NORDfire

FDMQ Fire Damper

- Square dampers from 150×150 mm to 1500×800 mm
- CE certified acc. to EN 15650
- Fire resistance up to EIS 90
- External casing leakage class C, Internal leakage class 2 acc. to EN 1751
- Manual or electrical

ETS NORD

Contents

1. General

1.1 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.

Fig. 1. FDMQ with spring return actuator

Fig. 2. FDMQ with manual control

1.2 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 class C, Internal leakage class 2 acc. to EN 1751
- Cycling test in class C_{10000} acc. to EN 15650
- Corrosion resistant acc. to EN 15650
- Certificate of conformity of performance No. 1391-CPR-2024/0009
- Declaration of Performance No. PM/FDMQ/01/24/1
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

1.3 Working conditions

Exact damper function is provided under the following conditions:

- maximum air circulation speed: 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.

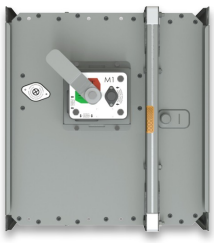
2. Design

2.1 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).

Fig. 3. Design .01



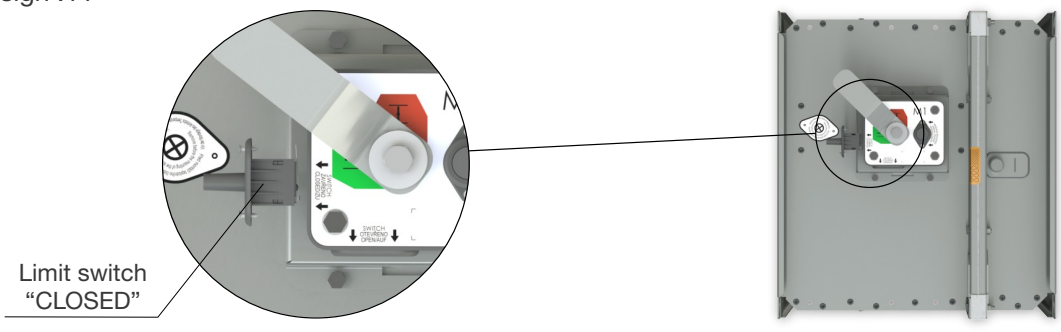
ATTENTION:

Manual controls are produced in five sizes M1 to M5, 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 Tab. 5. 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 details, see page 5.

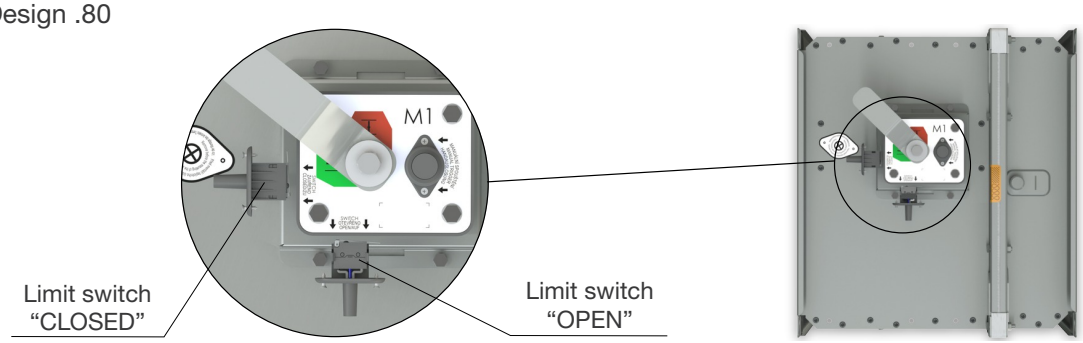
Fig. 4. Design .11



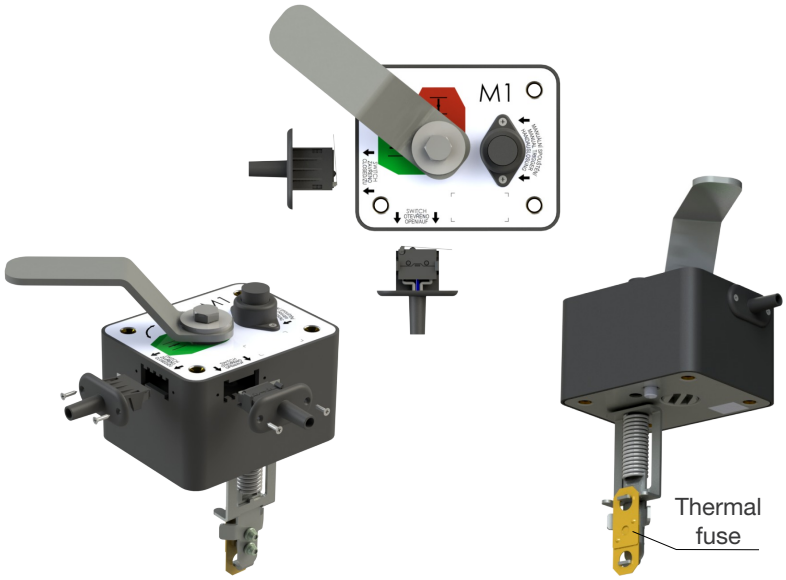
Design .80

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.

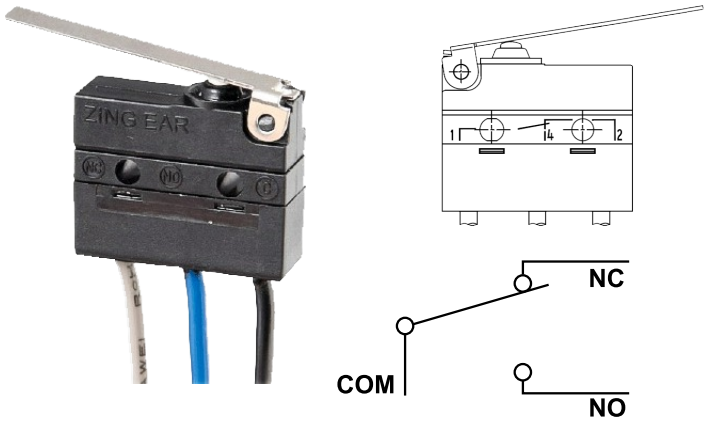
Fig. 5. Design .80



Manual control



Limit switch G905-300E03W1



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

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

This limit switch is possible to connect in two following ways

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

2.2 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 prestretches its return spring.

When the actuator is power supplied, the damper blade is in the position “OPEN” and the return spring is prestretched.

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”.

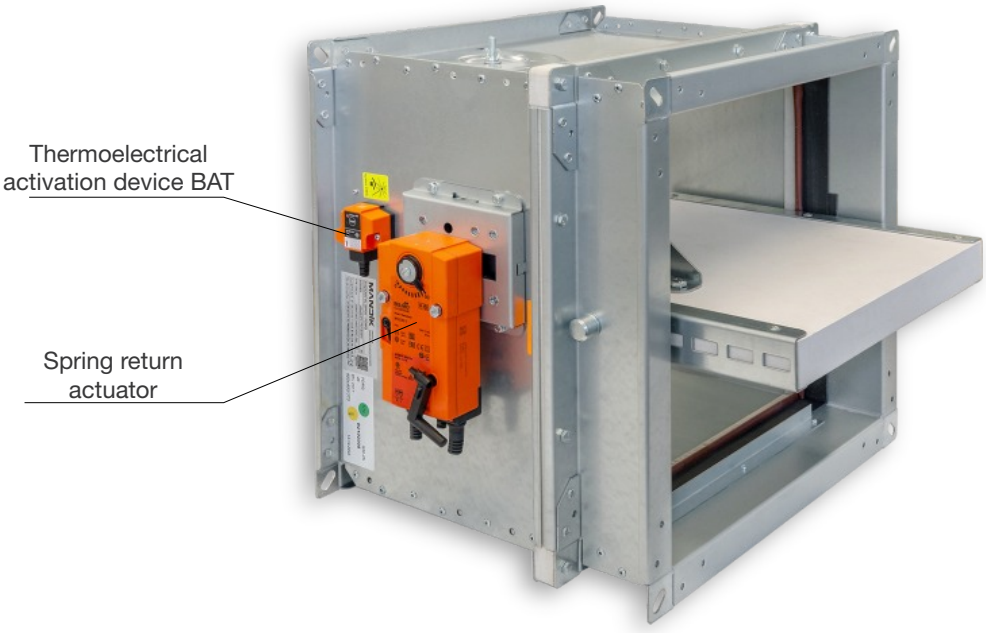
A thermoelectric activation device BAT, which contains two thermal fuses Tf1 and Tf2, is an integral part of the actuator.

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).

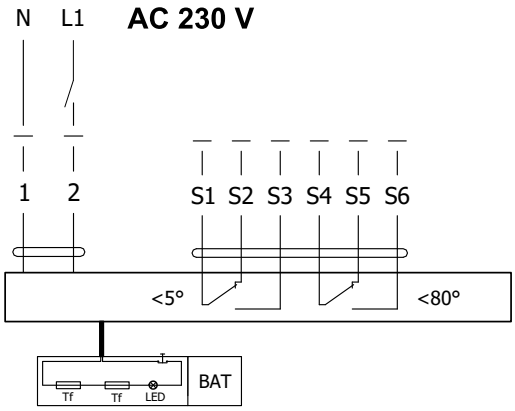
After the thermal fuse Tf1 or Tf2 has been activated, the power supply is permanently and irreversibly interrupted and the actuator, by means of the pre-stretched spring, rotates the damper blade into the breakdown position “CLOSED”.

Signalisation of damper blade position “OPEN” and “CLOSE” is provided by two microswitches.

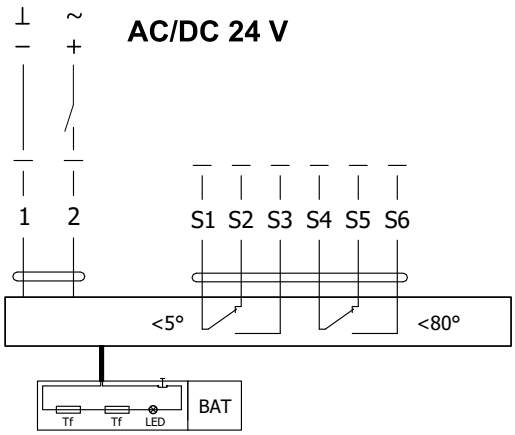
Fig. 6. Design .40 and .50



Actuator Belimo BFL 230-T



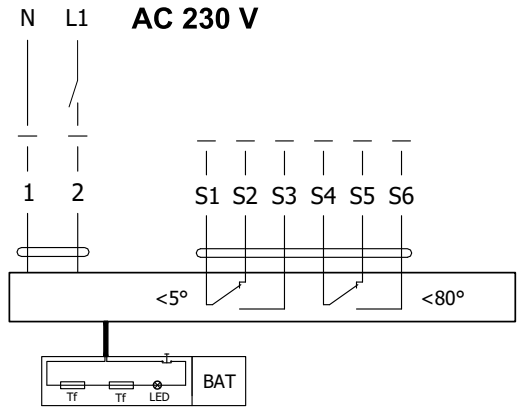
Actuator Belimo BFL 24-T



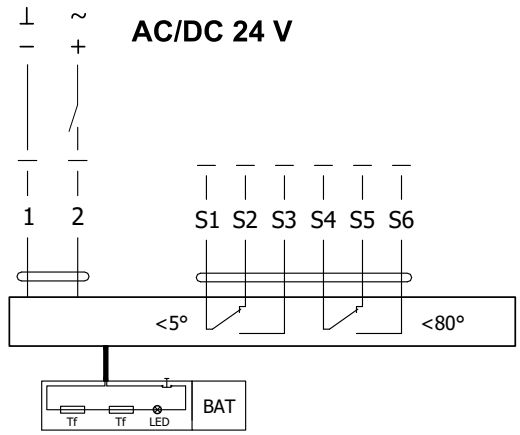
Tab. 1. Actuator BELIMO BFL 230-T, BFL 24-T

Actuator BELIMO - 4 Nm / 3 Nm Spring	BFL 230-T	BFL 24-T
Power voltage	AC 230 V 50/60 Hz	AC/DC 24 V 50/60 Hz
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	
Connecting - supply/control - auxiliary switch	 cable 1 m, 2 x 0,75 mm² cable 1 m, 6 x 0,75 mm²	
Response temperature thermal fuse	duct outside temperature +72 °C duct inside temperature +72 °C	

Actuator Belimo BFN 230-T



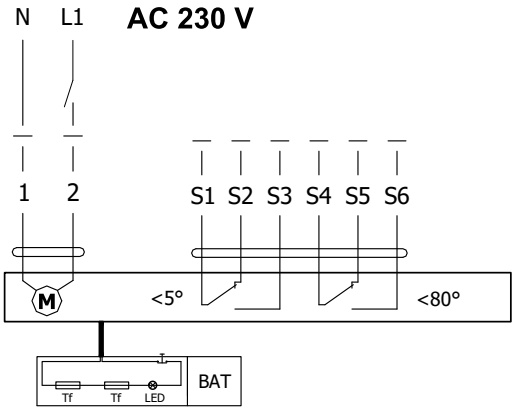
Actuator Belimo BFN 24-T



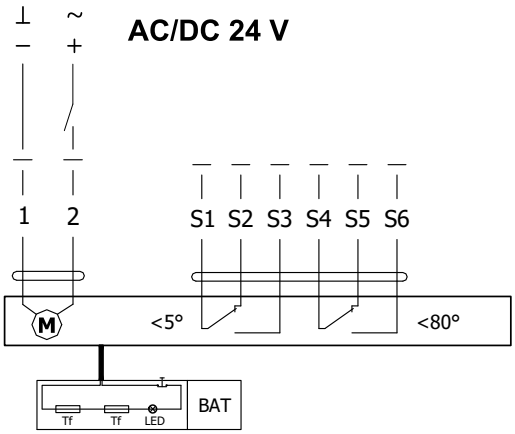
Tab. 2. Actuator BELIMO BFN 230-T, BFN 24-T

Actuator BELIMO - 9 Nm / 7 Nm Spring	BFN 230-T	BFN 24-T
Power voltage	AC 24 V 50/60 Hz	AC/DC 24 V 50/60 Hz
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	
Connecting - supply/control - auxiliary switch	 cable 1 m, 2 x 0,75 mm² cable 1 m, 6 x 0,75 mm²	
Response temperature thermal fuse	Duct outside temperature +72 °C Duct inside temperature +72 °C	

Actuator Belimo BF 230-TN



Actuator Belimo BF 24-TN



Tab. 3. Actuator BELIMO BF 230-TN, BF 24-TN

Actuator BELIMO - 18 Nm/ 12 Nm Spring	BF 230-TN	BF 24-TN
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	
Connecting - supply/control - auxiliary switch	 cable 1 m, 2 x 0,75 mm² cable 1 m, 6 x 0,75 mm²	
Response temperature thermal fuse	Duct outside temperature +72 °C Duct inside temperature +72 °C	

Thermoelectric activation device BAT

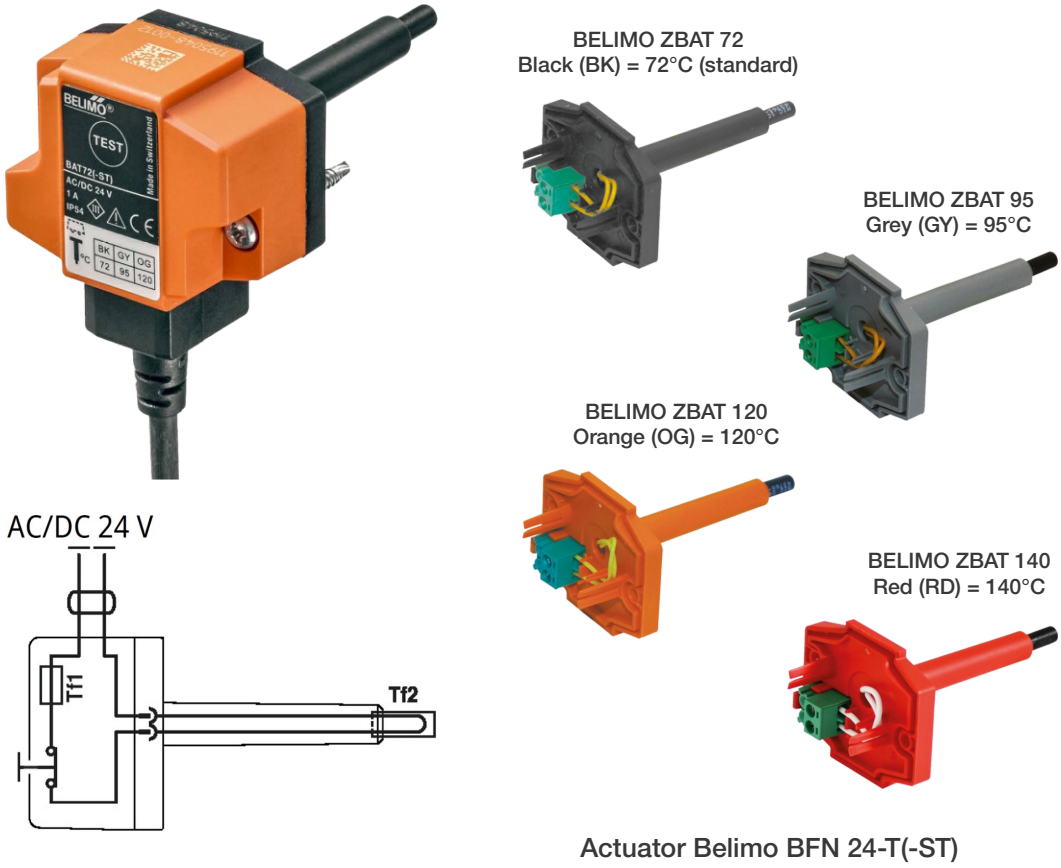
If the thermal fuse Tf1 is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. Thermoelectric activation device BAT is integral part of the actuator.

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, selftapping screws.



Actuator Belimo BFN 24-T(-ST)

Tab. 4. 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 Storage temperature Ambient humidity	-30°C … +50°C -40°C … +50°C 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

3. Material, dimensions, weights and effective area

3.1 Material

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 contol 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 40 mm or it is composed of two Promatect-H boards, thickness 20 mm, connected by galvanized "U" clips on the outside, sealed with Promat K84 glue.

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.

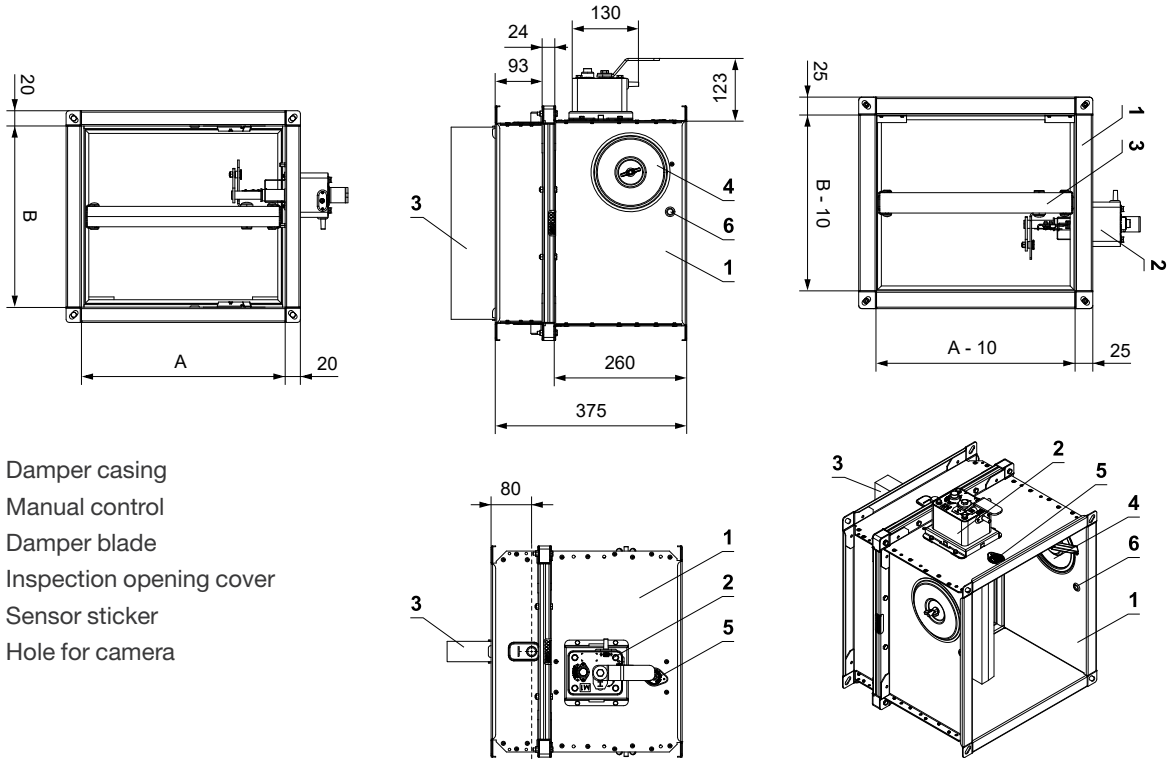
Some fasteners and components are only available in one class of stainless steel; the type will be used in all stainless-steel variants.

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.

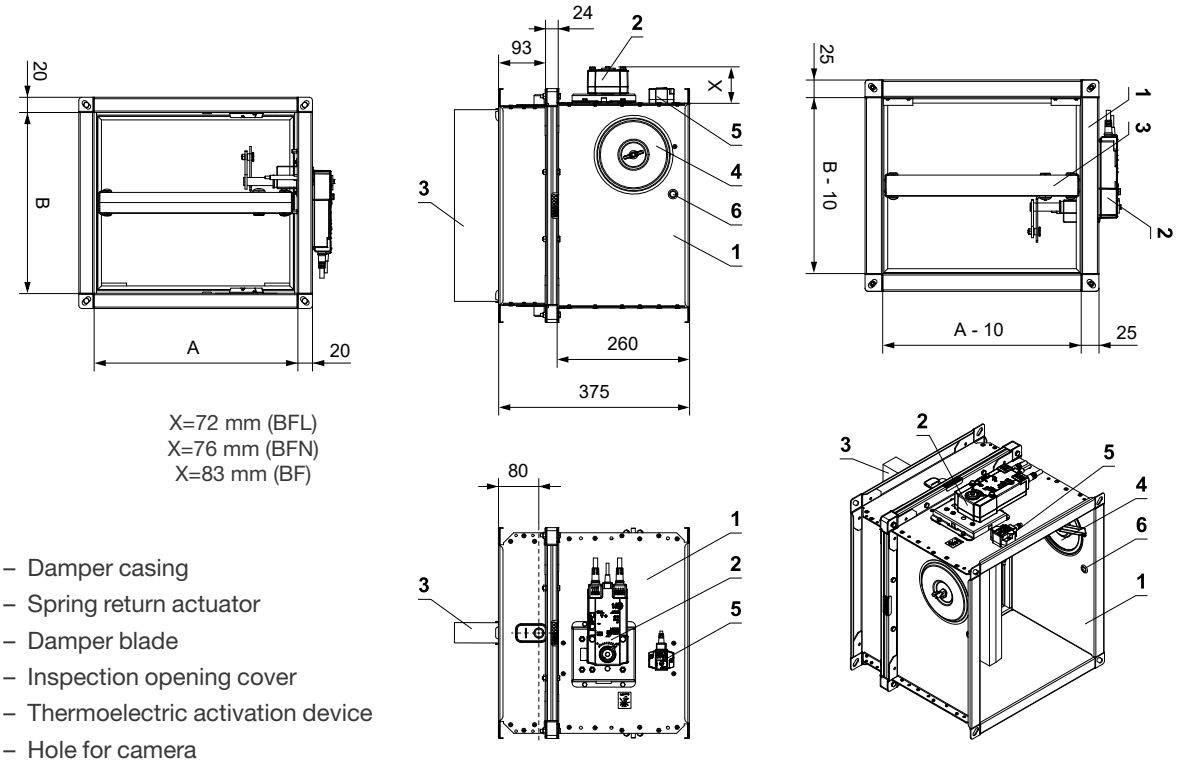
3.2 Dimensions

Fig. 7. FDMQ with manual control



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

Fig. 8. FDMQ with spring return actuator



X=72 mm (BFL)
X=76 mm (BFN)
X=83 mm (BF)

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

3.3 Damper blade overlaps

Open damper blade overlaps the damper casing by the value “a” or “c”. These values are specified in Tab. 5. Values “a” and “c” has to be respected when projecting following air-conditioning duct.

Fig. 9. Damper overlaps

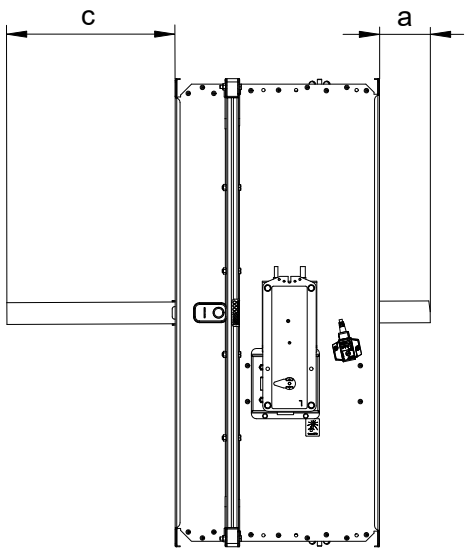


Fig. 10. Flange of damper - CONTROL SIDE

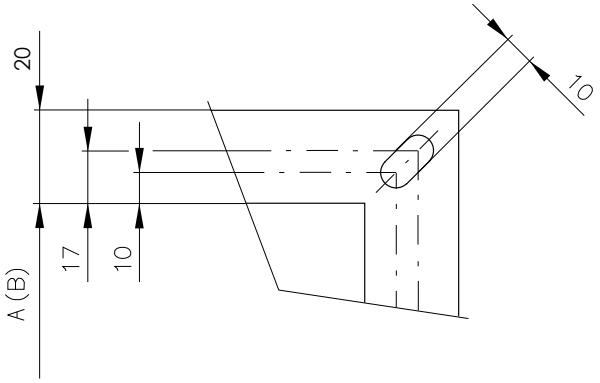
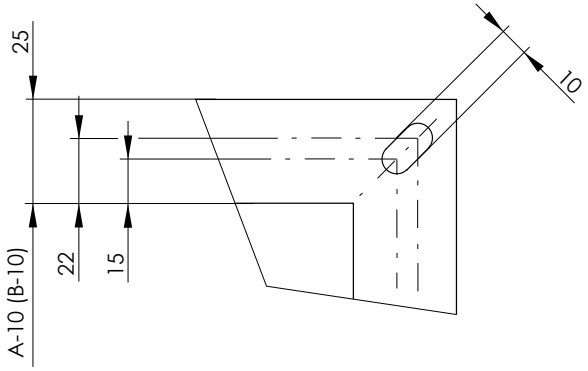


Fig. 11. Flange of Damper - INSTALLATION SIDE



20 mm wide flanges are fitted with oval holes in the corners.

Tab. 5. Technical parameters

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
150×150	-	-	8	8,1	0,0106	BFL	M1
×180	-	-	8,5	8,6	0,0144	BFL	M1
×200	-	9	8,9	9	0,0169	BFL	M1
×225	-	21	9,4	9,5	0,0200	BFL	M1
×250	-	34	9,9	10	0,0231	BFL	M1
×280	-	49	10,5	10,6	0,0269	BFL	M1
×300	-	59	11,1	11,2	0,0294	BFL	M1
×315	-	66	11,4	11,5	0,0313	BFL	M1
×355	-	86	12,4	12,6	0,0363	BFL	M1
×400	-	109	13,5	13,6	0,0419	BFL	M1
×450	-	134	14,5	14,6	0,0481	BFL	M1
×500	-	159	15,5	15,6	0,0544	BFL	M1
×550	-	184	16,4	16,6	0,0606	BFL	M1
×560	-	189	16,6	16,8	0,0619	BFL	M2
×600	-	209	17,4	17,5	0,0669	BFL	M2
×630	9	224	18	18,1	0,0706	BFL	M2
180×150	-	-	8,8	8,9	0,0132	BFL	M1
×180	-	-	9	10,5	0,0178	BFL	M1
×200	-	9	9,5	11	0,0209	BFL	M1
×225	-	21	10,0	11,5	0,0248	BFL	M1
×250	-	34	10,5	12	0,0287	BFL	M1
×280	-	49	11	12,5	0,0333	BFL	M1
×300	-	59	11,5	13	0,0364	BFL	M1
×315	-	66	12	13,5	0,0388	BFL	M1
×355	-	86	13	14,5	0,0450	BFL	M1
×400	-	109	14	15,5	0,0519	BFL	M1
×450	-	134	15	16,5	0,0597	BFL	M1
×500	-	159	16	17,5	0,0674	BFL	M2
×550	-	184	17	18,5	0,0752	BFL	M2
×560	-	189	17	18,5	0,0767	BFL	M2
×600	-	209	18	19,5	0,0829	BFL	M2
×630	9	224	18,5	20	0,0876	BFL	M2
×650	19	234	19	20,5	0,0907	BFL	M2
×700	44	259	20	21,5	0,0984	BFN	M2
×710	49	264	20	21,5	0,1000	BFN	M2
×750	69	284	21	22,5	0,1062	BFN	M2
×800	94	309	22	23,5	0,1139	BFN	M2
200×150	-	-	9,1	9,2	0,0149	BFL	M1
×180	-	-	9,5	11	0,0201	BFL	M1
×200	-	9	10	11,5	0,0236	BFL	M1
×225	-	21	10,5	13,5	0,0280	BFL	M1
×250	-	34	11	12,5	0,0324	BFL	M1
×280	-	49	11,5	14,5	0,0376	BFL	M1
×300	-	59	12	13,5	0,0411	BFL	M1
×315	-	66	12,5	14	0,0438	BFL	M1
×355	-	86	13	15	0,0508	BFL	M1
×400	-	109	14	16	0,0586	BFL	M1
×450	-	134	15	18	0,0674	BFL	M1
×500	-	159	16,5	18	0,0761	BFL	M2
×550	-	184	17,5	20,5	0,0849	BFL	M2
×560	-	189	17,5	20,5	0,0866	BFL	M2
×600	-	209	18,5	23	0,0936	BFL	M2

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×630	9	224	19	22	0,0989	BFL	M2
×650	19	234	19,5	22,5	0,1024	BFL	M2
×700	44	259	20,5	25	0,1111	BFN	M2
×710	49	264	21	24	0,1129	BFN	M2
×750	69	284	21,5	24,5	0,1199	BFN	M2
×800	94	309	23	26	0,1286	BFN	M2
225×150	-	-	9,5	9,7	0,0170	BFL	M1
×180	-	-	10	11,5	0,0230	BFL	M1
×200	-	9	10,5	12	0,0270	BFL	M1
×225	-	21	11	12,5	0,0320	BFL	M1
×250	-	34	11,5	13	0,0370	BFL	M1
×280	-	49	12	13,5	0,0430	BFL	M1
×300	-	59	12,5	14	0,0470	BFL	M1
×315	-	66	13	14,5	0,0500	BFL	M1
×355	-	86	14	15,5	0,0580	BFL	M1
×400	-	109	15	16,5	0,0670	BFL	M1
×450	-	134	16	17,5	0,0770	BFL	M1
×500	-	159	17	18,5	0,0870	BFL	M2
×550	-	184	18	19,5	0,0970	BFL	M2
×560	-	189	18	19,5	0,0990	BFL	M2
×600	-	209	19	20,5	0,1070	BFL	M2
×630	9	224	19,5	21	0,1130	BFN	M2
×650	19	234	20	21,5	0,1170	BFN	M2
×700	44	259	21	22,5	0,1270	BFN	M2
×710	49	264	21	22,5	0,1290	BFN	M2
×750	69	284	22	23,5	0,1370	BFN	M2
×800	94	309	23	24,5	0,1470	BFN	M2
250×150	-	-	10	10,1	0,0191	BFL	M1
×180	-	-	10,5	12	0,0259	BFL	M1
×200	-	9	10,5	12,5	0,0304	BFL	M1
×225	-	21	11	13	0,0360	BFL	M1
×250	-	34	12	13,5	0,0416	BFL	M1
×280	-	49	13	14,5	0,0484	BFL	M1
×300	-	59	13	15	0,0529	BFL	M1
×315	-	66	13,5	15	0,0563	BFL	M1
×355	-	86	14,5	16	0,0653	BFL	M1
×400	-	109	15,5	17	0,0754	BFL	M1
×450	-	134	16,5	19,5	0,0866	BFL	M1
×500	-	159	18	21	0,0979	BFL	M2
×550	-	184	19	22	0,1091	BFL	M2
×560	-	189	19	22	0,1114	BFL	M2
×600	-	209	20	23	0,1204	BFN	M2
×630	9	224	21	24	0,1271	BFN	M2
×650	19	234	21,5	24,5	0,1316	BFN	M2
×700	44	259	22,5	25,5	0,1429	BFN	M2
×710	49	264	23	26	0,1451	BFN	M2
×750	69	284	23,5	26,5	0,1541	BFN	M3
×800	94	309	25	28	0,1654	BFN	M3
280×150	-	-	10,5	10,6	0,0217	BFL	M1
×180	-	-	11	12,5	0,0293	BFL	M1
×200	-	9	11,5	13,5	0,0344	BFL	M1
×225	-	21	12	14	0,0408	BFL	M1

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×250	-	34	13	14,5	0,0472	BFL	M1
×280	-	49	14	15,5	0,0548	BFL	M1
×300	-	59	14	16	0,0599	BFL	M1
×315	-	66	14,5	16,5	0,0638	BFL	M1
×355	-	86	15,5	17,5	0,0740	BFL	M1
×400	-	109	17	18,5	0,0854	BFL	M1
×450	-	134	18	21	0,0982	BFL	M1
×500	-	159	19,5	22,5	0,1109	BFL	M2
×550	-	184	20,5	23,5	0,1237	BFL	M2
×560	-	189	21	24	0,1262	BFN	M2
×600	-	209	22	25	0,1364	BFN	M2
×630	9	224	22,5	25,5	0,1441	BFN	M2
×650	19	234	23	26	0,1492	BFN	M2
×700	44	259	24,5	27,5	0,1619	BFN	M2
×710	49	264	24,5	27,5	0,1645	BFN	M2
×750	69	284	25,5	28,5	0,1747	BFN	M3
×800	94	309	27	30	0,1874	BFN	M3
300×150	-	-	10,8	11	0,0234	BFL	M1
×180	-	-	11,5	13	0,0316	BFL	M1
×200	-	9	11,5	13,5	0,0371	BFL	M1
×225	-	21	12	14	0,0440	BFL	M1
×250	-	34	13	14,5	0,0509	BFL	M1
×280	-	49	14	15,5	0,0591	BFL	M1
×300	-	59	14	16	0,0646	BFL	M1
×315	-	66	14,5	16,5	0,0688	BFL	M1
×355	-	86	15,5	17,5	0,0798	BFL	M1
×400	-	109	17	18,5	0,0921	BFL	M1
×450	-	134	18	21	0,1059	BFL	M1
×500	-	159	19,5	22,5	0,1196	BFL	M2
×550	-	184	20,5	23,5	0,1334	BFN	M2
×560	-	189	21	24	0,1361	BFN	M2
×600	-	209	22	25	0,1471	BFN	M2
×630	9	224	22,5	25,5	0,1554	BFN	M2
×650	19	234	23	26	0,1609	BFN	M2
×700	44	259	24,5	27,5	0,1746	BFN	M2
×710	49	264	24,5	27,5	0,1774	BFN	M2
×750	69	284	25,5	28,5	0,1884	BFN	M3
×800	94	309	27	30	0,2021	BFN	M3
315×150	-	-	11,8	11,9	0,0281	BFL	M1
×180	-	-	12	13,5	0,0334	BFL	M1
×200	-	9	12	13,5	0,0392	BFL	M1
×225	-	21	12,5	14	0,0464	BFL	M1
×250	-	34	13,5	15	0,0537	BFL	M1
×280	-	49	14,5	16	0,0624	BFL	M1
×300	-	59	14,5	16,5	0,0682	BFL	M1
×315	-	66	15	16,5	0,0725	BFL	M1
×355	-	86	16	17,5	0,0841	BFL	M1
×400	-	109	17	19	0,0972	BFL	M1
×450	-	134	18,5	21,5	0,1117	BFL	M1
×500	-	159	19,5	22,5	0,1262	BFL	M2
×550	-	184	21	24	0,1407	BFN	M2
×560	-	189	21,5	24,5	0,1436	BFN	M2
×600	-	209	22,5	25,5	0,1639	BFN	M2
×630	9	224	23	26	0,1697	BFN	M2

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×650	19	234	23,5	26,5	0,1712	BFN	M2
×700	44	259	25	28	0,1842	BFN	M2
×710	49	264	25	28	0,1871	BFN	M2
×750	69	284	26	29	0,1987	BFN	M3
×800	94	309	27,5	30,5	0,2132	BFN	M3
355×150	-	-	11,8	11,9	0,0281	BFL	M1
×180	-	-	13	14,5	0,0380	BFL	M1
×200	-	9	13	14,5	0,0446	BFL	M1
×225	-	21	13,5	15	0,0528	BFL	M1
×250	-	34	14	16	0,0611	BFL	M1
×280	-	49	15	17	0,0710	BFL	M1
×300	-	59	15,5	17	0,0776	BFL	M1
×315	-	66	16	17,5	0,0825	BFL	M1
×355	-	86	17	18,5	0,0957	BFL	M1
×400	-	109	18	20	0,1106	BFL	M1
×450	-	134	19,5	22,5	0,1271	BFL	M1
×500	-	159	21	24	0,1436	BFN	M2
×550	-	184	22,5	25,5	0,1601	BFN	M2
×560	-	189	22,5	25,5	0,1634	BFN	M2
×600	-	209	23,5	26,5	0,1766	BFN	M2
×630	9	224	24,5	27,5	0,1865	BFN	M2
×650	19	234	25	28	0,1931	BFN	M2
×700	44	259	26,5	29,5	0,2096	BFN	M2
×710	49	264	26,5	29	0,2129	BFN	M2
×750	69	284	27,5	30,5	0,2261	BFN	M3
×800	94	309	29	32	0,2426	BF	M3
400×150	-	-	12,6	12,7	0,0319	BFL	M1
×180	-	-	13,5	15,5	0,0431	BFL	M1
×200	-	9	14	15,5	0,0506	BFL	M1
×225	-	21	14,5	16,5	0,0600	BFL	M1
×250	-	34	15	17	0,0694	BFL	M1
×280	-	49	16	18	0,0806	BFL	M1
×300	-	59	16,5	18	0,0881	BFL	M1
×315	-	66	17	18,5	0,0938	BFL	M1
×355	-	86	18	20	0,1088	BFL	M1
×400	-	109	19,5	21	0,1256	BFL	M1
×450	-	134	21	24	0,1444	BFL	M1
×500	-	159	22,5	25,5	0,1631	BFN	M2
×550	-	184	23,5	26,5	0,1819	BFN	M2
×560	-	189	24	27	0,1856	BFN	M2
×600	-	209	25,5	28,5	0,2006	BFN	M2
×630	9	224	26	29	0,2119	BFN	M2
×650	19	234	26,5	29,5	0,2194	BFN	M2
×700	44	259	28	31,5	0,2381	BFN	M2
×710	49	264	28,5	31,5	0,2419	BFN	M2
×750	69	284	29,5	32,5	0,2569	BF	M3
×800	94	309	31	34	0,2756	BF	M3
450×150	-	-	13,5	13,6	0,0361	BFL	M1
×180	-	-	14,5	16,5	0,0489	BFL	M1
×200	-	9	15	16,5	0,0574	BFL	M1
×225	-	21	15,5	17,5	0,0680	BFL	M1
×250	-	34	16	18	0,0786	BFL	M1
×280	-	49	17	19	0,0914	BFL	M1
×300	-	59	17,5	19,5	0,0999	BFL	M1

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×315	-	66	18	20	0,1063	BFL	M1
×355	-	86	19,5	21	0,1233	BFL	M1
×400	-	109	20,5	22,5	0,1424	BFL	M1
×450	-	134	22	25	0,1636	BFN	M2
×500	-	159	24	27	0,1849	BFN	M2
×550	-	184	25,5	28,5	0,2061	BFN	M2
×560	-	189	25,5	28,5	0,2104	BFN	M2
×600	-	209	27	30	0,2274	BFN	M2
×630	9	224	27,5	30,5	0,2401	BFN	M2
×650	19	234	28,5	31,5	0,2486	BFN	M2
×700	44	259	30	33	0,2699	BF	M2
×710	49	264	30	33	0,2741	BF	M2
×750	69	284	31,5	34,5	0,2911	BF	M3
×800	94	309	33	36	0,3124	BF	M3
500×150	-	-	14,3	14,5	0,0404	BFL	M1
×180	-	-	15,5	17	0,0546	BFL	M1
×200	-	9	16	17,5	0,0641	BFL	M1
×225	-	21	16,5	18	0,0760	BFL	M1
×250	-	34	17	19	0,0879	BFL	M1
×280	-	49	18	20	0,1021	BFL	M1
×300	-	59	19	20,5	0,1116	BFL	M1
×315	-	66	19,5	21	0,1188	BFL	M1
×355	-	86	20,5	22,5	0,1378	BFL	M1
×400	-	109	22	23,5	0,1591	BFL	M2
×450	-	134	23,5	26,5	0,1829	BFN	M2
×500	-	159	25,5	28,5	0,2066	BFN	M2
×550	-	184	27	30	0,2304	BFN	M2
×560	-	189	27	30	0,2351	BFN	M2
×600	-	209	28,5	31,5	0,2541	BFN	M2
×630	9	224	29,5	32,5	0,2684	BFN	M2
×650	19	234	30	33	0,2779	BF	M2
×700	44	259	32	35	0,3016	BF	M2
×710	49	264	32	35	0,3064	BF	M2
×750	69	284	33,5	36,5	0,3254	BF	M3
×800	94	309	35	38	0,3491	BF	M3
550×150	-	-	15,2	15,3	0,0446	BFL	M1
×180	-	-	16,5	18	0,0604	BFL	M1
×200	-	9	17	18,5	0,0709	BFL	M1
×225	-	21	17,5	19	0,0840	BFL	M1
×250	-	34	18	20	0,0971	BFL	M1
×280	-	49	19	21	0,1129	BFL	M1
×300	-	59	20	21,5	0,1234	BFL	M1
×315	-	66	20,5	22	0,1313	BFL	M1
×355	-	86	22	23,5	0,1523	BFL	M1
×400	-	109	23,5	25	0,1759	BFN	M2
×450	-	134	25	28	0,2021	BFN	M2
×500	-	159	27	30	0,2284	BFN	M2
×550	-	184	28,5	31,5	0,2546	BFN	M2
×560	-	189	29	32	0,2599	BFN	M2
×600	-	209	30,5	33,5	0,2809	BFN	M2
×630	9	224	31	34	0,2966	BF	M2
×650	19	234	32	35	0,3071	BF	M2
×700	44	259	34	37	0,3334	BF	M2
×710	49	264	34	37	0,3386	BF	M2

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×750	69	284	35,5	38,5	0,3596	BF	M3
×800	94	309	37	40	0,3859	BF	M3
560×150	-	-	15,4	15,5	0,0455	BFL	M1
×180	-	-	16,5	18,5	0,0615	BFL	M1
×200	-	9	17	18,5	0,0722	BFL	M1
×225	-	21	17,5	19,5	0,0856	BFL	M1
×250	-	34	18,5	20	0,0990	BFL	M1
×280	-	49	19,5	21	0,1150	BFL	M1
×300	-	59	20	22	0,1257	BFL	M1
×315	-	66	20,5	22,5	0,1338	BFL	M1
×355	-	86	22	23,5	0,1552	BFL	M1
×400	-	109	23,5	25,5	0,1792	BFN	M2
×450	-	134	25,5	28,5	0,2060	BFN	M2
×500	-	159	27	30	0,2327	BFN	M2
×550	-	184	29	32	0,2595	BFN	M2
×560	-	189	29,5	32,5	0,2648	BFN	M2
×600	-	209	31	34	0,2862	BFN	M2
×630	9	224	31,5	34,5	0,3023	BF	M2
×650	19	234	32	35	0,3130	BF	M2
×700	44	259	34	37	0,3397	BF	M2
×710	49	264	34,5	37,5	0,3451	BF	M2
×750	69	284	35,5	38,5	0,3665	BF	M3
×800	94	309	37,5	40,5	0,3932	BF	M3
600×150	-	-	16,1	16,2	0,0489	BFL	M1
×180	-	-	17,5	19,5	0,0661	BFL	M1
×200	-	9	18	20,5	0,0776	BFL	M1
×225	-	21	18,5	21,5	0,0920	BFL	M1
×250	-	34	19	22	0,1064	BFL	M1
×280	-	49	20	23	0,1236	BFL	M1
×300	-	59	21	24	0,1351	BFL	M1
×315	-	66	21,5	24,5	0,1438	BFL	M1
×355	-	86	23	26	0,1668	BFL	M2
×400	-	109	24,5	27,5	0,1926	BFN	M2
×450	-	134	26,5	29,5	0,2214	BFN	M2
×500	-	159	28,5	31,5	0,2501	BFN	M2
×550	-	184	30	33	0,2789	BFN	M2
×560	-	189	30,5	33,5	0,2846	BFN	M2
×600	-	209	32	35	0,3076	BF	M2
×630	9	224	33	36	0,3249	BF	M2
×650	19	234	33,5	36,5	0,3364	BF	M2
×700	44	259	35,5	38,5	0,3651	BF	M2
×710	49	264	36	39	0,3709	BF	M2
×750	69	284	37,5	40,5	0,3939	BF	M3
×800	94	309	39	42	0,4226	BF	M3
630×150	-	-	16,6	16,7	0,0514	BFL	M1
×180	-	-	18	20	0,0696	BFL	M1
×200	-	9	18,5	21	0,0817	BFL	M1
×225	-	21	19	22	0,0968	BFL	M1
×250	-	34	20	23	0,1119	BFL	M1
×280	-	49	21	24	0,1301	BFL	M1
×300	-	59	21,5	24,5	0,1422	BFL	M1
×315	-	66	22,5	25,5	0,1513	BFL	M1
×355	-	86	24	27	0,1755	BFL	M2
×400	-	109	25,5	28,5	0,2027	BFN	M2

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×450	-	134	27,5	30,5	0,2329	BFN	M2
×500	-	159	29	32	0,2632	BFN	M2
×550	-	184	31	34	0,2934	BFN	M2
×560	-	189	31,5	34,5	0,2995	BFN	M2
×600	-	209	33	36	0,3237	BF	M2
×630	9	224	34	37	0,3418	BF	M2
×650	19	234	34,5	37,5	0,3539	BF	M2
×700	44	259	36,5	39,5	0,3842	BF	M2
×710	49	264	37	40	0,3902	BF	M2
×750	69	284	38,5	41,5	0,4144	BF	M3
×800	94	309	40,5	43,5	0,4447	BF	M4
650×150	-	-	17	17,1	0,0531	BFL	M1
×180	-	-	19	20,5	0,0719	BFL	M1
×200	-	9	20	21,5	0,0844	BFL	M1
×225	-	21	21	22,5	0,1000	BFL	M1
×250	-	34	22	23,5	0,1156	BFL	M1
×280	-	49	23	24,5	0,1344	BFL	M1
×300	-	59	24	25,5	0,1469	BFL	M1
×315	-	66	24,5	26	0,1563	BFL	M2
×355	-	86	26	27,5	0,1813	BFL	M2
×400	-	109	28	29,5	0,2094	BFN	M2
×450	-	134	30	31,5	0,2406	BFN	M2
×500	-	159	32	33,5	0,2719	BFN	M2
×550	-	184	34	35,5	0,3031	BFN	M2
×560	-	189	34,5	37,5	0,3094	BF	M2
×600	-	209	36	39	0,3344	BF	M2
×630	9	224	37	40	0,3531	BF	M2
×650	19	234	38	41	0,3656	BF	M2
×700	44	259	40	43	0,3969	BF	M2
×710	49	264	40,5	43,5	0,4031	BF	M2
×750	69	284	42	45	0,4281	BF	M3
×800	94	309	44	47	0,4594	BF	M4
700×150	-	-	17,8	18	0,0574	BFL	M1
×180	-	-	20	21,5	0,0776	BFL	M1
×200	-	9	21	22,5	0,0911	BFL	M1
×225	-	21	22	23,5	0,1080	BFL	M1
×250	-	34	23	24,5	0,1249	BFL	M1
×280	-	49	24,5	26	0,1451	BFL	M1
×300	-	59	25,5	27	0,1586	BFL	M2
×315	-	66	26	27,5	0,1688	BFL	M2
×355	-	86	27,5	29	0,1958	BFN	M2
×400	-	109	29,5	31	0,2261	BFN	M2
×450	-	134	31,5	33	0,2599	BFN	M2
×500	-	159	33,5	35	0,2936	BFN	M2
×550	-	184	35,5	38,5	0,3274	BF	M2
×560	-	189	36	39	0,3341	BF	M2
×600	-	209	37,5	40,5	0,3611	BF	M2
×630	9	224	39	42	0,3814	BF	M2
×650	19	234	40	43	0,3949	BF	M2
×700	44	259	42	45	0,4286	BF	M2
×710	49	264	42,5	45,5	0,4354	BF	M2
×750	69	284	44	47	0,4624	BF	M3
×800	94	309	46	49	0,4961	BF	M4
710×150	-	-	18,0	18,1	0,0582	BFL	M1

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×180	-	-	20	21,5	0,0788	BFL	M1
×200	-	9	21	22,5	0,0925	BFL	M1
×225	-	21	21,5	23,5	0,1096	BFL	M1
×250	-	34	22	24,5	0,1267	BFL	M1
×280	-	49	23	26	0,1473	BFL	M1
×300	-	59	23,5	26,5	0,1610	BFL	M2
×315	-	66	24	27	0,1713	BFL	M2
×355	-	86	25,5	28,5	0,1987	BFN	M2
×400	-	109	27,5	30,5	0,2295	BFN	M2
×450	-	134	29,5	32,5	0,2637	BFN	M2
×500	-	159	31,5	34,5	0,2980	BFN	M2
×550	-	184	33,5	36,5	0,3322	BF	M2
×560	-	189	34	37	0,3391	BF	M2
×600	-	209	35,5	38,5	0,3665	BF	M2
×630	9	224	36,5	39,5	0,3870	BF	M2
×650	19	234	37,5	40,5	0,4007	BF	M2
×700	44	259	39,5	42,5	0,4350	BF	M2
×710	49	264	40	43	0,4418	BF	M3
×750	69	284	41,5	44,5	0,4692	BF	M3
×800	94	309	43,5	46,5	0,5035	BF	M4
750×150	-	-	18,7	18,8	0,0616	BFL	M1
×180	-	-	21	22,5	0,0834	BFL	M1
×200	-	9	22	23,5	0,0979	BFL	M1
×225	-	21	22,5	24,5	0,1160	BFL	M1
×250	-	34	23	25,5	0,1341	BFL	M1
×280	-	49	24	27	0,1559	BFL	M2
×300	-	59	24,5	27,5	0,1704	BFL	M2
×315	-	66	25	28	0,1813	BFL	M2
×355	-	86	26,5	29,5	0,2103	BFN	M2
×400	-	109	28,5	31,5	0,2429	BFN	M2
×450	-	134	30,5	33,5	0,2791	BFN	M2
×500	-	159	32,5	35,5	0,3154	BFN	M2
×550	-	184	35	38	0,3516	BF	M2
×560	-	189	35	38,5	0,3589	BF	M2
×600	-	209	37	40,5	0,3879	BF	M2
×630	9	224	38	41	0,4096	BF	M2
×650	19	234	39	42	0,4241	BF	M2
×700	44	259	41,5	44,5	0,4604	BF	M3
×710	49	264	41,5	44,5	0,4676	BF	M3
×750	69	284	43	46	0,4966	BF	M3
×800	94	309	45	48	0,5329	BF	M4
800×150	-	-	19,6	19,7	0,0659	BFL	M1
×180	-	-	22	23,5	0,0891	BFL	M1
×200	-	9	23	24,5	0,1046	BFL	M1
×225	-	21	23,5	25,5	0,1240	BFL	M1
×250	-	34	24	26,5	0,1434	BFL	M2
×280	-	49	25	28	0,1666	BFL	M2
×300	-	59	25,5	28,5	0,1821	BFL	M2
×315	-	66	26,5	29,5	0,1938	BFL	M2
×355	-	86	28	31	0,2248	BFN	M2
×400	-	109	30	33	0,2596	BFN	M2
×450	-	134	32	35	0,2984	BFN	M2
×500	-	159	34	37	0,3371	BFN	M2
×550	-	184	36,5	39,5	0,3759	BF	M2

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×560	-	189	37	40	0,3836	BF	M2
×600	-	209	39	42	0,4146	BF	M2
×630	9	224	40	43	0,4379	BF	M3
×650	19	234	40,5	43,5	0,4534	BF	M3
×700	44	259	43	46	0,4921	BF	M3
×710	49	264	43,5	46,5	0,4999	BF	M3
×750	69	284	45	48	0,5309	BF	M3
×800	94	309	47	50	0,5696	BF	M4
900×150	-	-	21,3	21,5	0,0744	BFL	M1
×180	-	-	24	25,5	0,1006	BFL	M1
×200	-	9	25	26,5	0,1181	BFL	M1
×225	-	21	26,5	28	0,1400	BFL	M2
×250	-	34	28	29,5	0,1619	BFL	M2
×280	-	49	29,5	31	0,1881	BFL	M2
×300	-	59	30	31,5	0,2056	BFL	M2
×315	-	66	30,5	32	0,2188	BFN	M2
×355	-	86	31	33,5	0,2538	BFN	M2
×400	-	109	32,5	35,5	0,2931	BFN	M2
×450	-	134	35	38	0,3369	BFN	M2
×500	-	159	37	40	0,3806	BF	M2
×550	-	184	39,5	42,5	0,4244	BF	M2
×560	-	189	40	43	0,4331	BF	M3
×600	-	209	42	45	0,4681	BF	M3
×630	9	224	43,5	46,5	0,4944	BF	M3
×650	19	234	44,5	47,5	0,5119	BF	M3
×700	44	259	47	50	0,5556	BF	M3
×710	49	264	47	50	0,5644	BF	M3
×750	69	284	49	52	0,5994	BF	M3
×800	94	309	51,5	54,5	0,6431	BF	M4
1000×150	-	-	23,1	23,2	0,0829	BFL	M1
×180	-	-	26	27,5	0,1121	BFL	M1
×200	-	9	27	28,5	0,1316	BFL	M2
×225	-	21	28,5	30	0,1560	BFL	M2
×250	-	34	30	31,5	0,1804	BFL	M2
×280	-	49	31,5	33	0,2096	BFL	M2
×300	-	59	32,5	34	0,2291	BFN	M2
×315	-	66	33,5	35	0,2438	BFN	M2
×355	-	86	35,5	37	0,2828	BFN	M2
×400	-	109	35	38	0,3266	BFN	M2
×450	-	134	37,5	40,5	0,3754	BFN	M2
×500	-	159	40	43	0,4241	BF	M2
×550	-	184	42,5	45,5	0,4729	BF	M3
×560	-	189	43	46	0,4826	BF	M3
×600	-	209	45	48	0,5216	BF	M3
×630	9	224	47	50	0,5509	BF	M3
×650	19	234	48	51	0,5704	BF	M3
×700	44	259	51	54	0,6191	BF	M3
×710	49	264	51	54	0,6289	BF	M3
×750	69	284	53	56	0,6679	BF	M3
×800	94	309	55,5	58,5	0,7166	BF	M4
1100×180	-	-	28	29,5	0,1236	BFL	M1
×200	-	9	29	30,5	0,1451	BFL	M2
×225	-	21	30,5	32	0,1720	BFL	M2
×250	-	34	32	33,5	0,1989	BFL	M2

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×280	-	49	34	35,5	0,2311	BFL	M2
×300	-	59	35	36,5	0,2526	BFN	M2
×315	-	66	36	37,5	0,2688	BFN	M2
×355	-	86	38	40	0,3118	BFN	M2
×400	-	109	38,5	41	0,3601	BFN	M2
×450	-	134	40,5	43,5	0,4139	BF	M2
×500	-	159	43	46	0,4676	BF	M3
×550	-	184	46	49	0,5214	BF	M3
×560	-	189	46,5	49,5	0,5321	BF	M3
×600	-	209	49	52	0,5751	BF	M3
×630	9	224	50	53	0,6074	BF	M3
×650	19	234	51,5	54,5	0,6289	BF	M3
×700	44	259	54,5	57,5	0,6826	BF	M3
×710	49	264	54,5	57,5	0,6934	BF	M3
×750	69	284	56,5	59,5	0,7364	BF	M3
×800	94	309	59,5	62,5	0,7901	BF	M4
1250×180	-	-	31	32,5	0,1409	BFL	M2
×200	-	9	32,5	34	0,1654	BFL	M2
×225	-	21	34	35,5	0,1960	BFL	M2
×250	-	34	35,5	37	0,2266	BFL	M2
×280	-	49	37,5	39	0,2634	BFN	M2
×300	-	59	39	40,5	0,2879	BFN	M2
×315	-	66	40	41,5	0,3063	BFN	M2
×355	-	86	42,5	45,5	0,3553	BFN	M2
×400	-	109	45,5	48,5	0,4104	BFN	M2
×450	-	134	49	52	0,4716	BF	M3
×500	-	159	47,5	50,5	0,5329	BF	M3
×550	-	184	50,5	53,5	0,5941	BF	M3
×560	-	189	51,5	54,5	0,6064	BF	M3
×600	-	209	54	57	0,6554	BF	M3
×630	9	224	55,5	58,5	0,6921	BF	M3
×650	19	234	56,5	59,5	0,7166	BF	M3
×700	44	259	60	63	0,7779	BF	M4
×710	49	264	60	63	0,7901	BF	M4
×750	69	284	62,5	65,5	0,8391	BF	M5
×800	94	309	65,5	68,5	0,9004	BF	M5
1400×180	-	-	34	35,5	0,1581	BFL	M2
×200	-	9	35,5	37	0,1856	BFL	M2
×225	-	21	37,5	39	0,2200	BFL	M2
×250	-	34	39,5	41	0,2544	BFN	M2
×280	-	49	41,5	43	0,2956	BFN	M2
×300	-	59	43	44,5	0,3231	BFN	M2
×315	-	66	44	47	0,3438	BFN	M2
×355	-	86	47	50	0,3988	BFN	M2
×400	-	109	50	53	0,4606	BF	M3
×450	-	134	53,5	56,5	0,5294	BF	M3
×500	-	159	52	55	0,5981	BF	M3
×550	-	184	55,5	58,5	0,6669	BF	M3
×560	-	189	56	59	0,6806	BF	M3
×600	-	209	59	62	0,7356	BF	M3
×630	9	224	60,5	63,5	0,7769	BF	M4
×650	19	234	62	65	0,8044	BF	M5
×700	44	259	65,5	68,5	0,8731	BF	M5
×710	49	264	66	69	0,8869	BF	M5

A×B (mm)	a	c	Weight		Effect. area Sef (m²)	Spring return actu.	Manual contr.
			man. (kg)	actu. (kg)			
×750	69	284	68,5	71,5	0,9419	BF	M5
×800	94	309	71,5	74,5	1,0106	BF	M5
1500×180	-	-	36	37,5	0,1696	BFL	M2
×200	-	9	37,5	39	0,1991	BFL	M2
×225	-	21	39,5	41	0,2360	BFL	M2
×250	-	34	41,5	43	0,2729	BFN	M2
×280	-	49	44	45,5	0,3171	BFN	M2
×300	-	59	45,5	48,5	0,3466	BFN	M2
×315	-	66	46,5	49,5	0,3688	BFN	M2
×355	-	86	49,5	52,5	0,4278	BFN	M3
×400	-	109	53	56	0,4941	BF	M3
×450	-	134	55	58	0,5679	BF	M3
×500	-	159	57	60	0,6416	BF	M3
×550	-	184	58,5	61,5	0,7154	BF	M3
×560	-	189	59,5	62,5	0,7301	BF	M3
×600	-	209	62,5	65,5	0,7891	BF	M4
×630	9	224	64	67	0,8334	BF	M5
×650	19	234	65,5	68,5	0,8629	BF	M5
×700	44	259	69,5	72,5	0,9366	BF	M5
×710	49	264	69,5	79,5	0,9514	BF	M5
×750	69	284	72,5	75,5	1,0104	BF	M5
×800	94	309	75,5	78,5	1,0841	BF	M5

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

4. Installation

4.1 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 23 to 51 and 56 to 74).

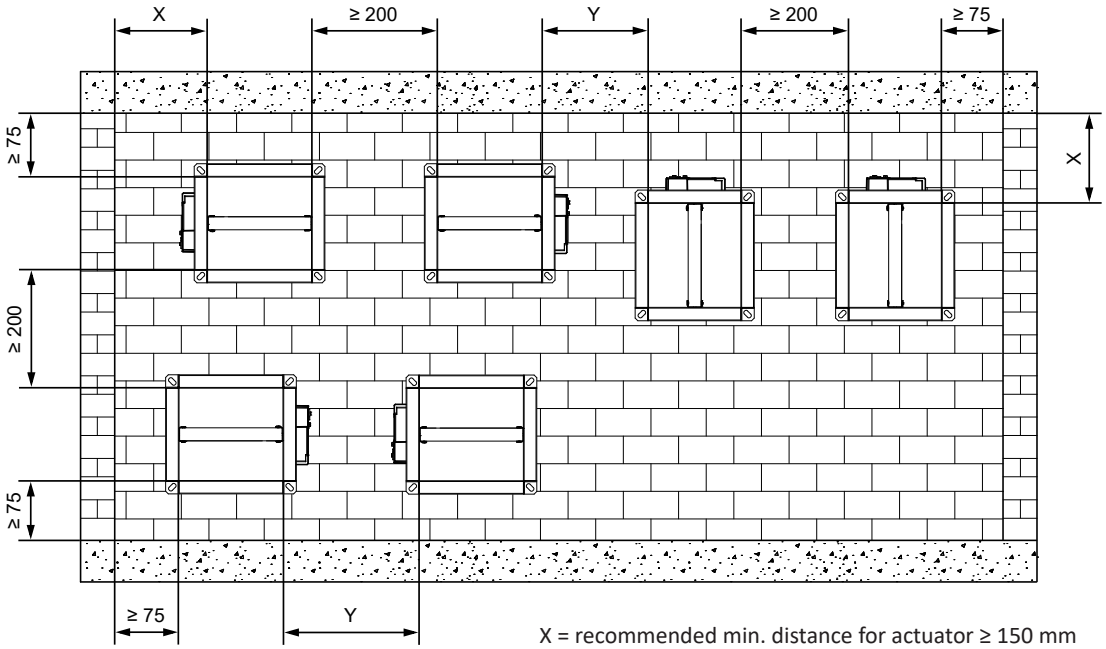
During the installation and plastering process, the actuating mechanism must be protected (covered) against damage and pollution. The damper casing should not be deformed during bricking in. Once the damper is built in, the damper blade should not grind against the damper casing during opening or closing.

The distance between the fire damper and the construction (wall, ceiling) must be 75 mm at the minimum, according to EN 1366-2. If two or more dampers are to be installed in one fire separating construction, the distance between adjacent dampers must be 200 mm at the minimum, according to EN 1366-2.

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 Tab. 5). 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).

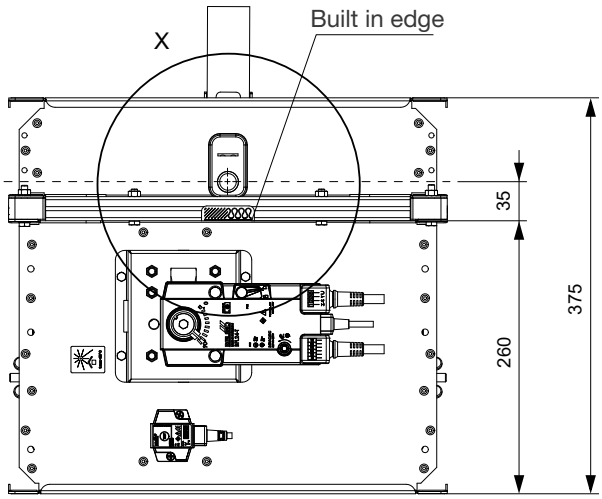
Minimum distance between the fire dampers and the construction

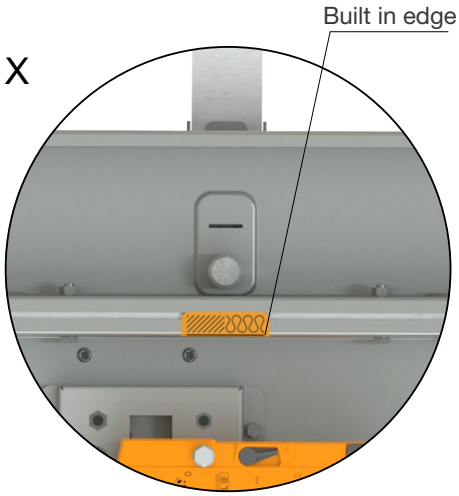
- minimum distance 200 mm between dampers, according to EN 1366-2
- minimum distance 75 mm between damper and construction (wall/ceiling), according to EN 1366-2
- recommended minimum distance 150 mm necessary for access to the actuator
- recommended minimum distance 250 mm necessary for access to the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

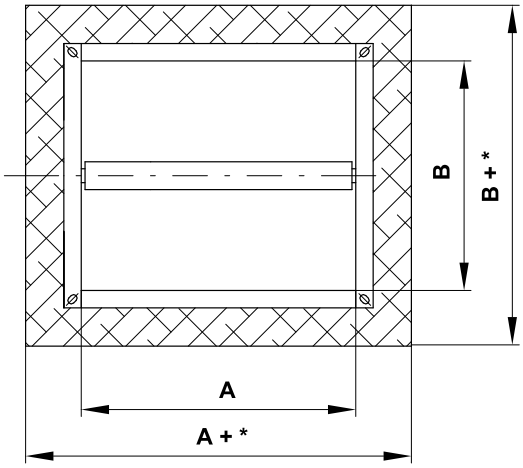
Built in edge





The damper must be installed so that the entire damper blade - in the closed position - is located inside the fire separating structure (wall) and at the same time the control mechanism and inspection openings are freely accessible. „Built in edge label" indicates the "maximum" edge of installation of fire damper into the fire partition structure.

Fig. 12. Dimensions of an installation opening



Mortar or gypsum
- min. A(B)+100
- max. A(B)+300

Stuffing box with fire protective boards
- min. A(B)+80
- max. A(B)+220

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

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 pourous concrete, with minimum thickness according to EN 1366-2.
- Outside the wall/ceiling contruction. The duct and damper must be protected by fire insulation.
- If the damper is installed outside the fire separation construction, a damper side A ≥ 800 mm and fire resistance is EIS 90, VRM-Q reinforcement frame must be used, see page 83.
- **NOTE:** For lower fire resistance than EIS 90, VRM-Q reinforcement frame is not necessary!

4.2 Statement of Installations

Placement	Wall/Ceiling min. thickness (mm)	Method of installation	Fire resist.	Page
In solid wall construction	100	Mortar or gypsum	EI 90 (v_e i↔o) S	23
		2 dampers in battery - mortar or gypsum		24
		4 dampers in battery - mortar or gypsum		25
		Weichschott system		26
		Mineral wool with fire-resistant coating and fire-resistant boards		27
		Installation next to the wall/ceiling - mortar or gypsum + mineral wool		28
Outside solid wall construction	100	ISOVER Ultimate Protect - mortar or gypsum	EI 60 (v_e i↔o) S	29
		ISOVER Ultimate Protect - Weichschott system		30
		Mineral wool ROCKWOOL - Mineral wool with fire-resistant coating and fireresistant board	EI 90 (v_e i↔o) S	31

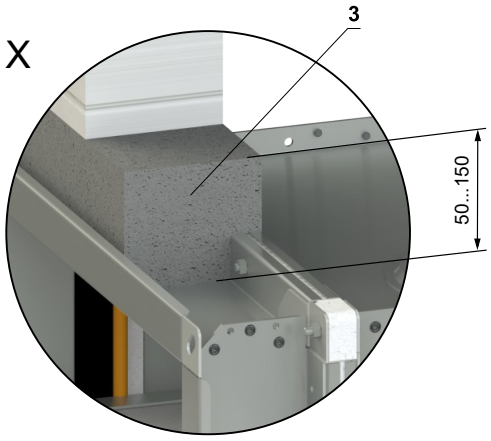
Placement	Wall/Ceiling min. thickness (mm)	Method of installation	Fire resist.	Page
In gypsum wall construction	100	Mortar or gypsum	EI 90 (v_e i↔o) S	32
		2 dampers in battery - mortar or gypsum		33
		4 dampers in battery - mortar or gypsum		34
		Weichschott system		35
		Mineral wool with fire-resistant coating and fire-resistant boards		36
		Installation next to the wall/ceiling - mortar or gypsum + mineral wool		37
Outside gypsum wall construction	100	ISOVER Ultimate Protect - mortar or gypsum	EI 60 (v_e i↔o) S	38
		ISOVER Ultimate Protect - Weichschott system		39
		Mineral wool ROCKWOOL - Mineral wool with fire-resistant coating and fireresistant boards	EI 90 (v_e i↔o) S	40
In sandwich wall construction	100	Weichschott system with fire-resistant boards	EI 90 (v_e i↔o) S	41
In shaft wall Rigips	110	Mortar or gypsum	EI 90 (v_e i↔o) S	43
	80	Installation frame E1		44
In solid ceiling construction	110 - Concrete 125 - Aerated concrete	Mortar or gypsum	EI 90 (h_o i↔o) S	45
		2 dampers in battery - mortar or gypsum		46
		4 dampers in battery - mortar or gypsum		47
		Weichschott system		48
		Mineral wool with fire-resistant coating and fire-resistant boards		49
Outside solid ceiling construction	110 - Concrete 125 - Aerate concrete	Mineral wool ROCKWOOL - mortar or gypsum	EI 90 (h_o i↔o) S	50
		Concreting		51
Installation frame in solid wall construction	100	Installation frame E1	EI 90 (v_e i↔o) S	58
		Installation frame E2		62
		Installation frame E4		67
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	73
Installation frame in gypsum wall construction	100	Installation frame E1	EI 90 (v_e i↔o) S	59
		Installation frame E3		65
		Flexible ceiling – installation frame E5		71
Installation frame in solid ceiling construction	110 - Concrete 125 - Aerated concrete	Installation frame E1	EI 90 (h_o i↔o) S	60
		Installation frame E2		71
		Installation frame E4		68
Installation frame outside solid ceiling construction	110 - Concrete 125 - Aerated concrete	Concreting - Installation frame E4	EI 90 (h_o i↔o) S	69
		Insulation from fire-resistant boards - mortar or gypsum - installation frame E6		74

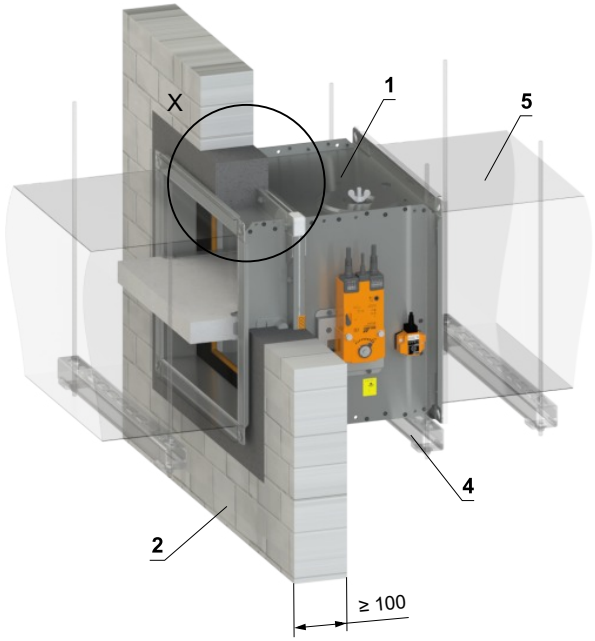
4.3 In solid wall construction

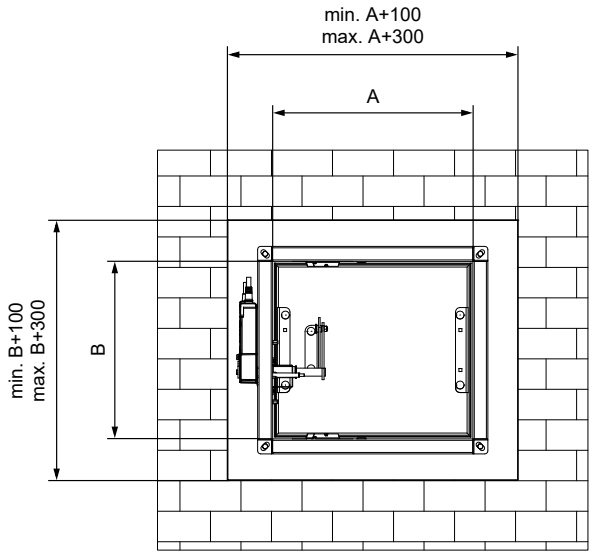
Fig. 13. In solid wall construction - mortar or gypsum

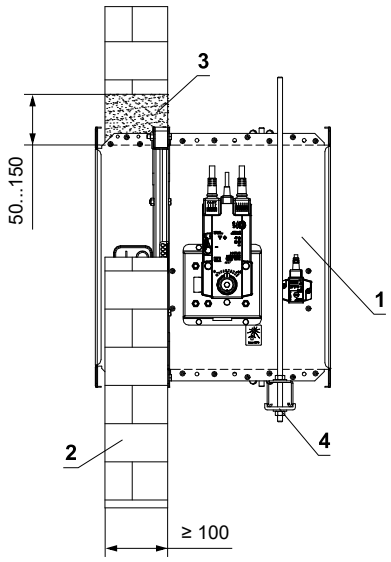
For connection of following duct, see page 79.

EIS 90





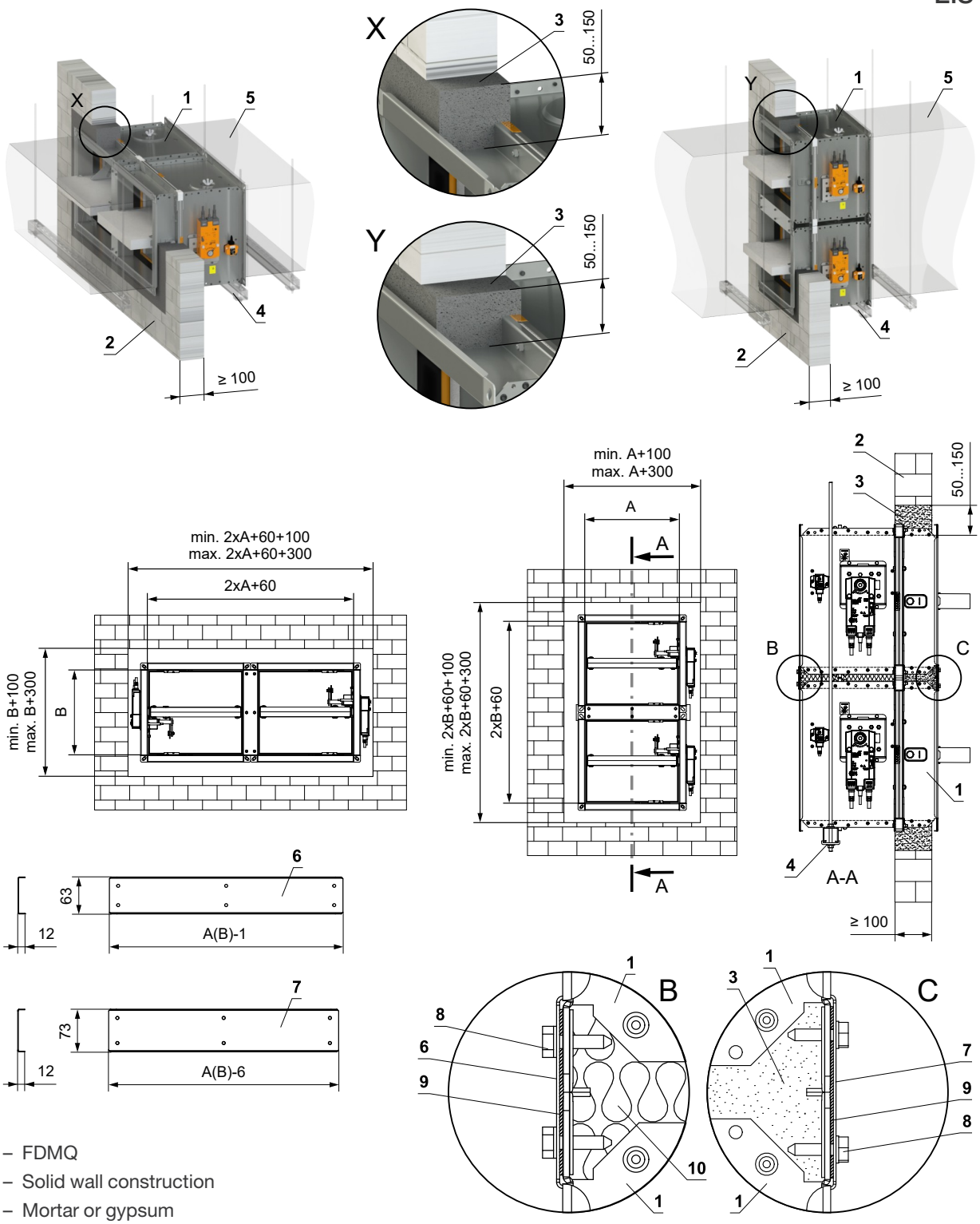




1 – FDMQ
2 – Solid wall construction
3 – Mortar or gypsum
4 – Profile with threaded rod, see pages 75 to 78
5 – Duct

Fig. 14. In solid wall construction - 2 dampers in battery - mortar or gypsum

EIS 90



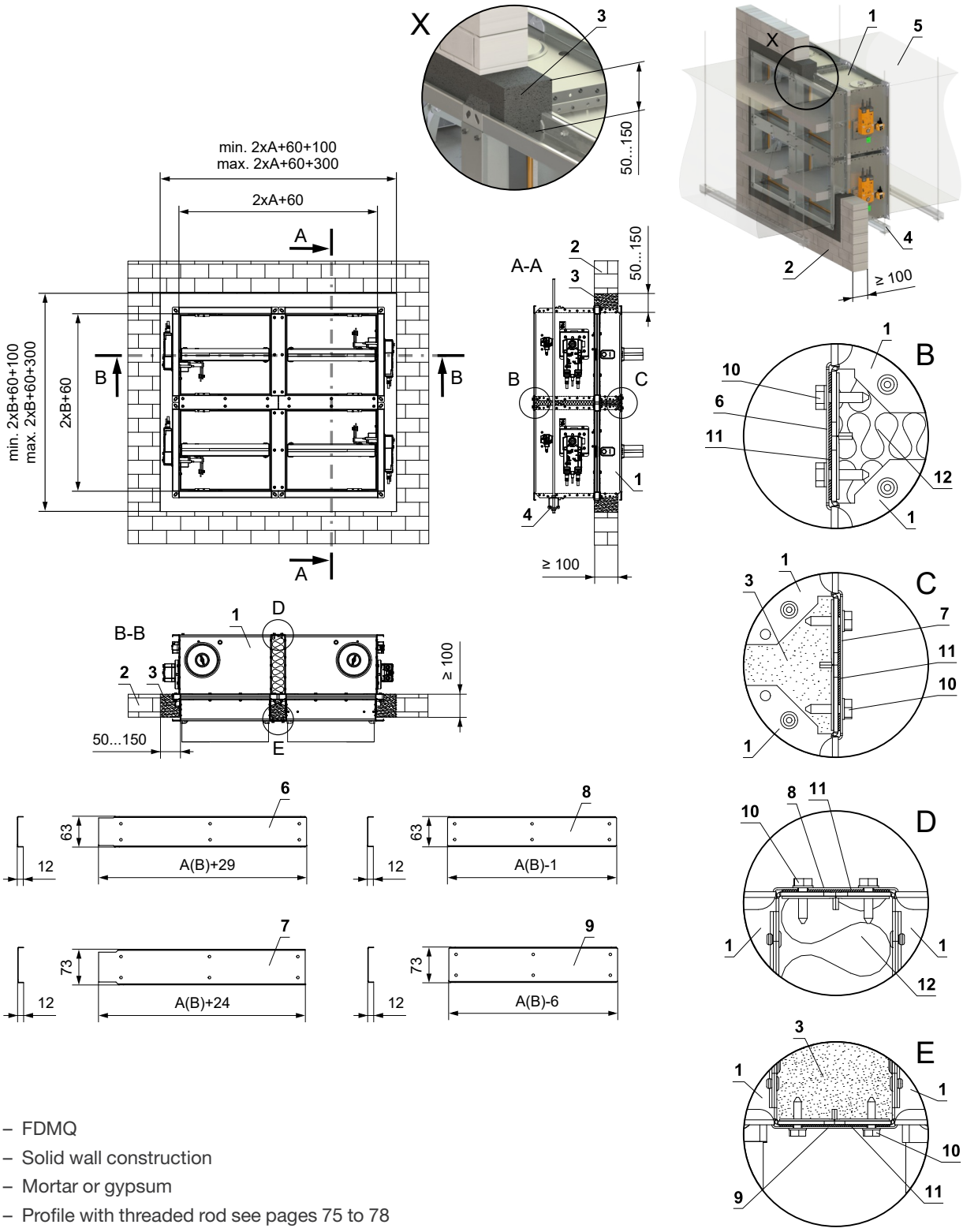
1 – FDMQ
2 – Solid wall construction
3 – Mortar or gypsum
4 – Profile with threaded rod see pages 75 to 78
5 – Duct
6 – U-profile type 3
7 – U-profile type 1
8 – Screw TEX 4,8×18 mm (pitch ≤ 200 mm)
9 – Sealing
10 – Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum

For connection of following duct, see page 79.

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

Fig. 15. In solid wall construction - 4 dampers in battery - mortar or gypsum

EIS 90



1 – FDMQ
2 – Solid wall construction
3 – Mortar or gypsum
4 – Profile with threaded rod see pages 75 to 78
5 – Duct
6 – U-profile type 2
7 – U-profile type 4
8 – U-profile type 1
9 – U-profile type 3
10 – Screw TEX 4,8×18 mm (pitch ≤ 200 mm)
11 – Sealing
12 – Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum

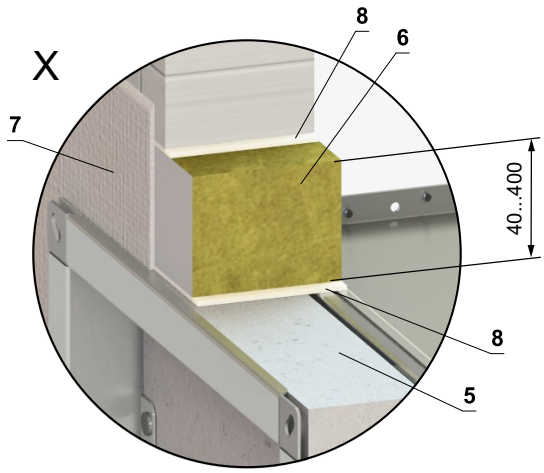
For connection of following duct, see page 79.

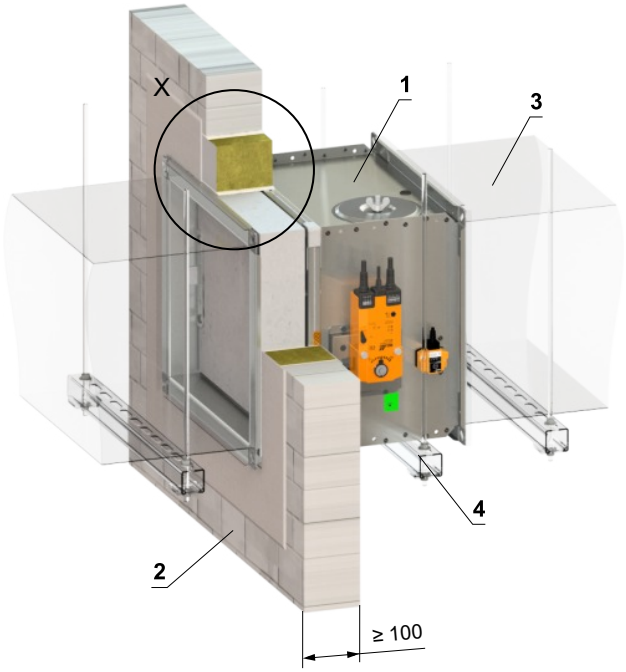
The gap between the damper and construction is filled with mortar or gypsum.

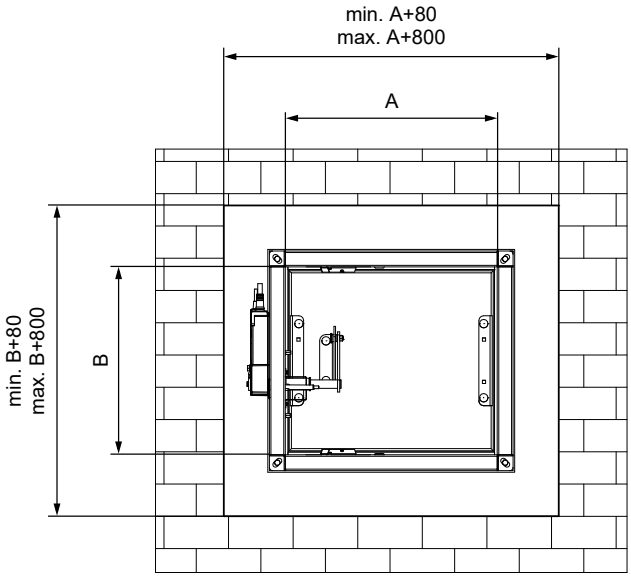
Fig. 16. In solid wall construction – Weichschott system

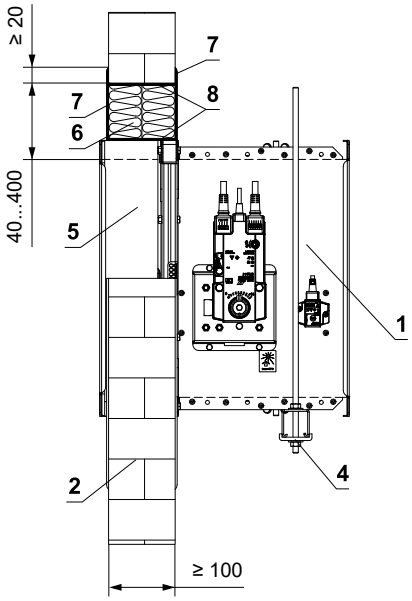
EIS 90

For connection of following duct, see page 79.









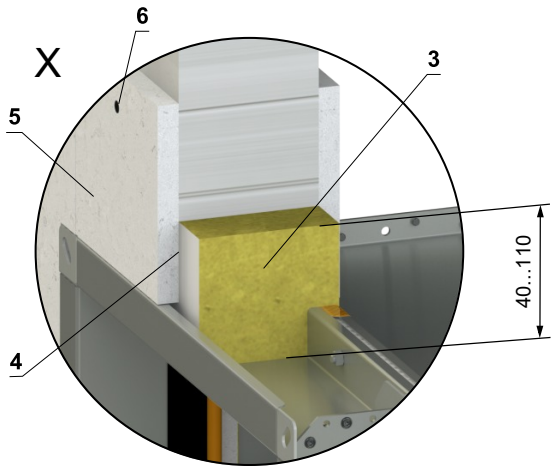
1 – FDMQ
2 – Solid wall construction
3 – Duct
4 – Profile with threaded rod, see pages 75 to 78
5 – Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST), see page 84, Weichschott system HILTI*
6 – Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
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

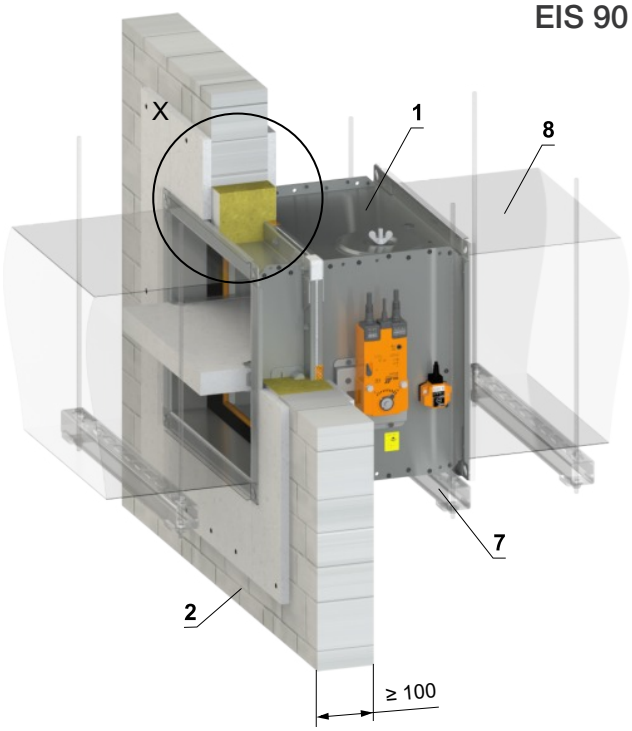
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

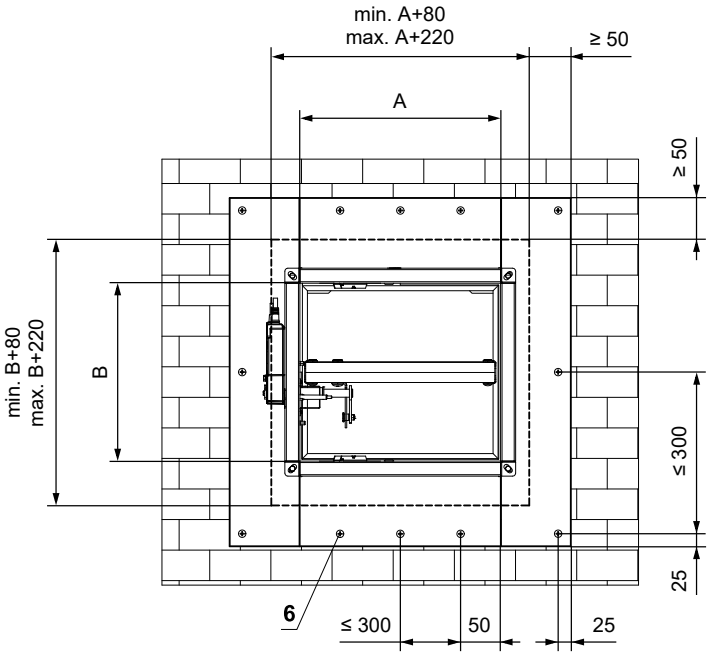
Fig. 17. In solid wall construction - mineral wool with fire-resistant coating and fire-resistance boards

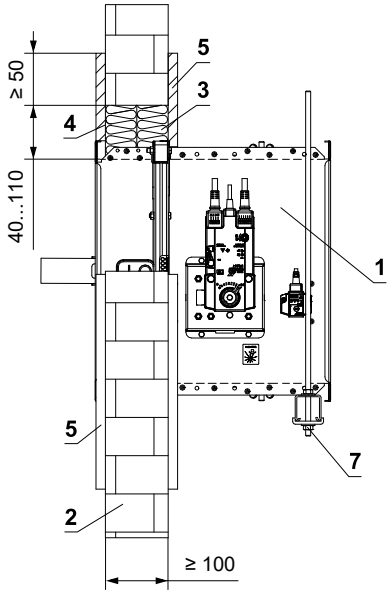
For connection of following duct, see page 79.

EIS 90





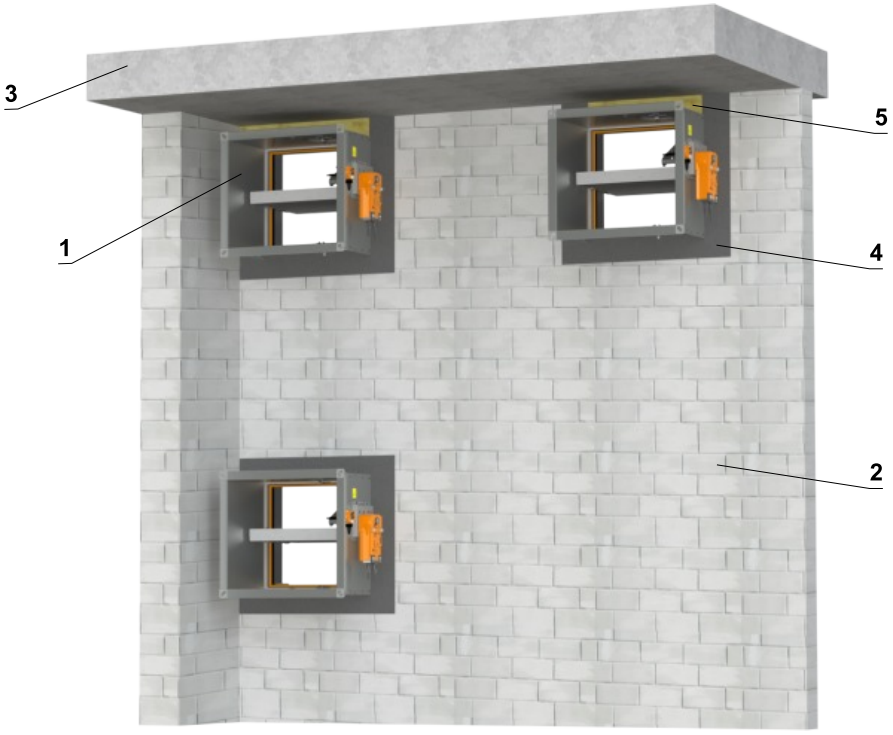


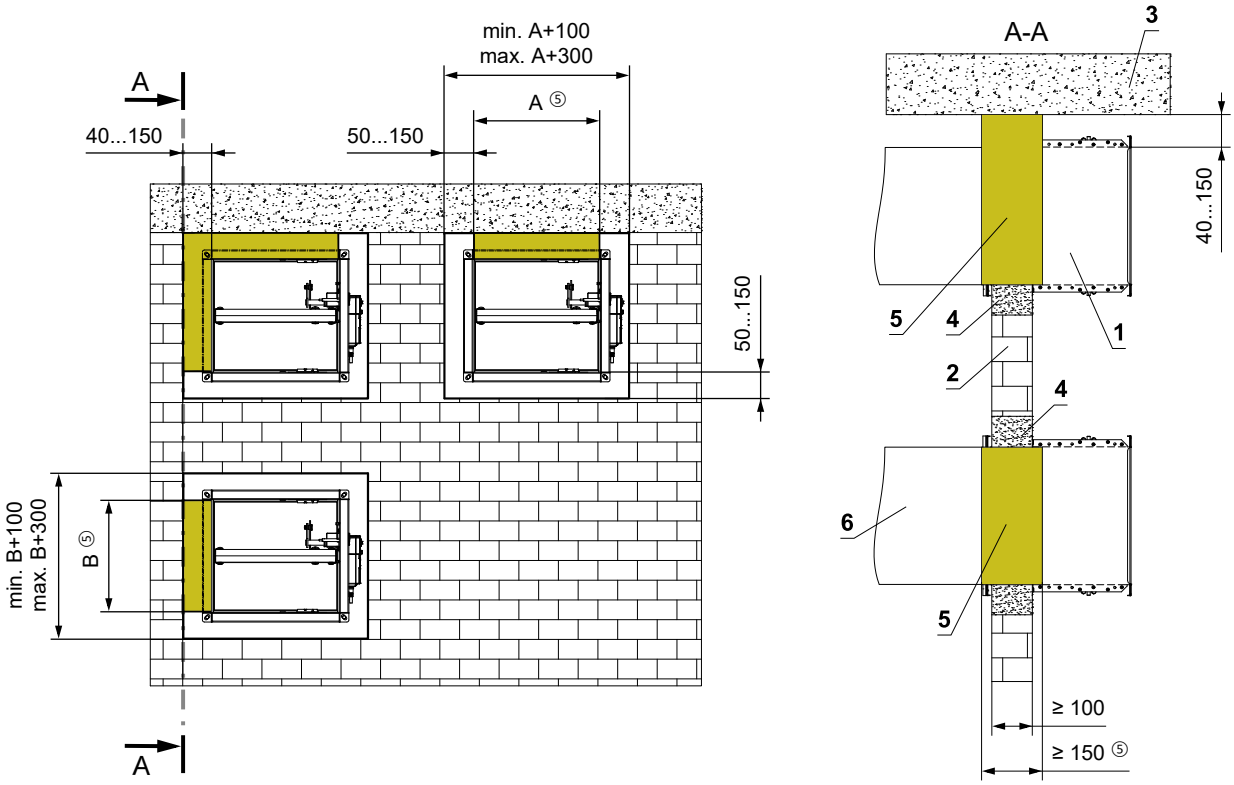


1 – FDMQ
2 – Solid wall construction
3 – Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
4 – Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
5 – Fire-resistant board - min. th. 15 mm, min. density 870 kg/m3 (e.g. PROMATECT-H)
6 – Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
7 – Profile with threaded rod, see pages 75 to 78
8 – Duct

Fig. 18. In solid wall construction - installation next to the wall/ceiling - mortar or gypsum + mineral wool

EIS 90





1 – FDMQ
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

For connection of following duct, see page 79.

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.

4.4 Installation outside solid wall constrution

Fig. 19. Outside solid wall constrution - ISOVER Ultimate Protect - mortar or gypsum

EIS 60

For connection of following duct, see page 79.

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.

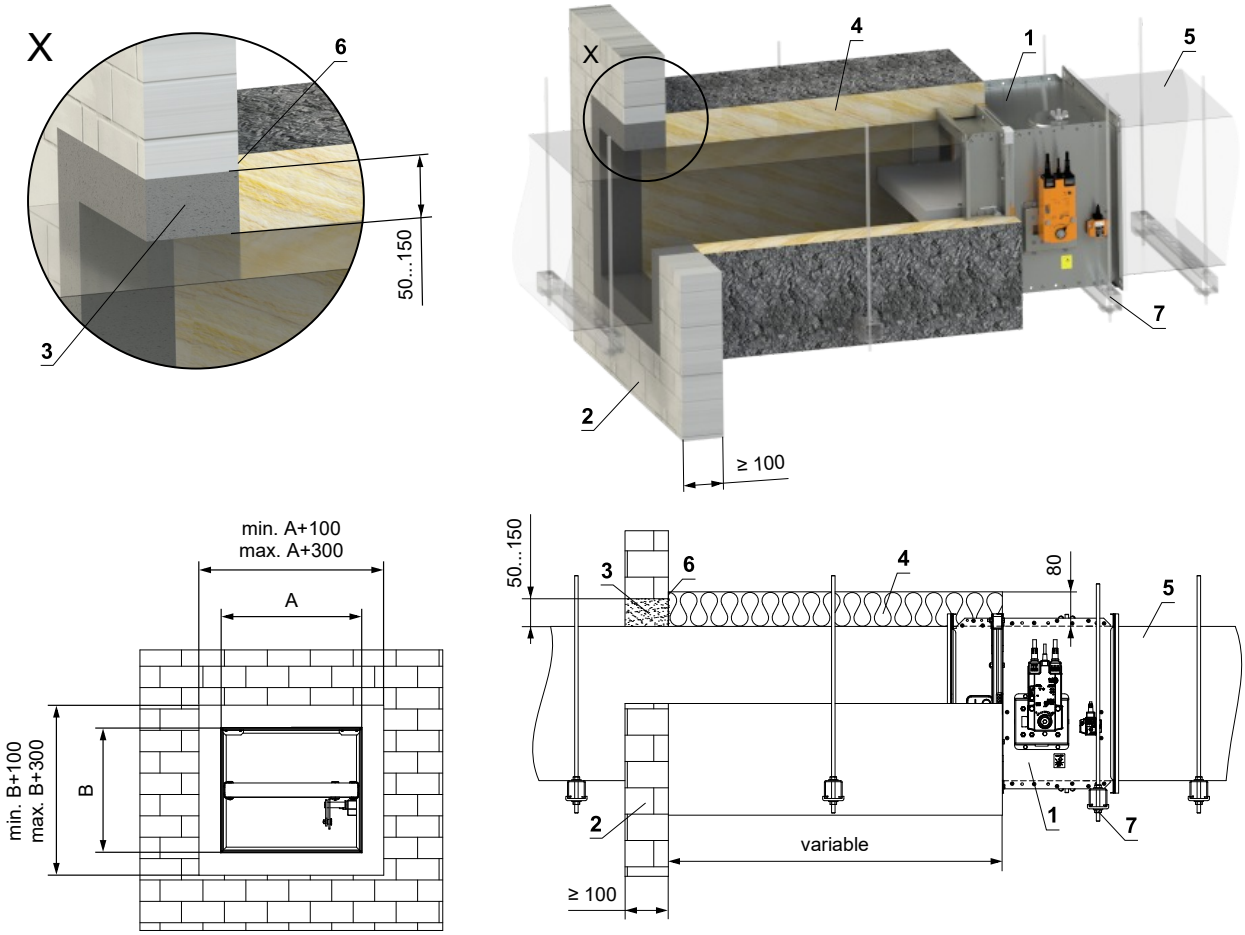
Load of the suspension system depends on weight of the fire damper and duct system, see page 75.

Max. distance between two suspension systems is 1500 mm.

Following ventilation 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 – FDMQ

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/m^3 (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)

5 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm

6 – ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction

7 – Profile with threaded rod, see pages 75 to 78

Fig. 20. Outside solid wall constrution - ISOVER Ultimate Protect - Weichschott system

EIS 60

For connection of following duct, see page 79.

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.

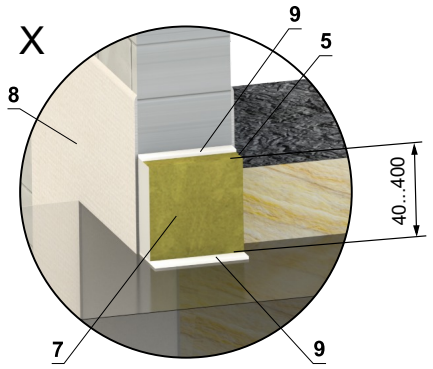
Load of the suspension system depends on weight of the fire damper and duct system, see page 75.

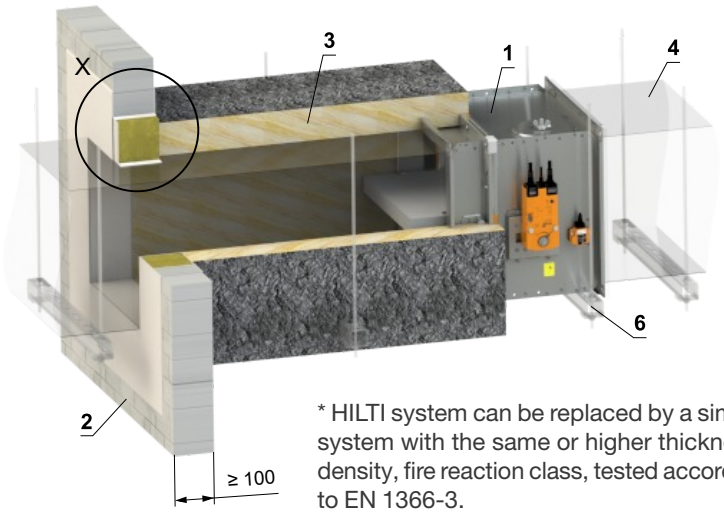
Max. distance between two suspension systems is 1500 mm.

Following ventilation 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.

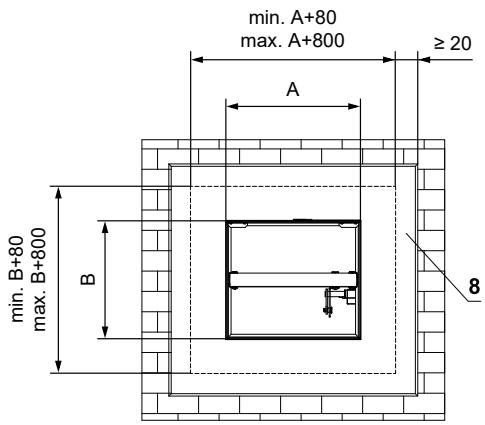
If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm.

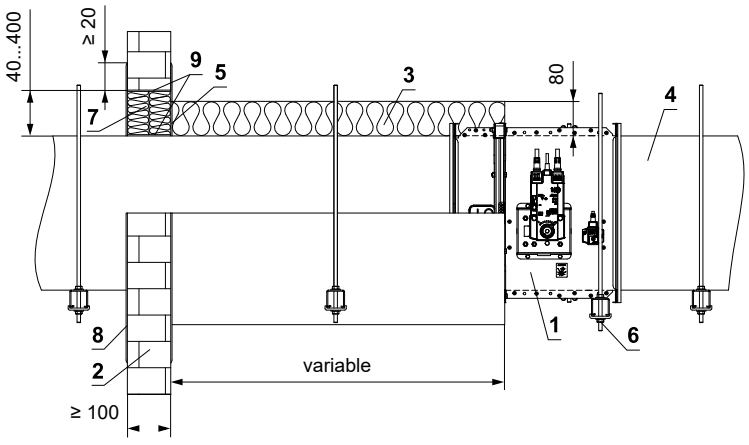
If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm.





* 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 – FDMQ

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/m^3 (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)

4 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm

5 – ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction

6 – Profile with threaded rod, see pages 75 to 78, Weichschott system HILTI*

7 – Mineral wool board - min. density 140 kg/m^3 (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

Fig. 21. Outside solid wall construction - mineral wool ROCKWOOL - mineral wool with fire-resistant coating and fireresistant board

EIS 90

For connection of following duct, see page 79.

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 75.

Max. distance between two suspension systems is 1500 mm.

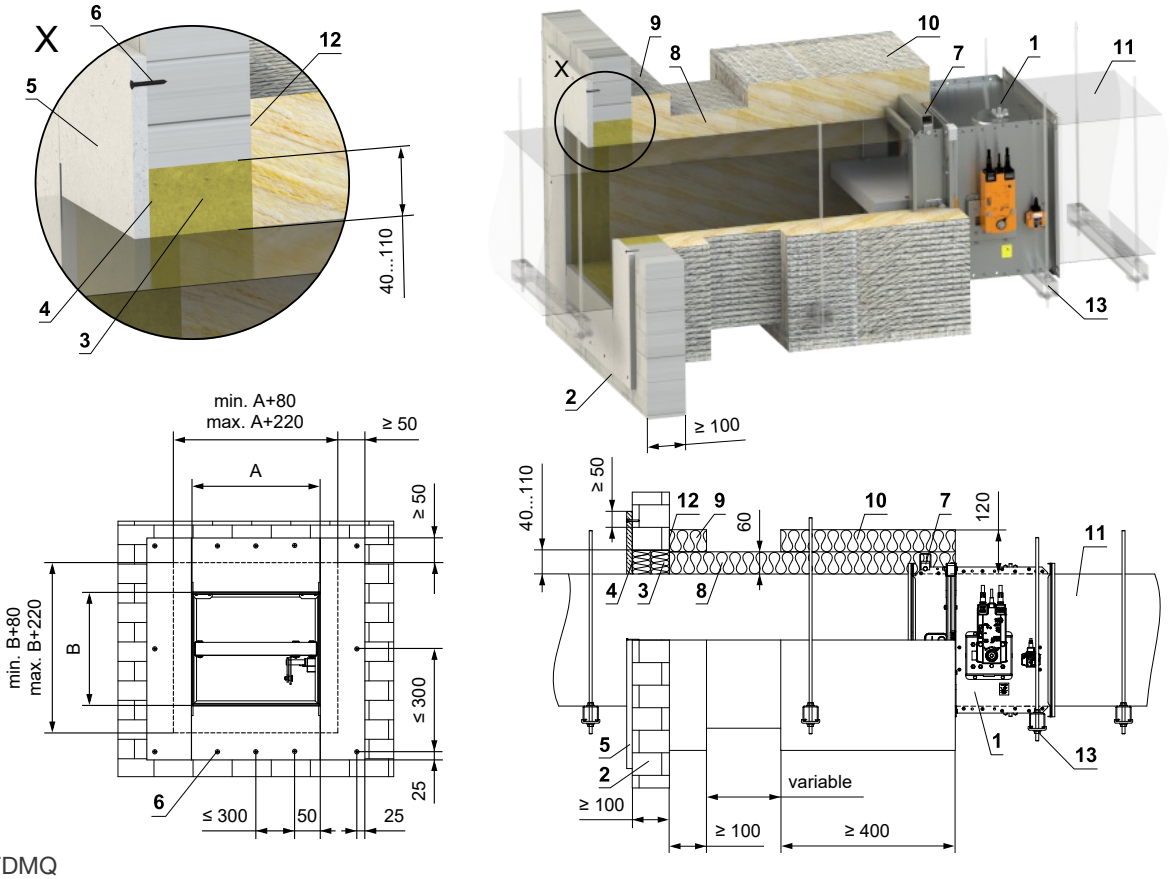
Duct at the point of penetration must be fixed to the fire separation structure.

Following ventilation 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.

If the damper is installed outside the fire separation construction and a damper side A ≥ 800 mm, VRM-Q reinforcement frame must be used, see page 83.



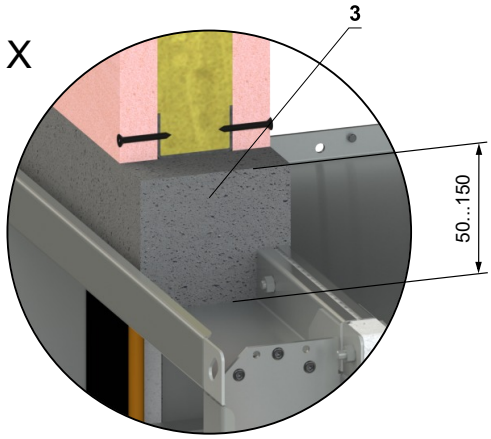
1 – FDMQ
2 – Solid wall construction
3 – Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
4 – Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
5 – Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
6 – Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
7 – VRM-Q, see page 83
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)
9 – Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90) - 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)
11 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm
12 – ROCKWOOL Firepro glue - apply on the insulation and fix it to the fire separation construction
13 – Profile with threaded rod, see pages 75 to 78

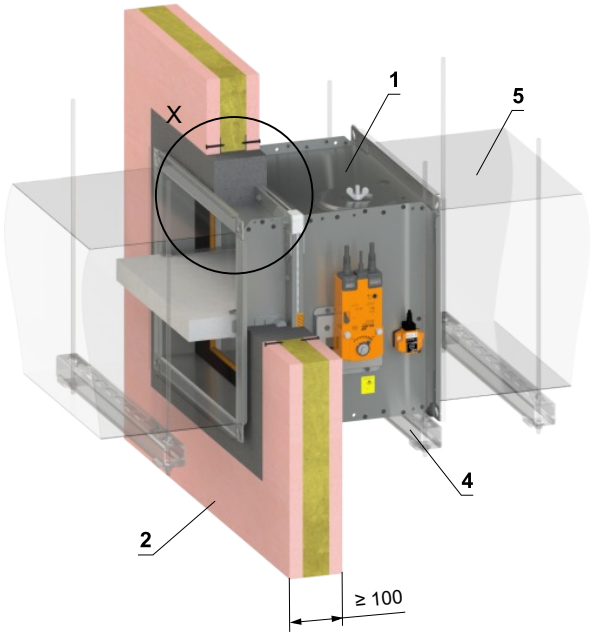
4.5 In gypsum wall construction

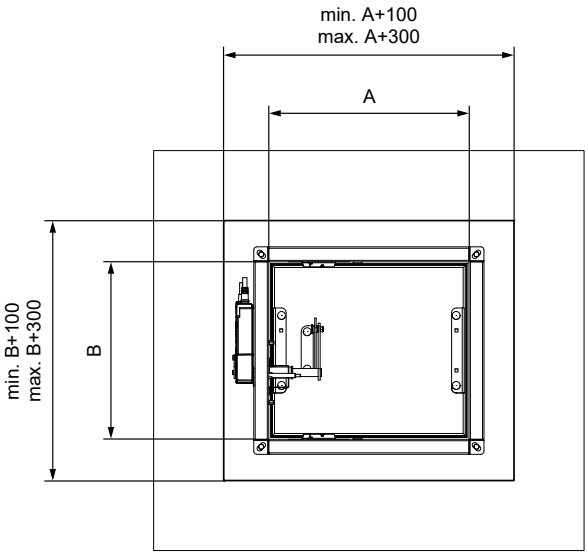
Fig. 22. In gypsum wall construction - mortar or gypsum

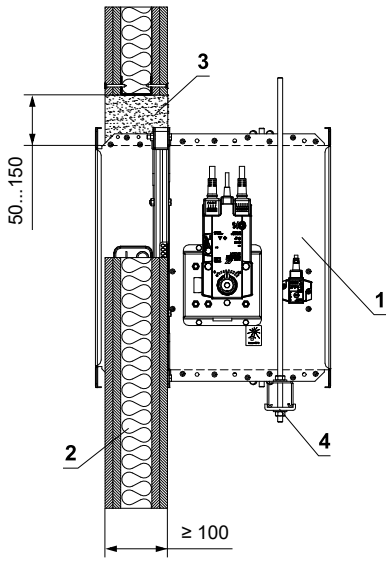
For connection of following duct, see page 79.

EIS 90





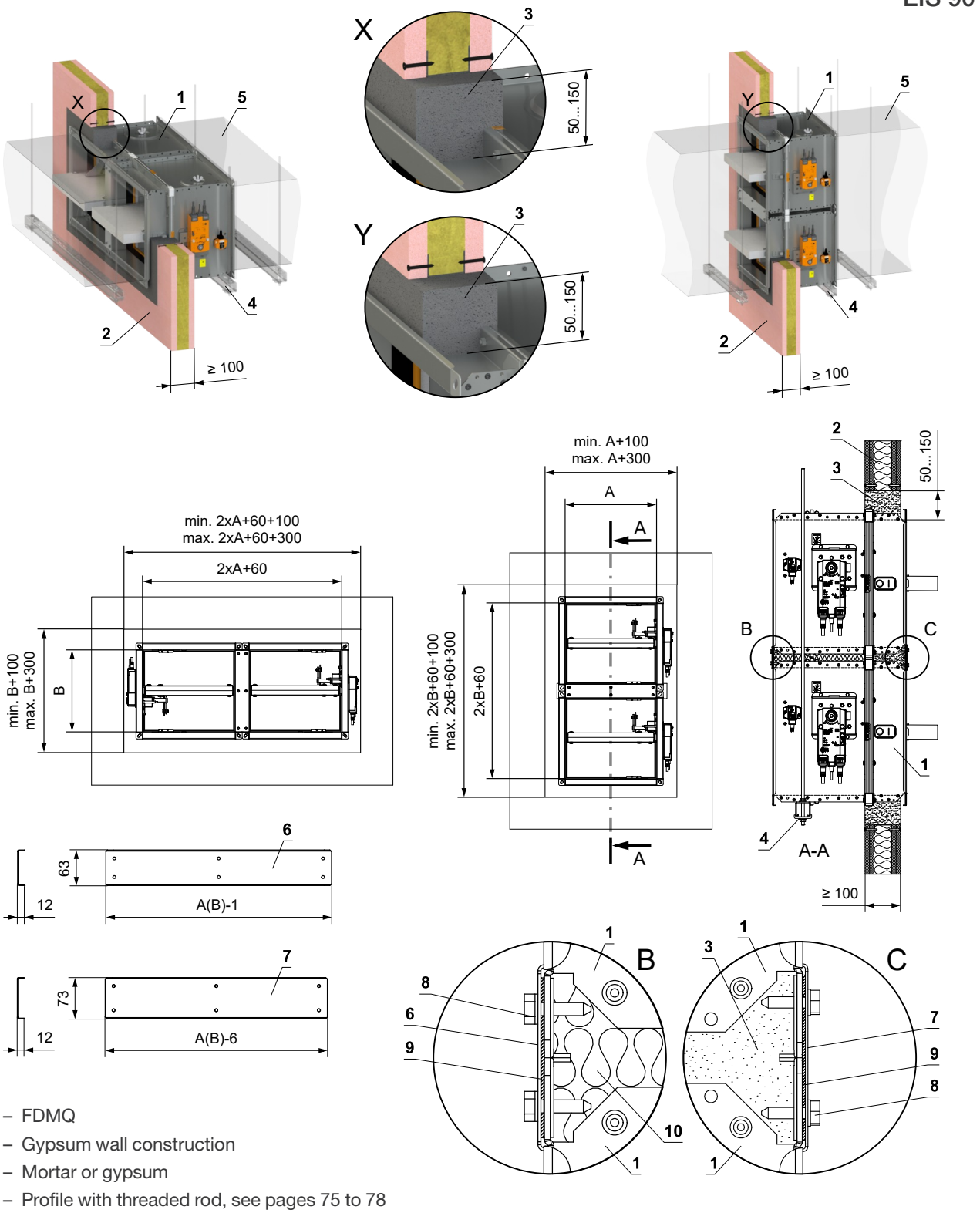




1 – FDMQ
2 – Gypsum wall construction
3 – Mortar or gypsum
4 – Profile with threaded rod, see pages 75 to 78
5 – Duct

Fig. 23. In gypsum wall construction - 2 dampers in battery - mortar or gypsum

EIS 90



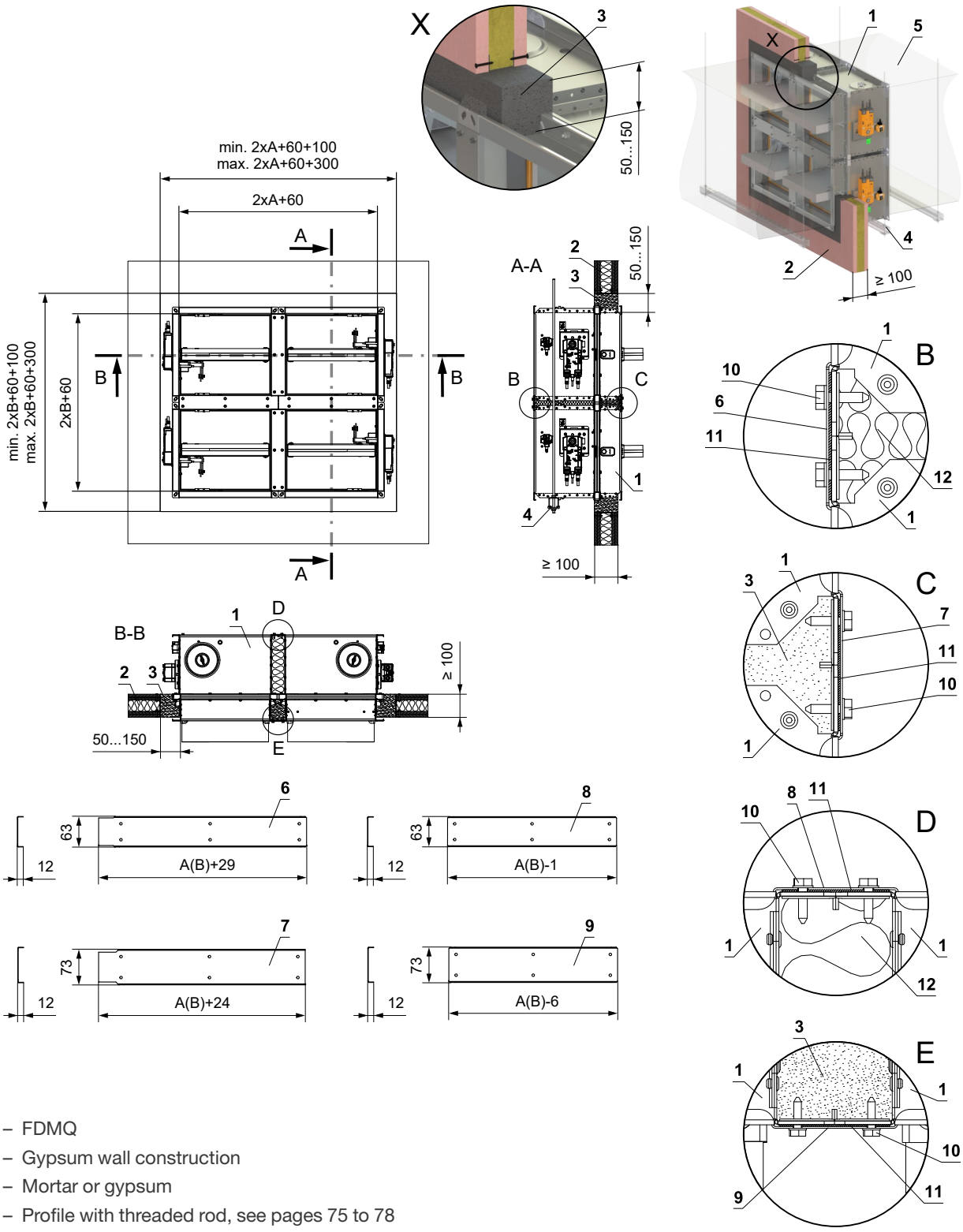
1 – FDMQ
2 – Gypsum wall construction
3 – Mortar or gypsum
4 – Profile with threaded rod, see pages 75 to 78
5 – Duct
6 – U-profile type 3
7 – U-profile type 1
8 – Screw TEX 4,8×18 mm (pitch ≤ 200 mm)
9 – Sealing
10 – Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum

For connection of following duct, see page 79.

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

Fig. 24. In gypsum wall construction - 4 dampers in battery - mortar or gypsum

EIS 90



1 – FDMQ
2 – Gypsum wall construction
3 – Mortar or gypsum
4 – Profile with threaded rod, see pages 75 to 78
5 – Duct
6 – U-profile type 2
7 – U-profile type 4
8 – U-profile type 1
9 – U-profile type 3
10 – Screw TEX 4,8×18 mm (pitch ≤ 200 mm)
11 – Sealing
12 – Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum

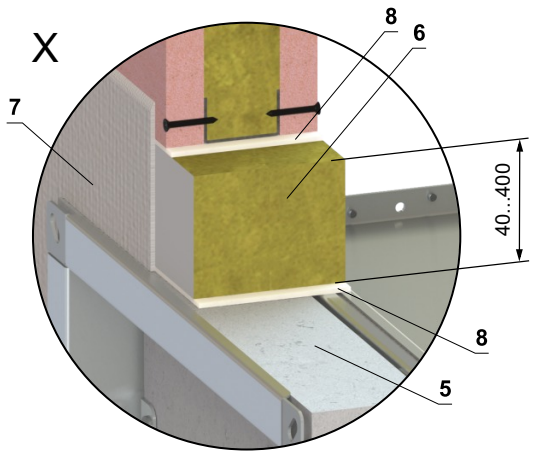
For connection of following duct, see page 79.

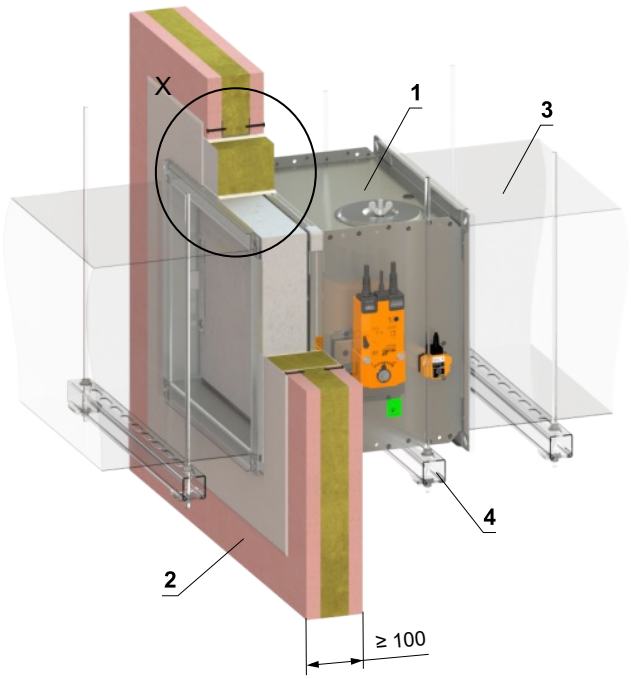
The gap between the damper and construction is filled with mortar or gypsum.

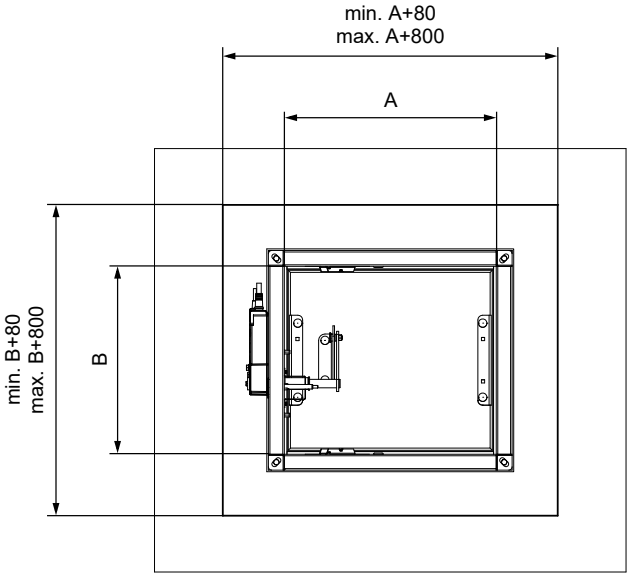
Fig. 25. In gypsum wall construction - Weichschott system

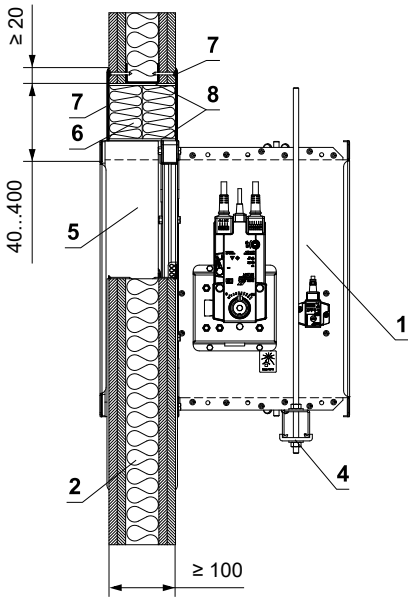
EIS 90

For connection of following duct, see page 79.









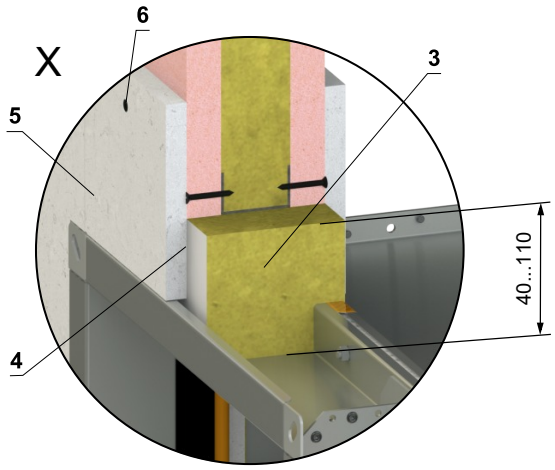
1 – FDMQ
2 – Gypsum wall construction
3 – Duct
4 – Profile with threaded rod, see pages 75 to 78
5 – Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST), see page 84, Weichschott system HILTI*
6 – Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
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

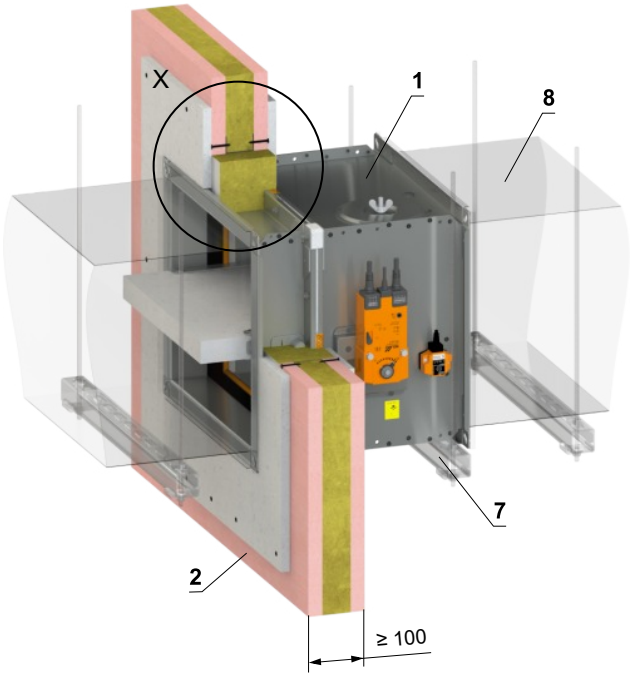
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

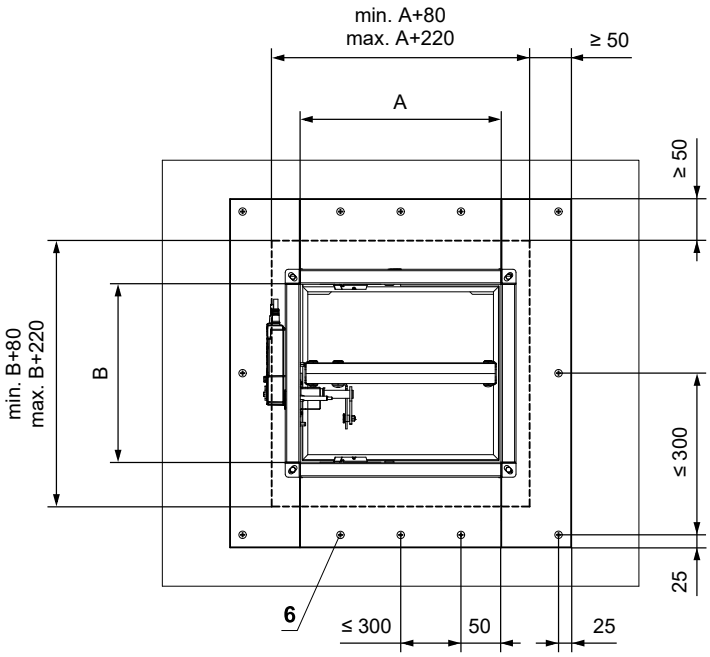
Fig. 26. In gypsum wall construction - mineral wool with fire-resistant coating and fire-resistance boards

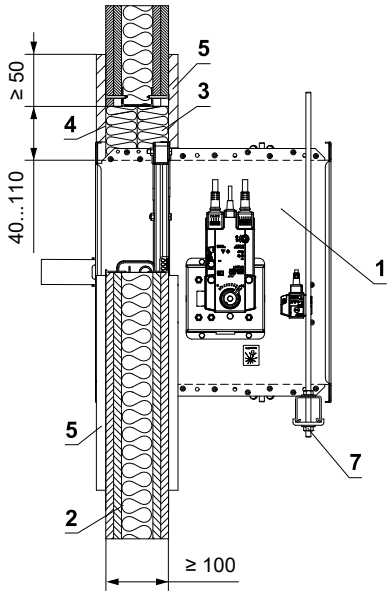
For connection of following duct, see page 79.

EIS 90





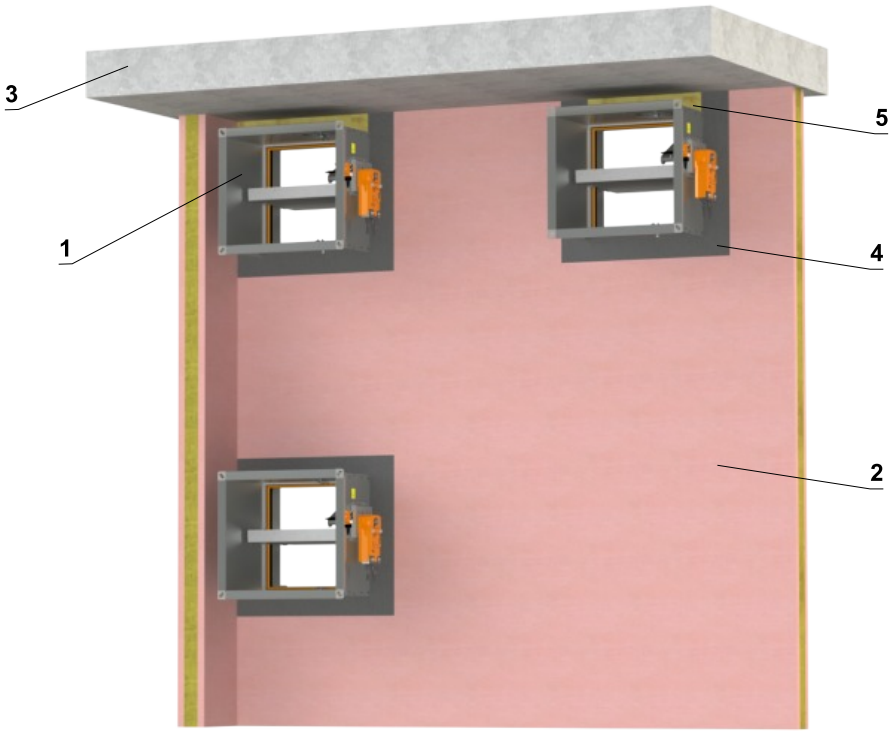


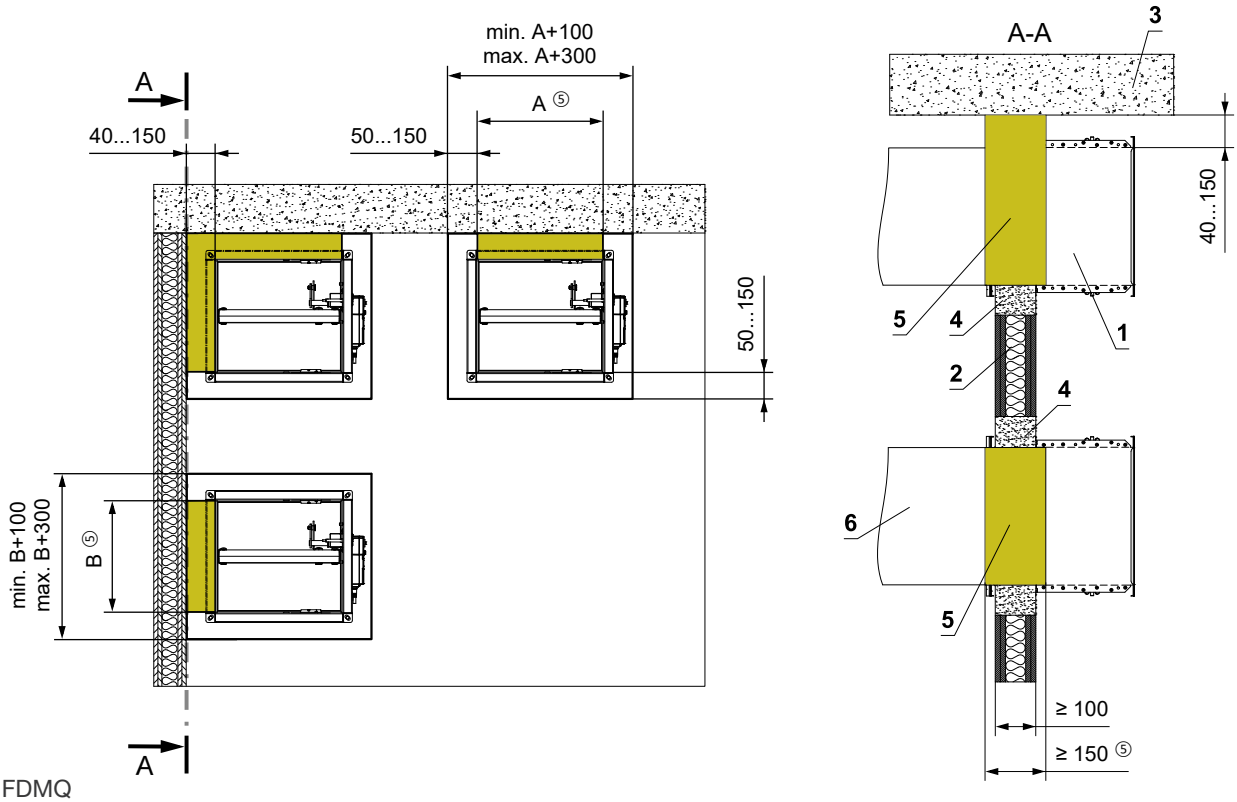


1 – FDMQ
2 – Gypsum wall construction
3 – Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
4 – Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
5 – Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
6 – Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
7 – Profile with threaded rod, see pages 75 to 78
8 – Duct

Fig. 27. In gypsum wall construction - installation next to the wall/ceiling - mortar or gypsum + mineral wool

EIS 90





1 – FDMQ
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

For connection of following duct, see page 79.

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.

4.6 Installation outside gypsum wall constrution

Fig. 28. Outside gypsum wall constrution - ISOVER Ultimate Protect - mortar or gypsum **EIS 60**

For connection of following duct, see page 79.

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.

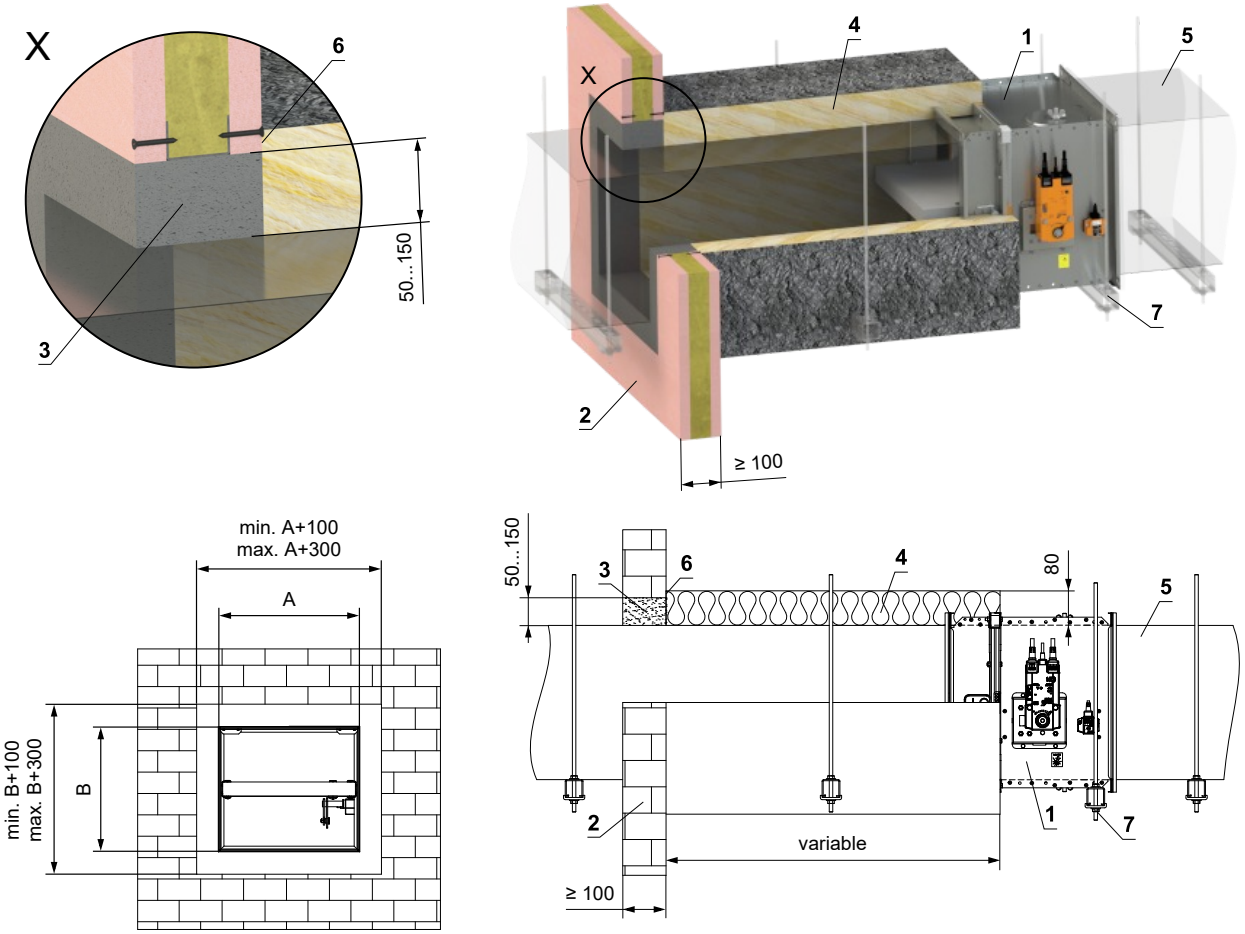
Load of the suspension system depends on weight of the fire damper and duct system, see page 75.

Max. distance between two suspension systems is 1500 mm.

Following ventilation 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 – FDMQ

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/m^3 (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)

5 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm

6 – ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction

7 – Profile with threaded rod, see pages 75 to 78

Fig. 29. Outside gypsum wall constrution - ISOVER Ultimate Protect - Weichschott system

EIS 60

For connection of following duct, see page 79.

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.

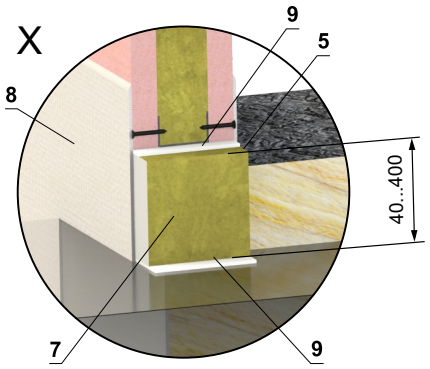
Load of the suspension system depends on weight of the fire damper and duct system, see page 75.

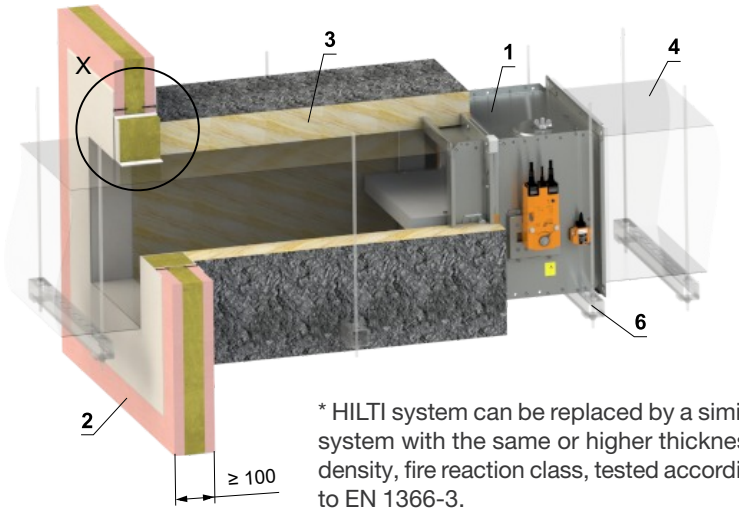
Max. distance between two suspension systems is 1500 mm.

Following ventilation 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.

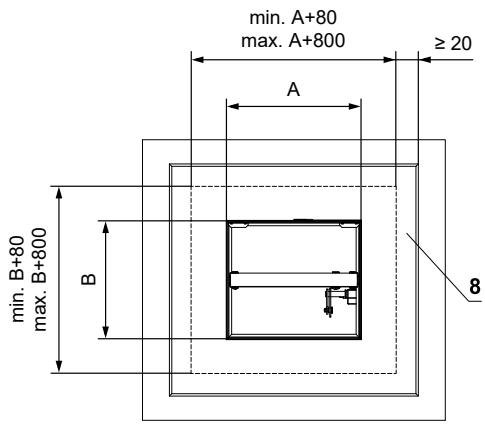
If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm.

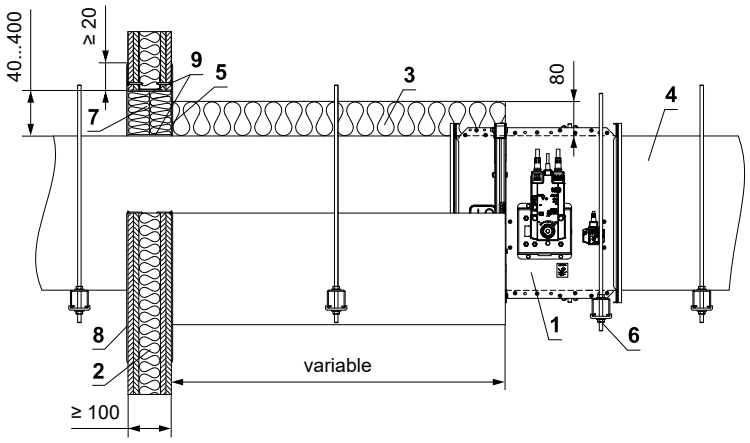
If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm.





* 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 – FDMQ

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/m^3 (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)

4 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm

5 – ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction

6 – Profile with threaded rod, see pages 75 to 78, Weichschott system HILTI*

7 – Mineral wool board - min. density 140 kg/m^3 (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

Fig. 30. Outside gypsum wall constrution - mineral wool ROCKWOOL - mineral wool with fire-resistant coating and fireresistant board

EIS 90

For connection of following duct, see page 79.

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 75.

Max. distance between two suspension systems is 1500 mm.

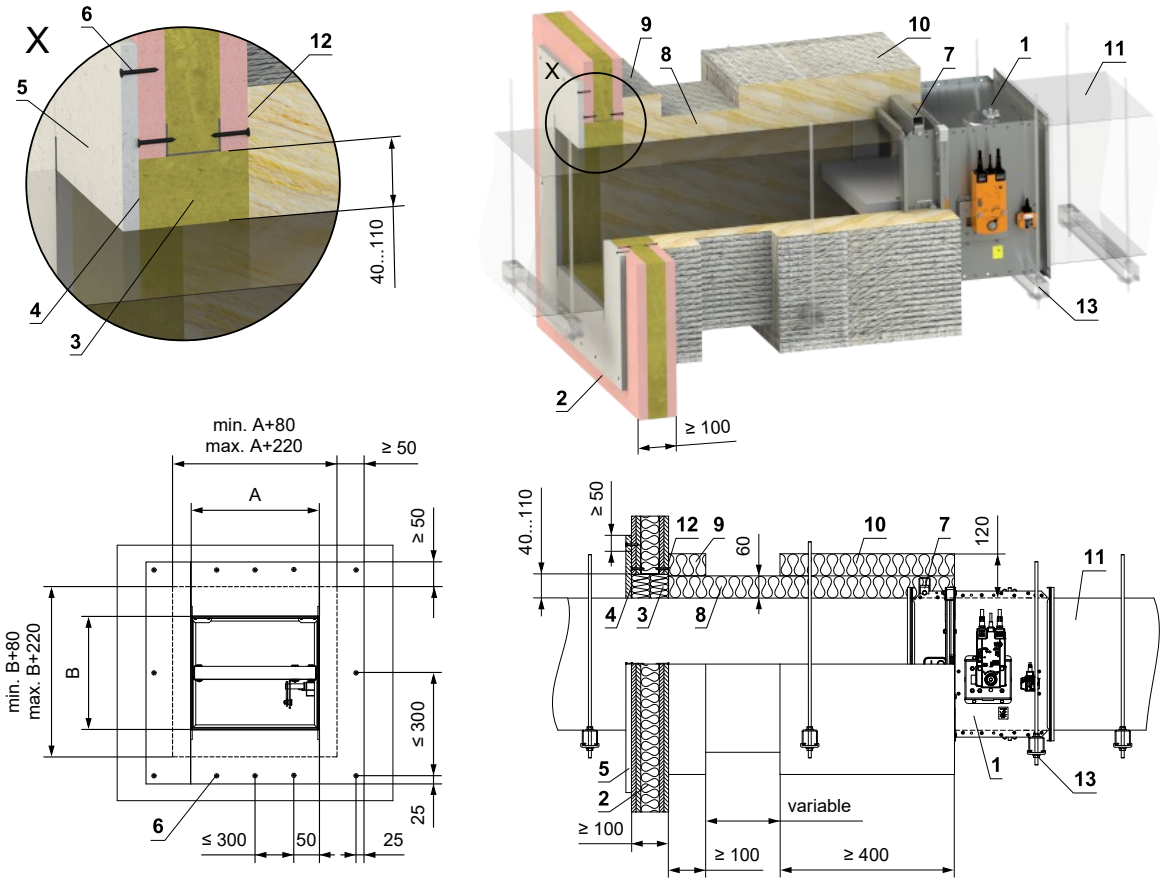
Duct at the point of penetration must be fixed to the fire separation structure.

Following ventilation 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.

If the damper is installed outside the fire separation construction and a damper side A ≥ 800 mm, VRM-Q reinforcement frame must be used, see page 83.



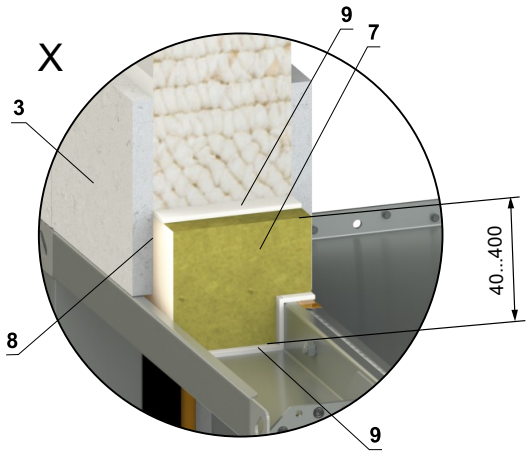
1 – FDMQ
2 – Gypsum wall construction
3 – Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
4 – Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
5 – Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
6 – Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
7 – VRM-Q, see page 83
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)
9 – Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90) - 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)
11 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm
12 – ROCKWOOL Firepro glue - apply on the insulation and fix it to the fire separation construction
13 – Profile with threaded rod, see pages 75 to 78

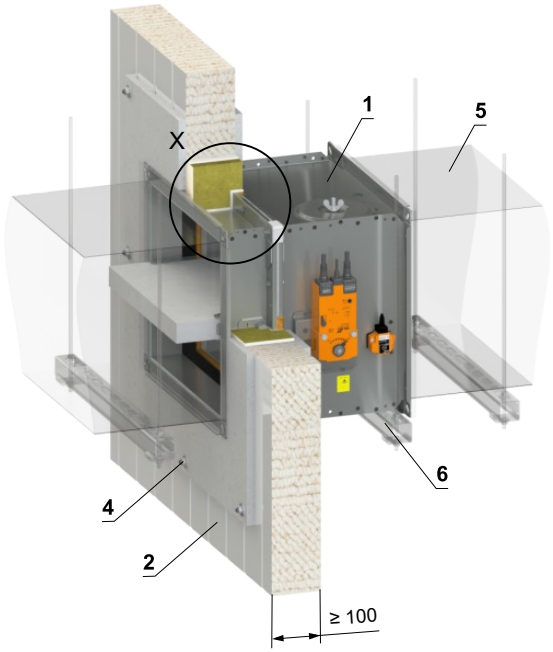
4.7 Installation in sandwich wall construction

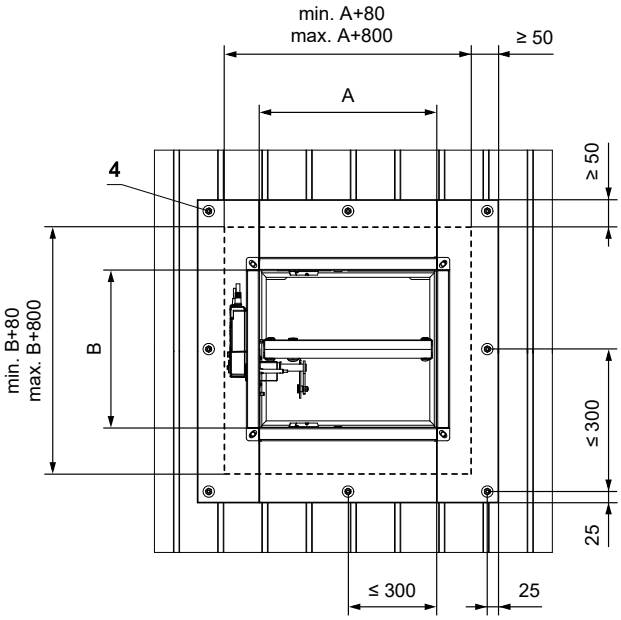
Fig. 31. In sandwich wall construction - Weichschott system with fire-resistant boards

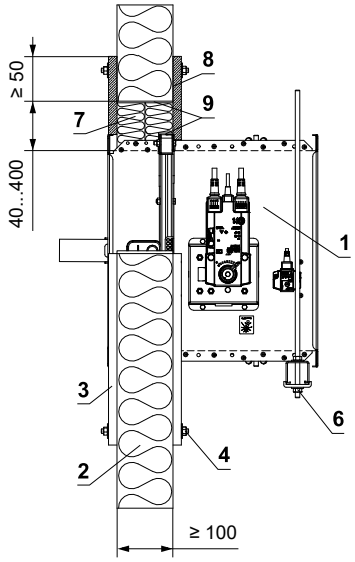
EIS 90

For connection of following duct, see page 79.









* 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 – FDMQ
2 – Sandwich wall construction - min. th. 100 mm (Paroc AST S or RUUKKI SPB W)
3 – Fire-resistant board - min. th. 15 mm, min. density 870 kg/m^3 (e.g. PROMATECT-H)
4 – Fixing connection of boards - threaded rod M8 (length of the threaded rod for 100 mm sandwich construction is approx. 150 mm, 2 pcs large washer M8, 2 pcs nut M8).
The boards must be tightly fixed to the sandwich wall construction!
5 – Duct
6 – Profile with threaded rod (see pages 75 to 78), Weichschott system HILTI*
7 – Mineral wool board - min. density 140 kg/m^3 (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

4.8 Shaft walls

Rigips

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

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

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

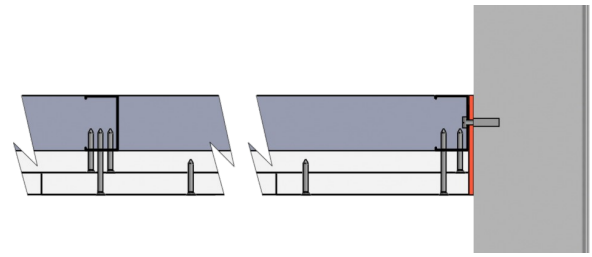
Assembly with support structure

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

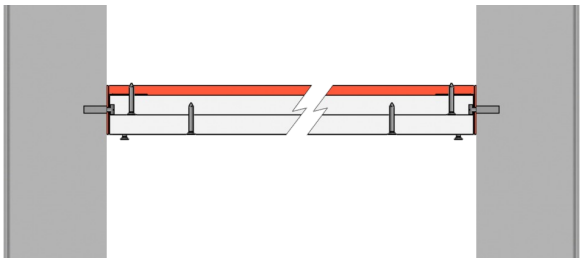
Assembly without support structure

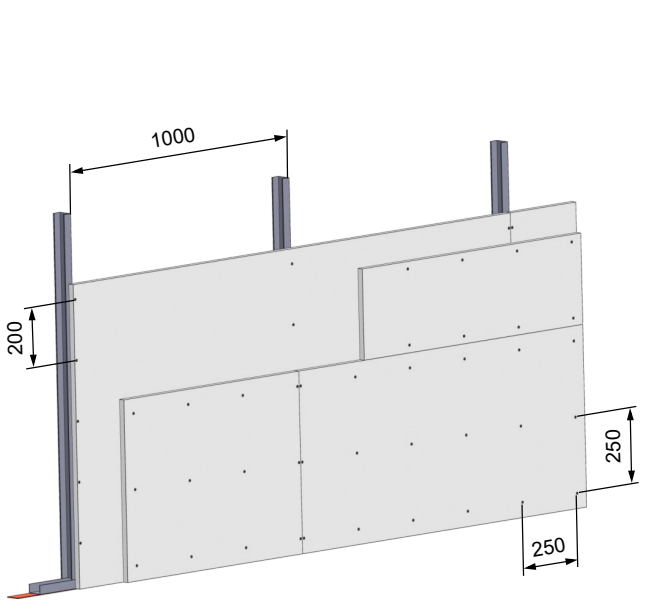
Maximum width of the shaft wall is 2 metres in this case (board length). Steel squares made from steel galvanized sheet metal 40/20/1 mm are used as perimeter sections, they are anchored to bearing wall using Ø 6 mm steel plugs (for example DN6 or ZHOP) with 500 mm spacing.

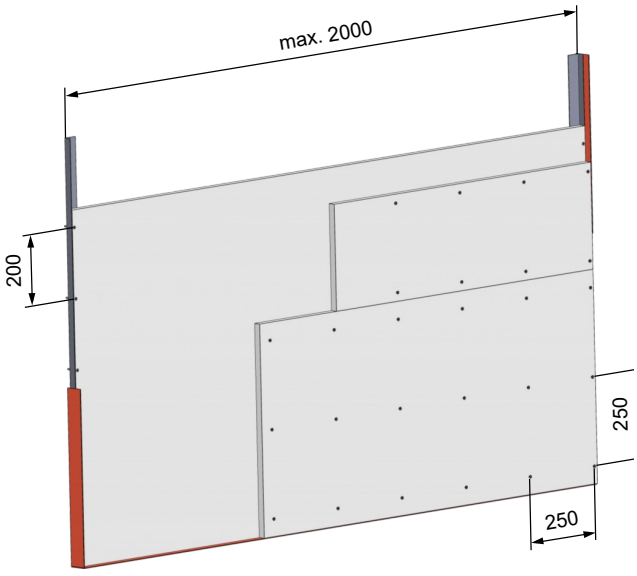
Assembly with support structure



Assembly without support structure





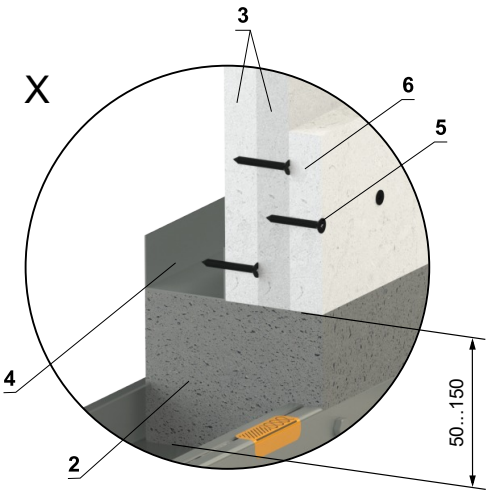


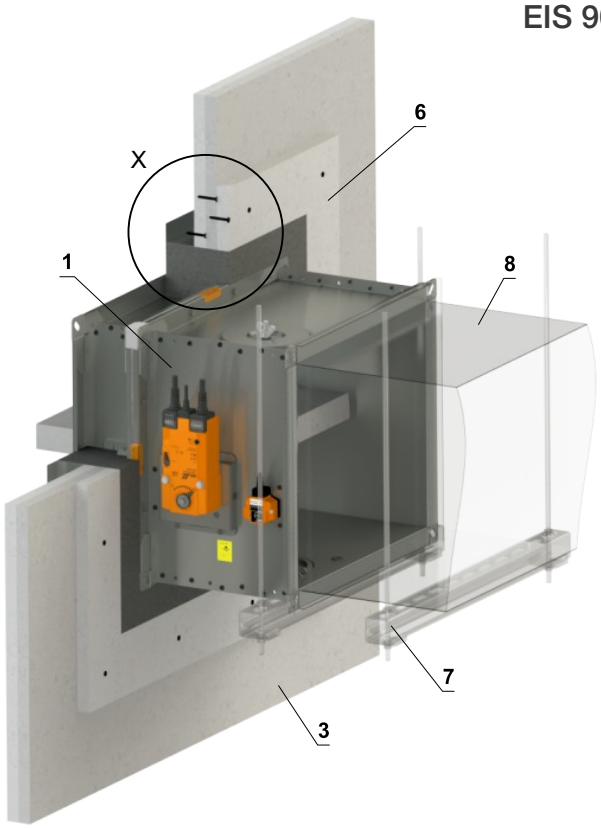
Rigips solution is shown here as an example. Alternatively it is possible to apply the solution from Knauf or Promat. In such a case follow the instructions of the producer.

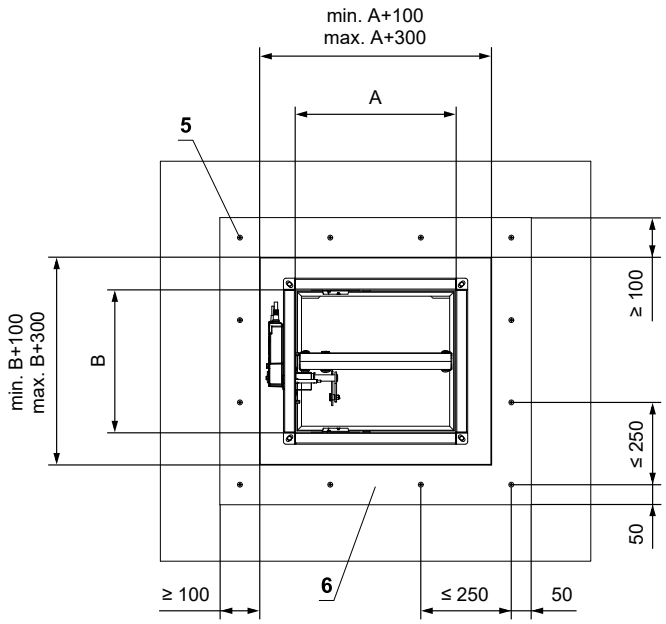
Fig. 32. In shaft wall Rigips - mortar or gypsum

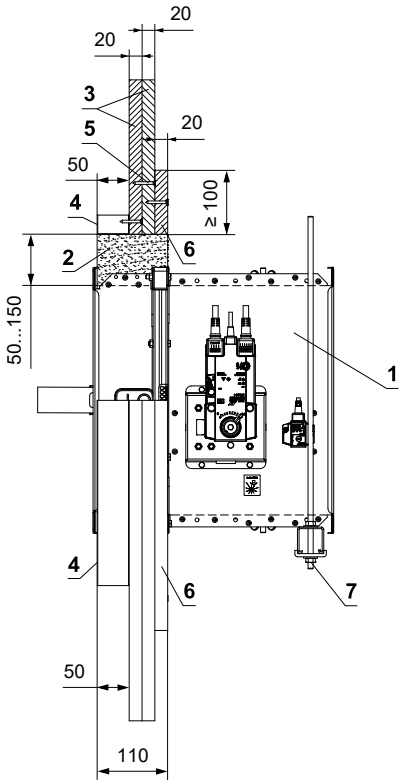
EIS 90

For connection of following duct, see page 79.
Follow shaft wall manufacturer's instructions.









1 – FDMQ
2 – Mortar or gypsum
3 – Fire-resistant board th. 20 mm Rigips Glasroc F Ridurit
4 – Steel U-profile Rigips R-UW 50 or Rigips R-CW 50
5 – Screw Rigips Ridurit TX 3,5x35 mm
6 – Additional fire-resistant board tl. 20 mm Rigips Glasroc F Ridurit
7 – Profile with threaded rod, see pages 75 to 78
8 – Duct

Fig. 33. In shaft wall Rigips - installation frame E1

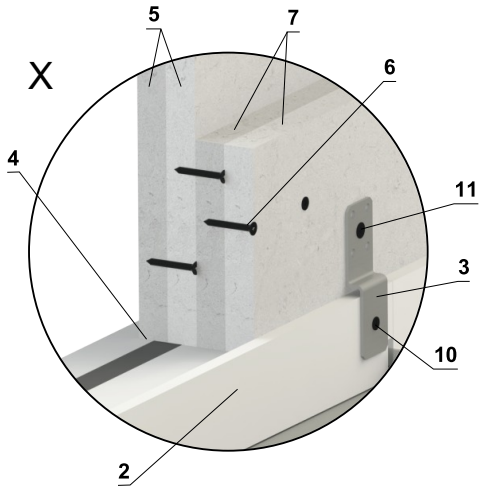
For connection of following duct, see page 79.

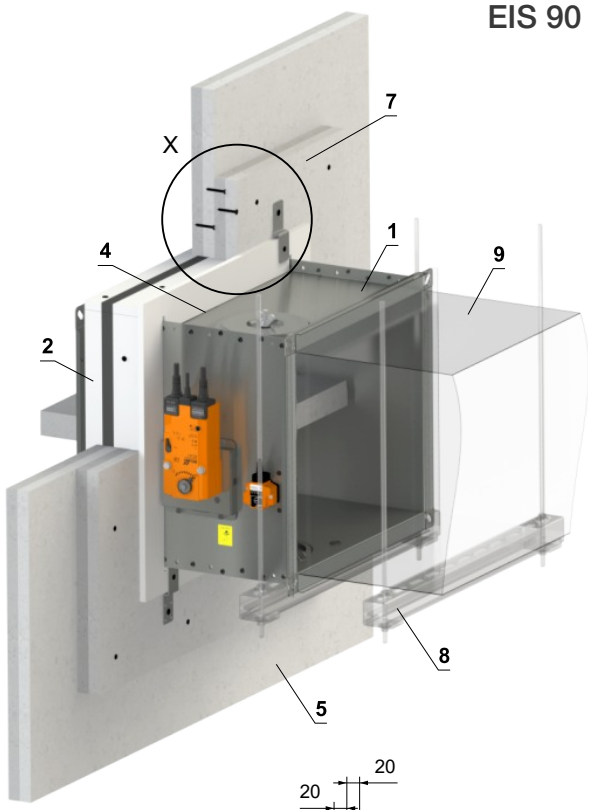
Follow shaft wall manufacturer's instructions.

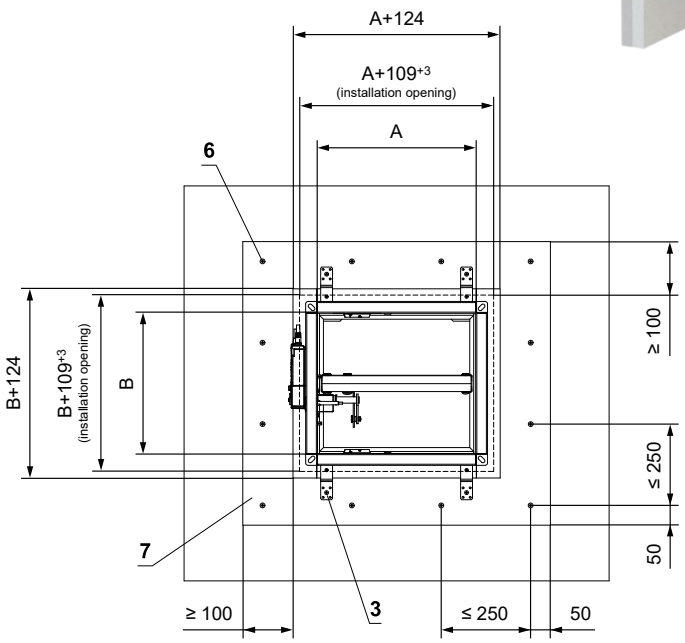
Installation frame can be installed on the damper or delivered separately.

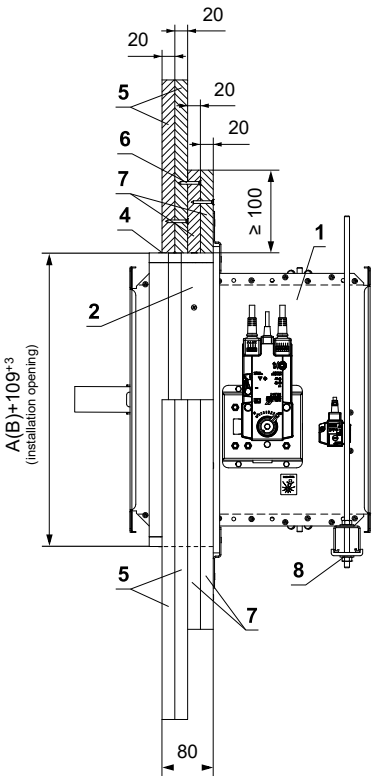
For more E1 frame details, see page 57.

EIS 90









1 – FDMQ
2 – Installation frame E1
3 – Bracket (fastening material included in frame delivery)
4 – Fill the gaps with glue PROMAT K84
5 – Fire-resistant board th. 20 mm Rigips Glasroc F Ridurit
6 – Screw Rigips Ridurit TX 3,5x35 mm
7 – Additional fire-resistant board th. 20 mm Rigips Glasroc F Ridurit
8 – Profile with threaded rod, see pages 75 to 78
9 – Duct
10 – Screw 4x16 mm to attach bracket to the frame
11 – Screw 5x60 mm to attach bracket to the construction

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

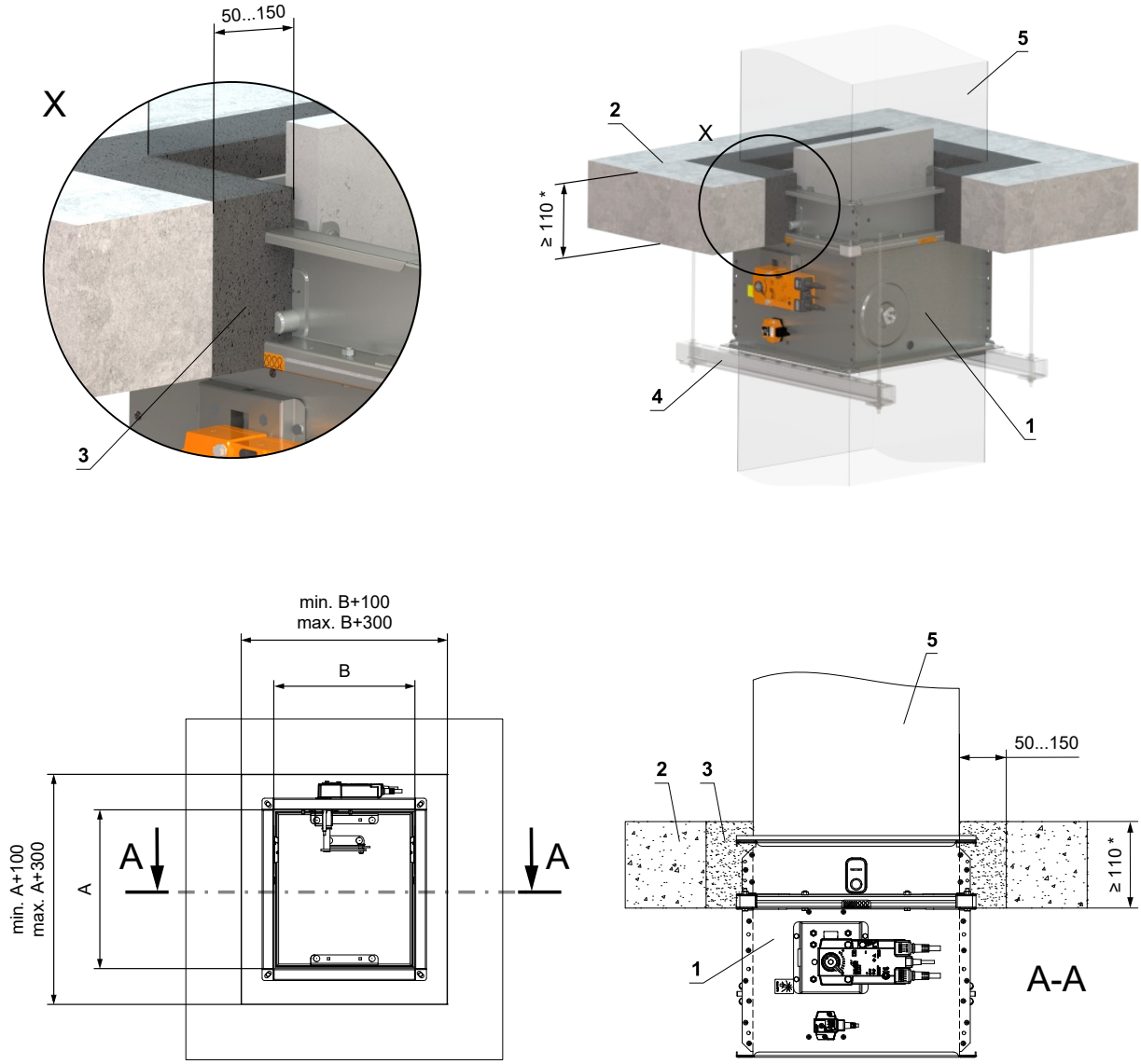
Side A	No. of brackets ZA	Side B	No. of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

4.9 In solid ceiling construction

Fig. 34. In solid ceiling construction - mortar or gypsum

For connection of following duct, see page 79.

EIS 90

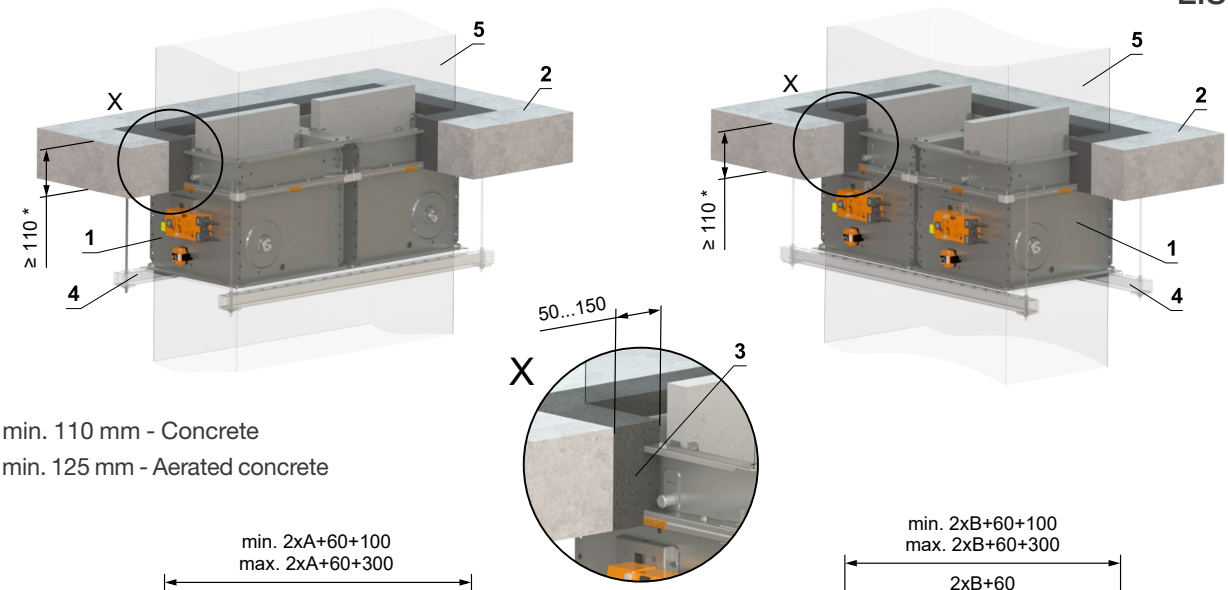


1 – FDMQ
2 – Solid ceiling construction
3 – Mortar or gypsum
4 – Profile with threaded rod, see pages 75 to 78
5 – Duct

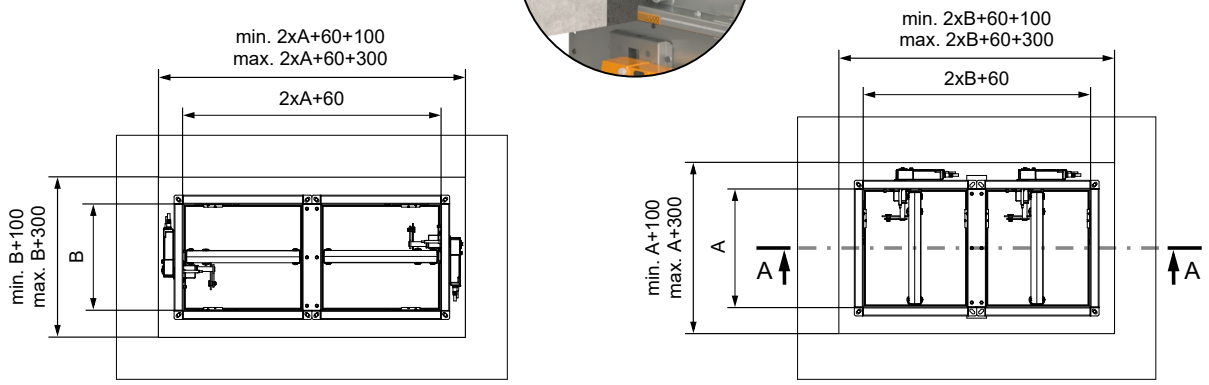
* min. 110 mm - Concrete
min. 125 mm - Aerated concrete

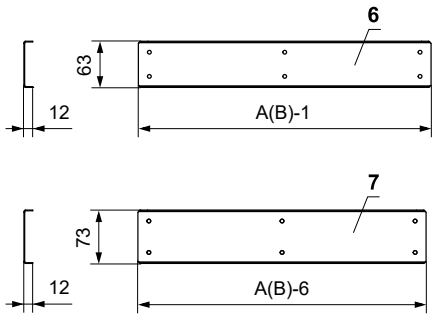
Fig. 35. In solid ceiling construction - 2 dampers in one opening - mortar or gypsum

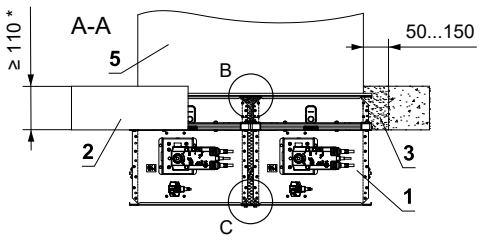
EIS 90

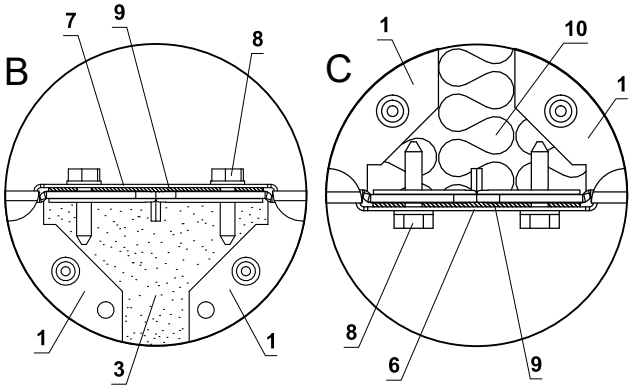


* min. 110 mm - Concrete
min. 125 mm - Aerated concrete









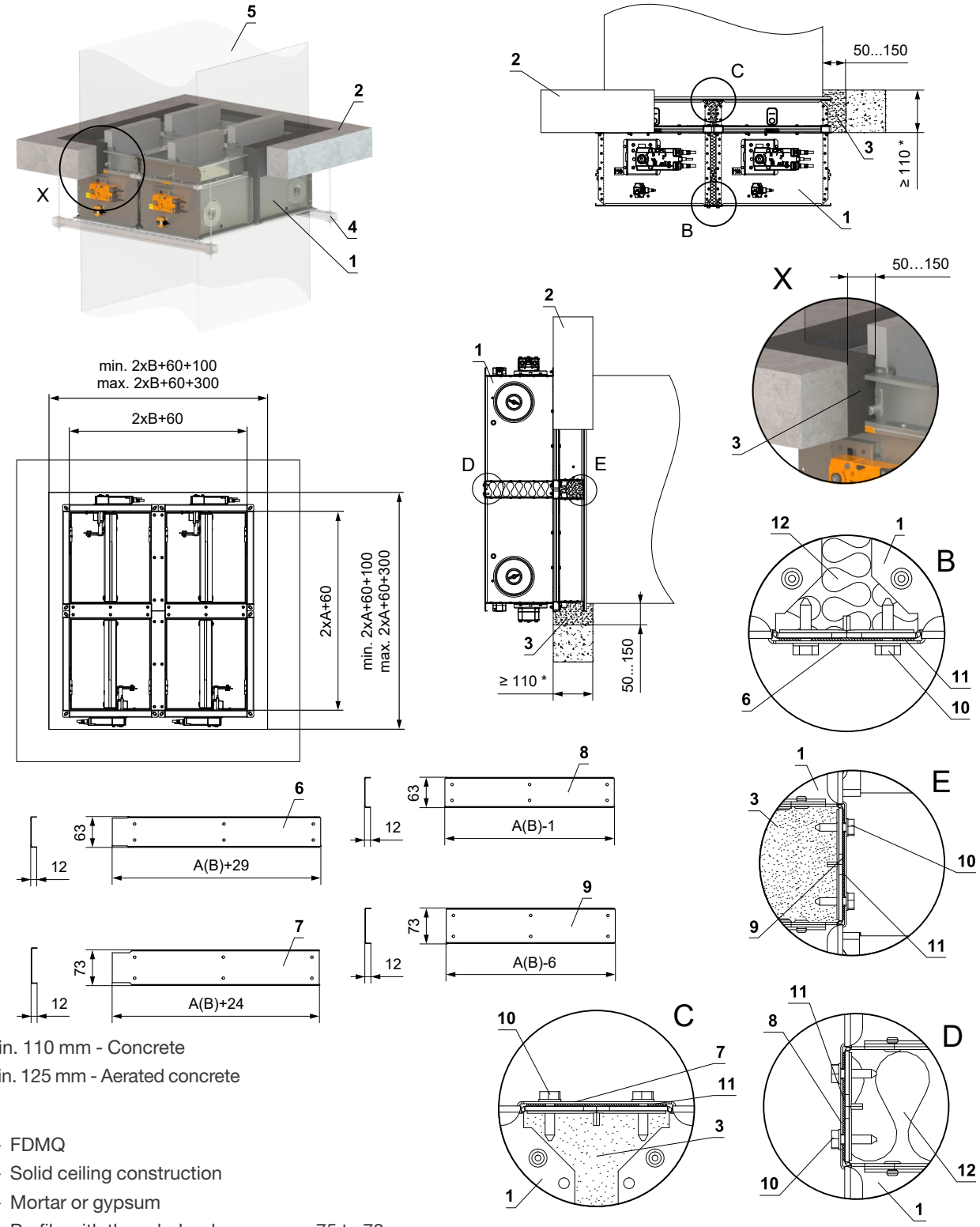
1 – FDMQ
2 – Solid ceiling construction
3 – Mortar or gypsum
4 – Profile with threaded rod, see pages 75 to 78
5 – Duct
6 – U-profile type 3
7 – U-profile type 1
8 – Screw TEX 4,8×18 mm (pitch ≤ 200 mm)
9 – Sealing
10 – Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum

For connection of following duct, see page 79.

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

Fig. 36. In solid ceiling construction - 4 dampers in one opening - mortar or gypsum

EIS 90



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

1 – FDMQ
2 – Solid ceiling construction
3 – Mortar or gypsum
4 – Profile with threaded rod, see pages 75 to 78
5 – Duct
6 – U-profile type 2
7 – U-profile type 4
8 – U-profile type 1
9 – U-profile type 3
10 – Screw TEX 4,8×18 mm (pitch ≤ 200 mm)
11 – Sealing
12 – Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum

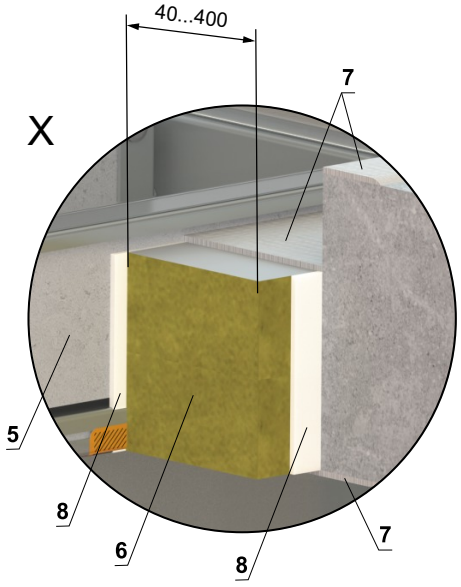
For connection of following duct, see page 79.

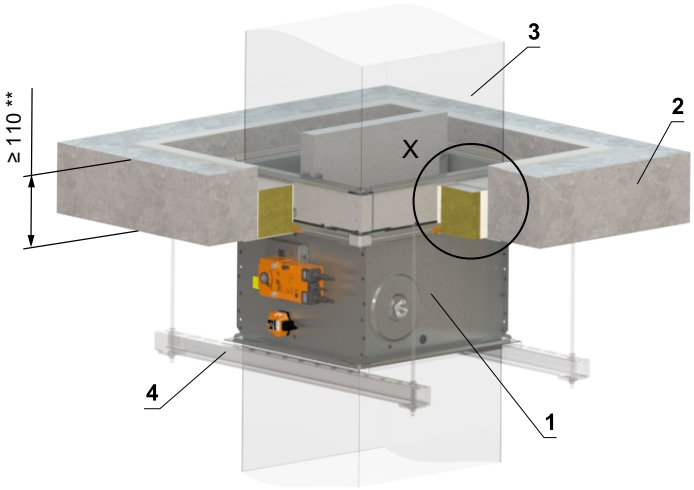
The gap between the damper and construction is filled with mortar or gypsum.

Fig. 37. In solid ceiling construction - Weichschott system

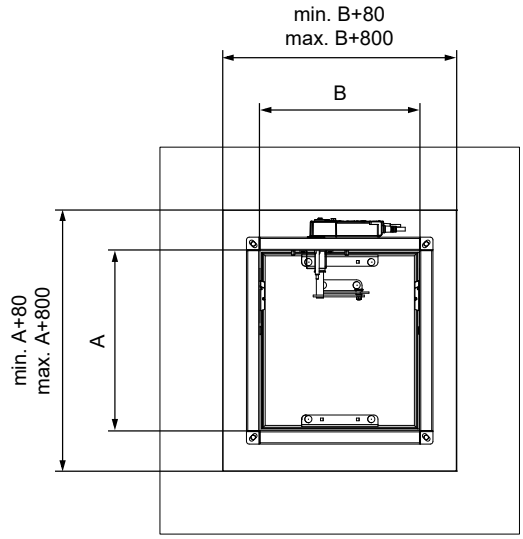
EIS 90

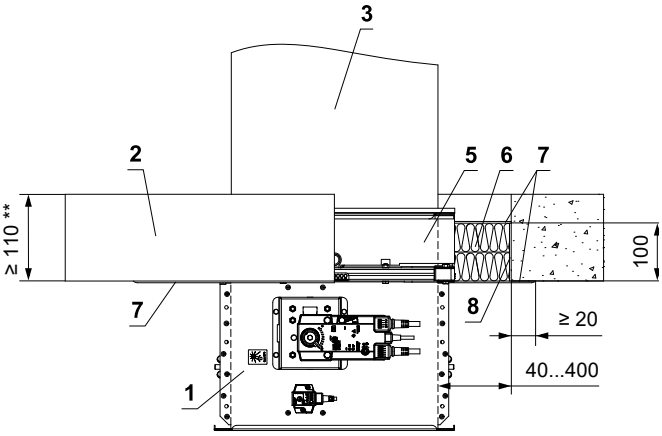
For connection of following duct, see page 79.





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





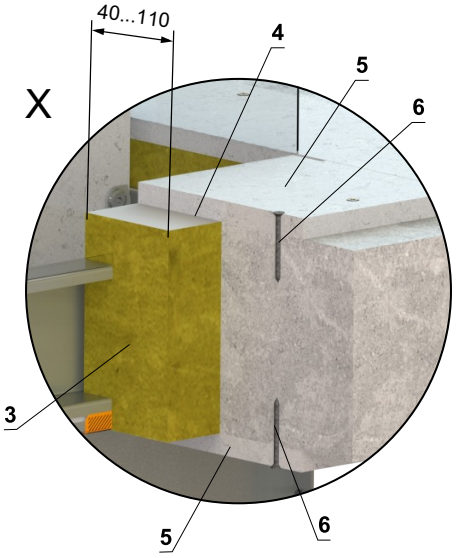
1 – FDMQ
2 – Solid ceiling construction
3 – Duct
4 – Profile with threaded rod, see pages 75 to 79
5 – Protective cladding board - min. th. 30 mm, min. density 750 kg/m^3 (e.g. PROMATECT-MST), see page 84 Weichschott system HILTI*
6 – Mineral wool board - min. density 140 kg/m^3 (HILTI CFS-CT B 1S 140/50...)
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

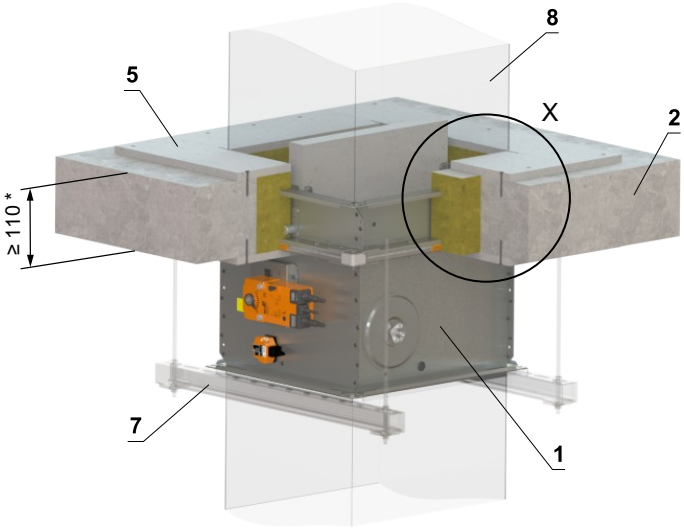
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

Fig. 38. In solid ceiling construction - mineral wool with fire-resistant coating and fire-resistance boards

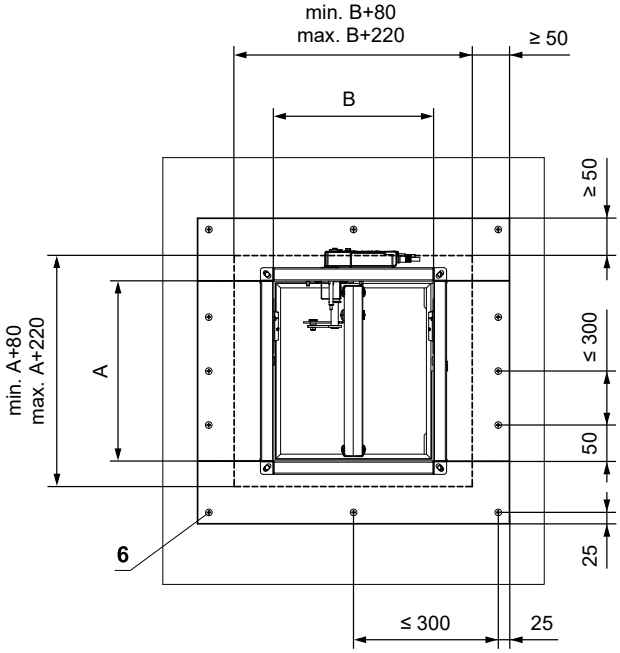
For connection of following duct, see page 79.

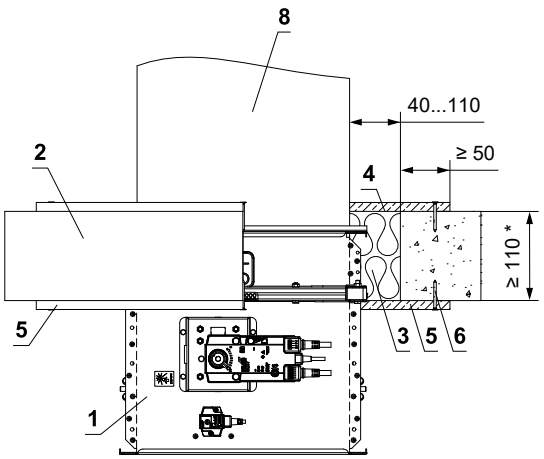
EIS 90





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





1 – FDMQ
2 – Solid ceiling 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 75 to 78
8 – Duct

4.10 Outside solid ceiling construction

Fig. 39. Outside solid wall constrution - mineral wool ROCKWOOL - mineral wool with fire-resistant coating and fireresistant board

EIS 90

For connection of following duct, see page 79.

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 75.

Max. distance between two suspension systems is 1500 mm.

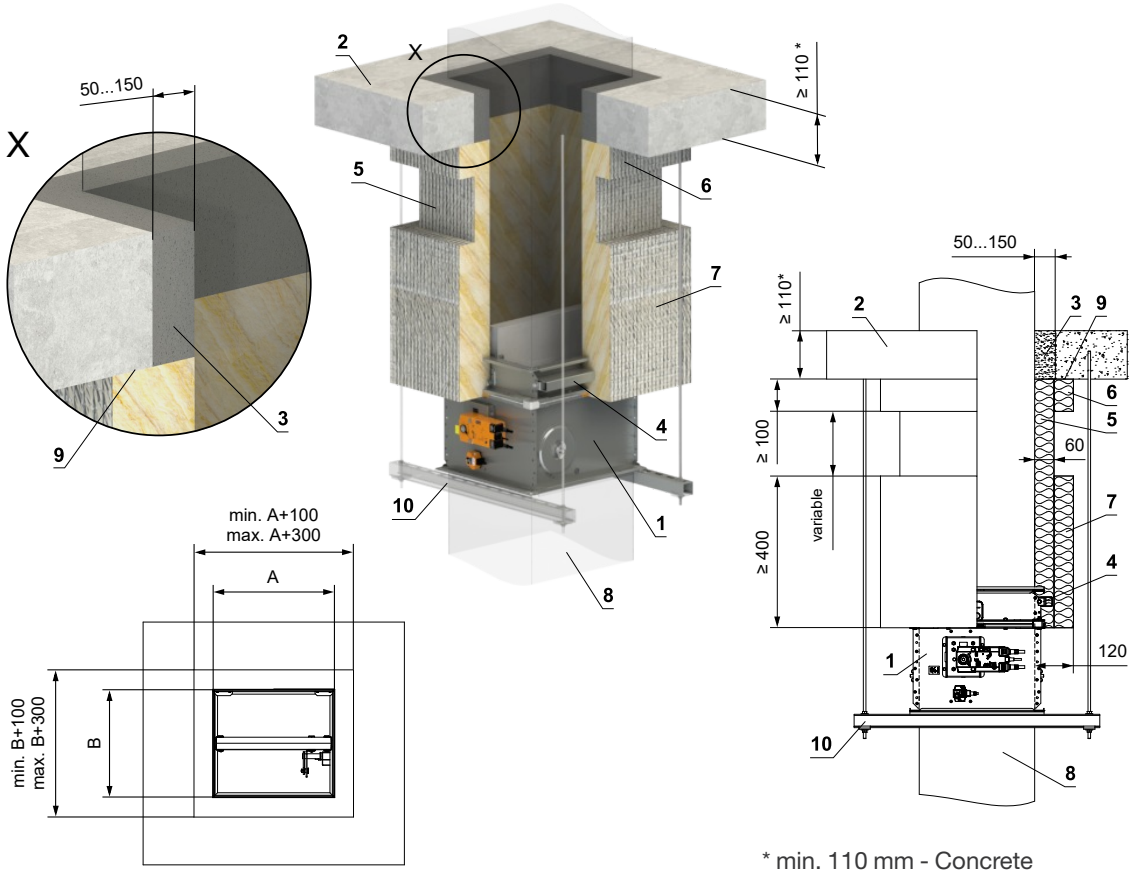
Duct at the point of penetration must be fixed to the fire separation structure.

Following ventilation 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.

If the damper is installed outside the fire separation construction and a damper side A ≥ 800 mm, VRM-Q reinforcement frame must be used, see page 83.



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

1 – FDMQ
2 – Solid ceiling construction
3 – Mortar or gypsum
4 – VRM-Q, see page 83
5 – 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)
6 – Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90) - glued (pos. 12) and fixed with screws to the wall construction
7 – Insulation collar of the damper and duct connection - th. 60 mm (System ROCKWOOL Conlit Ductrock 90)
8 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm
9 – ROCKWOOL Firepro glue - apply on the insulation and fix it to the fire separation construction
10 – Profile with threaded rod, see pages 75 to 78

Fig. 40. Outside solid ceiling construction - concreting

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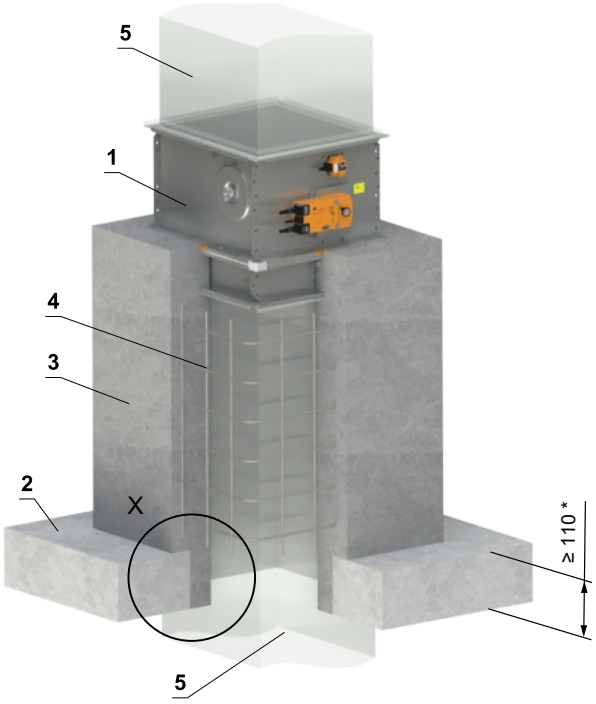
For connection of following duct, see page 79.

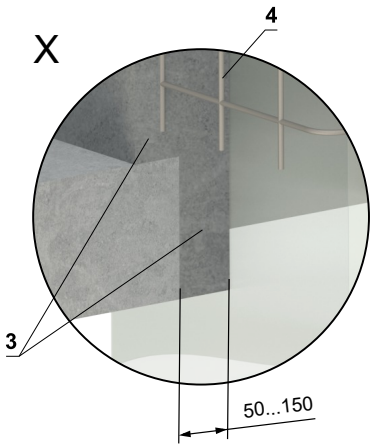
The duct must be suspended or supported on both sides of the damper acc. to national rules.

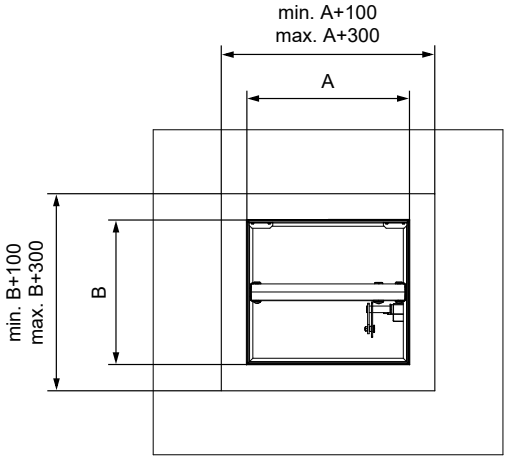
Load of the suspension system depends on weight of the fire damper and duct system, see page 73.

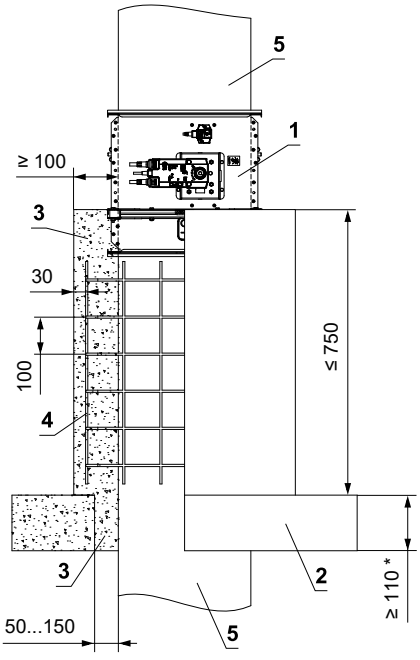
Max. distance between two suspension systems is 1500 mm.

Following ventilation 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 – FDMQ

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 min. thickness 0,8 mm

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

5. Technical data

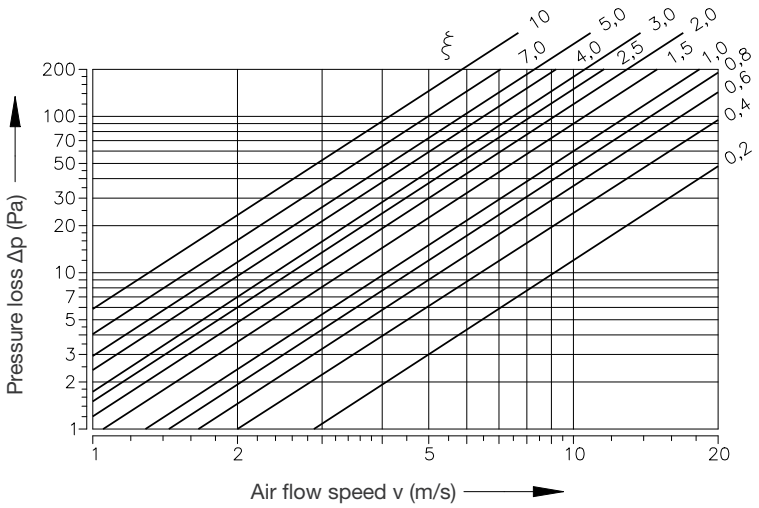
5.1 Pressure loss

Pressure loss calculation

$$\Delta p = \xi * \rho * (v^2 / 2)$$

Δp - presure loss (Pa)
ξ - coefficient of local pressure loss
ρ - air density (kg/m³)
v - air flow speed (m/s)

Pressure losses for air density ρ=1,2 kg/m³



Tab. 6. Coefficient of local pressure loss ξ (-)

B	A													
	150	180	200	225	250	280	300	315	355	400	450	500	550	560
150	2,742	2,575	2,399	2,320	2,219	2,105	2,047	1,954	1,885	1,811	1,753	1,703	1,686	1,665
180	2,132	1,992	1,864	1,795	1,721	1,636	1,575	1,502	1,440	1,387	1,342	1,308	1,290	1,275
200	1,691	1,580	1,477	1,417	1,363	1,288	1,244	1,186	1,136	1,094	1,059	1,030	1,017	1,005
225	1,338	1,288	1,161	1,052	1,031	1,003	0,972	0,938	0,892	0,847	0,833	0,806	0,783	0,774
250	1,118	1,042	0,969	0,934	0,902	0,852	0,807	0,776	0,741	0,715	0,691	0,673	0,661	0,655
280	1,030	0,938	0,911	0,873	0,842	0,801	0,752	0,710	0,662	0,641	0,623	0,612	0,605	0,591
300	0,954	0,868	0,821	0,789	0,754	0,710	0,668	0,621	0,594	0,582	0,551	0,543	0,538	0,535
315	0,797	0,740	0,690	0,667	0,639	0,606	0,570	0,548	0,524	0,503	0,486	0,473	0,464	0,460
355	0,685	0,638	0,595	0,568	0,545	0,518	0,492	0,472	0,450	0,433	0,418	0,406	0,399	0,395
400	0,602	0,561	0,522	0,498	0,479	0,453	0,436	0,413	0,395	0,378	0,366	0,355	0,349	0,345
450	0,538	0,500	0,465	0,446	0,429	0,408	0,384	0,367	0,351	0,337	0,325	0,315	0,313	0,307
500	0,491	0,456	0,423	0,407	0,394	0,369	0,352	0,334	0,319	0,306	0,296	0,287	0,284	0,280
550	0,470	0,436	0,404	0,388	0,374	0,352	0,330	0,313	0,304	0,288	0,277	0,275	0,267	0,264
560	0,450	0,417	0,388	0,374	0,356	0,335	0,321	0,305	0,291	0,279	0,270	0,262	0,259	0,255
600	0,423	0,394	0,370	0,354	0,342	0,321	0,304	0,290	0,278	0,271	0,260	0,249	0,244	0,235
630	0,414	0,384	0,357	0,344	0,331	0,311	0,295	0,281	0,268	0,258	0,248	0,241	0,229	0,234
650	–	0,366	0,344	0,330	0,318	0,299	0,287	0,274	0,257	0,248	0,242	0,232	0,221	0,225
700	–	0,363	0,337	0,323	0,311	0,296	0,280	0,266	0,254	0,242	0,236	0,227	0,215	0,214
710	–	0,357	0,332	0,319	0,306	0,291	0,276	0,260	0,249	0,239	0,230	0,223	0,212	0,212
750	–	0,344	0,320	0,312	0,300	0,278	0,263	0,252	0,239	0,231	0,223	0,216	0,213	0,209
800	–	0,335	0,311	0,301	0,289	0,274	0,257	0,244	0,233	0,223	0,215	0,209	0,205	0,203

B	A												
	600	630	650	700	710	750	800	900	1000	1100	1250	1400	1500
150	1,644	1,628	1,622	1,609	1,605	1,591	1,580	1,551	1,535	–	–	–	–
180	1,261	1,246	1,234	1,225	1,219	1,208	1,197	1,177	1,162	1,148	1,136	1,124	1,117
200	0,989	0,981	0,970	0,963	0,960	0,951	0,942	0,926	0,914	0,903	0,892	0,884	0,878
225	0,768	0,757	0,739	0,732	0,724	0,718	0,712	0,699	0,690	0,681	0,666	0,654	0,650
250	0,649	0,639	0,631	0,630	0,625	0,620	0,613	0,602	0,595	0,587	0,580	0,574	0,571
280	0,586	0,583	0,561	0,556	0,551	0,546	0,539	0,532	0,524	0,512	0,499	0,491	0,482
300	0,522	0,508	0,504	0,503	0,502	0,496	0,488	0,480	0,465	0,455	0,449	0,447	0,440
315	0,454	0,449	0,443	0,441	0,439	0,433	0,430	0,423	0,417	0,412	0,407	0,402	0,400
355	0,391	0,386	0,380	0,378	0,377	0,372	0,370	0,363	0,358	0,353	0,349	0,345	0,343
400	0,342	0,337	0,331	0,330	0,329	0,325	0,323	0,316	0,312	0,308	0,305	0,302	0,299
450	0,303	0,299	0,295	0,294	0,293	0,290	0,286	0,281	0,278	0,274	0,271	0,267	0,266
500	0,275	0,272	0,271	0,268	0,266	0,263	0,261	0,256	0,252	0,249	0,246	0,244	0,242
550	0,261	0,258	0,253	0,248	0,246	0,244	0,243	0,238	0,235	0,232	0,227	0,224	0,223
560	0,253	0,249	0,246	0,245	0,243	0,240	0,238	0,234	0,230	0,227	0,224	0,222	0,221
600	0,233	0,232	0,230	0,229	0,228	0,224	0,220	0,218	0,214	0,211	0,208	0,206	0,204
630	0,232	0,229	0,226	0,225	0,224	0,221	0,218	0,215	0,212	0,209	0,206	0,204	0,202
650	0,222	0,219	0,217	0,215	0,214	0,212	0,209	0,203	0,201	0,199	0,194	0,191	0,189
700	0,212	0,212	0,211	0,210	0,208	0,206	0,204	0,201	0,198	0,196	0,193	0,190	0,188
710	0,210	0,210	0,209	0,208	0,207	0,205	0,203	0,199	0,195	0,193	0,191	0,189	0,187
750	0,205	0,202	0,200	0,199	0,198	0,197	0,195	0,191	0,187	0,184	0,182	0,180	0,178
800	0,200	0,198	0,196	0,195	0,194	0,192	0,189	0,186	0,183	0,181	0,178	0,177	0,176

6. 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

Tab. 7. Level of accoustic output L_{W1} (dB) related to the 1 m^2 section

v	ξ (-)																
(m/s)	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,5	2,0	2,5	3,0	4,0	5,0	8,0	10,0
2	15,5	18,7	20,9	22,6	24,0	25,2	26,3	27,2	28,0	31,2	33,4	35,1	36,5	38,8	40,5	44,2	45,9
3	26,1	29,2	31,5	33,2	34,6	35,8	36,9	37,8	38,6	41,7	44,0	45,7	47,1	49,4	51,1	54,7	56,5
4	33,6	36,7	39,0	40,7	42,1	43,3	44,3	45,3	46,1	49,2	51,5	53,2	54,6	56,9	58,6	62,2	64,0
5	39,4	42,5	44,8	46,5	47,9	49,1	50,2	51,1	51,9	55,0	57,3	59,0	60,4	62,7	64,4	68,0	69,8
6	44,1	47,3	49,5	51,3	52,7	53,9	54,9	55,8	56,6	59,8	62,0	63,8	65,2	67,4	69,2	72,8	74,5
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	76,8	78,6
8	51,6	54,8	57,0	58,8	60,2	61,4	62,4	63,3	64,1	67,3	69,5	71,3	72,7	74,9	76,7	80,3	82,0
9	54,7	57,9	60,1	61,8	63,2	64,4	65,5	66,4	67,2	70,4	72,6	74,3	75,7	78,0	79,7	83,4	85,1
10	57,4	60,6	62,8	64,6	66,0	67,2	68,2	69,1	70,0	73,1	75,3	77,1	78,5	80,7	82,5	86,1	87,9
11	59,9	63,1	65,3	67,1	68,5	69,7	70,7	71,6	72,4	75,6	77,8	79,6	81,0	83,2	85,0	88,6	90,3
12	62,2	65,4	67,6	69,3	70,7	71,9	73,0	73,9	74,7	77,9	80,1	81,8	83,2	85,5	87,2	90,9	92,6

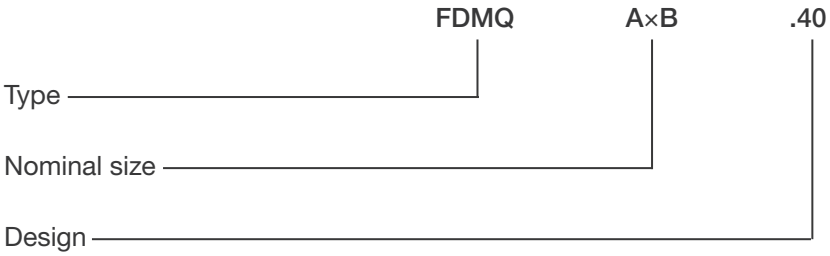
Tab. 8. Correction to the weight filter A

v (m/s)	2	3	4	5	6	7	8	9	10	11	12
(dB)	-15,0	-11,8	-9,8	-8,4	-7,3	-6,4	-5,7	-5,0	-4,5	-4,0	-3,6

Tab. 9. Relative level expressing the shape of the spectrum L_{rel}

v (m/s)	f(Hz)							
	63	125	250	500	1000	2000	4000	8000
2	–4,5	–6,9	–10,9	–16,7	–24,1	–33,2	–43,9	–56,4
3	–3,9	–5,3	–8,4	–13,1	–19,5	–27,6	–37,4	–48,9
4	–3,9	–4,5	–6,9	–10,9	–16,7	–24,1	–33,2	–43,9
5	–4,0	–4,1	–5,9	–9,4	–14,6	–21,5	–30,0	–40,3
6	–4,2	–3,9	–5,3	–8,4	–13,1	–19,5	–27,6	–37,4
7	–4,5	–3,9	–4,9	–7,5	–11,9	–17,9	–25,7	–35,1
8	–4,9	–3,9	–4,5	–6,9	–10,9	–16,7	–24,1	–33,2
9	–5,2	–3,9	–4,3	–6,4	–10,1	–15,6	–22,7	–31,5
10	–5,5	–4,0	–4,1	–5,9	–9,4	–14,6	–21,5	–30,0
11	–5,9	–4,1	–4,0	–5,6	–8,9	–13,8	–20,4	–28,8
12	–6,2	–4,3	–3,9	–5,3	–8,4	–13,1	–19,5	–27,6

7. Product marking



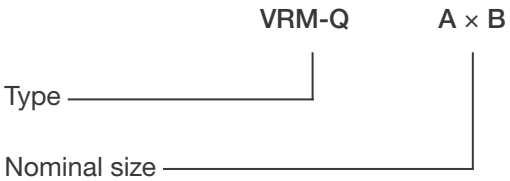
- .01 - Manual control and thermal
- .02 - Manual control and thermal (Zone 1,2)
- .11 - Manual control and thermal with a terminal switch („CLOSED“)
- .12 - Manual control and thermal with a terminal switch („CLOSED“) (Zone 1,2)
- .40 - With actuator BF 230-TN (BFL, BFN 230-T) - voltage AC 230 V
- .50 - With actuator BF 24-TN (BFL, BFN 24-T) - voltage AC/DC 24 V
- .80 - Manual control and thermal with two terminal switches („OPEN“, „CLOSED“)
- .81 - Manual control and thermal with two terminal switches („OPEN“, „CLOSED“) (Zone 1,2)

Example: FDMQ 800×400 .40

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.

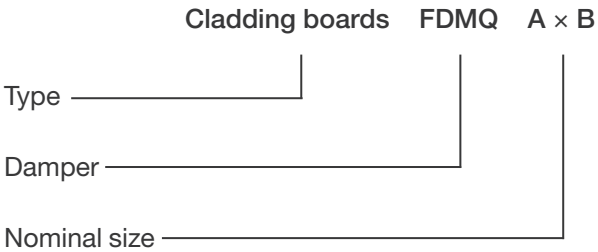
7.1 Accessories

Reinforcing frame VRM-Q



Example: VRM 800×400

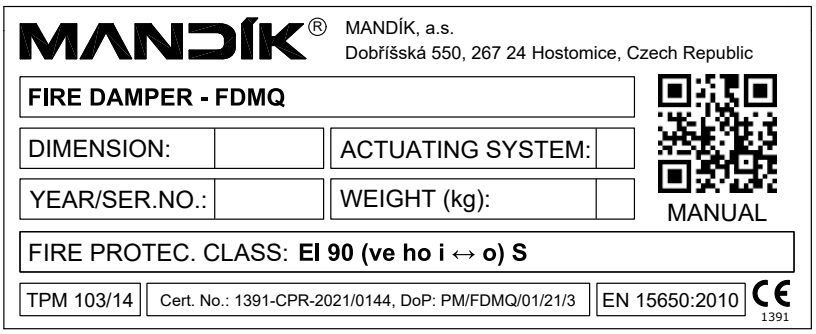
Protective cladding boards



Example: Cladding boards FDMQ 800×400

7.2 Data label

Data label is placed on the damper body.



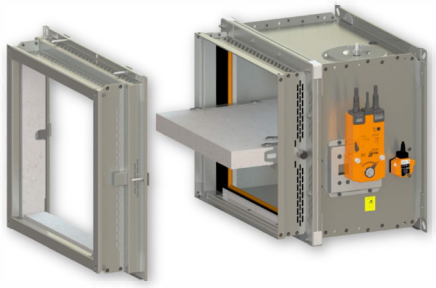
8. Installation frames

Tab. 10. List of installation frames and installation options

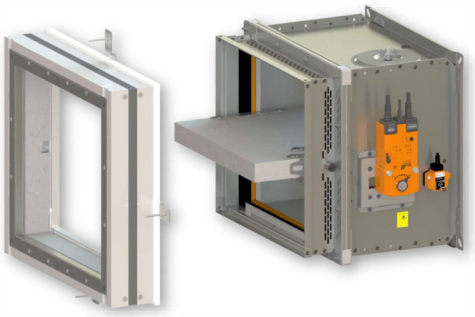
Inst. frame	Wall thickness (mm)								
	Solid wall construction			Gypsum wall construction			Solid ceiling construction		
	In construc-tion	Outside construc-tion	On construc-tion	In construc-tion	Outside construc-tion	On construc-tion	In costruc-tion	Outside construc-tion	On construc-tion
E1	≥ 100	-	-	≥ 100	-	-	≥ 110/125	-	-
E2	≥ 100	-	-	-	-	-	≥ 110/125	-	-
E3	-	-	-	≥ 100	-	-	-	-	-
E4	-	-	≥ 100	-	-	≥ 100	-	≥ 110/125	≥ 110/125
E5	-	-	-	≥ 100	-	-	-	-	-
E6	-	≥ 100	-	-	-	-	-	≥ 110/125	-

Installation frame E1

Installation frame E2

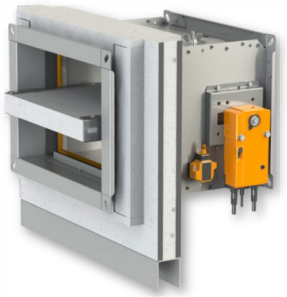


Installation frame E3



Installation frame E4

Installation frame E5



Installation frame E6

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

8.1 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

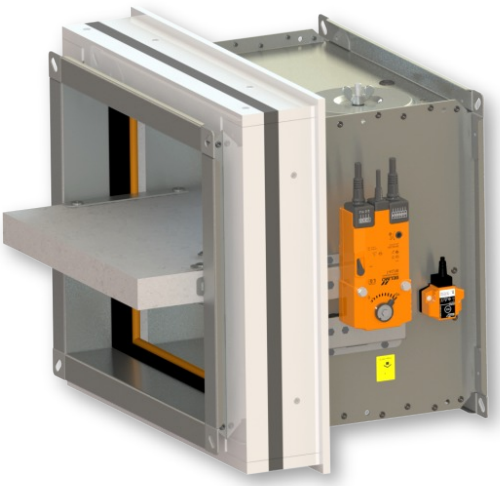
Installation frame is equipped with an intumescent sealing on the inside and outside. This sealing fills the gap between the damper casing and frame and between the frame and construction in the event of a fire.

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



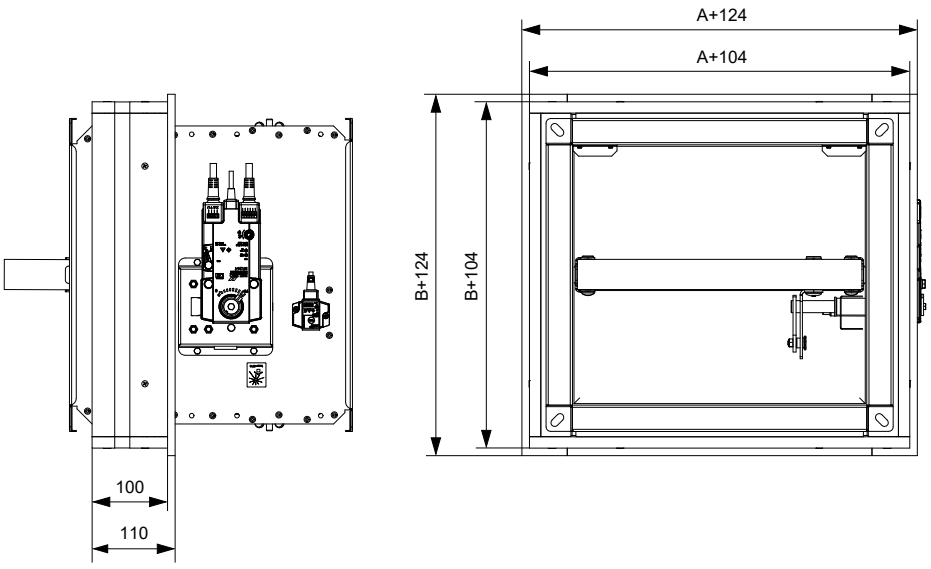


Fig. 41. In solid wall construction - installation frame E1

For connection of following duct, see page 79.
Installation frame can be installed on the damper or delivered separately.

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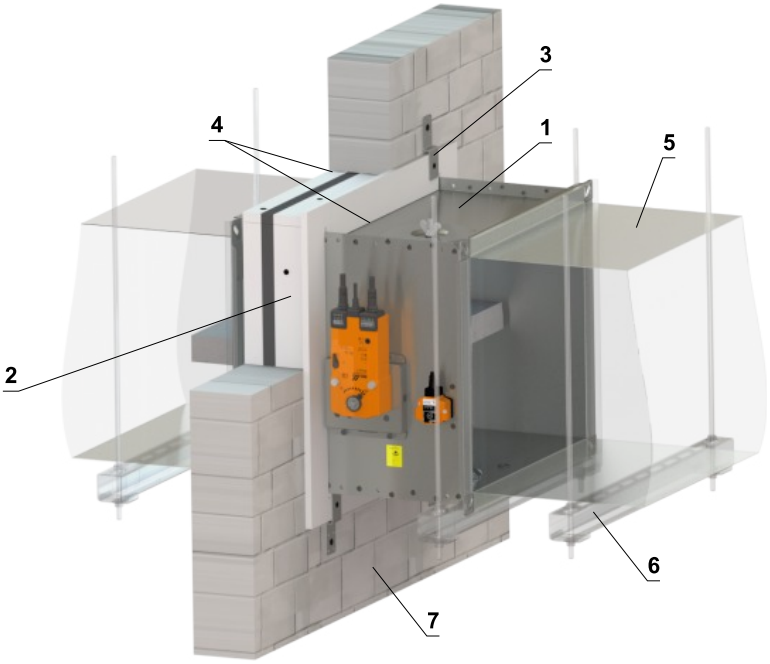
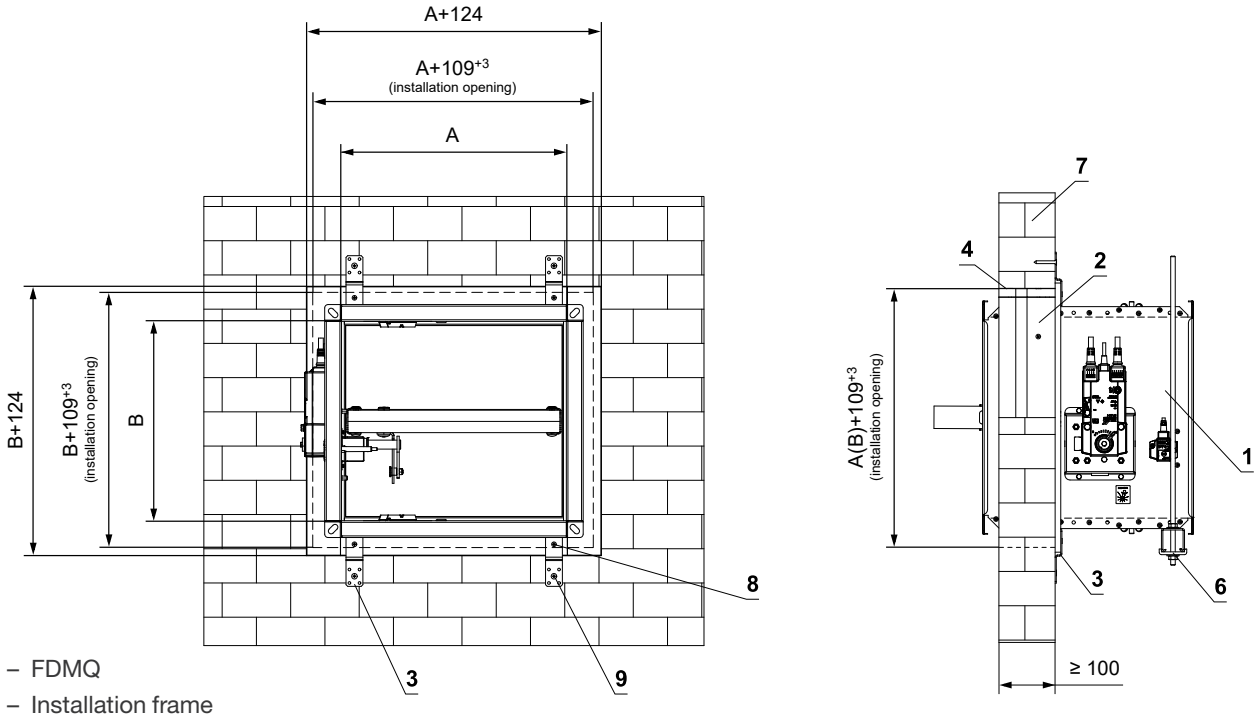




1 – FDMQ
2 – Installation frame
3 – Bracket (fastening material included in frame delivery)
4 – Fill the gaps with glue PROMAT K84
5 – Duct
6 – Profile with threaded rod, see pages 75 to 78
7 – Solid wall construction
8 – Screw 4x16 mm to attach bracket to the frame
9 – Screw 5x60 mm to attach bracket to the construction

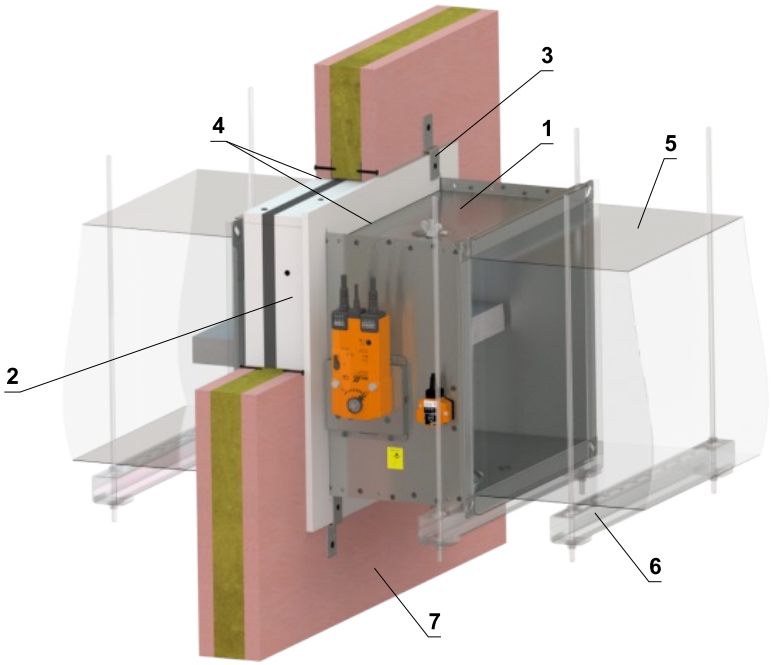
Number of brackets X = ZA + ZB Number of screws Y = 2 x X

Side A	No. of brackets ZA	Side B	No. of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

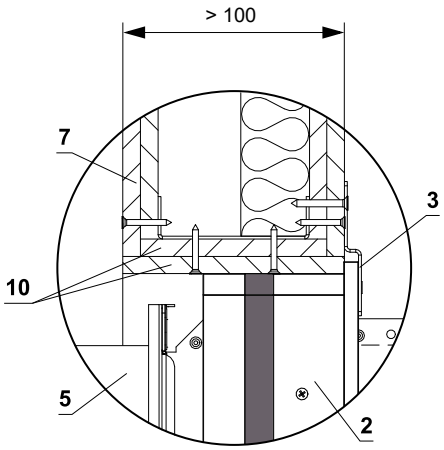
Fig. 42. Gypsum wall construction - installation frame E1

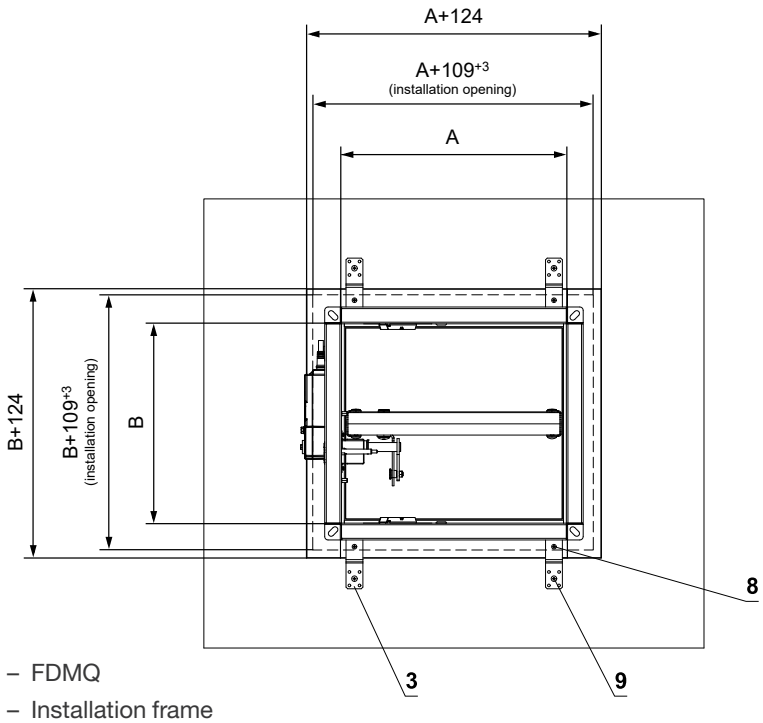
For connection of following duct, see page 79.
Installation frame can be installed on the damper or delivered separately.

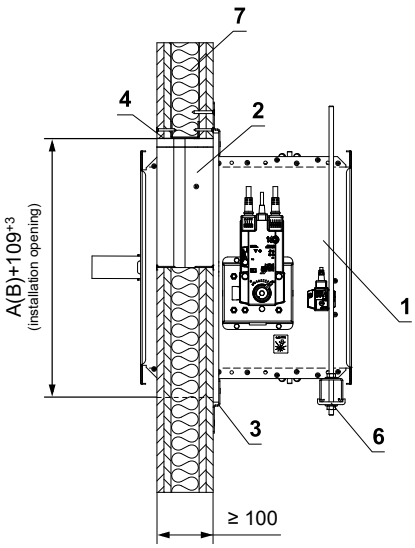
EIS 90



Detail of the wall > 100 mm







1 – FDMQ
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 75 to 78
7 – Gypsum wall construction
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

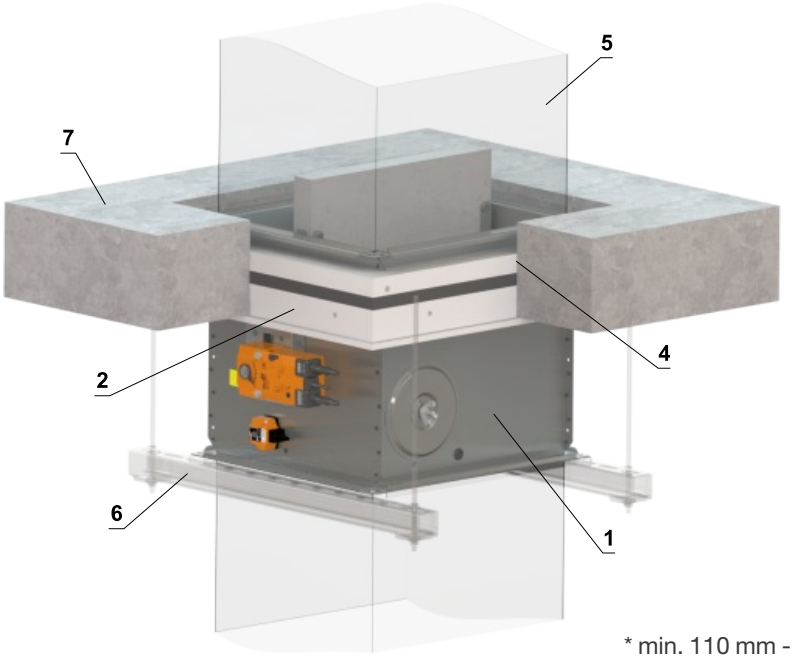
Number of brackets X = ZA + ZB Number of screws Y = 2 x X

Side A	No. of brackets ZA	Side B	No. of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

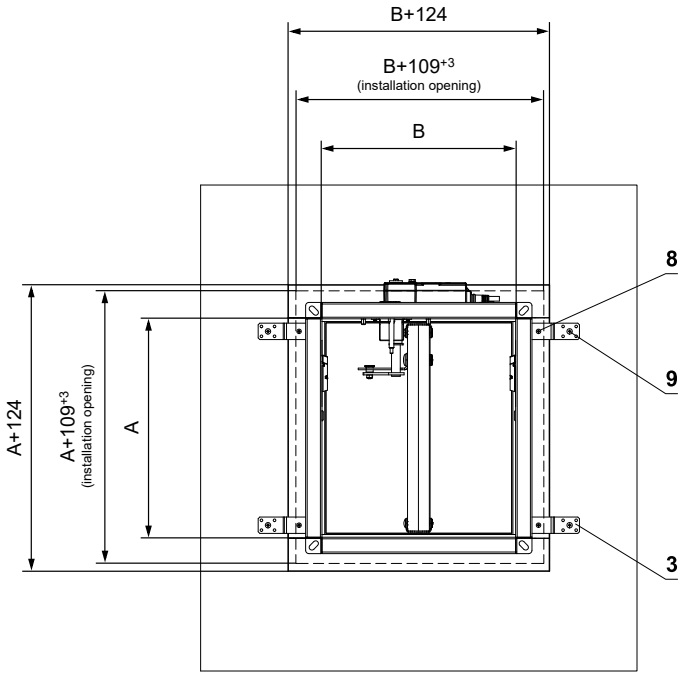
Fig. 43. Solid ceiling construction - installation frame E1

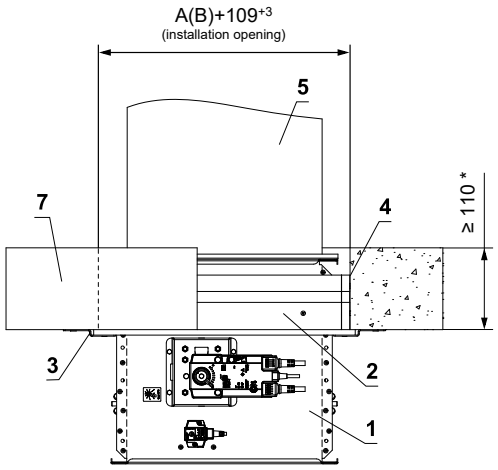
For connection of following duct, see page 79.
Installation frame can be installed on the damper or delivered separately.

EIS 90



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





1 – FDMQ
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 75 to 78
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	No. of brackets ZA	Side B	No. of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

8.2 Installation frame E2

Installation frame E2 is designed for installation with steel insert and mortar or gypsum into:

- Solid wall construction
- Solid ceiling construction

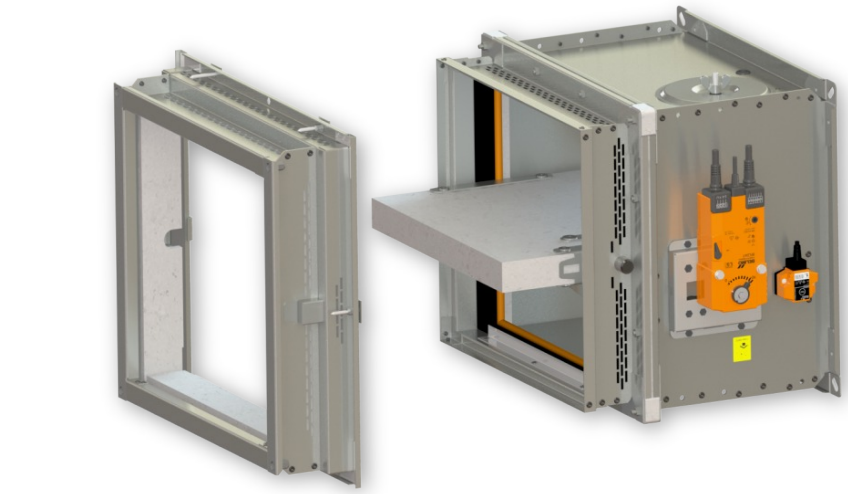
The damper is equipped with an intumescent sealing on the casing. This sealing fills the gap between the steel insert and the damper in the event of a fire.

Solid wall th. 100 mm or solid ceiling th. 110 mm

Material:

- Installation frame - cement-lime boards
- Fasteners - galvanized steel

Installation frame E2



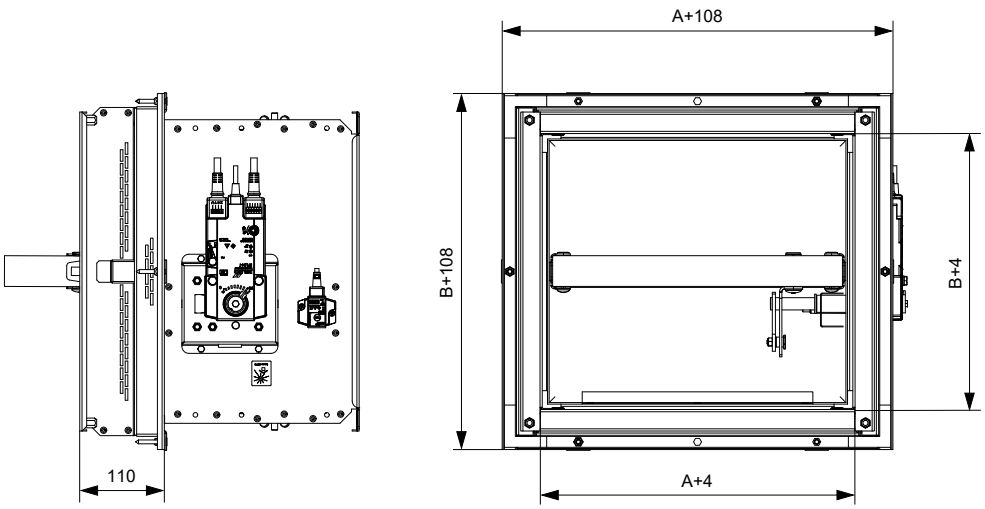
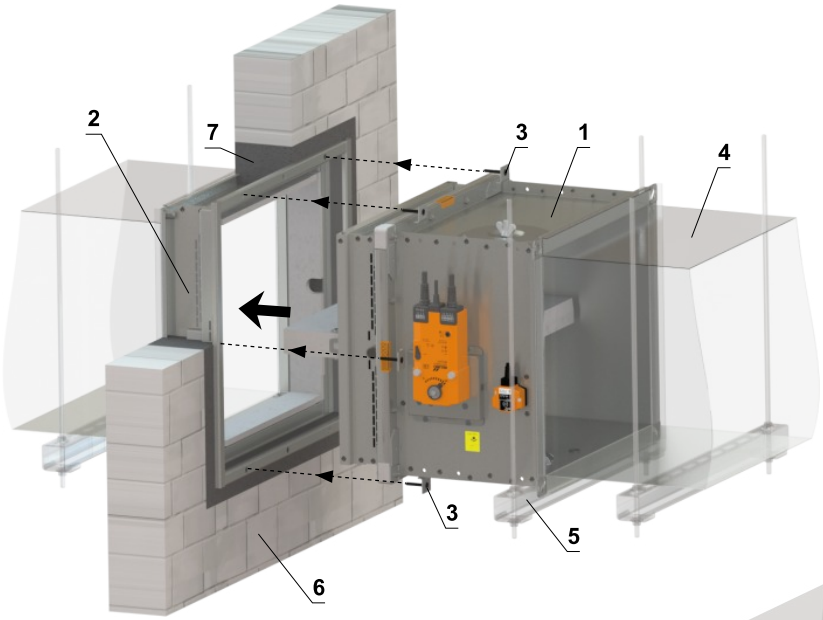


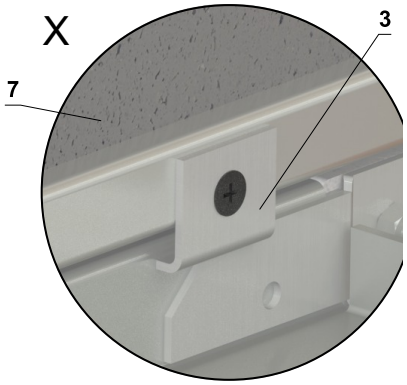
Fig. 44. In solid wall construction - installation frame E2

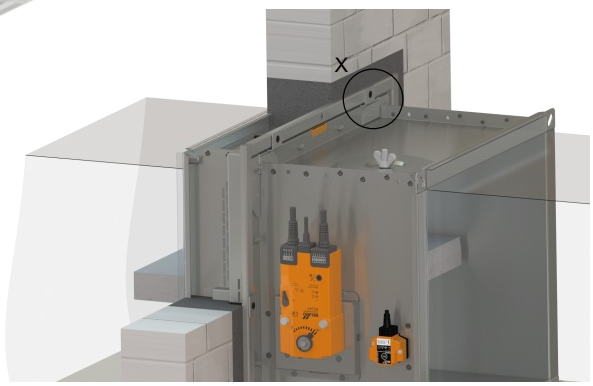
For connection of following duct, see page 79.

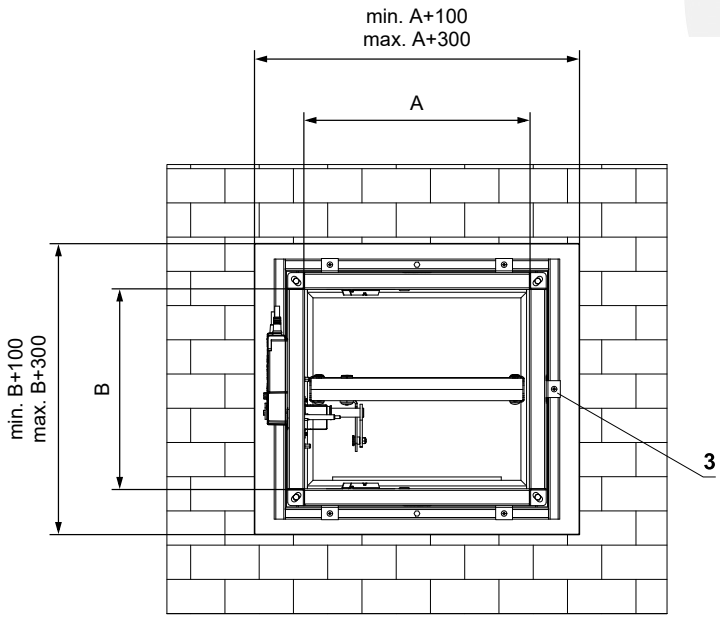
Installation frame can be installed on the damper or delivered separately.

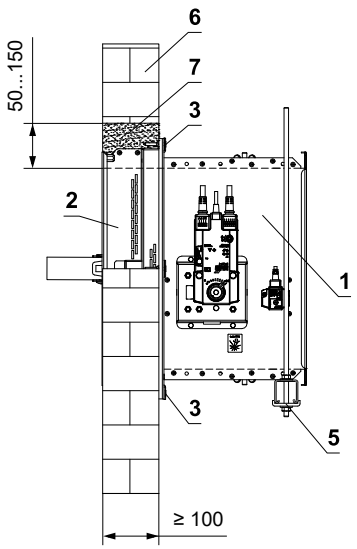
EIS 90











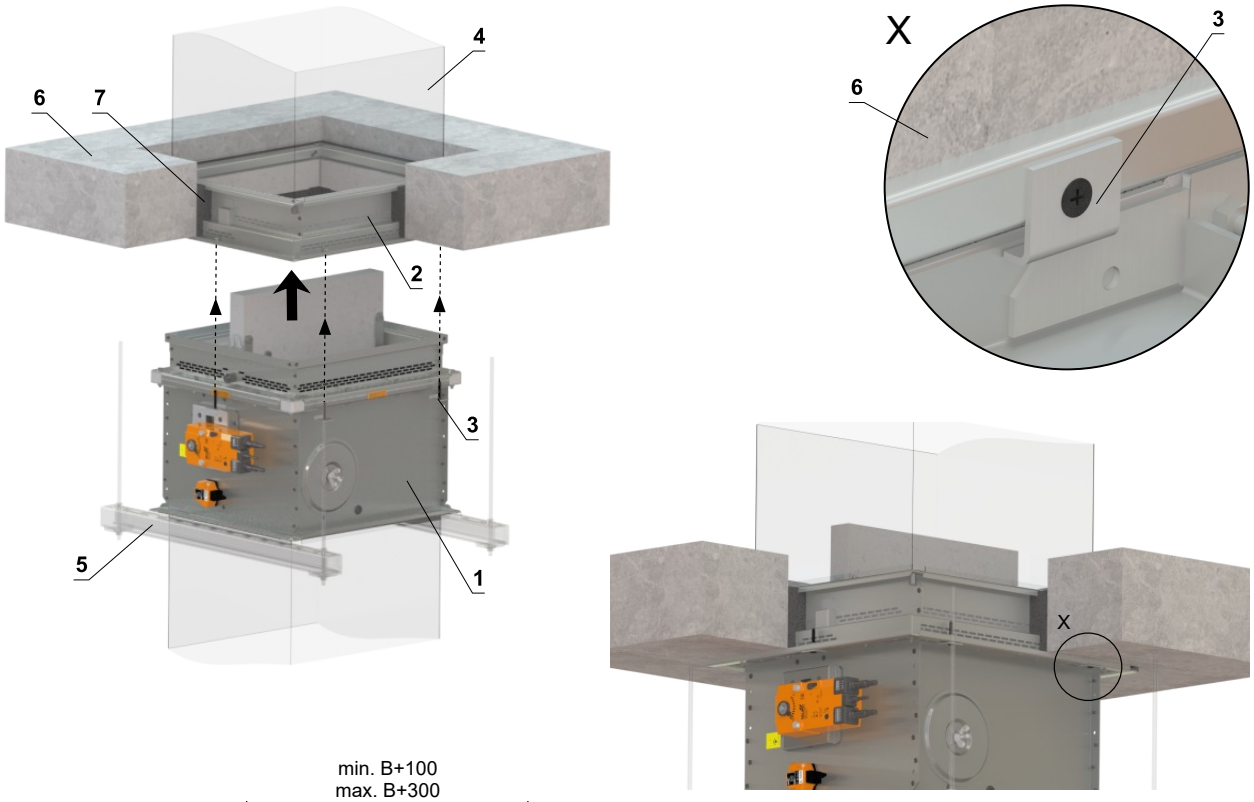
1 – FDMQ
2 – Installation frame
3 – Mounting of the damper to the frame (delivered with frame)
4 – Duct
5 – Profile with threaded rod, see pages 75 to 78
6 – Solid wall construction
7 – Mortar or gypsum

Fig. 45. In solid ceiling construction - installation frame E2

For connection of following duct, see page 79.

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

EIS 90



1 – FDMQ
2 – Installation frame
3 – Mounting of the damper to the frame (delivered with frame)
4 – Duct
5 – Profile with threaded rod, see pages 75 to 78
6 – Solid ceiling construction
7 – Mortar or gypsum

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

8.3 Installation frame E3

Installation frame E is designed for installation into:

- Gypsum wall construction

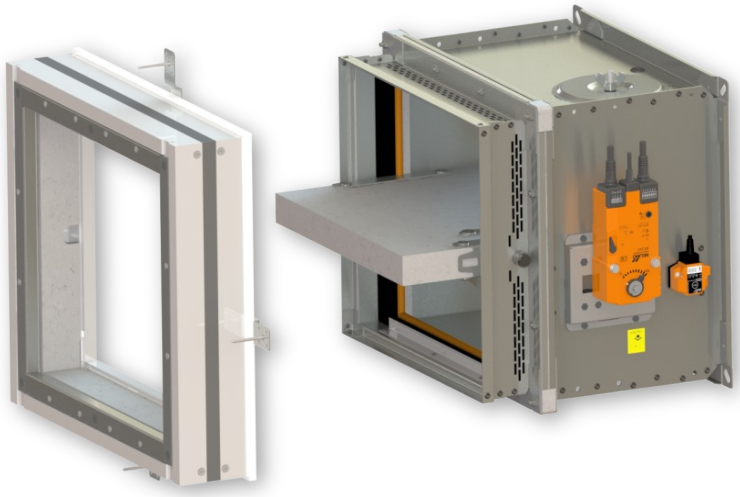
The damper is equipped with an intumescent sealing on the casing. This sealing fills the gap between the damper casing and frame in the event of a fire. The frame is equipped with an intumescent sealing on external side. This sealing fills the gap between the frame and construction in the event of a fire.

Gypsum wall th. 100 mm.

Material:

- Installation frame - cement-lime boards and galvanized steel
- Fasteners - galvanized steel

Installation frame E3



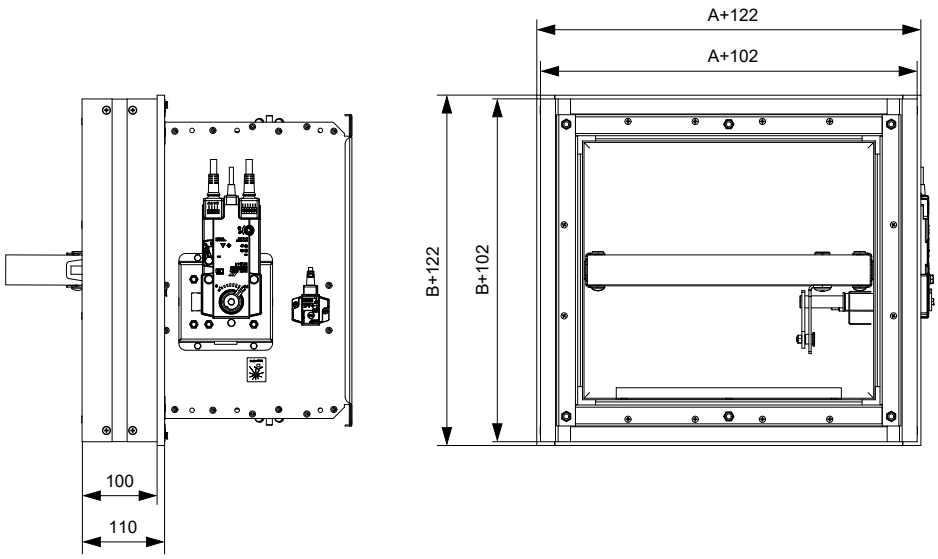
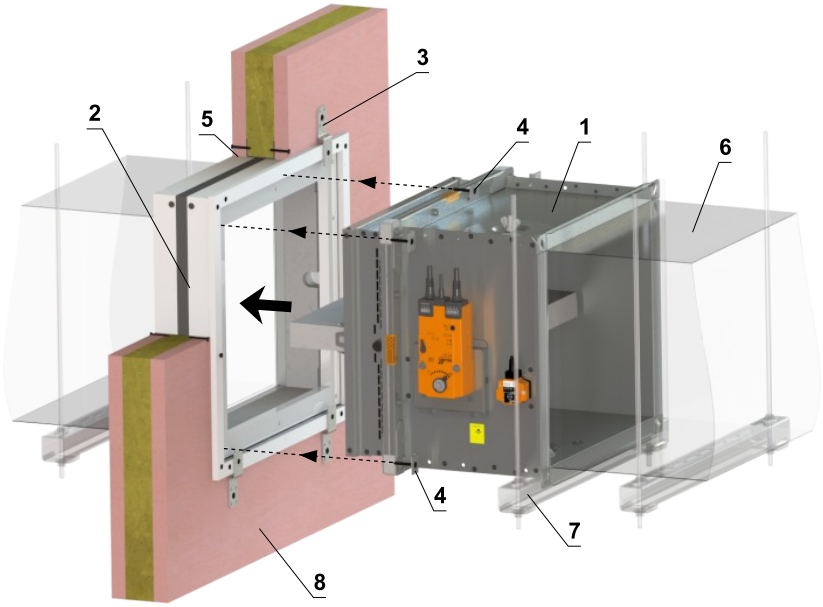


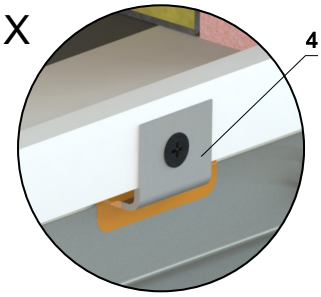
Fig. 46. In gypsum wall construction - installation frame E3

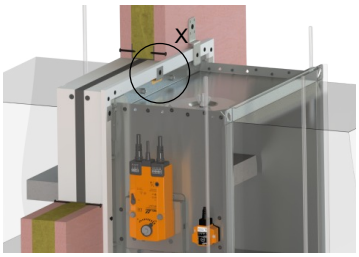
EIS 90

For connection of following duct, see page 79.

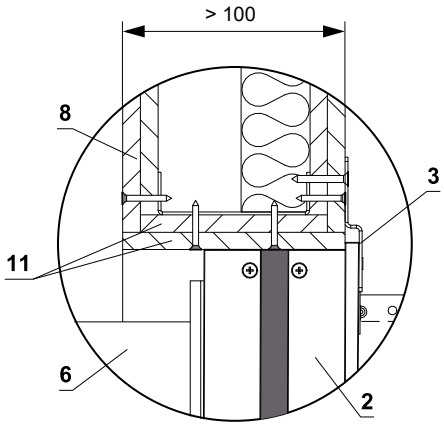
Installation frame can be installed on the damper or delivered separately.

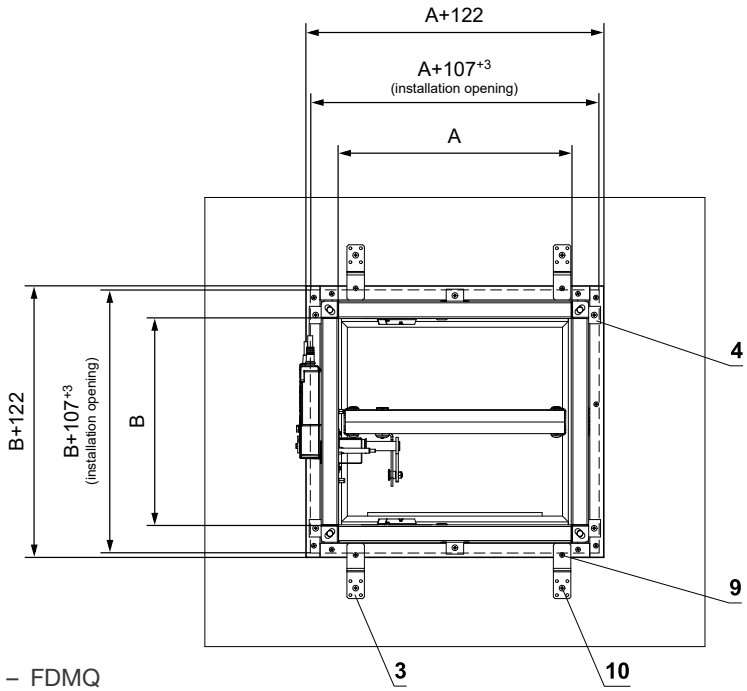


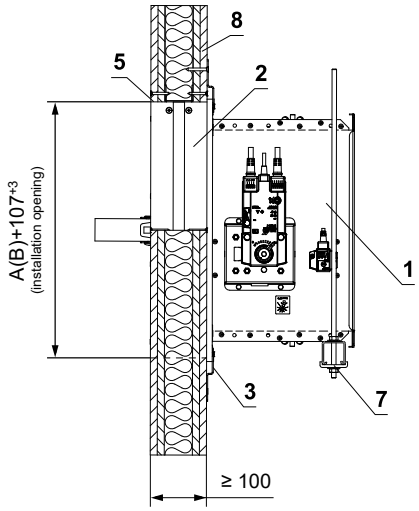




Detail of the wall > 100 mm







1 – FDMQ
2 – Installation frame
3 – Bracket (fastening material included in frame delivery)
4 – Mounting of the damper to the frame (delivered with frame)
5 – Fill the gaps with glue PROMAT K84
6 – Duct
7 – Profile with threaded rod, see pages 75 to 78
8 – Gypsum wall construction
9 – Screw 4x16 mm to attach bracket to the frame
10 – Screw 5x60 mm to attach bracket to the construction
11 – Additional boards made from plasterboard

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

Side A	No. of brackets ZA	Side B	No. of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

8.4 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

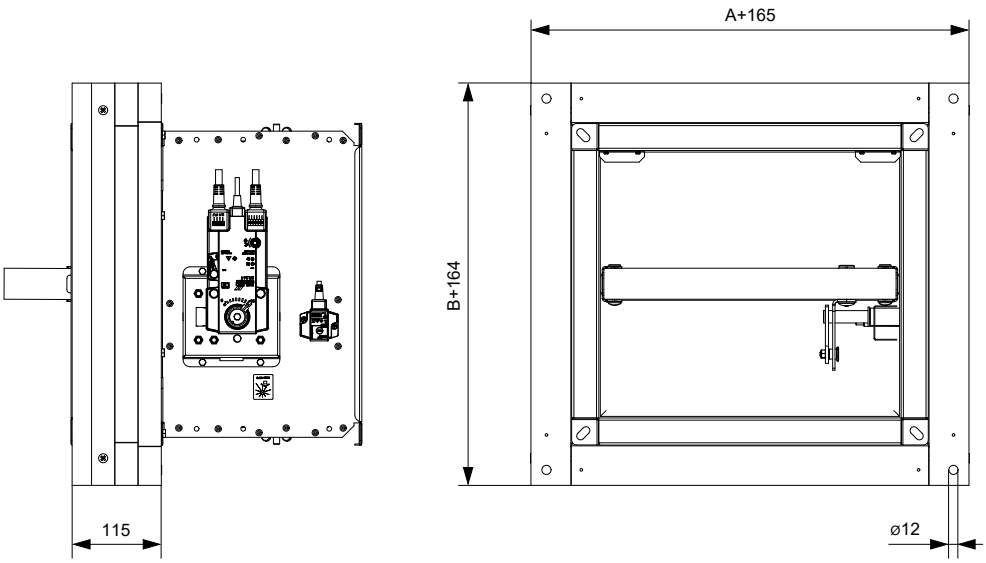
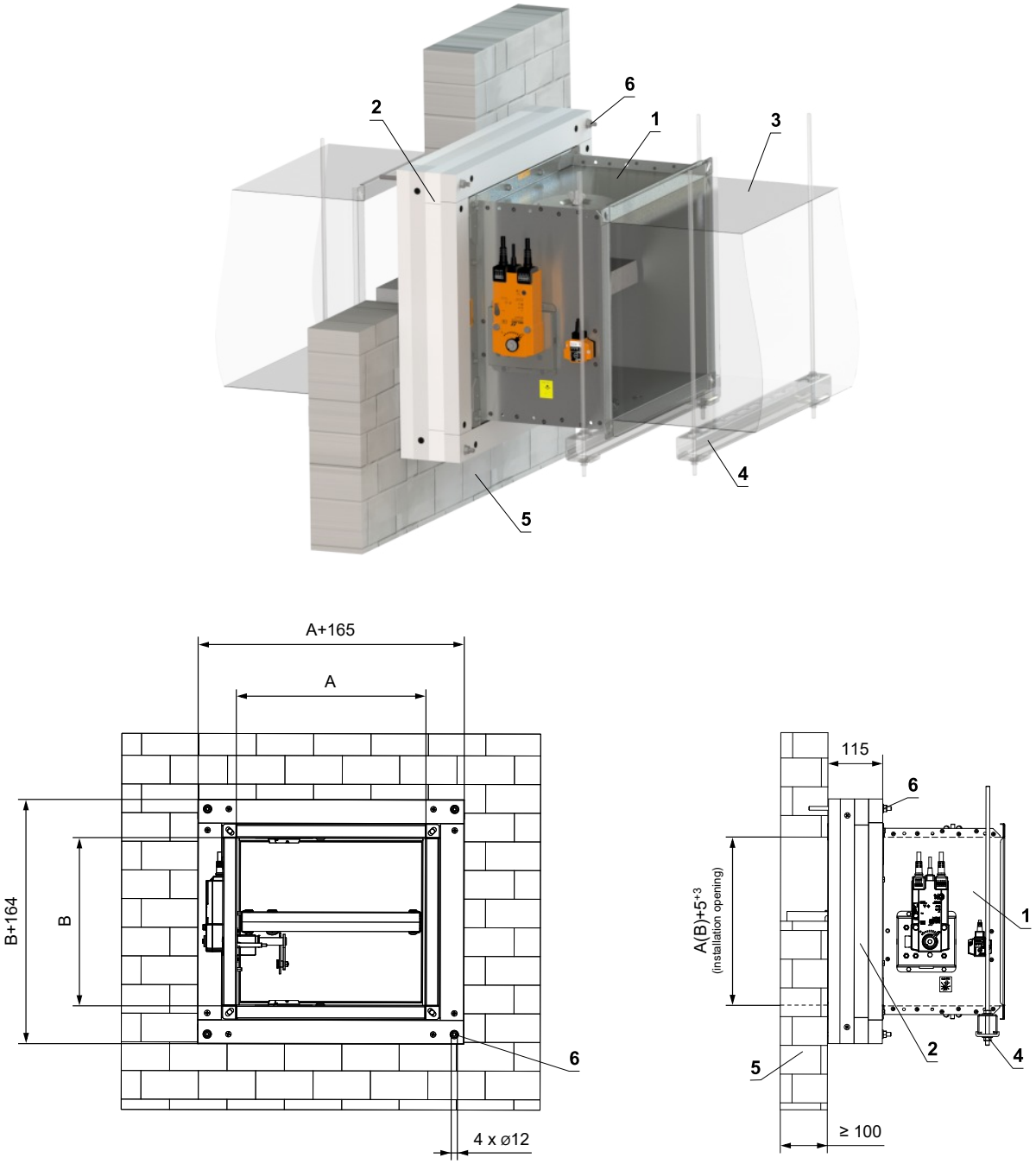


Fig. 47. In solid wall construction - installation frame E4

For connection of following duct, see page 79.

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

EIS 90



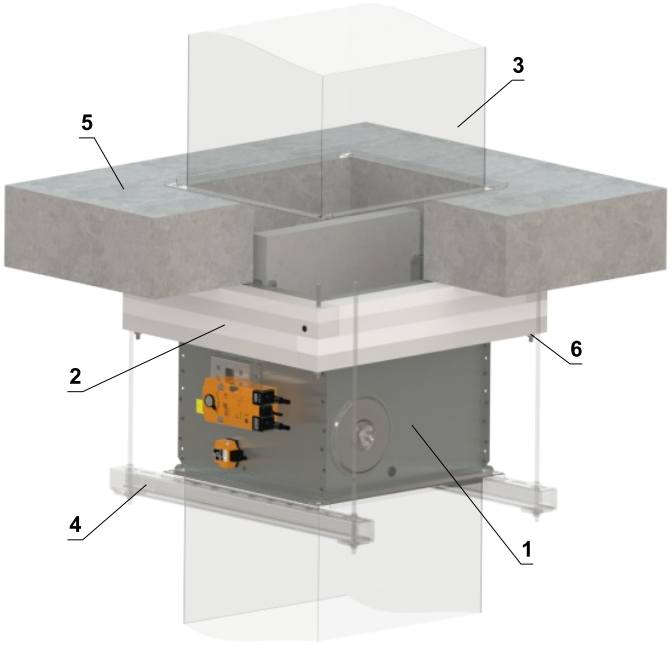
1 – FDMQ
2 – Installation frame - apply HILTI CFS-S ACR mastic at the entire area and glue it to the fire separating construction
3 – Duct
4 – Profile with threaded rod, see pages 75 to 78
5 – Solid wall construction
6 – Holes for fixing the frame with threaded rods or steel anchors (material for fixing the frame is not included)

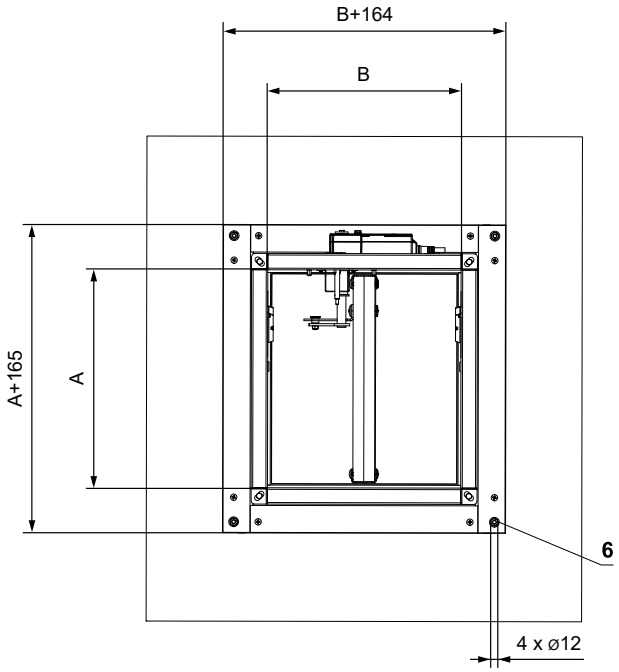
Fig. 48. In solid ceiling construction - installation frame E4

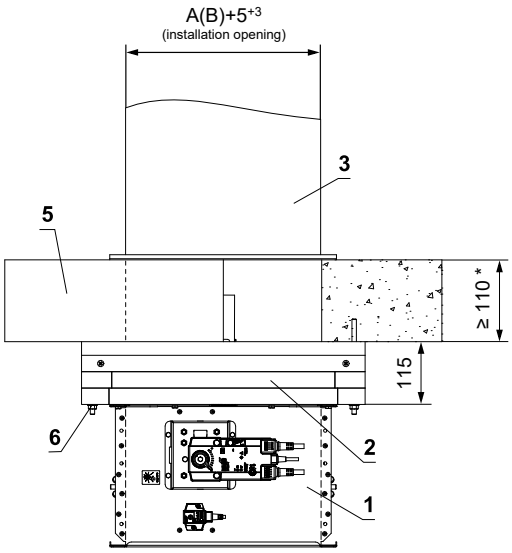
For connection of following duct, see page 79.

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

EIS 90







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

1 – FDMQ
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 75 to 78
5 – Solid ceiling construction
6 – Holes for fixing the frame with threaded rods or steel anchors (material for fixing the frame is not included)

Fig. 49. Outside solid ceiling construction - concreting - installation frame E4

EIS 90

For connection of following duct, see page 79.

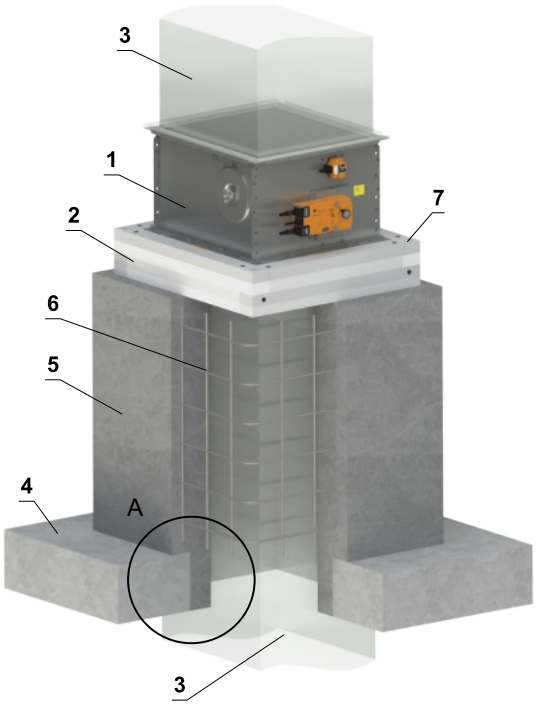
The duct must be suspended or supported on both sides of the damper acc. to national rules.

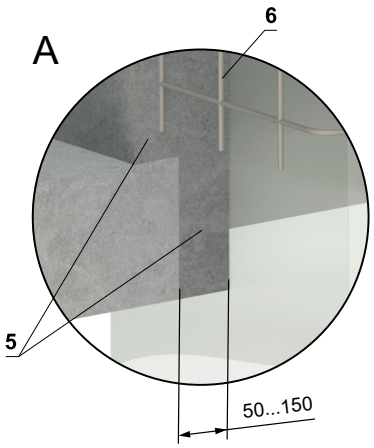
Load of the suspension system depends on weight of the fire damper and duct system, see page 73.

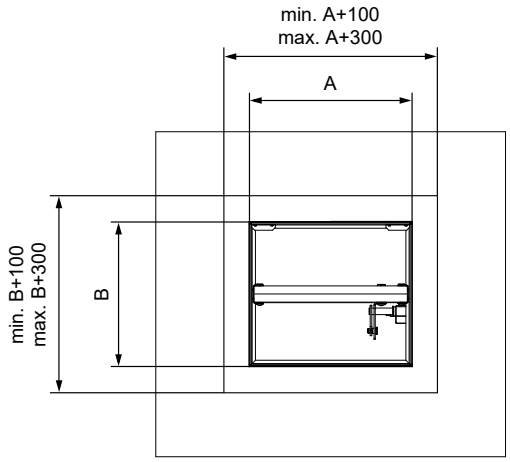
Max. distance between two suspension systems is 1500 mm.

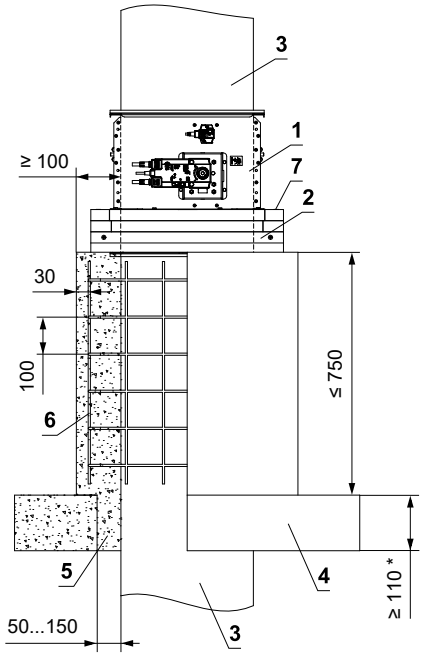
Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.

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









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

1 – FDMQ
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 min. thickness 0,8 mm
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)

8.5 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 100 to 150 mm

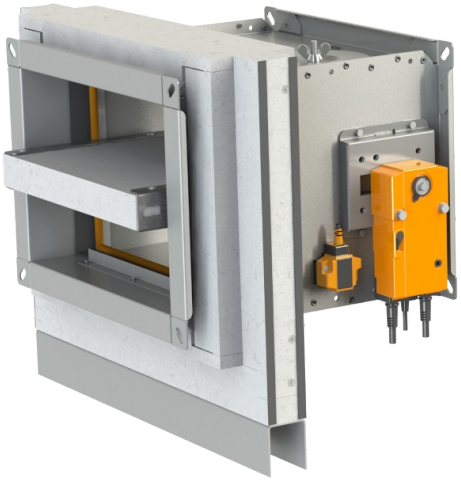
Installation frame is equipped with an intumescent sealing on the inside and outside. This sealing fills the gap between the damper casing and frame and between the frame and construction in the event of a fire.

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



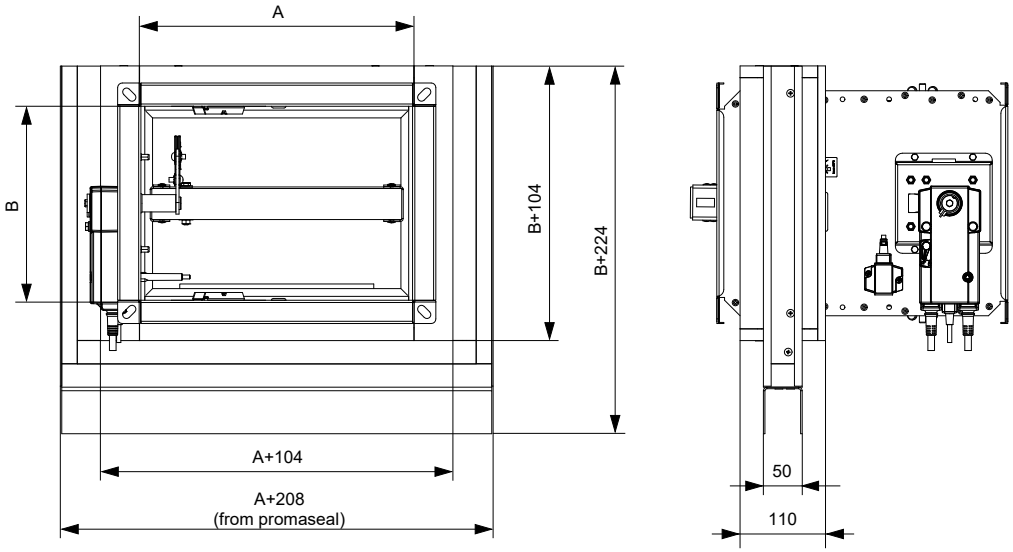
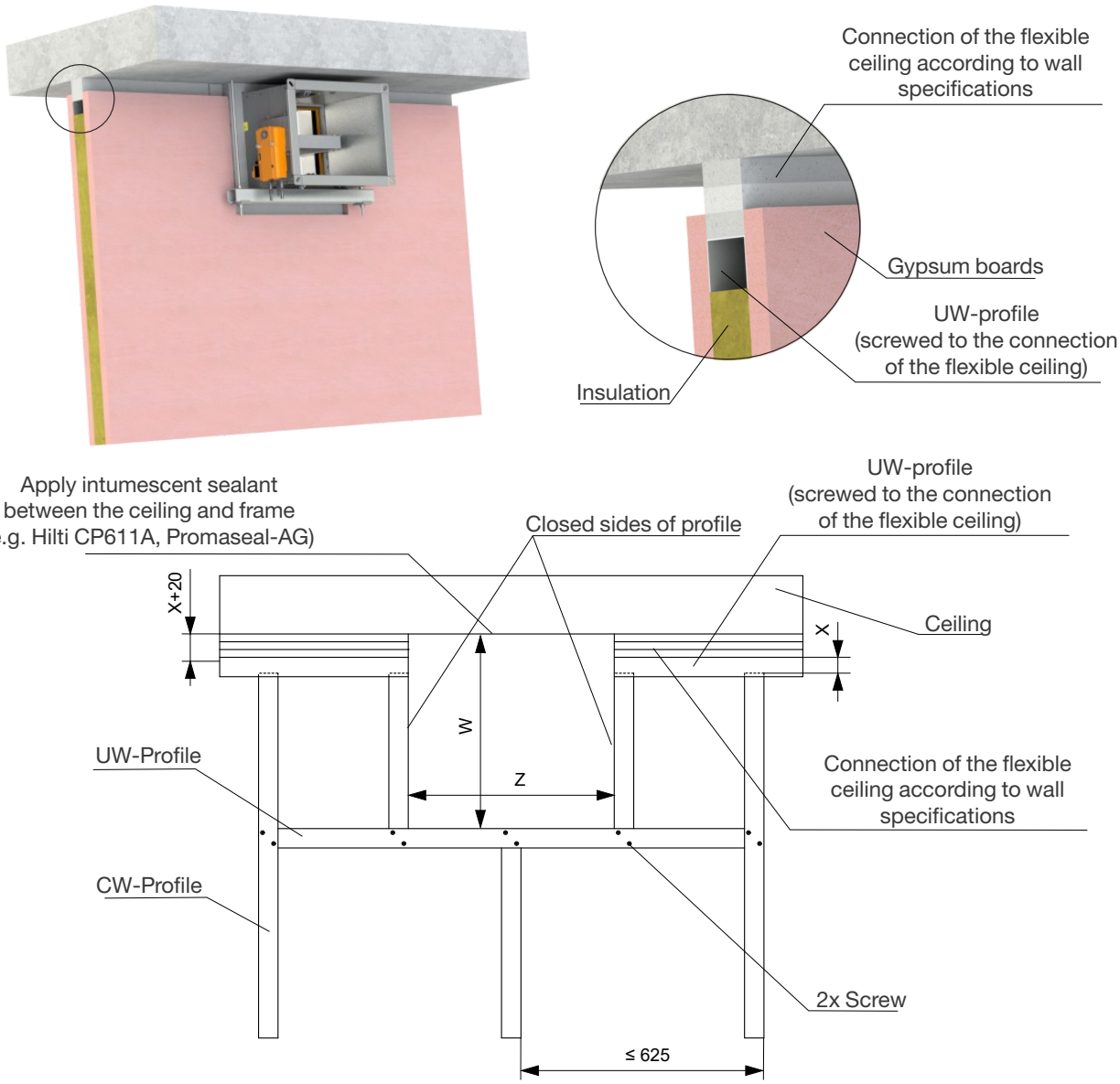


Fig. 50. In solid ceiling construction – installation frame E5

Installation directly on the ceiling
For connection of following duct, see page 79.
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.

EIS 90



Installation frame	W (mm)	Z (mm)
E5	B + 224 + X	A + 208 + (2 x F)

X = ceiling movement = 10 to 40 mm

F = gap between frame (promaseal) and profile = 2 to 5 mm

8.6 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

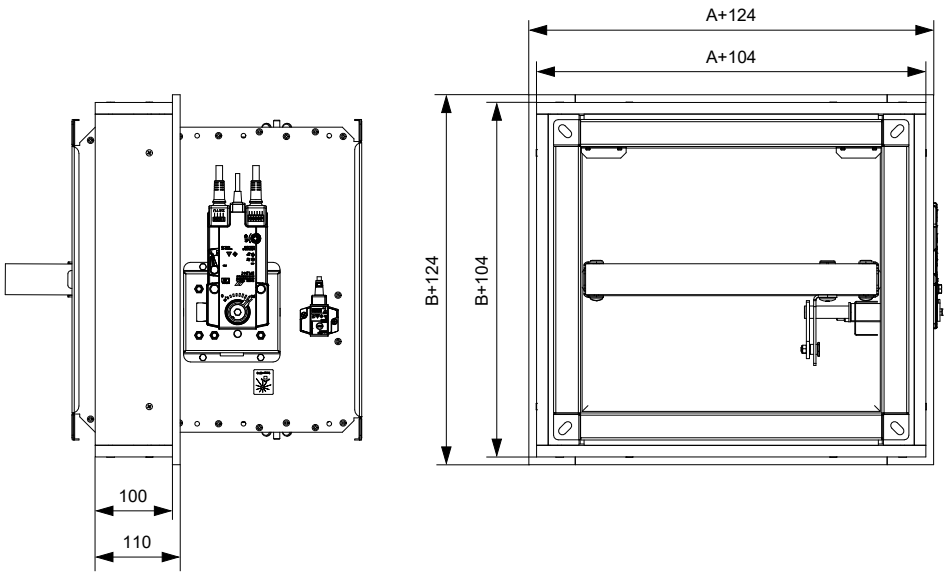
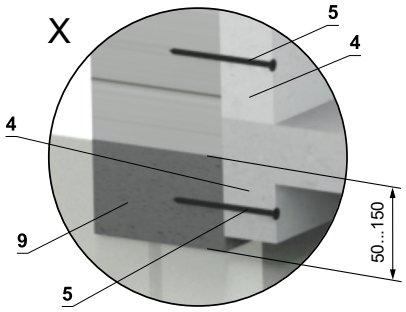
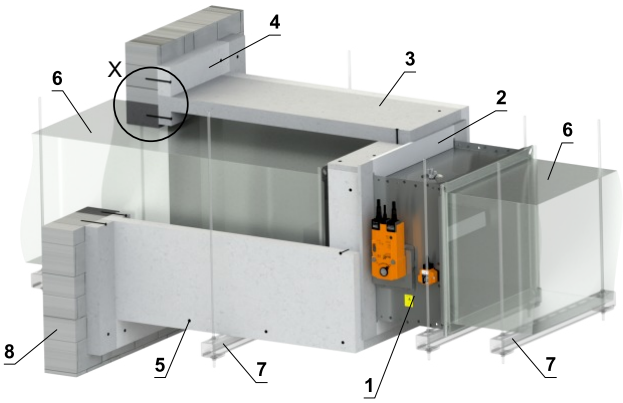


Fig. 52. Outside solid wall construction - insulation from fire-resistant boards - mortar or gypsum - installation frame E6

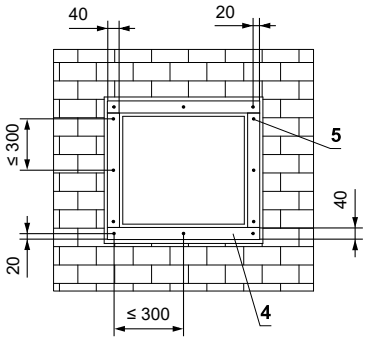
EIS 90

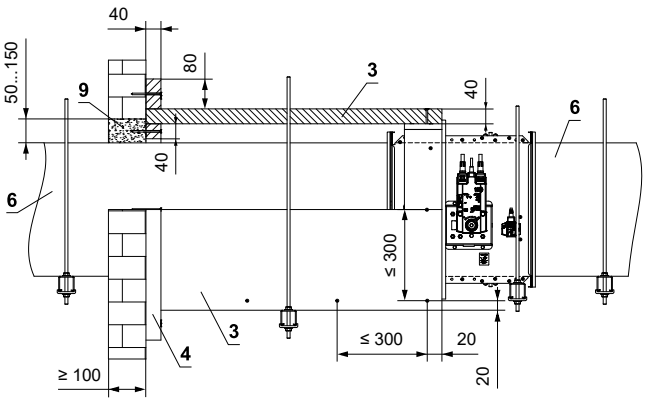
For connection of following duct, see page 79.
Minimum and maximum distance between the wall and fire damper is unlimited.
Insulation must be suspended using threaded rods and mounting profiles or other mounting system, according to national standards.
Duct inside the insulation must be suitably supported. 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 75.
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.



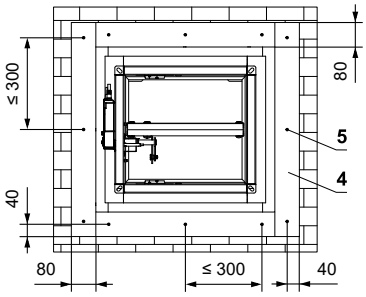


Additional board of duct





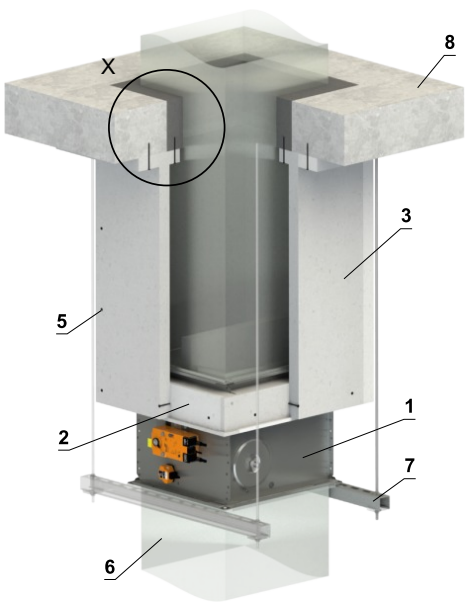
Additional board of frame

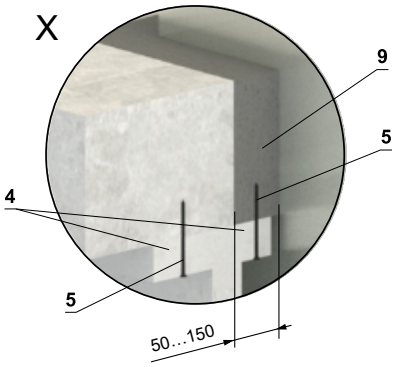


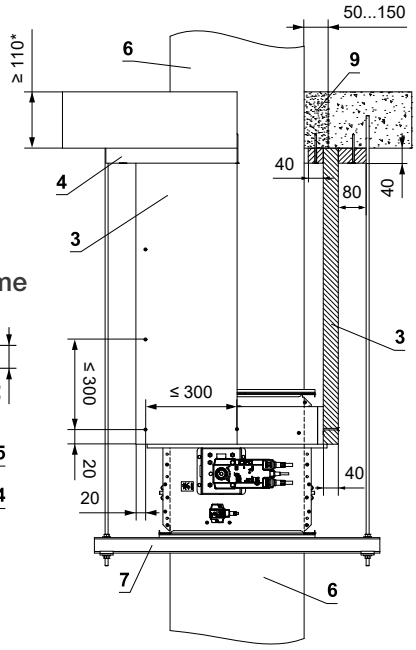
1 – FDMQ
2 – Installation frame
3 – Insulation made of cement-lime board - min. thickness 40 mm, min. density 450 kg/m^3 (e.g. PROMATECT-L). All parts are glued with glue Promat K84 and secured with screws 4x80 mm
4 – Additional board made of cement-lime board - min. thickness 40 mm,min. density 450 kg/m^3 (e.g. PROMATECT-L). Apply HILTI CFS-S ACR mastic at the entire area and secure it with screws 4x80 mm
5 – Screw 4x80 mm - screws must be firmly fixed in the wall construction, if necessary use steel anchors
6 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm
7 – Clamp with threaded rod, see pages 75 to 78
8 – Solid wall construction
9 – Mortar or gypsum

Fig. 53. Outside solid ceiling construction - insulation from fire-resistant boards - mortar or gypsum - installation frame E6

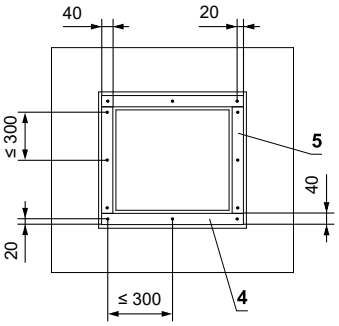
For connection of following duct, see page 79.
Minimum and maximum distance between the wall and fire damper is unlimited.
Insulation must be suspended using threaded rods and mounting profiles or other mounting system, according to national standards.
Load of the suspension system depends on weight of the fire damper, duct system and the insulation, see page 75.
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.



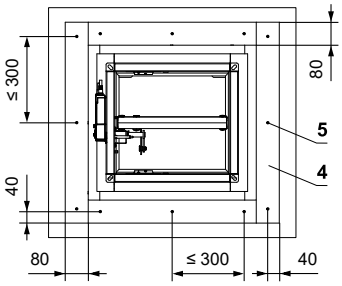




Additional board of duct



Additional board of frame



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

1 – FDMQ
2 – Installation frame
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
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
5 – Screw 4x80 mm - screws must be firmly fixed in the wall construction, if necessary use steel anchors
6 – Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm
7 – Clamp with threaded rod, see pages 75 to 78
8 – Solid wall construction
9 – Mortar or gypsum

9. Suspension Systems

Mounting to the ceiling wall

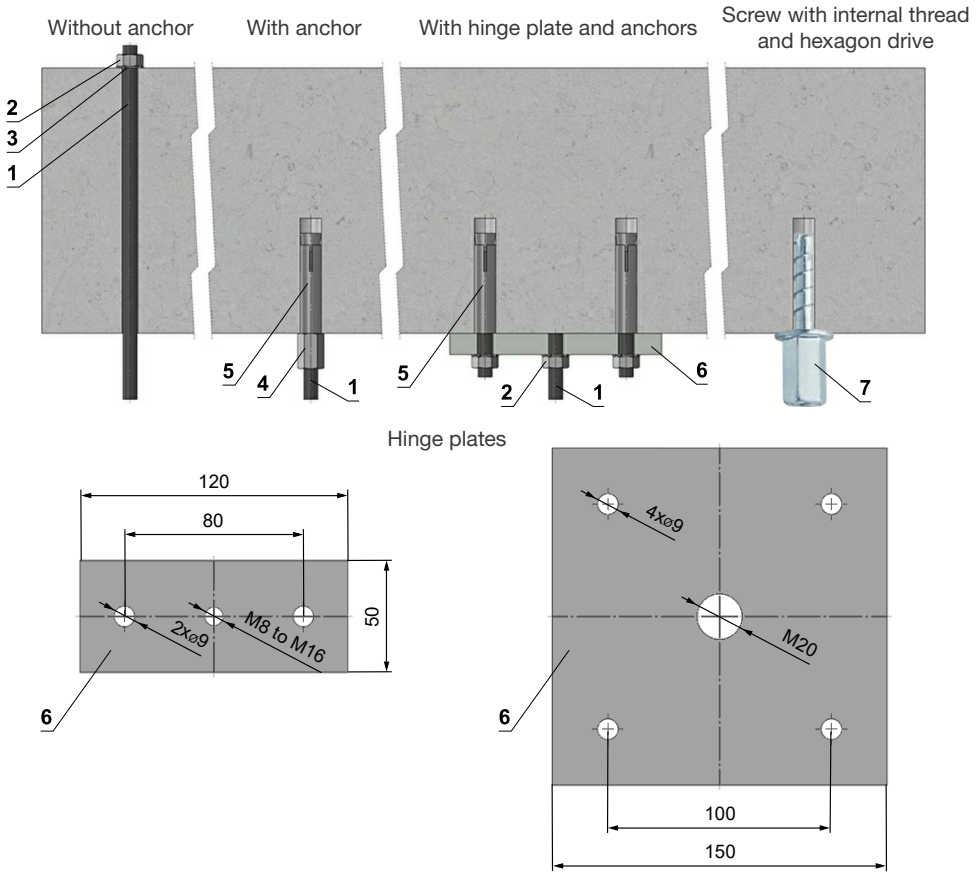
The dampers must be suspended using threaded rods and mounting profiles. Their dimensioning depend on the weight of the damper.

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



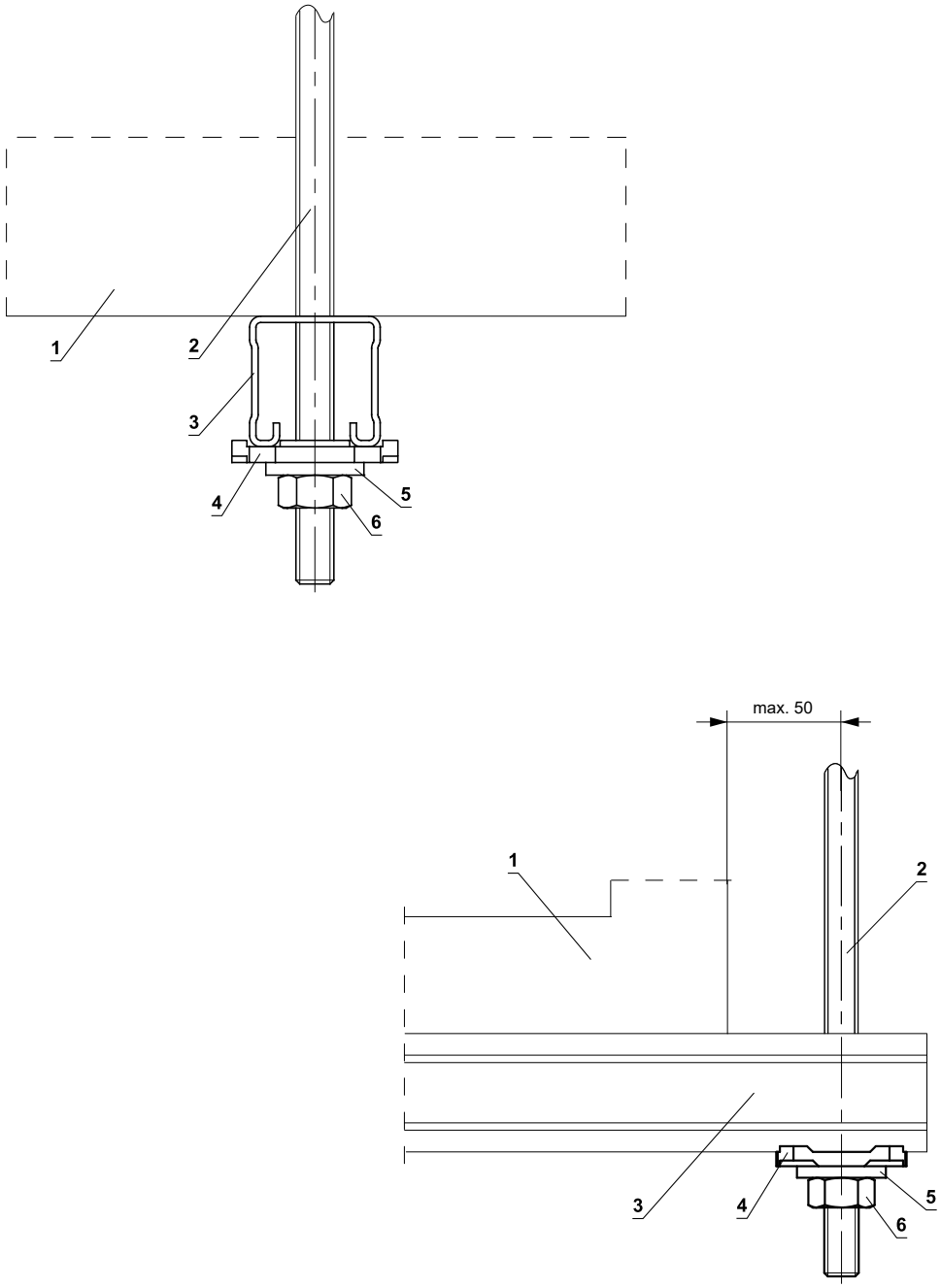
If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

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)

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
M14	115	70	140
M16	157	96	192
M18	192	117	234
M20	245	150	300

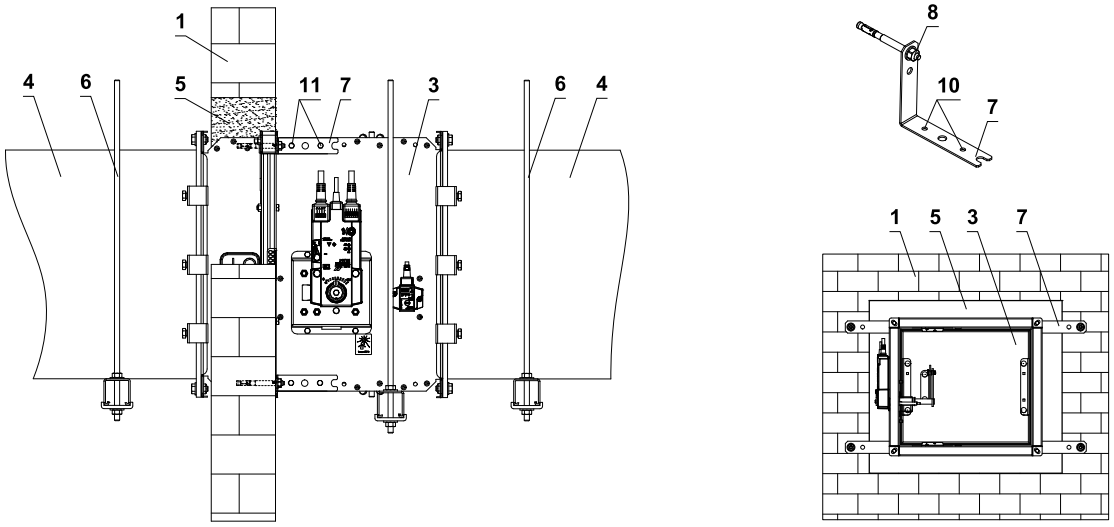
Fig. 54. Example of placing of mounting profiles HILTI



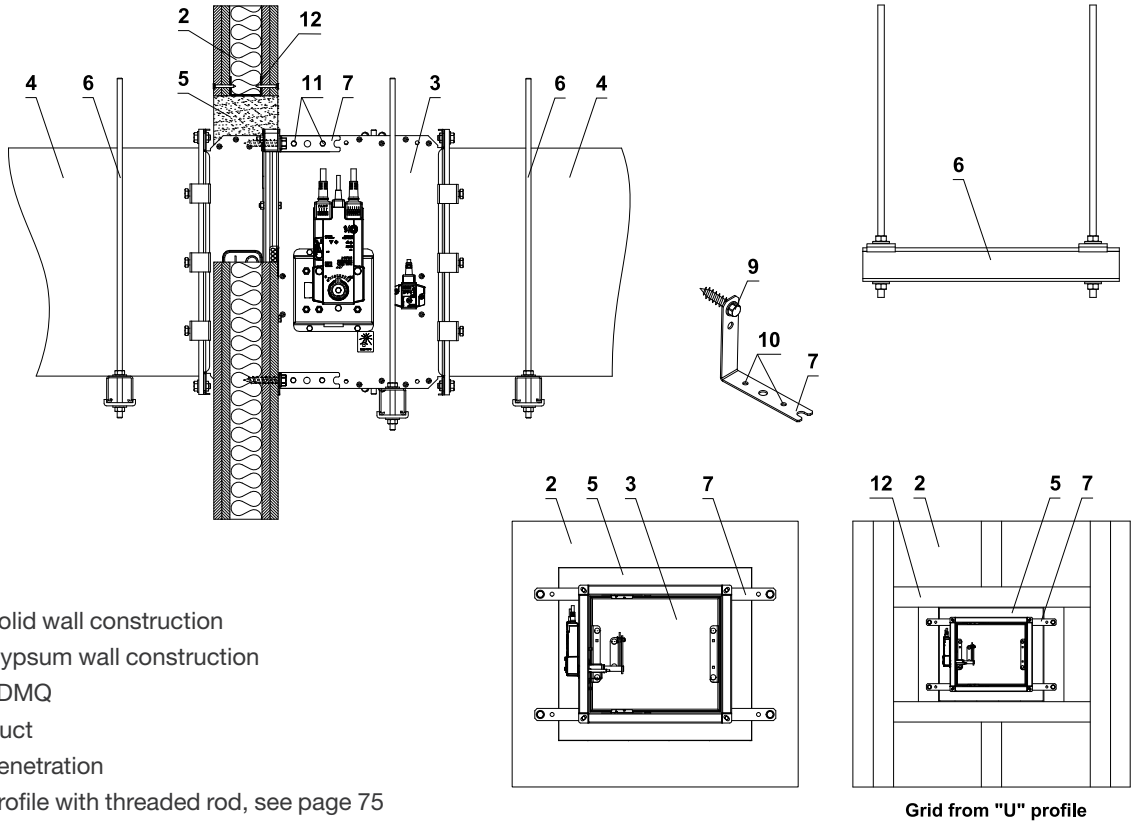
1 – FDMQ
2 – Threaded rod M8 - M12
3 – Support HILTI MQ-41 or MQ-41/3
4 – Bored plate HILTI MQZ-L
5 – Washer for M8 - M12
6 – Nut M8 - M12

Fig. 55. Example of fixing FDMQ to the wall ceiling

In solid wall construction



In gypsum wall construction



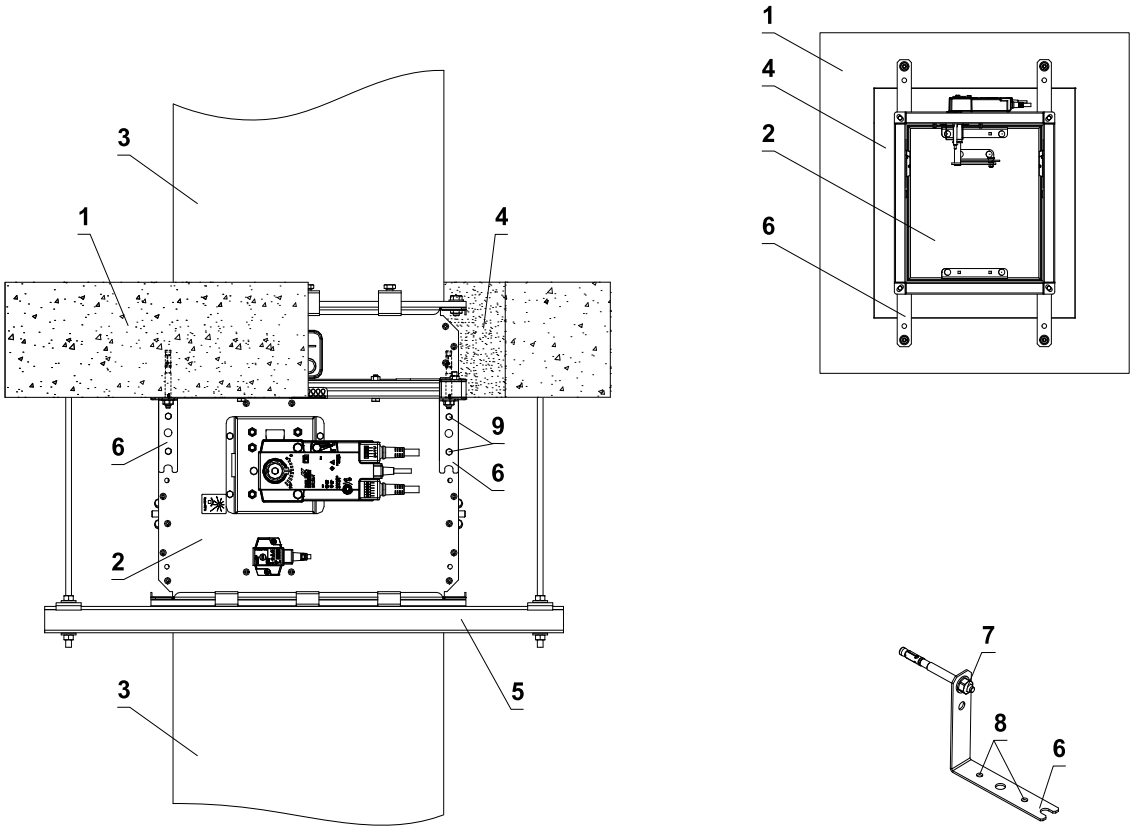
Grid from "U" profile

1 – Solid wall construction
2 – Gypsum wall construction
3 – FDMQ
4 – Duct
5 – Penetration
6 – Profile with threaded rod, see page 75
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.

Fig. 56. Example of fixing FDMQ to the ceiling

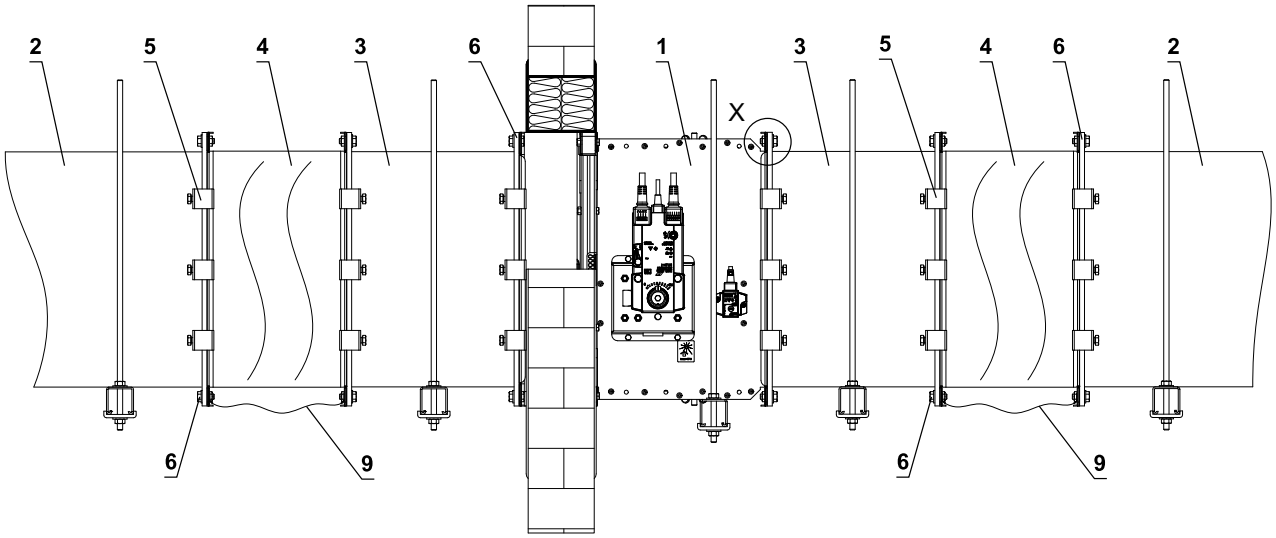
In solid ceiling construction

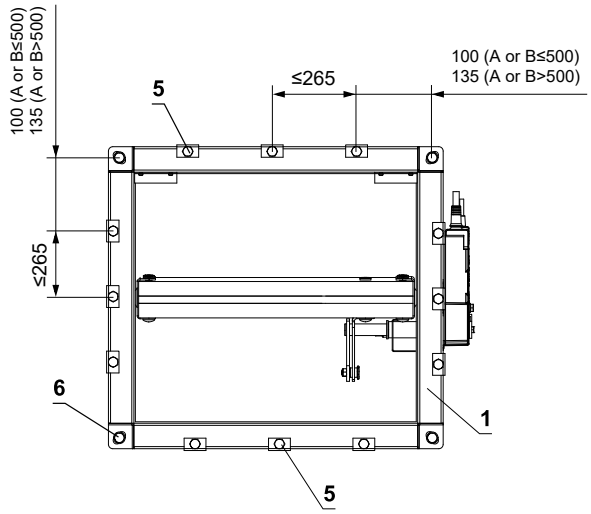


1 – Solid ceiling construction
2 – FDMQ
3 – Duct
4 – Penetration
5 – Profile with threaded rod, see page 75
6 – Fixing element/steel bracket for fixing the damper to the wall (optional accessories from MANDÍK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
7 – Nut M8 with anchor
8 – Installation holes
9 – Screw assembly M6 (screw M6x10, nut M6)

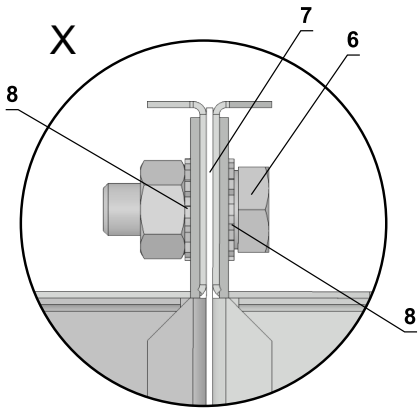
The method of attachment must follow the minimum requirements for attachment and connection of ductwork in accordance with national regulations. Also, the elements can be suspended from the top, or supported from bottom, or fastened from the side.

9.1 Example of duct connection





Electrically conductive connection



* at least one connection must be electrically conductive

1 – FDMQ
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

10. Transportation, storage and warranty

10.1 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 (minumum 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%.

10.2 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 FDMQ, 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 dismounted.

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.

11. 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 dismounted).

On the other hand, if the limit switch is to be added to the damper design, the change can be implemented by change kit.

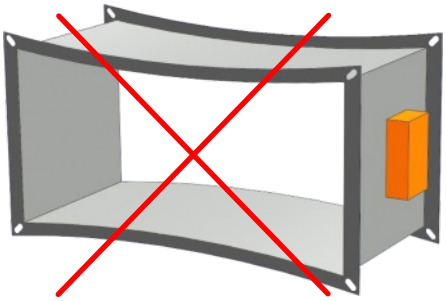
These facts must be recorded in the respective operation documentation of the damper (record books of the damper, fire logs, etc.) and subsequently, adequate function checks must be carried out.

Installation / fixing the damper

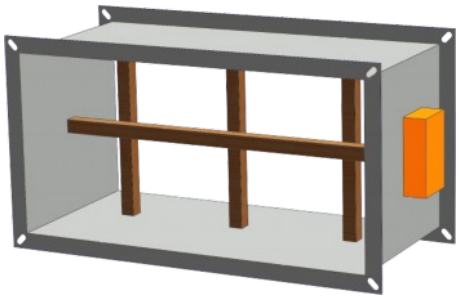
The damper casing shall not be deformed in the course of bricking in.

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!

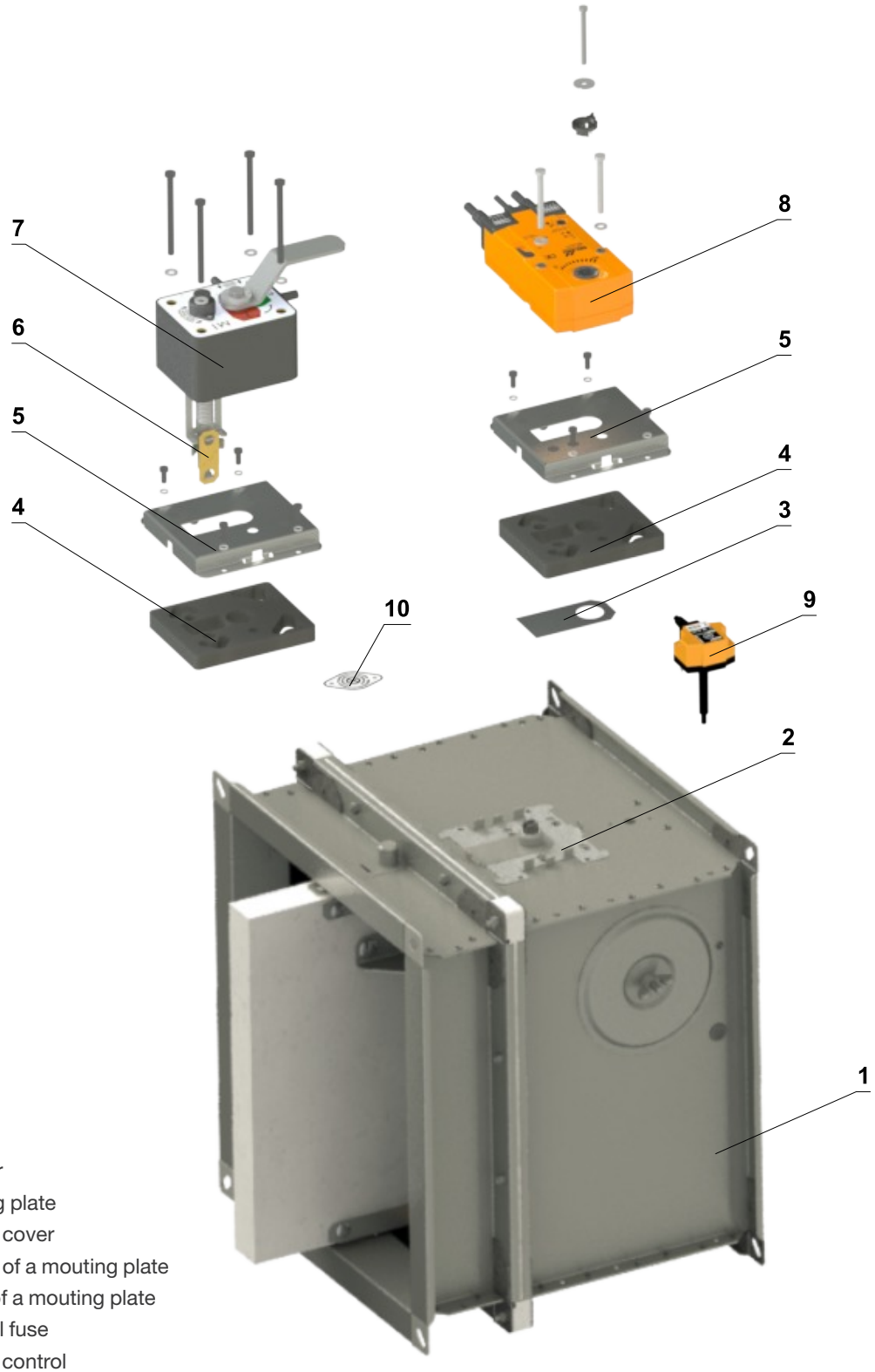


WRONG!



Reinforcement of the casing with wooden beams

Fig. 57. Change of manual control for the actuator or vice versa



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

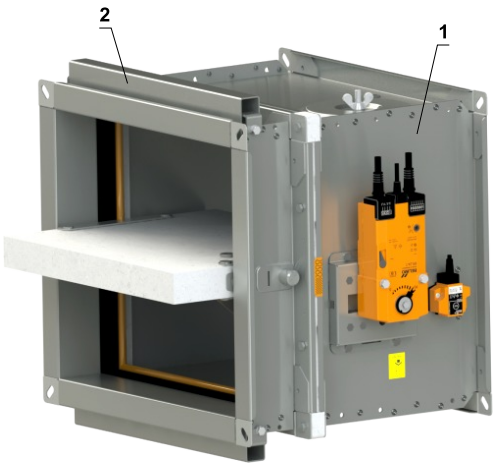
Reinforcement frame VRM-Q

If the damper is installed outside the fire separation construction, a damper side A ≥ 800 mm and fire resistance is EIS 90, VRM-Q reinforcement frame must be used.

For lower fire resistance than EIS 90, VRM-Q reinforcement frame is not necessary!

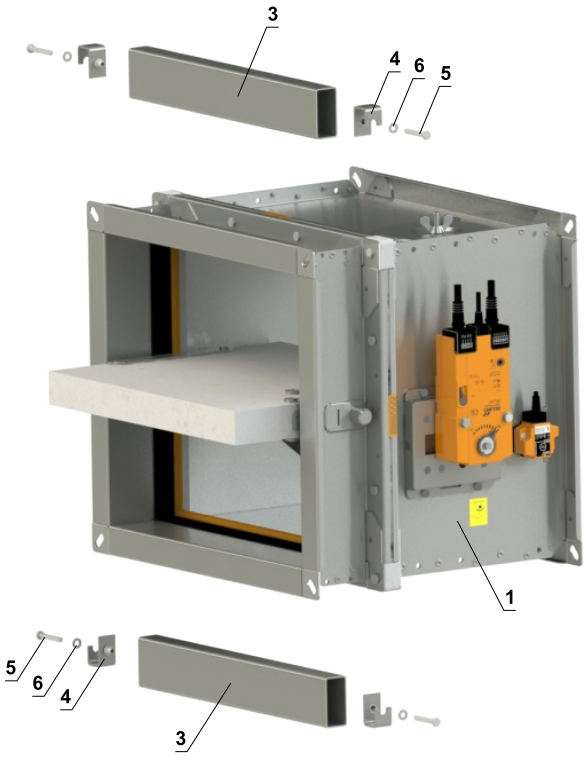
VRM-Q is mounted only on "A" sides.

Fixing of reinforcing frame VRM-Q to the damper casing



Installation procedure

1. Place part A on the damper casing.
2. Insert part B to the part A.
3. Adjust a nut of part B against a hole on the damper casing and fasten it with M6x40 mm hexagon head screw DIN 931 with washer M6/6,4 DIN 7349.
4. Repeat the procedure on the other side of the VRM-Q and an opposite side "A" of the fire damper.



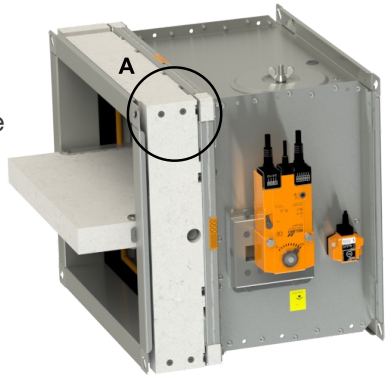
1 – FDMQ
2 – VRM-Q
3 – Part A of VRM-Q
4 – Part B of VRM-Q
5 – Hexagon head screw M6x40 mm DIN 931
6 – Washer M6/6,4 DIN 7349

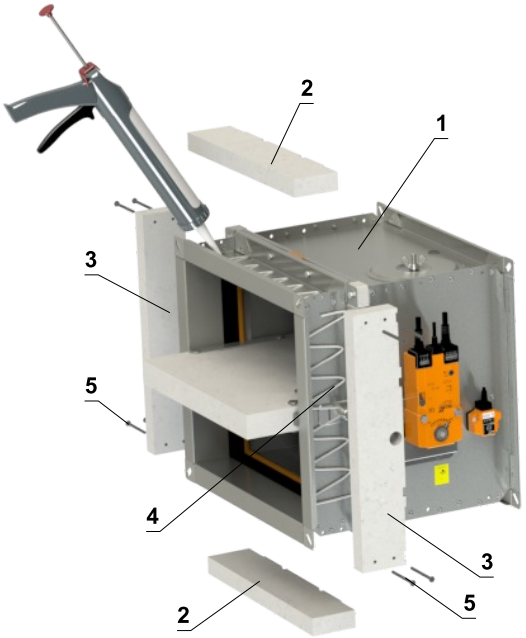
Protective cladding boards

Protective cladding boards must be used as a part of installation with weichschott system.
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.
Protective cladding boards are made of PROMATECTMST, thickness 30 mm.
Glue K84 is not included in the package.

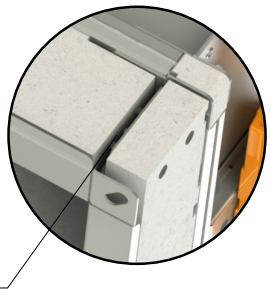
Installation procedure

1. Apply K84 glue over the entire surface.
2. Attach protective cladding boards on all sides of a fire damper and glue them on the damper casing.
3. Screw parts A and B using four screws 5x70 mm.
4. Completely fill the gaps with glue.





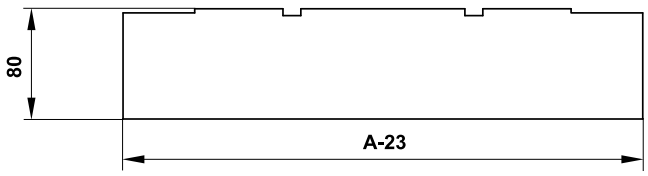
DETAIL A



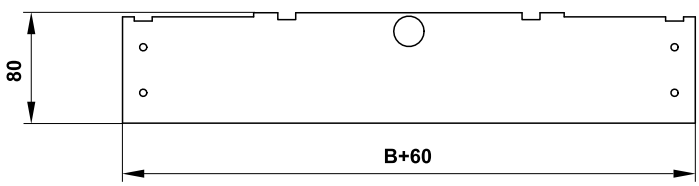
Complitly fill the gaps between boards!

1 – FDMQ
2 – Part A
3 – Part B
4 – Glue PROMAT K-84
5 – Screw 5x70 mm

Part A



Part B



Detailed dimensions of protective cladding boards on request.

12. Entry into service and revisions

Before putting the damper into operation, serviceability checks and functional tests must be carried out including testing of functionality of all electrical elements. After putting into operation these serviceability checks must be carried at least twice a year. If no defect is found during two subsequent serviceability checks, these checks can be carried out once a year.

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

Results of regular checks, imperfections found and allimportant 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.

For dampers with manual control, following checks must be carried out:

Check of a manual control and thermal fuse

To check the funcktion of the mechanism 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 M5, depending on the closing spring strength.

For dampers with actuators, following checks must be carried out

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).

The check of function of the damper with actuator can be carried out as follows

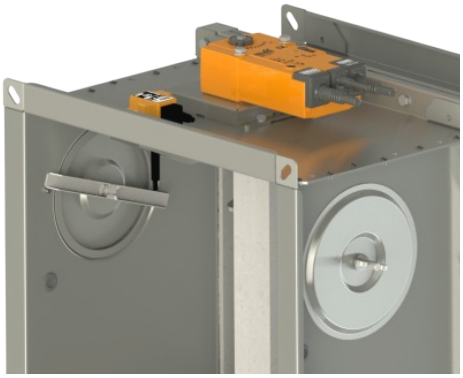
- By disconnecting and restoring the power supply, e.g. by a signal from electrical fire signalization.
- By pressing the test button on the thermoelectric activation device BAT (simulating fuse tripping).

Before putting the dampers into operation and during subsequent function checks, the 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.
- 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.



Inspection opening detail

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.

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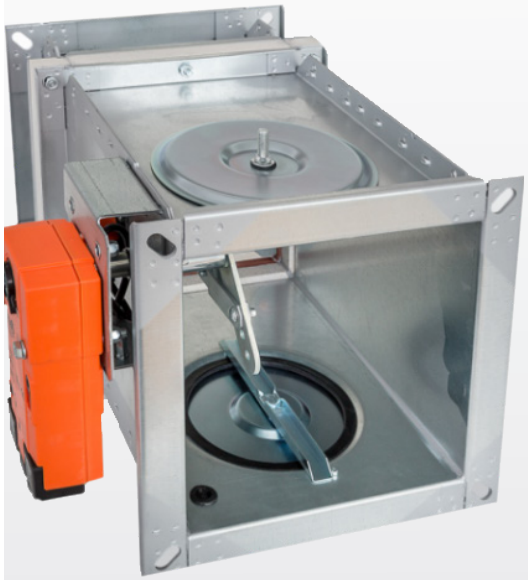

Let's move the air ***together!***