq 400$)

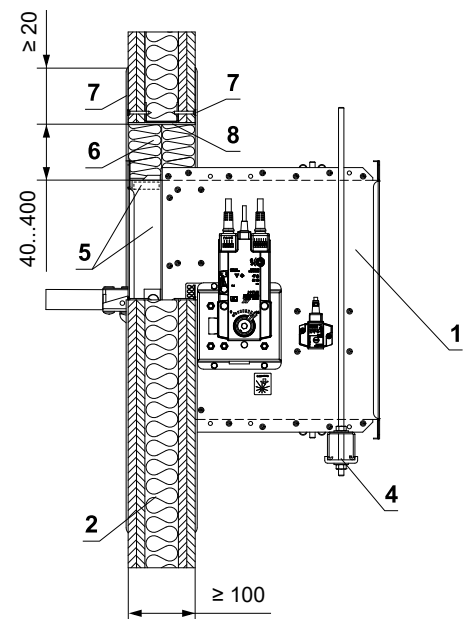
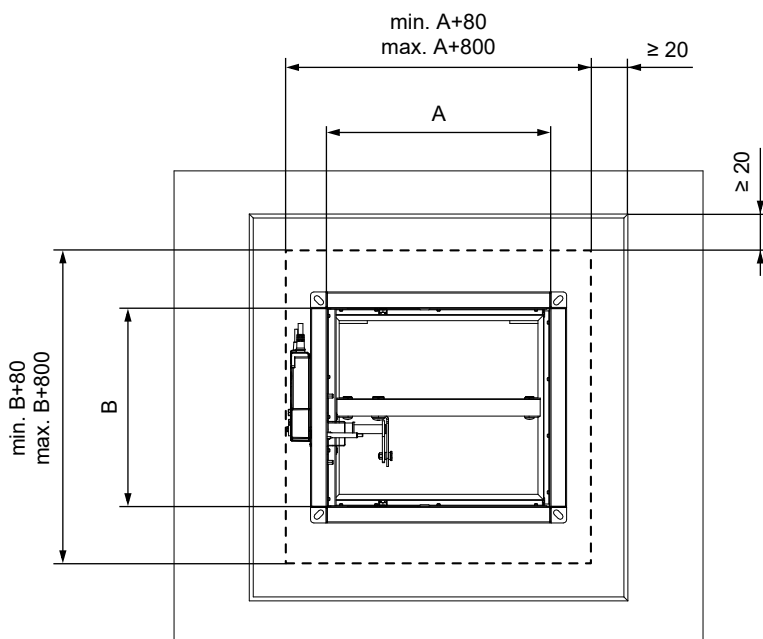
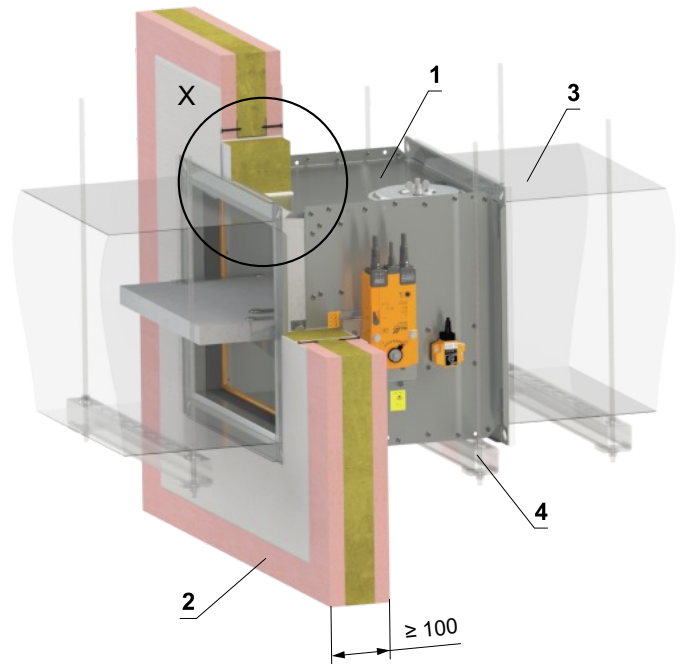
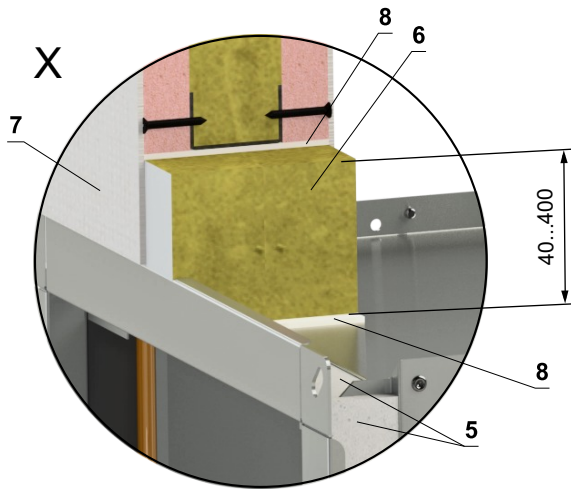
* Z=99 ($A > 500$ or $B > 400$)

■ For connection of following duct → see page 81

■ The gap between the damper and construction is filled with mortar or gypsum

In gypsum wall construction - Weichschott system 100 mm

- For connection of following duct → see page 81

EI 60 ($v_e i \leftrightarrow o$) S with wall fire resistance EI 60EI 90 ($v_e i \leftrightarrow o$) S with wall fire resistance EI 90

- 1 FDMB
- 2 Gypsum wall construction
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Protective cladding board - min. th. 10 mm, min. density 870 kg/m³ (e.g. PROMATECT-H) → see page 91
Weichschott system HILTI*
- 6 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 7 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 8 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

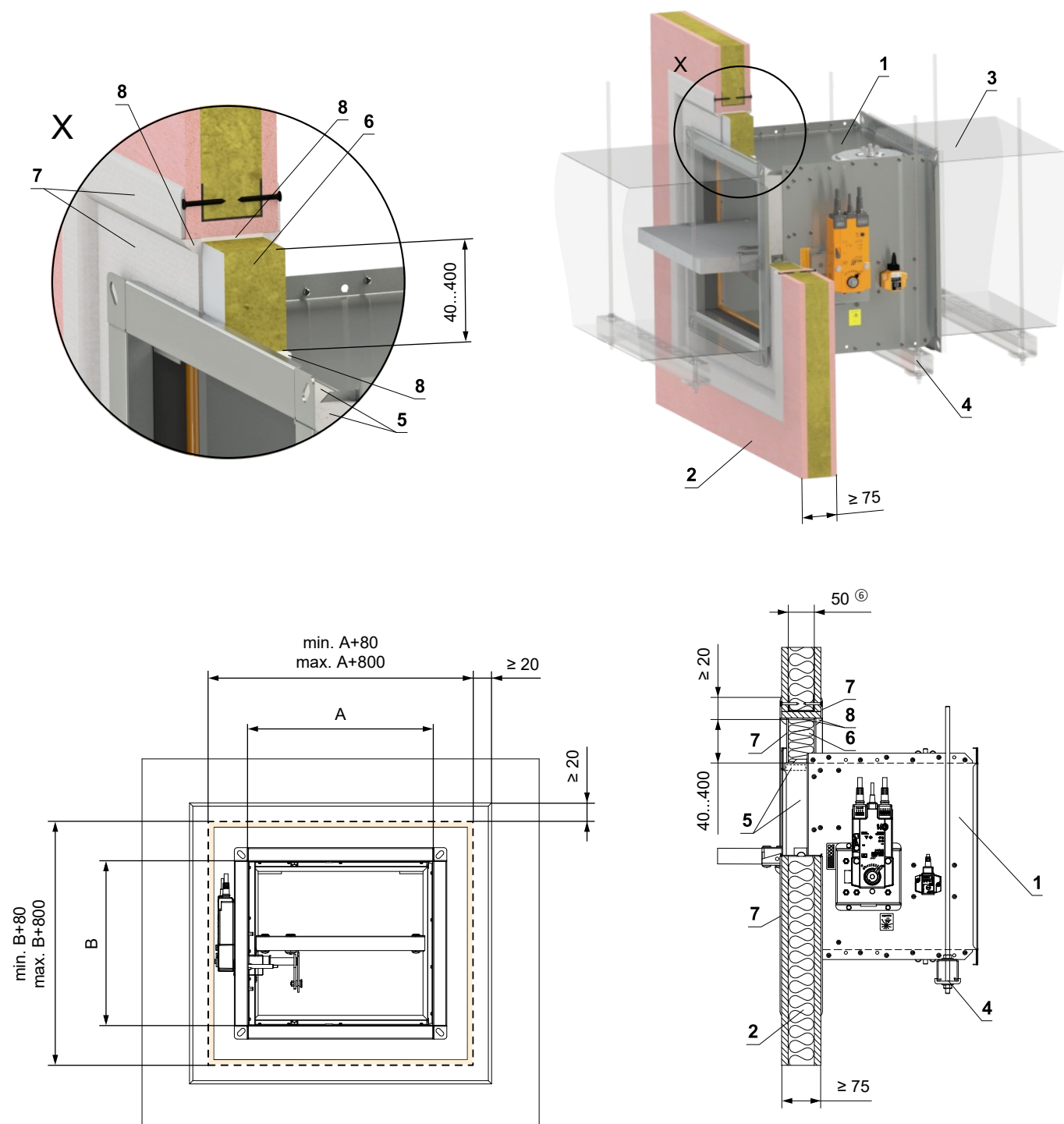
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In gypsum wall construction - Weichschott system 50 mm

EI 30 ($v_e i \leftrightarrow o$) S

EI 45 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81



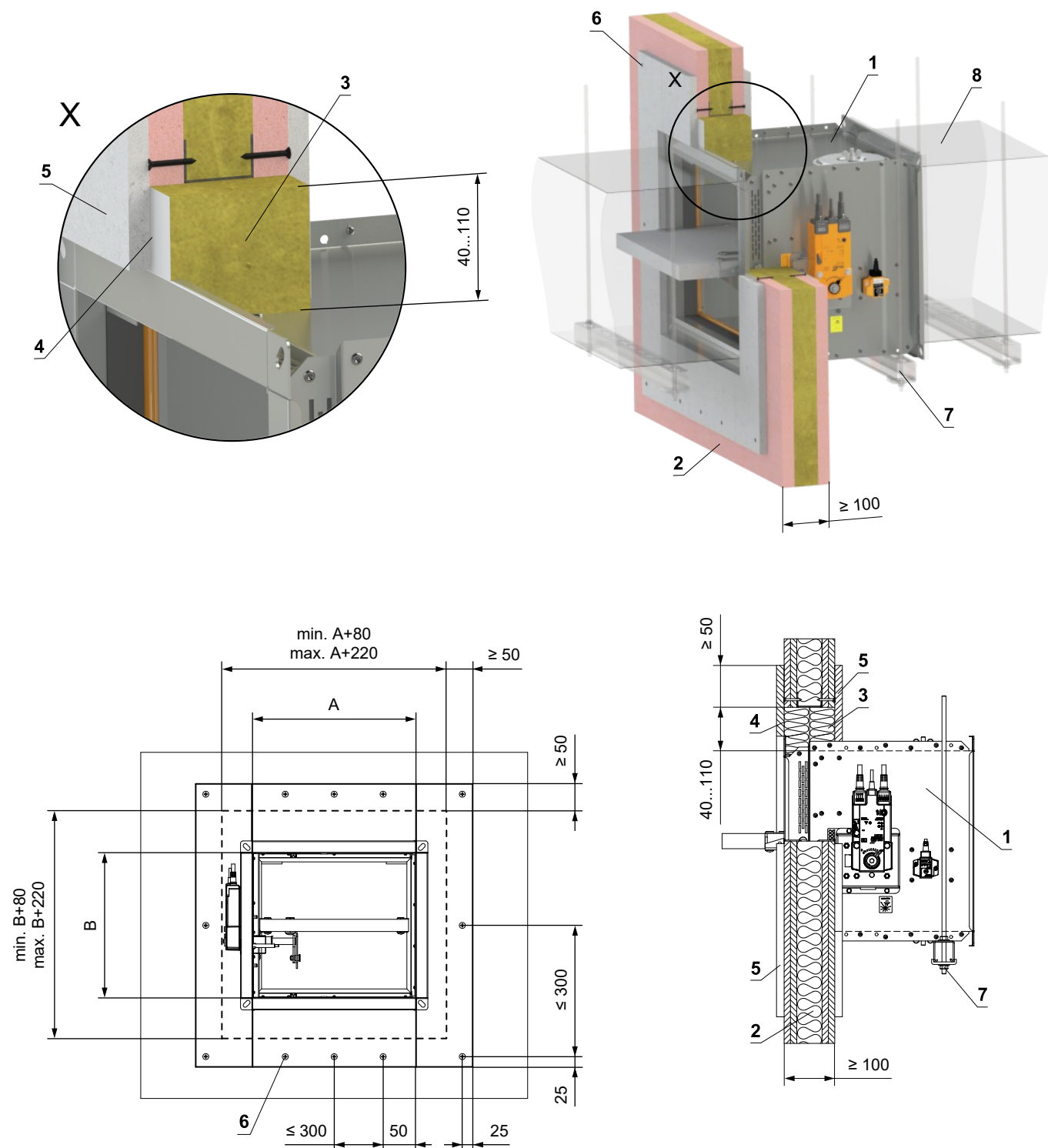
- 1 FDMB
- 2 Gypsum wall construction
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Protective cladding board - min. th. 10 mm, min. density 870 kg/m³ (e.g. PROMATECT-H) → see page 91
Weichschott system HILTI*
- 6 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 7 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 8 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In gypsum wall construction - mineral wool with fire-resistant coating and fire-resistance boards

EI 90 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81

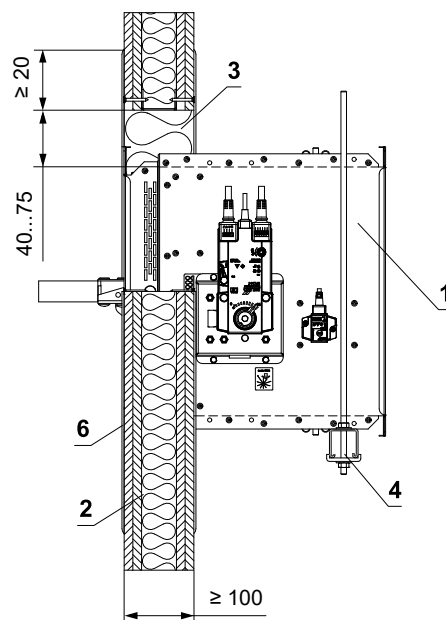
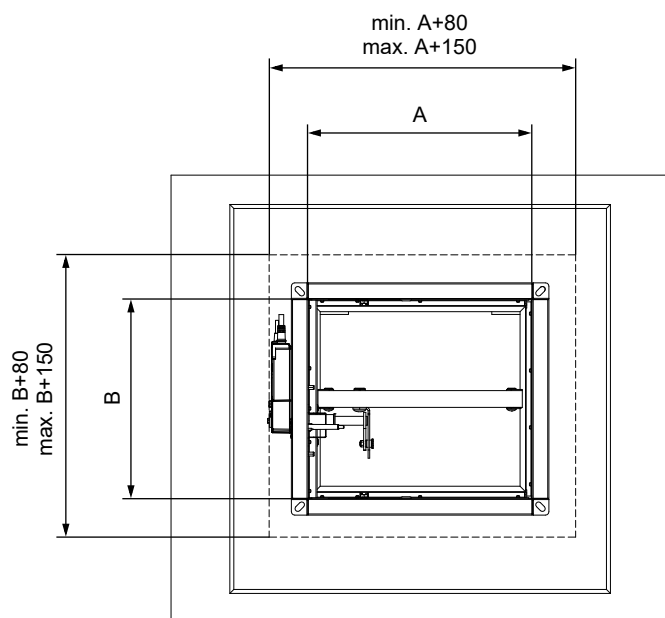
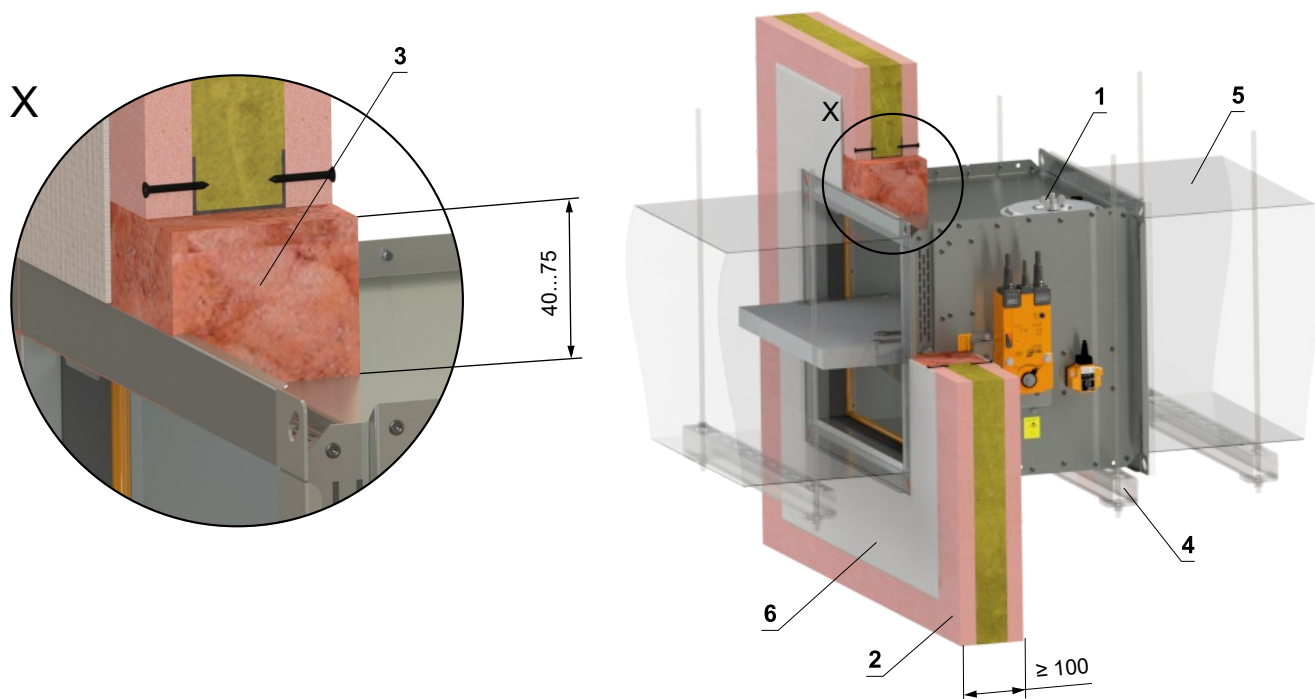


- 1 FDMB
- 2 Gypsum wall construction
- 3 Mineral wool board - min. density 140 kg/m^3 (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m^3 (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 Profile with threaded rod → see pages 77 to 80
- 8 Duct

In gypsum wall construction - fire-resistant foam with stucco plaster

EI 60 ($v_e i \leftrightarrow o$) S

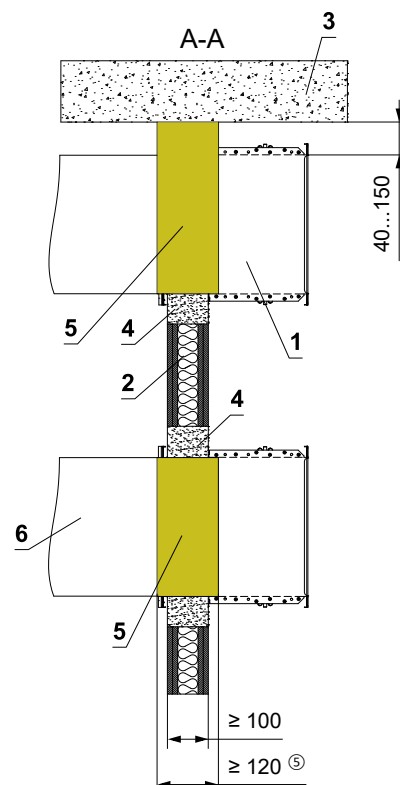
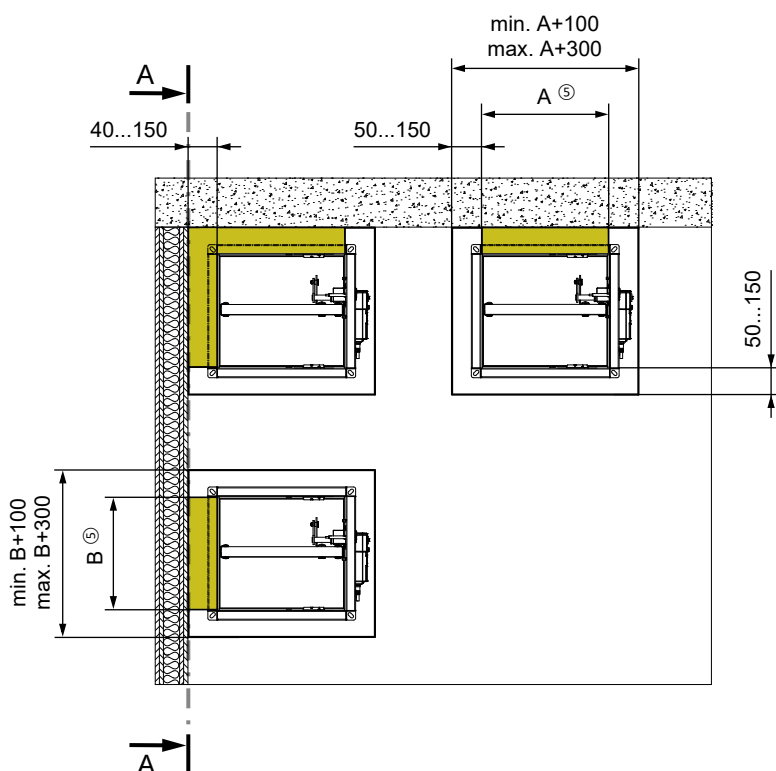
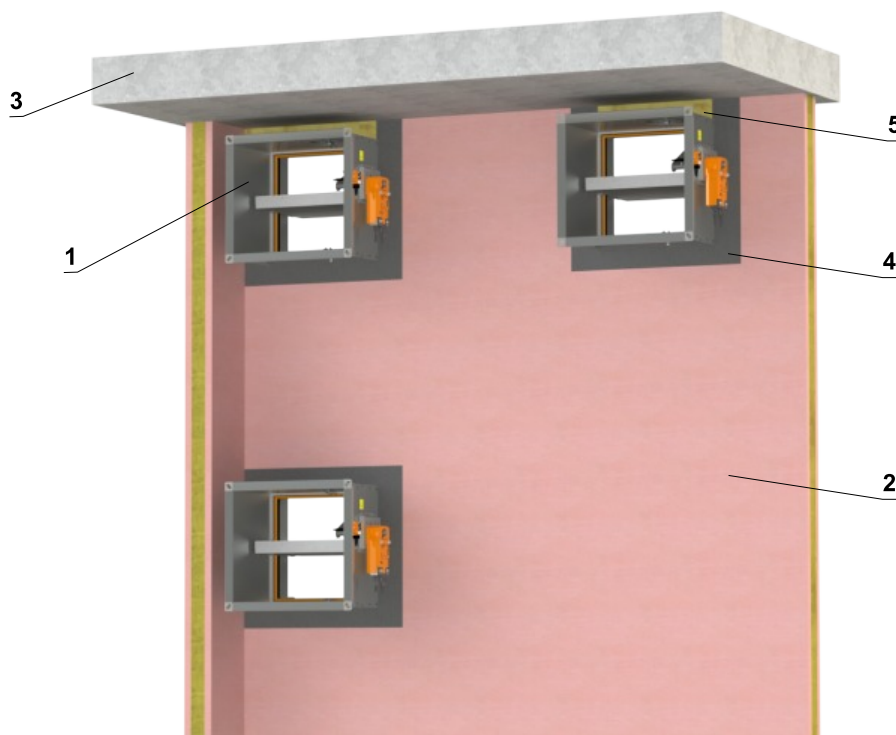
- For connection of following duct → see page 81
- This installation is only possible for maximum size of the fire damper 400x400 mm



- 1 FDMB
- 2 Gypsum wall construction
- 3 Fire-resistant foam HILTI CFS-F FX
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct
- 6 Stucco plaster

In gypsum wall construction - installation next to the wall/ceiling - mortar or gypsum + mineral wool EI 90 (v_e i↔o) S

- For connection of following duct → see page 81
- Conditions of this installation are also valid for the installation in **Solid ceiling construction**
- Penetration is filled with mortar or gypsum + mineral wool (shape, according to the location of the damper). Fix the mineral wool with glue (e.g. Promat K84 or equivalent) to the construction and damper casing



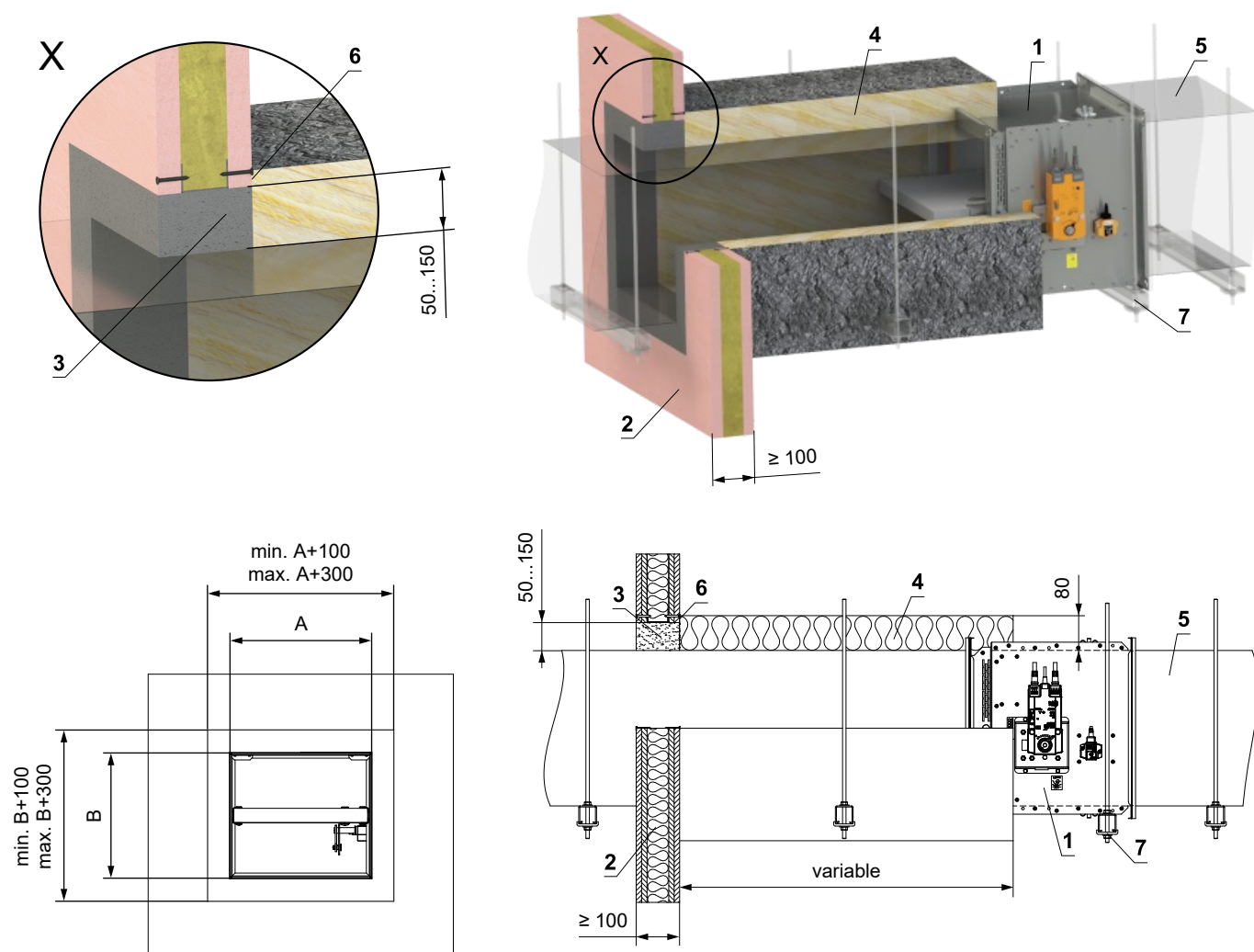
- 1 FDMB
- 2 Gypsum wall construction
- 3 Solid ceiling construction
- 4 Mortar or gypsum
- 5 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
- 6 Duct

Installation outside gypsum wall construction

Outside gypsum wall construction - ISOVER Ultimate Protect - mortar or gypsum

EI 60 (v_e i↔o) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ISOVER manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm

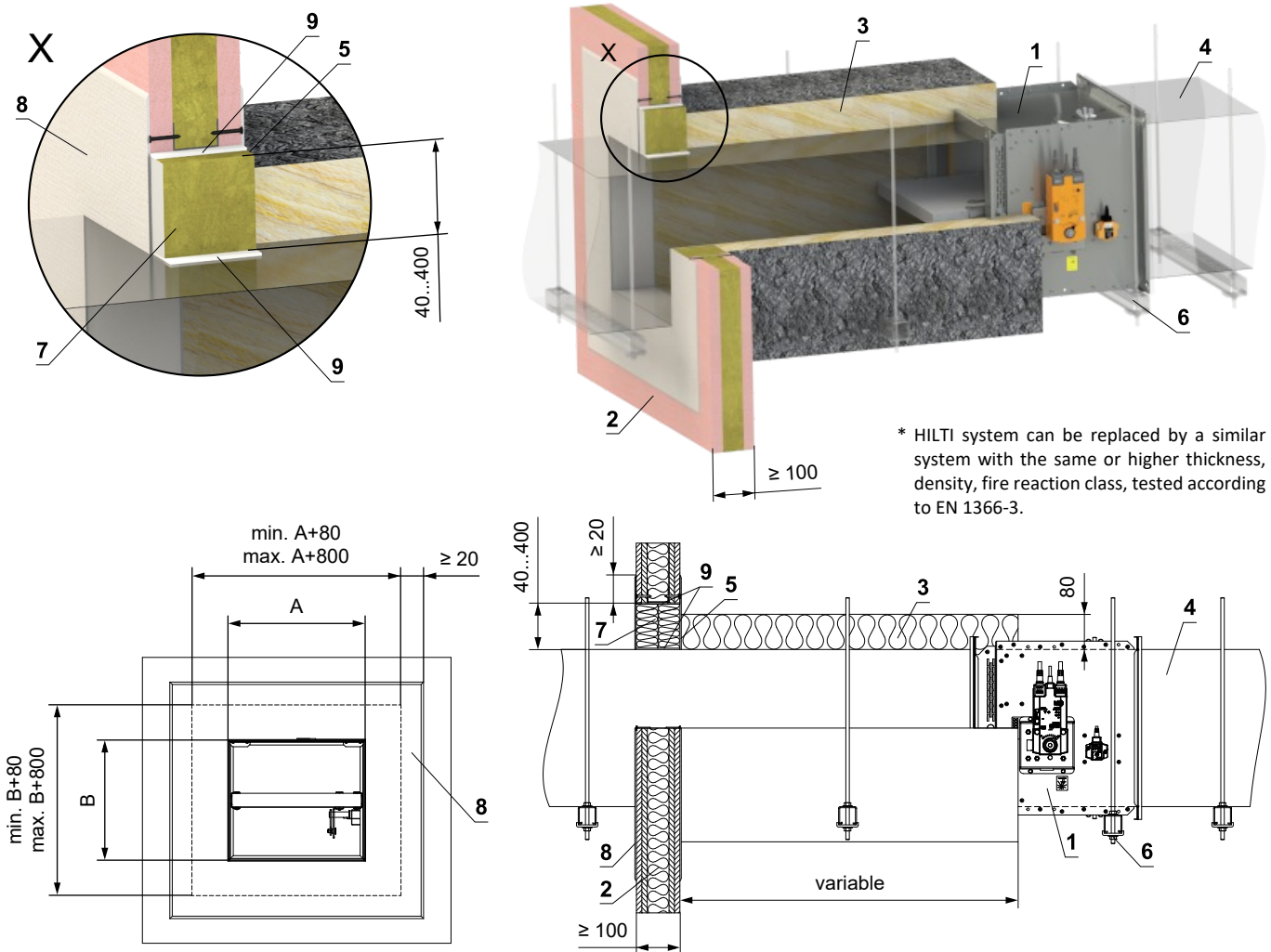


- 1 FDMB
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Insulation board made of mineral wool, with a surface treatment of aluminum foil, min. thickness 80 mm, min. density 66 kg/m³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)
- 5 Standard air duct, made of galvanized sheet metal, thickness according to damper size
- 6 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction
- 7 Profile with threaded rod → see pages 77 to 80

Outside gypsum wall construction - ISOVER Ultimate Protect - Weichschott system

EI 60 (v_e i↔o) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ISOVER manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm

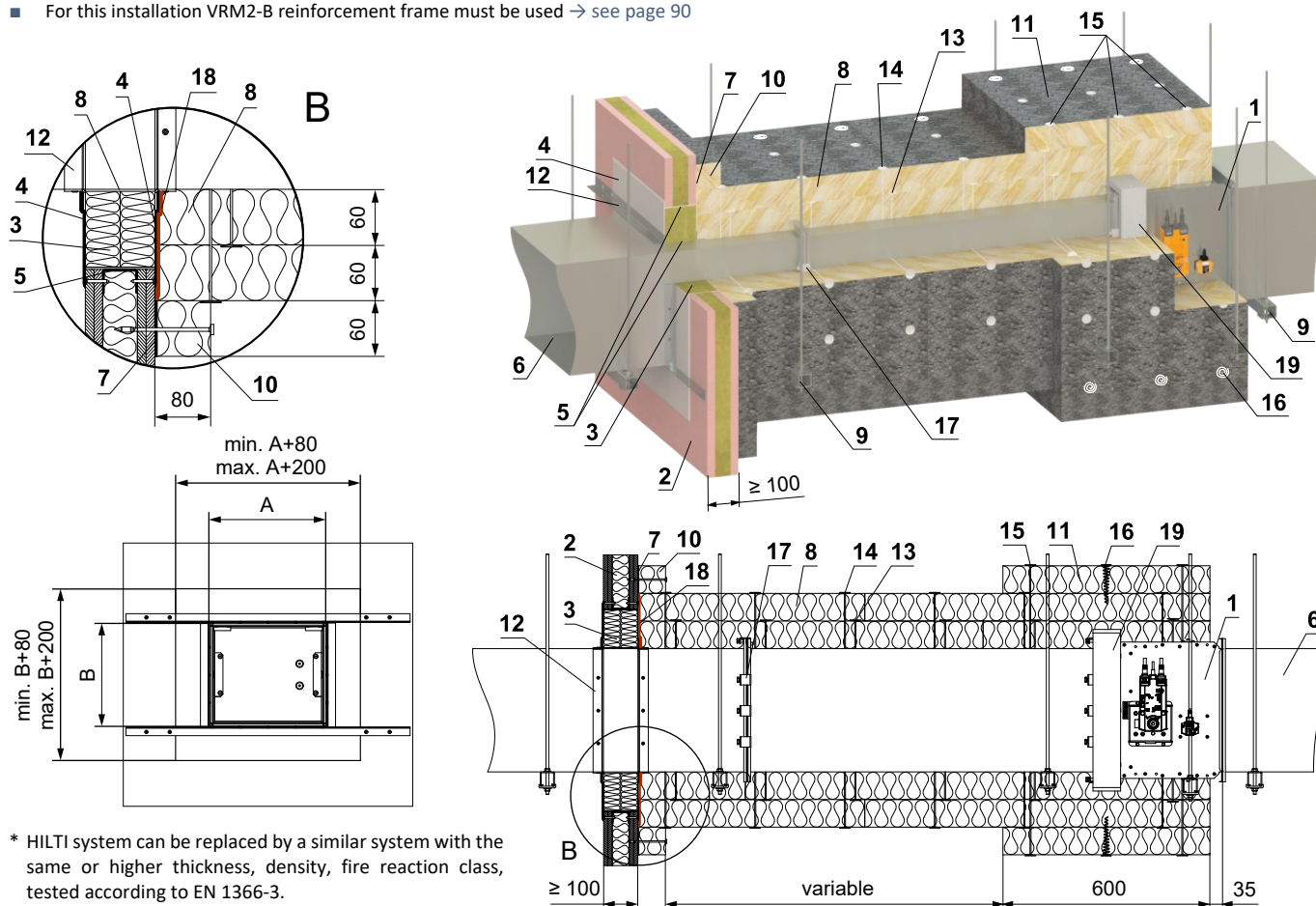


- 1 FDMB
- 2 Gypsum wall construction
- 3 Insulation board made of mineral wool, with a surface treatment of aluminum foil, min. thickness 80 mm, min. density 66 kg/m³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)
- 4 Standard air duct, made of galvanized sheet metal, thickness according to damper size
- 5 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction
- 6 Profile with threaded rod → see pages 77 to 80
Weichschott system HILTI*
- 7 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 8 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 9 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

Outside gypsum wall construction - ISOVER Ultimate Protect - Weichschott system

EI 90 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ISOVER manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- Damper inspection holes are covered with insulation, therefore it's necessary to make an inspection hole on the connecting duct
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- For this installation VRM2-B reinforcement frame must be used → see page 90



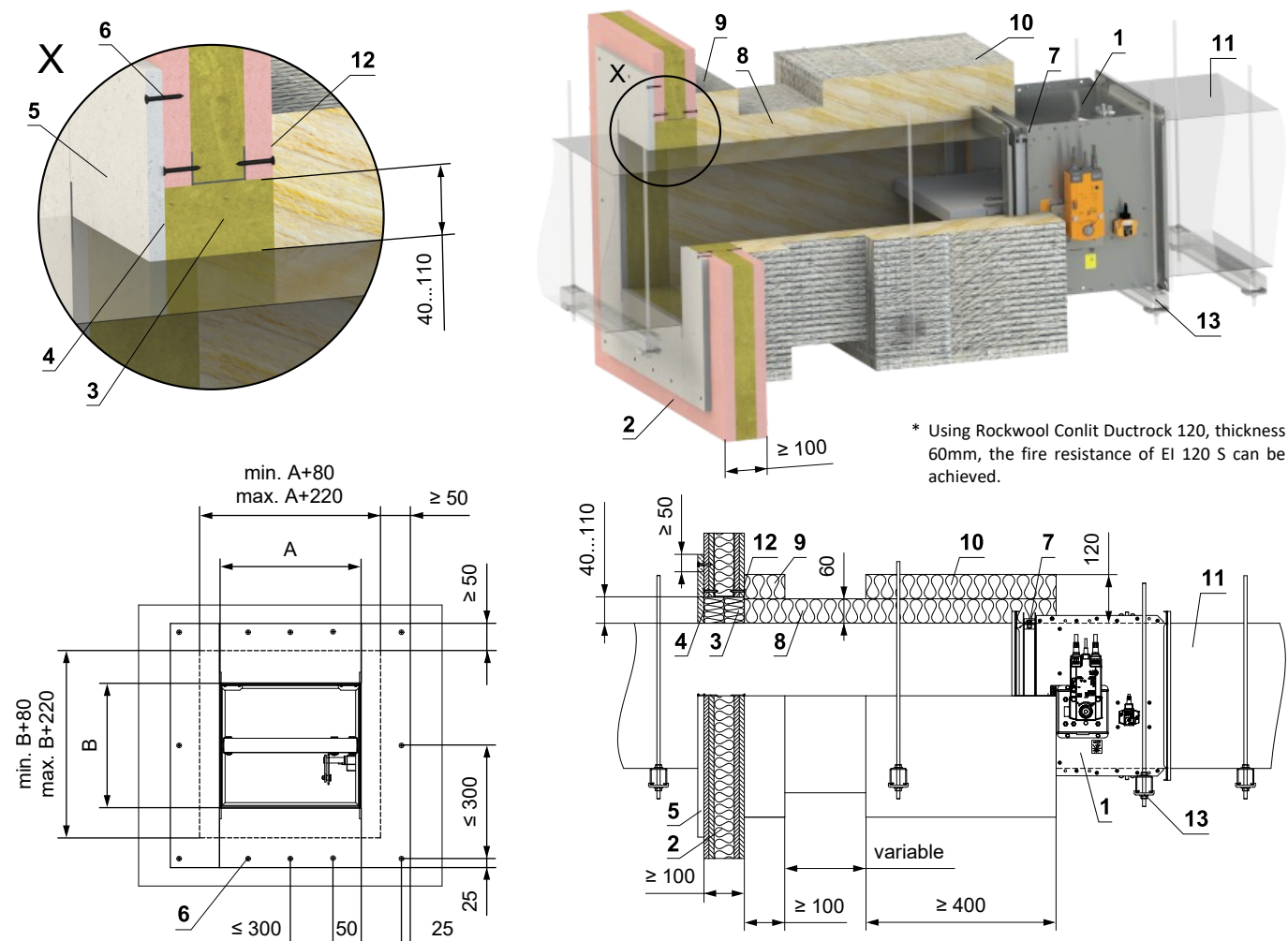
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

- | | | | |
|---|--|----|---|
| 1 | FDMB | 9 | Profile with threaded rod → see pages 77 to 80 |
| 2 | Solid wall construction
Weichschott system HILTI* | 10 | Duct penetration insulation collar - th. 60 mm - ISOVER Ultimate Protect SLAB 4.0 Alu1, - glued (pos. 7) and fixed with screws to the wall construction |
| 3 | Mineral wool board - min. density 140 kg/m ³ (HILTI CFS-CT B 1S 140/50...) | 11 | Insulating collar of the damper and duct connection - th. 60 mm ISOVER Ultimate Protect SLAB 4.0 Alu1 |
| 4 | Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct | 12 | L-profile 30x30x3 mm - installation acc. to ISOVER |
| 5 | Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing | 13 | Stud-welded pin 60 mm - quantity and placing acc. to ISOVER |
| 6 | Standard air duct, made of galvanized sheet metal, thickness according to damper size | 14 | Stud-welded pin 120 mm - quantity and placing acc. to ISOVER |
| 7 | ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction | 15 | Stud-welded pin 180 mm - quantity and placing acc. to ISOVER |
| 8 | Insulation board made of mineral wool, with a surface treatment of aluminum foil, thickness 60 mm, min. density 66 kg/m ³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1) | 16 | Fire spiral shaped screw - quantity and placing acc. to ISOVER |
| | | 17 | Steel clamp min. bolt M8 |
| | | 18 | ISOVER Protect BSF |
| | | 19 | VRM2-B → see page 90 |

Outside gypsum wall construction - mineral wool ROCKWOOL - mineral wool with fire-resistant coating and fire-resistant board

EI 90 ($v_e i \leftrightarrow o$) S*EI 120 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- When installing the insulation, follow the ROCKWOOL manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- For this installation VRM-B reinforcement frame must be used → see page 89



- 1 FDMB
- 2 Gypsum wall construction
- 3 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 VRM-B → see page 89
- 8 Insulation board made of mineral wool, with a surface treatment of aluminum foil - th. 60 mm, min. density 300 kg/m³ - (System ROCKWOOL Conlit Ductrock 90(120*))
- 9 Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90(120*)) - glued (pos. 12) and fixed with screws to the wall construction
- 10 Insulation collar of the damper and duct connection - th. 60 mm (System ROCKWOOL Conlit Ductrock 90(120*))
- 11 Standard air duct, made of galvanized sheet metal, thickness according to damper size
- 12 ROCKWOOL Firepro glue - apply on the insulation and fix it to the fire separation construction
- 13 Profile with threaded rod → see pages 77 to 80

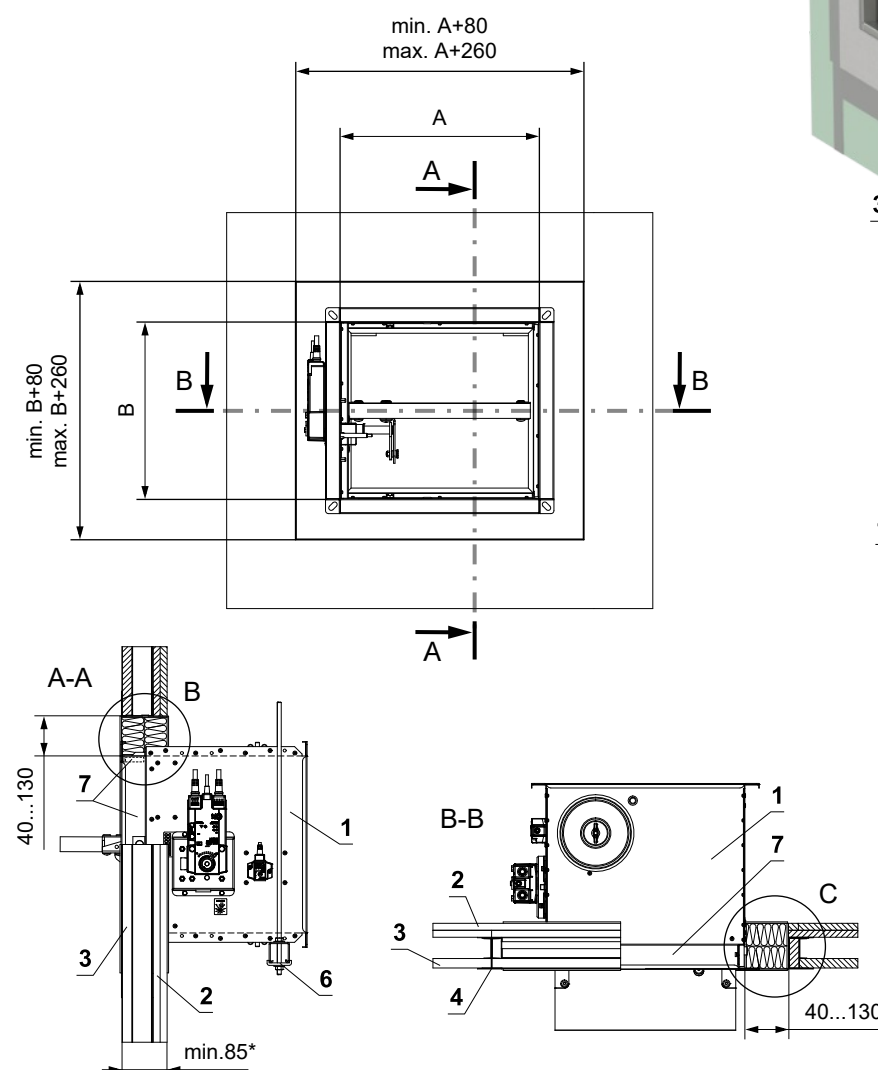
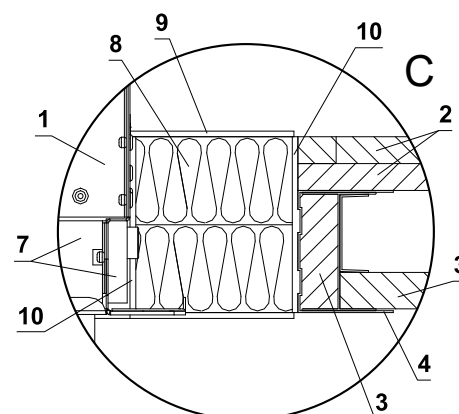
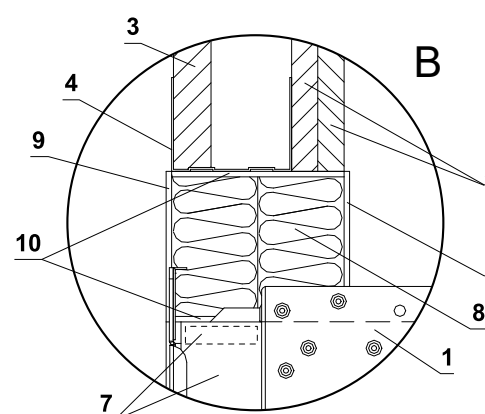
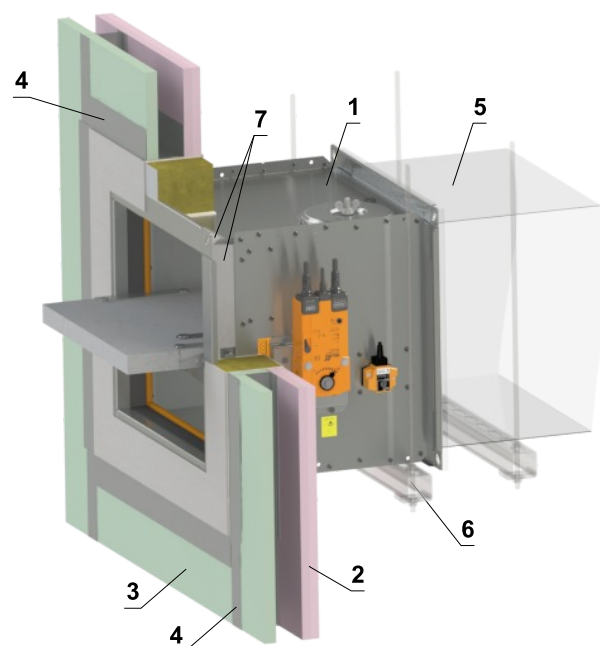
In shaft wall construction

In shaft wall construction - Weichschott system

- For connection of following duct → see page 81
- Damper can be installed on either side of the wall
- It is possible to use e.g. wall type A306002 (EIS 60), A306003 (EIS 90)... from www.british-gypsum.com or RNS 103, RNS 104 (EIS 60)... from www.siniat.co.uk
- It is possible to use walls that have the same or greater thickness and density of boards than the walls listed below (more layers of boards can also be used)
- Follow the instructions of the shaft wall manufacturer.

EIS 60 with shaftwall fire resistance EI 60

EIS 90 with shaftwall fire resistance EI 90



- 1 FDMB
- 2 Plasterboard EN 520 - Type F min. 2x12,5 mm*
- 3 Plasterboard EN 520 - Type F min. 1x19 mm*
- 4 Plasteboard profile
- 5 Duct
- 6 Profile with threaded rod → see pages 77 to 80
- 7 Protective cladding board - min. th. 10 mm, min. density 870 kg/m³ (e.g. PROMATECT-H) → see page 91
Weichschott system HILTI**
- 8 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 9 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 10 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

* For fire resistance of the shaftwall EIS 60

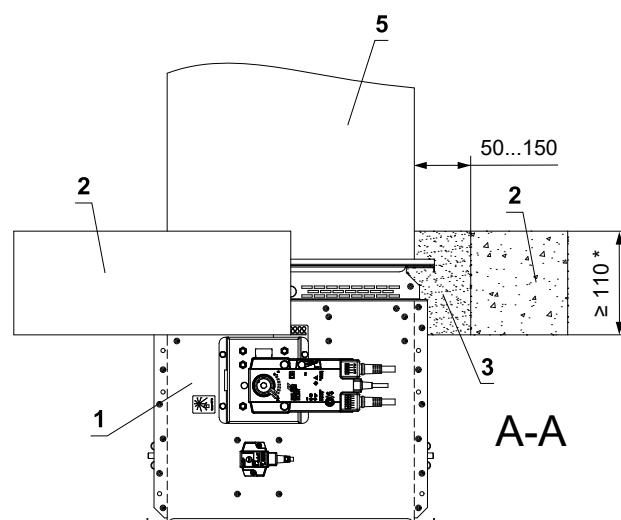
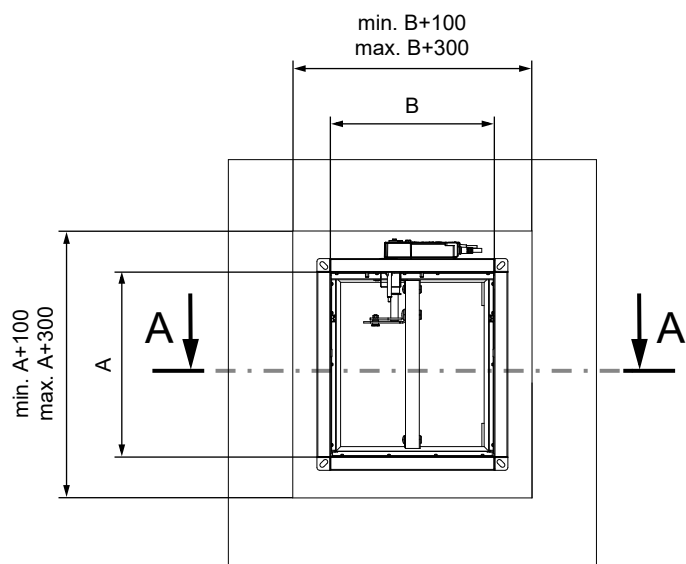
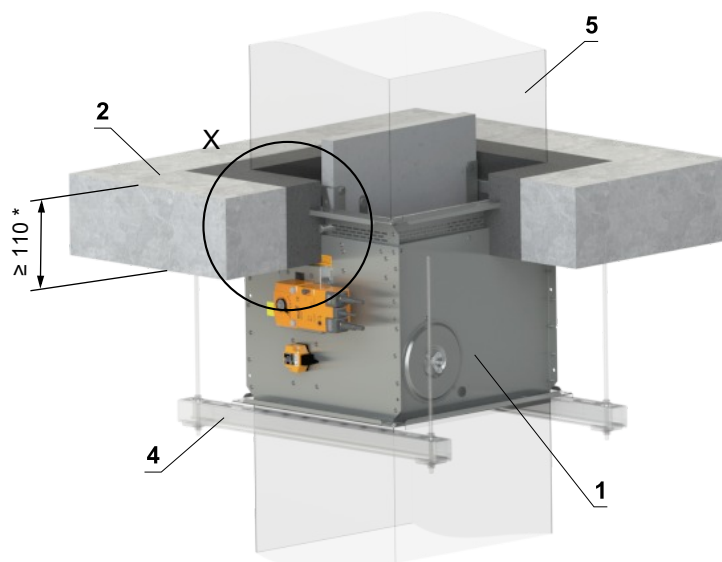
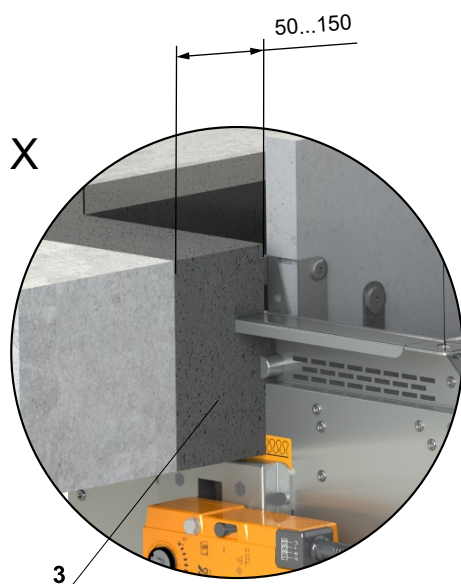
** HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

In solid ceiling construction

In solid ceiling construction - mortar or gypsum

EI 120 ($h_o \leftrightarrow o$) S

- For connection of following duct → see page 81



- 1 FDMB
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct

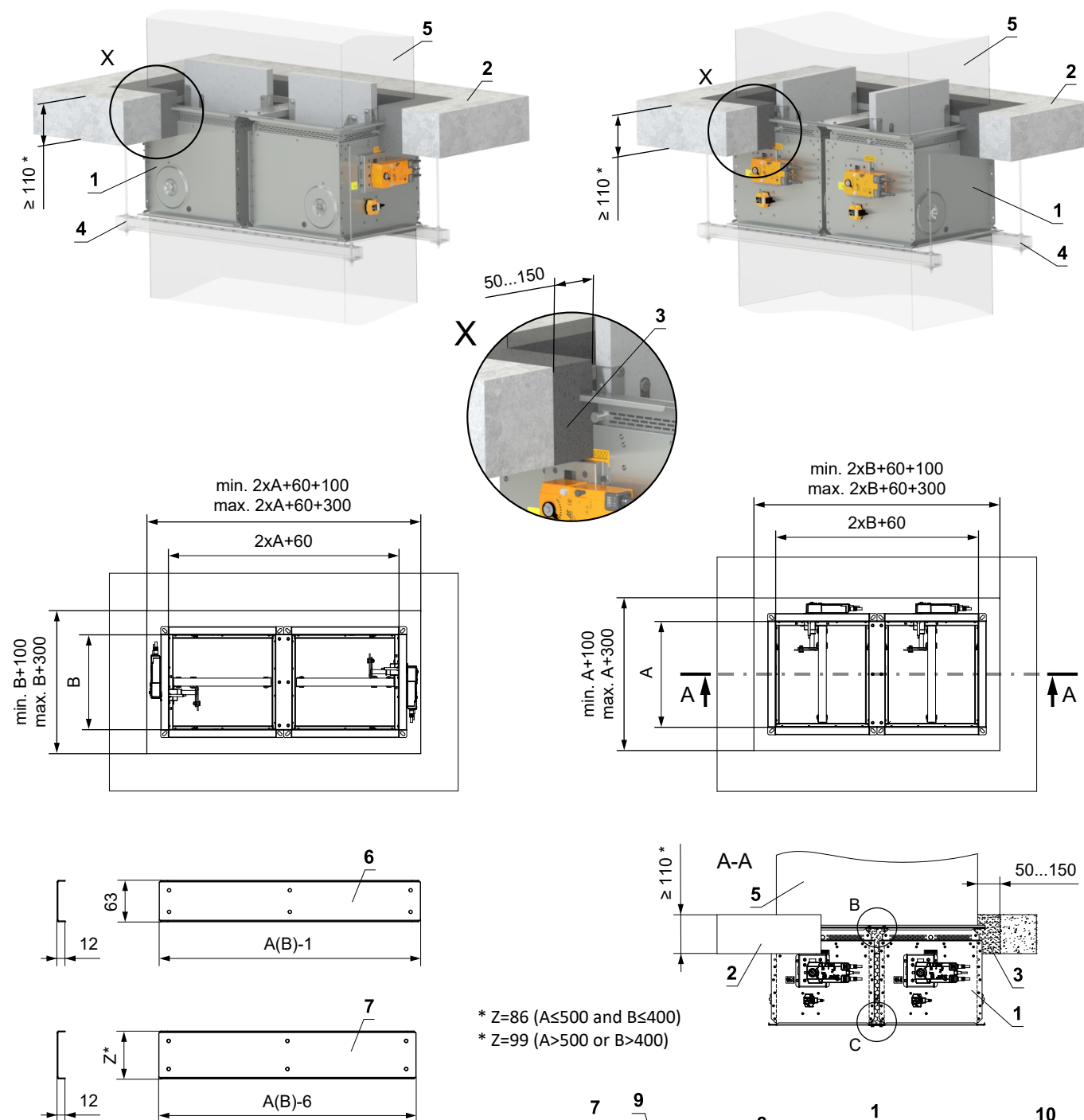
* min. 110 mm - Concrete
min. 125 mm - Aerated concrete

In solid ceiling construction - 2 dampers in one opening - mortar or gypsum

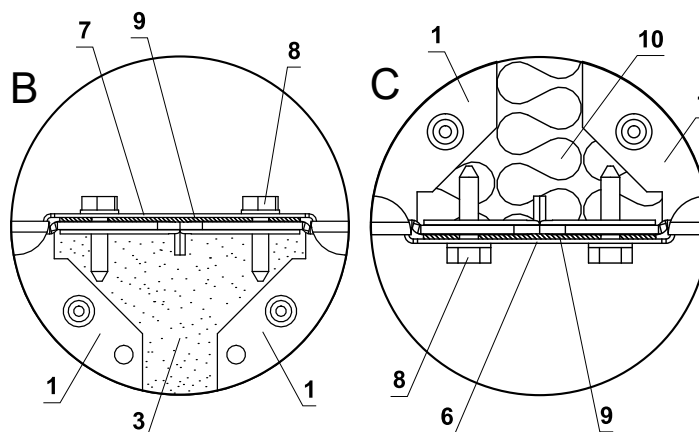
EI 90 ($h_o \leftrightarrow o$) S

- For connection of following duct → see page 81
- The gap between the damper and construction is filled with mortar or gypsum

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



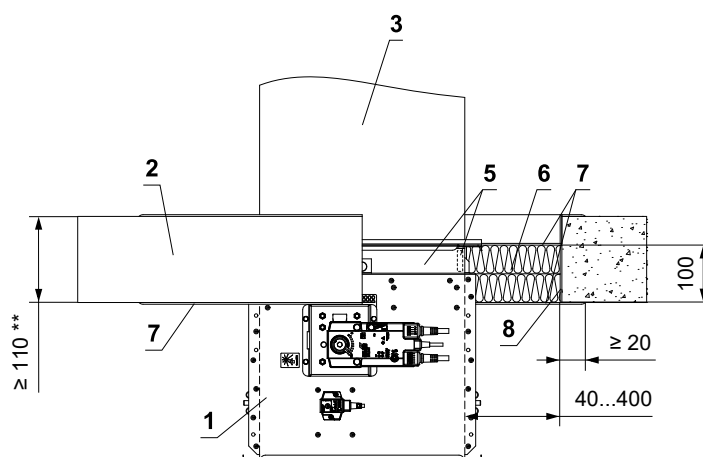
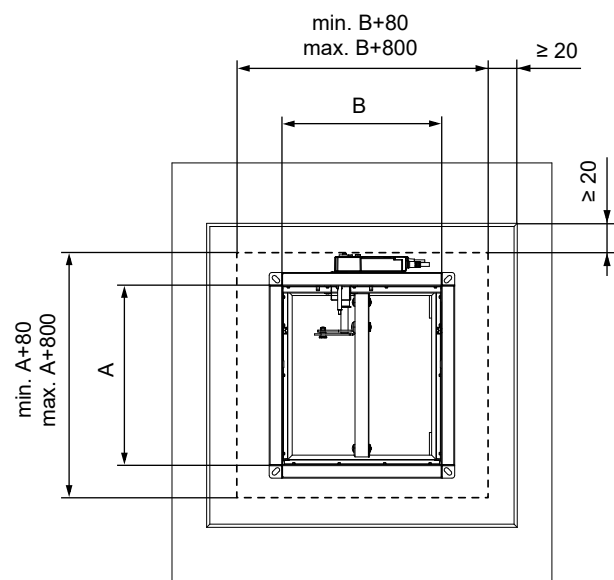
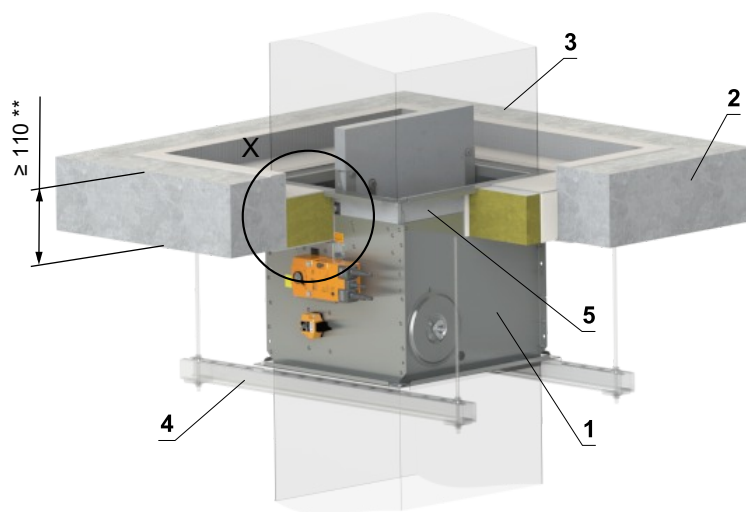
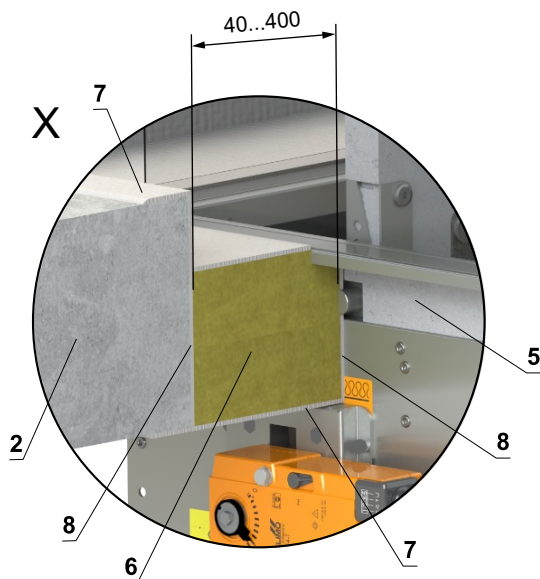
- 1 FDMB
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.



In solid ceiling construction - Weichschott system

EI 90 (h_o i↔o) S

- For connection of following duct → see page 81



* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

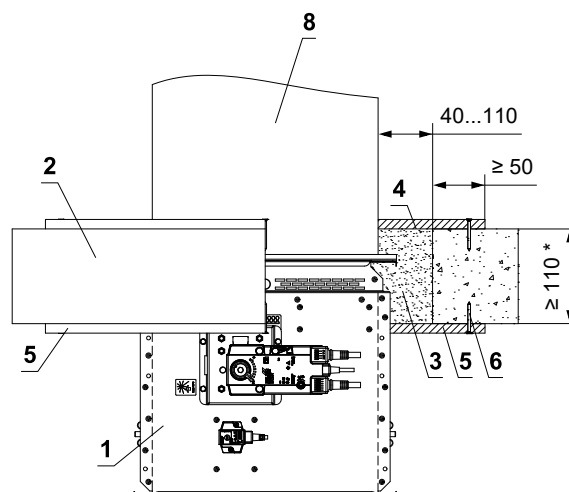
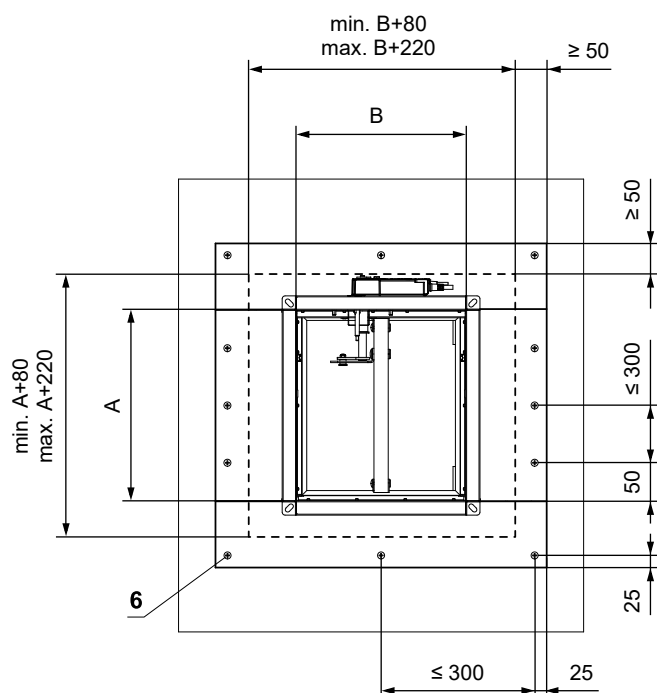
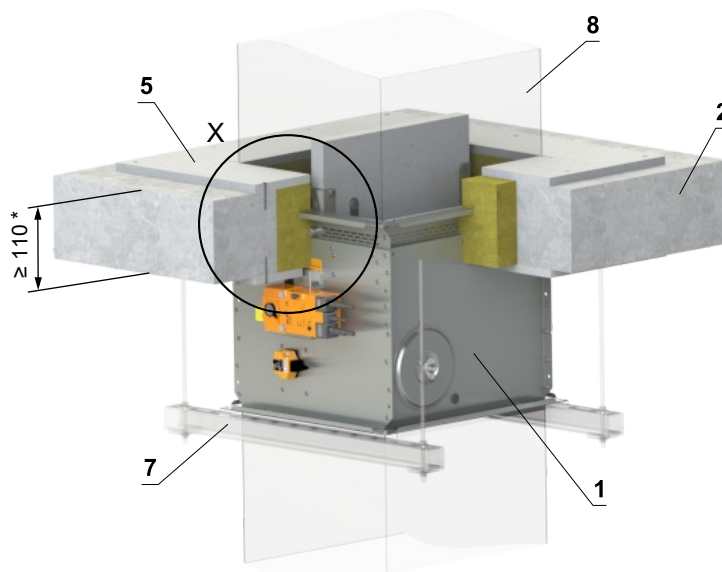
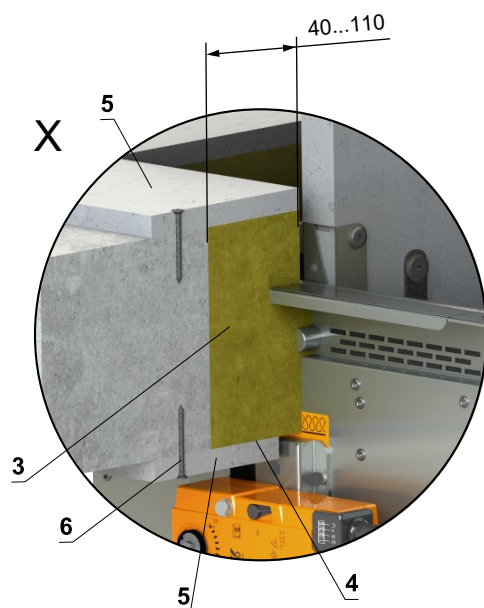
** min. 110 mm - Concrete
min. 125 mm - Aerated concrete

- 1 FDMB
- 2 Solid ceiling construction
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Protective cladding board - min. th. 10 mm, min. density 870 kg/m³ (e.g. PROMATECT-H) → see page 91
Weichschott system HILTI*
- 6 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 7 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 8 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

In solid ceiling construction - mineral wool with fire-resistant coating and fire-resistance boards

EI 90 ($h_o \leftrightarrow o$) S

■ For connection of following duct → see page 81



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

- 1 FDMB
- 2 Solid ceiling construction
- 3 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 Profile with threaded rod → see pages 77 to 80
- 8 Duct

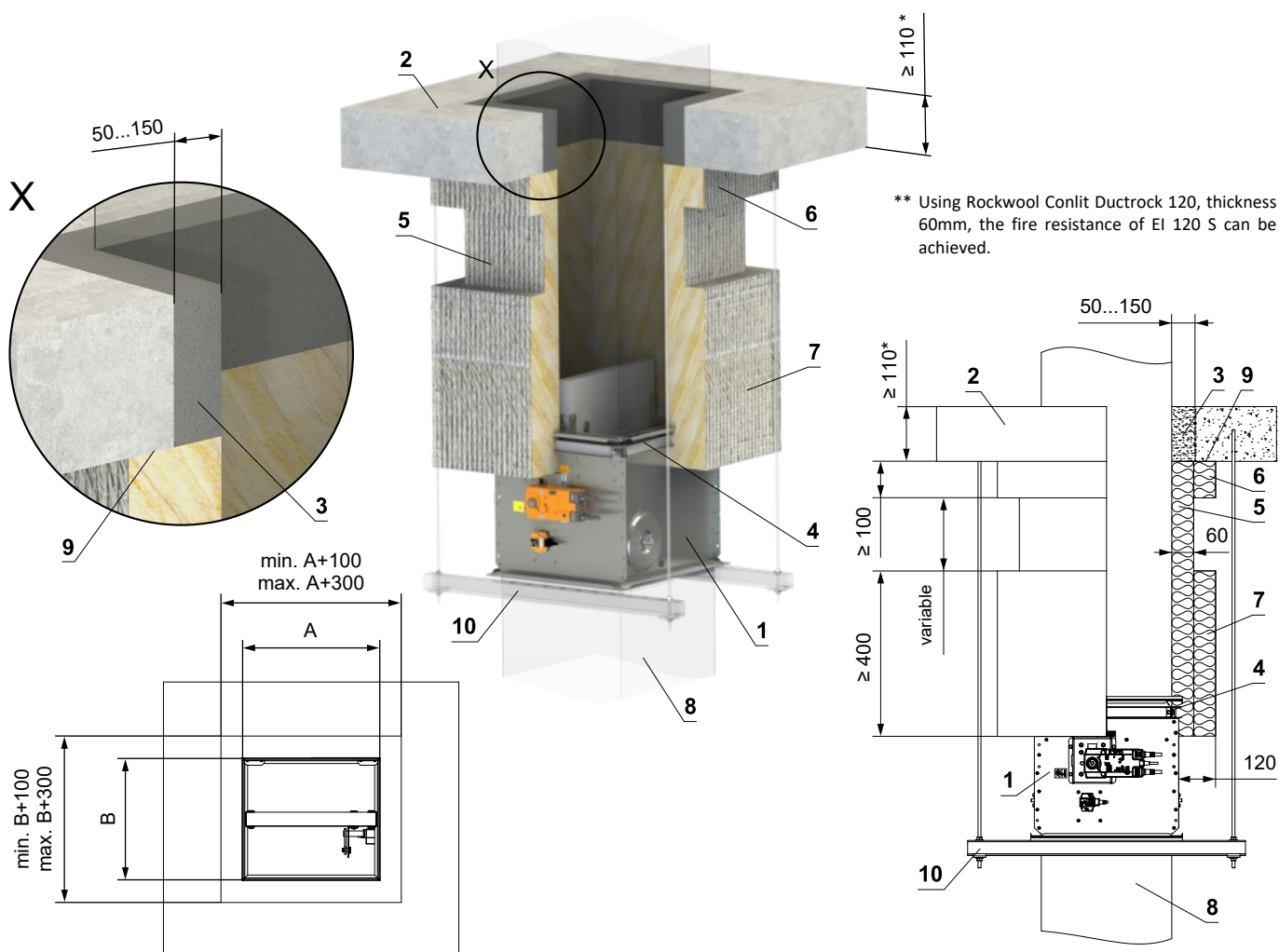
Outside solid ceiling construction

Outside solid wall construction - mineral wool ROCKWOOL - mortar or gypsum

El 90 ($h_o \leftrightarrow o$) S

**El 120 ($h_o \leftrightarrow o$) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the ceiling and fire damper is unlimited
- When installing the insulation, follow the ROCKWOOL manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- For this installation VRM-B reinforcement frame must be used → see page 89



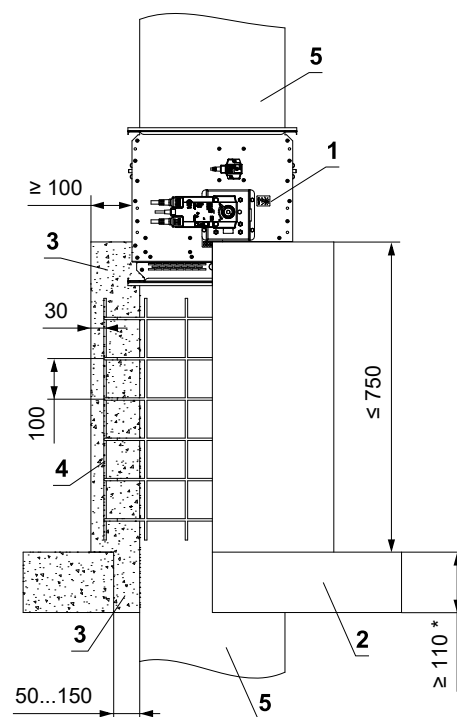
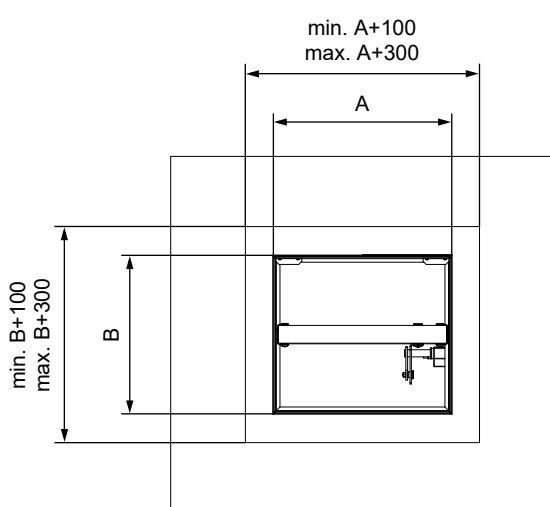
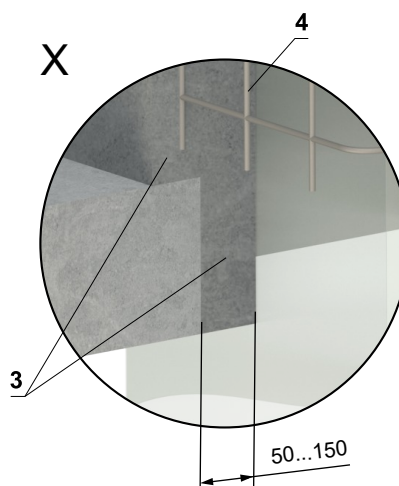
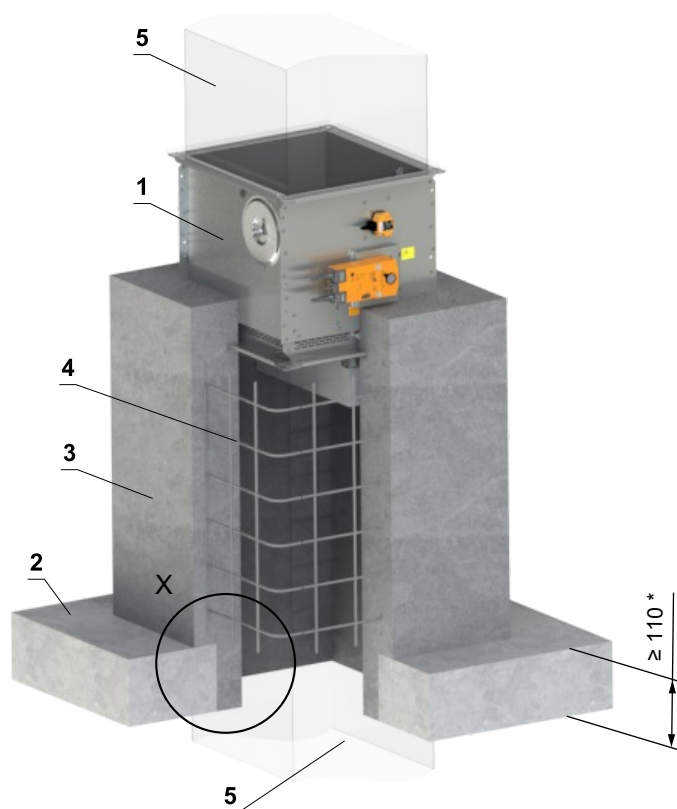
- | | |
|--|---|
| <ol style="list-style-type: none"> 1 FDMB 2 Solid ceiling construction 3 Mortar or gypsum 4 VRM-B → see page 89 5 Insulation board made of mineral wool, with a surface treatment of aluminum foil - th. 60 mm, min. density 300 kg/m³ - (System ROCKWOOL Conlit Ductrock 90(120**)) 6 Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90(120**)) - glued (pos. 9) and fixed with screws to the wall construction | <ol style="list-style-type: none"> 7 Insulation collar of the damper and duct connection - th. 60 mm (System ROCKWOOL Conlit Ductrock 90(120**)) 8 Standard air duct, made of galvanized sheet metal, thickness according to damper size 9 ROCKWOOL Firepro glue - apply on the insulation and fix it to the fire separation construction 10 Profile with threaded rod → see pages 77 to 80 |
|--|---|

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

Outside solid ceiling construction - concreting

El 90 (h_o i↔o) S

- For connection of following duct → see page 81
- The duct must be suspended or supported on both sides of the damper acc. to national rules
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers



- 1 FDMB
- 2 Solid ceiling construction
- 3 Concrete B20
- 4 Rebar - steel rod Ø 6 mm, mesh hole 100 mm
- 5 Standard air duct, made of galvanized sheet metal, thickness according to damper size

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

Installation frames

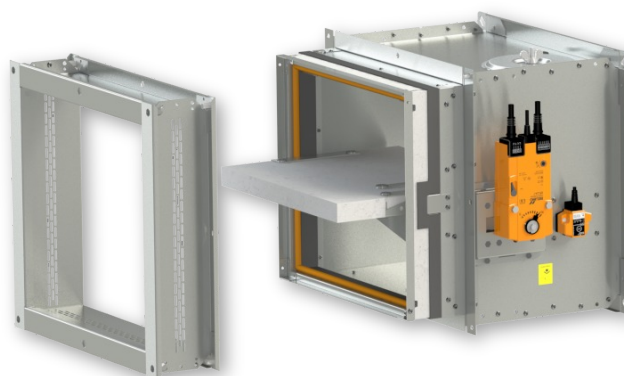
List of installation frames and installation options

Installation frame	Wall thickness (mm)								
	Solid wall construction			Gypsum wall construction			Solid ceiling construction		
	In construction	Outside construction	On construction	In construction	Outside construction	On construction	In construction	Outside construction	On construction
E1	≥ 100	–	–	≥ 100	–	–	≥ 110/125	–	–
E2	≥ 100	–	–	–	–	–	≥ 110/125	–	–
E3	–	–	–	≥ 100	–	–	–	–	–
E4	–	–	≥ 100	–	–	≥ 100	–	≥ 110/125	≥ 110/125
E5	–	–	–	100/≥115	–	–	–	–	–
E6	–	≥ 100	–	–	–	–	–	≥ 110/125	–

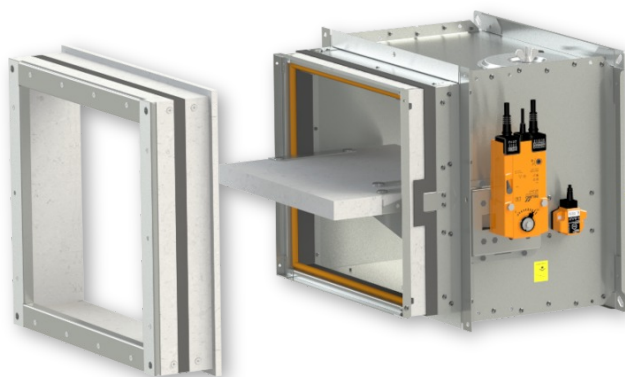
Installation frame E1



Installation frame E2



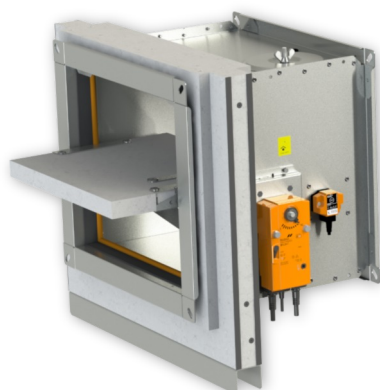
Installation frame E3



Installation frame E4



Installation frame E5



Installation frame E6

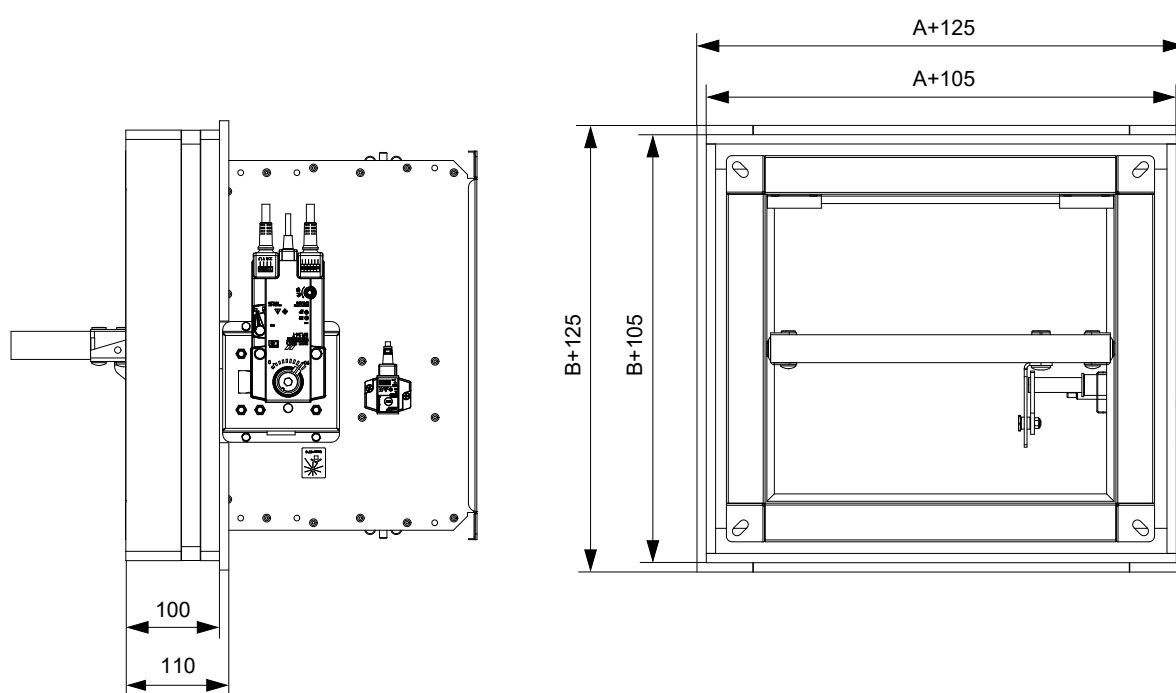


■ Installation frame can be installed on the damper or delivered separately

Installation frame E1

- Installation frame E1 is designed for installation without additional sealing of the penetration into:
 - Solid wall construction
 - Gypsum wall construction
 - Solid ceiling construction
- Installation frame is equipped with an intumescent sealing on the inside and outside. This sealing fills the gap between the damper casing and frame and between the frame and construction in the event of a fire
- **Solid wall/gypsum wall th. 100 mm or solid ceiling th. 110 mm**
- Material:
 - Installation frame - cement-lime boards
 - Fasteners - galvanized steel

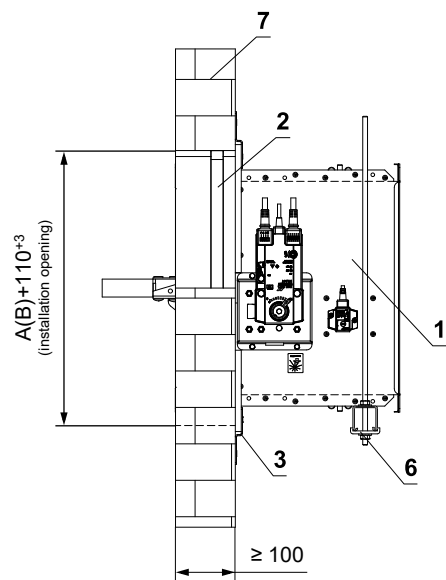
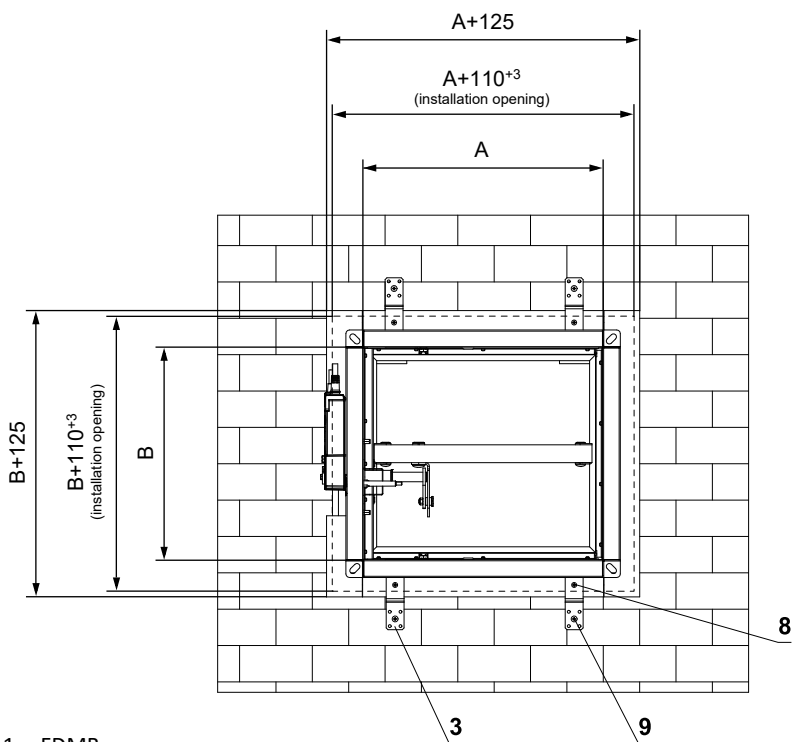
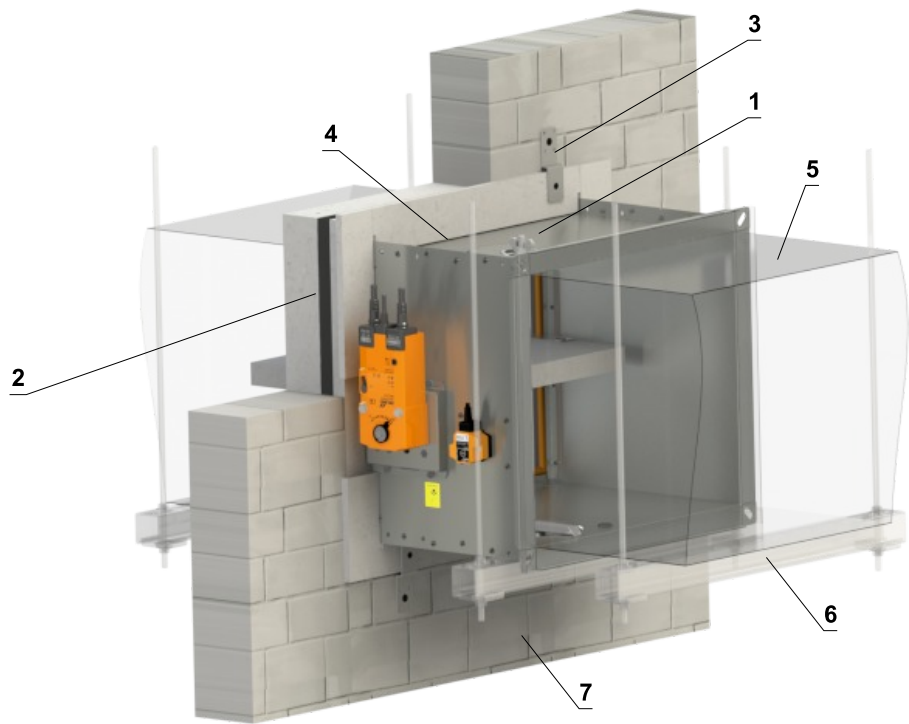
Installation frame E1



In solid wall construction - installation frame E1

EI 90 (v_e i↔o) S

- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately



- 1 FDMB
- 2 Installation frame
- 3 Bracket (fastening material included in frame delivery)
- 4 Fill the gaps with glue PROMAT K84
- 5 Duct
- 6 Profile with threaded rod → see pages 77 to 80
- 7 Solid wall construction
- 8 Screw 4x16 mm to attach bracket to the frame
- 9 Screw 5x60 mm to attach bracket to the construction

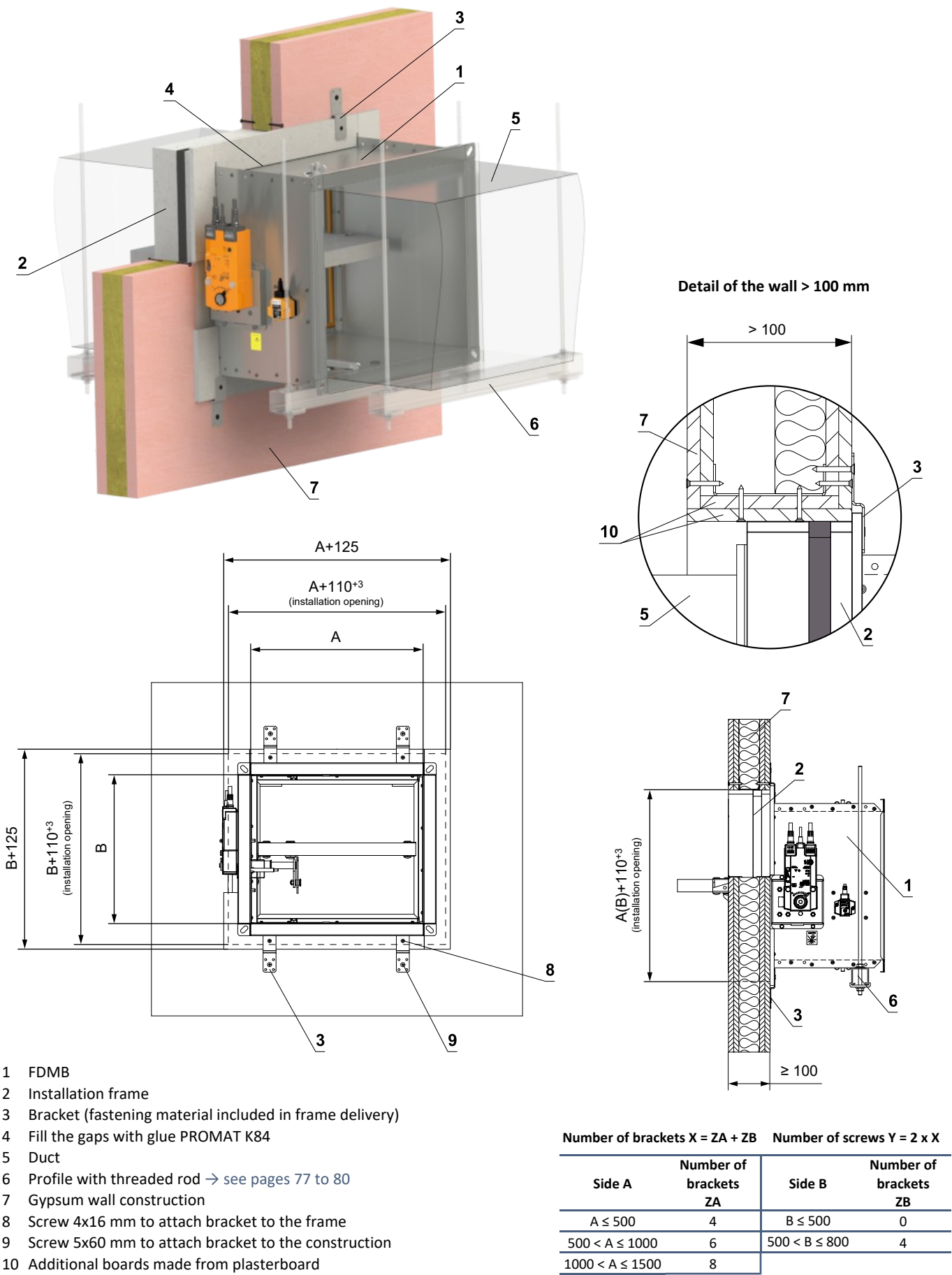
Number of brackets $X = ZA + ZB$ Number of screws $Y = 2 \times X$

Side A	Number of brackets ZA	Side B	Number of brackets ZB
$A \leq 500$	4	$B \leq 500$	0
$500 < A \leq 1000$	6	$500 < B \leq 800$	4
$1000 < A \leq 1500$	8		

In gypsum wall construction - installation frame E1

EI 90 (v_e i↔o) S

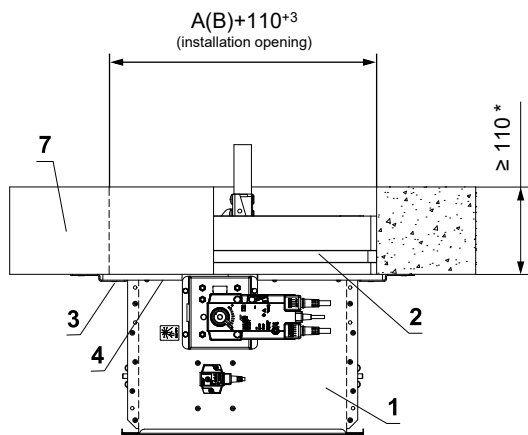
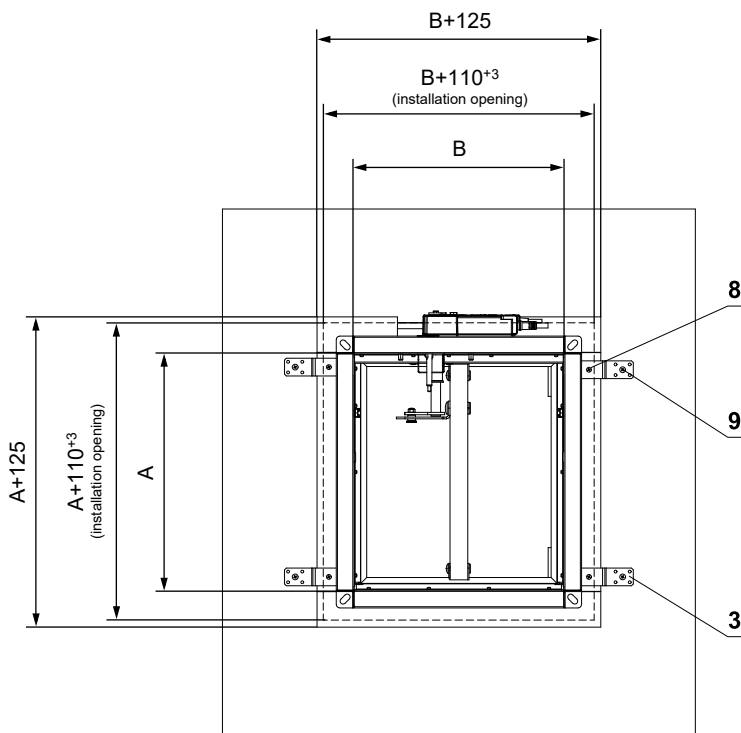
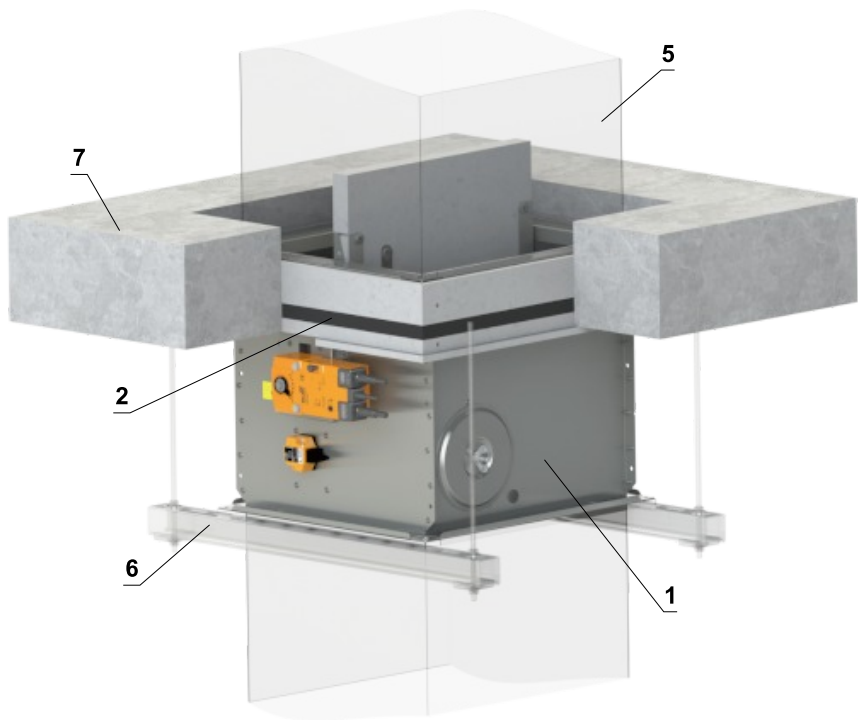
- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately



Solid ceiling construction - installation frame E1

EI 90 (h_o i↔o) S

- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately



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

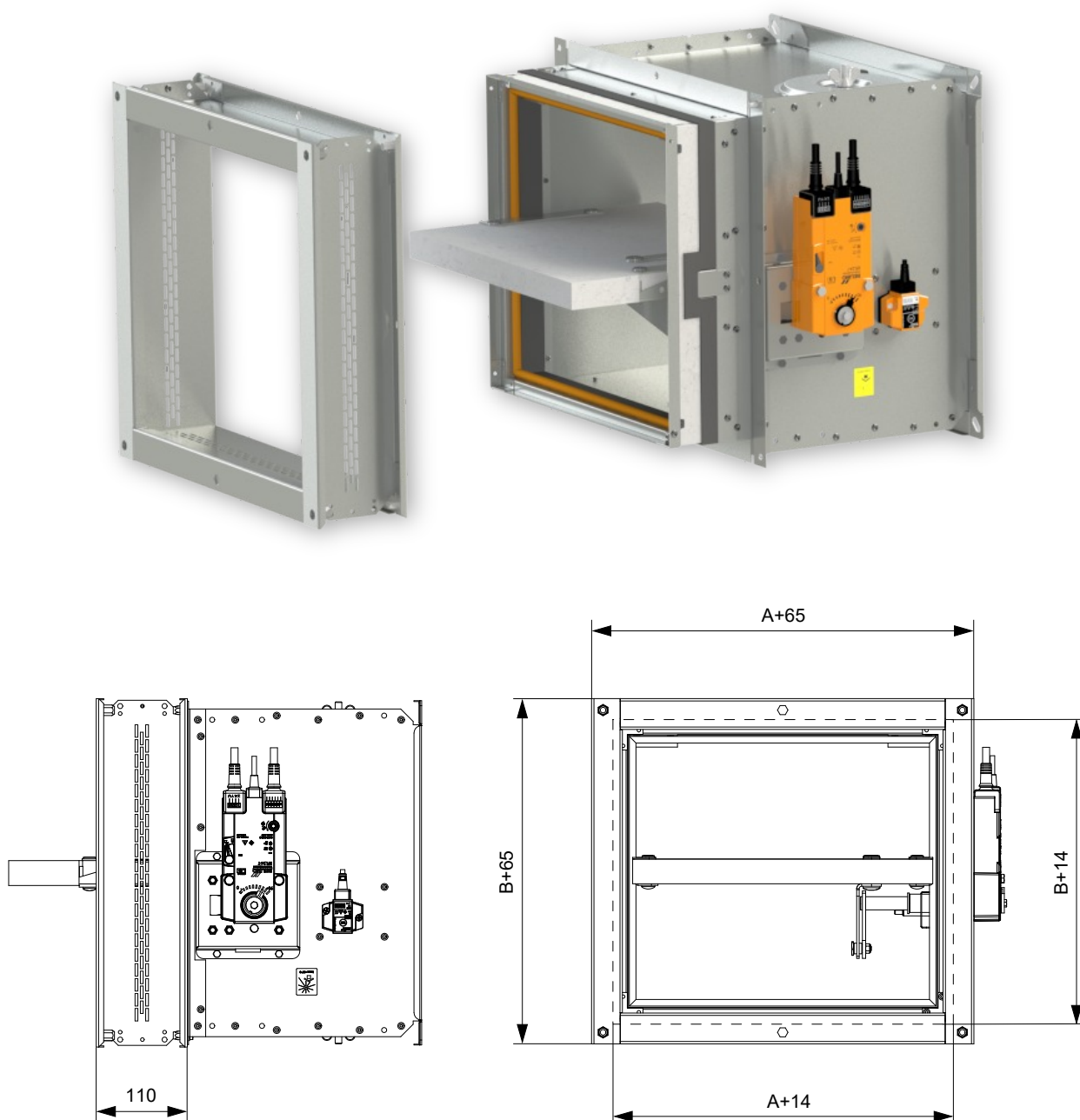
- 1 FDMB
- 2 Installation frame
- 3 Bracket (fastening material included in frame delivery)
- 4 Fill the gaps with glue PROMAT K84
- 5 Duct
- 6 Profile with threaded rod → see pages 77 to 80
- 7 Solid ceiling construction
- 8 Screw 4x16 mm to attach bracket to the frame
- 9 Screw 5x60 mm to attach bracket to the construction

Number of brackets X = ZA + ZB		Number of screws Y = 2 x X	
Side A	Number of brackets ZA	Side B	Number of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

Installation frame E2

- Installation frame E2 is designed for installation with steel insert and mortar or gypsum into:
 - Solid wall construction
 - Solid ceiling construction
- The damper is equipped with an intumescent sealing on the casing. This sealing fills the gap between the steel insert and the damper in the event of a fire
- **Solid wall th. 100 mm or solid ceiling th. 110 mm**
- Material:
 - Installation frame - cement-lime boards
 - Fasteners - galvanized steel

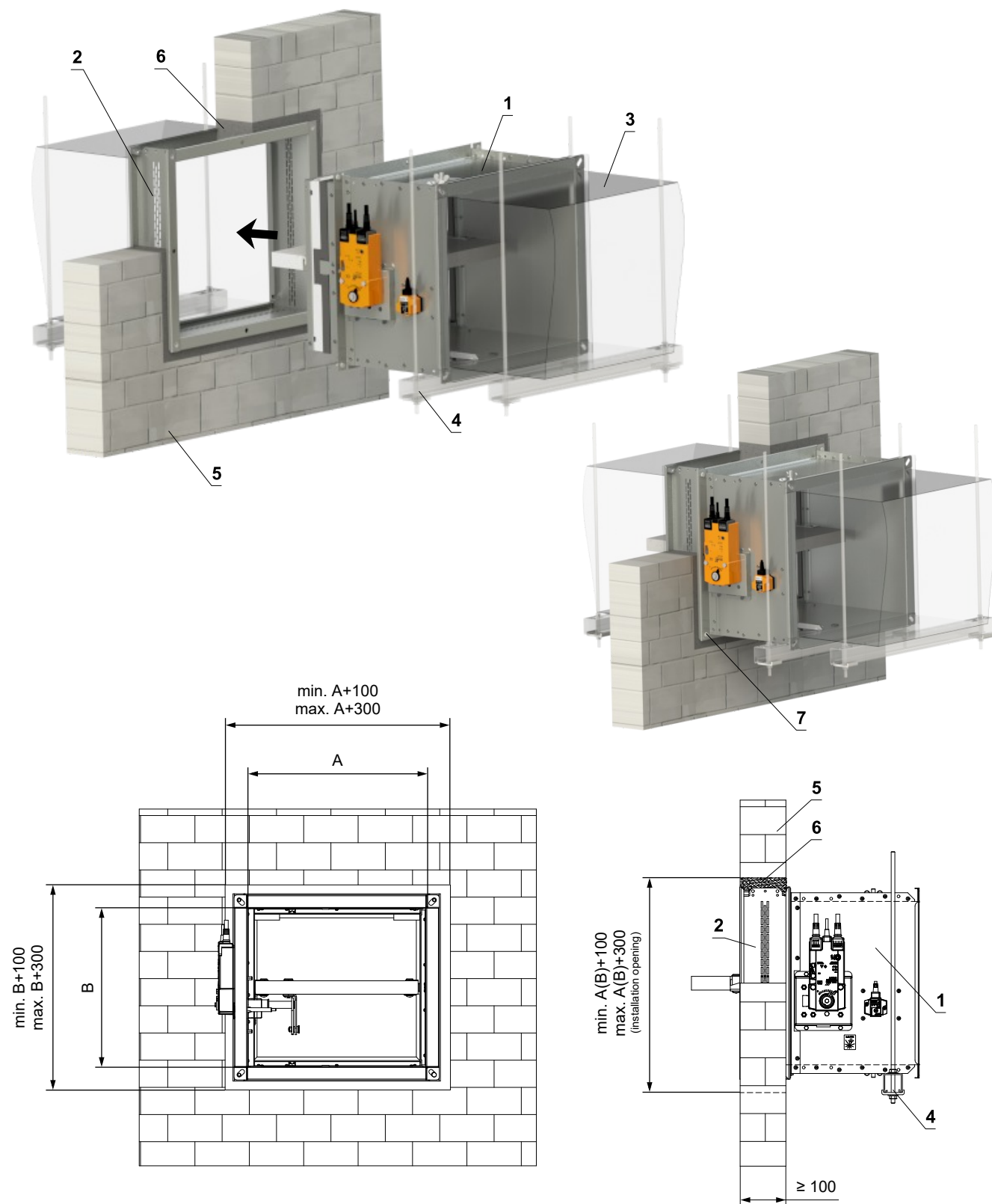
Installation frame E2



In solid wall construction - installation frame E2

EI 90 (v_e i↔o) S

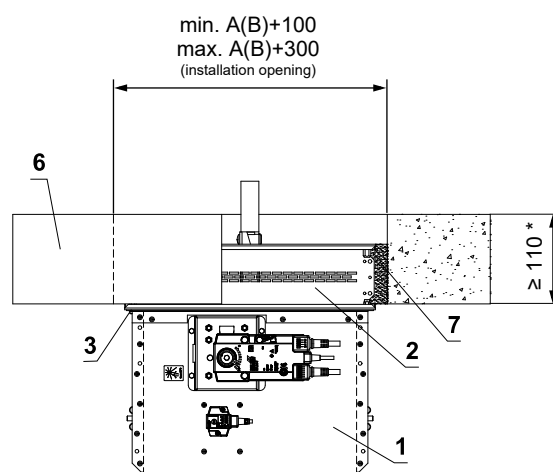
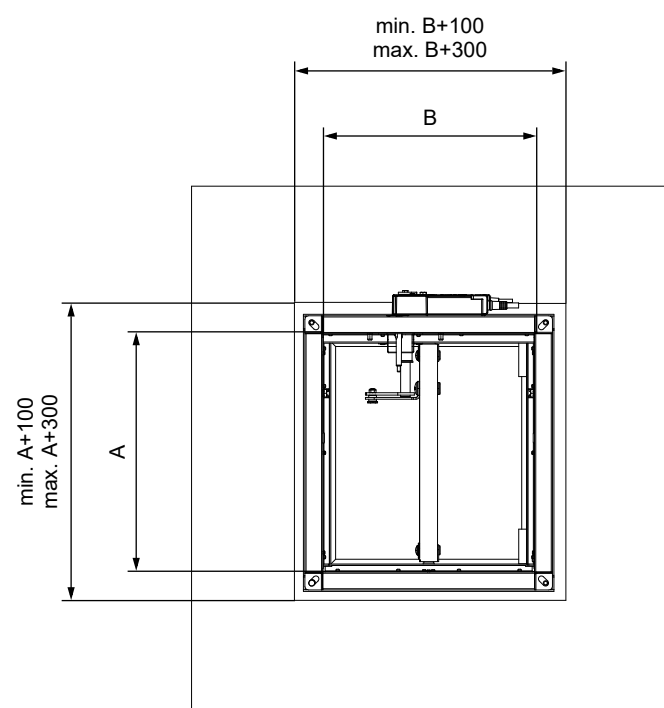
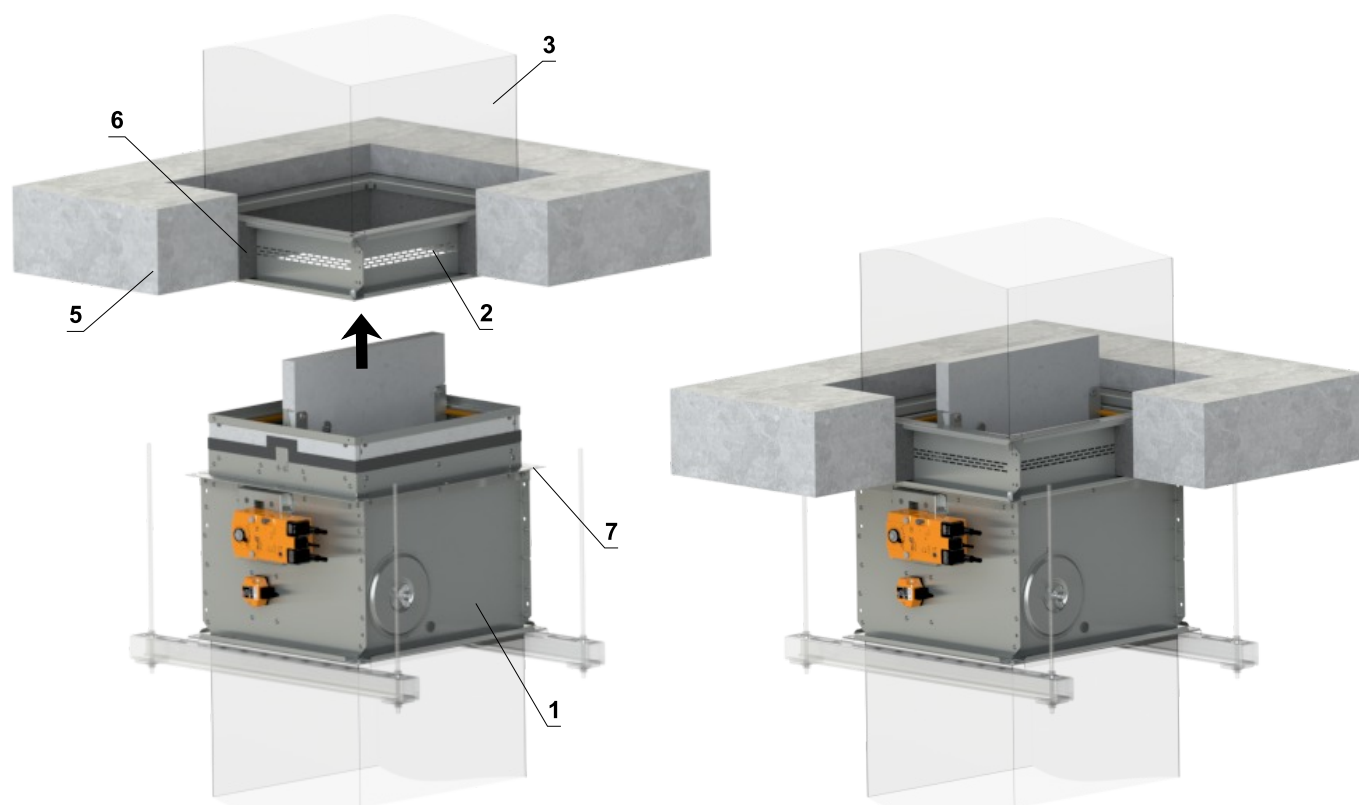
- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately



- 1 FDMB
- 2 Installation frame
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Solid wall construction
- 6 Mortar or gypsum
- 7 Screw M6x12 (4x)

In solid ceiling construction - installation frame E2
EI 90 (h_o i↔o) S

- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately



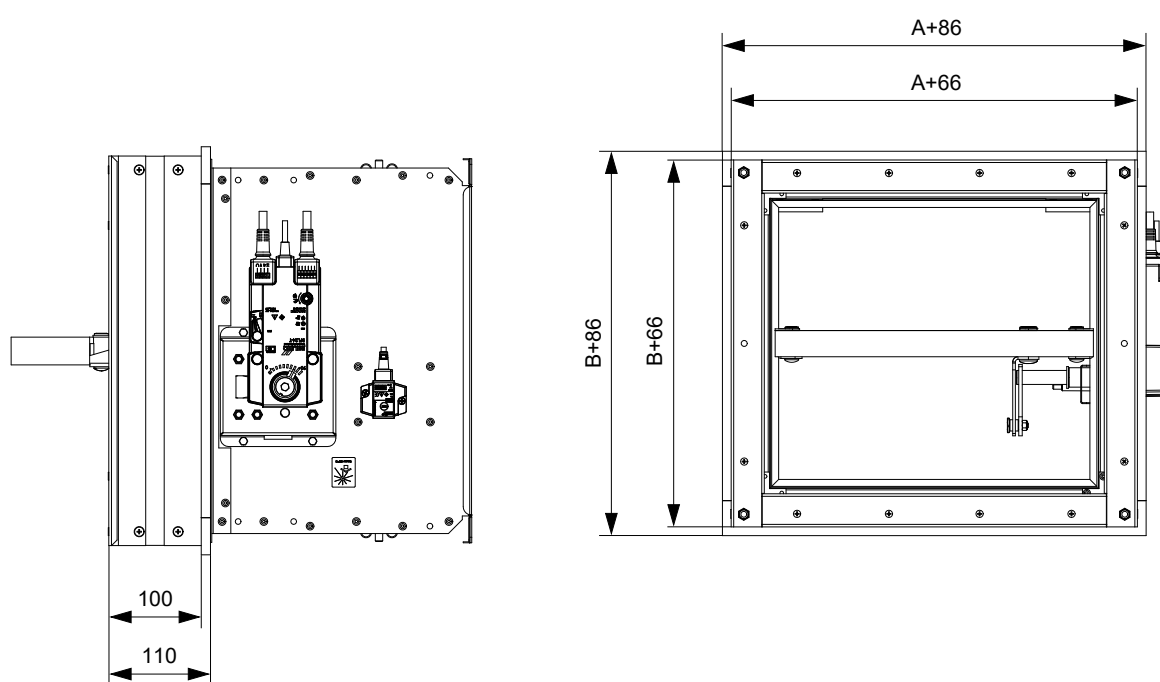
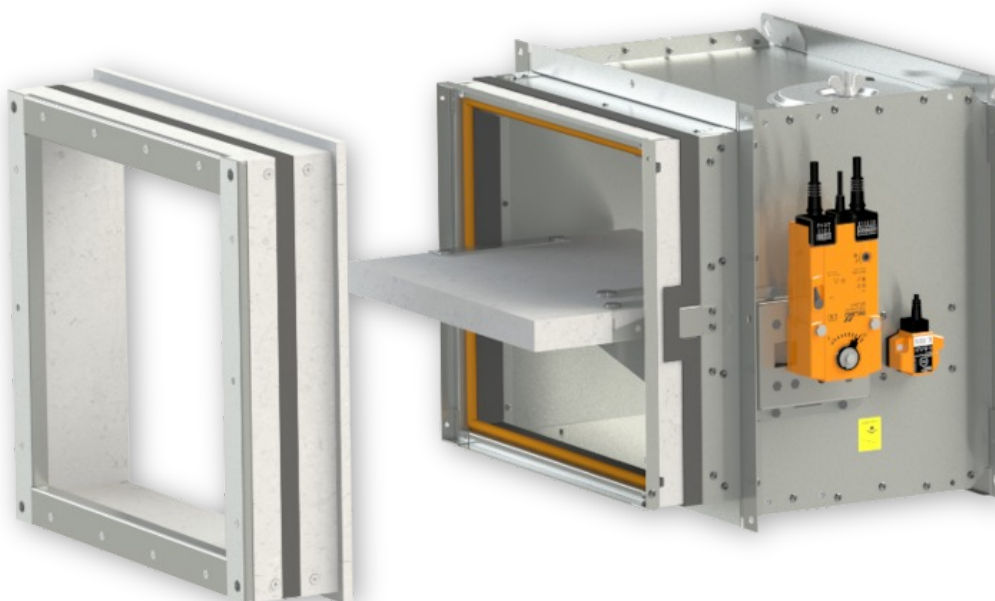
- 1 FDMB
- 2 Installation frame
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Solid ceiling construction
- 6 Mortar or gypsum
- 7 Screw M6x12 (4x)

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

Installation frame E3

- Installation frame E2 is designed for installation into:
 - Gypsum wall construction
- The damper is equipped with an intumescent sealing on the casing. This sealing fills the gap between the damper casing and frame in the event of a fire. The frame is equipped with an intumescent sealing on external side. This sealing fills the gap between the frame and construction in the event of a fire
- **Gypsum wall th. 100 mm**
- Material:
 - Installation frame - cement-lime boards and galvanized steel
 - Fasteners - galvanized steel

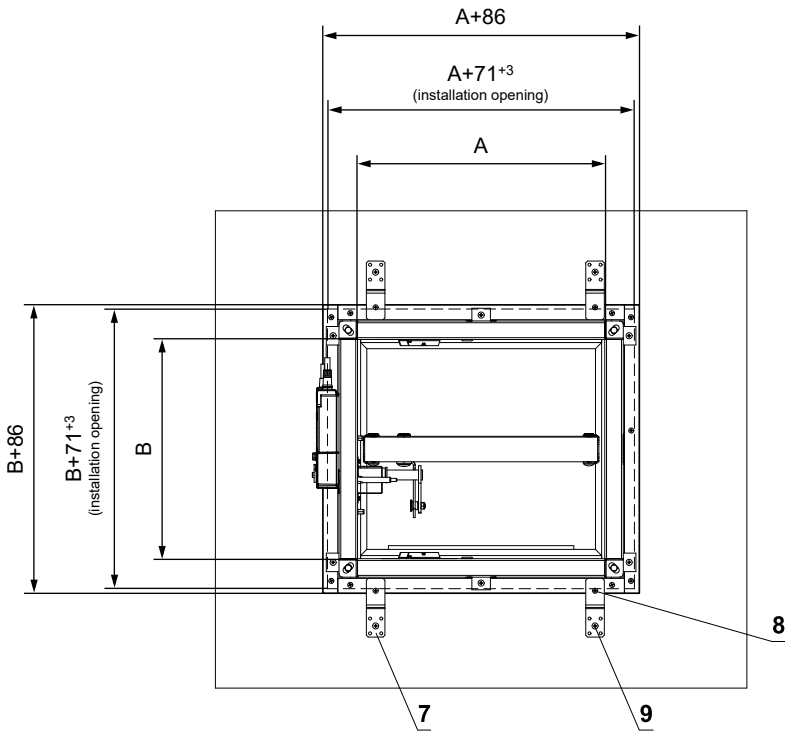
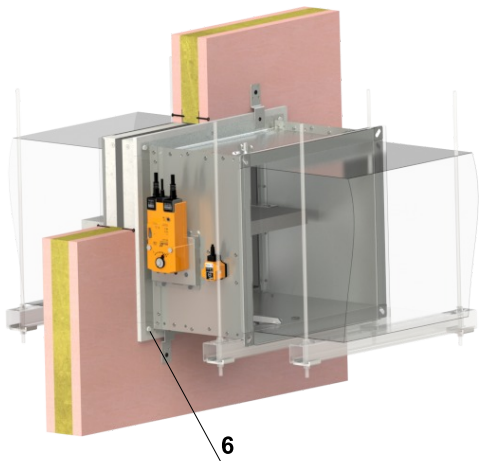
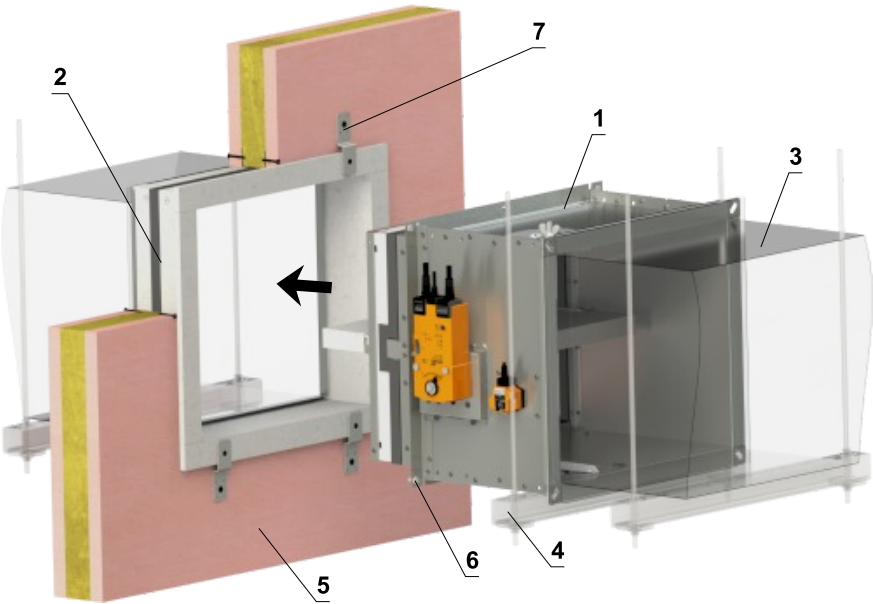
Installation frame E3



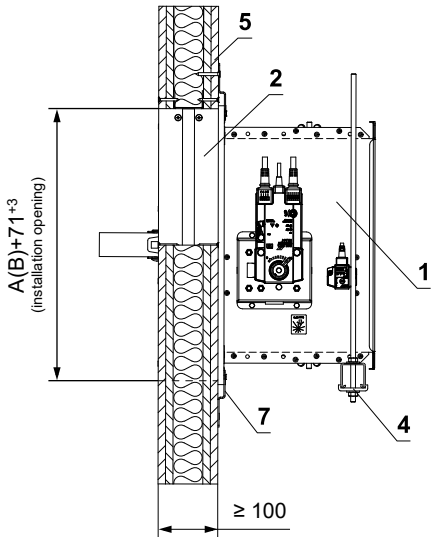
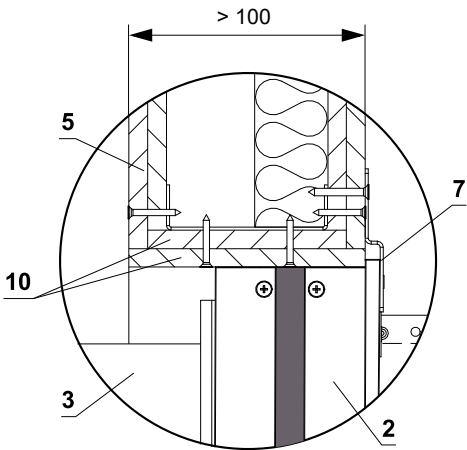
In gypsum wall construction - installation frame E3

EI 90 (v_e i↔o) S

- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately



Detail of the wall > 100 mm



- 1 FDMB
- 2 Installation frame
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Gypsum wall construction
- 6 Screw M6x12 (4x)
- 7 Bracket (fastening material included in frame delivery)
- 8 Screw 4x16 mm to attach bracket to the frame
- 9 Screw 5x60 mm to attach bracket to the construction
- 10 Additional boards made from plasterboard

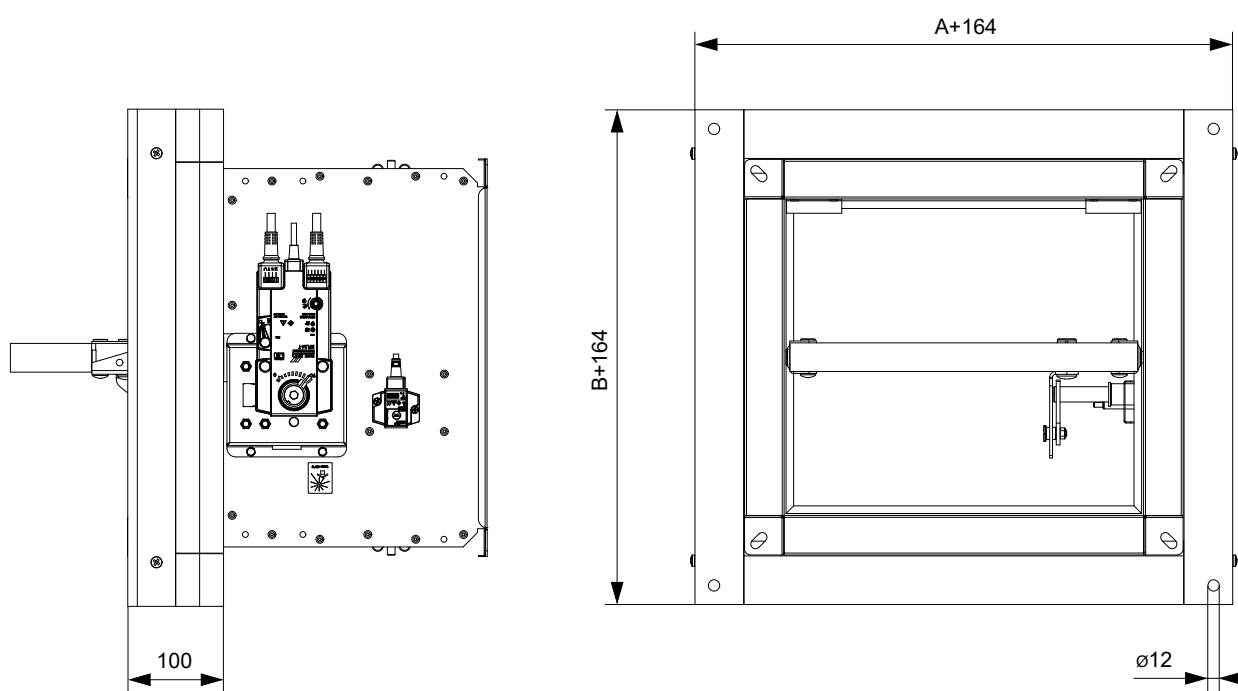
Number of brackets X = ZA + ZB Number of screws Y = 2 x X

Side A	Number of brackets ZA	Side B	Number of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

Installation frame E4

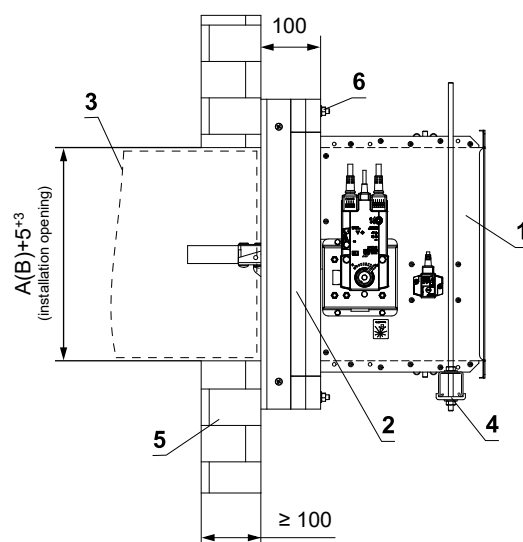
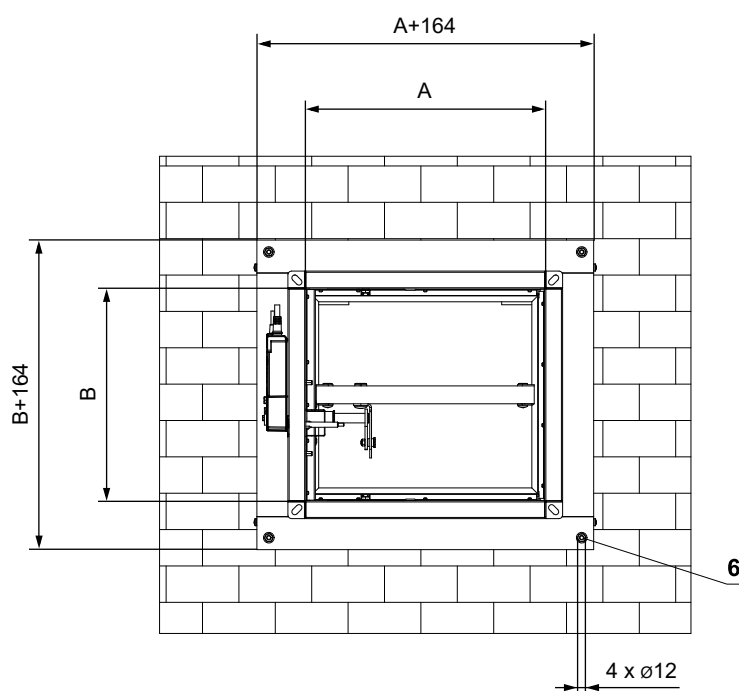
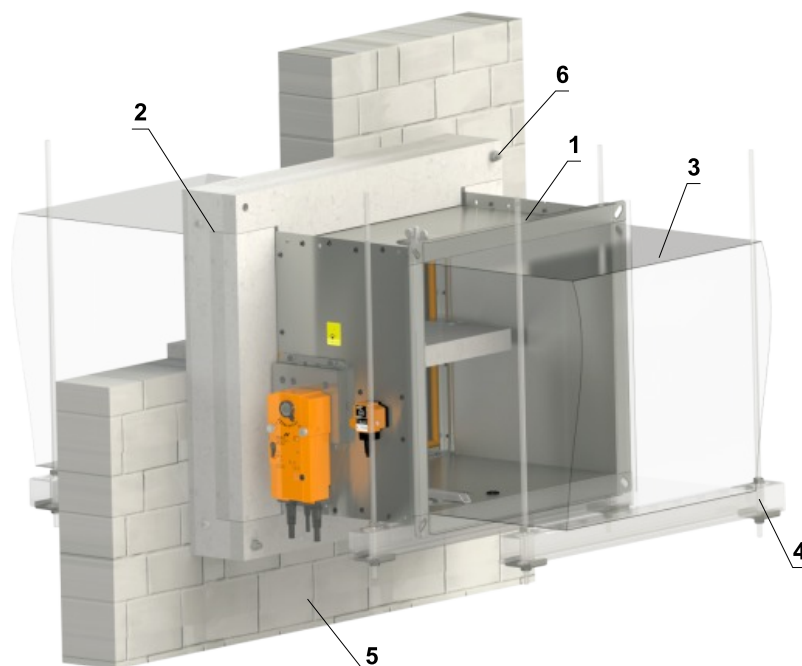
- Installation frame E4 is designed for installation on:
 - Solid wall construction
 - Solid ceiling construction
 - Outside solid ceiling construction with concreting
- Installation frame is equipped with an intumescent sealing on the inside. This sealing fills the gap between the damper casing and frame in the event of a fire
- Material:
 - Installation frame - cement-lime boards
 - Fasteners - galvanized steel

Installation frame E4



In solid wall construction - installation frame E4
EI 90 ($v_e i \leftrightarrow o$) S

- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately

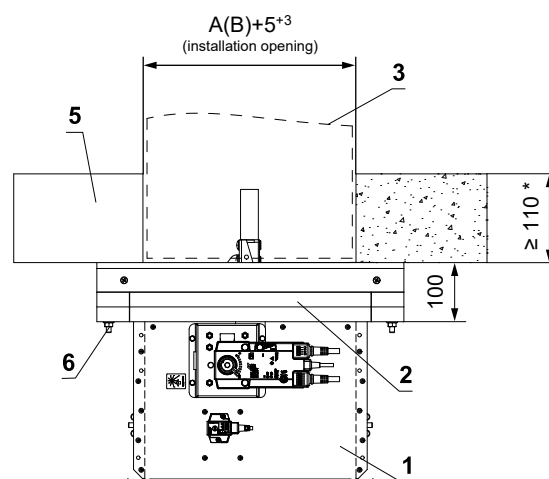
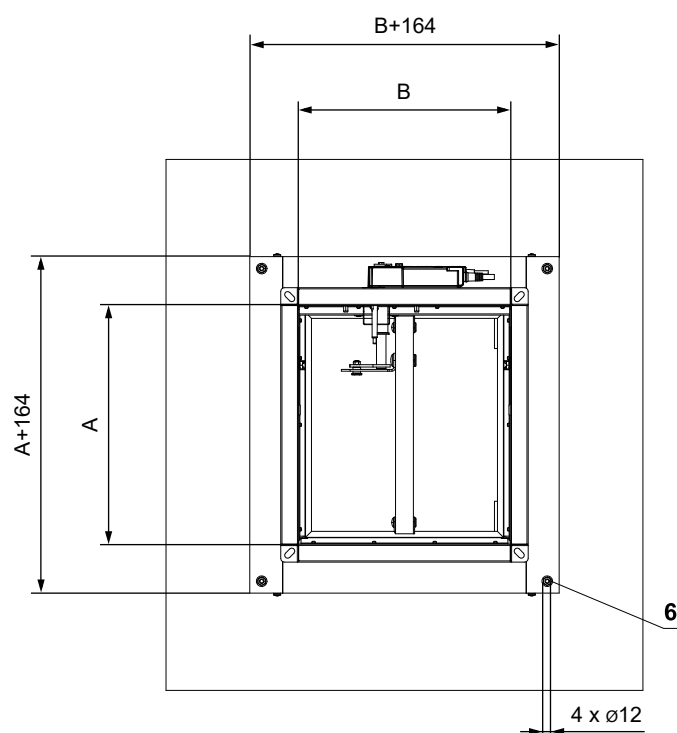
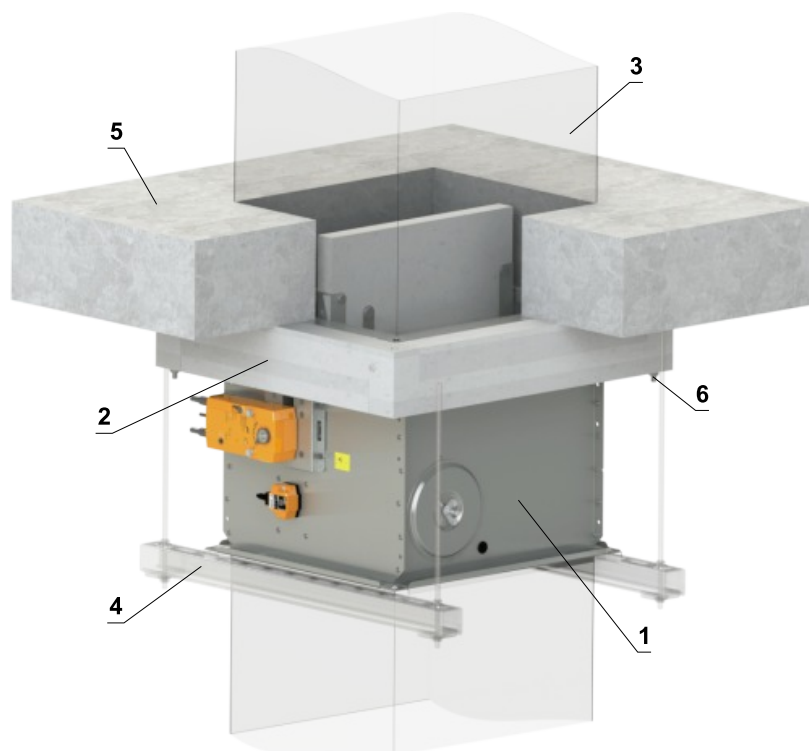


- 1 FDMB
- 2 Installation frame - apply HILTI CFS-S ACR mastic at the entire area and glue it to the fire separating construction
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Solid wall construction
- 6 Holes for fixing the frame with threaded rods or steel anchors (material for fixing the frame is not included)

In solid ceiling construction - installation frame E4

EI 90 ($h_o \leftrightarrow o$) S

- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately



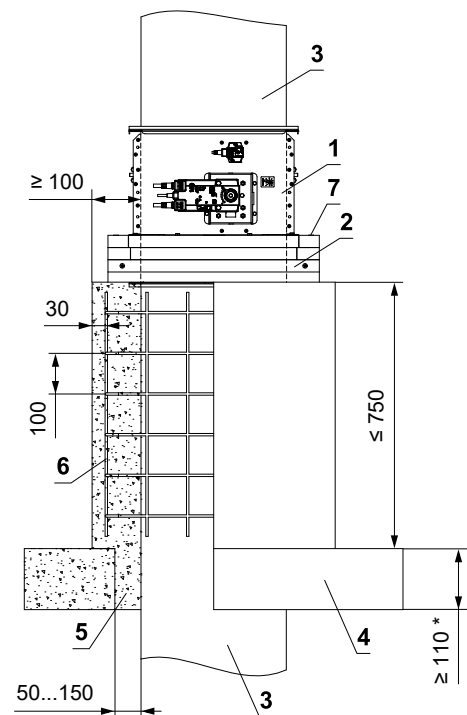
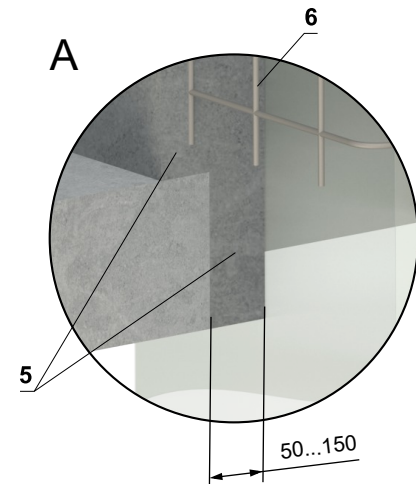
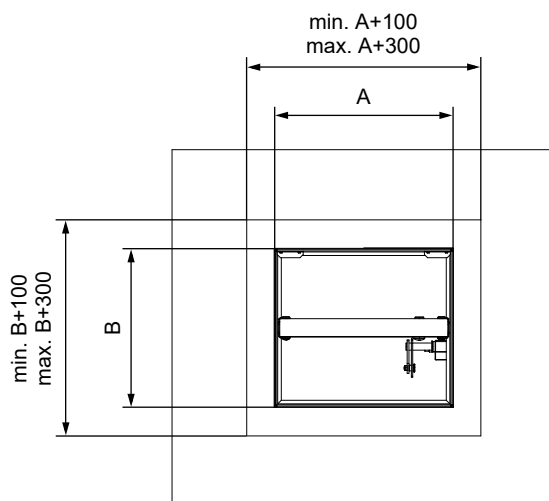
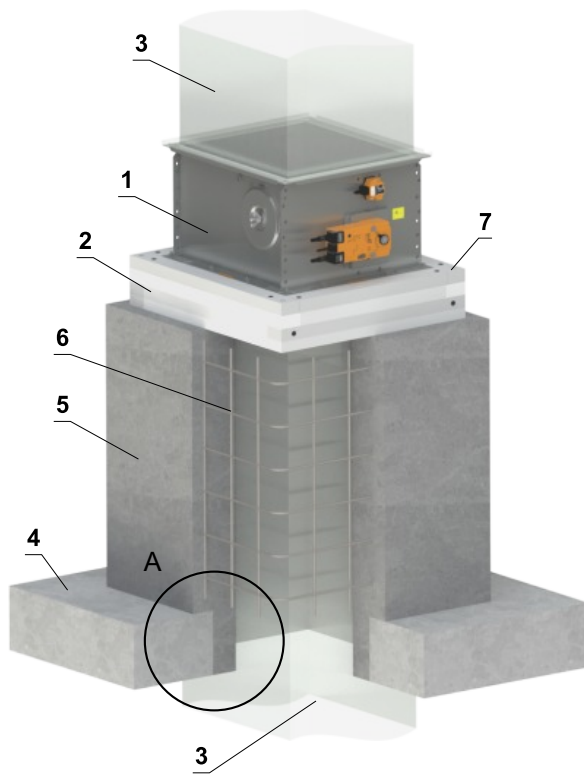
- 1 FDMB
- 2 Installation frame - apply HILTI CFS-S ACR mastic at the entire area and glue it to the fire separating construction
- 3 Duct
- 4 Profile with threaded rod → see pages 77 to 80
- 5 Solid ceiling construction
- 6 Holes for fixing the frame with threaded rods or steel anchors (material for fixing the frame is not included)

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

Outside solid ceiling construction - concreting - installation frame E4

EI 90 (h_o i↔o) S

- For connection of following duct → see page 81
- The duct must be suspended or supported on both sides of the damper acc. to national rules
- Load of the suspension system depends on weight of the fire damper and duct system → see page 77
- Max. distance between two suspension systems is 1500 mm
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- Installation frame can be installed on the damper or delivered separately



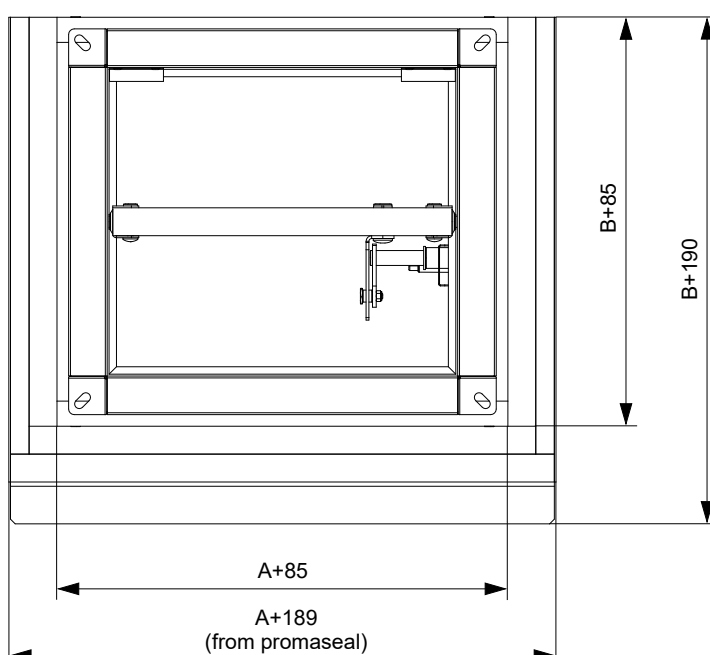
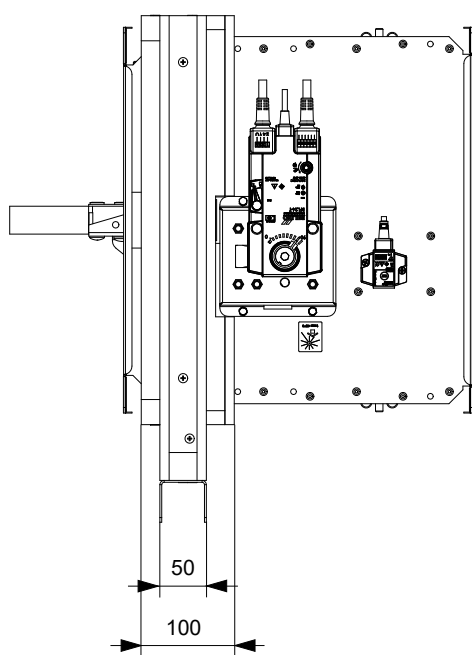
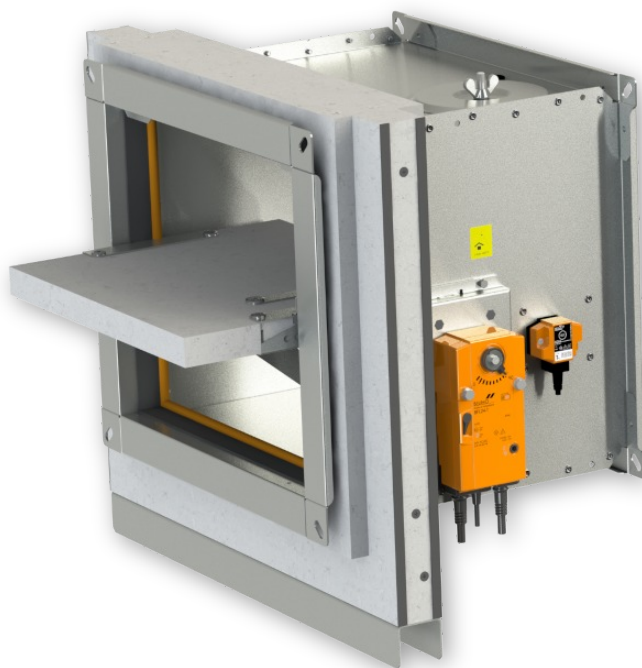
- 1 FDMB
- 2 Installation frame - apply HILTI CFS-S ACR mastic at the entire area and glue it to the fire separating construction
- 3 Standard air duct, made of galvanized sheet metal, thickness according to damper size
- 4 Solid ceiling construction
- 5 Concrete B20
- 6 Rebar - steel rod Ø 6 mm, mesh hole 100 mm
- 7 Holes for fixing the frame with threaded rods or steel anchors (frame fixing material not included)

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

Installation frame E5

- Installation frame E5 is designed for installation without additional sealing of the penetration for:
 - Installation in gypsum walls under flexible ceilings with a maximum movement of 40 mm
 - **Wall thicknesses of 100 or ≥ 115 mm**
- Installation frame is equipped with an intumescent sealing on the inside and outside. This sealing fills the gap between the damper casing and frame and between the frame and construction in the event of a fire
- Position of the damper can be directly on the ceiling or at a distance of max. 80 mm from the ceiling
- Material:
 - Installation frame - cement-lime boards and galvanized steel
 - Fasteners - galvanized steel

Installation frame E5

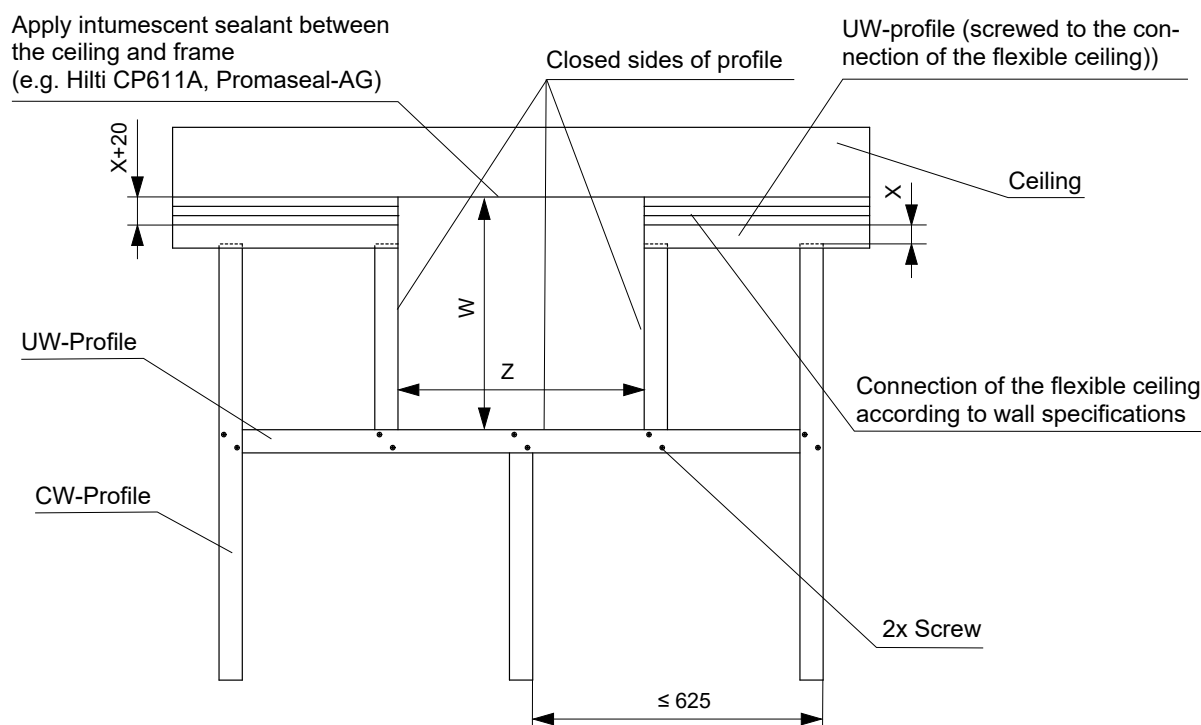
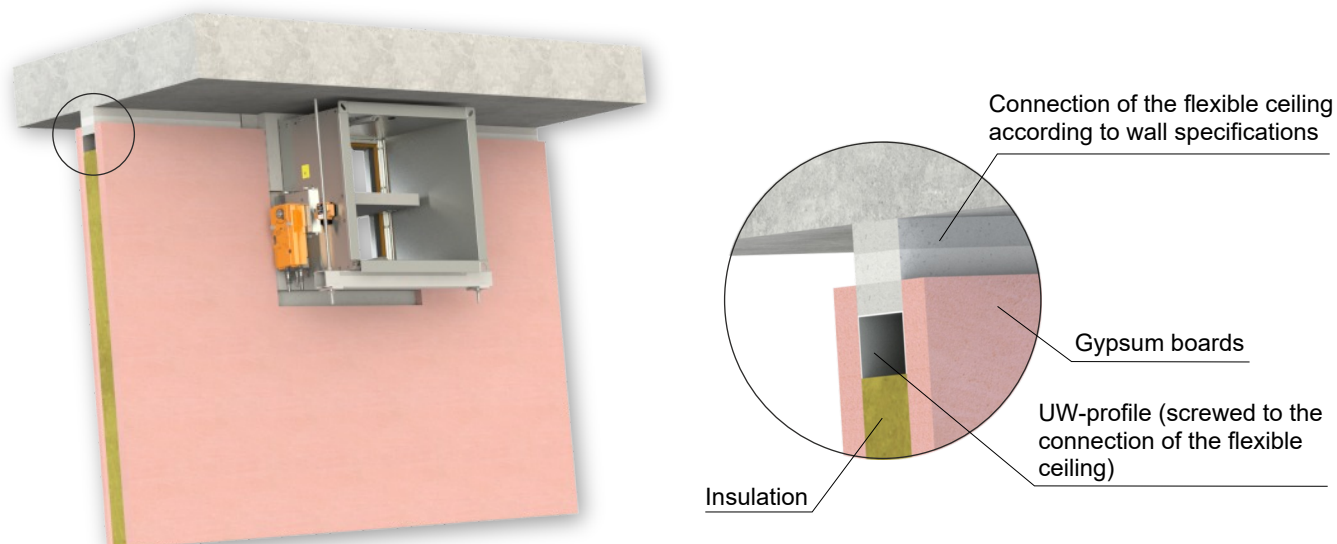


In gypsum wall construction - flexible ceiling - installation frame E5

Installation directly on the ceiling

EI 90 (v_e i↔o) S

- Detailed instructions for installation E5 frame → see manual
- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately
- Gypsum construction must be made in accordance with the specifications of the wall system manufacturer

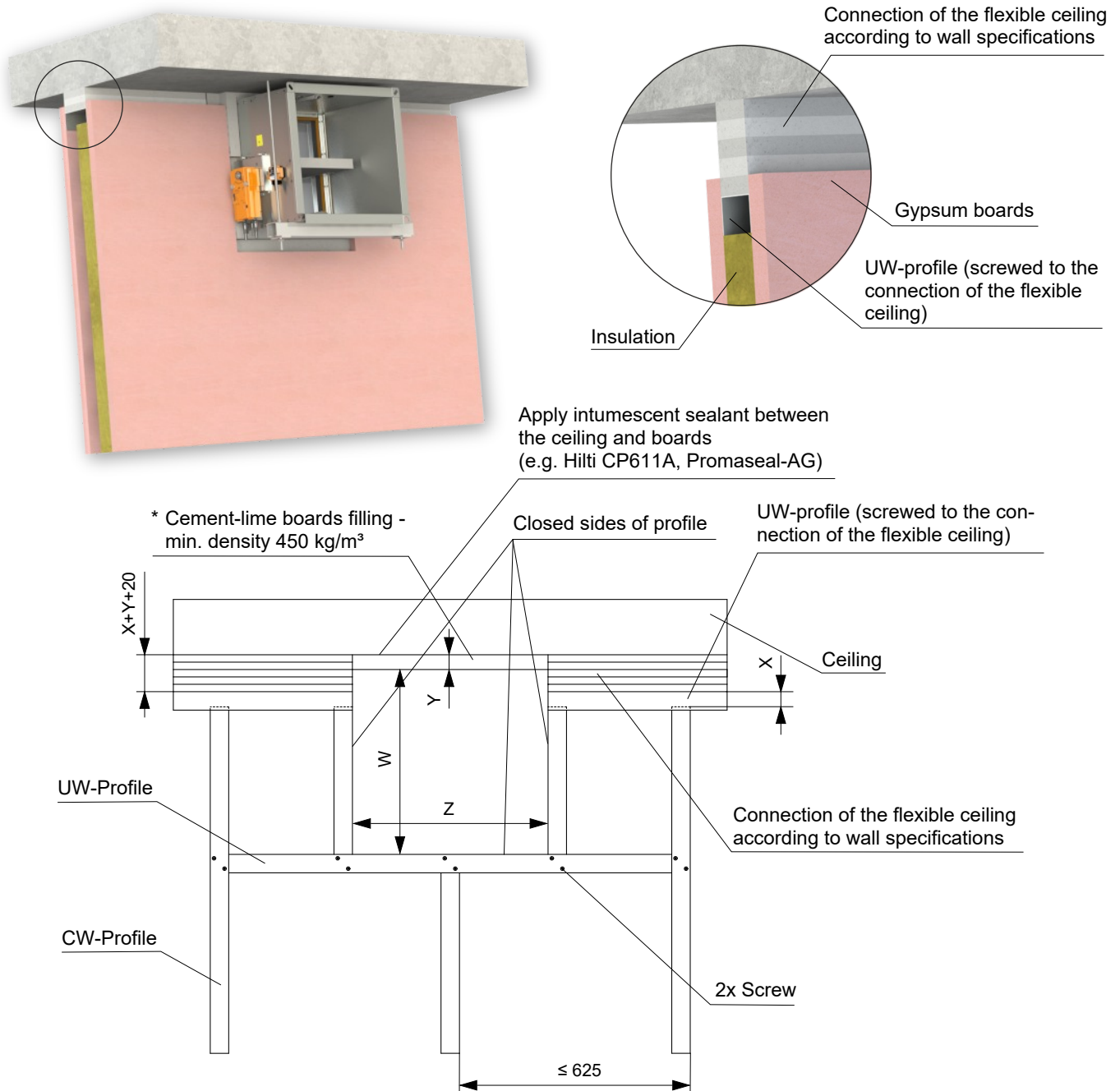


Installation frame	W [mm]	Z [mm]
E5	B + 190 + X	A + 189 + (2 x F)

- X = ceiling movement = 10 to 40 mm
- F = gap between frame (promaseal) and profile = 2 to 5 mm

Installation at a maximum distance of 80 mm from the ceiling**EI 90 (v_e i↔o) S**

- Detailed instructions for installation E5 frame → see manual
- For connection of following duct → see page 81
- Installation frame can be installed on the damper or delivered separately
- Gypsum construction must be made in accordance with the specifications of the wall system manufacturer



Installation frame	W [mm]	Z [mm]
E5	$B + 190 + X + Y$	$A + 189 + (2 \times F)$

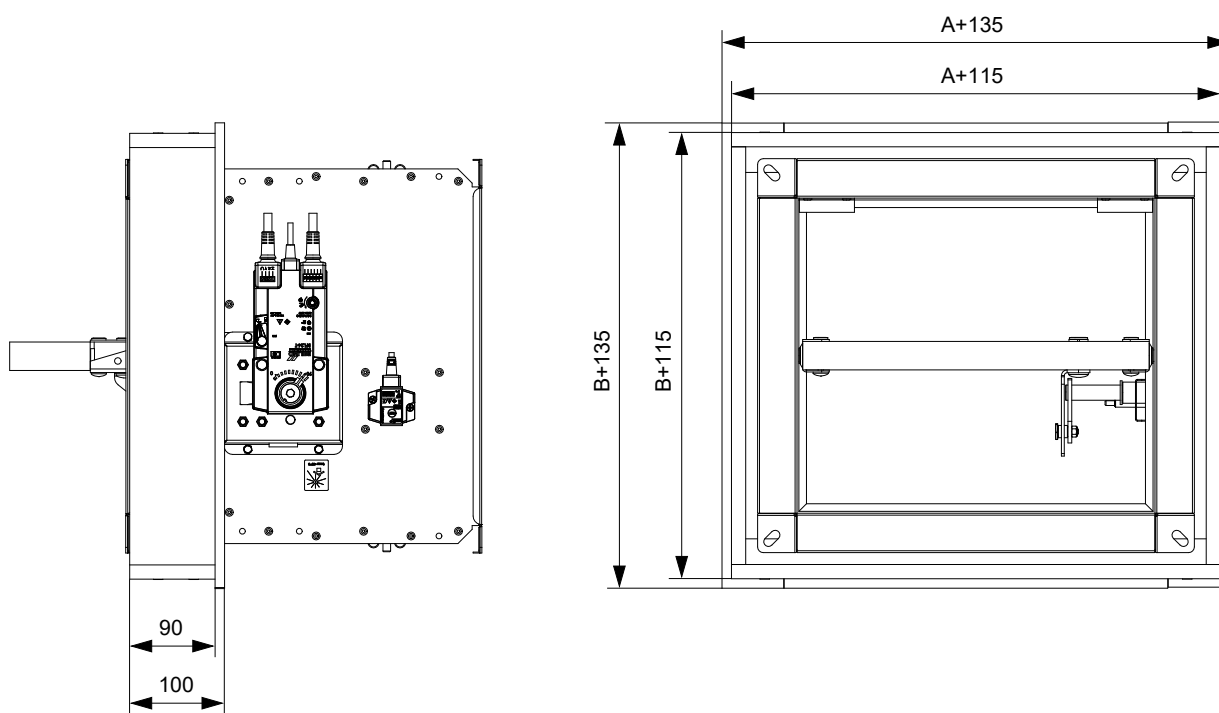
* Width of the boards for frame E5 = 100 mm

- X = ceiling movement = 10 to 40 mm
- Y = distance of frame from ceiling max. 80 mm
- F = gap between frame (promaseal) and profile = 2 to 5 mm

Installation frame E6

- Installation frame E6 is designed for installation without additional sealing of the penetration into:
 - Installation outside solid wall/ceiling construction with insulation from fire-resistant boards
- Installation frame is equipped with an intumescent sealing on the inside. This sealing fills the gap between the damper casing and frame in the event of a fire
- Material:
 - Installation frame - cement-lime boards
 - Fasteners - galvanized steel

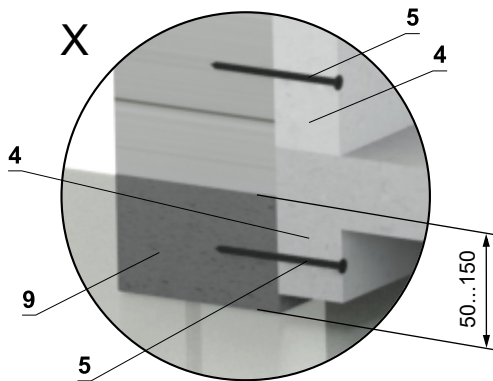
Installation frame E6



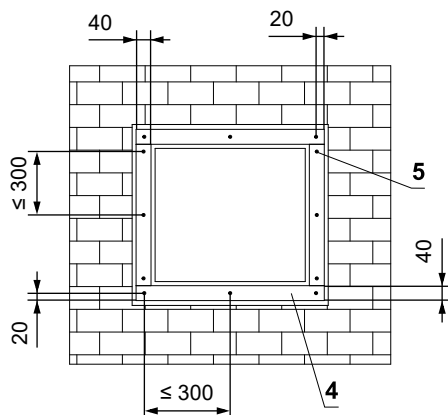
Outside solid wall construction - insulation from fire-resistant boards - mortar or gypsum - installation frame E6

EI 90 (v_e i↔o) S

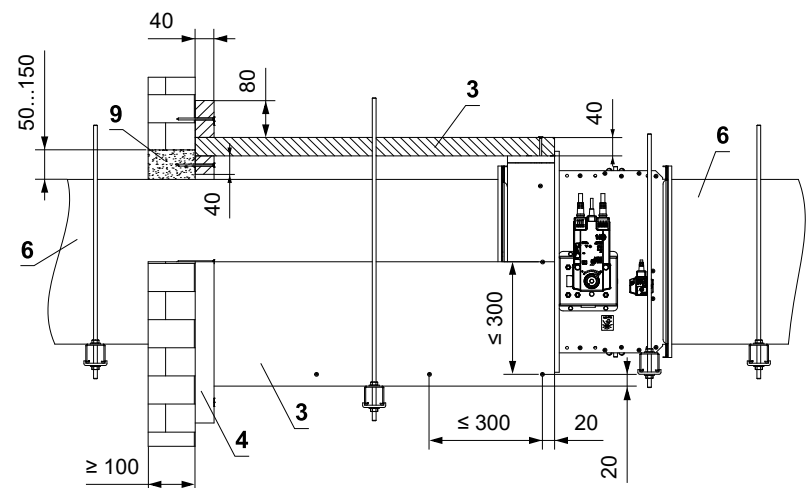
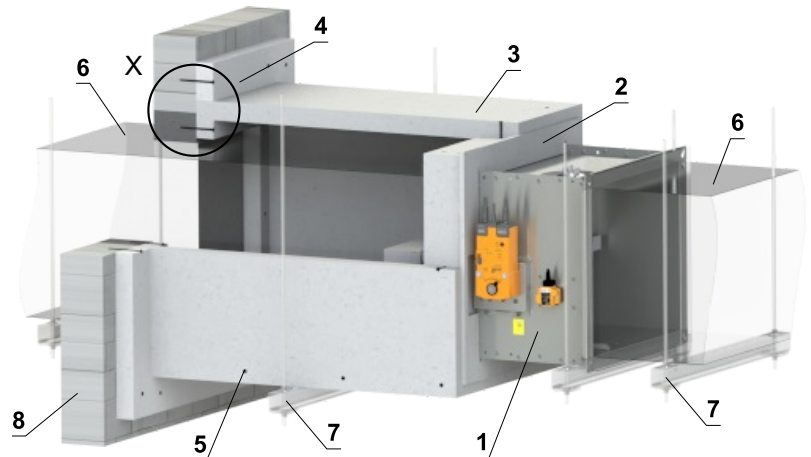
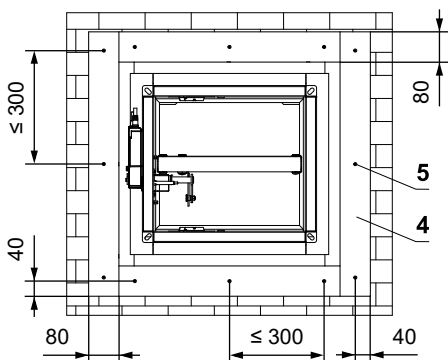
- For connection of following duct → see page 81
- Minimum and maximum distance between the wall and fire damper is unlimited
- Insulation must be suspended using threaded rods and mounting profiles or other mounting system, according to national standards
- Duct inside the insulation must be suitably supported. The insulation must be suspended at the point of the duct support using threaded rods and mounting profiles
- Load of the suspension system depends on weight of the fire damper, duct system and the insulation → see page 77
- Max. distance between two suspension systems is 1500 mm
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded
- Adjacent duct must be suspended or supported, as required by the duct suppliers
- Installation frame can be installed on the damper or delivered separately



Additional board of duct



Additional board of frame

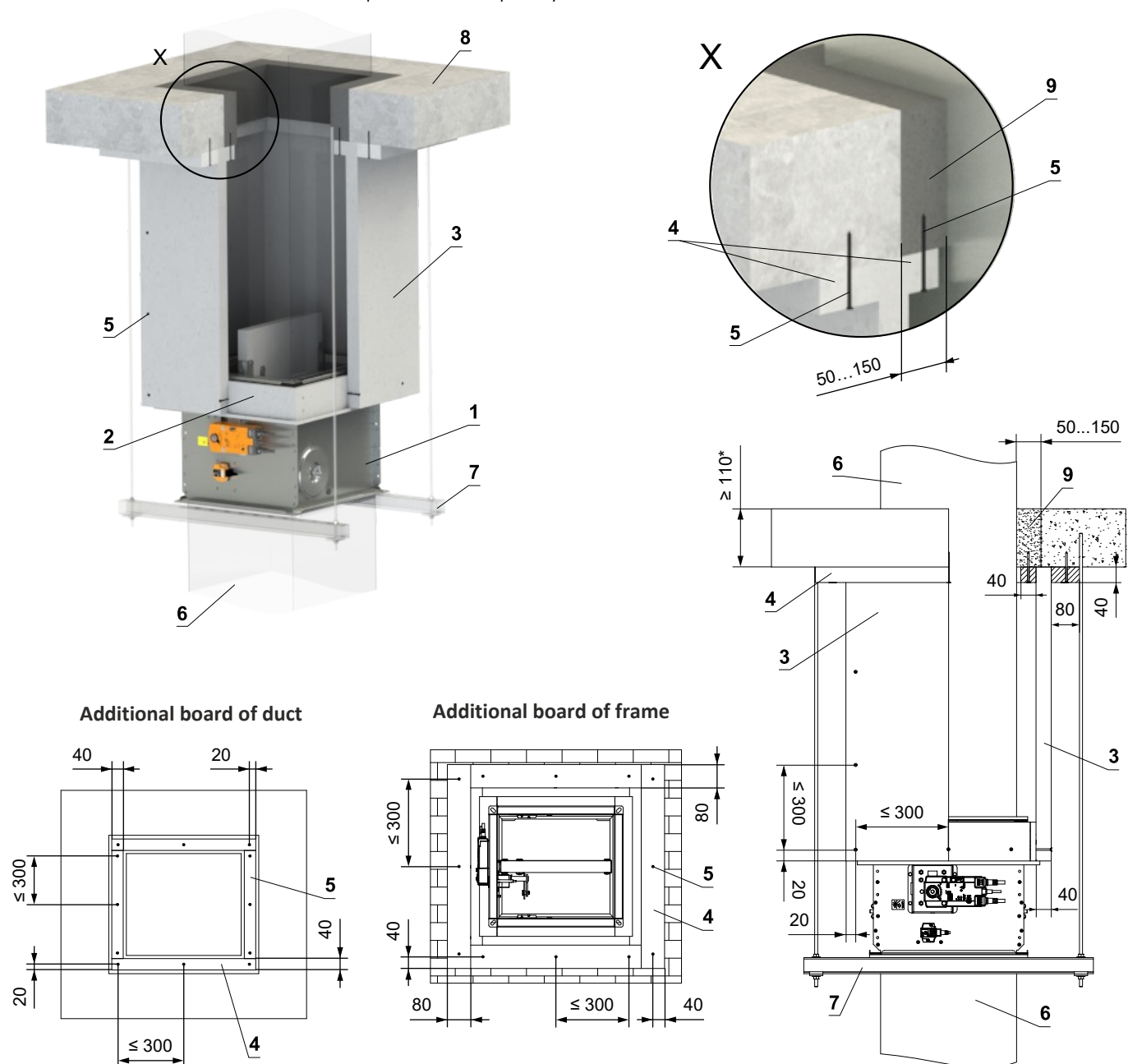


- | | |
|--|---|
| <p>1 FDMB</p> <p>2 Installation frame</p> <p>3 Insulation made of cement-lime board - min. thickness 40 mm, min. density 450 kg/m³ (e.g. PROMATECT-L). All parts are glued with glue Promat K84 and secured with screws 4x80 mm</p> <p>4 Additional board made of cement-lime board - min. thickness 40 mm, min. density 450 kg/m³ (e.g. PROMATECT-L). Apply HILTI CFS-S ACR mastic at the entire area and secure it with screws 4x80 mm</p> | <p>5 Screw 4x80 mm - screws must be firmly fixed in the wall construction, if necessary use steel anchors</p> <p>6 Standard air duct, made of galvanized sheet metal, thickness according to damper size</p> <p>7 Clamp with threaded rod → see pages 77 to 80</p> <p>8 Solid wall construction</p> <p>9 Mortar or gypsum</p> |
|--|---|

Outside solid ceiling construction - insulation from fire-resistant boards - mortar or gypsum - installation frame E6

EI 90 (h_o i↔o) S

- For connection of following duct → see page 81
- Minimum and maximum distance between the ceiling and fire damper is unlimited
- Insulation must be suspended using threaded rods and mounting profiles or other mounting system, according to national standards
- Load of the suspension system depends on weight of the fire damper, duct system and the insulation → see page 77
- Max. distance between two suspension systems is 1500 mm
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded
- Adjacent duct must be suspended or supported, as required by the duct suppliers
- Installation frame can be installed on the damper or delivered separately



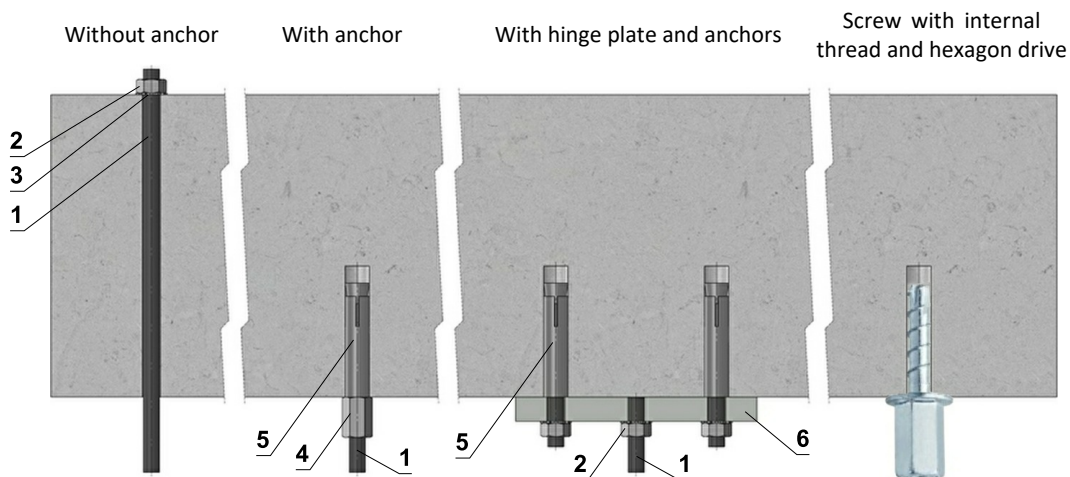
- | | |
|---|--|
| 1 FDMB | 5 Screw 4x80 mm - screws must be firmly fixed in the wall construction, if necessary use steel anchors |
| 2 Installation frame | 6 Standard air duct, made of galvanized sheet metal, thickness according to damper size |
| 3 Insulation made of cement-lime board - min. thickness 40 mm, min. density 450 kg/m ³ (e.g. PROMATECT-L). All parts are glued with glue Promat K84 and secured with screws 4x80 mm | 7 Clamp with threaded rod → see pages 77 to 80 |
| 4 Additional board made of cement-lime board - min. thickness 40 mm, min. density 450 kg/m ³ (e.g. PROMATECT-L). Apply HILTI CFS-S ACR mastic at the entire area and secure it with screws 4x80 mm | 8 Solid ceiling construction |
| | 9 Mortar or gypsum |

V. SUSPENSION SYSTEMS

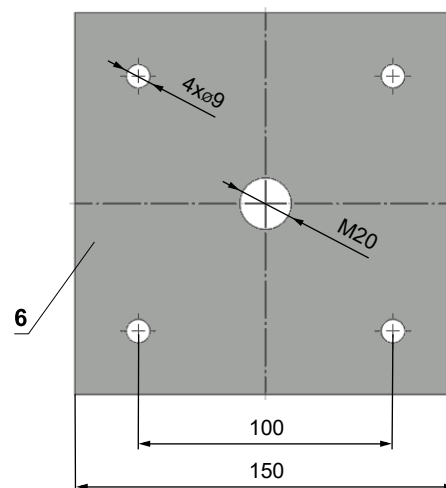
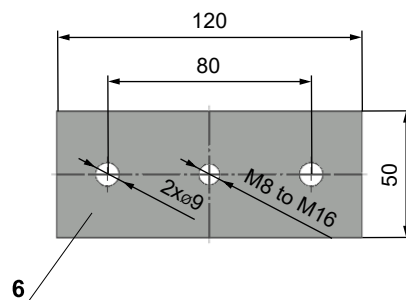
Mounting to the ceiling wall

- The dampers must be suspended using threaded rods and mounting profiles. Their dimensioning depend on the weight of the damper.
- The dampers and the duct must be suspended separately.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the damper flanges is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.
- Threaded rods longer than 1,5 m must be protected by fire insulation.

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



Hinge plates



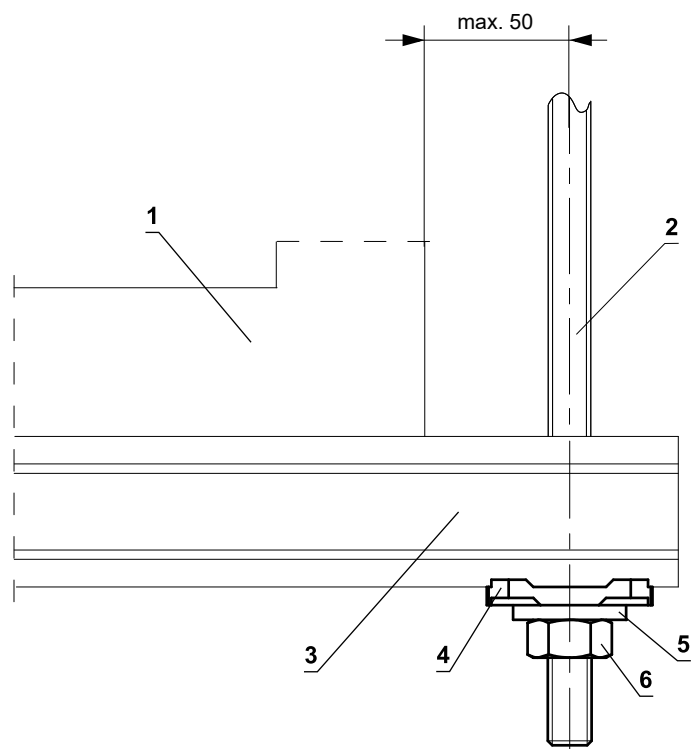
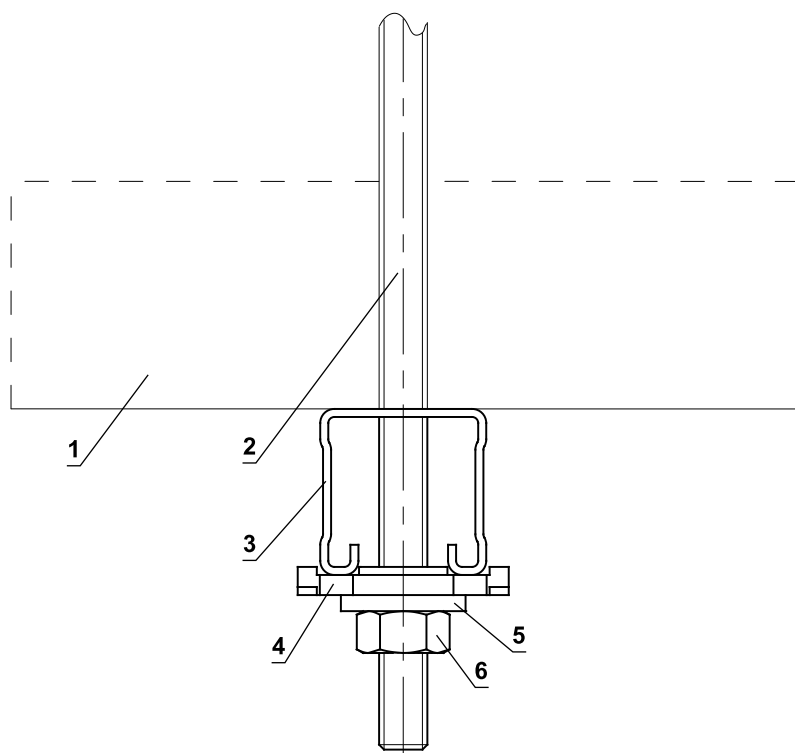
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

Load capacities of threaded rods at the required fire resistance 60 min. < t ≤ 120 min.

Size	As [mm²]	Weight [kg]	
		for 1 rod	for 2 rods
M8	36,6	22	44
M10	58	35	70
M12	84,3	52	104
M16	157	96	192
M18	192	117	234
M20	245	150	300

- 1 Threaded rod M8 - M20
- 2 Nut M8 - M20
- 3 Washer for M8 - M20
- 4 Coupling Nut M8 - M20
- 5 Anchor
- 6 Hinge plate - min. thickness 10 mm
- 7 Concrete screw tested for fire resistance R30-R90, max. Tension up to 0.75 KN (length 35 mm)

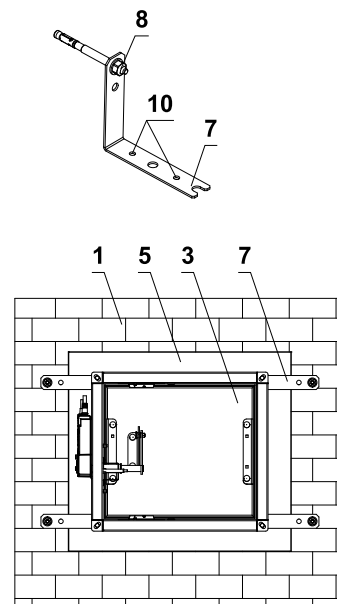
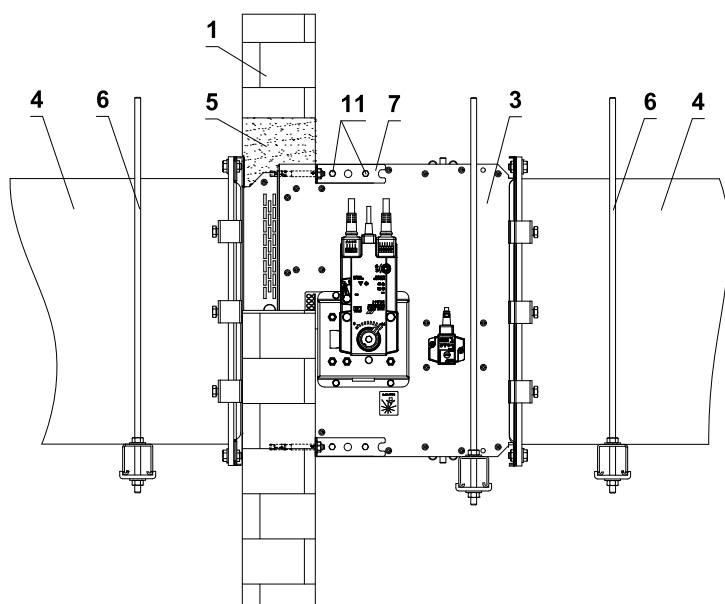
Example of placing of mounting profiles HILTI



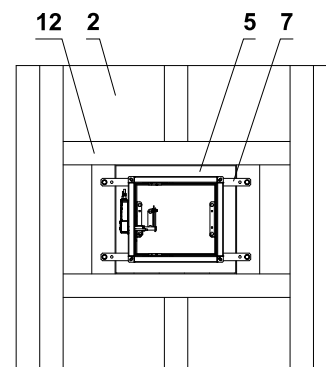
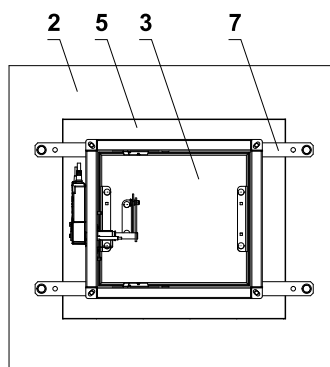
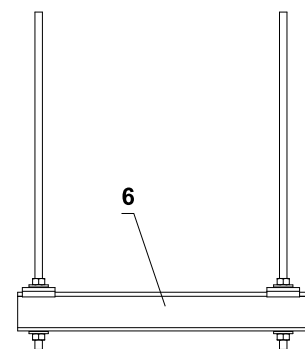
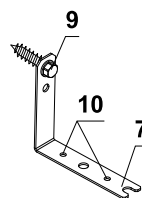
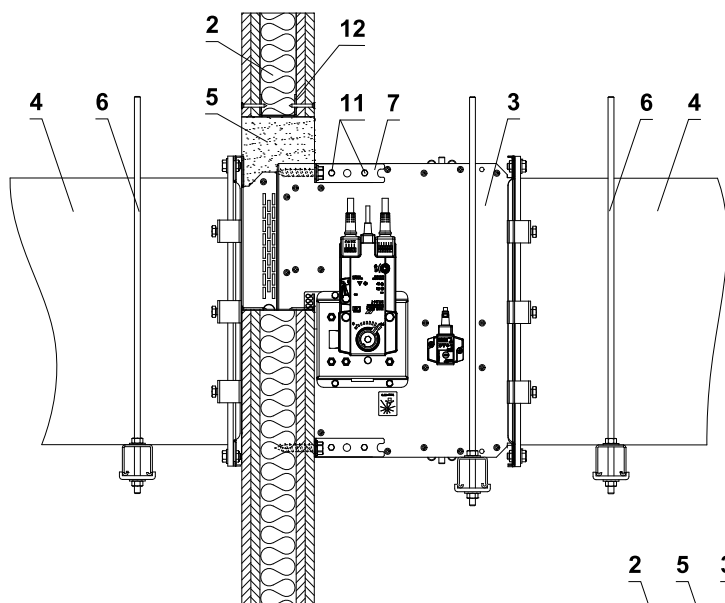
- 1 FDMB
- 2 Threaded rod M8 - M12
- 3 Support HILTI MQ-41 or MQ-41/3
- 4 Bored plate HILTI MQZ-L
- 5 Washer for M8 - M12
- 6 Nut M8 - M12

Example of fixing FDMB to the wall ceiling

In solid wall construction



In gypsum wall construction



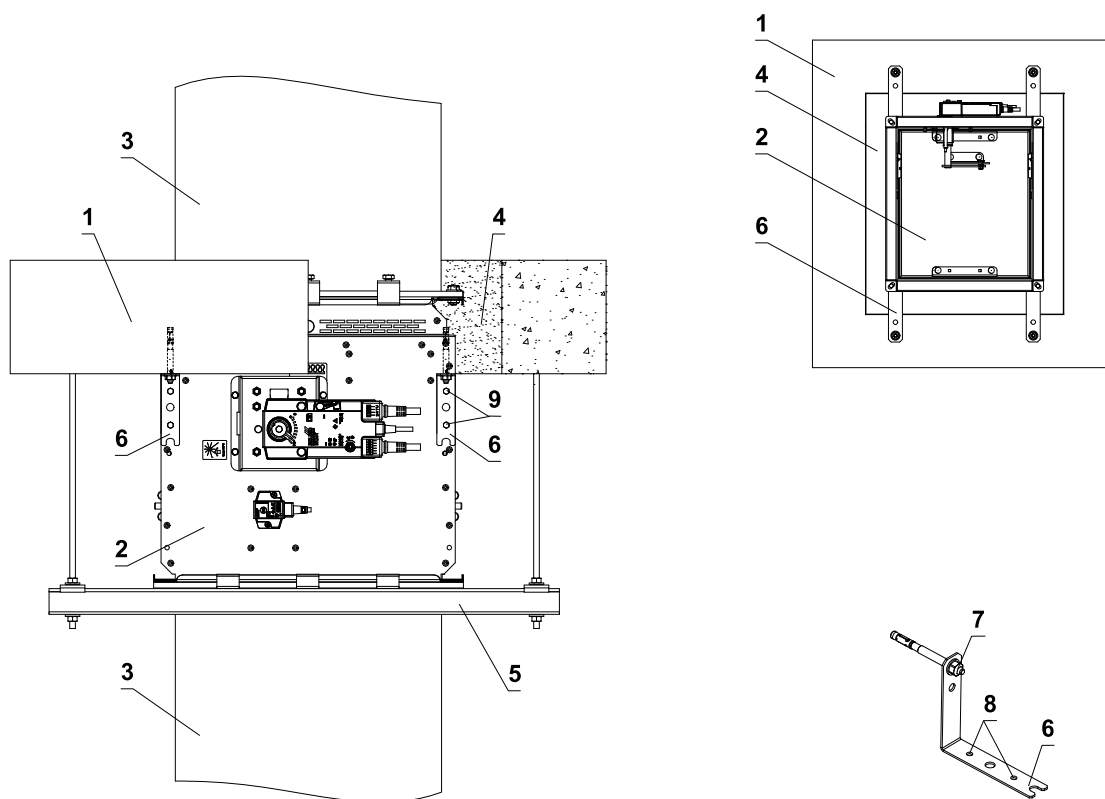
Grid from "U" profile

- 1 Solid wall construction
- 2 Gypsum wall construction
- 3 FDMB
- 4 Duct
- 5 Penetration
- 6 Profile with threaded rod → see page 78
- 7 Fixing element/steel bracket for fixing the damper to the wall (optional accessories from MANDÍK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
- 8 Nut M8 with anchor
- 9 Hexagon head screw
- 10 Installation holes
- 11 Screw assembly M6 (screw M6x10, nut M6)
- 12 Gypsum grid from "U" profile

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

Example of fixing FDMB to the ceiling

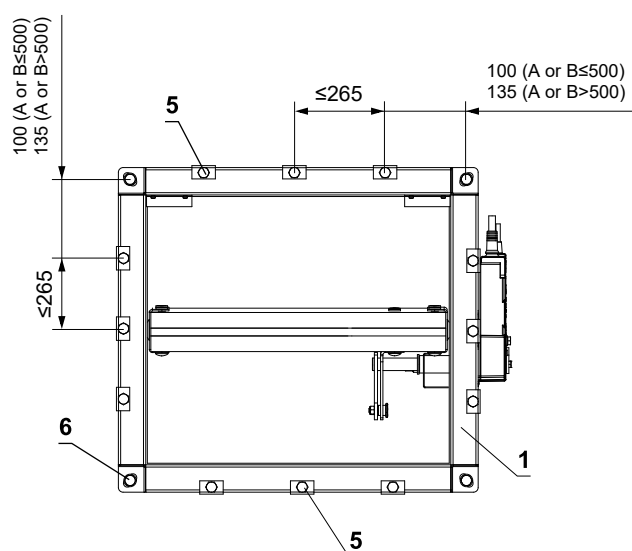
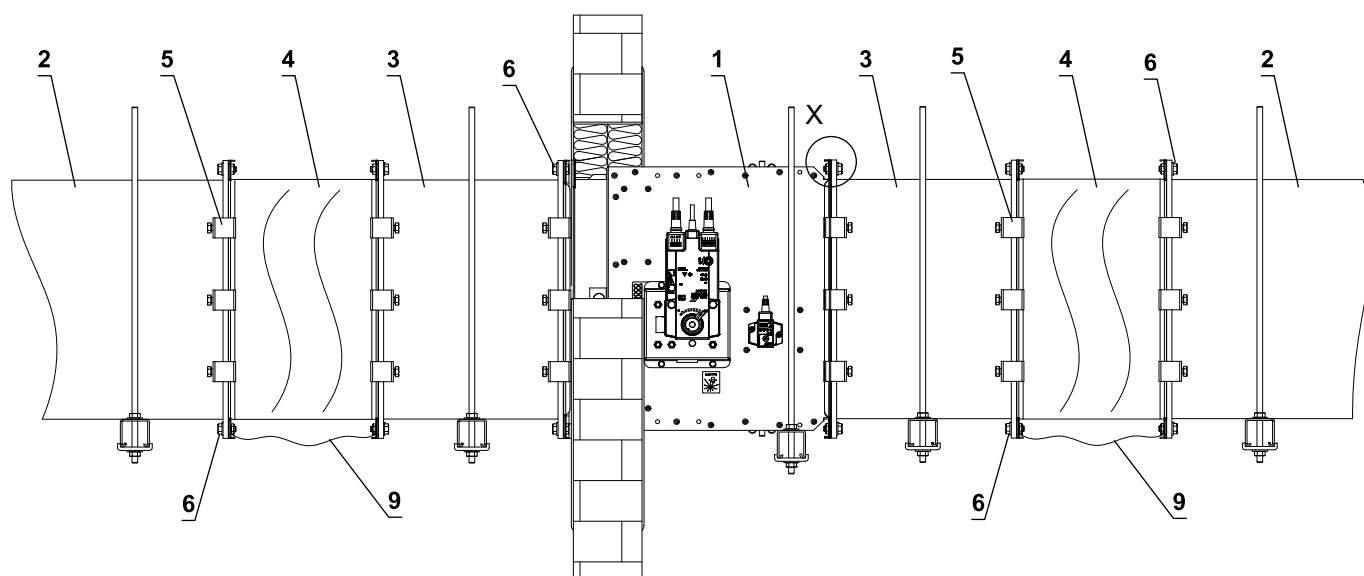
In solid ceiling construction



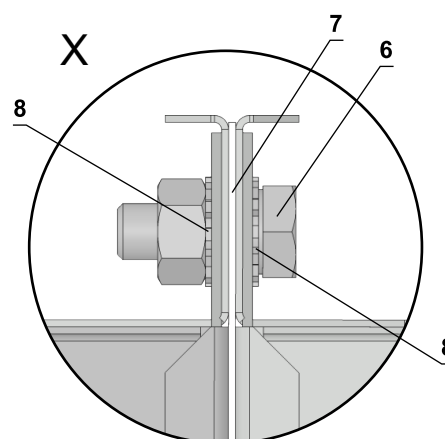
- 1 Solid ceiling construction
- 2 FDMB
- 3 Duct
- 4 Penetration
- 5 Profile with threaded rod → see page 78
- 6 Fixing element/steel bracket for fixing the damper to the wall (optional accessories from MANDÍK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
- 7 Nut M8 with anchor
- 8 Installation holes
- 9 Screw assembly M6 (screw M6x10, nut M6)

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

Example of duct connection



Electrically conductive connection



* at least one connection must be electrically conductive

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

VI. TECHNICAL DATA

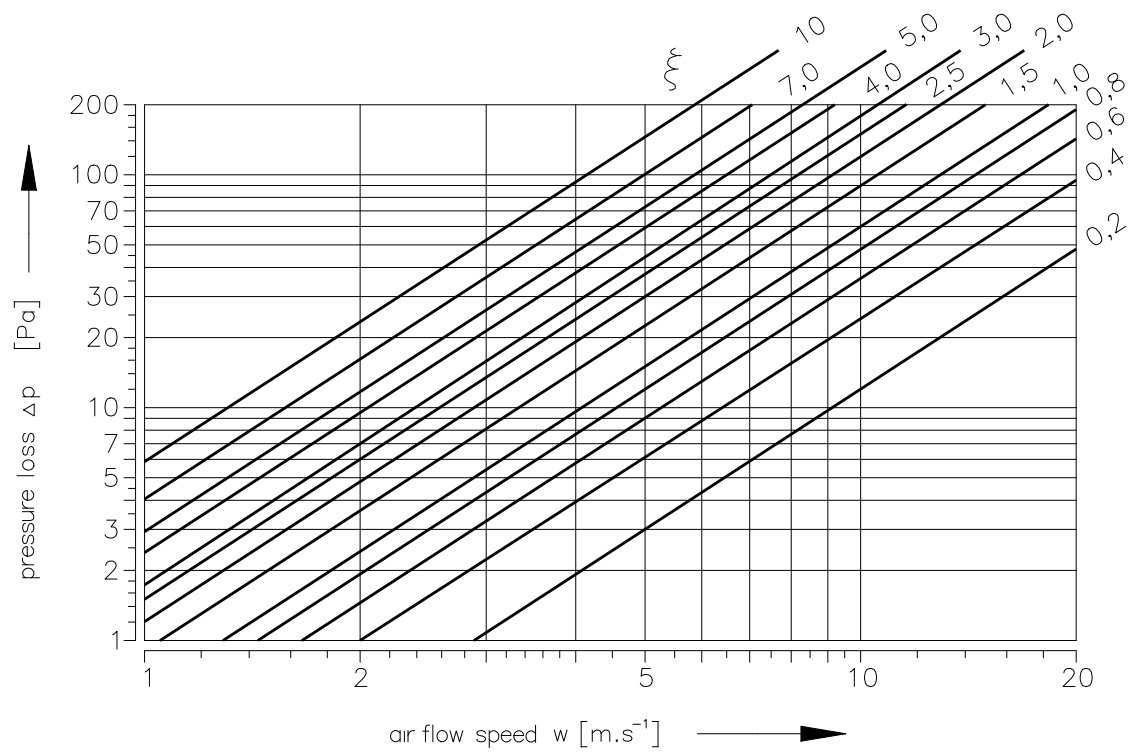
Pressure loss

Pressure loss calculation

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

Δp	[Pa]	pressure loss
w	[m/s]	air flow speed in nominal damper section
ρ	[kg/m³]	air density
ξ	[-]	coefficient of local pressure loss for the nominal damper section → see page 83

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



Coefficient of local pressure loss

	B													
A	100	110	125	140	150	160	180	200	225	250	280	300	315	355
100	19,025	15,910	11,370	7,983	6,374	5,264	2,959	2,962	2,162	1,548	1,399	–	–	–
110	15,690	12,678	9,499	6,910	5,576	4,528	2,743	2,649	1,978	1,459	1,299	–	–	–
125	11,247	9,984	7,440	5,444	4,529	3,773	2,461	2,208	1,744	1,327	1,163	–	–	–
140	8,673	7,669	5,933	4,489	3,755	3,195	2,204	1,893	1,552	1,217	1,044	–	–	–
150	7,408	6,620	5,144	4,007	3,388	2,899	2,091	1,728	1,443	1,160	0,985	–	–	–
160	6,659	5,813	4,748	3,683	3,129	4,771	3,458	2,717	2,285	1,813	1,538	1,407	1,327	1,165
180	4,528	4,270	3,630	3,000	2,644	4,102	3,251	2,351	2,016	1,676	1,342	1,221	1,136	0,986
200	4,490	4,170	3,466	2,807	2,446	3,701	2,951	2,105	1,867	1,554	1,302	1,113	1,052	0,933
225	4,220	3,969	3,379	2,767	2,431	3,654	2,873	2,056	1,726	1,475	1,226	1,067	1,029	0,917
250	4,120	3,904	3,306	2,744	2,405	3,588	2,793	2,005	1,675	1,386	1,155	1,033	0,987	0,893
280	3,520	3,404	3,005	2,551	2,266	3,411	2,692	1,975	1,599	1,341	1,123	0,986	0,916	0,822
300	3,307	3,225	2,876	2,457	2,189	3,288	2,599	1,903	1,536	1,315	1,101	0,974	0,911	0,787
315	3,219	3,139	2,760	2,338	2,072	3,102	2,454	1,833	1,489	1,289	0,988	0,933	0,833	0,721
355	2,914	2,842	2,550	2,195	1,963	2,955	2,302	1,796	1,412	1,199	0,956	0,902	0,799	0,678
400	3,291	3,125	2,665	2,196	1,926	2,833	2,159	1,703	1,356	1,126	0,931	0,825	0,711	0,635
450	–	–	2,690	2,176	1,884	2,732	2,055	1,623	1,302	1,103	0,852	0,777	0,677	0,599
500	–	–	2,590	2,110	1,836	2,670	1,988	1,587	1,251	1,025	0,796	0,725	0,618	0,529
550	–	–	1,976	1,885	1,731	4,219	2,941	2,237	1,687	1,402	1,156	1,039	0,968	0,827
560	–	–	1,978	1,884	1,727	4,194	2,922	2,222	1,623	1,392	1,147	1,031	0,910	0,820
600	–	–	–	1,841	1,696	4,104	2,857	2,170	1,573	1,357	1,117	1,004	0,935	0,797
630	–	–	–	1,828	1,682	4,046	2,814	2,137	1,553	1,334	1,098	0,986	0,918	0,782
650	–	–	–	1,814	1,670	4,010	2,788	2,116	1,526	1,320	1,086	0,975	0,908	0,773
700	–	–	–	–	1,664	3,975	2,759	2,098	1,515	1,297	1,071	0,965	0,892	0,761
710	–	–	–	–	1,645	3,918	2,720	2,062	1,496	1,284	1,055	0,947	0,881	0,749
750	–	–	–	–	1,630	3,865	2,682	2,032	1,475	1,264	1,037	0,931	0,866	0,736
800	–	–	–	–	1,612	3,808	2,640	1,999	1,445	1,241	1,018	0,913	0,849	0,721
900	–	–	–	–	–	3,715	2,572	1,946	1,414	1,205	0,988	0,885	0,822	0,697
1000	–	–	–	–	–	3,643	2,519	1,904	1,395	1,177	0,964	0,863	0,801	0,679

	B													
A	400	450	500	550	560	600	630	650	700	710	750	800	900	1000
100	–	–	–	–	–	–	–	–	–	–	–	–	–	–
110	–	–	–	–	–	–	–	–	–	–	–	–	–	–
125	–	–	–	–	–	–	–	–	–	–	–	–	–	–
140	–	–	–	–	–	–	–	–	–	–	–	–	–	–
150	–	–	–	–	–	–	–	–	–	–	–	–	–	–
160	1,040	2,025	1,874	1,761	1,741	1,672	1,627	1,601	1,598	1,532	1,493	1,452	1,386	1,336
180	0,922	1,676	1,548	1,451	1,434	1,375	1,337	1,315	1,289	1,256	1,224	1,180	1,133	1,090
200	0,801	1,445	1,332	1,246	1,232	1,179	1,146	1,126	1,106	1,074	1,046	1,015	0,965	0,928
225	0,781	1,239	1,172	1,075	1,035	0,998	0,965	0,938	0,926	0,905	0,873	0,856	0,822	0,803
250	0,736	1,113	1,021	0,952	0,940	0,898	0,871	0,855	0,831	0,813	0,790	0,765	0,725	0,695
280	0,713	0,996	0,912	0,849	0,880	0,800	0,775	0,760	0,742	0,722	0,701	0,678	0,641	0,613
300	0,692	0,937	0,857	0,797	0,786	0,750	0,726	0,712	0,689	0,675	0,655	0,633	0,599	0,572
315	0,634	0,900	0,822	0,764	0,754	0,718	0,695	0,681	0,662	0,646	0,626	0,605	0,572	0,546
355	0,588	0,821	0,749	0,694	0,685	0,651	0,630	0,617	0,603	0,584	0,566	0,546	0,514	0,490
400	0,527	0,757	0,689	0,637	0,628	0,597	0,577	0,565	0,543	0,534	0,516	0,498	0,468	0,445
450	0,507	0,705	0,640	0,591	0,583	0,553	0,534	0,522	0,503	0,493	0,476	0,458	0,430	0,408
500	0,460	0,666	0,603	0,556	0,548	0,520	0,501	0,490	0,482	0,462	0,446	0,429	0,401	0,380
550	0,719	0,635	0,575	0,529	0,521	0,494	0,476	0,465	0,441	0,437	0,422	0,405	0,379	–
560	0,713	0,630	0,570	0,524	0,517	0,489	0,471	0,461	0,448	0,433	0,418	0,401	–	–
600	0,692	0,611	0,552	0,507	0,500	0,473	0,455	0,445	0,426	0,418	0,403	0,387	–	–
630	0,678	0,598	0,540	0,496	0,489	0,462	0,445	0,435	0,418	0,408	0,393	–	–	–
650	0,670	0,590	0,533	0,490	0,482	0,456	0,439	0,428	0,414	0,402	0,387	–	–	–
700	0,656	0,581	0,527	0,483	0,476	0,444	0,431	0,421	0,409	0,398	–	–	–	–
710	0,648	0,571	0,515	0,472	0,465	0,439	0,422	0,412	0,399	–	–	–	–	–
750	0,636	0,560	0,504	0,462	0,455	0,429	0,413	0,403	–	–	–	–	–	–
800	0,623	0,547	0,493	0,451	0,444	0,419	–	–	–	–	–	–	–	–
900	0,602	0,528	0,474	0,434	–	–	–	–	–	–	–	–	–	–
1000	0,585	0,512	0,460	–	–	–	–	–	–	–	–	–	–	–

Noise data

Level of acoustic output corrected with filter A

$L_{WA} = L_{W1} + 10 \log(S) + K_A$

L_{WA}	[dB(A)]	level of acoustic output corrected with filter A
L_{W1}	[dB]	level of acoustic output L_{W1} related to the 1 m ² section
S	[m ²]	duct cross section
K_A	[dB]	correction to the weight filter A

Level of acoustic output in octave ranges

$L_{Woct} = L_{W1} + 10 \log(S) + L_{rel}$

L_{Woct}	[dB]	spectrum of acoustic output in octave range
L_{W1}	[dB]	level of acoustic output L_{W1} related to the 1 m ² section
S	[m ²]	duct cross section
L_{rel}	[dB]	relative level expressing the shape of the spectrum

Tables of acoustic values

Level of acoustic output L_{W1} [dB] related to the 1 m ² section															
	ξ [-]														
w [m/s]	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1	1,5	2	2,5	3	4	5
2	15,5	18,7	20,9	22,6	24	25,2	26,3	27,2	28	31,2	33,4	35,1	36,5	38,8	40,5
3	26,1	29,2	31,5	33,2	34,6	35,8	36,9	37,8	38,6	41,7	44	45,7	47,1	49,4	51,1
4	33,6	36,7	39	40,7	42,1	43,3	44,3	45,3	46,1	49,2	51,5	53,2	54,6	56,9	58,6
5	39,4	42,5	44,8	46,5	47,9	49,1	50,2	51,1	51,9	55	57,3	59	60,4	62,7	64,4
6	44,1	47,3	49,5	51,3	52,7	53,9	54,9	55,8	56,6	59,8	62	63,8	65,2	67,4	69,2
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	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	79,7
10	57,4	60,6	62,8	64,6	66	67,2	68,2	69,1	70	73,1	75,3	77,1	78,5	80,7	82,5
11	59,9	63,1	65,3	67,1	68,5	69,7	70,7	71,6	72,4	75,6	77,8	79,6	81	83,2	85
12	62,2	65,4	67,6	69,3	70,7	71,9	73	73,9	74,7	77,9	80,1	81,8	83,2	85,5	87,2

Correction to the weight filter A											
w [m/s]	2	3	4	5	6	7	8	9	10	11	12
K_A [dB]	-15	-11,8	-9,8	-8,4	-7,3	-6,4	-5,7	-5	-4,5	-4	-3,6

Relative level expressing the shape of the spectrum L_{rel}								
	f [Hz]							
w [m/s]	63	125	250	500	1000	2000	4000	8000
2	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9	-56,4
3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4	-48,9
4	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9
5	-4	-4,1	-5,9	-9,4	-14,6	-21,5	-30,0	-40,3
6	-4,2	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4
7	-4,5	-3,9	-4,9	-7,5	-11,9	-17,9	-25,7	-35,1
8	-4,9	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2
9	-5,2	-3,9	-4,3	-6,4	-10,1	-15,6	-22,7	-31,5
10	-5,5	-4	-4,1	-5,9	-9,4	-14,6	-21,5	-30
11	-5,9	-4,1	-4	-5,6	-8,9	-13,8	-20,4	-28,8
12	-6,2	-4,3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6

VII. MATERIAL, FINISHING

- Damper casings are made from galvanized sheet metal without further surface treatment.
- Damper blades are made from fire resistant asbestos free boards made of mineral fibres.
- Manual control have cover made of mechanically resistant and durable plastic and the other parts are galvanized without further surface treatment.
- Thermal fuses are made of sheet brass, thickness 0,5 mm.
- Fasteners and springs are galvanized.
- According to the customer's requirements, dampers can be made of stainless steel material.

Specifications for stainless-steel design:

- Class A2 – Food-grade stainless steel (AISI 304 – EN 1.4301)
- Class A4 – Chemistry-grade stainless steel (AISI 316, 316L – EN 1.4401, EN 1.4404)

The respective stainless steel is the material for all components that are located or entering the damper inner space; components outside the damper casing are typically from galvanised sheet metal (fasteners for mounting the actuator or manual control, mechanical components except Item 4), frame components.

The following components, including the fasteners, are made from stainless steel at all times:

- 1) Damper casing and all components permanently attached
- 2) Blade holders including pins, metal parts of blades
- 3) Control components inside the damper (L-profile, pin with lever, rod, fasteners)
- 4) Parts of a manual control entering the inner space of a damper casing (lower sheet of a manual control, lock holder "1", lock lever "2", closing spring, 8 dia. stopper pin, manual control pin)
- 5) Inspection opening cover including the stirrup and fasteners (if they are parts of the cover)
- 6) Bearing for torque transfer from the lever with pin on the blade L-profile (made from AISI 440C)

The damper blade is made from a board of homogeneous material Promatect-MST, thickness 30 mm.

Thermal fuse is identical for all material variants of the dampers. Upon specification by customer, the thermal fuse can be made from A4 from stainless steel sheet metal.

Thermoelectric activation device BAT is modified for stainless-steel variant of the dampers; standard galvanised screws are replaced with stainless-steel M4 screws of corresponding class. Damper casing has stainless-steel riveting M4 nuts.

Plastic, rubber and silicon components, sealants, foaming tapes, glass-ceramic seals, housings, brass bearings of the blade, actuators, and end switches are identical for all material variants of the dampers.

Some fasteners and components are only available in one class of stainless steel; the type will be used in all stainless-steel variants.

The damper blade in the variant for chemical environments (Class A4) is always treated with a coating of chemically resistant Promat SR.

Any other requirements for the design will be considered atypical and will be addressed on an individual basis.

VIII. TRANSPORTATION, STORAGE AND WARRANTY

Logistic terms

- Dampers are delivered on pallets. As standard, the dampers are wrapped in plastic foil for protection during transport and must not be used for long-term storage. Temperature changes during transport can cause condensation of water inside the packaging and thereby cause corrosion of materials used in the dampers (e.g. white corrosion on zinc-coated items or mould on calcium silicate). Therefore, it is necessary to remove the transport packaging immediately after unloading to allow air to circulate around the product.
- The dampers must be stored in clean, dry, well ventilated and dust-free environment out of direct sunlight. Ensure protection against moisture and extreme temperatures (minimum temperature +5°C). The dampers must be protected against mechanical and accidental damage prior to installation.
- Another required packaging system should be approved and agreed by manufacturer. Packaging material is not returnable in case that another packaging system (material) is required and used and it is not included into final price of damper.
- Dampers are transported by box freight vehicles without direct weather impact, there must not occur any shocks and ambient temperature must not exceed +50°C. Dampers must be protected against impact when transported and manipulated. During transportation, the damper blade must be in the "CLOSED" position.
- Dampers must be stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -30°C to +50°C and maximum relative humidity 95%.

Warranty

- The manufacturer provides a warranty of 24 months from the date of dispatch for the dampers.
- In case of using a Schischek actuator, the manufacturer provides a 12-month warranty for the actuator from the date of shipment.
- The warranty for fire dampers FDMB, provided by the manufacturer, is completely void if actuating, closing and control devices are unprofessionally handled by untrained workers or if electric components, i.e. limit switches, actuators, communication and supply devices and thermoelectric activation devices are dismantled.
- The warranty is void if dampers are used for other purposes, devices and working conditions than those allowed by these technical conditions or if the dampers are mechanically damaged during handling.
- If the dampers are damaged by transport, a record must be written down with the forwarder at reception for later complaint.

IX. ASSEMBLY, ATTENDANCE AND MAINTENANCE

- Assembly, maintenance and damper function check can be done only by qualified and trained person, i.e. "AUTHORIZED PERSON" according to the manufacturer documentation. All works done on the fire dampers must be done according international and local norms and laws.
- All effective safety standards and directives must be observed during damper assembly.
- To ensure reliable damper function it is necessary to avoid blocking the actuating mechanism and contact surfaces with collected dust, fibre and sticky materials and solvents.
- Flange and screw joints must be conductively connected to protect against dangerous contact. 2 galvanized lock washers that are placed under the head of one screw and a fastened nut are used for conductive connection.

Manual operation - actuator control without electric voltage

- A special wrench (part of the actuator) can be used to manually turn the damper blade to any position. When the wrench is turned in the direction of the arrow, the damper blade rotates to its open position. As the blade rotation is stopped, in every position, the actuator will be locked. Unlocking is possible even manually as per instructions on the actuator, or by the activation of the supply voltage.
- If the actuator is manually locked, the damper blade will not close in the event of a fire after the activation of the thermoelectric activation device BAT. To restore correct damper operation, the actuator must be unlocked (manually or by applying power supply).

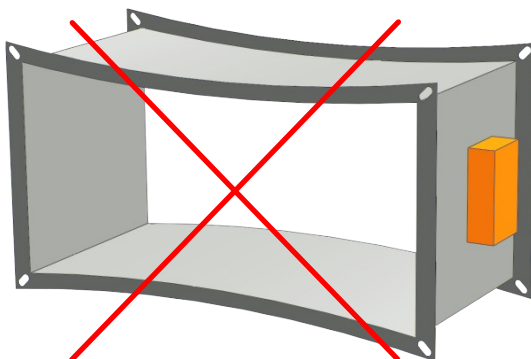
Limit switches

- If the damper is equipped with limit switches and these switches are not used during operation (e.g. because of a project change), they can be left on the damper and not connected (they need not be dismantled).
- On the other hand, if the limit switch is to be added to the damper design, the change can be implemented by change kit.
- These facts must be recorded in the respective operation documentation of the damper (record books of the damper, fire logs, etc.) and subsequently, adequate function checks must be carried out.

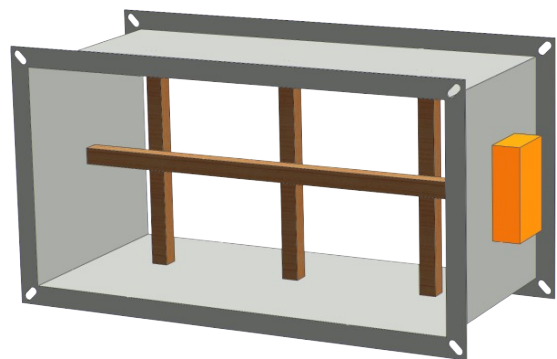
Installation / fixing the damper

- The damper casing shall not be deformed in the course of bricking in.
- Once the damper is built in, the damper blade shall not grind on the damper casing during opening or closing.

Protection of the damper casing against buckling during installation, especially for large sizes!

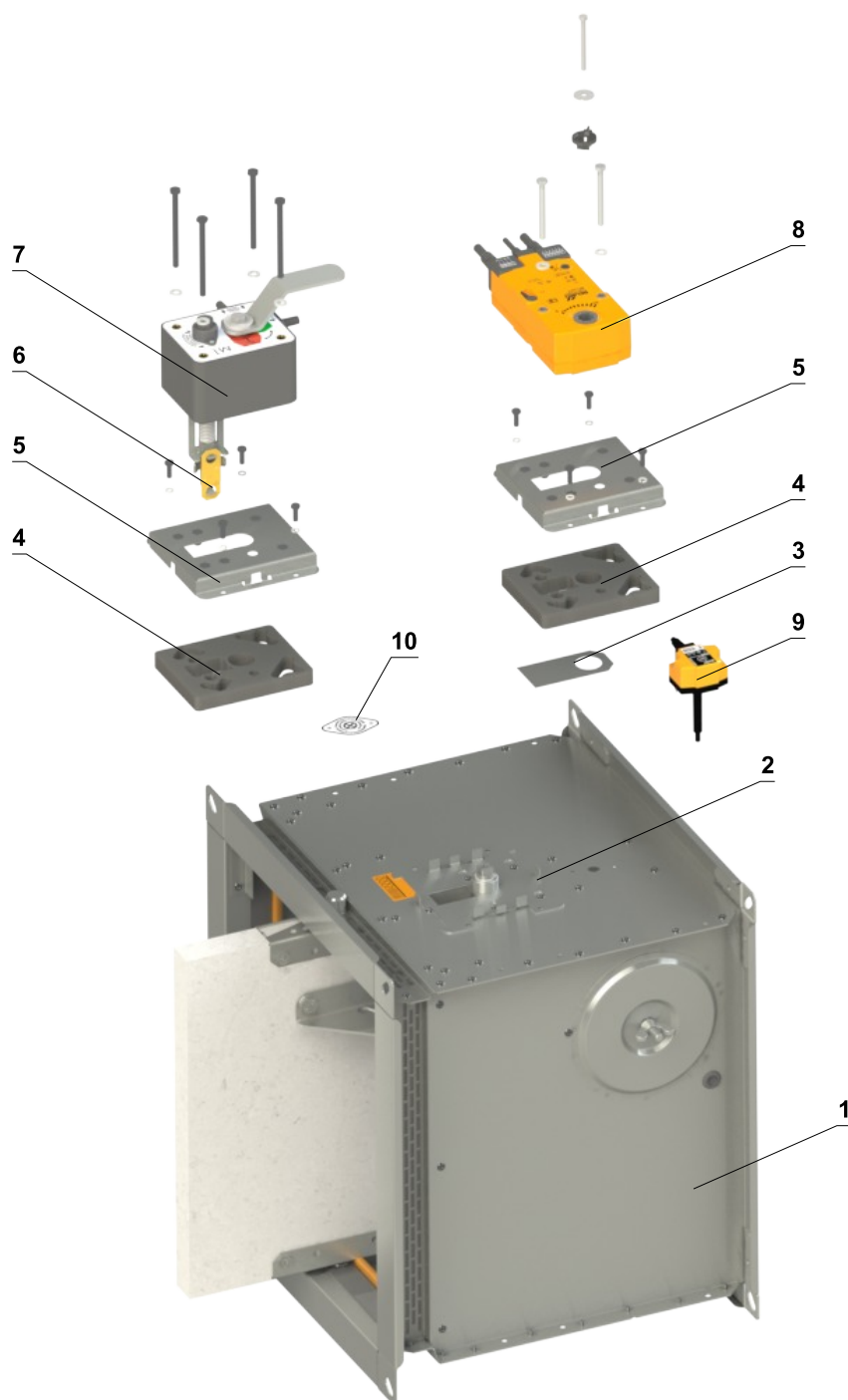


WRONG!



Reinforcement of the casing with wooden beams

Change of manual control for the actuator or vice versa

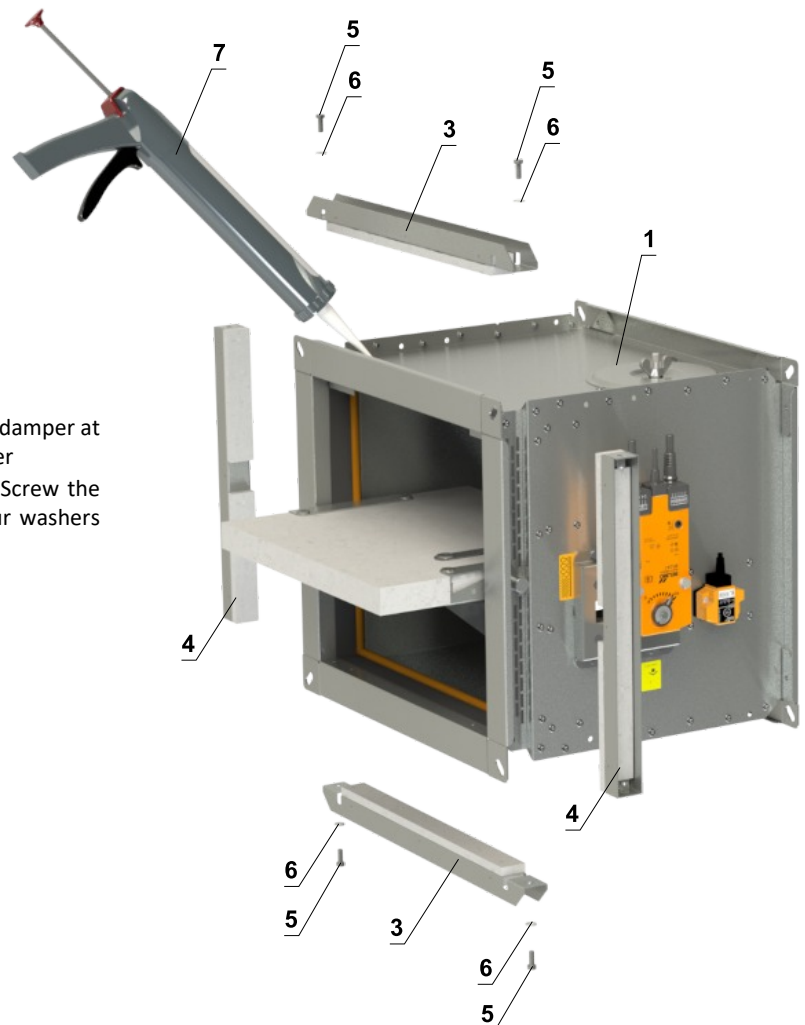
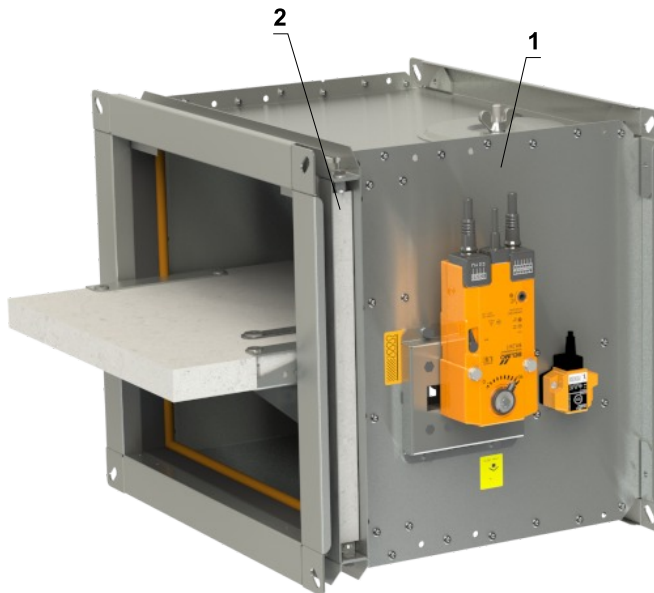


- | | |
|-------------------------------|--|
| 1 Damper | 6 Thermal fuse |
| 2 Mounting plate | 7 Manual control |
| 3 Sealing cover | 8 Spring return actuator |
| 4 Sealing of a mounting plate | 9 Thermoelectric activation device BAT |
| 5 Cover of a mounting plate | 10 Sensor sticker |

Reinforcing frame VRM-B

- If the damper is installed outside the fire separation construction with insulation from ROCKWOOL and fire resistance is $\geq$ EI 90 S, VRM-B reinforcement frame must be used.
- For lower fire resistance than EI 90 S, VRM-B reinforcement frame is not necessary!
- Glue K84 is not included in the package

Fixing of reinforcing frame VRM-B to the damper casing



Installation procedure

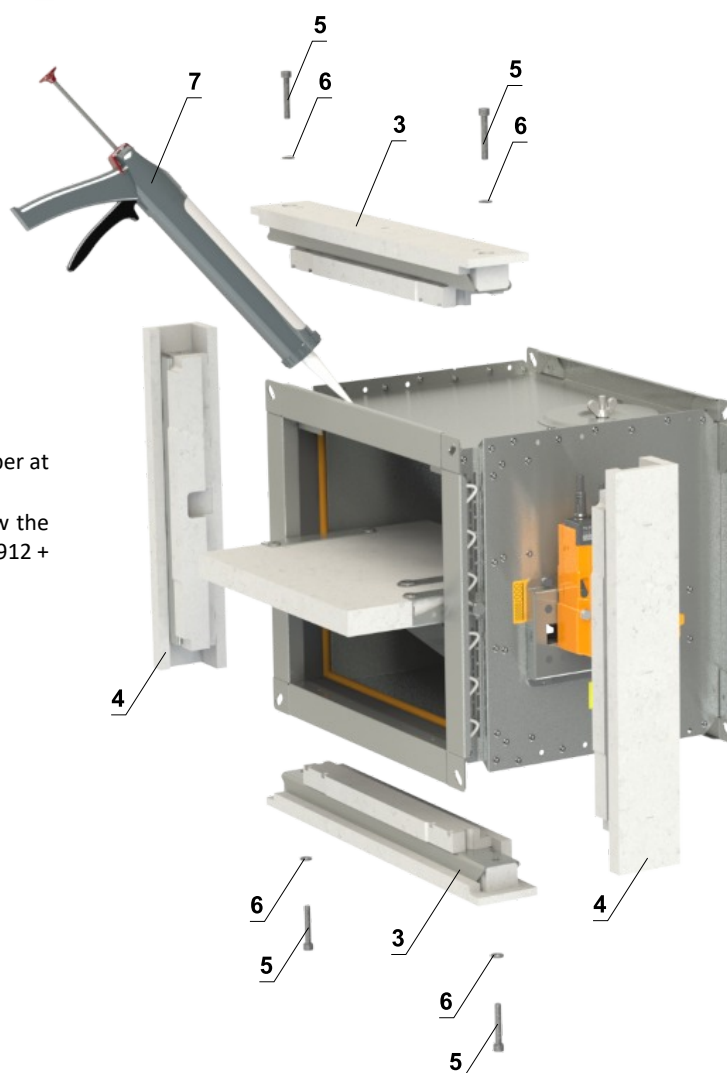
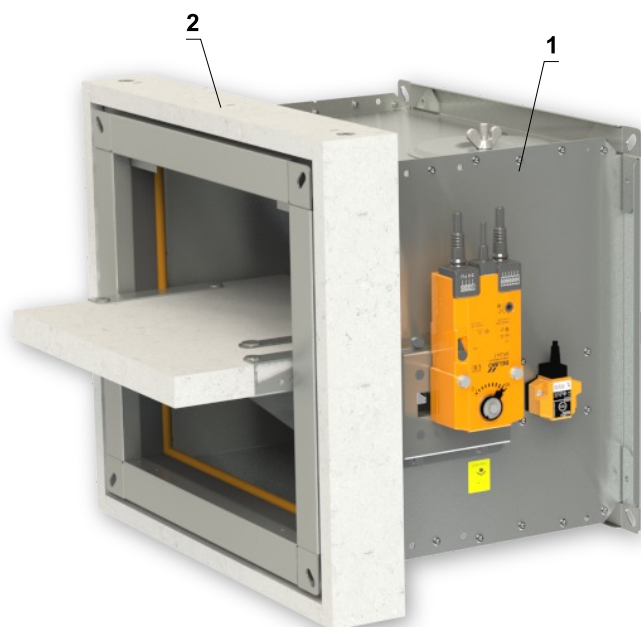
- 1) Apply glue PROMAT K-84 on the entire surface of the damper at the place of perforation on all four sides of the damper
- 2) Attach parts A and B of the VRM-B to the damper. Screw the parts together using four M6x16 mm DIN 933 + four washers M6/6,4 DIN 7349.

- 1 FDMB
- 2 VRM-B
- 3 Part A of VRM-B
- 4 Part B of VRM-B
- 5 Hexagon socket bolt M6x16 mm DIN 933
- 6 Washer M6/6,4 DIN 7349
- 7 Glue PROMAT K-84

Reinforcing frame VRM2-B

- If the damper is installed outside the fire separation construction with insulation from ISOVER and fire resistance is $\geq$ EI 90 S, VRM2-B reinforcement frame must be used.
- For lower fire resistance than EI 90 S, VRM2-B reinforcement frame is not necessary!
- Glue K84 is not included in the package

Fixing of reinforcing frame VRM2-B to the damper casing



Installation procedure

- 1) Apply glue PROMAT K-84 on the entire surface of the damper at the place of perforation on all four sides of the damper
- 2) Attach parts A and B of the VRM2-B to the damper. Screw the parts together using four M8x50 hexagon socket bolts DIN 912 + four M8 washers DIN 7349.

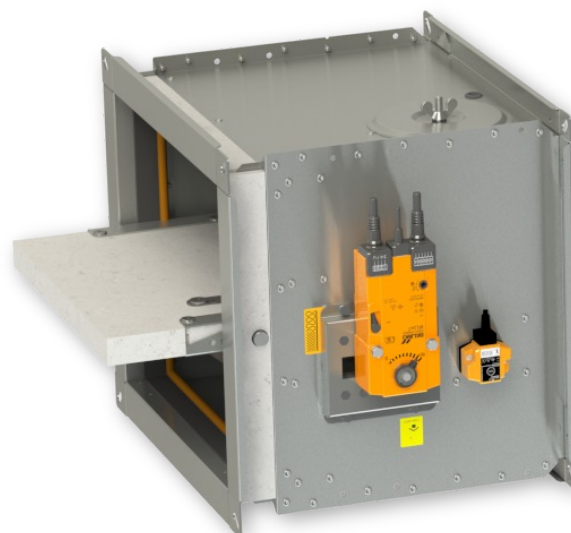
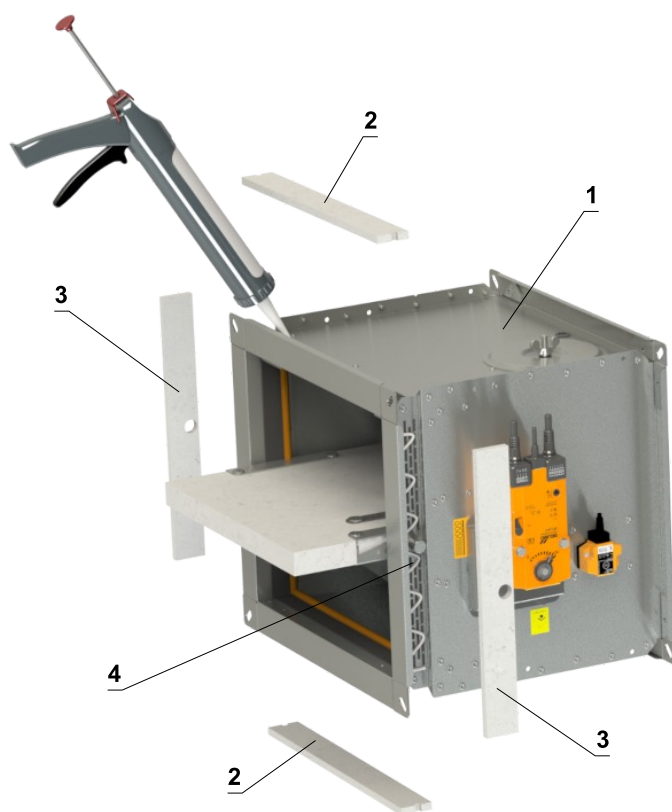
- 1 FDMB
- 2 VRM2-B
- 3 Part A of VRM2-B
- 4 Part B of VRM2-B
- 5 Hexagon socket bolt M8x50 DIN 912
- 6 Washer M8/8,4 DIN 7349
- 7 Glue PROMAT K-84

Protective cladding boards

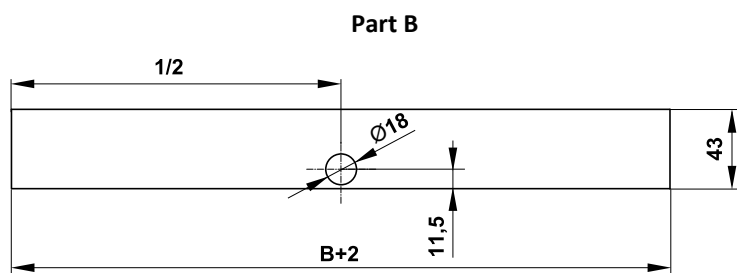
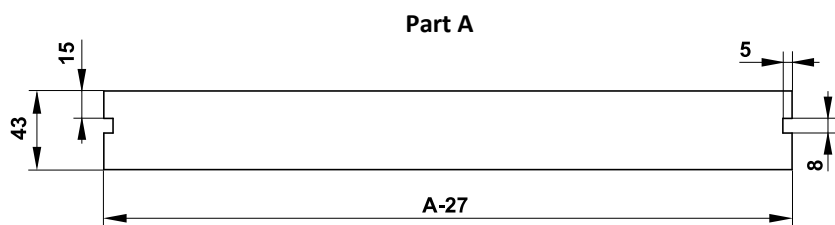
- Protective cladding boards must be used as part of the penetration filling of installation with ablative coated batt
- Can be ordered from MANDIK (installed on the damper or as an accessory) or can be sourced from local supplier
- If protective cladding boards are required, this must be specified in the ordering key
- Boards are made of PROMATECT-H, thickness 10 or 15 mm according to the damper size
- Glue K84 is not included in the package

Installation procedure

- 1) Apply K84 glue over the entire surface
- 2) Attach protective cladding boards to the damper and glue them to the casing



- 1 FDMB
- 2 Part A
- 3 Part B
- 4 Glue K-84 PROMAT



- Thickness of protective cladding boards according to the damper size:
- for $A \times B \leq 500 \times 400$, thickness 10 mm
- for $A \times B > 500 \times 400$, thickness 15 mm

Commissioning and revisions

- Before putting the damper into operation, serviceability checks and functional tests must be carried out including testing of functionality of all electrical elements. After putting into operation these serviceability checks must be carried out at least twice a year. If no defect is found during two subsequent serviceability checks, these checks can be carried out once a year.
- In case that dampers are found unable to serve for their function for any cause, it must be clearly marked. The operator is obliged to ensure that the damper is put into condition in which it is ready for function and meanwhile he is obliged to provide the fire protection by another appropriate way.
- Results of regular checks, imperfections found and all important facts connected with the damper function must be recorded in the "FIRE BOOK" and immediately reported to the operator.
- Before entering the dampers with actuator into operation after their assembly and by sequential checks. Check of blade rotation into the breakdown position "CLOSED" can be done after disconnecting the actuator supply (e.g. by pressing the test button at the thermoelectric activation device BAT or disconnecting the supply from ELECTRICAL FIRE SIGNALISATION). Check of blade rotation back into the "OPEN" position can be done after restoration of power supply (e.g. by releasing the test button or restoration of supply from ELECTRICAL FIRE SIGNALISATION). Without power supply, the damper can be operated manually and fixed in any required position. Release of the locking mechanism can be achieved manually or automatically by applying the supply voltage. It is recommended to provide periodical checks, maintenance and service actions on fire equipment by authorized persons. The authorized persons can be trained by producer, or by authorized distributor. All effective safety standards and directives must be observed during fire damper assembly.
- Visual inspection of proper damper installation, inner area of a damper, damper blade, contact surfaces and silicon seal.
- For regular or exceptional inspection of interior of fire damper, micro-camera device can be used. On each fire damper is an inspection opening. In the case of inspection by camera, take out the black rubber cap, insert the camera inside the damper, check interior and at the end of inspection, put the rubber cap back tightly to cover the empty hole.

Following checks must be carried out for dampers with manual control

Check of a manual control and thermal fuse

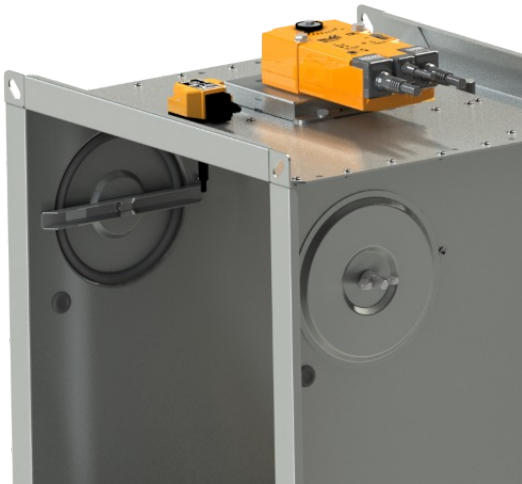
- **To check the function of the manual control proceed as follows:**
- Turn the damper blade to "CLOSED" position as follows:
 - The damper blade is in "OPEN" position.
 - Press the control button of the manual control to turn the damper blade to "CLOSED" position.
 - Check the damper blade rotation to "CLOSED" position.
 - Damper blade closing shall be smooth and fast, the control lever shall be in „CLOSED“ position.
- Turn the damper blade to "OPEN" position as follows:
 - Turn the control lever by 90°.
 - Check the damper blade rotation to "OPEN" position.
 - The lever will automatically lock in "OPEN" position.
- **Check of function and condition of the thermal fuse:**
 - To check the function and the status of the fuse it's possible to remove the manual control from the casing of the fire damper which is attached to the damper casing with four screws M6.
 - Removing the thermal fuse from the fuse holder of a manual control, checks its correct functionality.
 - The manual control is identified as M1 to M3, depending on the closing spring strength.

Following checks must be carried out for dampers with actuator

- Check the rotation of the blade to "CLOSED" failure position after disconnection the power supply of the actuator (e.g. by pressing the test button on the thermoelectric activation device BAT or by disconnection the power supply from electrical fire signalization). Check the rotation of the blade back to "OPEN" position by restoring the power supply to the actuator (e.g. by releasing the test button or by restoring the power supply from electrical fire signalization).

Following checks must be carried out for dampers with optical smoke detector

- The function checks of the optical smoke detector are to be carried out by employees of an authorized organization who have corresponding electrotechnical qualification and have been properly trained by the manufacturer. The function checks are to be carried out as a part of function checks of the fire dampers, at least 1x a year.
- For the function checks, the damper blade should be in "CLOSED" position with the fan off or with closed air regulation situated between the fan and the fire damper.
- Inspection opening disassembly
 - Release the covering lid by turning the wing nut and while turning the lid right or left release it from the security belt. Then tilt the lid and remove it from its original position.



Inspection opening detail

- Ensure each damper is fully checked for operational capability, control should be initiated from the control system or by manual control. Damper blades should open and close correctly and operation should be visually inspected and documented prior to handover.

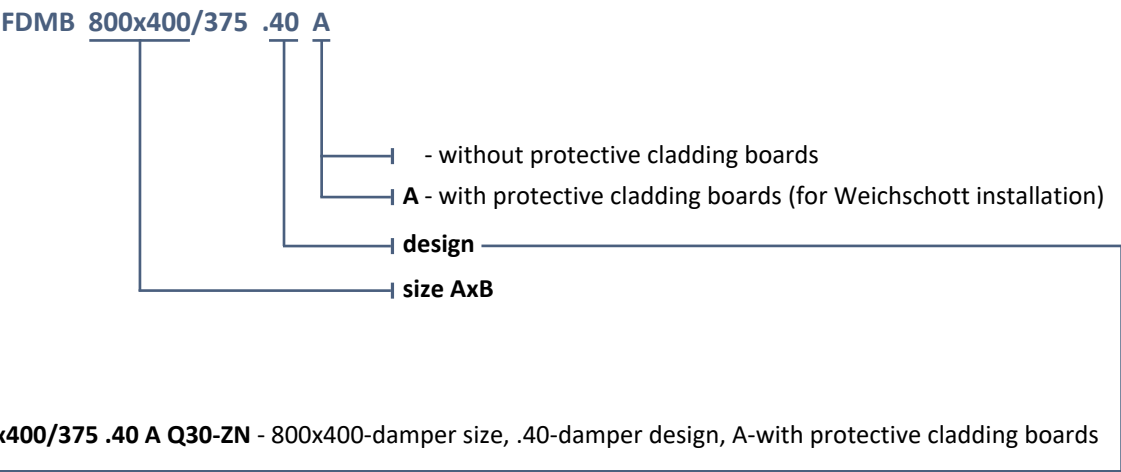
How to proceed after Tf1 or Tf2 fuses have been activated

- If the thermal fuse **Tf1** is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. → [see page 10](#)
- If the thermal fuse **Tf2** is interrupted (due to temperature inside the duct) , only the spare part ZBAT 72 (95/120/140) needs to be replaced (acc.to the activation temperature). → [see page 10](#)

X. ORDERING INFORMATIONS

Ordering key

Fire damper



Damper design	Additional digit
Manual control and thermal	.01
Manual control and thermal (Zone 1,2)	.02
Manual control and thermal with a terminal switch („CLOSED“)	.11
Manual control and thermal with a terminal switch („CLOSED“) (Zone 1,2)	.12
Manual control and thermal with two terminal switches („OPEN“, „CLOSED“)	.80
Manual control and thermal with two terminal switches („OPEN“, „CLOSED“) (Zone 1,2)	.81
With actuator BF 230-TN (BFL, BFN 230-T) - voltage AC 230 V	.40
With actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K and with supply device BKN 230-24-MOD (voltage AC 230 V)*	.41
With actuator ExMax-15-BF, with thermoelectric activation device ExPro-TT (Zone 1,2) - supply voltage range 24 to 230 VAC/DC	.42
With actuator BF 24-TN (BFL, BFN 24-T) - voltage AC/DC 24 V	.50
With actuator 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 actuator BF 24-TN-ST (BFL, BFN 24-T-ST)	.60
With communication and supply device BKN 230-24-C-MP, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST)	.61
With communication and supply device BKN 230-24-C-MP, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST) and with smoke detector ORS 142 K*	.61S
With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST)	.63
With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST) and with smoke detector ORS 142 K*	.63S

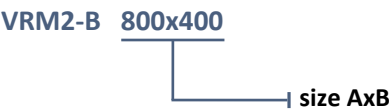
- * For sizes A<160 mm or B<160 mm, the optical smoke detector ORS 142 K is not part of the fire damper and is supplied separately.
- If dampers with installation frame are required, that must be specified separately in the order. The installation frame can be installed on the damper or delivered separately.
 - Detailed information for ATEX dampers (ZONE 1,2) → see Appendix

Accessories

Reinforcing frame VRM-B



Reinforcing frame VRM2-B



Protective cladding boards



Data label

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

MANDÍK®

MANDÍK, a.s.
Dobříšská 550, 267 24 Hostomice, Czech Republic

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


1391

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