

FDMQ

Fire damper

Technical Documentation

Installation, Commissioning, Operation, Maintenance and Service Manual



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

CONTENT

I. GENERAL.....	3	Commissioning and revisions.....	88
Description.....	3	X. ORDERING INFORMATIONS.....	90
II. DESIGN.....	4	Ordering key.....	90
Design with manual control.....	4	Accessories.....	91
Design with spring return actuator.....	6	Data label.....	92
Design with the communication and supply device	12		
III. DIMENSIONS.....	14		
Technical parameters.....	16		
IV. INSTALLATION.....	22		
Placement and installation.....	22		
Statement of installations.....	24		
In solid wall construction.....	25		
Installation outside solid wall construction.....	31		
In gypsum wall construction.....	34		
Installation outside gypsum wall construction.....	40		
Installation in sandwich wall construction.....	43		
Shaft walls.....	44		
In solid ceiling construction.....	47		
Outside solid ceiling construction.....	52		
Installation frames.....	54		
Installation frame E1.....	55		
Installation frame E2.....	59		
Installation frame E3.....	62		
Installation frame E4.....	64		
Installation frame E5.....	68		
Installation frame E6.....	71		
V. SUSPENSION SYSTEMS.....	74		
Example of duct connection.....	78		
VI. TECHNICAL DATA.....	79		
Pressure loss.....	79		
Noise data.....	81		
VII. MATERIAL, FINISHING.....	82		
VIII. TRANSPORTATION, STORAGE AND WARRANTY.....	83		
Logistic terms.....	83		
Warranty.....	83		
IX. ASSEMBLY, ATTENDANCE AND MAINTENANCE.....	84		

I. GENERAL

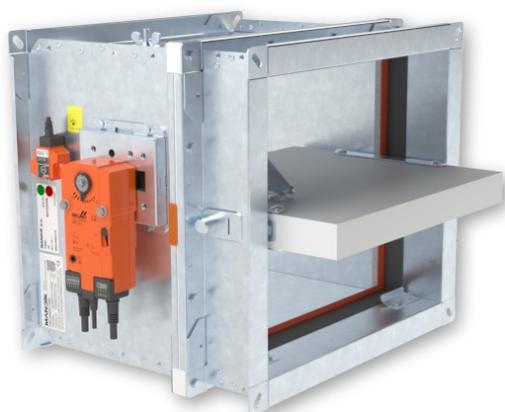
Description

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

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

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

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



FDMQ with spring return actuator



FDMQ with manual control

Damper characteristics

- CE certified acc. to EN 15650
- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3+A1
- External Casing leakage class ATC 3 (old marking "C"), Internal leakage class 2 acc. to EN 1751
- Cycling test in class C₁₀₀₀₀ acc. to EN 15650
- Corrosion resistant acc. to EN 15650
- Certificate of constancy of performance No. 1391-CPR-XXXX/XXXX
- Declaration of Performance No. PM/FDMQ/01/XX/X
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

Working conditions

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

II. DESIGN

Design with manual control

Design .01

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



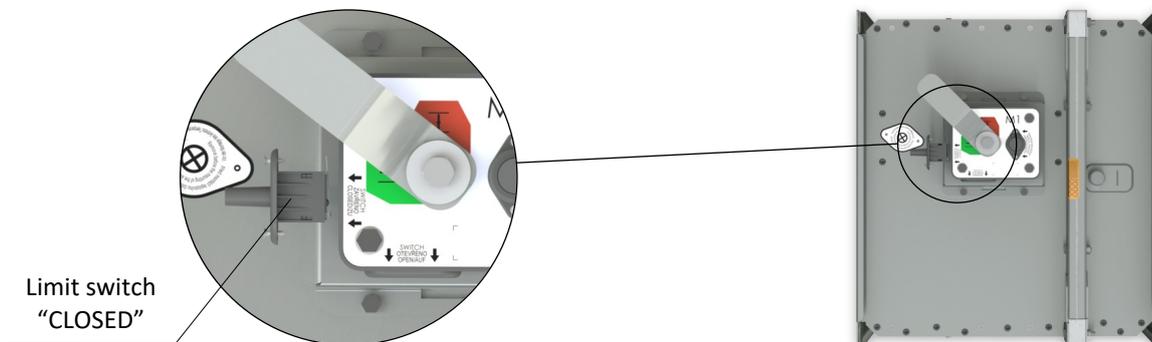
Design .01

ATTENTION:

- Manual controls are produced in 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 pages 16 to 21
- It is not recommended to use different size of the manual control than given by the manufacturer, otherwise there is a risk of damaging the fire damper.

Design .11

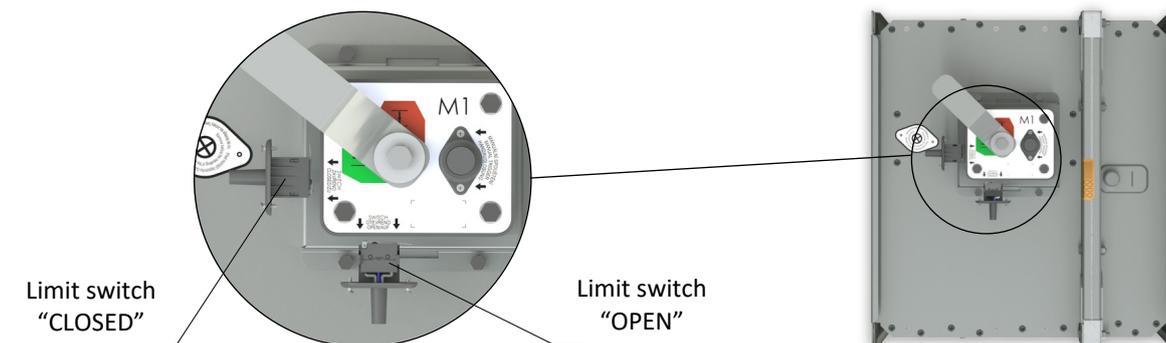
- Design .01 with manual control can be complemented with a limit switch signaling of the damper blade position "CLOSED".
- Cable is connected directly to limit switch.
- Limit switch detail → see page 5



Design .11

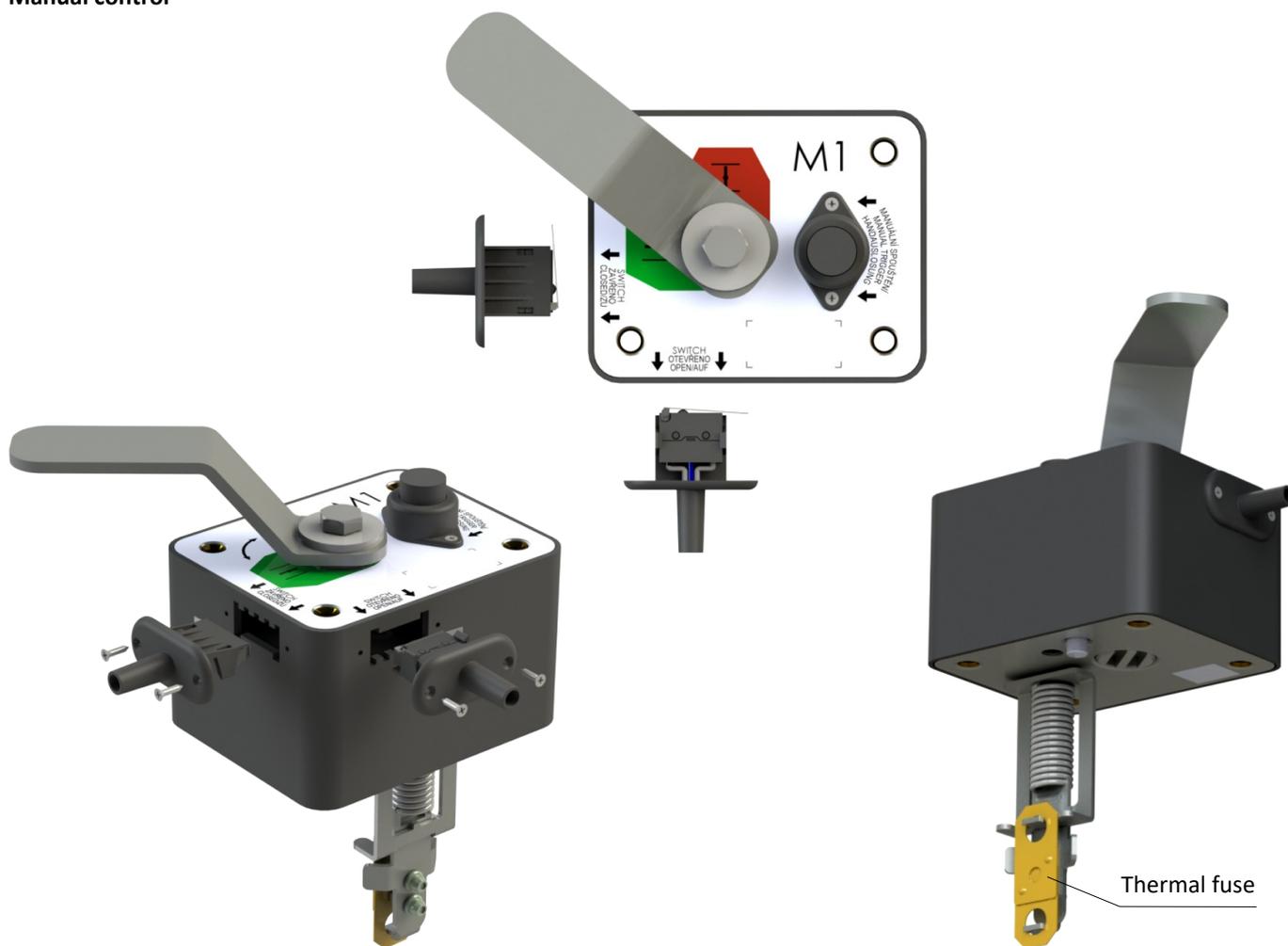
Design .80

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

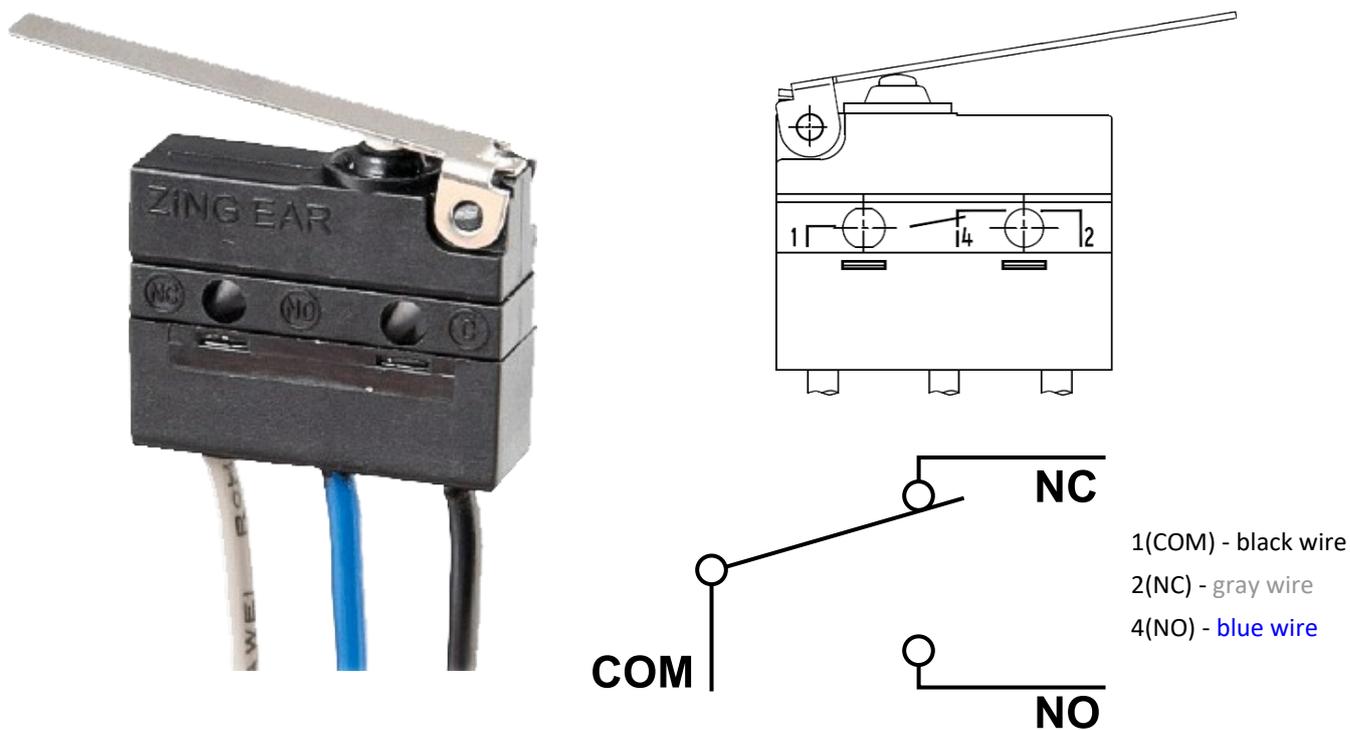


Design .80

Manual control



Limit switch G905-300E03W1



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

This limit switch is possible to connect in two following ways

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

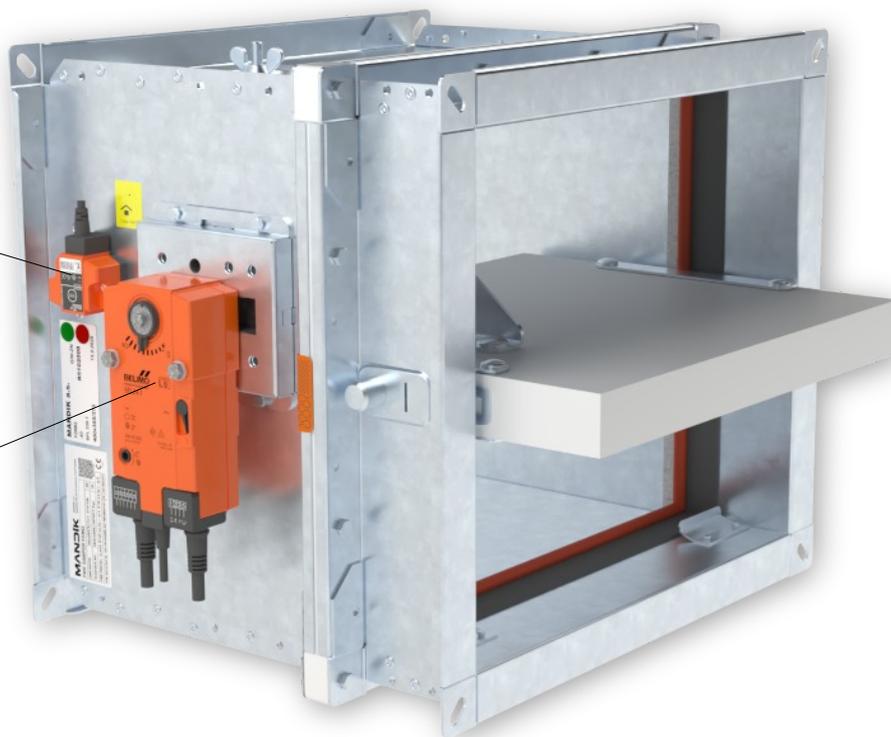
Design with spring return actuator

Design .40 and .50

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

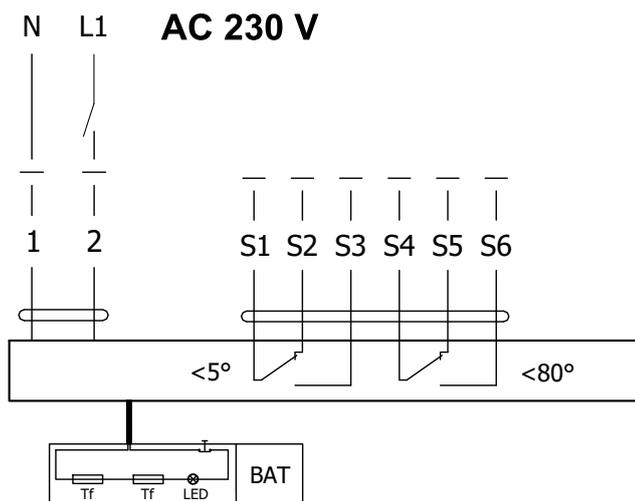
Thermoelectric activation device BAT

Spring return actuator

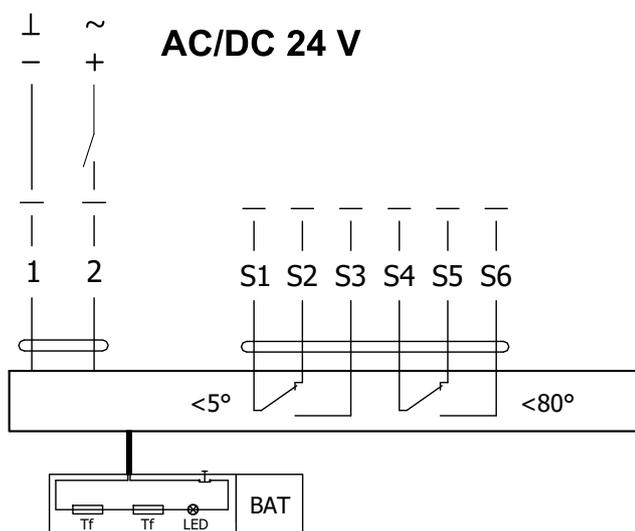


Design .40 and .50

Actuator BELIMO BFL 230-T



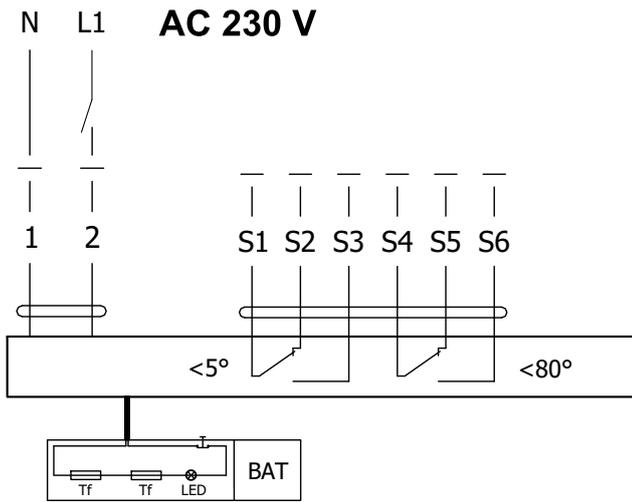
Actuator BELIMO BFL 24-T(-ST)



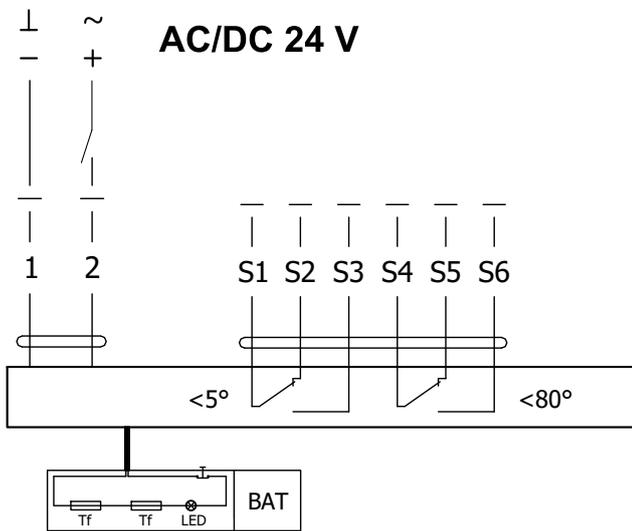
Actuator BELIMO BFL 230-T(-ST), BFL 24-T(-ST)

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

Actuator BELIMO BFN 230-T



Actuator BELIMO BFN 24-T(-ST)



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

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

Thermoelectric activation device BAT

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



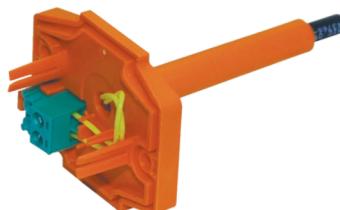
BELIMO ZBAT 72
Black (BK) = 72°C (standard)



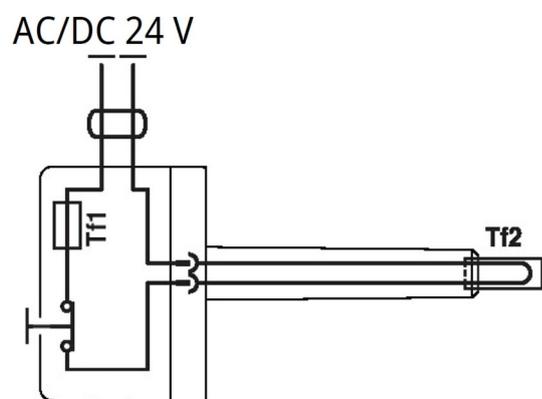
BELIMO ZBAT 95
Grey (GY) = 95°C



BELIMO ZBAT 120
Orange (OG) = 120°C



BELIMO ZBAT 140
Red (RD) = 140°C



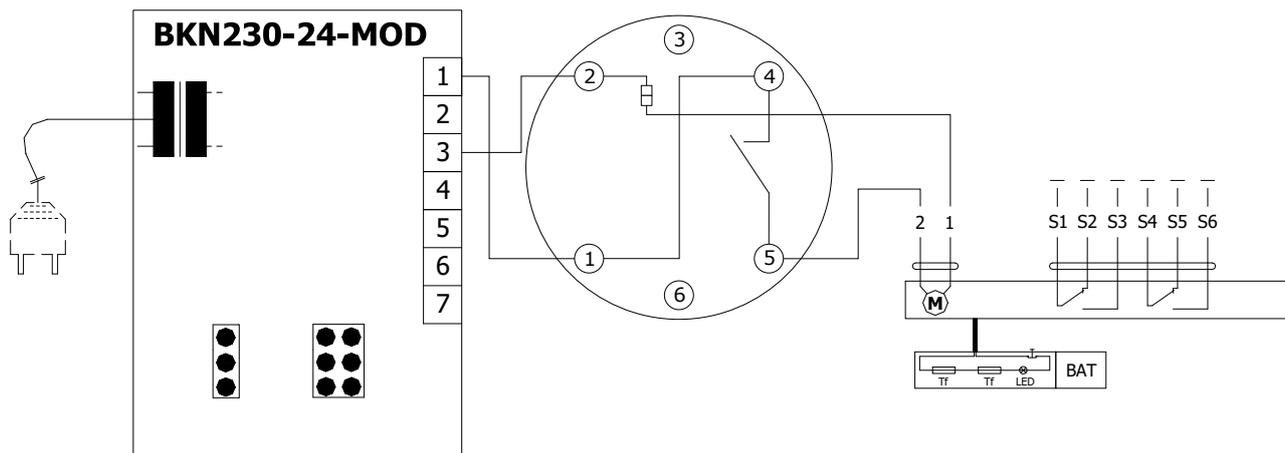
Thermoelectric activation device BAT 72 (95/120/140)

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

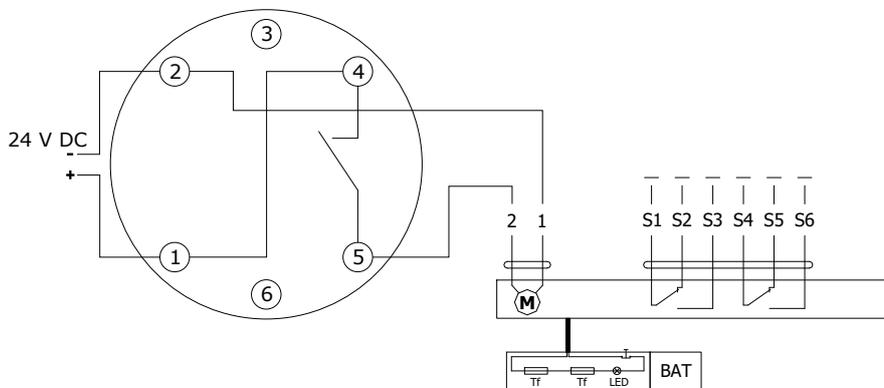
Design .41 and .51

- Design .41 or .51 with actuator and smoke detector ORS 142 K. The voltage can be AC 230 V or 24 V DC. Design .41 with voltage AC 230 V is equipped with communication and supply device BKN 230-24-MOD and with actuator BF 24-TN (BFL 24-T, BFN 24-T).
- The smoke detector is activated when smoke spreads in air duct system. Deactivation of the smoke detector alarm status is provided by interruption of supply voltage for min. 2s.
- Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two microswitches.

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



Design .51 with actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K (voltage 24 V DC)



Communication and supply device BKN 230-24-MOD

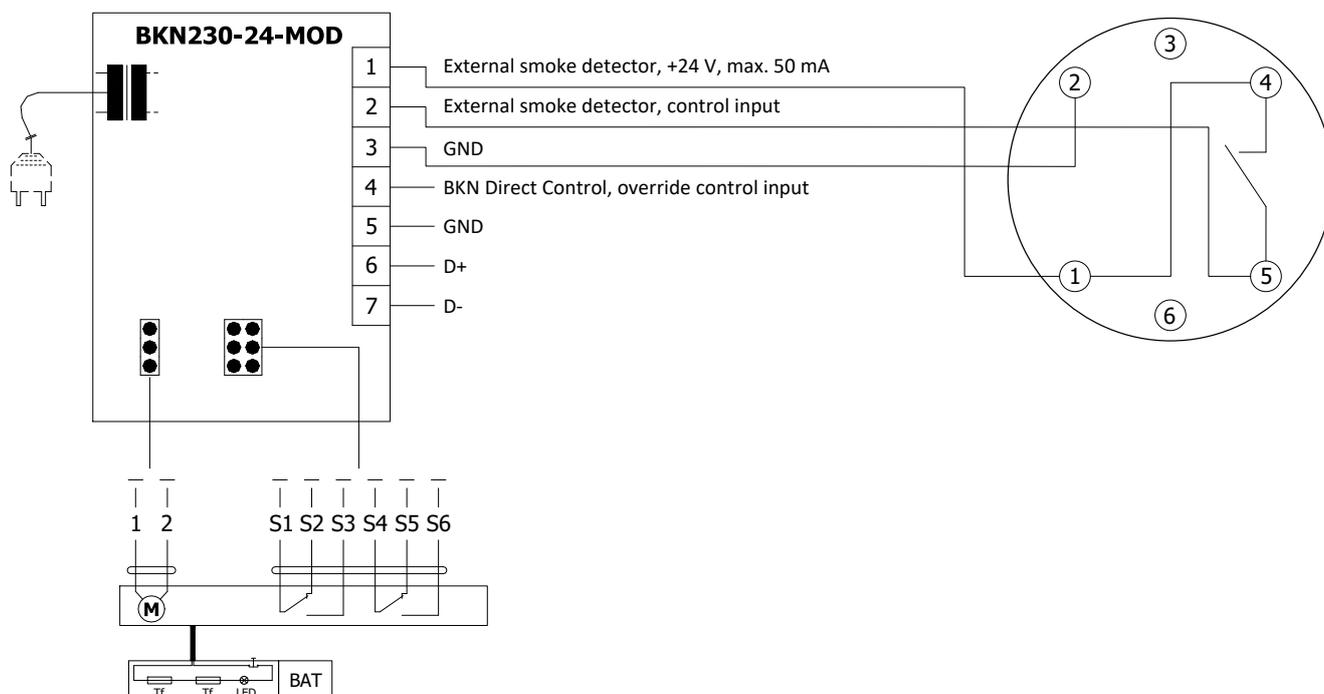
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3 W (operating position)
Dimensioning	14 VA (including actuator)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-40°C ... +80°C
Connection - net	cable 0,9 m with EURO plug type 26
- motor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

Design with the communication and supply device

Design .63, 63S

- Design with the communication and supply device BKN 230-24-MOD and actuator BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST) for communication with control systems using the Modbus RTU or BACnet MS / TP. Design 63. can be extended with an optical smoke detector ORS 142 K (design .63S).
- The wiring of the line is to be carried out in accordance with applicable RS485 regulations.
- Parameterization of the communication is done using DIL switches.
- BKN 230-24-MOD can be installed separately, without a connection to a master control system, in which case the connection bridge between the terminals 1 and 4 must be installed.
- If the test button on BAT is pressed or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION) is disconnected, the damper blade position will be "FAILURE".
- For design .63S the smoke detector is activated when smoke spreads in air duct system. Deactivation of the smoke detector alarm status is provided by interruption of supply voltage for min. 2s.

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



Communication and supply device BKN 230-24-MOD

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

Optical smoke detector ORS 142 K with the socket 143A

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

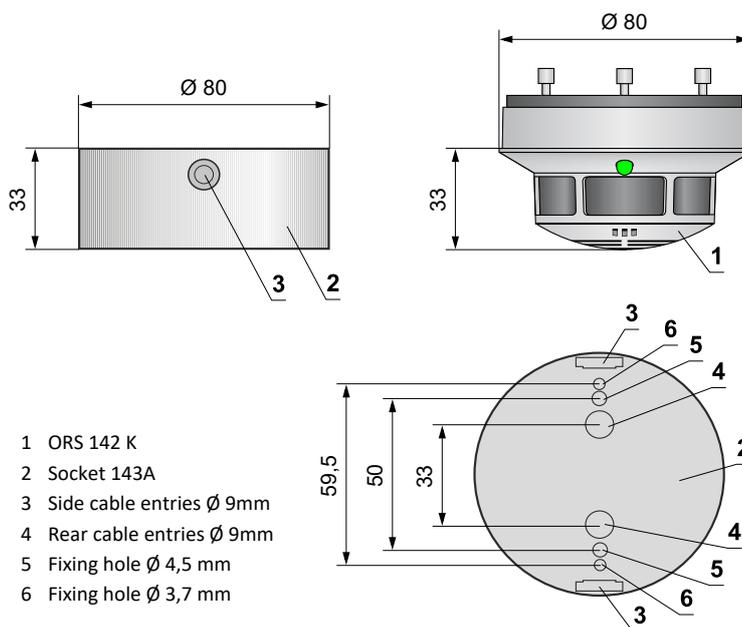
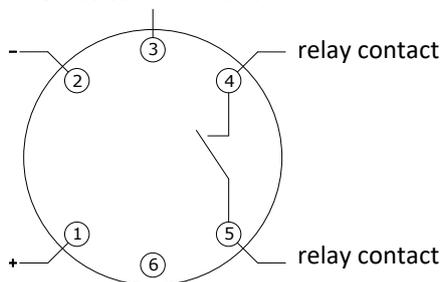
ORS 142 K



Socket 143A



RS-Bus communication



Relay contact		LED	
In operation		Green	Shines
Slight contamination		Green / Yellow	Flashes
Heavy contamination		Green / Yellow	Flashes
Fault		Yellow	Shines
Alarm		Red	Shines
Power Off		Off	-

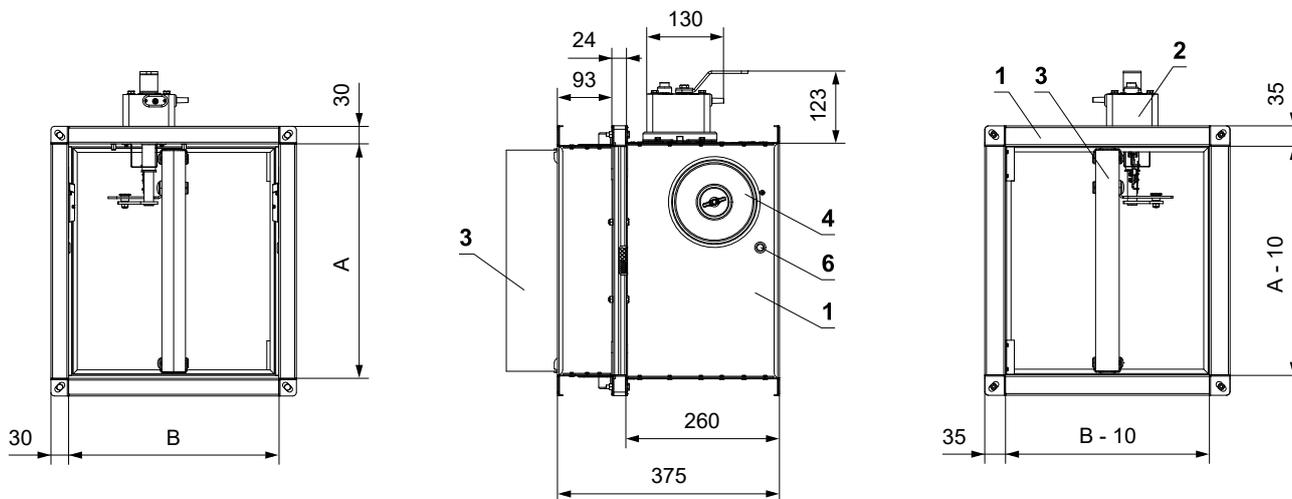
- 1 ORS 142 K
- 2 Socket 143A
- 3 Side cable entries Ø 9mm
- 4 Rear cable entries Ø 9mm
- 5 Fixing hole Ø 4,5 mm
- 6 Fixing hole Ø 3,7 mm

Optical smoke detector ORS 142 K with the socket 143A

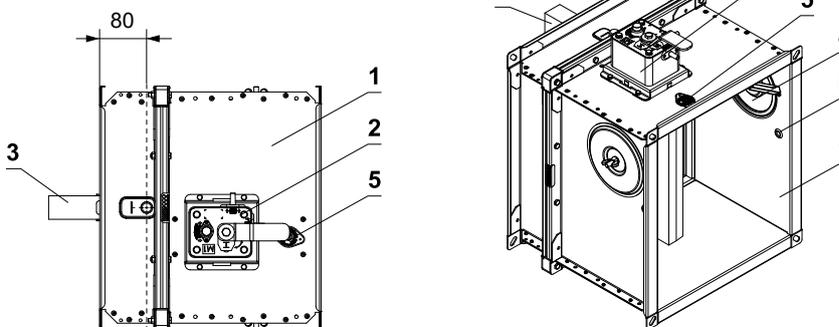
Operating voltage	18 ... 28 V DC
Residual ripple	≤ 200 mV
Power Consumption Socket (without actuator)	max. 22 mA
Degree of protection	IP 42
Ambient temperature	-20°C ... +75°C
Additional temperature sensor	+70°C
Connection - net	Cabel 1m, connected to terminals 1, 2 and 4
- motor	Actuator connected on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

III. DIMENSIONS

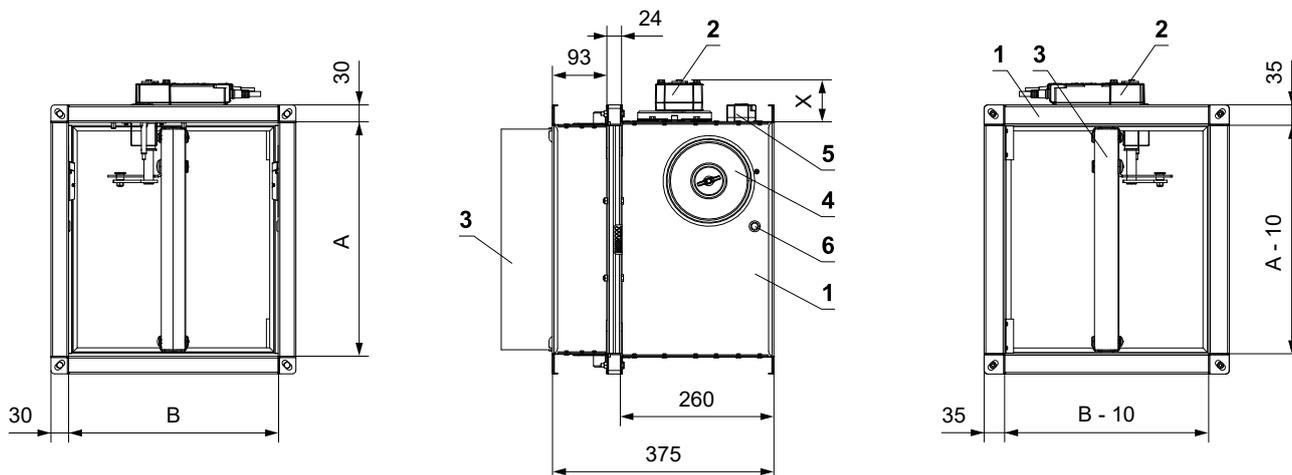
FDMQ with manual control



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

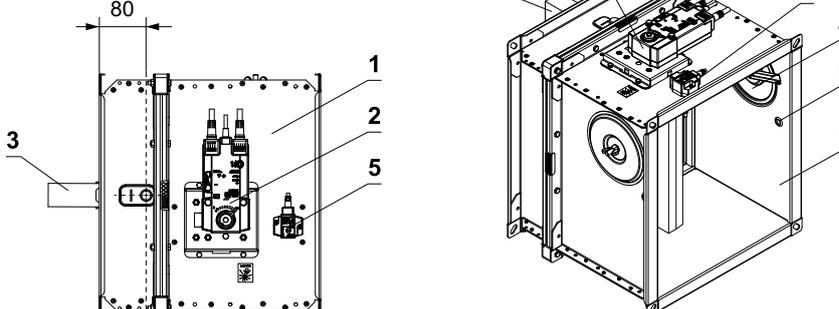


FDMQ with spring return actuator



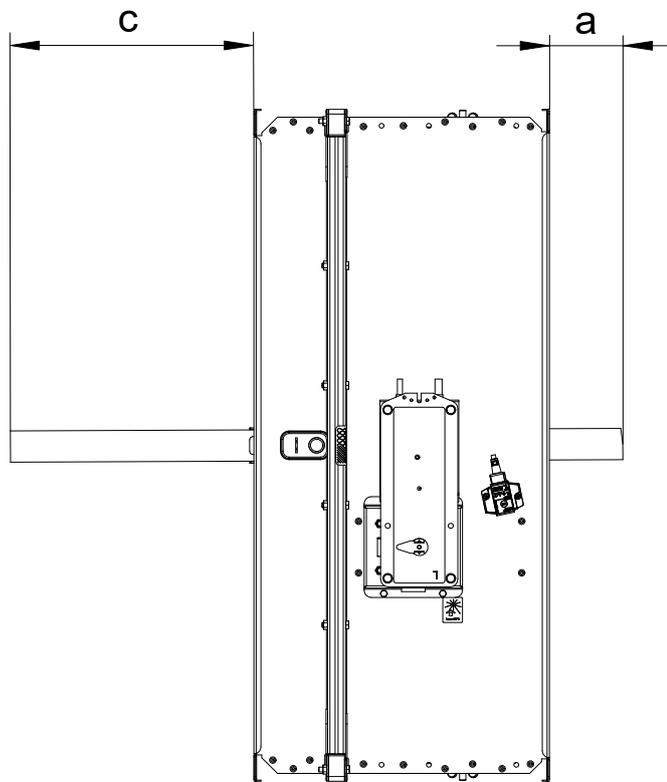
X=72 mm (BFL)
 X=76 mm (BFN)
 X=83 mm (BF)

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



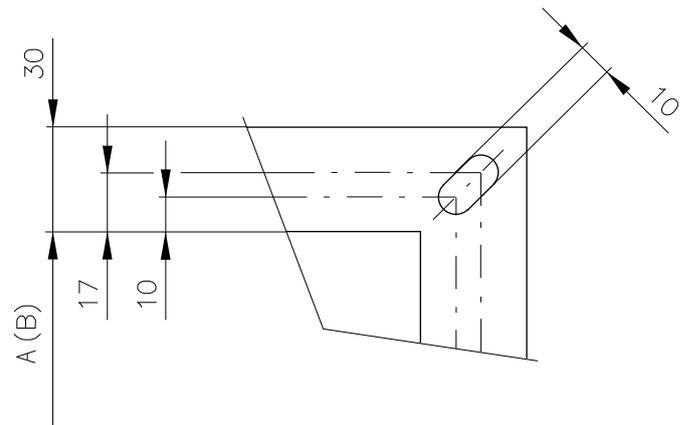
Damper blade overlaps

- Open damper blade overlaps the damper casing by the value "a" or "c". These values are specified in chapter Technical parameters → see pages 16 to 21

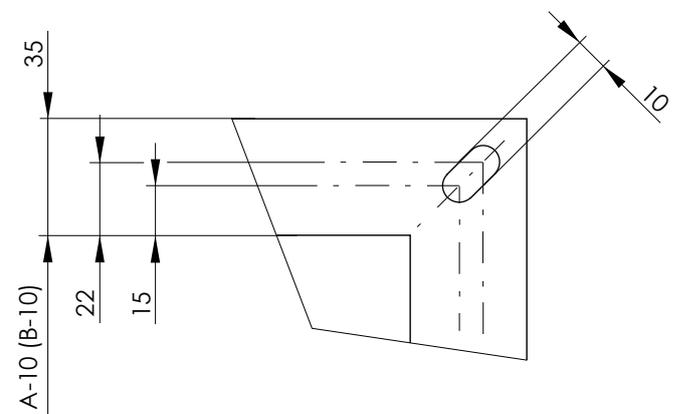


Values "a" and "c" has to be respected when projecting following air-conditioning duct.

Flange of a damper - CONTROL SIDE



Flange of a damper - INSTALLATION SIDE



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

Technical parameters

A x B [mm]	Damper blade overlaps		Weight		Free area S _r [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Free area S _r [m ²]	Spring return actuator	Manual control	
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*				
150 x	-	-	8,4	8,5	0,0106	BFL	M1	200 x	650	18,5	233,5	16,5	16,7	0,1024	BFL	M2
	180	-	8,8	8,8	0,0144				700	43,5	258,5	17,2	17,4	0,1111		
	200	-	8,5	9	9,1				0,0169	710	48,5	263,5	17,3	17,5	0,1129	
	225	-	21	9,3	9,3				0,0200	750	68,5	283,5	17,9	18,1	0,1199	
	250	-	33,5	9,6	9,7				0,0231	800	93,5	308,5	18,6	18,9	0,1286	
	280	-	48,5	9,9	10				0,0269	150	-	-	9,3	9,3	0,0170	
	300	-	59	10,2	10,3				0,0294	180	-	-	9,8	9,9	0,0230	
	315	-	66	10,3	10,4				0,0313	200	-	8,5	10,2	10,3	0,0270	
	355	-	86	10,8	10,9			0,0363	225	-	21	10,6	10,7	0,0320		
	400	-	108,5	11,3	11,4			0,0419	250	-	33,5	11	11,1	0,0370		
	450	-	133,5	11,9	12			0,0481	280	-	48,5	11,5	11,6	0,0430		
	500	-	158,5	12,4	12,5			0,0544	300	-	59	11,9	12	0,0470		
	550	-	183,5	13	13,1			0,0606	315	-	66	12,1	12,2	0,0500		
	560	-	188,5	13,1	13,2			0,0619	355	-	86	12,8	12,9	0,0580		
600	-	208,5	13,5	13,7	0,0669	400	-	108,5	13,5	13,7	0,0670					
630	8,5	223,5	13,9	14,1	0,0706	450	-	133,5	14,4	14,5	0,0770					
180 x	-	-	8,8	8,9	0,0132	BFL	M1	225 x	500	-	158,5	15,2	15,4	0,0870	M2	
	180	-	9,2	9,3	0,0178				550	-	183,5	16	16,2	0,0970		
	200	-	8,5	9,5	9,6				0,0209	560	-	188,5	16,2	16,4		0,0990
	225	-	21	9,8	9,9				0,0248	600	-	208,5	16,8	17		0,1070
	250	-	33,5	10,2	10,3				0,0287	630	8,5	223,5	17,3	17,5		0,1130
	280	-	48,5	10,6	10,7				0,0333	650	18,5	233,5	17,6	17,9		0,1170
	300	-	59	10,8	10,9				0,0364	700	43,5	258,5	18,4	18,7		0,1270
	315	-	66	11	11,1				0,0388	710	48,5	263,5	18,6	18,8		0,1290
	355	-	86	11,6	11,7			0,0450	750	68,5	283,5	19,2	19,5	0,1370		
	400	-	108,5	12,2	12,3			0,0519	800	93,5	308,5	20	20,3	0,1470		
	450	-	133,5	12,9	13			0,0597	150	-	-	9,6	9,7	0,0191		
	500	-	158,5	13,5	13,7			0,0674	180	-	-	10,2	10,3	0,0259		
	550	-	183,5	14,2	14,3			0,0752	200	-	8,5	10,5	10,6	0,0304		
	560	-	188,5	14,3	14,5			0,0767	225	-	21	11	11,1	0,0360		
600	-	208,5	14,9	15	0,0829	250	-	33,5	11,5	11,6	0,0416					
630	8,5	223,5	15,3	15,4	0,0876	280	-	48,5	12	12,1	0,0484					
650	18,5	233,5	15,5	15,7	0,0907	300	-	59	12,4	12,5	0,0529					
700	43,5	258,5	16,2	16,4	0,0984	315	-	66	12,7	12,8	0,0563					
710	48,5	263,5	16,3	16,5	0,1000	355	-	86	13,4	13,6	0,0653					
750	68,5	283,5	16,8	17	0,1062	400	-	108,5	14,3	14,4	0,0754					
800	93,5	308,5	17,5	17,7	0,1139	450	-	133,5	15,2	15,4	0,0866					
200 x	-	-	9	9,1	0,0149	BFL	M1	250 x	500	-	158,5	16,1	16,3	0,0979	M2	
	180	-	9,5	9,6	0,0201				550	-	183,5	17	17,2	0,1091		
	200	-	8,5	9,8	9,9				0,0236	560	-	188,5	17,2	17,4		0,1114
	225	-	21	10,2	10,3				0,0280	600	-	208,5	17,9	18,1		0,1204
	250	-	33,5	10,5	10,6				0,0324	630	8,5	223,5	18,4	18,7		0,1271
	280	-	48,5	11	11,1				0,0376	650	18,5	233,5	18,8	19		0,1316
	300	-	59	11,3	11,4				0,0411	700	43,5	258,5	19,7	19,9		0,1429
	315	-	66	11,5	11,6				0,0438	710	48,5	263,5	19,9	20,1		0,1451
	355	-	86	12,1	12,2			0,0508	750	68,5	283,5	20,6	20,8	0,1541		
	400	-	108,5	12,8	12,9			0,0586	800	93,5	308,5	21,4	21,7	0,1654		
	450	-	133,5	13,5	13,7			0,0674	150	-	-	9,9	10	0,0217		
	500	-	158,5	14,3	14,4			0,0761	180	-	-	10,6	10,7	0,0293		
	550	-	183,5	15	15,2			0,0849	200	-	8,5	11	11,1	0,0344		
	560	-	188,5	15,2	15,3			0,0866	225	-	21	11,5	11,6	0,0408		
600	-	208,5	15,7	15,9	0,0936	250	-	33,5	12	12,1	0,0472					
630	8,5	223,5	16,2	16,4	0,0989	280	-	48,5	12,7	12,8	0,0548					

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

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

A x B [mm]	Damper blade overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
280 x	300	-	59	13,1	13,2	0,0599	BFL	315 x	710	48,5	263,5	23,1	23,4	0,1871	BFL	M2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	315	-	66	13,4	13,5	0,0638			355	-	86	14,2	14,4	0,0740			400	-	108,5	15,2	15,3	0,0854	450	-	133,5	16,2	16,4	0,0982	500	-	158,5	17,2	17,4	0,1109	550	-	183,5	18,2	18,4	0,1237	560	-	188,5	18,4	18,6	0,1262	600	-	208,5	19,2	19,4	0,1364	630	8,5	223,5	19,8	20	0,1441	650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3	0,0234	BFL	355 x	450	-	133,5	18,6	18,8	0,1271	BFL	M2	180	-	-	10,8	10,9	0,0316	200	-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-	133,5	20	20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																							
	355	-	86	14,2	14,4	0,0740			400	-	108,5	15,2	15,3	0,0854			450	-	133,5	16,2	16,4	0,0982	500	-	158,5	17,2	17,4	0,1109	550	-	183,5	18,2	18,4	0,1237	560	-	188,5	18,4	18,6	0,1262	600	-	208,5	19,2	19,4	0,1364	630	8,5	223,5	19,8	20	0,1441	650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-	133,5			18,6	18,8	0,1271	BFL	M2	180			-	-	10,8	10,9	0,0316	200	-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x		150	-	-	10,3	10,4	0,0281			BFL	400 x	450	-	133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5		258,5	22,9	23,2	0,1842	355 x	150			-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																														
	400	-	108,5	15,2	15,3	0,0854			450	-	133,5	16,2	16,4	0,0982			500	-	158,5	17,2	17,4	0,1109	550	-	183,5	18,2	18,4	0,1237	560	-	188,5	18,4	18,6	0,1262	600	-	208,5	19,2	19,4	0,1364	630	8,5	223,5	19,8	20	0,1441	650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8	0,1271			BFL	M2	180			-			-	10,8	10,9	0,0316	200	-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x			150	-	-	10,3	10,4	0,0281					BFL	400 x	450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8		22,1	0,1712	700	43,5		258,5			22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																					
	450	-	133,5	16,2	16,4	0,0982			500	-	158,5	17,2	17,4	0,1109			550	-	183,5	18,2	18,4	0,1237	560	-	188,5	18,4	18,6	0,1262	600	-	208,5	19,2	19,4	0,1364	630	8,5	223,5	19,8	20	0,1441	650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2	180					-			-			10,8	10,9	0,0316	200	-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x				150	-	-	10,3	10,4	0,0281							BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697		650	18,5	233,5	21,8		22,1			0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																												
	500	-	158,5	17,2	17,4	0,1109			550	-	183,5	18,2	18,4	0,1237			560	-	188,5	18,4	18,6	0,1262	600	-	208,5	19,2	19,4	0,1364	630	8,5	223,5	19,8	20	0,1441	650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180					-					-			10,8			10,9	0,0316	200	-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x					150	-	-	10,3	10,4	0,0281											BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5		223,5	21,3	21,6	0,1697		650			18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																			
	550	-	183,5	18,2	18,4	0,1237			560	-	188,5	18,4	18,6	0,1262			600	-	208,5	19,2	19,4	0,1364	630	8,5	223,5	19,8	20	0,1441	650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-					-					10,8			10,9			0,0316	200	-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x						150	-	-	10,3	10,4	0,0281															BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7		21	0,1639	630	8,5		223,5			21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																										
	560	-	188,5	18,4	18,6	0,1262			600	-	208,5	19,2	19,4	0,1364			630	8,5	223,5	19,8	20	0,1441	650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-						-					10,8					10,9			0,0316			200	-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x							150	-	-	10,3	10,4	0,0281																			BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436		600	-	208,5	20,7		21			0,1639	630	8,5		223,5					21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																	
	600	-	208,5	19,2	19,4	0,1364			630	8,5	223,5	19,8	20	0,1441			650	18,5	233,5	20,2	20,4	0,1492	700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-						-						10,8					10,9					0,0316			200			-	8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x								150	-	-	10,3	10,4	0,0281																							BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-		188,5	19,8	20	0,1436		600			-	208,5	20,7		21					0,1639	630	8,5		223,5					21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																								
	630	8,5	223,5	19,8	20	0,1441			650	18,5	233,5	20,2	20,4	0,1492			700	43,5	258,5	21,2	21,5	0,1619	710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-						-						10,8						10,9					0,0316					200			-			8,5	11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x									150	-	-	10,3	10,4	0,0281																											BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6		19,8	0,1407	560	-		188,5			19,8	20	0,1436		600					-	208,5	20,7		21					0,1639	630	8,5		223,5					21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																															
	650	18,5	233,5	20,2	20,4	0,1492			700	43,5	258,5	21,2	21,5	0,1619			710	48,5	263,5	21,4	21,7	0,1645	750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-						-						10,8						10,9						0,0316					200					-			8,5			11,3	11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x										150	-	-	10,3	10,4	0,0281																															BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262		550	-	183,5	19,6		19,8			0,1407	560	-		188,5					19,8	20	0,1436		600					-	208,5	20,7		21					0,1639	630	8,5		223,5					21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																						
	700	43,5	258,5	21,2	21,5	0,1619			710	48,5	263,5	21,4	21,7	0,1645			750	68,5	283,5	22,1	22,4	0,1747	800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-						-						10,8						10,9						0,0316						200					-					8,5			11,3			11,4	0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x											150	-	-	10,3	10,4	0,0281																																			BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-		158,5	18,4	18,7	0,1262		550			-	183,5	19,6		19,8					0,1407	560	-		188,5					19,8	20	0,1436		600					-	208,5	20,7		21					0,1639	630	8,5		223,5					21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842													
	710	48,5	263,5	21,4	21,7	0,1645			750	68,5	283,5	22,1	22,4	0,1747			800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-						-						10,8						10,9						0,0316						200						-					8,5					11,3			11,4			0,0371	225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x												150	-	-	10,3	10,4	0,0281																																							BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3		17,5	0,1117	500	-		158,5			18,4	18,7	0,1262		550					-	183,5	19,6		19,8					0,1407	560	-		188,5					19,8	20	0,1436		600					-	208,5	20,7		21					0,1639	630	8,5		223,5					21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842				
	750	68,5	283,5	22,1	22,4	0,1747			800	93,5	308,5	23,1	23,4	0,1874			300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-		133,5			18,6	18,8		0,1271			BFL	M2		180						-						-						10,8						10,9						0,0316						200						-						8,5					11,3					11,4			0,0371			225	-	21	11,9	12	0,0440	250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x													150	-	-	10,3	10,4	0,0281																																											BFL	400 x			450	-			133,5	20			20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972		450	-	133,5	17,3		17,5			0,1117	500	-		158,5					18,4	18,7	0,1262		550					-	183,5	19,6		19,8					0,1407	560	-		188,5					19,8	20	0,1436		600					-	208,5	20,7		21					0,1639	630	8,5		223,5					21,3	21,6	0,1697		650					18,5	233,5	21,8		22,1					0,1712	700	43,5		258,5					22,9	23,2	0,1842	355 x	150					-	-	10,3	10,4	0,0281	BFL			450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700
800	93,5	308,5	23,1	23,4	0,1874	300 x	150	-	-	10,2	10,3	0,0234	BFL	355 x	450	-		133,5	18,6	18,8	0,1271	BFL		M2			180	-		-			10,8	10,9		0,0316						200						-						8,5						11,3						11,4						0,0371						225						-						21					11,9					12			0,0440			250	-	33,5	12,4	12,5	0,0509	280	-	48,5	13,1	13,2	0,0591	300	-	59	13,5	13,7	0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4														0,0281	BFL	400 x	450	-	133,5																																															20	20,3			0,1444	BFL			M2	180			-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450		-	133,5	17,3	17,5		0,1117			500	-	158,5		18,4					18,7	0,1262	550		-					183,5	19,6	19,8		0,1407					560	-	188,5		19,8					20	0,1436	600		-					208,5	20,7	21		0,1639					630	8,5	223,5		21,3					21,6	0,1697	650		18,5					233,5	21,8	22,1		0,1712					700	43,5	258,5		22,9					23,2	0,1842	355 x		150					-	-	10,3	10,4	0,0281					BFL	450 x	450	-	133,5	20			20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334	200	-	8,5	11,5	11,6	0,0392	225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5
300 x	150	-	-	10,2	10,3		0,0234	BFL	355 x	450	-	133,5			18,6	18,8		0,1271	BFL	M2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	180	-	-	10,8	10,9		0,0316			200	-	8,5			11,3	11,4		0,0371			225						-	21		11,9			12	0,0440		250						-						33,5						12,4						12,5						0,0509						280						-					48,5	13,1					13,2	0,0591	300	-			59	13,5	13,7			0,0646	315	-	66	13,9	14	0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-	133,5	20	20,3	0,1444	BFL	M2	180	-	-	11	11,1	0,0334		200	-	8,5	11,5	11,6												0,0392	225	-			21	12,1	12,2	0,0464	250	-	33,5					12,7	12,8			0,0537	280																																	-	48,5			13,4					13,5			0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1		0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x		150		-	-		10,3	10,4	0,0281		BFL					450 x	450	-		133,5					20	20,3	0,1444		BFL					M1	180	-		-					11	11,1	0,0334		200					-	8,5	11,5		11,6					0,0392	225	-		21					12,1	12,2	0,0464		250					-	33,5			12,7					12,8	0,0537	280	-	48,5							13,4	13,5	0,0624	300			-	59			13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																								
	200	-	8,5	11,3	11,4		0,0371			225	-	21			11,9	12		0,0440			250						-	33,5		12,4			12,5	0,0509		280						-						48,5						13,1						13,2						0,0591						300					-	59					13,5	13,7	0,0646	315			-	66	13,9	14			0,0688	355	-	86	14,7	14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-	-	11	11,1	0,0334			200	-	8,5	11,5	11,6	0,0392		225	-	21	12,1	12,2											0,0464	250	-	33,5			12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624			300	-			59	13,9			14	0,0682																													315	-			66					14,2			14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-	133,5			20	20,3	0,1444	BFL	M1	180	-	-				11	11,1			0,0334	200		-					8,5	11,5	11,6								0,0392	225		-					21	12,1	12,2		0,0464					250	-	33,5		12,7					12,8	0,0537	280		-					48,5	13,4	13,5		0,0624					300	-			59					13,9	14	0,0682	315	-							66	14,2	14,4	0,0725			355	-			86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																			
	225	-	21	11,9	12		0,0440			250	-	33,5			12,4	12,5		0,0509			280						-	48,5		13,1			13,2	0,0591		300						-						59						13,5						13,7						0,0646					315	-					66	13,9	14	0,0688			355	-	86	14,7			14,9	0,0798	400	-	108,5	15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-	8,5	11,5	11,6	0,0392			225	-	21	12,1	12,2	0,0464		250	-	33,5	12,7	12,8										0,0537	280	-	48,5	13,4			13,5	0,0624	300	-	59	13,9	14	0,0682	315	-	66	14,2	14,4			0,0725	355			-	86			15,1	15,3																									0,0841	400			-					108,5			16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-	-		11	11,1	0,0334	200			-	8,5	11,5			11,6	0,0392	225	-		21	12,1		12,2		0,0464	250		-	33,5	12,7								12,8	0,0537		280					-	48,5	13,4		13,5					0,0624	300	-		59					13,9	14	0,0682		315					-	66	14,2		14,4					0,0725	355			-					86	15,1	15,3	0,0841	400							-	108,5	16,2	16,4			0,0972	450			-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																														
	250	-	33,5	12,4	12,5		0,0509			280	-	48,5			13,1	13,2		0,0591			300						-	59		13,5			13,7	0,0646		315						-						66						13,9						14					0,0688	355					-	86	14,7	14,9			0,0798	400	-	108,5			15,7	15,9	0,0921	450	-	133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-	21	12,1	12,2	0,0464			250	-	33,5	12,7	12,8	0,0537		280	-	48,5	13,4	13,5									0,0624	300	-	59	13,9	14			0,0682	315	-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2			16,4	0,0972			450	-			133,5	17,3																					17,5	0,1117			500					-			158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-	8,5		11,5	11,6	0,0392	225			-	21	12,1	12,2		0,0464	250	-	33,5		12,7	12,8		0,0537	280	-	48,5	13,4	13,5	0,0624	300				-	59			13,9	14		0,0682					315	-	66		14,2					14,4	0,0725	355		-					86	15,1	15,3		0,0841					400	-	108,5		16,2					16,4	0,0972			450					-	133,5	17,3	17,5	0,1117							500	-	158,5	18,4			18,7	0,1262			550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																									
	280	-	48,5	13,1	13,2		0,0591			300	-	59			13,5	13,7		0,0646			315						-	66		13,9			14	0,0688		355						-						86						14,7					14,9	0,0798					400	-	108,5	15,7			15,9	0,0921	450	-			133,5	16,8	17	0,1059	500	-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-	33,5	12,7	12,8	0,0537			280	-	48,5	13,4	13,5	0,0624		300	-	59	13,9	14								0,0682	315	-	66	14,2	14,4	0,0725			355	-	86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5			18,4	18,7			0,1262	550			-	183,5																	19,6	19,8			0,1407					560			-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-	21		12,1	12,2	0,0464	250			-	33,5	12,7	12,8		0,0537	280	-	48,5		13,4	13,5	0,0624	300	-	59	13,9	14	0,0682	315	-			66	14,2	14,4	0,0725		355	-		86		15,1	15,3		0,0841	400	-		108,5					16,2	16,4	0,0972		450					-	133,5	17,3		17,5					0,1117	500	-		158,5					18,4	18,7			0,1262					550	-	183,5	19,6	19,8							0,1407	560	-	188,5			19,8	20			0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																				
	300	-	59	13,5	13,7		0,0646			315	-	66			13,9	14		0,0688			355						-	86		14,7			14,9	0,0798		400						-						108,5					15,7	15,9					0,0921	450	-	133,5			16,8	17	0,1059	500			-	158,5	17,9	18,1	0,1196	550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-	48,5	13,4	13,5	0,0624			300	-	59	13,9	14	0,0682		315	-	66	14,2	14,4							0,0725	355	-	86	15,1	15,3	0,0841	400			-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-			188,5	19,8			20	0,1436			600	-													208,5	20,7			21					0,1639			630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-	33,5		12,7	12,8	0,0537	280			-	48,5	13,4	13,5		0,0624	300	-	59		13,9	14	0,0682	315	-	66	14,2	14,4	0,0725	355	-	86		15,1	15,3	0,0841	400		-	108,5		16,2	16,4	0,0972	450	-	133,5	17,3	17,5		0,1117		500	-		158,5	18,4	18,7		0,1262					550	-	183,5		19,6					19,8	0,1407	560		-					188,5	19,8			20					0,1436	600	-	208,5	20,7							21	0,1639	630	8,5			223,5	21,3			21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																															
	315	-	66	13,9	14		0,0688			355	-	86			14,7	14,9		0,0798			400						-	108,5		15,7			15,9	0,0921		450						-					133,5	16,8					17	0,1059	500	-			158,5	17,9	18,1	0,1196			550	-	183,5	19	19,2	0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-	59	13,9	14	0,0682			315	-	66	14,2	14,4	0,0725		355	-	86	15,1	15,3						0,0841	400	-	108,5	16,2	16,4	0,0972	450	-			133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630			8,5	223,5			21,3	21,6			0,1697	650									18,5	233,5			21,8					22,1			0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-	48,5		13,4	13,5	0,0624	300			-	59	13,9	14		0,0682	315	-	66		14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-	108,5		16,2	16,4	0,0972	450		-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262		550	-	183,5	19,6	19,8	0,1407	560	-		188,5		19,8	20		0,1436	600	-		208,5					20,7	21	0,1639		630					8,5	223,5			21,3					21,6	0,1697	650	18,5	233,5							21,8	22,1	0,1712	700			43,5	258,5			22,9	23,2	0,1842																																																																																										
	355	-	86	14,7	14,9		0,0798			400	-	108,5			15,7	15,9		0,0921			450						-	133,5		16,8			17	0,1059		500					-	158,5					17,9	18,1	0,1196	550			-	183,5	19	19,2			0,1334	560	-	188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-	66	14,2	14,4	0,0725			355	-	86	15,1	15,3	0,0841		400	-	108,5	16,2	16,4					0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5			18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712			700	43,5			258,5	22,9			23,2	0,1842					355 x	150			-					-			10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-	59		13,9	14	0,0682	315			-	66	14,2	14,4		0,0725	355	-	86		15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5		17,3	17,5	0,1117	500		-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5		20,7	21	0,1639	630	8,5	223,5	21,3	21,6		0,1697		650	18,5		233,5	21,8	22,1		0,1712					700	43,5			258,5					22,9	23,2	0,1842																																																																																																															
	400	-	108,5	15,7	15,9		0,0921			450	-	133,5			16,8	17		0,1059			500						-	158,5		17,9			18,1	0,1196	550	-					183,5	19	19,2	0,1334			560	-	188,5	19,2			19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-	86	15,1	15,3	0,0841			400	-	108,5	16,2	16,4	0,0972		450	-	133,5	17,3	17,5				0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6			19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3			10,4	0,0281			BFL	450 x			450	-		133,5			20					20,3			0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-	66		14,2	14,4	0,0725	355			-	86	15,1	15,3		0,0841	400	-	108,5		16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5		18,4	18,7	0,1262	550		-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712		700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																			
	450	-	133,5	16,8	17		0,1059			500	-	158,5			17,9	18,1		0,1196			550						-	183,5	19	19,2			0,1334	560	-	188,5	19,2	19,4			0,1361	600	-	208,5			20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-	108,5	16,2	16,4	0,0972			450	-	133,5	17,3	17,5	0,1117		500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20			0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281		BFL	450 x	450	-	133,5	20	20,3	0,1444							BFL	M1		180	-	-	11					11,1			0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-	86		15,1	15,3	0,0841	400			-	108,5	16,2	16,4		0,0972	450	-	133,5		17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5		19,6	19,8	0,1407	560		-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																										
	500	-	158,5	17,9	18,1		0,1196			550	-	183,5			19	19,2		0,1334			560		-				188,5	19,2	19,4	0,1361	600	-	208,5	20	20,3	0,1471	630	8,5			223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-	133,5	17,3	17,5	0,1117			500	-	158,5	18,4	18,7	0,1262		550	-	183,5	19,6	19,8		0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639			630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281		BFL	450 x	450	-	133,5	20				20,3	0,1444	BFL	M1	180	-	-	11								11,1	0,0334	200	-		8,5	11,5		11,6			0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-	108,5		16,2	16,4	0,0972	450			-	133,5	17,3	17,5		0,1117	500	-	158,5		18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5		19,8	20	0,1436	600		-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																
	550	-	183,5	19	19,2		0,1334			560	-	188,5			19,2	19,4	0,1361	600			-		208,5		20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-		133,5	17,3	17,5	0,1117					500	-	158,5	18,4	18,7	0,1262			550	-	183,5	19,6	19,8	0,1407		560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650			18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281		BFL	450 x	450	-	133,5	20				20,3	0,1444	BFL	M1				180	-			-	11	11,1	0,0334			200	-				8,5	11,5	11,6	0,0392		225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-	133,5		17,3	17,5	0,1117	500			-	158,5	18,4	18,7		0,1262	550	-	183,5		19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5		20,7	21	0,1639	630		8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																						
	560	-	188,5	19,2	19,4	0,1361	600			-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7			21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-		133,5	17,3	17,5	0,1117					500	-		158,5	18,4	18,7	0,1262					550	-	183,5	19,6	19,8	0,1407			560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x		450	-	133,5	20	20,3	0,1444				BFL	M1	180	-				-	11						11,1	0,0334			200	-	8,5	11,5			11,6	0,0392				225	-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-		133,5	17,3	17,5	0,1117					500	-	158,5		18,4	18,7	0,1262	550			-	183,5	19,6	19,8		0,1407	560	-	188,5		19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5		21,3	21,6	0,1697	650		18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																												
600	-	208,5	20	20,3	0,1471	630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4	0,0281	BFL	400 x	450	-		133,5	20	20,3	0,1444	BFL	M2			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-		133,5	17,3	17,5	0,1117					500	-		158,5	18,4	18,7	0,1262					550	-		183,5	19,6	19,8	0,1407					560	-	188,5	19,8	20	0,1436			600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-	133,5				20	20,3	0,1444	BFL	M1	180						-	-				11	11,1						0,0334	200			-	8,5	11,5	11,6			0,0392	225				-	21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280					-	48,5		13,4	13,5	0,0624	300					-	59		13,9	14	0,0682	315					-	66		14,2	14,4	0,0725	355					-	86		15,1	15,3	0,0841	400					-	108,5		16,2	16,4	0,0972	450					-	133,5		17,3	17,5	0,1117	500					-	158,5	18,4		18,7	0,1262	550	-			183,5	19,6	19,8	0,1407		560	-	188,5	19,8		20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3		21,6	0,1697	650	18,5		233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																													
630	8,5	223,5	20,7	21	0,1554	650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4		0,0281	BFL	400 x	450	-	133,5			20	20,3		0,1444	BFL	M2	180					-	-		11	11,1	0,0334	200					-	8,5		11,5	11,6	0,0392	225					-	21		12,1	12,2	0,0464	250					-	33,5		12,7	12,8	0,0537	280					-	48,5		13,4	13,5	0,0624	300					-	59		13,9	14	0,0682	315					-	66		14,2	14,4	0,0725	355					-	86		15,1	15,3	0,0841	400					-	108,5		16,2	16,4	0,0972	450					-	133,5		17,3	17,5	0,1117	500					-	158,5		18,4	18,7	0,1262	550					-	183,5	19,6	19,8	0,1407	560	-			188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3	0,1444				BFL	M1	180			-						-	11				11,1	0,0334						200	-			8,5	11,5	11,6	0,0392			225	-				21	12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-					48,5	13,4		13,5	0,0624	300	-					59	13,9		14	0,0682	315	-					66	14,2		14,4	0,0725	355	-					86	15,1		15,3	0,0841	400	-					108,5	16,2		16,4	0,0972	450	-					133,5	17,3		17,5	0,1117	500	-					158,5	18,4	18,7	0,1262	550	-	183,5	19,6			19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																			
650	18,5	233,5	21,1	21,4	0,1609	700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4		0,0281	BFL	400 x	450	-		133,5			20	20,3	0,1444			BFL	M2		180			-					-	11		11,1	0,0334	200	-					8,5	11,5		11,6	0,0392	225	-					21	12,1		12,2	0,0464	250	-					33,5	12,7		12,8	0,0537	280	-					48,5	13,4		13,5	0,0624	300	-					59	13,9		14	0,0682	315	-					66	14,2		14,4	0,0725	355	-					86	15,1		15,3	0,0841	400	-					108,5	16,2		16,4	0,0972	450	-					133,5	17,3		17,5	0,1117	500	-					158,5	18,4	18,7	0,1262	550	-	183,5			19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3		0,1444			BFL	M1	180						-			-						11	11,1				0,0334	200						-	8,5			11,5	11,6	0,0392	225			-	21				12,1	12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5					13,4	13,5		0,0624	300	-	59					13,9	14		0,0682	315	-	66					14,2	14,4		0,0725	355	-	86					15,1	15,3		0,0841	400	-	108,5					16,2	16,4		0,0972	450	-	133,5					17,3	17,5	0,1117	500	-	158,5	18,4			18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																									
700	43,5	258,5	22,1	22,4	0,1746	710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4		0,0281	BFL	400 x	450	-		133,5			20	20,3		0,1444			BFL	M2	180						-			-					11	11,1		0,0334	200	-	8,5					11,5	11,6		0,0392	225	-	21					12,1	12,2		0,0464	250	-	33,5					12,7	12,8		0,0537	280	-	48,5					13,4	13,5		0,0624	300	-	59					13,9	14		0,0682	315	-	66					14,2	14,4		0,0725	355	-	86					15,1	15,3		0,0841	400	-	108,5					16,2	16,4		0,0972	450	-	133,5					17,3	17,5	0,1117	500	-	158,5	18,4			18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3		0,1444			BFL	M1		180					-						-			11						11,1	0,0334				200	-						8,5	11,5			11,6	0,0392	225	-			21	12,1				12,2	0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4					13,5	0,0624		300	-	59	13,9					14	0,0682		315	-	66	14,2					14,4	0,0725		355	-	86	15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972	450	-	133,5	17,3	17,5			0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																															
710	48,5	263,5	22,4	22,7	0,1774	750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4		0,0281	BFL	400 x	450	-		133,5			20	20,3		0,1444			BFL	M2		180					-						-			11					11,1	0,0334		200	-	8,5	11,5					11,6	0,0392		225	-	21	12,1					12,2	0,0464		250	-	33,5	12,7					12,8	0,0537		280	-	48,5	13,4					13,5	0,0624		300	-	59	13,9					14	0,0682		315	-	66	14,2					14,4	0,0725		355	-	86	15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972	450	-	133,5	17,3	17,5			0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3		0,1444			BFL	M1		180						-					-						11			11,1						0,0334	200				-	8,5						11,5	11,6			0,0392	225	-	21			12,1	12,2				0,0464	250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5					0,0624	300		-	59	13,9	14					0,0682	315		-	66	14,2	14,4					0,0725	355		-	86	15,1	15,3					0,0841	400	-	108,5	16,2	16,4	0,0972			450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																					
750	68,5	283,5	23,2	23,5	0,1884	800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4		0,0281	BFL	400 x	450	-		133,5			20	20,3		0,1444			BFL	M2		180						-					-						11			11,1					0,0334	200		-	8,5	11,5	11,6					0,0392	225		-	21	12,1	12,2					0,0464	250		-	33,5	12,7	12,8					0,0537	280		-	48,5	13,4	13,5					0,0624	300		-	59	13,9	14					0,0682	315		-	66	14,2	14,4					0,0725	355		-	86	15,1	15,3					0,0841	400	-	108,5	16,2	16,4	0,0972			450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3		0,1444			BFL	M1		180						-						-					11						11,1			0,0334						200	-				8,5	11,5						11,6	0,0392			225	-	21	12,1			12,2	0,0464				250	-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-	86	15,1	15,3	0,0841	400			-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																											
800	93,5	308,5	24,2	24,6	0,2021	315 x	150	-	-	10,3	10,4		0,0281	BFL	400 x	450	-		133,5			20	20,3		0,1444			BFL	M2		180						-						-					11						11,1			0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-	86	15,1	15,3	0,0841	400			-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3		0,1444			BFL	M1		180						-						-						11					11,1						0,0334			200						-	8,5				11,5	11,6						0,0392	225			-	21	12,1	12,2			0,0464	250				-	33,5	12,7	12,8	0,0537	280	-	48,5	13,4	13,5	0,0624	300					-	59		13,9	14	0,0682	315					-	66	14,2	14,4	0,0725	355	-			86	15,1	15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																	
315 x	150	-	-	10,3	10,4		0,0281	BFL	400 x	450	-		133,5			20	20,3		0,1444			BFL	M2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	180	-	-	11	11,1		0,0334			200	-		8,5			11,5	11,6		0,0392						225						-						21						12,1					12,2						0,0464			250					-	33,5		12,7	12,8	0,0537	280					-	48,5		13,4	13,5	0,0624	300					-	59		13,9	14	0,0682	315					-	66		14,2	14,4	0,0725	355					-	86	15,1	15,3	0,0841	400	-			108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-	133,5	20	20,3	0,1444	BFL	M1	180	-	-	11	11,1	0,0334		200	-	8,5	11,5	11,6		0,0392			225	-		21			12,1	12,2		0,0464						250						-						33,5						12,7					12,8						0,0537			280						-	48,5				13,4	13,5						0,0624	300			-	59	13,9	14			0,0682	315			-	66	14,2	14,4	0,0725	355	-	86	15,1	15,3	0,0841	400	-			108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																													
	200	-	8,5	11,5	11,6		0,0392			225	-		21			12,1	12,2		0,0464						250						-						33,5						12,7					12,8						0,0537			280					-	48,5		13,4	13,5	0,0624	300					-	59		13,9	14	0,0682	315					-	66		14,2	14,4	0,0725	355					-	86	15,1	15,3	0,0841	400	-			108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-	-	11	11,1	0,0334			200	-	8,5	11,5	11,6	0,0392		225	-	21	12,1	12,2		0,0464			250	-		33,5			12,7	12,8		0,0537						280						-						48,5						13,4					13,5						0,0624			300						-	59				13,9	14			0,0682			315	-			66	14,2	14,4	0,0725	355	-	86	15,1			15,3	0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																								
	225	-	21	12,1	12,2		0,0464			250	-		33,5			12,7	12,8		0,0537						280						-						48,5						13,4					13,5						0,0624			300					-	59		13,9	14	0,0682	315					-	66		14,2	14,4	0,0725	355					-	86	15,1	15,3	0,0841	400	-			108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-	8,5	11,5	11,6	0,0392			225	-	21	12,1	12,2	0,0464		250	-	33,5	12,7	12,8		0,0537			280	-		48,5			13,4	13,5		0,0624						300						-						59						13,9					14						0,0682			315						-	66	14,2			14,4	0,0725			355	-	86	15,1	15,3			0,0841	400	-	108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																			
	250	-	33,5	12,7	12,8		0,0537			280	-		48,5			13,4	13,5		0,0624						300						-						59						13,9					14						0,0682			315					-	66		14,2	14,4	0,0725	355					-	86	15,1	15,3	0,0841	400	-			108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-	21	12,1	12,2	0,0464			250	-	33,5	12,7	12,8	0,0537		280	-	48,5	13,4	13,5		0,0624			300	-		59			13,9	14		0,0682						315						-						66						14,2					14,4						0,0725			355	-					86	15,1	15,3	0,0841	400	-	108,5			16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																														
	280	-	48,5	13,4	13,5		0,0624			300	-		59			13,9	14		0,0682						315						-						66						14,2					14,4						0,0725			355					-	86	15,1	15,3	0,0841	400	-			108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-	33,5	12,7	12,8	0,0537			280	-	48,5	13,4	13,5	0,0624		300	-	59	13,9	14		0,0682			315	-		66			14,2	14,4		0,0725						355						-						86						15,1					15,3			0,0841			400			-	108,5	16,2	16,4			0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																									
	300	-	59	13,9	14		0,0682			315	-		66			14,2	14,4		0,0725						355						-						86						15,1					15,3					0,0841	400			-			108,5	16,2	16,4	0,0972	450	-	133,5	17,3	17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-	48,5	13,4	13,5	0,0624			300	-	59	13,9	14	0,0682		315	-	66	14,2	14,4		0,0725			355	-		86			15,1	15,3		0,0841						400						-						108,5					16,2	16,4					0,0972	450	-	133,5			17,3			17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																				
	315	-	66	14,2	14,4		0,0725			355	-		86			15,1	15,3		0,0841						400						-						108,5					16,2	16,4					0,0972	450	-			133,5	17,3			17,5	0,1117	500	-	158,5	18,4	18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-	59	13,9	14	0,0682			315	-	66	14,2	14,4	0,0725		355	-	86	15,1	15,3		0,0841			400	-		108,5			16,2	16,4		0,0972						450						-					133,5	17,3					17,5	0,1117	500	-			158,5	18,4	18,7	0,1262			550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																															
	355	-	86	15,1	15,3		0,0841			400	-		108,5			16,2	16,4		0,0972						450						-					133,5	17,3					17,5	0,1117	500	-			158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-	66	14,2	14,4	0,0725			355	-	86	15,1	15,3	0,0841		400	-	108,5	16,2	16,4		0,0972			450	-		133,5			17,3	17,5		0,1117						500					-	158,5					18,4	18,7	0,1262	550			-	183,5	19,6	19,8			0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																										
	400	-	108,5	16,2	16,4		0,0972			450	-		133,5			17,3	17,5		0,1117						500					-	158,5					18,4	18,7	0,1262	550			-	183,5	19,6	19,8			0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-	86	15,1	15,3	0,0841			400	-	108,5	16,2	16,4	0,0972		450	-	133,5	17,3	17,5		0,1117			500	-		158,5			18,4	18,7		0,1262					550	-					183,5	19,6	19,8	0,1407			560	-	188,5	19,8			20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																					
	450	-	133,5	17,3	17,5		0,1117			500	-		158,5			18,4	18,7		0,1262					550	-					183,5	19,6	19,8	0,1407			560	-	188,5	19,8			20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-	108,5	16,2	16,4	0,0972			450	-	133,5	17,3	17,5	0,1117		500	-	158,5	18,4	18,7		0,1262			550	-		183,5			19,6	19,8	0,1407	560					-	188,5	19,8	20			0,1436	600	-	208,5			20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																
	500	-	158,5	18,4	18,7		0,1262			550	-		183,5			19,6	19,8	0,1407	560					-	188,5	19,8	20			0,1436	600	-	208,5			20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-	133,5	17,3	17,5	0,1117			500	-	158,5	18,4	18,7	0,1262		550	-	183,5	19,6	19,8		0,1407			560	-	188,5	19,8			20	0,1436	600	-	208,5	20,7			21	0,1639	630	8,5			223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																											
	550	-	183,5	19,6	19,8		0,1407			560	-	188,5	19,8			20	0,1436	600	-	208,5	20,7			21	0,1639	630	8,5			223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-		133,5	17,3	17,5	0,1117					500	-	158,5	18,4	18,7	0,1262			550	-	183,5	19,6	19,8	0,1407		560	-	188,5	19,8	20	0,1436	600			-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650			18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																						
	560	-	188,5	19,8	20	0,1436	600			-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650			18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-		133,5	17,3	17,5	0,1117					500	-		158,5	18,4	18,7	0,1262					550	-	183,5	19,6	19,8	0,1407			560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																	
600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4	0,0281	BFL	450 x	450	-		133,5	20	20,3	0,1444	BFL	M1			180	-		-	11	11,1	0,0334					200	-		8,5	11,5	11,6	0,0392					225	-		21	12,1	12,2	0,0464					250	-		33,5	12,7	12,8	0,0537					280	-		48,5	13,4	13,5	0,0624					300	-		59	13,9	14	0,0682					315	-		66	14,2	14,4	0,0725					355	-		86	15,1	15,3	0,0841					400	-		108,5	16,2	16,4	0,0972					450	-		133,5	17,3	17,5	0,1117					500	-		158,5	18,4	18,7	0,1262					550	-		183,5	19,6	19,8	0,1407					560	-	188,5	19,8	20	0,1436			600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																							
630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-	133,5			20	20,3		0,1444	BFL	M1	180					-	-		11	11,1	0,0334	200					-	8,5		11,5	11,6	0,0392	225					-	21		12,1	12,2	0,0464	250					-	33,5		12,7	12,8	0,0537	280					-	48,5		13,4	13,5	0,0624	300					-	59		13,9	14	0,0682	315					-	66		14,2	14,4	0,0725	355					-	86		15,1	15,3	0,0841	400					-	108,5		16,2	16,4	0,0972	450					-	133,5		17,3	17,5	0,1117	500					-	158,5		18,4	18,7	0,1262	550					-	183,5	19,6	19,8	0,1407	560	-			188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																													
650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3	0,1444			BFL	M1		180			-					-	11		11,1	0,0334	200	-					8,5	11,5		11,6	0,0392	225	-					21	12,1		12,2	0,0464	250	-					33,5	12,7		12,8	0,0537	280	-					48,5	13,4		13,5	0,0624	300	-					59	13,9		14	0,0682	315	-					66	14,2		14,4	0,0725	355	-					86	15,1		15,3	0,0841	400	-					108,5	16,2		16,4	0,0972	450	-					133,5	17,3		17,5	0,1117	500	-					158,5	18,4	18,7	0,1262	550	-	183,5			19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																			
700	43,5	258,5	22,9	23,2	0,1842	355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3		0,1444			BFL	M1	180						-			-					11	11,1		0,0334	200	-	8,5					11,5	11,6		0,0392	225	-	21					12,1	12,2		0,0464	250	-	33,5					12,7	12,8		0,0537	280	-	48,5					13,4	13,5		0,0624	300	-	59					13,9	14		0,0682	315	-	66					14,2	14,4		0,0725	355	-	86					15,1	15,3		0,0841	400	-	108,5					16,2	16,4		0,0972	450	-	133,5					17,3	17,5	0,1117	500	-	158,5	18,4			18,7	0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																									
355 x	150	-	-	10,3	10,4		0,0281	BFL	450 x	450	-		133,5			20	20,3		0,1444			BFL	M1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	180	-	-	11	11,1		0,0334			200	-		8,5			11,5	11,6		0,0392						225					-						21			12,1					12,2	0,0464		250	-	33,5	12,7					12,8	0,0537		280	-	48,5	13,4					13,5	0,0624		300	-	59	13,9					14	0,0682		315	-	66	14,2					14,4	0,0725		355	-	86	15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972		450	-	133,5	17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																
	200	-	8,5	11,5	11,6		0,0392			225	-		21			12,1	12,2		0,0464						250					-						33,5			12,7					12,8	0,0537		280	-	48,5	13,4					13,5	0,0624		300	-	59	13,9					14	0,0682		315	-	66	14,2					14,4	0,0725		355	-	86	15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972		450	-	133,5	17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																											
	225	-	21	12,1	12,2		0,0464			250	-		33,5			12,7	12,8		0,0537						280					-						48,5			13,4					13,5	0,0624		300	-	59	13,9					14	0,0682		315	-	66	14,2					14,4	0,0725		355	-	86	15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972		450	-	133,5	17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																						
	250	-	33,5	12,7	12,8		0,0537			280	-		48,5			13,4	13,5		0,0624						300					-						59			13,9					14	0,0682		315	-	66	14,2					14,4	0,0725		355	-	86	15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972		450	-	133,5	17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	280	-	48,5	13,4	13,5		0,0624			300	-		59			13,9	14		0,0682						315					-						66			14,2					14,4	0,0725		355	-	86	15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972		450	-	133,5	17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	300	-	59	13,9	14		0,0682			315	-		66			14,2	14,4		0,0725						355					-						86			15,1					15,3	0,0841		400	-	108,5	16,2					16,4	0,0972		450	-	133,5	17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	315	-	66	14,2	14,4		0,0725			355	-		86			15,1	15,3		0,0841						400					-						108,5			16,2					16,4	0,0972		450	-	133,5	17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	355	-	86	15,1	15,3		0,0841			400	-		108,5			16,2	16,4		0,0972						450					-						133,5			17,3					17,5	0,1117	500	-	158,5	18,4	18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	400	-	108,5	16,2	16,4		0,0972			450	-		133,5			17,3	17,5		0,1117						500					-					158,5	18,4			18,7			0,1262	550	-	183,5	19,6	19,8	0,1407	560	-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	450	-	133,5	17,3	17,5		0,1117			500	-		158,5			18,4	18,7		0,1262					550	-					183,5	19,6	19,8			0,1407	560			-	188,5	19,8	20	0,1436	600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	500	-	158,5	18,4	18,7		0,1262			550	-		183,5			19,6	19,8	0,1407	560					-	188,5	19,8	20			0,1436	600	-			208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	550	-	183,5	19,6	19,8		0,1407			560	-	188,5	19,8			20	0,1436	600	-	208,5	20,7			21	0,1639	630	8,5			223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	560	-	188,5	19,8	20	0,1436	600			-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650			18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
600	-	208,5	20,7	21	0,1639	630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
630	8,5	223,5	21,3	21,6	0,1697	650	18,5	233,5	21,8	22,1	0,1712	700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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700	43,5	258,5	22,9	23,2	0,1842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

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

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

A x B [mm]	Damper blade overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Free area Sf [m²]	Spring return actuator	Manual control		
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					
450 x	400	-	108,5	20	20,3	0,1424	BFL	M1	150	-	-	13,1	13,2	0,0455			
	450	-	133,5	21,6	21,9	0,1636			180	-	-	14,3	14,5	0,0615			
	500	-	158,5	23,2	23,5	0,1849			200	-	8,5	15,2	15,3	0,0722			
	550	-	183,5	24,7	25,1	0,2061			225	-	21	16,2	16,4	0,0856			
	560	-	188,5	25	25,4	0,2104	BFN		250	-	33,5	17,2	17,4	0,0990	BFL	M1	
	600	-	208,5	26,2	26,6	0,2274		M2	280	-	48,5	18,4	18,6	0,1150			
	630	8,5	223,5	27,1	27,5	0,2401			300	-	59	19,2	19,4	0,1257			
	650	18,5	233,5	27,7	28,2	0,2486			315	-	66	19,8	20	0,1338			
	700	43,5	258,5	29,2	29,7	0,2699			355	-	86	21,4	21,7	0,1552			
	710	48,5	263,5	29,5	30	0,2741			400	-	108,5	23,1	23,4	0,1792			
	750	68,5	283,5	30,7	31,2	0,2911	BF		560 x	450	-	133,5	25	25,4	0,2060		
	800	93,5	308,5	32,1	32,6	0,3124		M3	500	-	158,5	26,9	27,3	0,2327			
500 x	150	-	-	12,4	12,5	0,0404			550	-	183,5	28,7	29,2	0,2595	BFN		
	180	-	-	13,5	13,7	0,0546			560	-	188,5	29,1	29,6	0,2648			
	200	-	8,5	14,3	14,4	0,0641			600	-	208,5	30,6	31,1	0,2862		M2	
	225	-	21	15,2	15,4	0,0760			630	8,5	223,5	31,6	32,2	0,3023			
	250	-	33,5	16,1	16,3	0,0879			650	18,5	233,5	32,3	32,9	0,3130			
	280	-	48,5	17,2	17,4	0,1021	BFL	M1	700	43,5	258,5	34,1	34,7	0,3397			
	300	-	59	17,9	18,1	0,1116			710	48,5	263,5	34,4	35	0,3451	BF		
	315	-	66	18,4	18,7	0,1188			750	68,5	283,5	35,8	36,5	0,3665			
	355	-	86	19,9	20,1	0,1378			800	93,5	308,5	37,5	38,2	0,3932		M3	
	400	-	108,5	21,4	21,7	0,1591			500 x	150	-	-	13,5	13,7	0,0489		
	450	-	133,5	23,2	23,5	0,1829	BFN		180	-	-	14,9	15	0,0661			
	500	-	158,5	24,9	25,2	0,2066			200	-	8,5	15,7	15,9	0,0776			
550	-	183,5	26,6	27	0,2304			225	-	21	16,8	17	0,0920				
560	-	188,5	26,9	27,3	0,2351	BFN	M2	250	-	33,5	17,9	18,1	0,1064	BFL	M1		
600	-	208,5	28,2	28,7	0,2541			280	-	48,5	19,2	19,4	0,1236				
630	8,5	223,5	29,2	29,7	0,2684			300	-	59	20	20,3	0,1351				
650	18,5	233,5	29,9	30,3	0,2779			315	-	66	20,7	21	0,1438				
700	43,5	258,5	31,5	32	0,3016			355	-	86	22,4	22,7	0,1668				
710	48,5	263,5	31,8	32,3	0,3064	BF		400	-	108,5	24,2	24,6	0,1926				
750	68,5	283,5	33	33,6	0,3254		M3	600 x	450	-	133,5	26,2	26,6	0,2214			
800	93,5	308,5	34,6	35,2	0,3491			500	-	158,5	28,2	28,7	0,2501	BFN			
550 x	150	-	-	13	13,1	0,0446			550	-	183,5	30,2	30,7	0,2789			
	180	-	-	14,2	14,3	0,0604			560	-	188,5	30,6	31,1	0,2846		M2	
	200	-	8,5	15	15,2	0,0709			600	-	208,5	32,1	32,6	0,3076			
	225	-	21	16	16,2	0,0840			630	8,5	223,5	33,2	33,8	0,3249			
	250	-	33,5	17	17,2	0,0971	BFL	M1	650	18,5	233,5	34	34,6	0,3364			
	280	-	48,5	18,2	18,4	0,1129			700	43,5	258,5	35,8	36,5	0,3651	BF		
	300	-	59	19	19,2	0,1234			710	48,5	263,5	36,2	36,8	0,3709			
	315	-	66	19,6	19,8	0,1313			750	68,5	283,5	37,6	38,3	0,3939			
	355	-	86	21,1	21,4	0,1523			800	93,5	308,5	39,4	40,1	0,4226		M3	
	400	-	108,5	22,8	23,2	0,1759			550 x	150	-	-	13,9	14	0,0514		
	450	-	133,5	24,7	25,1	0,2021	BFN		180	-	-	15,3	15,4	0,0696			
	500	-	158,5	26,6	27	0,2284			200	-	8,5	16,2	16,4	0,0817			
550	-	183,5	28,4	28,8	0,2546			225	-	21	17,3	17,5	0,0968				
560	-	188,5	28,7	29,2	0,2599		M2	250	-	33,5	18,4	18,7	0,1119	BFL	M1		
600	-	208,5	30,2	30,7	0,2809			280	-	48,5	19,8	20	0,1301				
630	8,5	223,5	31,2	31,7	0,2966			630 x	300	-	59	20,7	21	0,1422			
650	18,5	233,5	31,9	32,5	0,3071			315	-	66	21,3	21,6	0,1513				
700	43,5	258,5	33,7	34,2	0,3334			355	-	86	23,1	23,4	0,1755				
710	48,5	263,5	34	34,6	0,3386	BF		400	-	108,5	25	25,4	0,2027				
750	68,5	283,5	35,4	36	0,3596		M3	450	-	133,5	27,1	27,5	0,2329	BFN	M2		
800	93,5	308,5	37	37,7	0,3859			500	-	158,5	29,2	29,7	0,2632				

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

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

A x B [mm]	Damper blade overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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	[mm]	[mm]	[kg]	[kg]*					[mm]	[mm]	[kg]	[kg]*																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
630 x	550	-	183,5	31,2	31,7	0,2934	BFN	710 x	225	-	21	18,6	18,8	0,1096	M2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	560	-	188,5	31,6	32,2	0,2995			600	-	208,5	33,2	33,8	0,3237		630	8,5	223,5	34,4	35	0,3418	650	18,5	233,5	35,2	35,8	0,3539	700	43,5	258,5	37,1	37,8	0,3842	710	48,5	263,5	37,5	38,1	0,3902	750	68,5	283,5	38,9	39,7	0,4144	800	93,5	308,5	40,8	41,6	0,4447	650 x	150	-	-	14,1	14,2	0,0531	M1	550	-	183,5	34	34,6	0,3322	180	-	-	15,5	15,7	0,0719	560	-	188,5	34,4	35	0,3391	200	-	8,5	16,5	16,7	0,0844	600	-	208,5	36,2	36,8	0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-	15,2	15,4	0,0616	450	-	133,5	27,7	28,2	0,2406	180	-	-	16,8	17	0,0834	500	-	158,5	29,9	30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-	-	14,6	14,8	0,0574	550	-	183,5	35,4	36	0,3516	180	-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150	-	-	15,7	15,9	0,0659	450	-	133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x	150	-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146
	600	-	208,5	33,2	33,8	0,3237			630	8,5	223,5	34,4	35	0,3418		650	18,5	233,5	35,2	35,8	0,3539	700	43,5	258,5	37,1	37,8	0,3842	710	48,5	263,5	37,5	38,1	0,3902	750	68,5	283,5	38,9	39,7	0,4144	800	93,5	308,5	40,8	41,6	0,4447	650 x	150	-	-	14,1	14,2		0,0531	M1	550	-	183,5	34		34,6	0,3322	180	-	-	15,5	15,7	0,0719	560	-	188,5	34,4	35	0,3391	200	-	8,5	16,5	16,7	0,0844	600	-	208,5	36,2	36,8	0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-		15,2	15,4	0,0616	450	-	133,5	27,7	28,2	0,2406	180	-	-	16,8	17	0,0834	500	-	158,5	29,9	30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-		-	14,6	14,8	0,0574	550	-	183,5	35,4	36	0,3516	180	-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150		-	-	15,7	15,9	0,0659	450	-	133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x		150	-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146
	630	8,5	223,5	34,4	35	0,3418	650		18,5	233,5	35,2	35,8	0,3539	700		43,5	258,5	37,1	37,8	0,3842	710	48,5	263,5	37,5	38,1	0,3902	750	68,5	283,5	38,9	39,7	0,4144	800	93,5	308,5	40,8	41,6	0,4447	650 x	150	-	-	14,1	14,2	0,0531		M1	550	-	183,5	34		34,6		0,3322	180	-	-		15,5	15,7	0,0719	560	-	188,5	34,4	35	0,3391	200	-	8,5	16,5	16,7	0,0844	600	-	208,5	36,2	36,8	0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-	15,2		15,4	0,0616	450		-	133,5	27,7	28,2	0,2406	180	-	-	16,8	17	0,0834	500	-	158,5	29,9	30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-	-		14,6	14,8		0,0574	550	-	183,5	35,4	36	0,3516	180	-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150	-		-		15,7	15,9	0,0659	450	-	133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x	150			-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146	
	650	18,5	233,5	35,2	35,8	0,3539	700		43,5	258,5	37,1	37,8	0,3842	710		48,5	263,5	37,5	38,1	0,3902	750	68,5	283,5	38,9	39,7	0,4144	800	93,5	308,5	40,8	41,6	0,4447	650 x	150	-	-	14,1	14,2		0,0531	M1	550	-	183,5	34			34,6	0,3322	180	-		-		15,5	15,7	0,0719	560		-	188,5	34,4	35	0,3391	200	-	8,5	16,5	16,7	0,0844	600	-	208,5	36,2	36,8	0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-		15,2	15,4	0,0616	450		-	133,5	27,7		28,2	0,2406	180	-	-	16,8	17	0,0834	500	-	158,5	29,9	30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-		-	14,6	14,8		0,0574	550		-	183,5	35,4	36	0,3516	180	-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150		-	-		15,7		15,9	0,0659	450	-	133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x		150		-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146		
	700	43,5	258,5	37,1	37,8	0,3842	710		48,5	263,5	37,5	38,1	0,3902	750		68,5	283,5	38,9	39,7	0,4144	800	93,5	308,5	40,8	41,6	0,4447	650 x	150	-	-	14,1	14,2		0,0531	M1	550	-	183,5		34		34,6	0,3322	180	-			-	15,5	15,7	0,0719		560		-	188,5	34,4	35		0,3391	200	-	8,5	16,5	16,7	0,0844	600	-	208,5	36,2	36,8	0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-		15,2	15,4	0,0616		450	-	133,5	27,7		28,2	0,2406	180		-	-	16,8	17	0,0834	500	-	158,5	29,9	30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-		-	14,6		14,8	0,0574	550		-	183,5		35,4	36	0,3516	180	-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150		-		-	15,7		15,9		0,0659	450	-	133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x			150	-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146			
	710	48,5	263,5	37,5	38,1	0,3902	750		68,5	283,5	38,9	39,7	0,4144	800		93,5	308,5	40,8	41,6	0,4447	650 x	150	-	-	14,1	14,2		0,0531	M1	550	-	183,5		34		34,6	0,3322	180		-		-	15,5	15,7	0,0719			560	-	188,5	34,4		35		0,3391	200	-	8,5		16,5	16,7	0,0844	600	-	208,5	36,2	36,8	0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-		15,2	15,4	0,0616		450	-	133,5		27,7	28,2	0,2406	180		-	-	16,8		17	0,0834	500	-	158,5	29,9	30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-		-	14,6		14,8	0,0574		550	-	183,5		35,4	36		0,3516	180	-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150		-		-		15,7	15,9		0,0659		450	-	133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x			150	-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146				
	750	68,5	283,5	38,9	39,7	0,4144	800		93,5	308,5	40,8	41,6	0,4447	650 x		150	-	-	14,1	14,2		0,0531	M1	550	-	183,5		34		34,6	0,3322	180		-		-	15,5	15,7		0,0719		560	-	188,5	34,4			35	0,3391	200	-		8,5		16,5	16,7	0,0844	600		-	208,5	36,2	36,8	0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-		15,2	15,4	0,0616		450	-	133,5		27,7	28,2	0,2406		180	-	-	16,8		17	0,0834	500		-	158,5	29,9	30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-		-	14,6		14,8	0,0574		550	-		183,5	35,4	36		0,3516	180		-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150		-		-		15,7		15,9	0,0659		450		-	133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x			150	-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146					
	800	93,5	308,5	40,8	41,6	0,4447	650 x		150	-	-	14,1	14,2			0,0531	M1	550	-	183,5		34		34,6	0,3322	180		-		-	15,5	15,7		0,0719		560	-	188,5		34,4		35	0,3391	200	-			8,5	16,5	16,7	0,0844		600		-	208,5	36,2	36,8		0,3665	225	-	21	17,6	17,9	0,1000	630	8,5	223,5	37,5	38,1	0,3870	250	-	33,5	18,8	19	0,1156	650	18,5	233,5	38,3	39	0,4007	280	-	48,5	20,2	20,4	0,1344	700	43,5	258,5	40,4	41,1	0,4350	300	-	59	21,1	21,4	0,1469	710	48,5	263,5	40,8	41,6	0,4418	315	-	66	21,8	22,1	0,1563	750	68,5	283,5	42,4	43,2	0,4692	355	-	86	23,6	23,9	0,1813	800	93,5	308,5	44,4	45,3	0,5035	400	-	108,5	25,6	25,9	0,2094	750 x	150	-	-		15,2	15,4	0,0616		450	-	133,5		27,7	28,2	0,2406		180	-	-		16,8	17	0,0834	500		-	158,5	29,9		30,3	0,2719	200	-	8,5	17,9	18,1	0,0979	550	-	183,5	31,9	32,5	0,3031	225	-	21	19,2	19,5	0,1160	560	-	188,5	32,3	32,9	0,3094	250	-	33,5	20,6	20,8	0,1341	600	-	208,5	34	34,6	0,3344	280	-	48,5	22,1	22,4	0,1559	630	8,5	223,5	35,2	35,8	0,3531	300	-	59	23,2	23,5	0,1704	650	18,5	233,5	36	36,6	0,3656	315	-	66	24	24,3	0,1813	700	43,5	258,5	37,9	38,6	0,3969	355	-	86	26	26,4	0,2103	710	48,5	263,5	38,3	39	0,4031	400	-	108,5	28,2	28,7	0,2429	750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5	30,7	31,2	0,2791	800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5	33	33,6	0,3154	700 x	150	-		-	14,6		14,8	0,0574		550	-		183,5	35,4		36	0,3516	180		-	-		16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329	400	-	108,5	26,9	27,3	0,2261	800 x	150		-		-		15,7		15,9		0,0659	450		-		133,5	29,2	29,7	0,2599	180	-	-	17,5	17,7	0,0891	500	-	158,5	31,5	32	0,2936	200	-	8,5	18,6	18,9	0,1046	550	-	183,5	33,7	34,2	0,3274	225	-	21	20	20,3	0,1240	560	-	188,5	34,1	34,7	0,3341	250	-	33,5	21,4	21,7	0,1434	600	-	208,5	35,8	36,5	0,3611	280	-	48,5	23,1	23,4	0,1666	630	8,5	223,5	37,1	37,8	0,3814	300	-	59	24,2	24,6	0,1821	650	18,5	233,5	37,9	38,6	0,3949	315	-	66	25	25,4	0,1938	700	43,5	258,5	40	40,7	0,4286	355	-	86	27,2	27,6	0,2248	710	48,5	263,5	40,4	41,1	0,4354	400	-	108,5	29,5	30	0,2596	750	68,5	283,5	42	42,8	0,4624	450	-	133,5	32,1	32,6	0,2984	800	93,5	308,5	43,9	44,8	0,4961	500	-	158,5	34,6	35,2	0,3371	710 x			150	-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146						
650 x	150	-	-	14,1	14,2	0,0531		M1	550	-	183,5	34	34,6		0,3322																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	180	-	-	15,5	15,7	0,0719			560	-	188,5	34,4	35		0,3391																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	200	-	8,5	16,5	16,7	0,0844			600	-	208,5	36,2	36,8		0,3665																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	225	-	21	17,6	17,9	0,1000			630	8,5	223,5	37,5	38,1		0,3870																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	250	-	33,5	18,8	19	0,1156			650	18,5	233,5	38,3	39		0,4007																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	280	-	48,5	20,2	20,4	0,1344			700	43,5	258,5	40,4	41,1		0,4350																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	300	-	59	21,1	21,4	0,1469			710	48,5	263,5	40,8	41,6		0,4418																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	315	-	66	21,8	22,1	0,1563			750	68,5	283,5	42,4	43,2		0,4692																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	355	-	86	23,6	23,9	0,1813			800	93,5	308,5	44,4	45,3		0,5035																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	400	-	108,5	25,6	25,9	0,2094			750 x	150	-	-	15,2		15,4	0,0616																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	450	-	133,5	27,7	28,2	0,2406				180	-	-	16,8	17	0,0834																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	500	-	158,5	29,9	30,3	0,2719	200			-	8,5	17,9	18,1	0,0979																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
550	-	183,5	31,9	32,5	0,3031	225	-	21		19,2	19,5	0,1160																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
560	-	188,5	32,3	32,9	0,3094	250	-	33,5		20,6	20,8	0,1341																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
600	-	208,5	34	34,6	0,3344	280	-	48,5		22,1	22,4	0,1559																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
630	8,5	223,5	35,2	35,8	0,3531	300	-	59		23,2	23,5	0,1704																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
650	18,5	233,5	36	36,6	0,3656	315	-	66		24	24,3	0,1813																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
700	43,5	258,5	37,9	38,6	0,3969	355	-	86		26	26,4	0,2103																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
710	48,5	263,5	38,3	39	0,4031	400	-	108,5		28,2	28,7	0,2429																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
750	68,5	283,5	39,8	40,6	0,4281	450	-	133,5		30,7	31,2	0,2791																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
800	93,5	308,5	41,7	42,5	0,4594	500	-	158,5		33	33,6	0,3154																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
700 x	150	-	-	14,6	14,8	0,0574	550	-	183,5	35,4	36	0,3516																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	180	-	-	16,2	16,4	0,0776	560	-	188,5	35,8	36,5	0,3589																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	200	-	8,5	17,2	17,4	0,0911	600	-	208,5	37,6	38,3	0,3879																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	225	-	21	18,4	18,7	0,1080	630	8,5	223,5	38,9	39,7	0,4096																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	250	-	33,5	19,7	19,9	0,1249	650	18,5	233,5	39,8	40,6	0,4241																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	280	-	48,5	21,2	21,5	0,1451	700	43,5	258,5	42	42,8	0,4604																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	300	-	59	22,1	22,4	0,1586	710	48,5	263,5	42,4	43,2	0,4676																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	315	-	66	22,9	23,2	0,1688	750	68,5	283,5	44,1	45	0,4966																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	355	-	86	24,8	25,1	0,1958	800	93,5	308,5	46,1	47,1	0,5329																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	400	-	108,5	26,9	27,3	0,2261	800 x	150	-	-	15,7	15,9	0,0659																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	450	-	133,5	29,2	29,7	0,2599		180	-	-	17,5	17,7	0,0891																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	500	-	158,5	31,5	32	0,2936		200	-	8,5	18,6	18,9	0,1046																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
550	-	183,5	33,7	34,2	0,3274	225		-	21	20	20,3	0,1240																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
560	-	188,5	34,1	34,7	0,3341	250		-	33,5	21,4	21,7	0,1434																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
600	-	208,5	35,8	36,5	0,3611	280		-	48,5	23,1	23,4	0,1666																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
630	8,5	223,5	37,1	37,8	0,3814	300		-	59	24,2	24,6	0,1821																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
650	18,5	233,5	37,9	38,6	0,3949	315		-	66	25	25,4	0,1938																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
700	43,5	258,5	40	40,7	0,4286	355		-	86	27,2	27,6	0,2248																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
710	48,5	263,5	40,4	41,1	0,4354	400		-	108,5	29,5	30	0,2596																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
750	68,5	283,5	42	42,8	0,4624	450		-	133,5	32,1	32,6	0,2984																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
800	93,5	308,5	43,9	44,8	0,4961	500		-	158,5	34,6	35,2	0,3371																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
710 x	150	-	-	14,7	14,9	0,0582	550	-	183,5	37	37,7	0,3759																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	180	-	-	16,3	16,5	0,0788	560	-	188,5	37,5	38,2	0,3836																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	200	-	8,5	17,3	17,5	0,0925	600	-	208,5	39,4	40,1	0,4146																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

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

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

A x B [mm]	Damper blade overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control					
	a	c	Man.	Actu.					a	c	Man.	Actu.								
	[mm]	[mm]	[kg]	[kg]*					[mm]	[mm]	[kg]	[kg]*								
800 x	630	8,5	223,5	40,8	41,6	0,4379	BF	M3	315	-	66	31,2	31,7	0,2688	BFN	M2				
	650	18,5	233,5	41,7	42,5	0,4534			355	-	86	34	34,6	0,3118						
	700	43,5	258,5	43,9	44,8	0,4921			400	-	108,5	37	37,7	0,3601						
	710	48,5	263,5	44,4	45,3	0,4999			450	-	133,5	40,3	41	0,4139						
	750	68,5	283,5	46,1	47,1	0,5309			500	-	158,5	43,4	44,2	0,4676						
	800	93,5	308,5	48,2	49,2	0,5696			550	-	183,5	46,4	47,3	0,5214						
900 x	150	-	-	16,8	17	0,0744	BFL	M2	1100 x	560	-	188,5	47	47,9	0,5321	BF	M3			
	180	-	-	18,8	19	0,1006			600	-	208,5	49,2	50,3	0,5751						
	200	-	8,5	20	20,3	0,1181			630	8,5	223,5	50,9	52	0,6074						
	225	-	21	21,6	21,9	0,1400			650	18,5	233,5	52	53,2	0,6289						
	250	-	33,5	23,2	23,5	0,1619			700	43,5	258,5	54,6	55,9	0,6826						
	280	-	48,5	25	25,4	0,1881			710	48,5	263,5	55,1	56,4	0,6934						
	300	-	59	26,2	26,6	0,2056			750	68,5	283,5	57,1	58,5	0,7364						
	315	-	66	27,1	27,5	0,2188			800	93,5	308,5	59,5	61	0,7901						
	355	-	86	29,5	30	0,2538			BFN	M4	180	-	-	23,2	23,5			0,1409	BFL	M2
	400	-	108,5	32,1	32,6	0,2931					200	-	8,5	24,9	25,2			0,1654		
1000 x	450	-	133,5	34,9	35,5	0,3369	BF	M3	225	-	21	27	27,4	0,1960	BFN	M4				
	500	-	158,5	37,6	38,3	0,3806			250	-	33,5	29	29,5	0,2266						
	550	-	183,5	40,3	41	0,4244			280	-	48,5	31,5	32	0,2634						
	560	-	188,5	40,8	41,6	0,4331			300	-	59	33	33,6	0,2879						
	600	-	208,5	42,8	43,7	0,4681			315	-	66	34,2	34,8	0,3063						
	630	8,5	223,5	44,3	45,2	0,4944			355	-	86	37,2	37,9	0,3553						
	650	18,5	233,5	45,3	46,2	0,5119			400	-	108,5	40,5	41,3	0,4104						
	700	43,5	258,5	47,7	48,7	0,5556			450	-	133,5	44,1	45	0,4716						
	710	48,5	263,5	48,2	49,2	0,5644			500	-	158,5	47,4	48,4	0,5329						
	750	68,5	283,5	50	51,1	0,5994			550	-	183,5	50,6	51,8	0,5941						
1100 x	800	93,5	308,5	52,2	53,4	0,6431	BFL	M2	560	-	188,5	51,3	52,4	0,6064	BF	M3				
	150	-	-	17,9	18,1	0,0829			600	-	208,5	53,7	54,9	0,6554						
	180	-	-	20	20,3	0,1121			630	8,5	223,5	55,4	56,7	0,6921						
	200	-	8,5	21,4	21,7	0,1316			650	18,5	233,5	56,6	57,9	0,7166						
	225	-	21	23,2	23,5	0,1560			700	43,5	258,5	59,3	60,8	0,7779						
	250	-	33,5	24,9	25,2	0,1804			710	48,5	263,5	59,8	61,3	0,7901						
	280	-	48,5	26,9	27,3	0,2096			750	68,5	283,5	61,9	63,5	0,8391						
	300	-	59	28,2	28,7	0,2291			800	93,5	308,5	64,3	66	0,9004						
	315	-	66	29,2	29,7	0,2438			BFN	M4	180	-	-	25			25,4	0,1581	BFL	M2
	355	-	86	31,8	32,3	0,2828					200	-	8,5	26,9			27,3	0,1856		
1100 x	400	-	108,5	34,6	35,2	0,3266	BF	M3	225	-	21	29,2	29,7	0,2200	BFN	M4				
	450	-	133,5	37,6	38,3	0,3754			250	-	33,5	31,5	32	0,2544						
	500	-	158,5	40,5	41,3	0,4241			280	-	48,5	34,1	34,7	0,2956						
	550	-	183,5	43,4	44,2	0,4729			300	-	59	35,8	36,5	0,3231						
	560	-	188,5	43,9	44,8	0,4826			315	-	66	37,1	37,8	0,3438						
	600	-	208,5	46,1	47,1	0,5216			355	-	86	40,4	41,1	0,3988						
	630	8,5	223,5	47,7	48,7	0,5509			400	-	108,5	43,9	44,8	0,4606						
	650	18,5	233,5	48,7	49,8	0,5704			450	-	133,5	47,7	48,7	0,5294						
	700	43,5	258,5	51,3	52,4	0,6191			500	-	158,5	51,3	52,4	0,5981						
	710	48,5	263,5	51,7	52,9	0,6289			550	-	183,5	54,6	55,9	0,6669						
1100 x	750	68,5	283,5	53,7	54,9	0,6679	BFL	M2	560	-	188,5	55,3	56,6	0,6806	BF	M3				
	800	93,5	308,5	56	57,3	0,7166			600	-	208,5	57,8	59,2	0,7356						
	180	-	-	21,3	21,6	0,1236			630	8,5	223,5	59,6	61,1	0,7769						
	200	-	8,5	22,8	23,2	0,1451			650	18,5	233,5	60,7	62,3	0,8044						
	225	-	21	24,7	25,1	0,1720			700	43,5	258,5	63,5	65,2	0,8731						
	250	-	33,5	26,6	27	0,1989			710	48,5	263,5	64	65,8	0,8869						
	280	-	48,5	28,7	29,2	0,2311			750	68,5	283,5	66,1	68	0,9419						
	300	-	59	30,2	30,7	0,2526			800	93,5	308,5	68,4	70,5	1,0106						

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

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

A x B [mm]	Damper blade overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blade overlaps		Weight		Free area S _f [m ²]	Spring return actuator	Manual control
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*			
1500 x	180	-	-	26,2	26,6	0,1696		1500 x	500	-	158,5	53,7	54,9	0,6416	
	200	-	8,5	28,2	28,7	0,1991	BFL		550	-	183,5	57,1	58,5	0,7154	M3
	225	-	21	30,7	31,2	0,2360			560	-	188,5	57,8	59,2	0,7301	
	250	-	33,5	33	33,6	0,2729	M2		600	-	208,5	60,3	61,9	0,7891	M4
	280	-	48,5	35,8	36,5	0,3171			630	8,5	223,5	62,2	63,8	0,8334	
	300	-	59	37,6	38,3	0,3466	BFN		650	18,5	233,5	63,3	65	0,8629	BF
	315	-	66	38,9	39,7	0,3688			700	43,5	258,5	66,1	68	0,9366	
	355	-	86	42,4	43,2	0,4278			710	48,5	263,5	66,6	68,5	0,9514	M5
	400	-	108,5	46,1	47,1	0,4941			750	68,5	283,5	68,6	70,7	1,0104	
	450	-	133,5	50	51,1	0,5679	BF		M3	800	93,5	308,5	70,9	73,1	1,0841

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

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

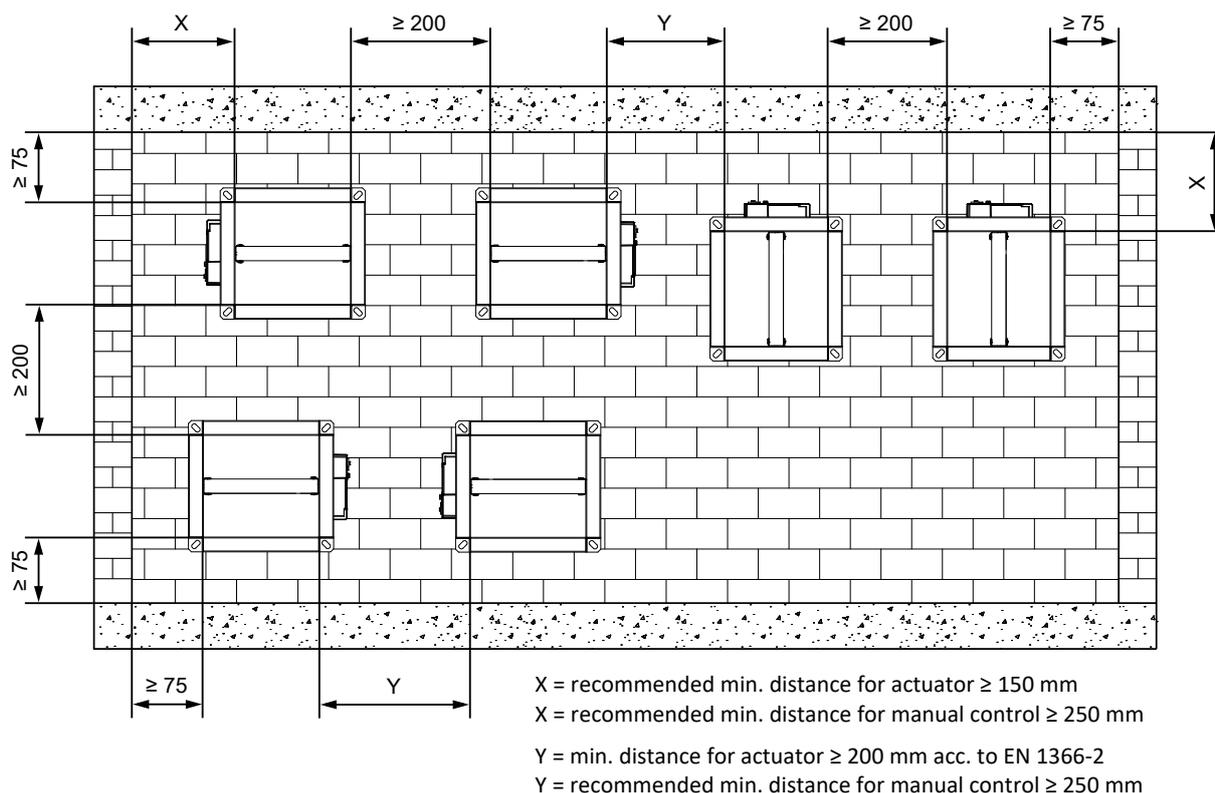
IV. INSTALLATION

Placement and installation

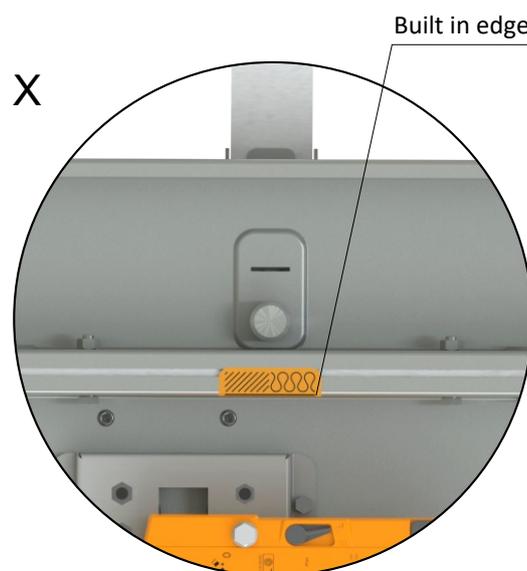
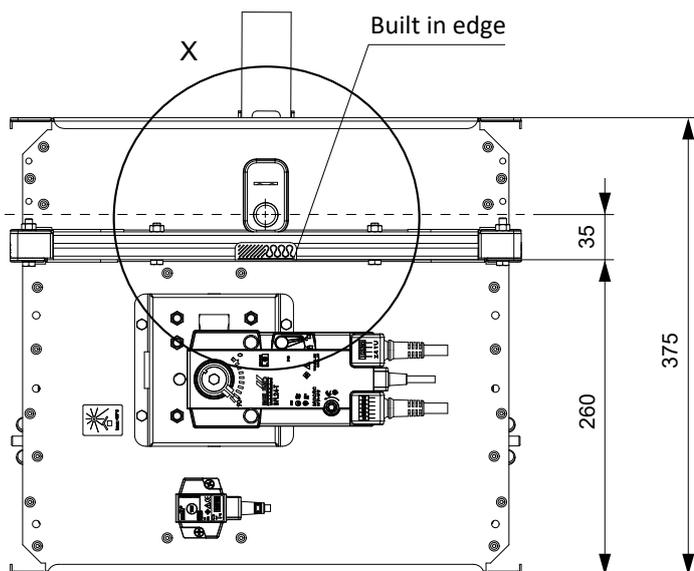
- The fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating constructions. The damper installation procedures must be done so that all load transfer from the fire separating constructions to the damper is absolutely excluded. Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. The gap between the installed damper and the fire separating construction must be perfectly filled with approved material.
- The damper must be installed so that the damper blade (in closed position) is situated in the fire separating construction - marked by the label BUILT-IN EDGE on the damper casing. If such solution is not possible, the duct between the fire separating construction and the damper blade must be protected according to the certified installation method → see pages 25 to 73
- 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 pages 16 to 21). 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

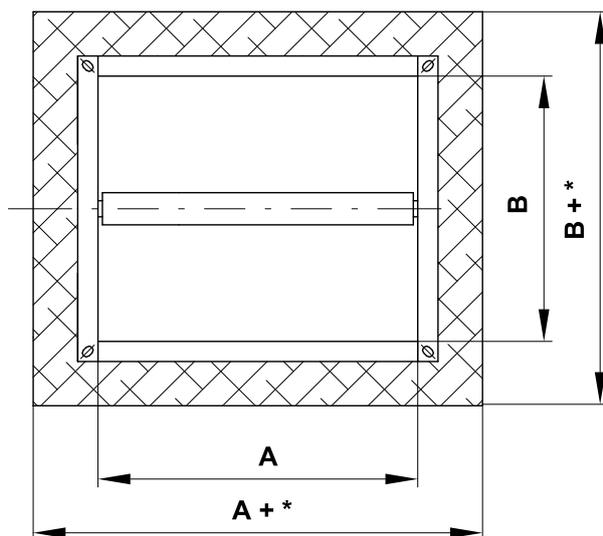
- minimum distance 200 mm between dampers, according to EN 1366-2
- minimum distance 75 mm between damper and construction (wall/ceiling), according to EN 1366-2
- recommended minimum distance 150 mm necessary for access to the actuator
- recommended minimum distance 250 mm necessary for access to the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



Built in edge



Dimensions of an installation opening



- * Mortar or gypsum
 - min. A(B)+100
 - max. A(B)+300
- * Ablative Coated Batt
 - min. A(B)+80
 - max. A(B)+800
- * Stuffing box with fire protective boards
 - min. A(B)+80
 - max. A(B)+220

Examples of constructions for fire damper installation

- The fire damper can be installed into:
 - Solid wall construction made e.g. of normal concrete/masonry or porous concrete with min. thickness 100 mm.
 - Gypsum wall construction with min. thickness 100 mm.
 - Solid ceiling construction made e.g. of normal concrete or porous concrete, with minimum thickness according to EN 1366-2.
- Outside the wall/ceiling construction. The duct and damper must be protected by fire insulation.
- If the damper is installed outside the fire separation construction, a damper side A ≥ 800 mm and fire resistance is EI 90 S, VRM-Q reinforcement frame must be used. → see page 86

NOTE: For lower fire resistance than EI 90 S, VRM-Q reinforcement frame is not necessary!

Statement of installations

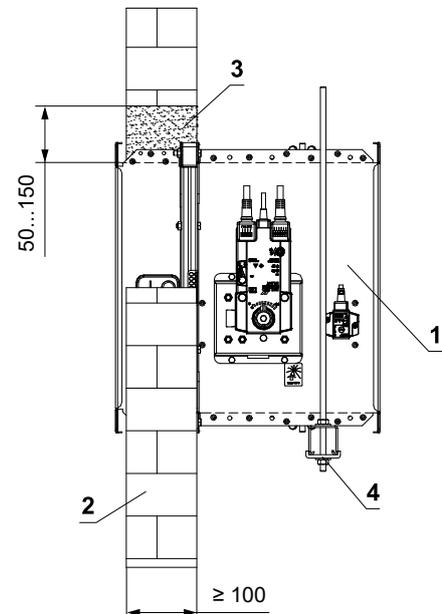
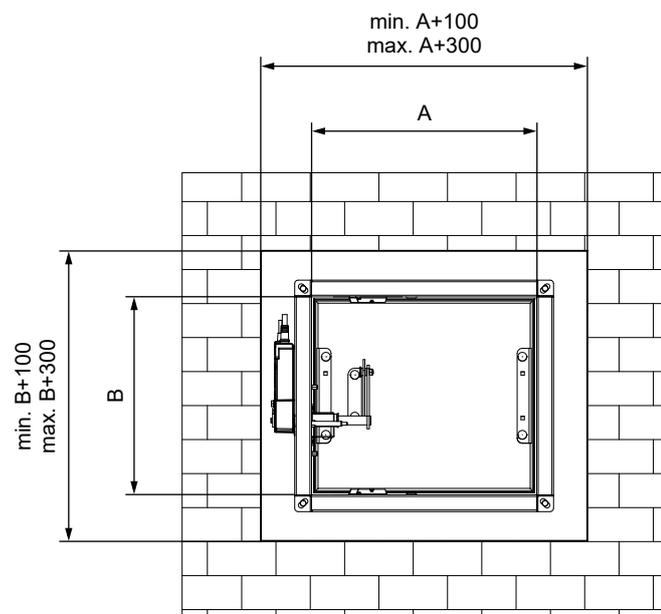
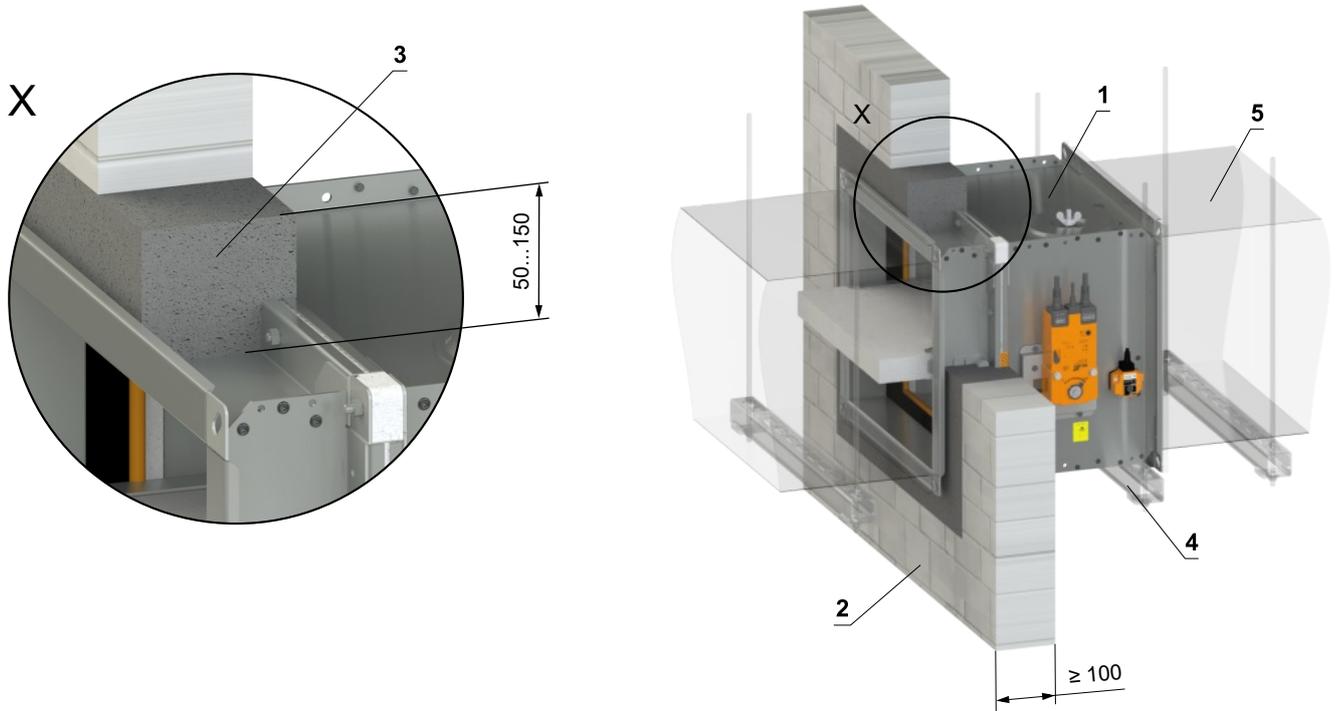
Placement	wall/ceiling min. thickness [mm]	Method of installation	Fire resistance	Page
In solid wall construction	100	Mortar or gypsum	EI 90 (v _e i↔o) S	25
		2 dampers in battery - mortar or gypsum		26
		4 dampers in battery - mortar or gypsum		27
		Ablative Coated Batt		28
		Mineral wool with fire-resistant coating and fire-resistant boards		29
		Installation next to the wall/ceiling - mortar or gypsum + mineral wool		30
Outside solid wall construction	100	ISOVER Ultimate Protect - mortar or gypsum	EI 60 (v _e i↔o) S	31
		ISOVER Ultimate Protect - Ablative Coated Batt		32
		Mineral wool ROCKWOOL - Mineral wool with fire-resistant coating and fireresistant board		EI 90 (v _e i↔o) S
In gypsum wall construction	100	Mortar or gypsum	EI 90 (v _e i↔o) S	34
		2 dampers in battery - mortar or gypsum		35
		4 dampers in battery - mortar or gypsum		36
		Ablative Coated Batt		37
		Mineral wool with fire-resistant coating and fire-resistant boards		38
		Installation next to the wall/ceiling - mortar or gypsum + mineral wool		39
Outside gypsum wall construction	100	ISOVER Ultimate Protect - mortar or gypsum	EI 60 (v _e i↔o) S	40
		ISOVER Ultimate Protect - Ablative Coated Batt		41
		Mineral wool ROCKWOOL - Mineral wool with fire-resistant coating and fireresistant boards		EI 90 (v _e i↔o) S
In sandwich wall construction	100	Ablative Coated Batt with fire-resistant boards	EI 90 (v _e i↔o) S	43
In shaft wall Rigips	110	Mortar or gypsum	EI 90 (v _e i↔o) S	45
	80	Installation frame E1		46
In solid ceiling construction	150	Mortar or gypsum	EI 90 (h _o i↔o) S	47
		2 dampers in battery - mortar or gypsum		48
		4 dampers in battery - mortar or gypsum		49
		Ablative Coated Batt		50
		Mineral wool with fire-resistant coating and fire-resistant boards		51
Outside solid ceiling construction	150	Mineral wool ROCKWOOL - mortar or gypsum	EI 90 (h _o i↔o) S	52
		Concreting		53
Installation frame in solid wall construction	100	Installation frame E1	EI 90 (v _e i↔o) S	56
		Installation frame E2		60
		Installation frame E4		65
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	72
Installation frame in gypsum wall construction	100	Installation frame E1	EI 90 (v _e i↔o) S	57
		Installation frame E3		63
		Flexible ceiling - installation frame E5		69-70
Installation frame in solid ceiling construction	150	Installation frame E1	EI 90 (h _o i↔o) S	58
		Installation frame E2		61
		Installation frame E4		66
Installation frame outside solid ceiling construction	150	Concreting - Installation frame E4	EI 90 (h _o i↔o) S	67
		Insulation from fire-resistant boards - mortar or gypsum - installation frame E6		73

In solid wall construction

In solid wall construction - mortar or gypsum

EI 90 (v_e i↔o) S

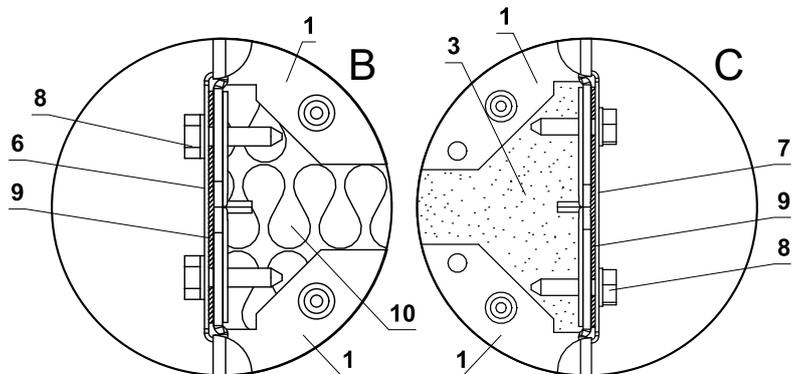
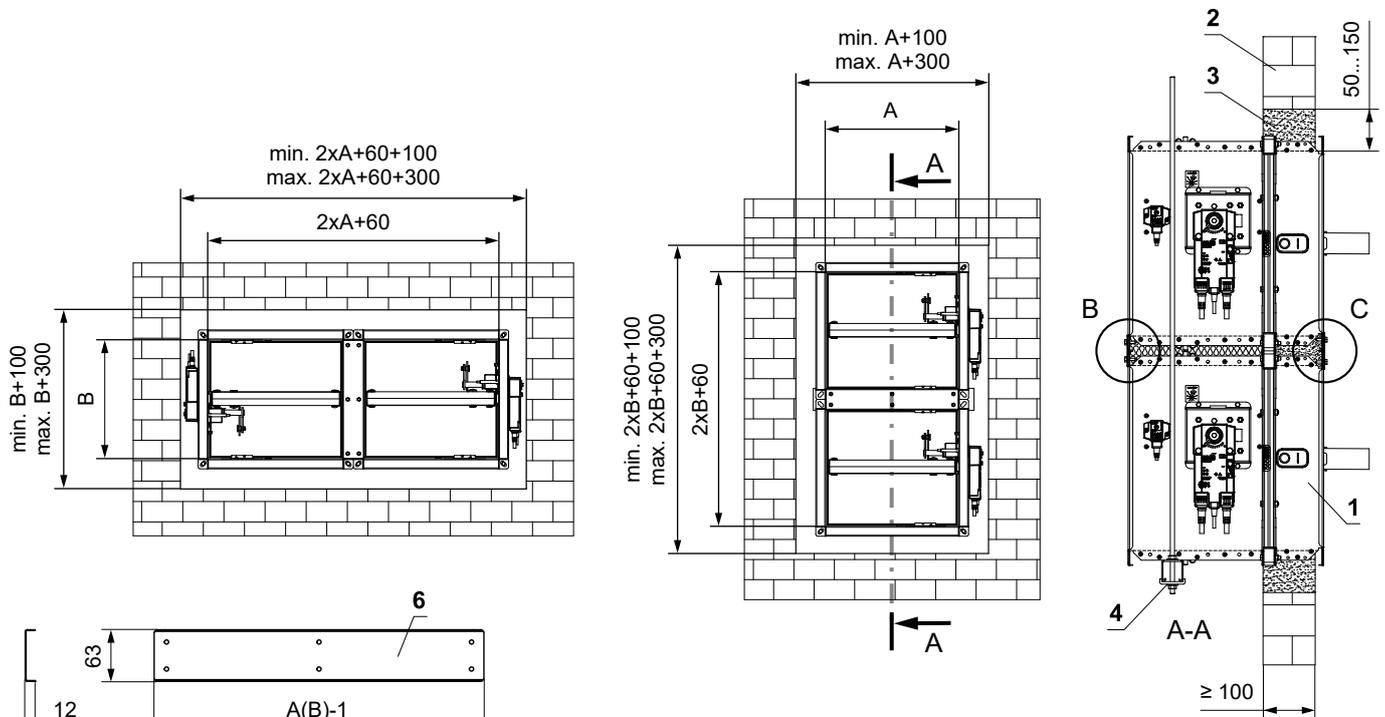
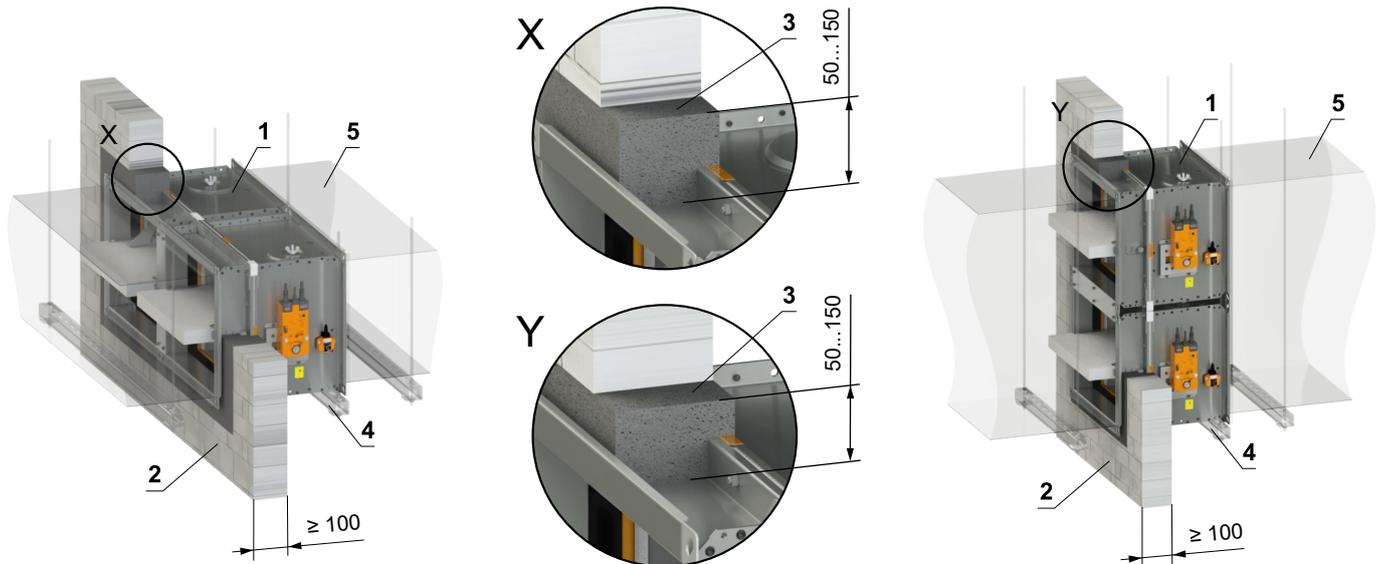
- For connection of following duct → see page 78



- 1 FDMQ
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct

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

EI 90 (v_e i↔o) S

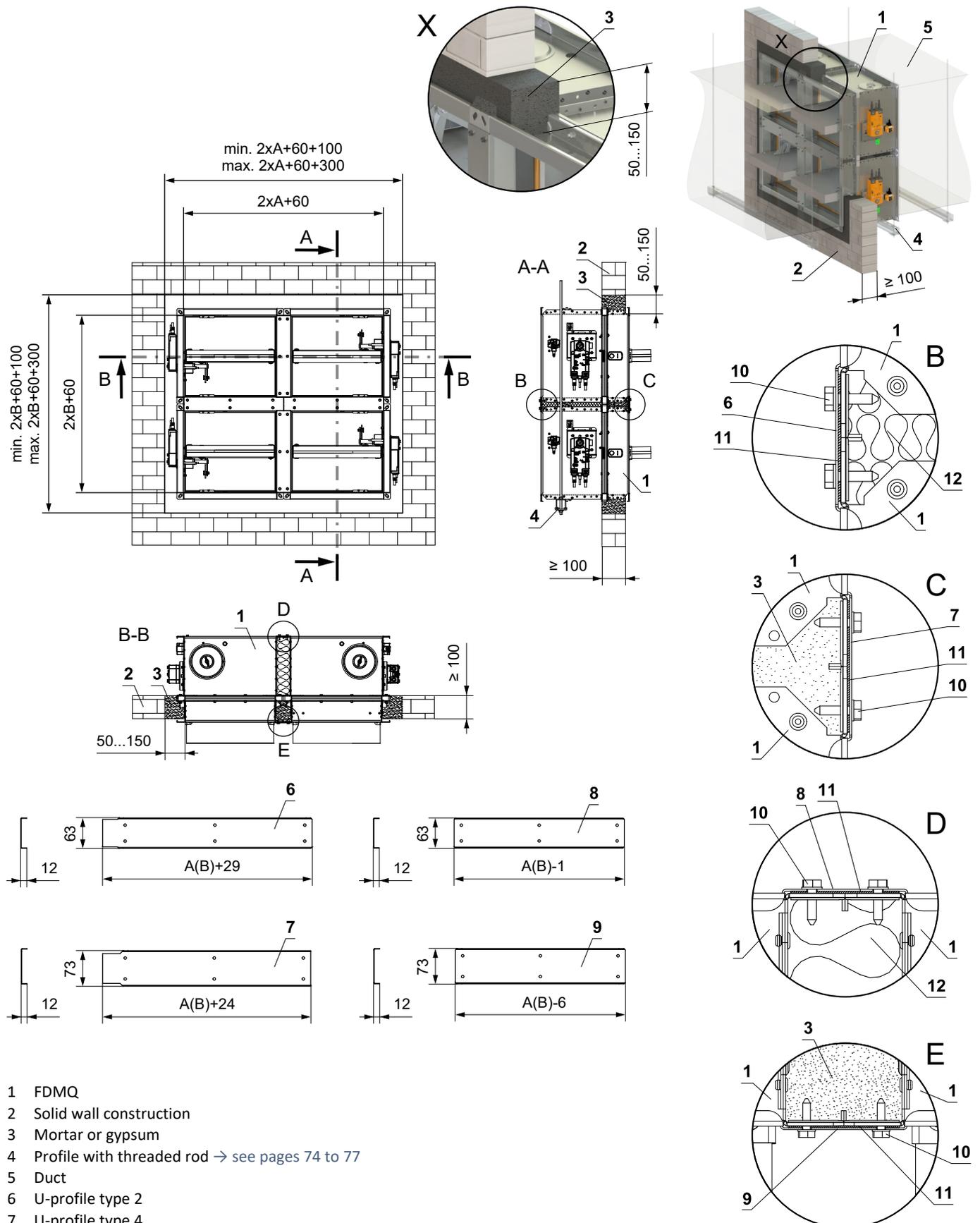


- 1 FDMQ
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection of following duct → see page 78
- The gap between the damper and construction is filled with mortar or gypsum

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

EI 90 (v_e i↔o) S



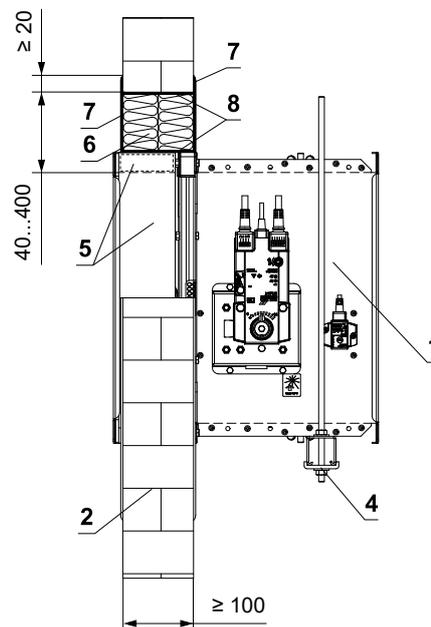
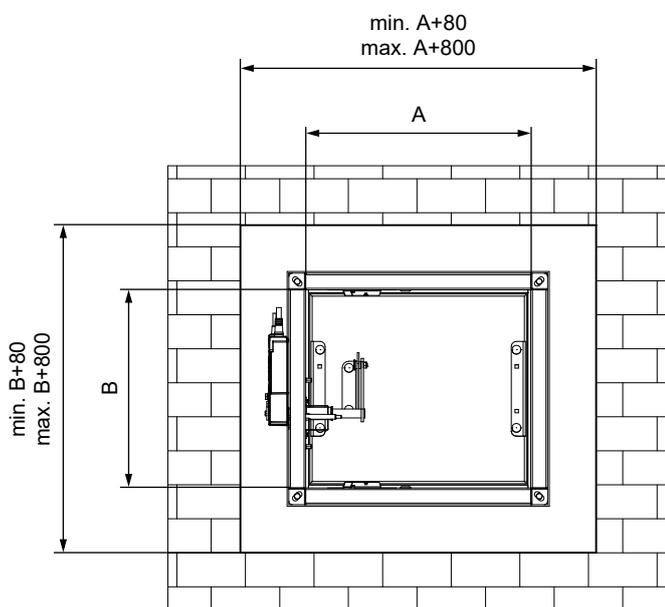
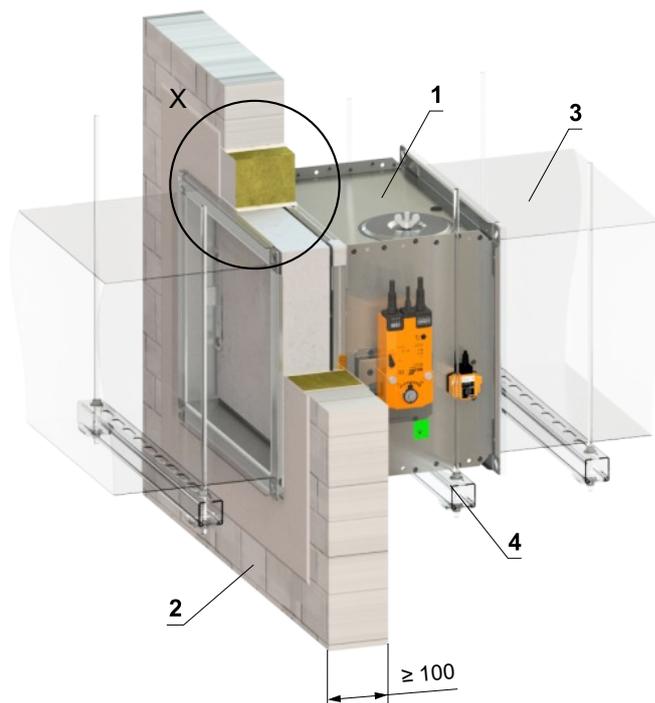
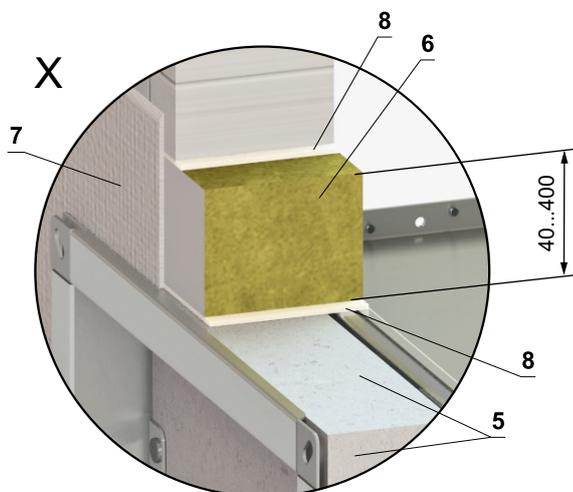
- 1 FDMQ
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct
- 6 U-profile type 2
- 7 U-profile type 4
- 8 U-profile type 1
- 9 U-profile type 3
- 10 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 11 Sealing
- 12 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection of following duct → see page 78
- The gap between the damper and construction is filled with mortar or gypsum

In solid wall construction - Ablative Coated Batt

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78



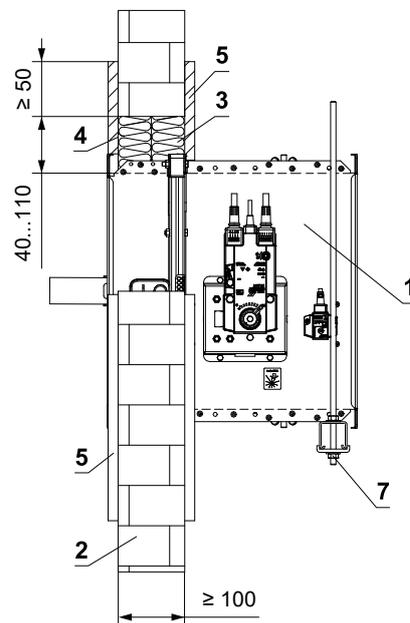
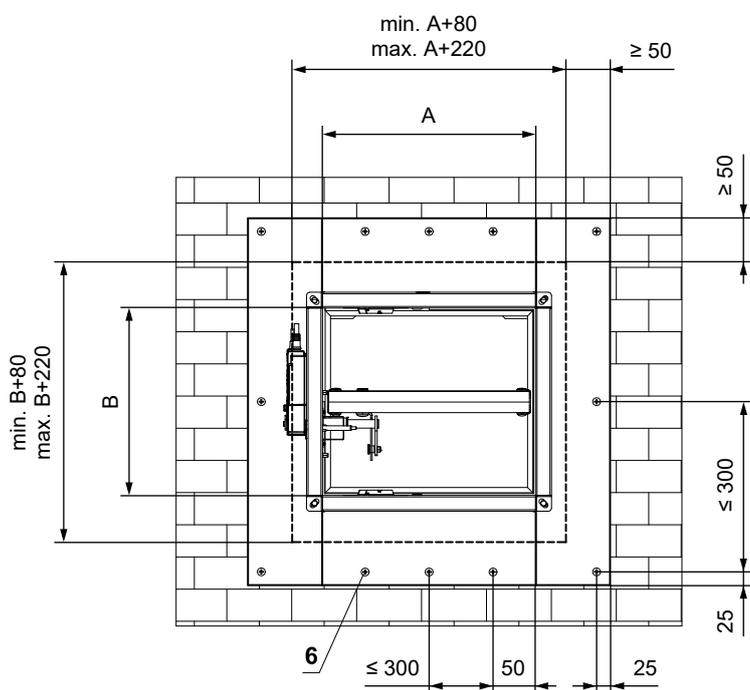
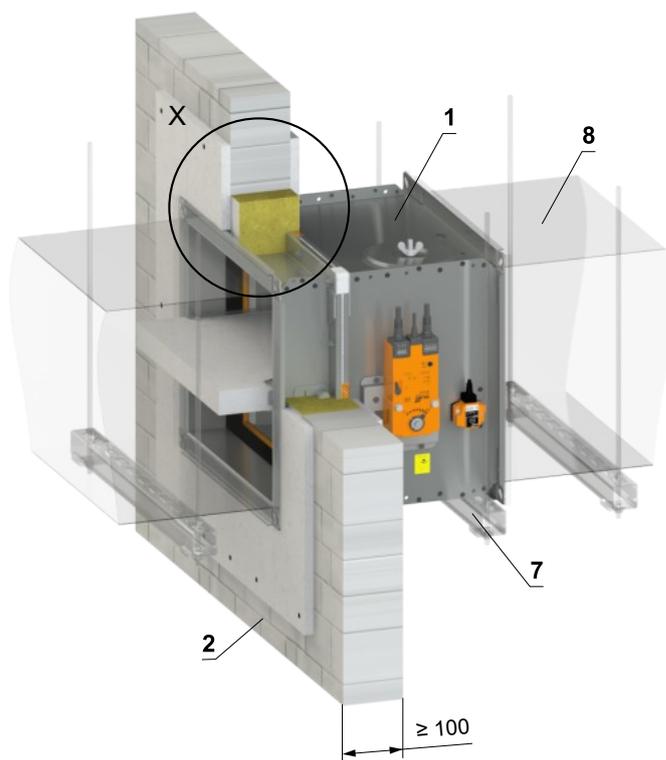
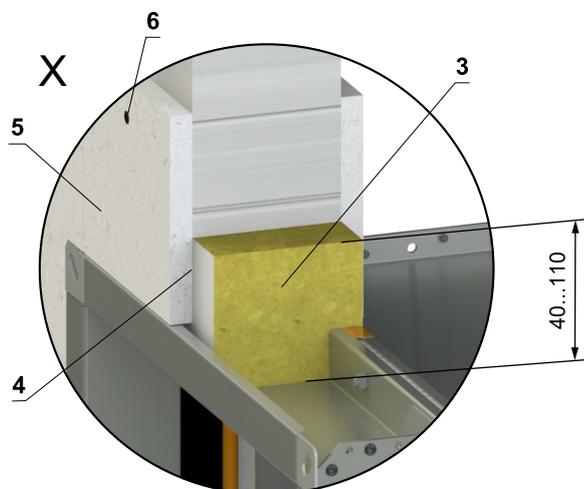
- 1 FDMQ
- 2 Solid wall construction
- 3 Duct
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 87
Ablative Coated Batt System HILTI*
- 6 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 7 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 8 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

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

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

EI 90 (v_e i↔o) S

■ For connection of following duct → see page 78

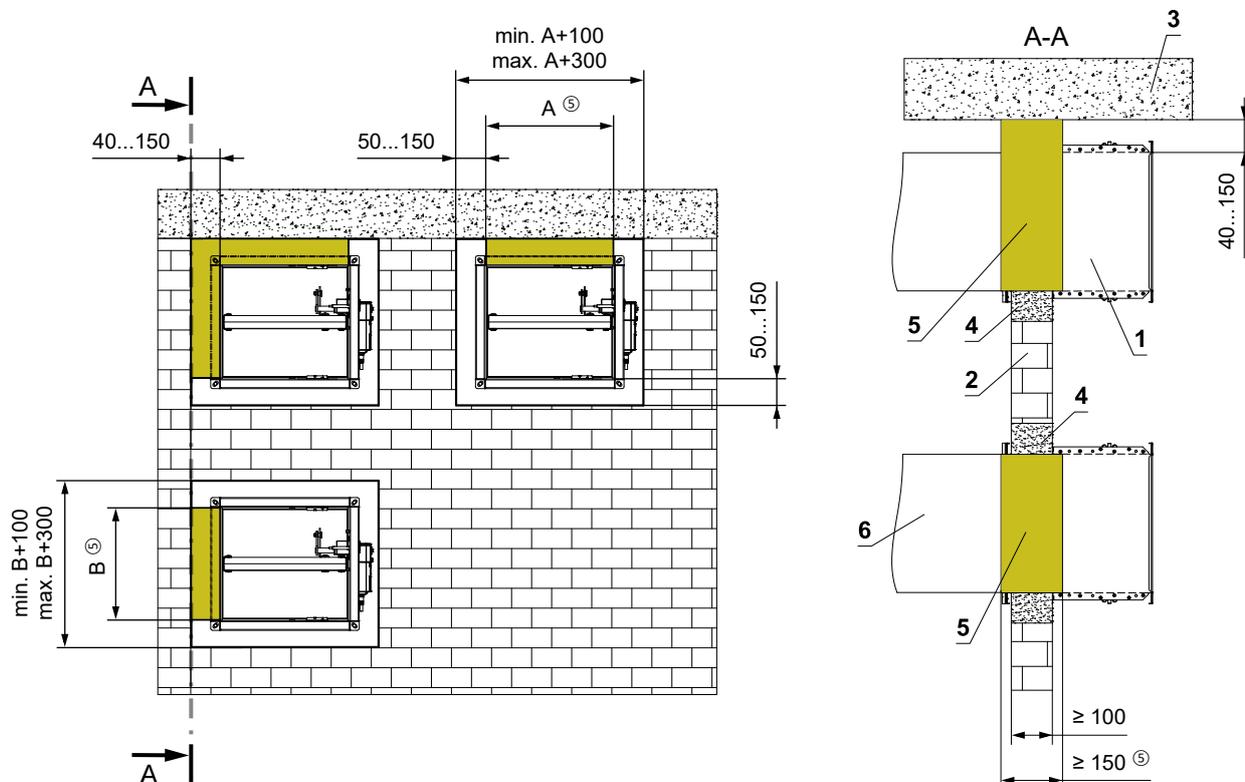
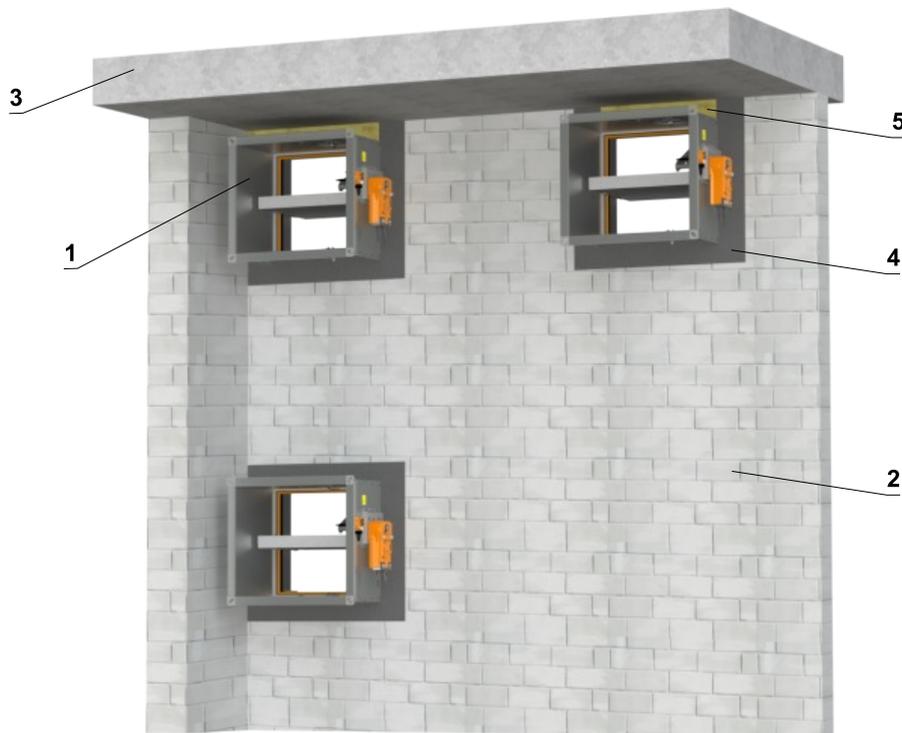


- 1 FDMQ
- 2 Solid wall construction
- 3 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 Profile with threaded rod → see pages 74 to 77
- 8 Duct

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

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- Conditions of this installation are also valid for the installation in **Solid ceiling construction**
- Penetration is filled with mortar or gypsum + mineral wool (shape, according to the location of the damper). Fix the mineral wool with glue (e.g. Promat K84 or equivalent) to the construction and damper casing



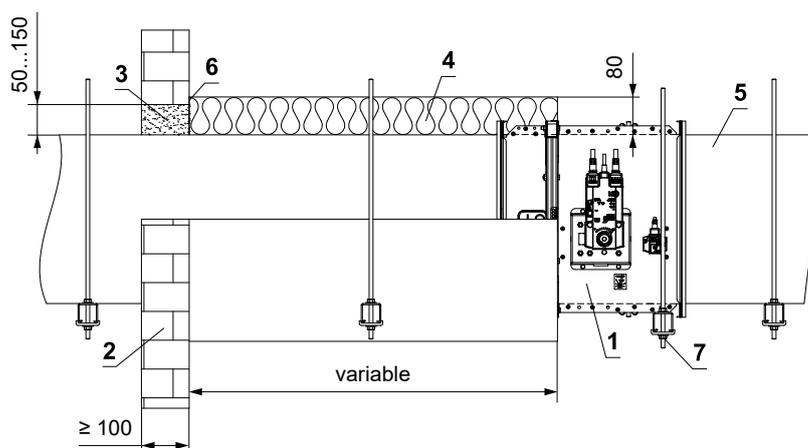
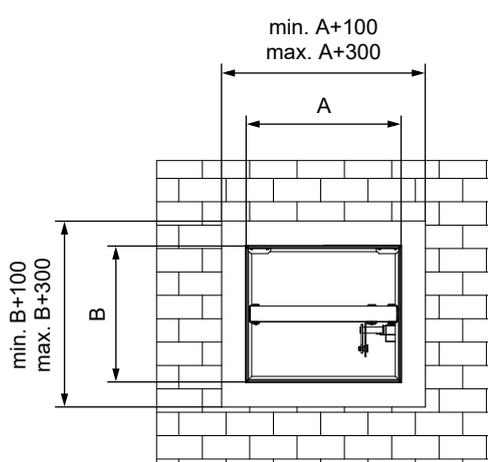
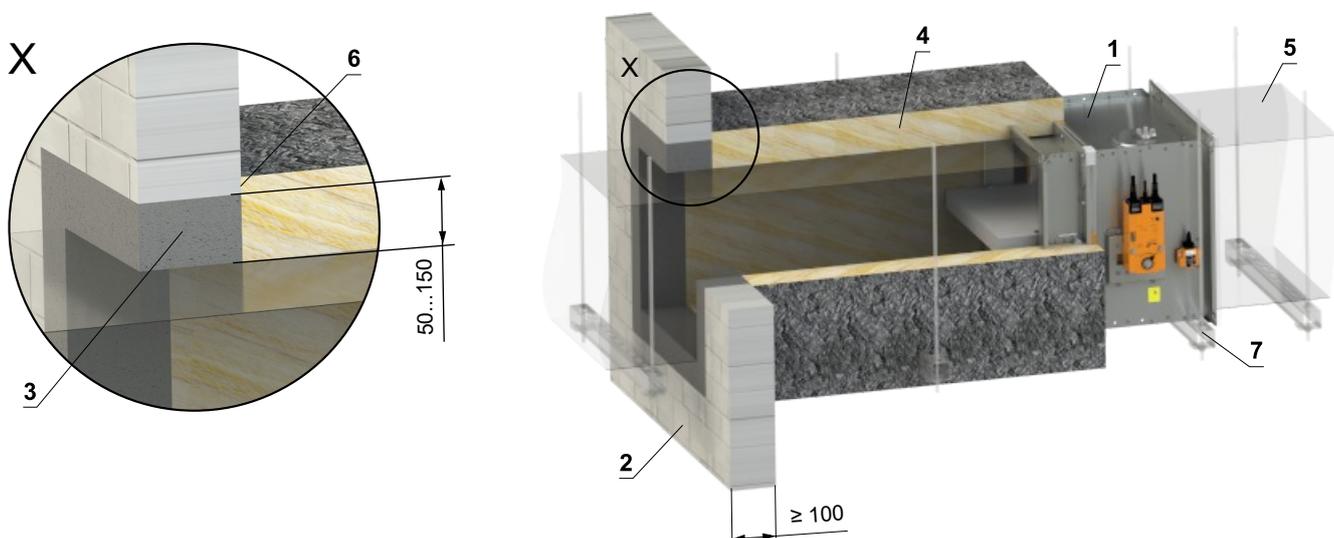
- 1 FDMQ
- 2 Solid wall construction
- 3 Solid ceiling construction
- 4 Mortar or gypsum
- 5 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPLOCK HD)
- 6 Duct

Installation outside solid wall construction

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

EI 60 (v_e i↔o) S

- For connection of following duct → see page 78
- 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 74
- 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
- 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

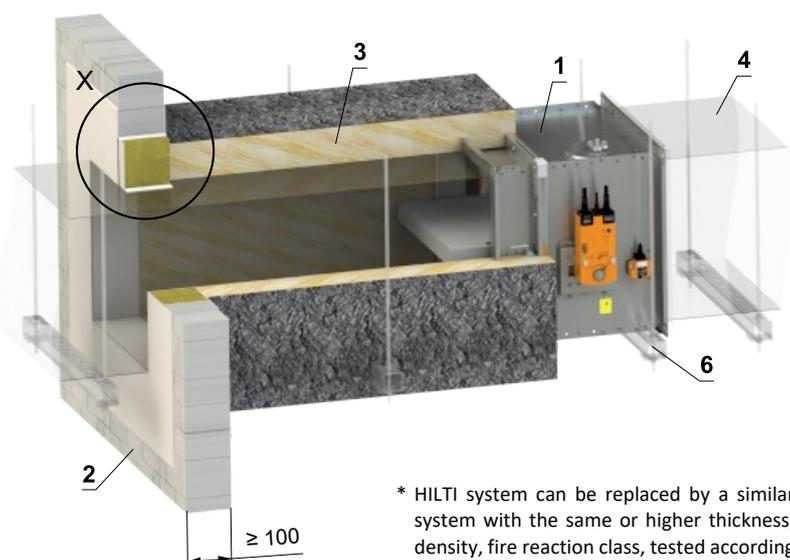
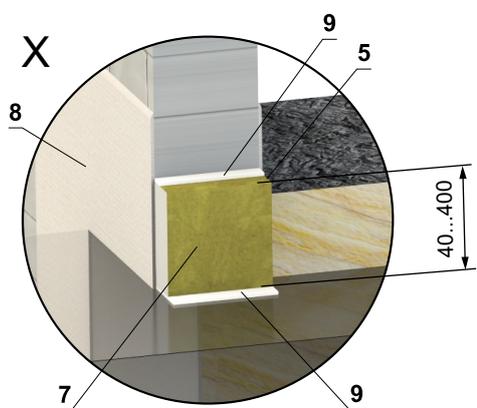


- 1 FDMQ
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Insulation board made of mineral wool, with a surface treatment of aluminum foil, min. thickness 80 mm, min. density 66 kg/m³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)
- 5 Standard air duct, made of galvanized sheet metal min. thickness 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 74 to 77

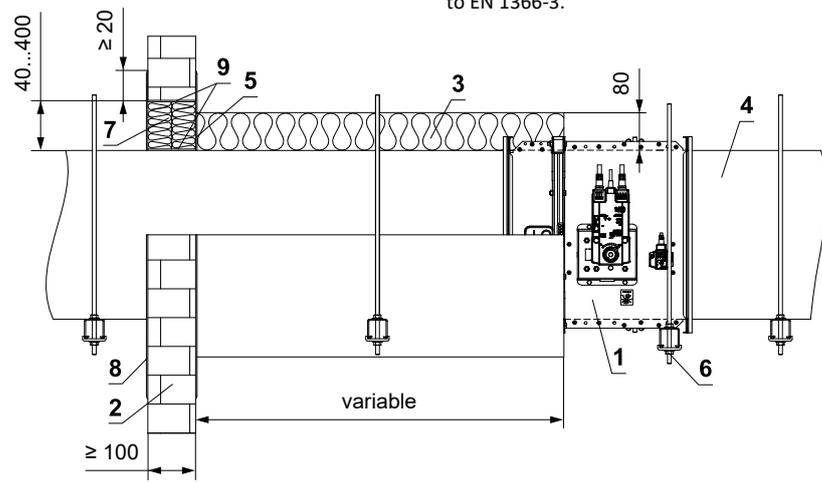
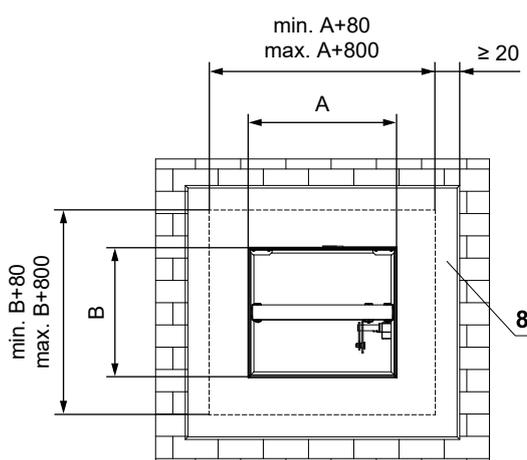
Outside solid wall construction - ISOVER Ultimate Protect - Ablative Coated Batt

EI 60 (v_e i↔o) S

- For connection of following duct → see page 78
- 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 74
- 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
- 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.

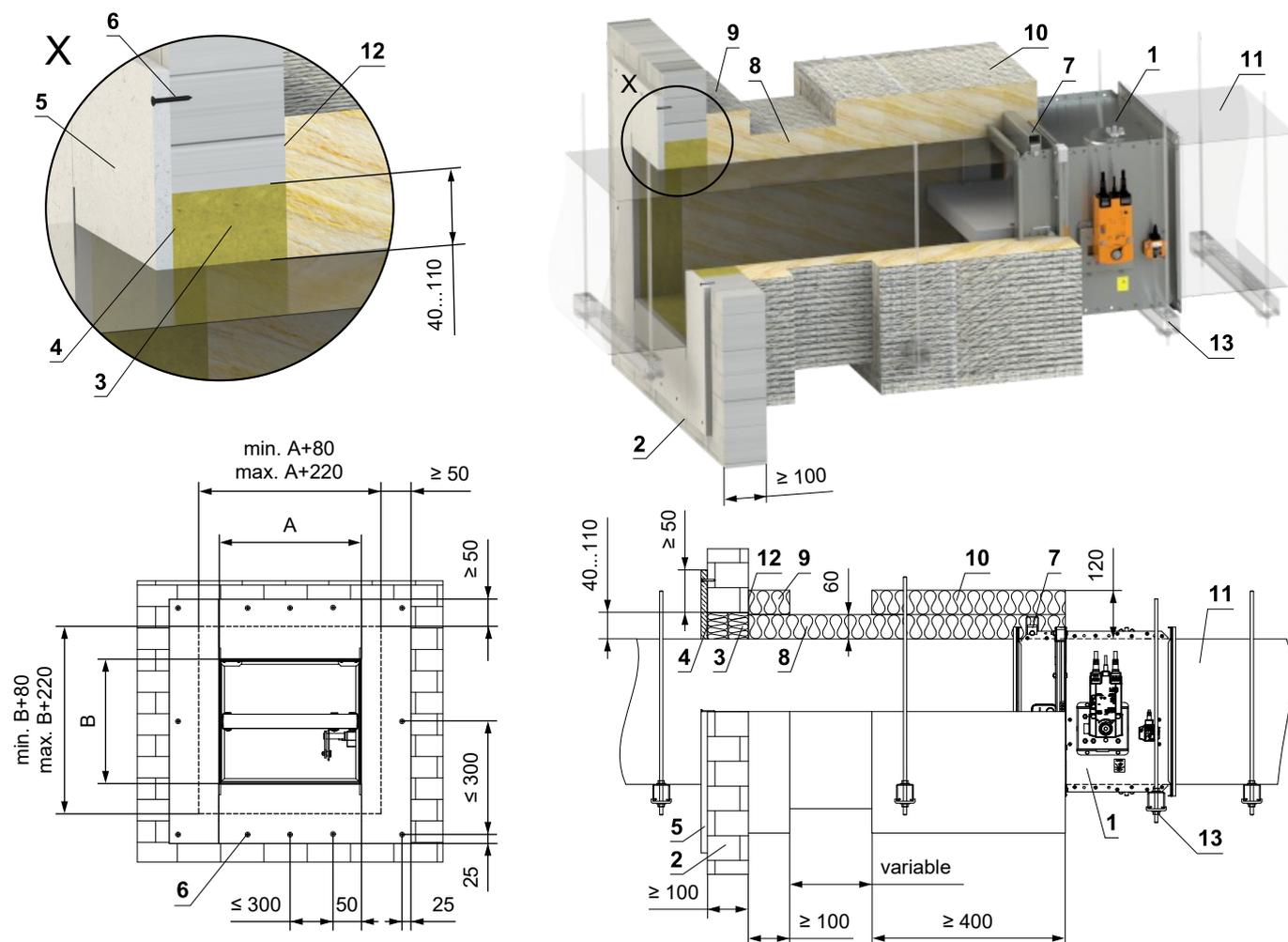


- 1 FDMQ
 - 2 Solid wall construction
 - 3 Insulation board made of mineral wool, with a surface treatment of aluminum foil, min. thickness 80 mm, min. density 66 kg/m³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)
 - 4 Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm
 - 5 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction
 - 6 Profile with threaded rod → see pages 74 to 77
- Ablative Coated Batt System HILTI*
- 7 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
 - 8 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
 - 9 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

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

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- 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 74
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- 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 86



- 1 FDMQ
- 2 Solid wall construction
- 3 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPLOCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 VRM-Q → see page 86

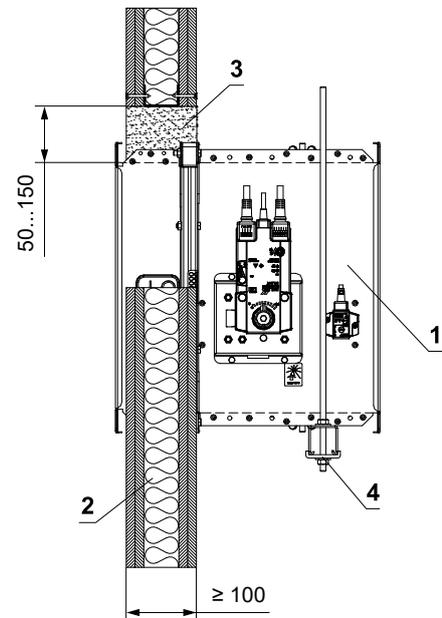
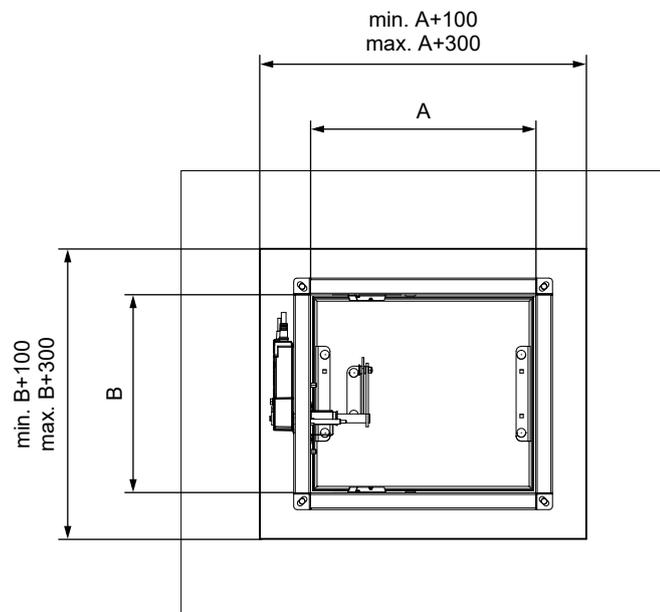
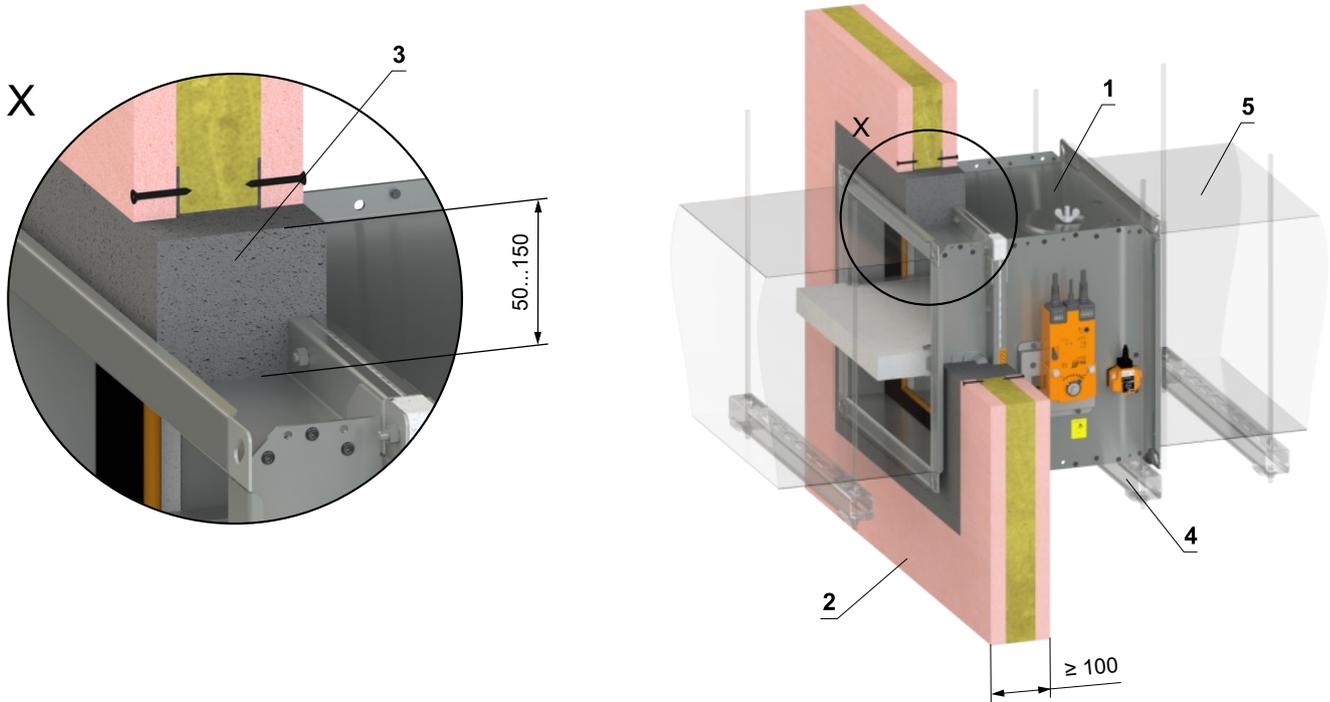
- 8 Insulation board made of mineral wool, with a surface treatment of aluminum foil - th. 60 mm, min. density 300 kg/m³ - (System ROCKWOOL Conlit Ductrock 90)
- 9 Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90) - glued (pos. 12) and fixed with screws to the wall construction
- 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 74 to 77

In gypsum wall construction

In gypsum wall construction - mortar or gypsum

EI 90 (v_e i↔o) S

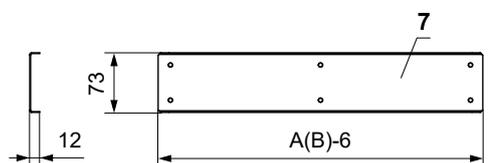
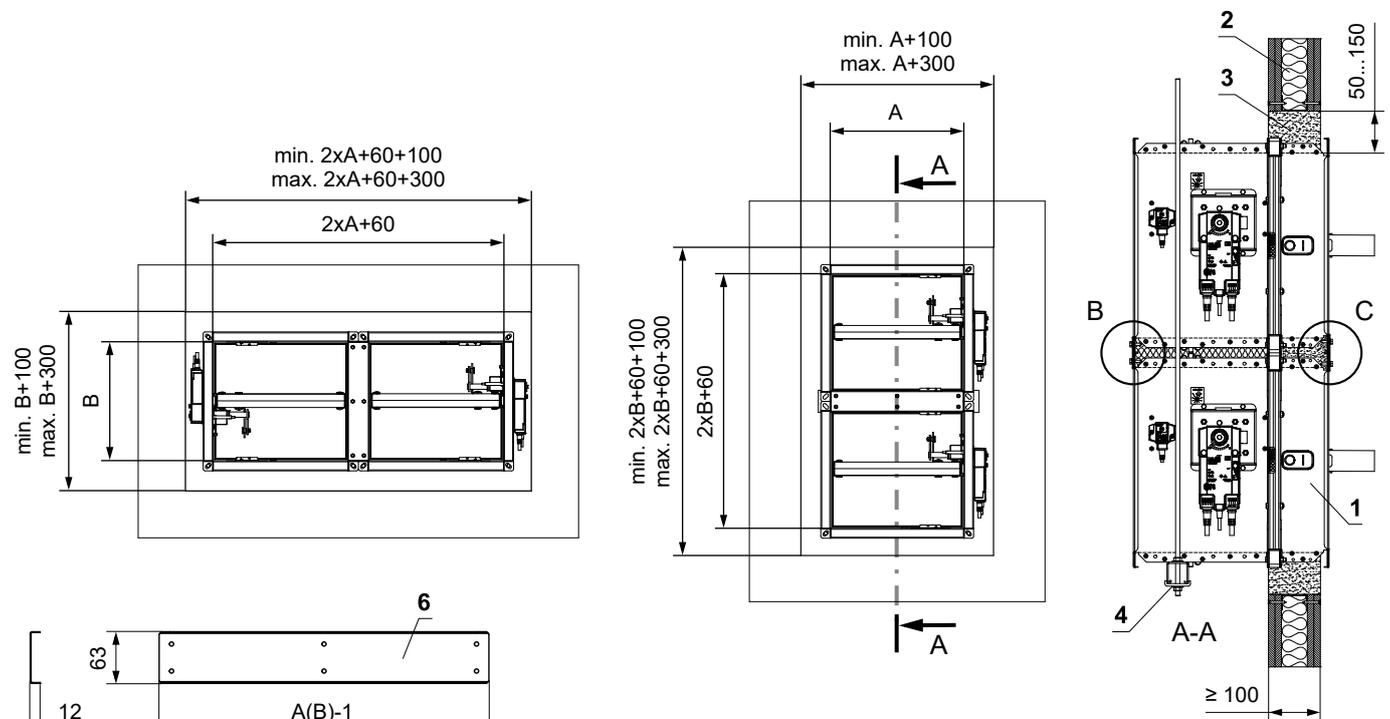
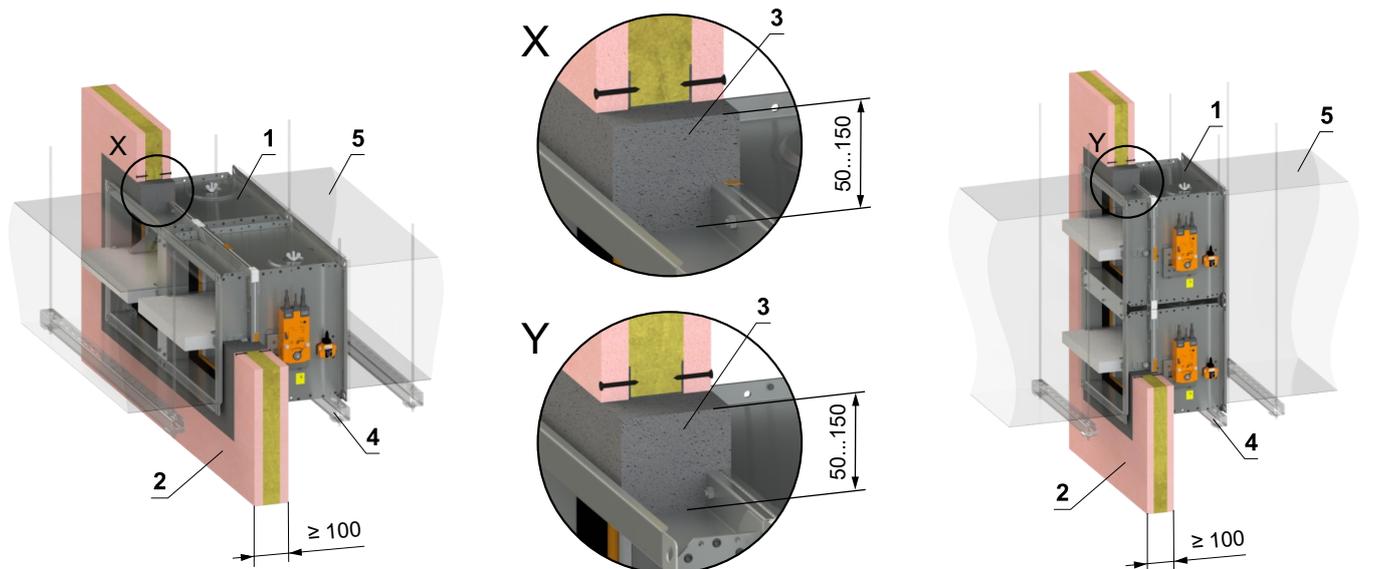
- For connection of following duct → see page 78
- The installation opening is lined with a UW/CW profile.



- 1 FDMQ
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct

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

EI 90 (v_e i↔o) S

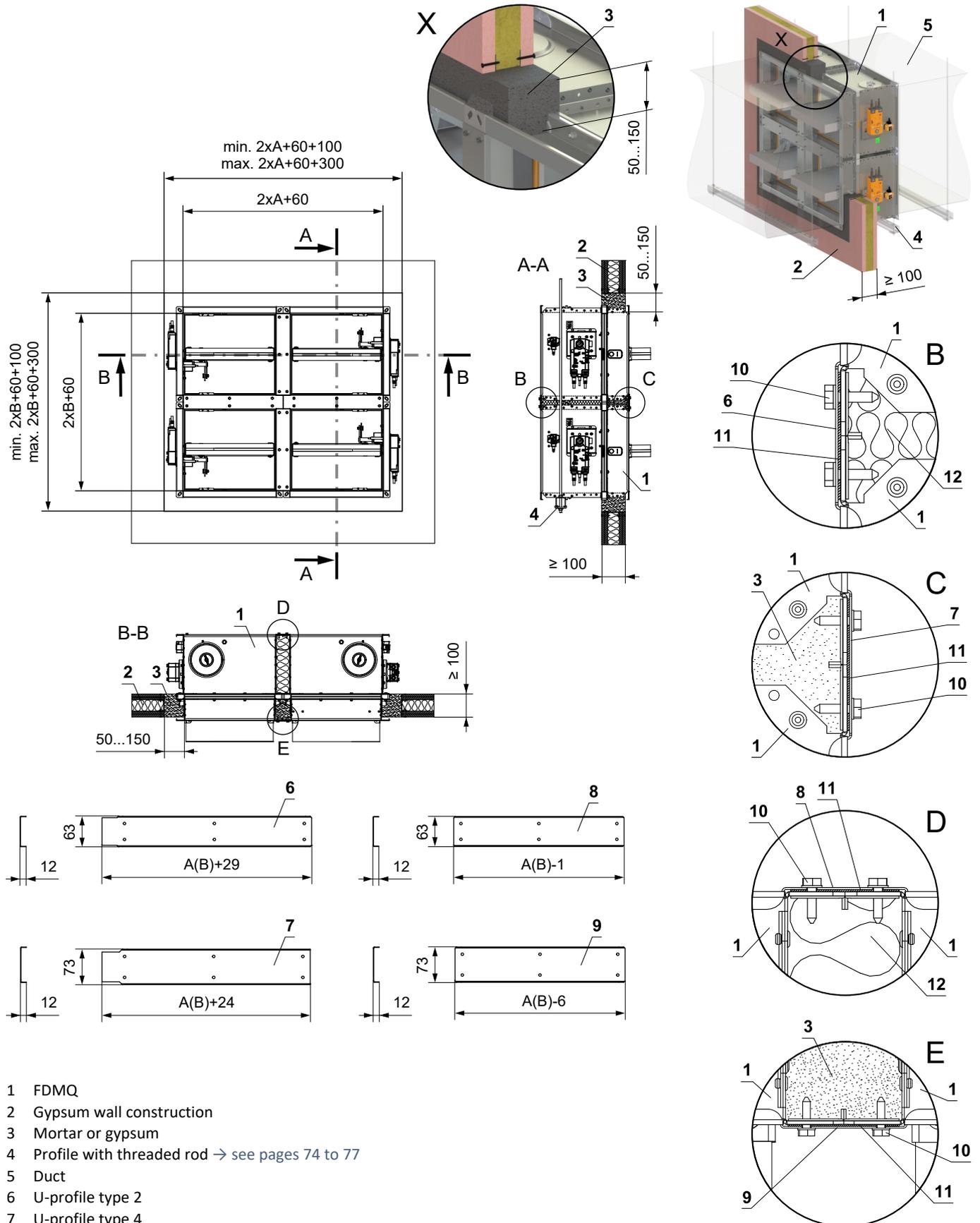


- 1 FDMQ
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection of following duct → see page 78
- The gap between the damper and construction is filled with mortar or gypsum
- The installation opening is lined with a UW/CW profile.

In gypsum wall construction - 4 dampers in battery - mortar or gypsum

EI 90 (v_e i↔o) S



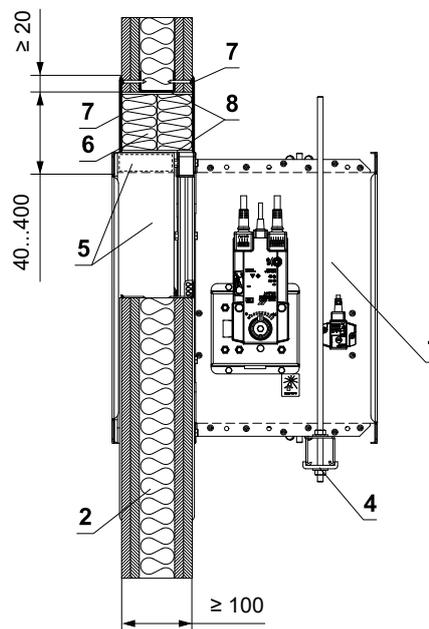
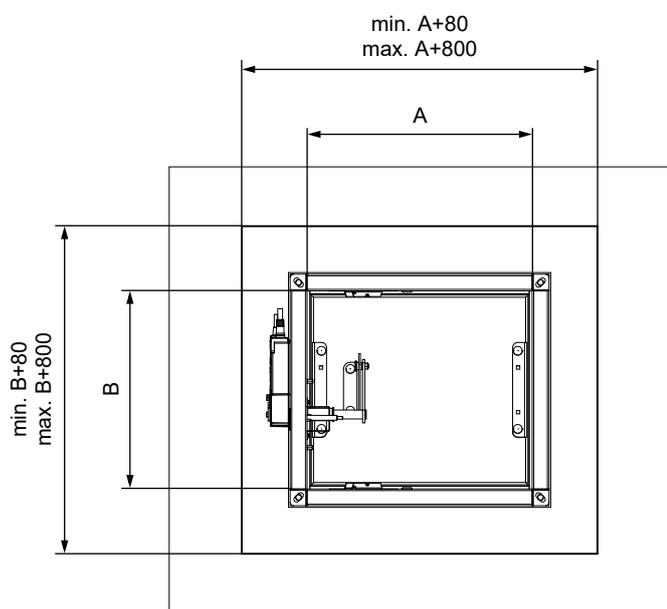
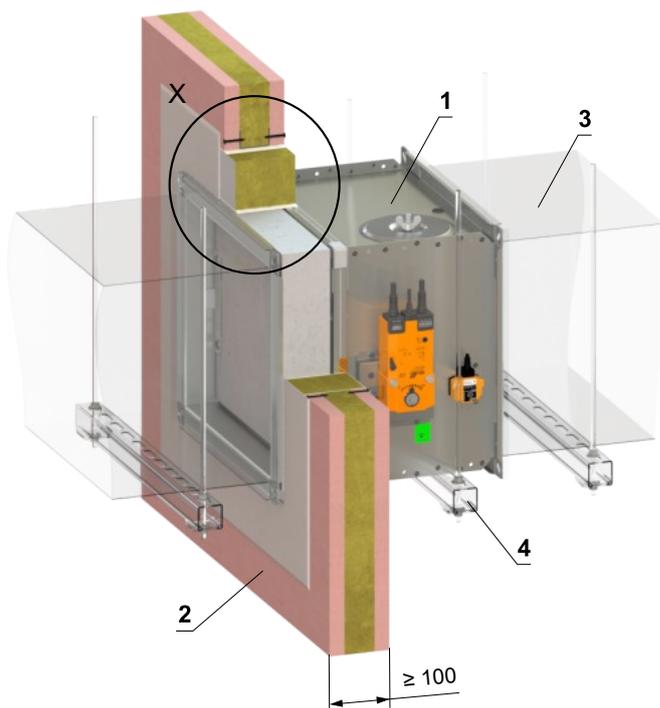
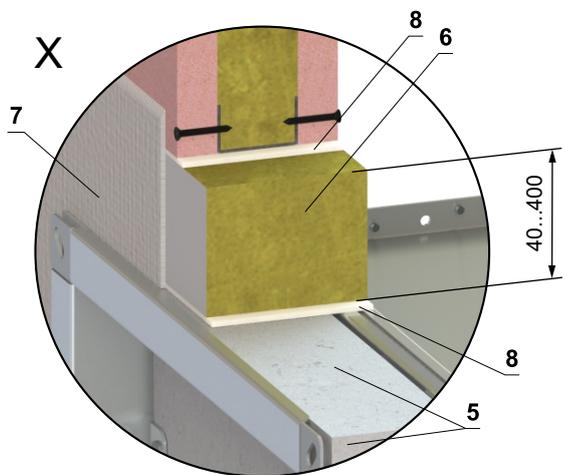
- 1 FDMQ
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct
- 6 U-profile type 2
- 7 U-profile type 4
- 8 U-profile type 1
- 9 U-profile type 3
- 10 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 11 Sealing
- 12 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection of following duct → see page 78
- The gap between the damper and construction is filled with mortar or gypsum
- The installation opening is lined with a UW/CW profile.

In gypsum wall construction - Ablative Coated Batt

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- The installation opening is lined with a UW/CW profile.



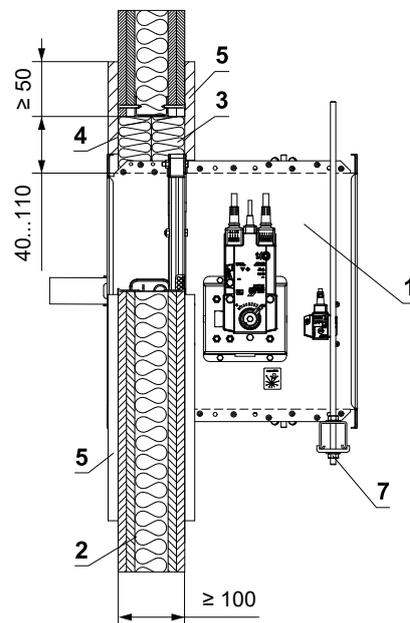
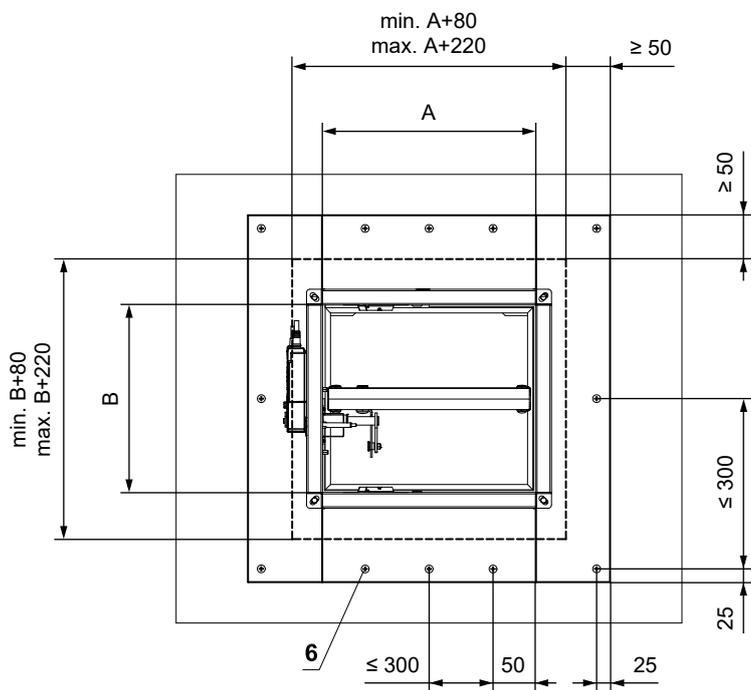
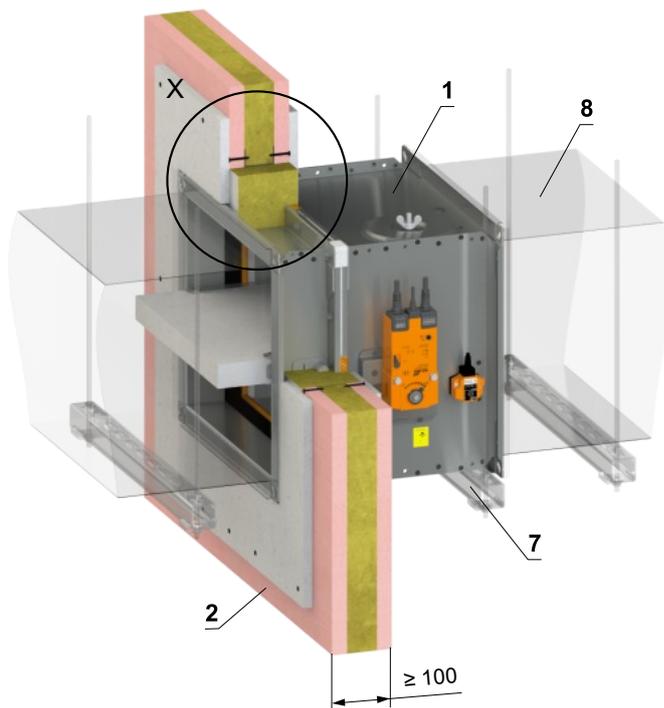
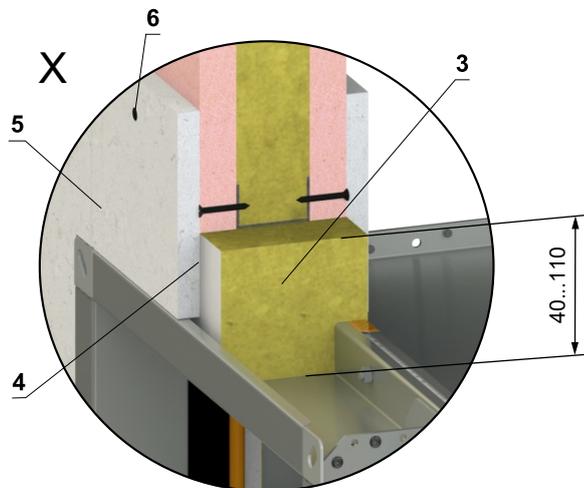
- 1 FDMQ
- 2 Gypsum wall construction
- 3 Duct
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 87
Ablative Coated Batt System HILTI*
- 6 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 7 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 8 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

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

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

EI 90 (v_e i↔o) S

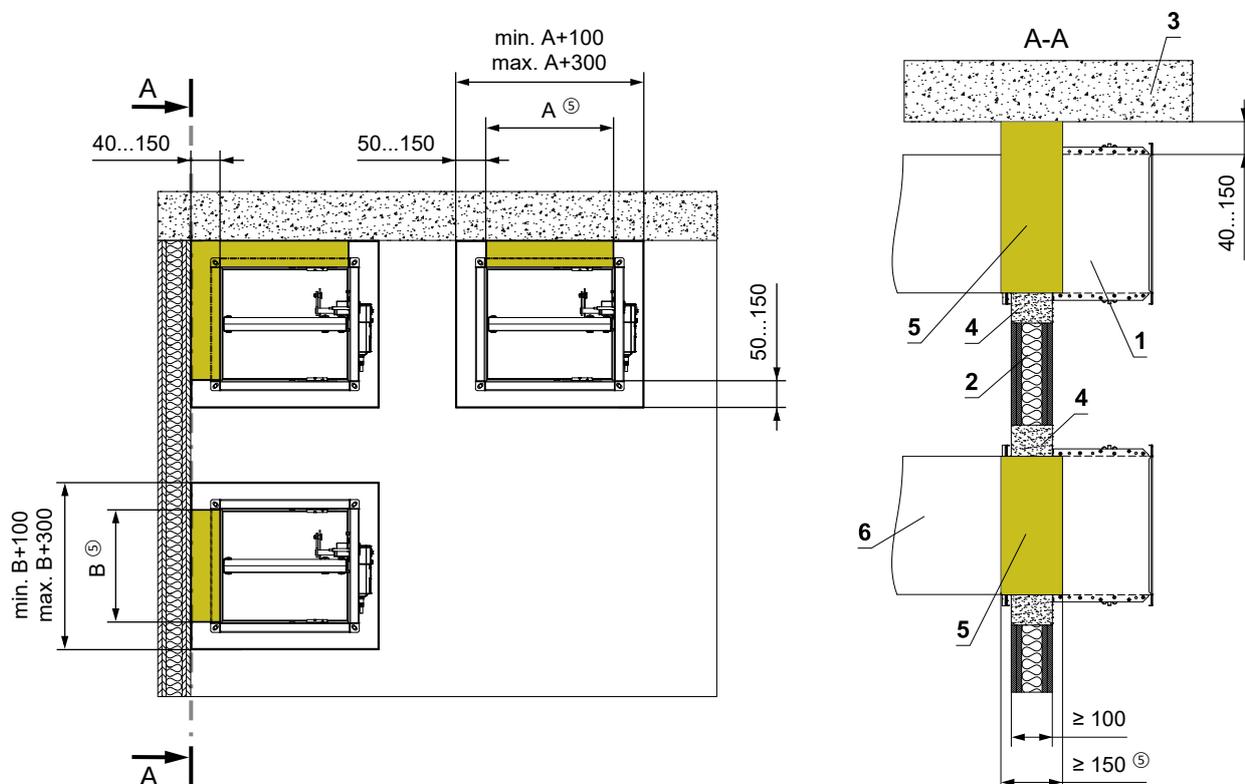
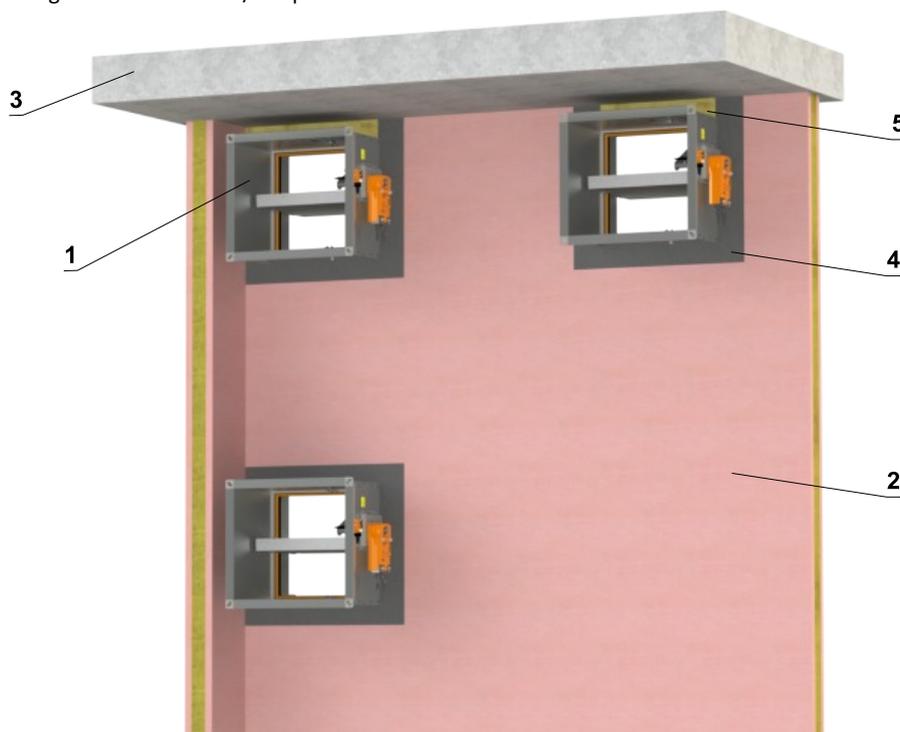
- For connection of following duct → see page 78
- The installation opening is lined with a UW/CW profile.



- 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 74 to 77
- 8 Duct

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

- For connection of following duct → see page 78
- 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
- The installation opening is lined with a UW/CW profile.



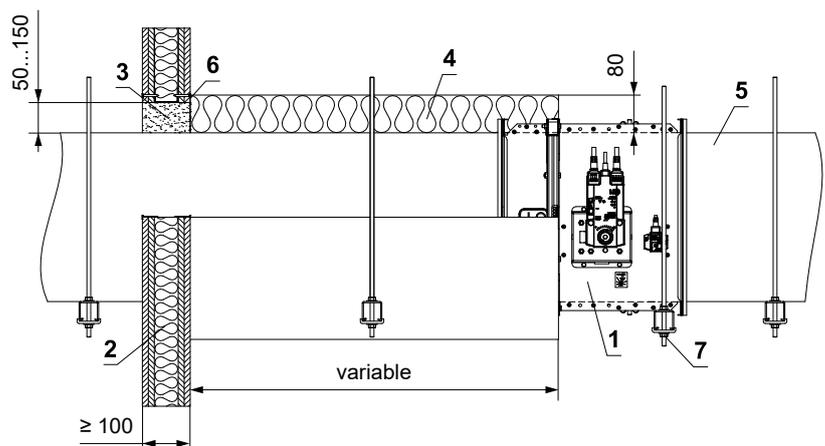
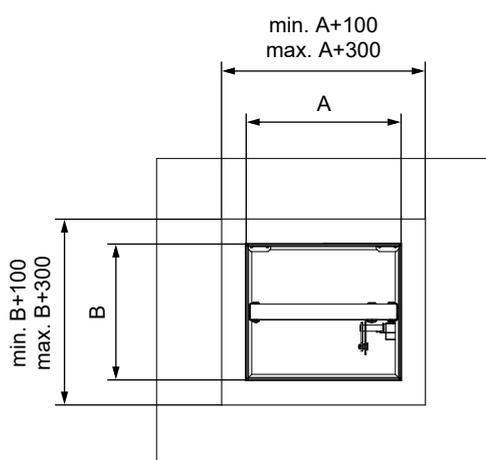
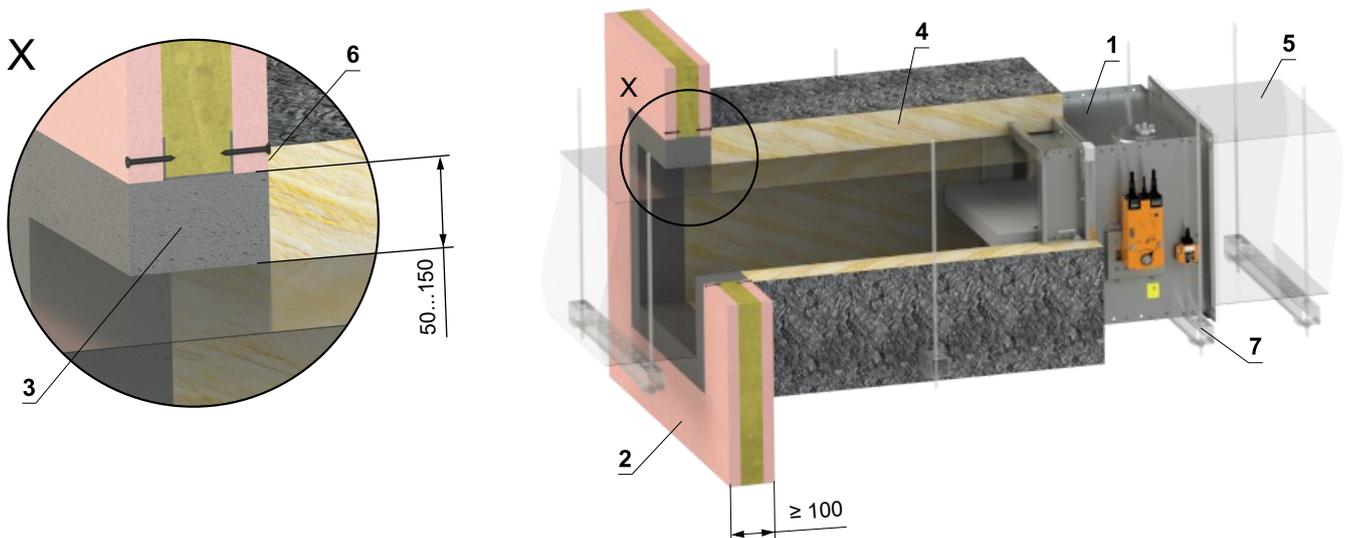
- 1 FDMQ
- 2 Gypsum wall construction
- 3 Solid ceiling construction
- 4 Mortar or gypsum
- 5 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEP ROCK HD)
- 6 Duct

Installation outside gypsum wall construction

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

EI 60 (v_e i↔o) S

- For connection of following duct → see page 78
- 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 74
- 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
- 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
- The installation opening is lined with a UW/CW profile.

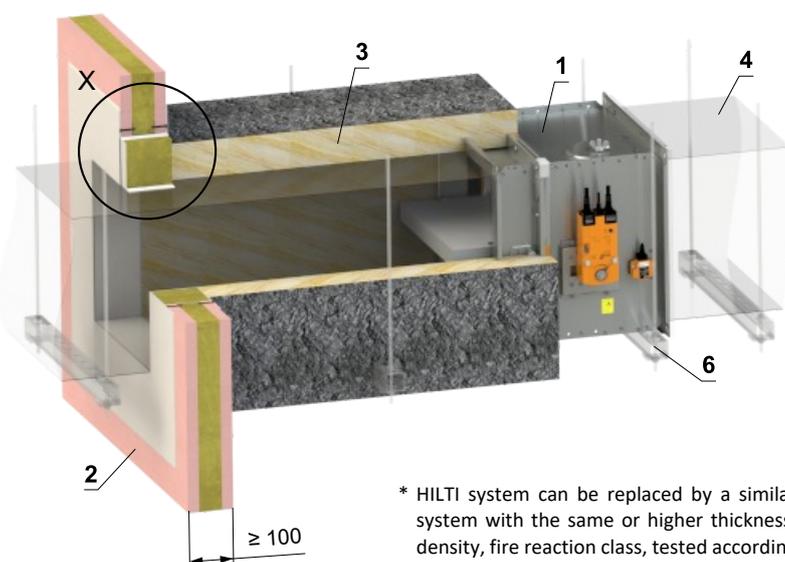
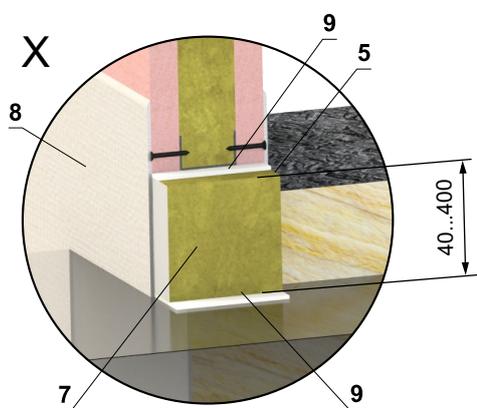


- 1 FDMQ
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Insulation board made of mineral wool, with a surface treatment of aluminum foil, min. thickness 80 mm, min. density 66 kg/m³ (System ISOVER Ultimate Protect Wired Mat 4.0 Alu1)
- 5 Standard air duct, made of galvanized sheet metal min. thickness 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 74 to 77

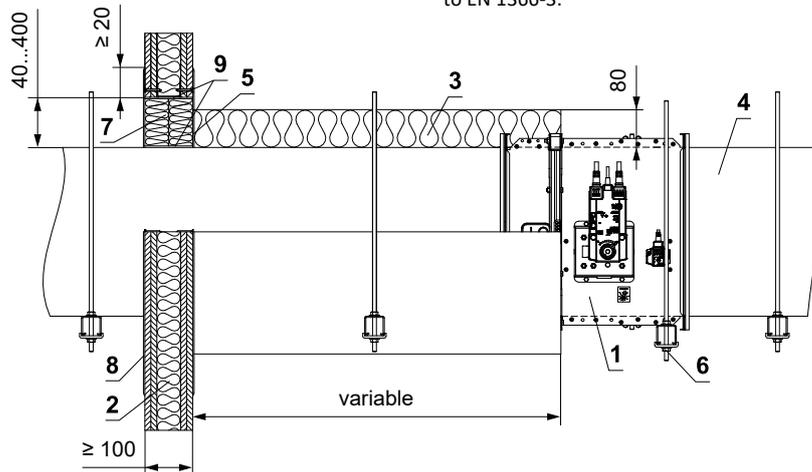
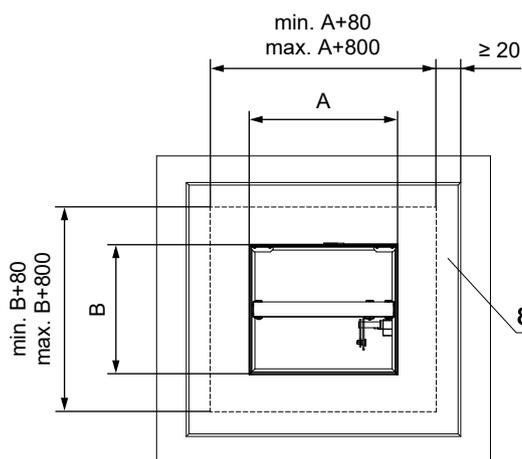
Outside gypsum wall construction - ISOVER Ultimate Protect - Ablative Coated Batt

EI 60 (v_e i↔o) S

- For connection of following duct → see page 78
- 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 74
- 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
- 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
- The installation opening is lined with a UW/CW profile.



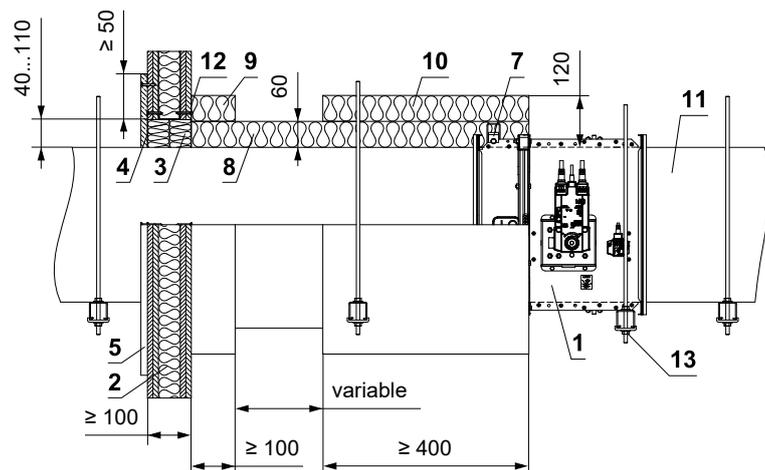
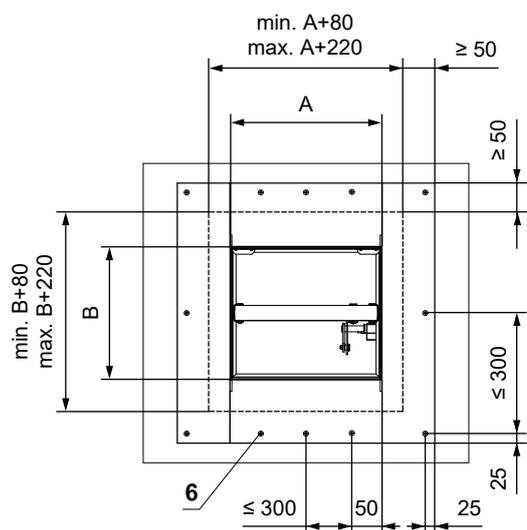
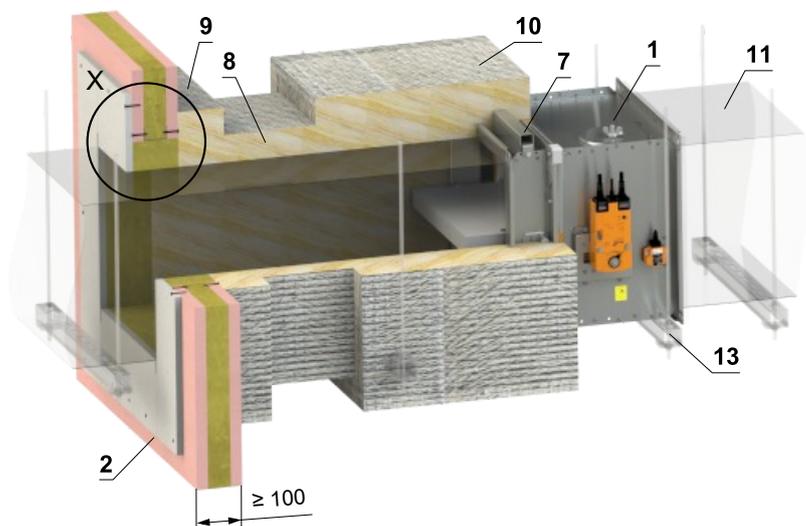
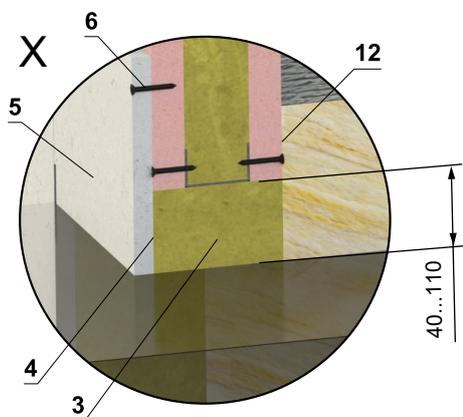
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.



- 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/m³ (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 74 to 77
- Ablative Coated Batt System HILTI*
- 7 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
 - 8 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
 - 9 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

Outside gypsum wall construction - mineral wool ROCKWOOL - mineral wool with fire-resistant coating and fire-resistant board EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- 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 74
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- 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 86
- The installation opening is lined with a UW/CW profile.



- 1 FDMQ
- 2 Gypsum wall construction
- 3 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPLOCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 VRM-Q → see page 86

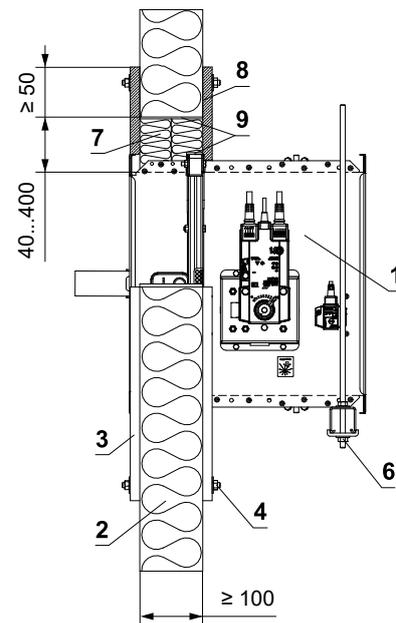
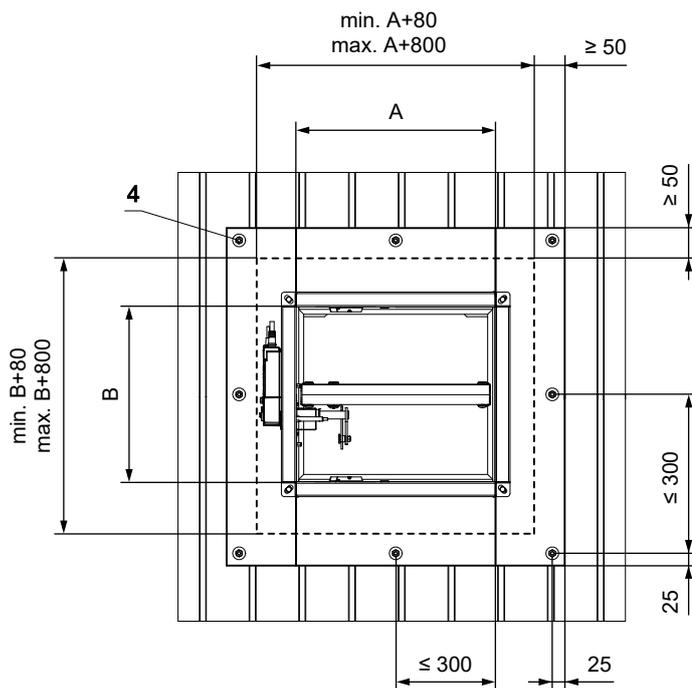
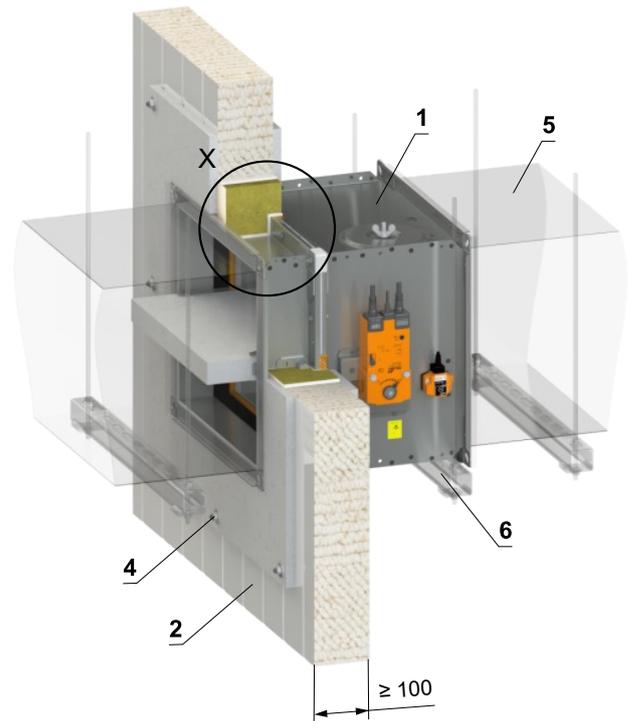
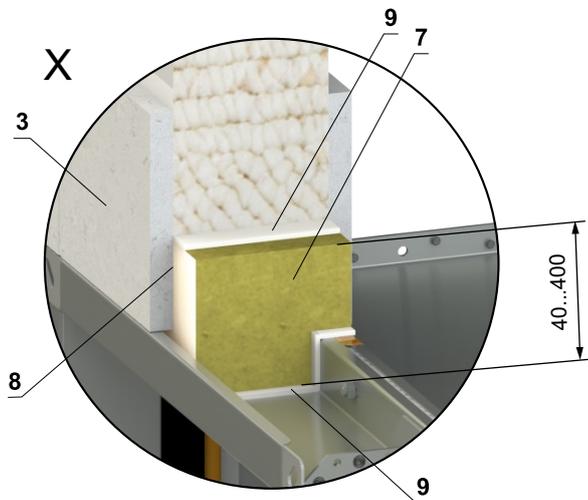
- 8 Insulation board made of mineral wool, with a surface treatment of aluminum foil - th. 60 mm, min. density 300 kg/m³ - (System ROCKWOOL Conlit Ductrock 90)
- 9 Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90) - glued (pos. 12) and fixed with screws to the wall construction
- 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 74 to 77

Installation in sandwich wall construction

In sandwich wall construction - Ablative Coated Batt with fire-resistant boards

EI 90 (v_e i↔o) S

■ For connection of following duct → see page 78



* 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/m³ (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 74 to 77
- Ablative Coated Batt System HILTI*
- 7 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 8 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 9 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

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 \varnothing 6 mm (for example DN6 or ZHOP) with 500 mm span.
- Sheathing is carried out using two layers of Glasroc F boards Ridurit with 20 mm thickness, the boards are oriented horizontally. First sheathing layer is fixed with TN 212 screws in spacing 200mm to the support 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.

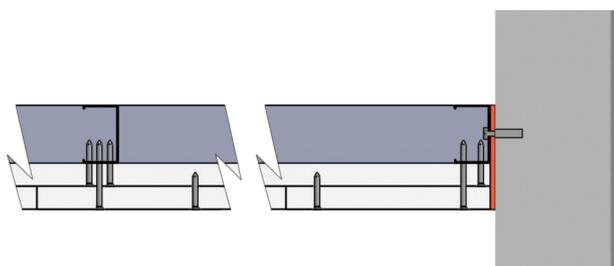
Assembly with support structure

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

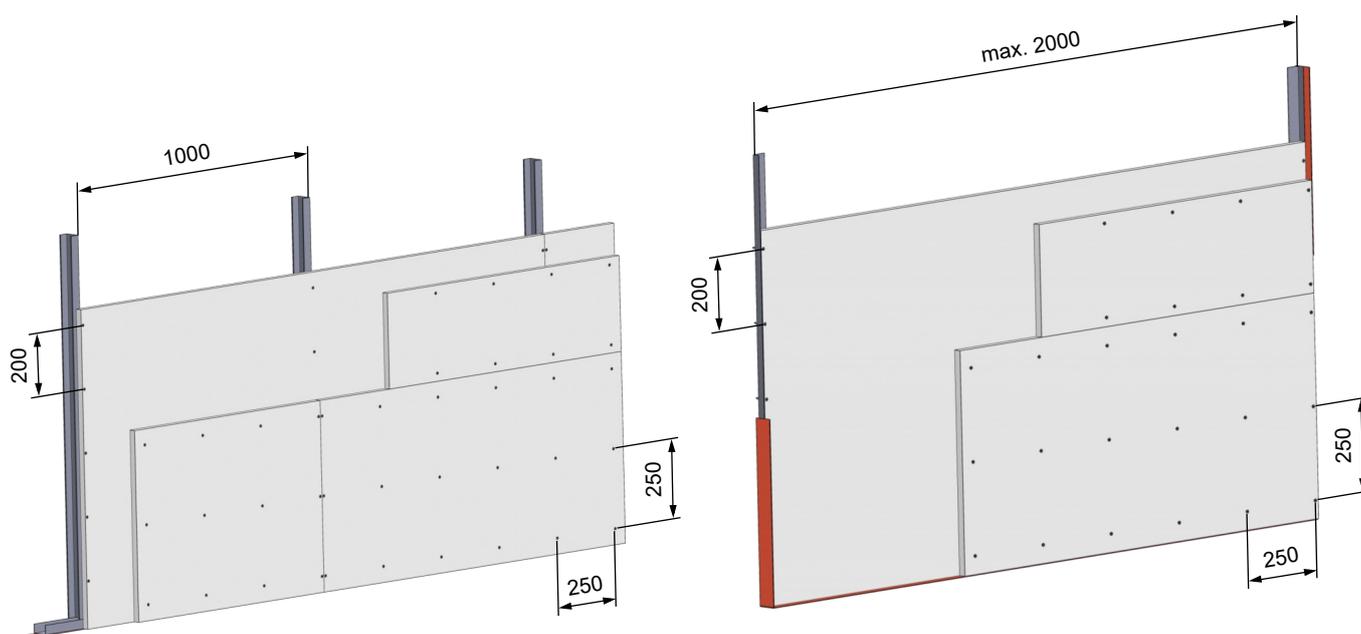
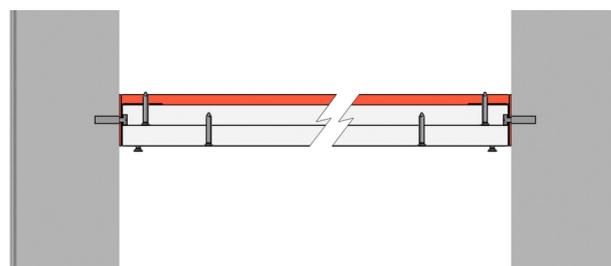
Assembly without support structure

- 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 \varnothing 6 mm steel plugs (for example DN6 or ZHOP) with 500 mm spacing.

Assembly with support structure



Assembly without support structure

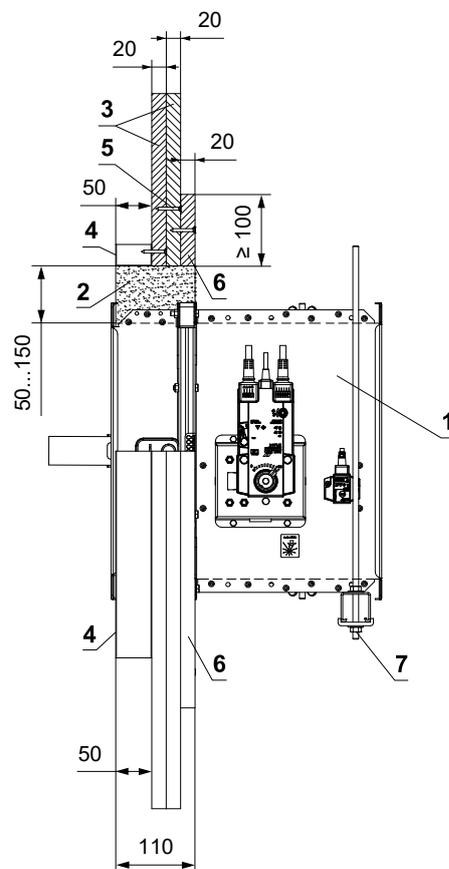
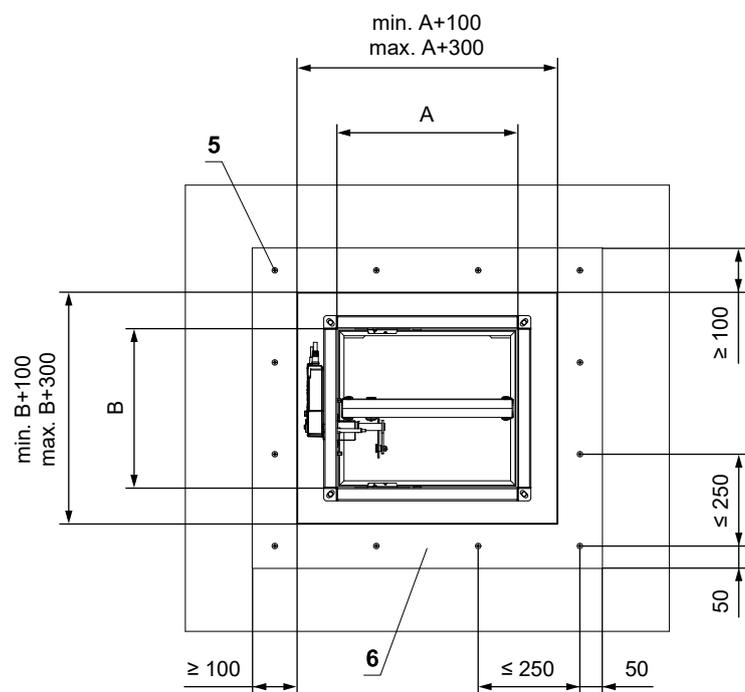
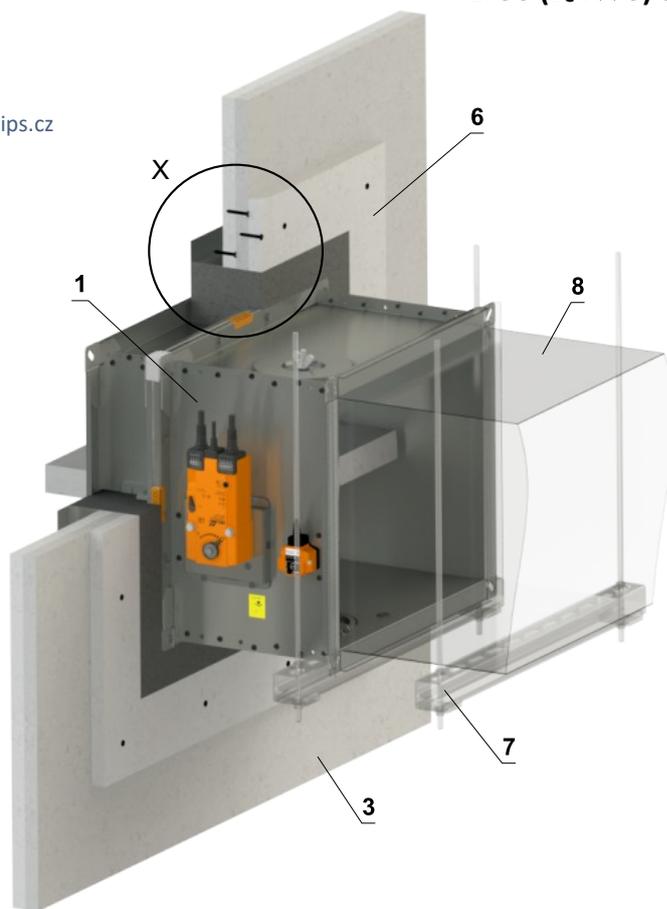
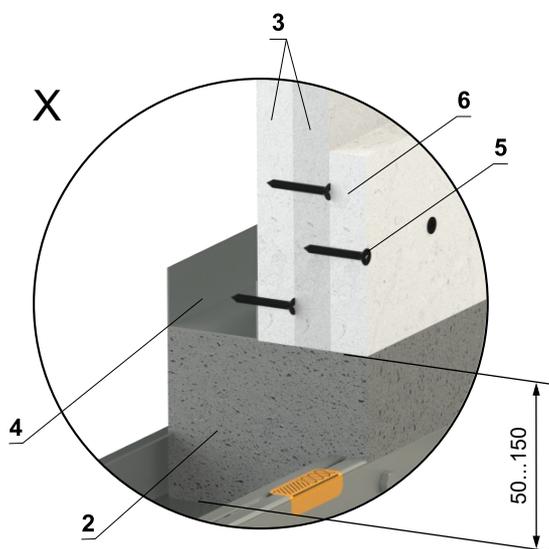


- Rigips solution is shown here as an example. Alternatively it is possible to apply the solution from Knauf or Promat. In such a case follow the instructions of the producer.

In shaft wall Rigips - mortar or gypsum

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- Follow shaft wall manufacturer's instructions
- All technical specifications and conditions can be found at www.rigips.cz

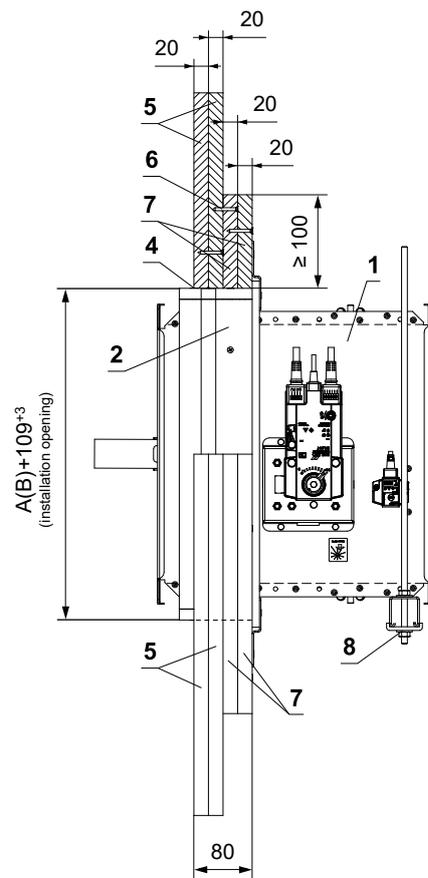
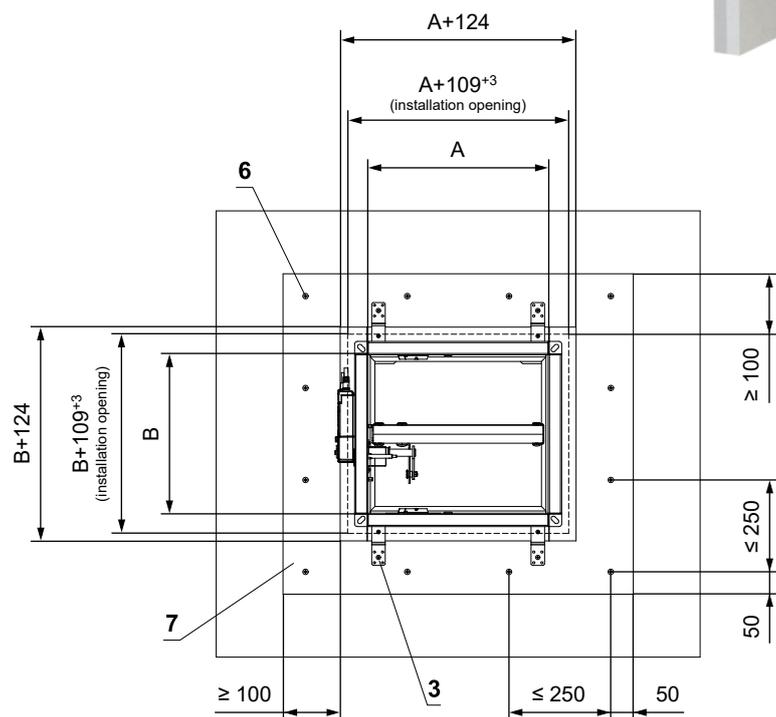
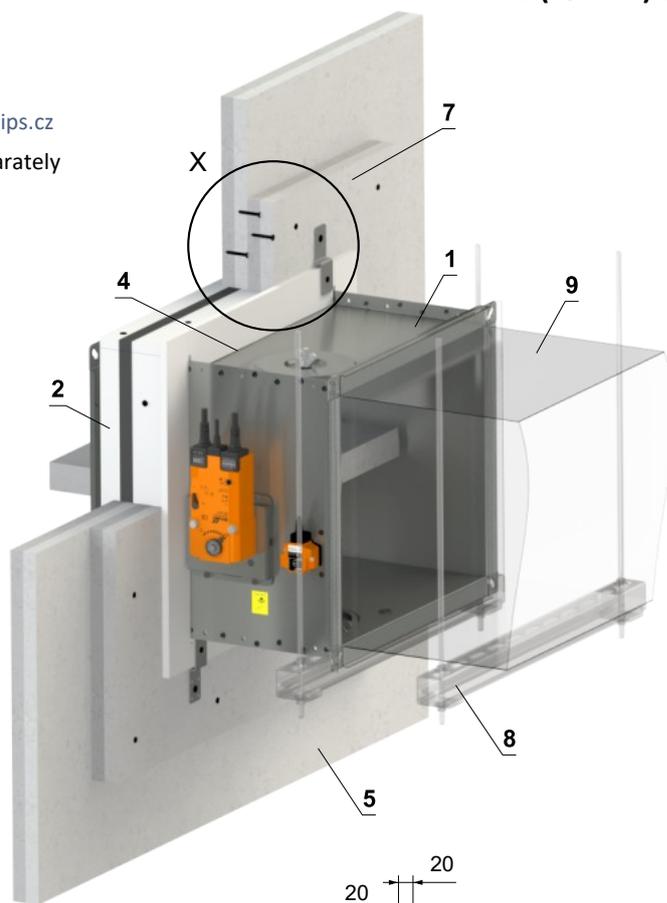
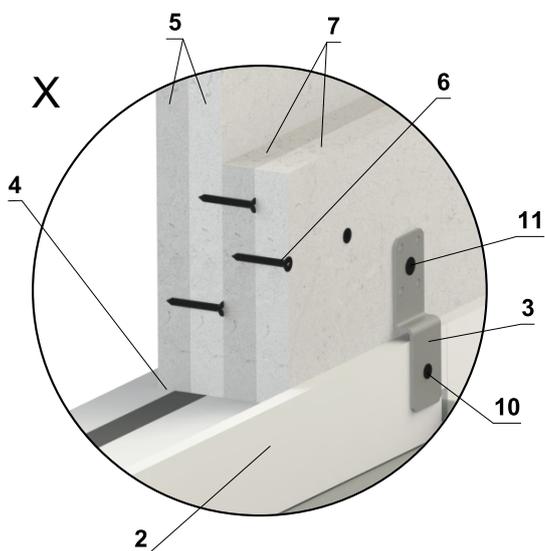


- 1 FDMQ
- 2 Mortar or gypsum
- 3 Fire-resistant board th. 20 mm Rigips Glasroc F Ridurit
- 4 Steel U-profile Rigips R-UW 50 or Rigips R-CW 50
- 5 Screw Rigips Ridurit TX 3,5x35 mm
- 6 Additional fire-resistant board tl. 20 mm Rigips Glasroc F Ridurit
- 7 Profile with threaded rod → see pages 74 to 77
- 8 Duct

In shaft wall Rigips - installation frame E1

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- Follow shaft wall manufacturer's instructions
- All technical specifications and conditions can be found at www.rigips.cz
- Installation frame can be installed on the damper or delivered separately
- For more E1 frame details → see page 55



- 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 74 to 77
- 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

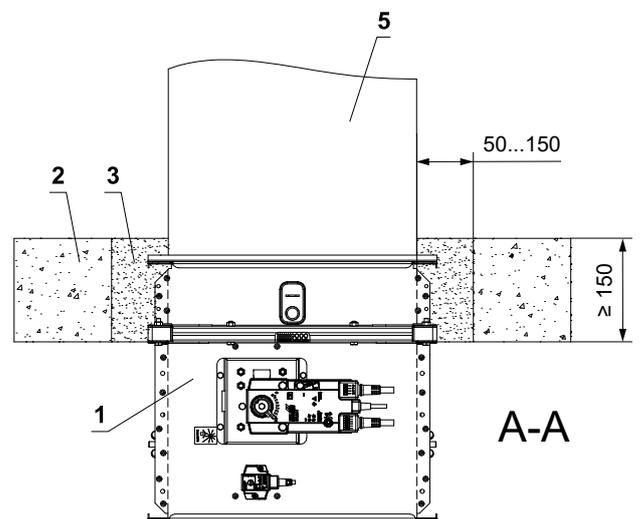
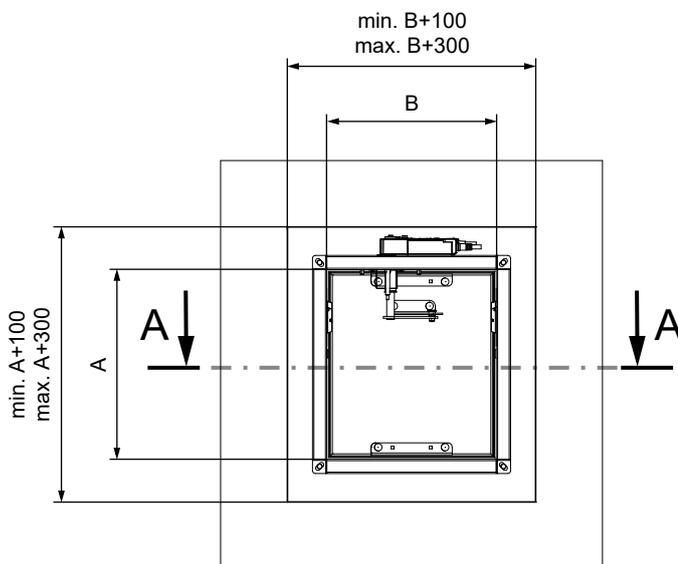
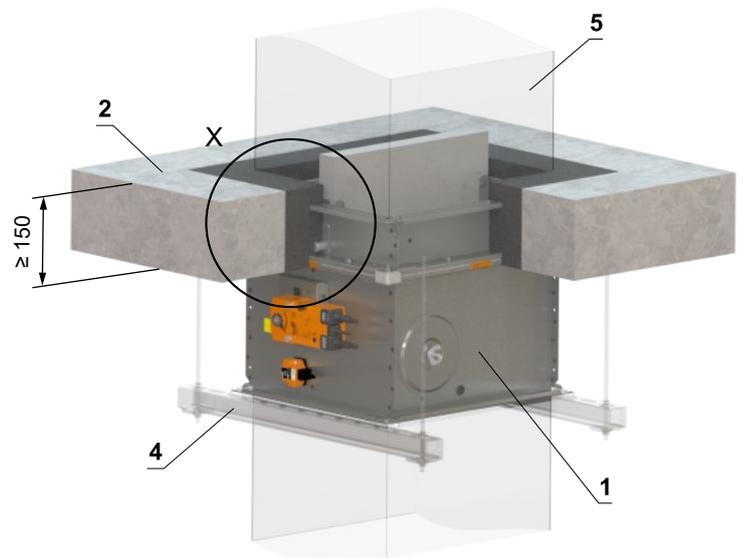
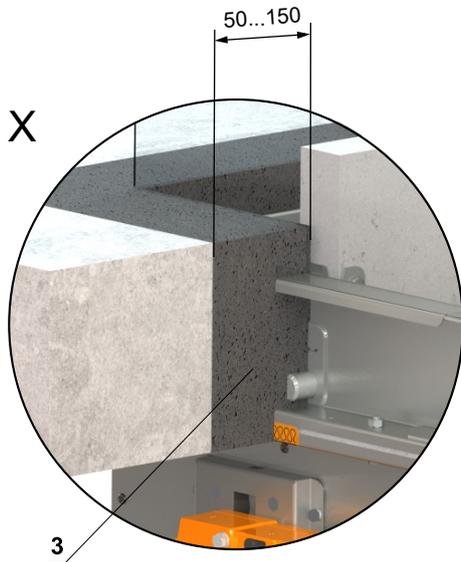
Side A	Number of brackets ZA	Side B	Number of brackets ZB
A ≤ 500	4	B ≤ 500	0
500 < A ≤ 1000	6	500 < B ≤ 800	4
1000 < A ≤ 1500	8		

In solid ceiling construction

In solid ceiling construction - mortar or gypsum

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.

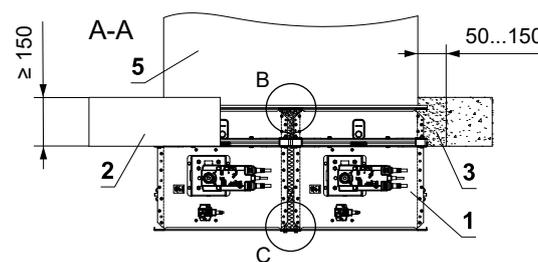
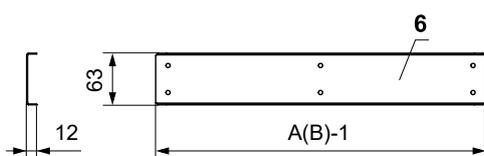
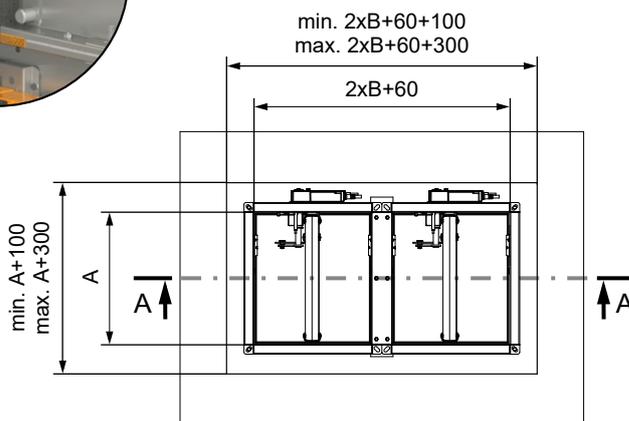
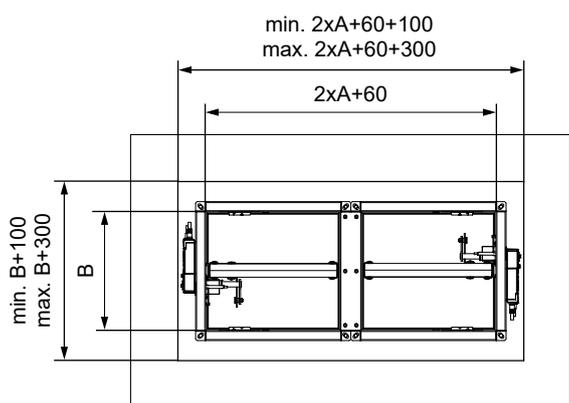
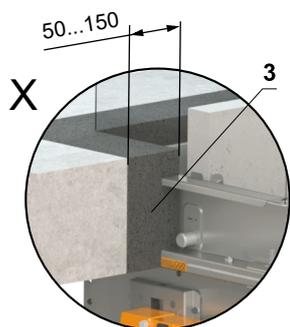
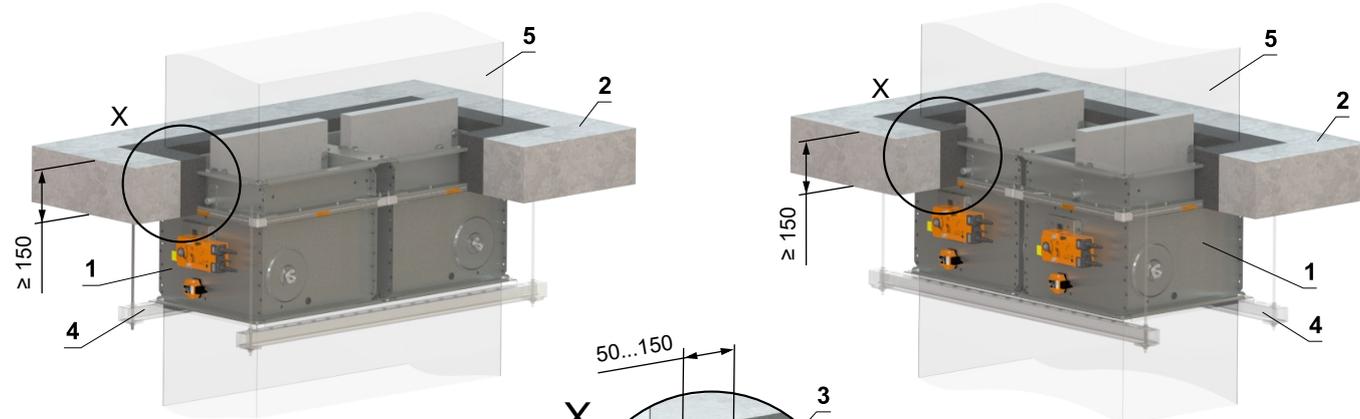


- 1 FDMQ
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct

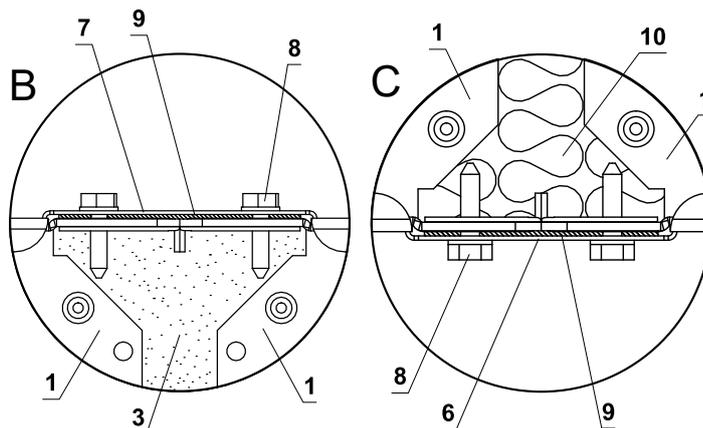
In solid ceiling construction - 2 dampers in battery - mortar or gypsum

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- The gap between the damper and construction is filled with mortar or gypsum
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.



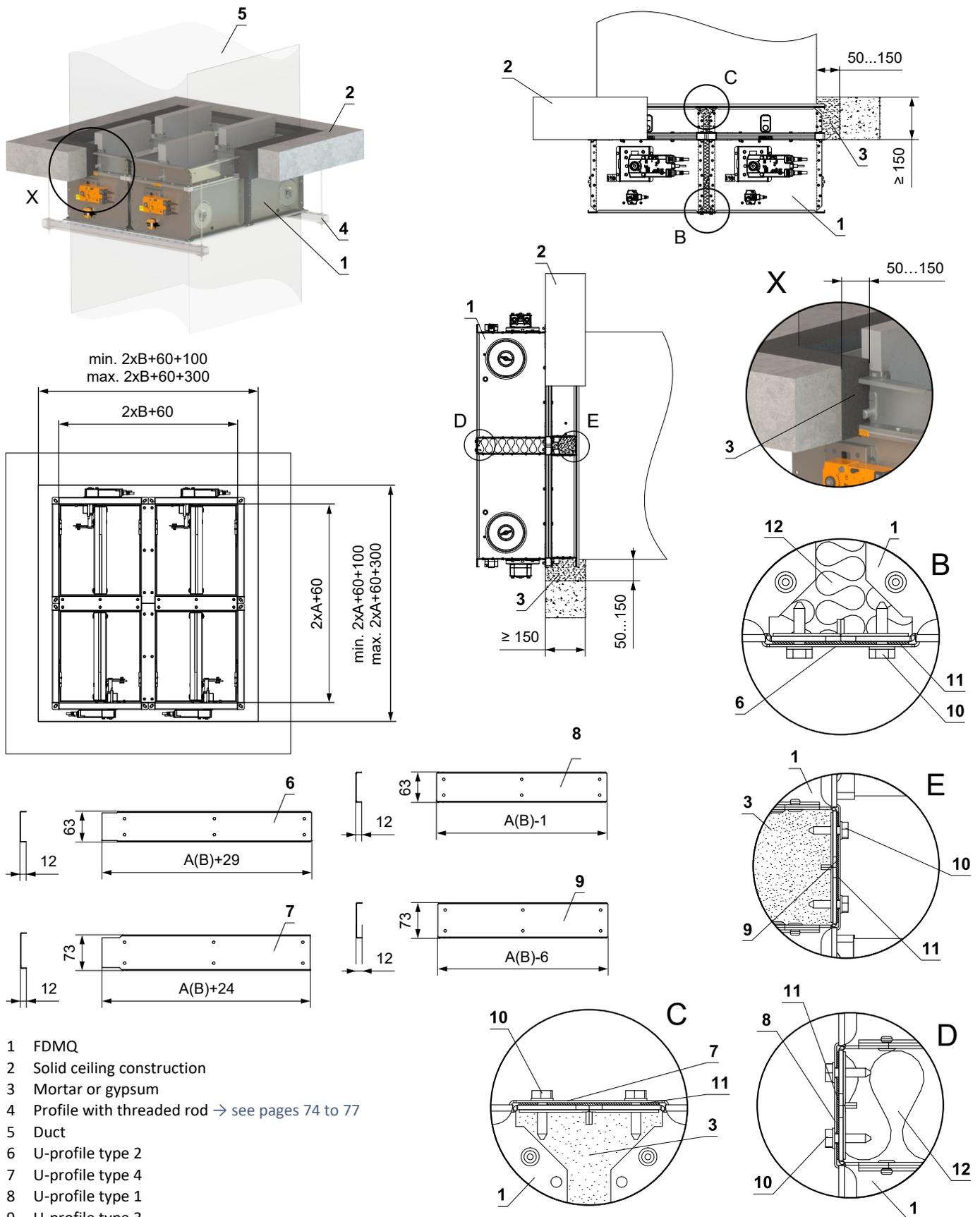
- 1 FDMQ
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.



In solid ceiling construction - 4 dampers in battery - mortar or gypsum

EI 90 (h_o i↔o) S

- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.



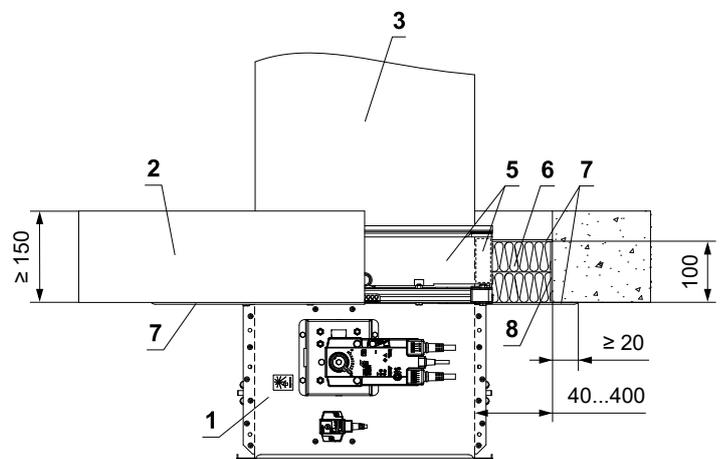
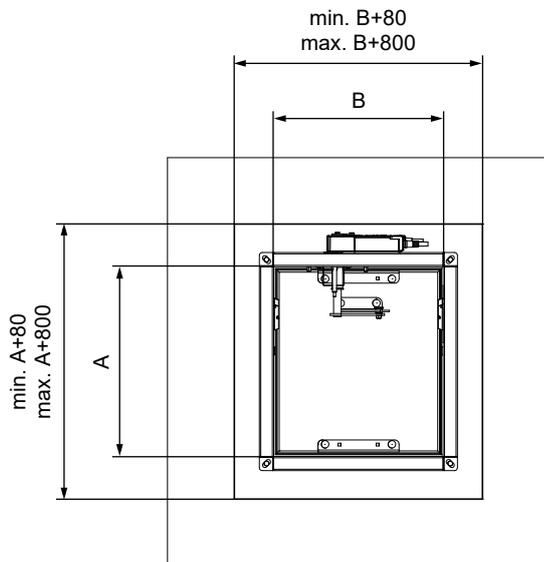
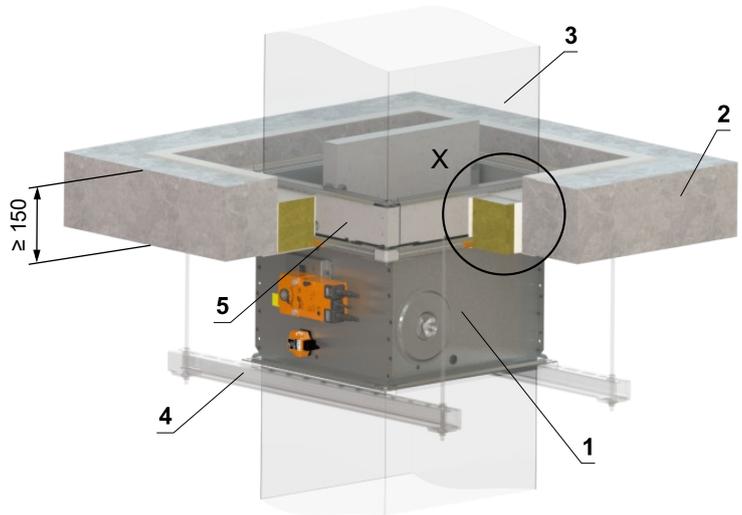
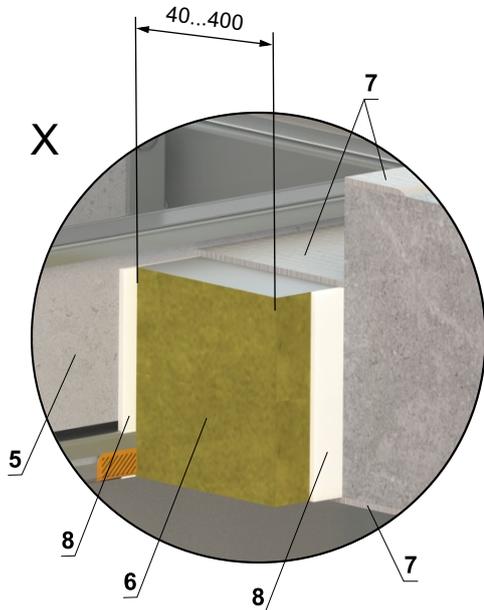
- 1 FDMQ
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Duct
- 6 U-profile type 2
- 7 U-profile type 4
- 8 U-profile type 1
- 9 U-profile type 3
- 10 Screw TEX 4,8x18 mm (pitch ≤ 200 mm)
- 11 Sealing
- 12 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection of following duct → see page 78
- The gap between the damper and construction is filled with mortar or gypsum

In solid ceiling construction - Ablative Coated Batt

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.



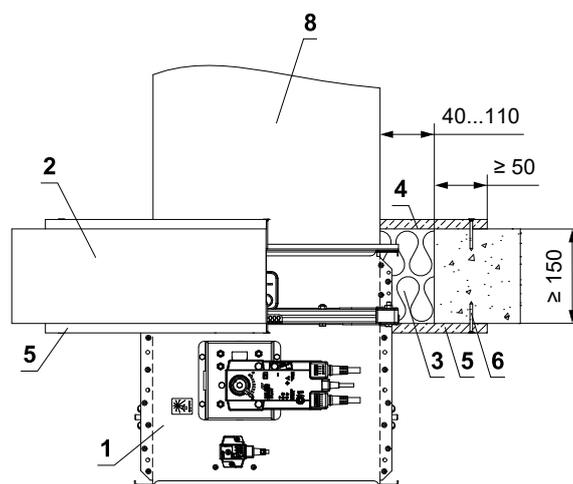
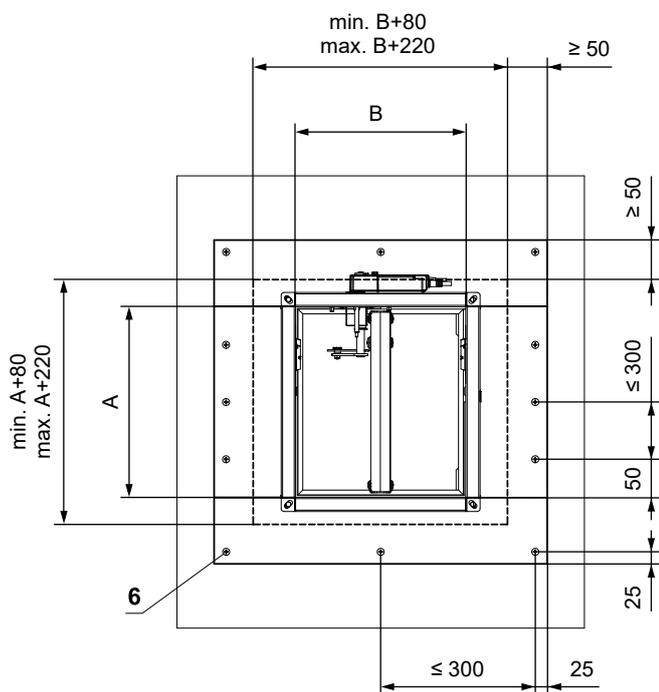
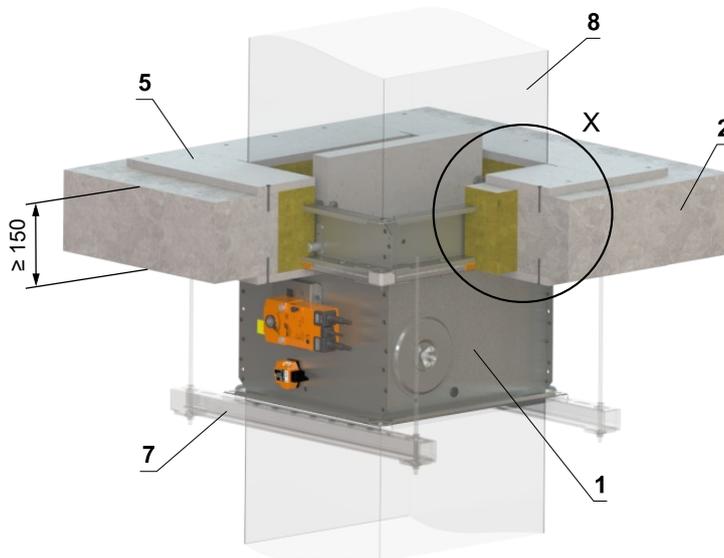
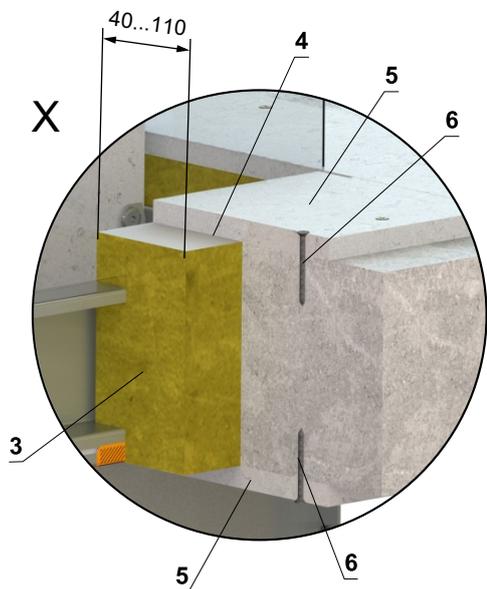
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

- 1 FDMQ
- 2 Solid ceiling construction
- 3 Duct
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 87
- Ablative Coated Batt System HILTI*
- 6 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 7 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 8 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing

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

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.



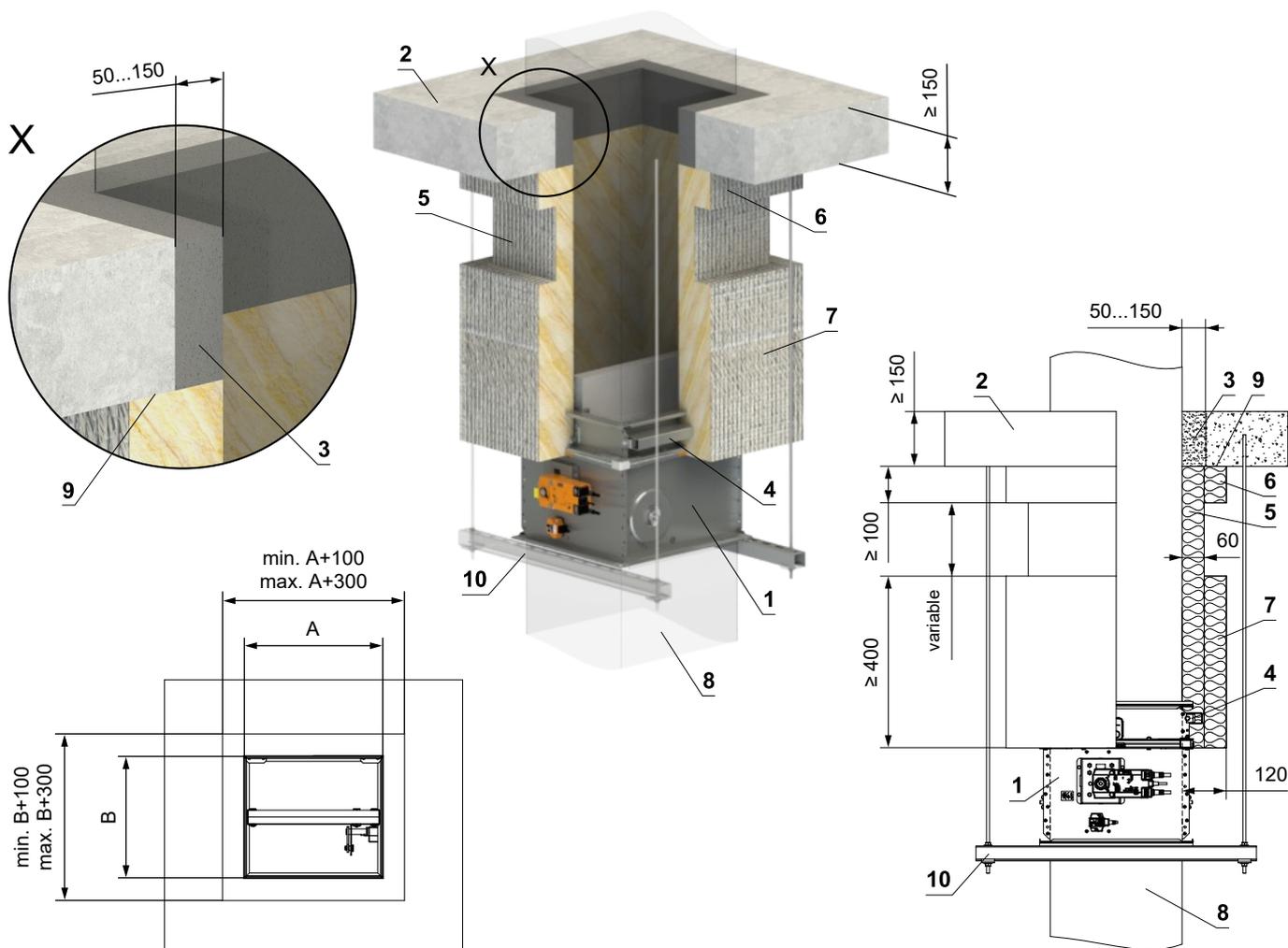
- 1 FDMQ
- 2 Solid ceiling construction
- 3 Mineral wool board - min. density 140 kg/m³ (e.g. PROMAPYR-T150, ROCKWOOL HARDROCK / STEPROCK HD)
- 4 Fire-resistant coating - th. 1 mm (e.g. PROMASTOP-I)
- 5 Fire-resistant board - min. th. 15 mm, min. density 870 kg/m³ (e.g. PROMATECT-H)
- 6 Screw 4x50 mm - screws must be fixed in the wall construction, use steel anchors if necessary
- 7 Profile with threaded rod → see pages 74 to 77
- 8 Duct

Outside solid ceiling construction

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

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- Minimum and maximum distance between the ceiling and fire damper is unlimited
- When installing the insulation, follow the ROCKWOOL manufacturer's instructions
- The damper and the duct must be suspended separately
- The duct must be suspended on both sides of damper acc. to national rules
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards
- Load of the suspension system depends on weight of the fire damper and duct system → see page 74
- Max. distance between two suspension systems is 1500 mm
- Duct at the point of penetration must be fixed to the fire separation structure
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm
- If the threaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm
- 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 86
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.

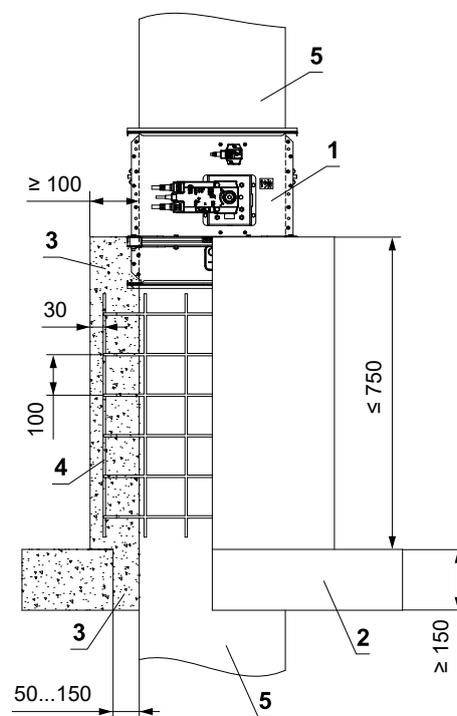
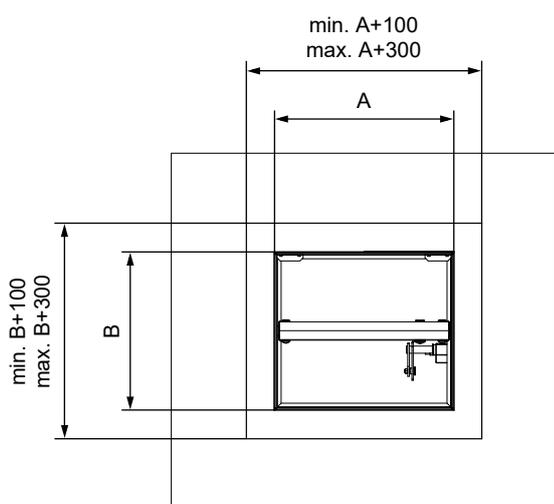
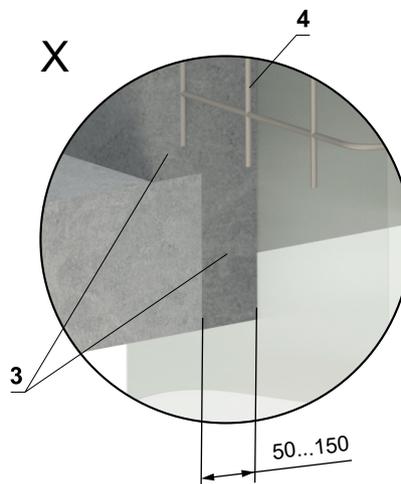
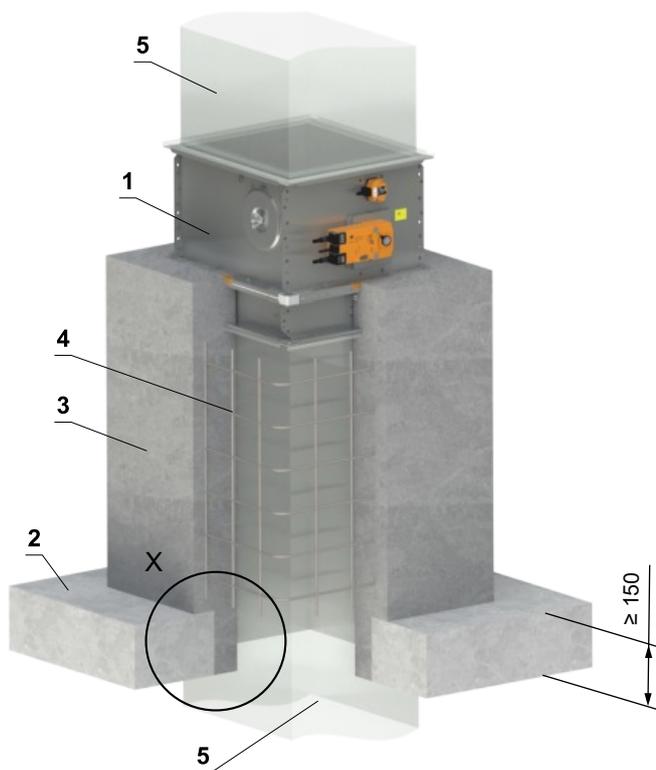


- | | |
|---|--|
| <ul style="list-style-type: none"> 1 FDMQ 2 Solid ceiling construction 3 Mortar or gypsum 4 VRM-Q → see page 86 5 Insulation board made of mineral wool, with a surface treatment of aluminum foil - th. 60 mm, min. density 300 kg/m³ - (System ROCKWOOL Conlit Ductrock 90) 6 Duct penetration insulation collar - th. 60 mm (System ROCKWOOL Conlit Ductrock 90) - glued (pos. 12) and fixed with screws to the wall construction | <ul style="list-style-type: none"> 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 74 to 77 |
|---|--|

Outside solid ceiling construction - concreting

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- 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 74
- Max. distance between two suspension systems is 1500 mm
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers



- 1 FDMQ
- 2 Solid ceiling construction
- 3 Concrete B20
- 4 Rebar - steel rod \varnothing 6 mm, mesh hole 100 mm
- 5 Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm

Installation frames

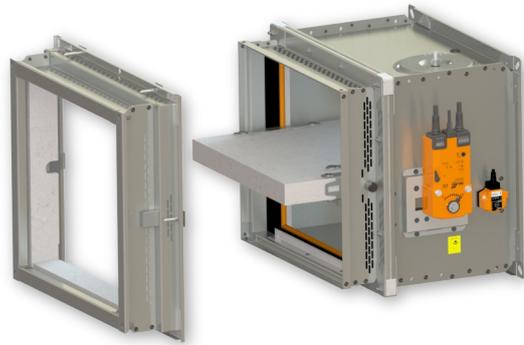
List of installation frames and installation options

Installation frame	Wall thickness (mm)								
	Solid wall construction			Gypsum wall construction			Solid ceiling construction		
	In construction	Outside construction	On construction	In construction	Outside construction	On construction	In construction	Outside construction	On construction
E1	≥ 100	–	–	≥ 100	–	–	≥ 150	–	–
E2	≥ 100	–	–	–	–	–	≥ 150	–	–
E3	–	–	–	≥ 100	–	–	–	–	–
E4	–	–	≥ 100	–	–	≥ 100	–	≥ 150	≥ 150
E5	–	–	–	≥ 100	–	–	–	–	–
E6	–	≥ 100	–	–	–	–	–	≥ 150	–

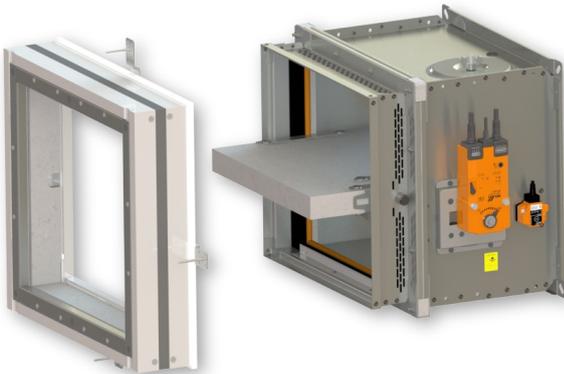
Installation frame E1



Installation frame E2



Installation frame E3



Installation frame E4



Installation frame E5



Installation frame E6

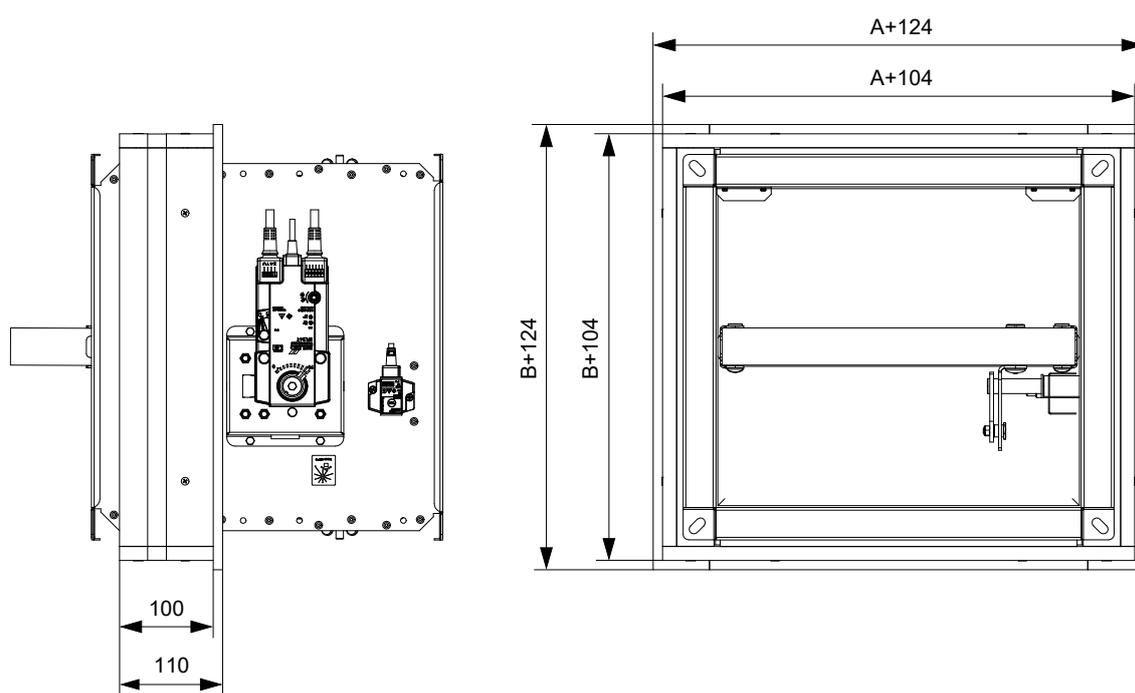


- Installation frame can be installed on the damper or delivered separately

Installation frame E1

- Installation frame E1 is designed for installation without additional sealing of the penetration into:
 - Solid wall construction
 - Gypsum wall construction
 - Solid ceiling construction
- Installation frame is equipped with an intumescent sealing on the inside and outside. This sealing fills the gap between the damper casing and frame and between the frame and construction in the event of a fire
- **Solid wall/gypsum wall th. 100 mm or solid ceiling th. 150 mm**
- Material:
 - Installation frame - cement-lime boards
 - Fasteners - galvanized steel

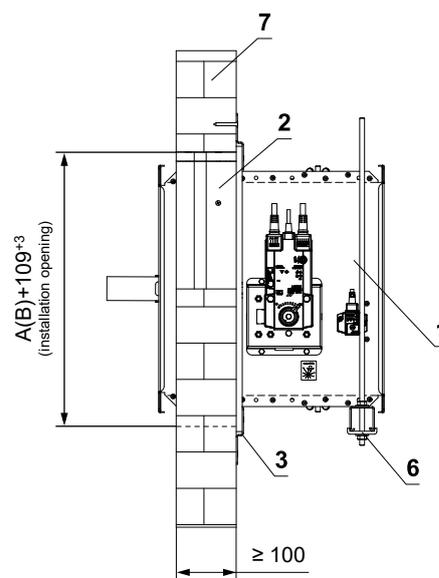
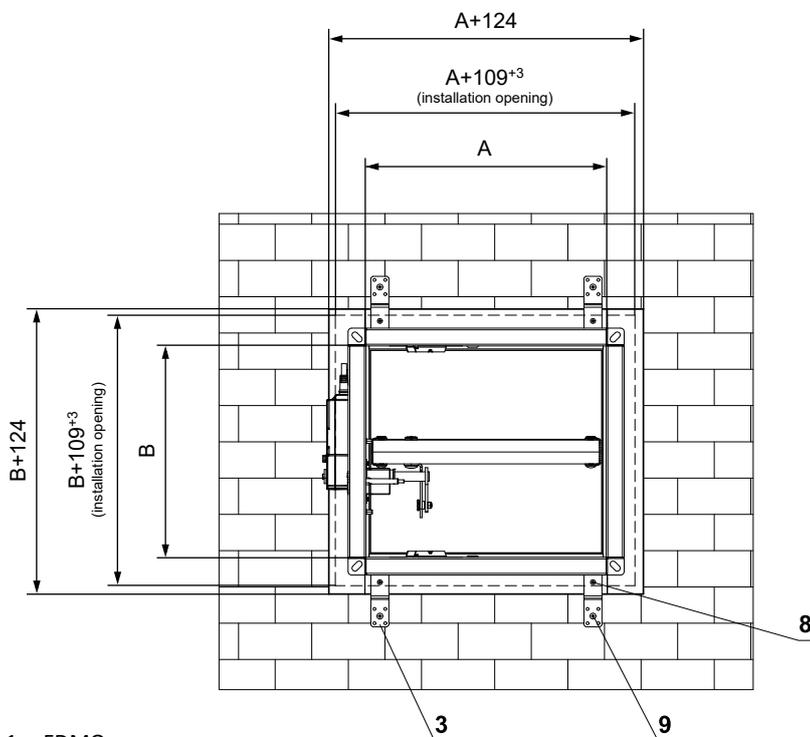
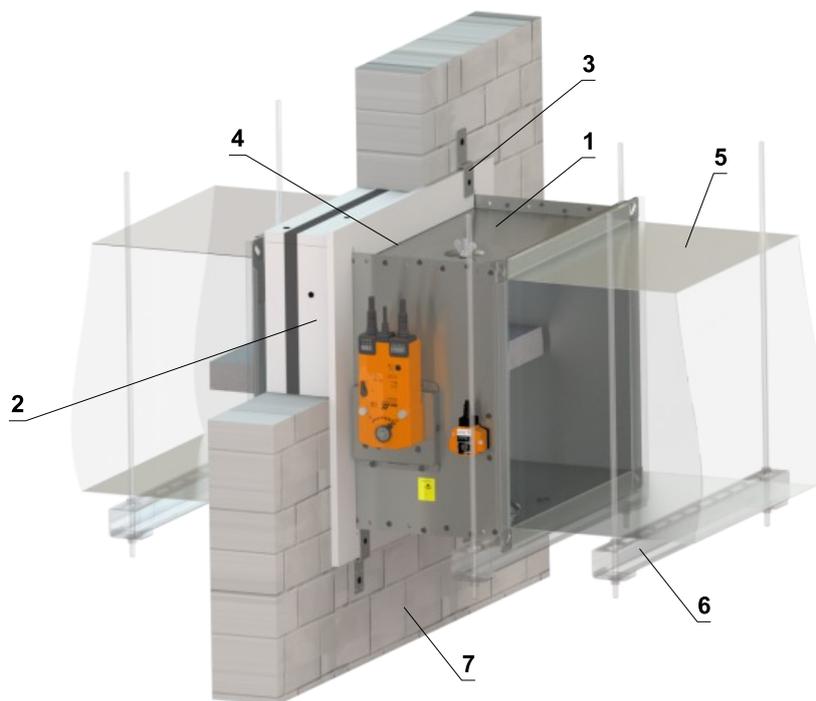
Installation frame E1



In solid wall construction - installation frame E1

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- Installation frame can be installed on the damper or delivered separately



- 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 74 to 77
- 7 Solid wall construction
- 8 Screw 4x16 mm to attach bracket to the frame
- 9 Screw 5x60 mm to attach bracket to the construction

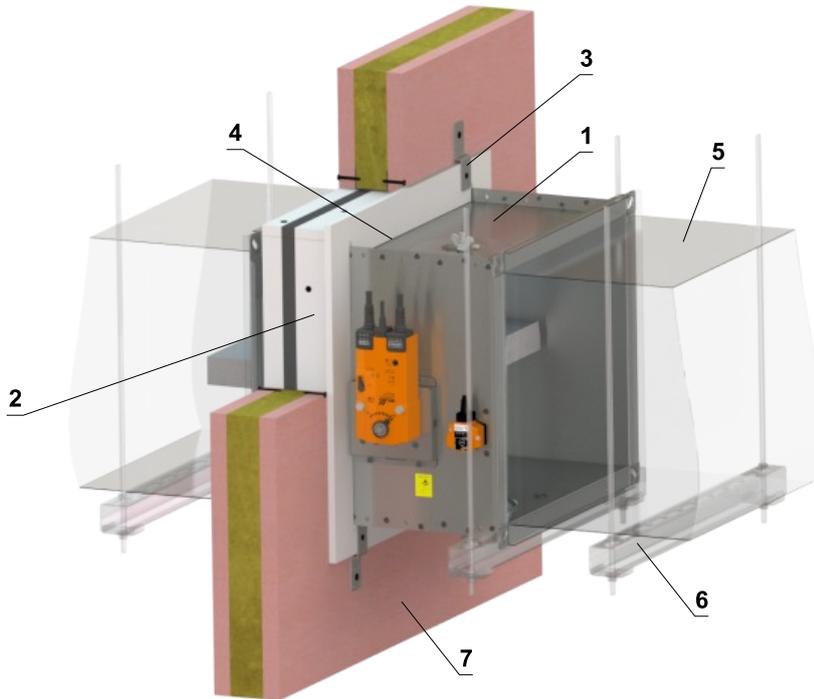
Number of brackets X = ZA + ZB Number of screws Y = 2 x X

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

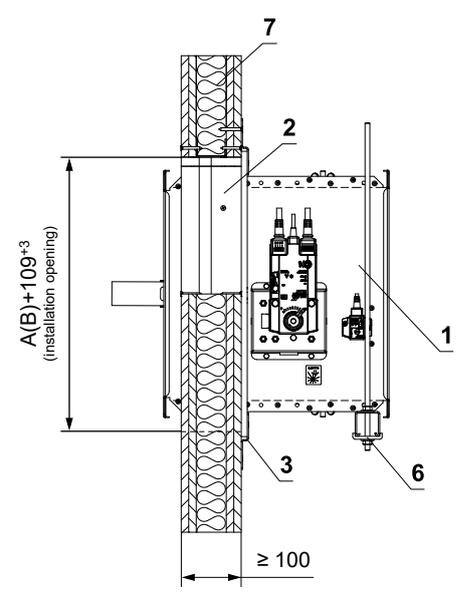
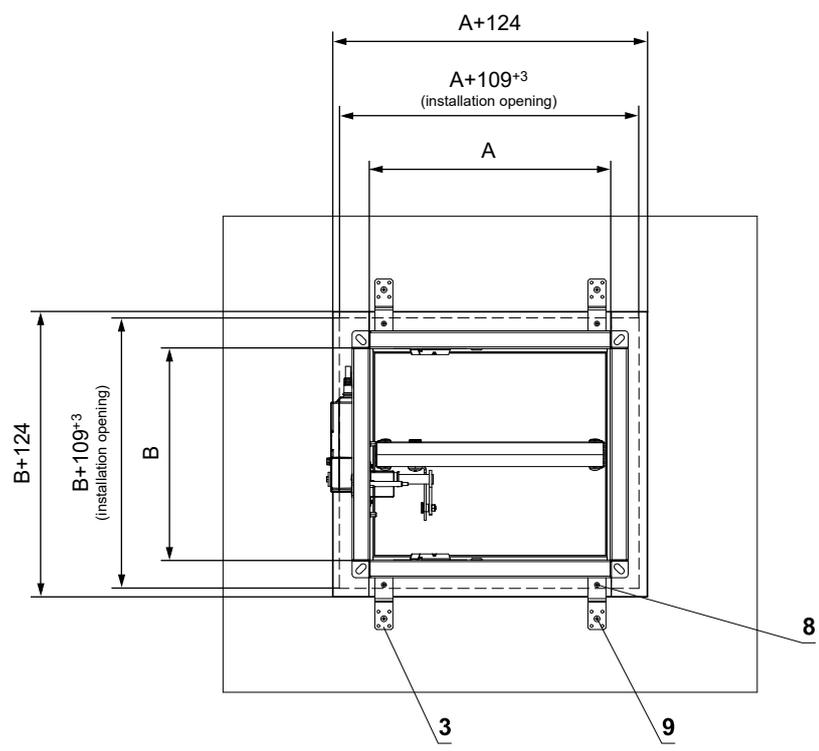
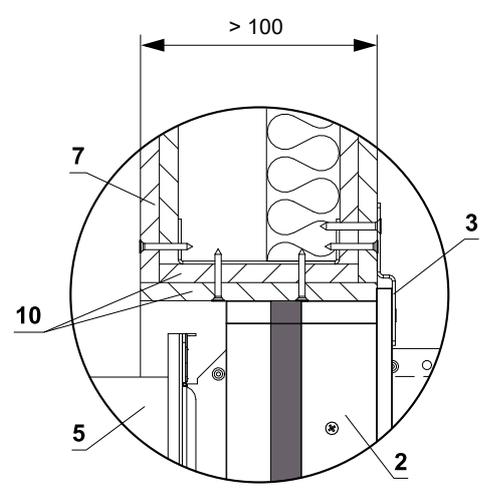
Gypsum wall construction - installation frame E1

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- Installation frame can be installed on the damper or delivered separately
- The installation opening is lined with a UW/CW profile.



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 74 to 77
- 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

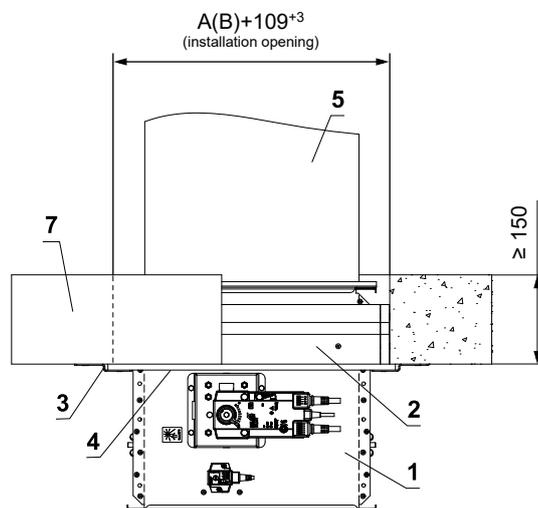
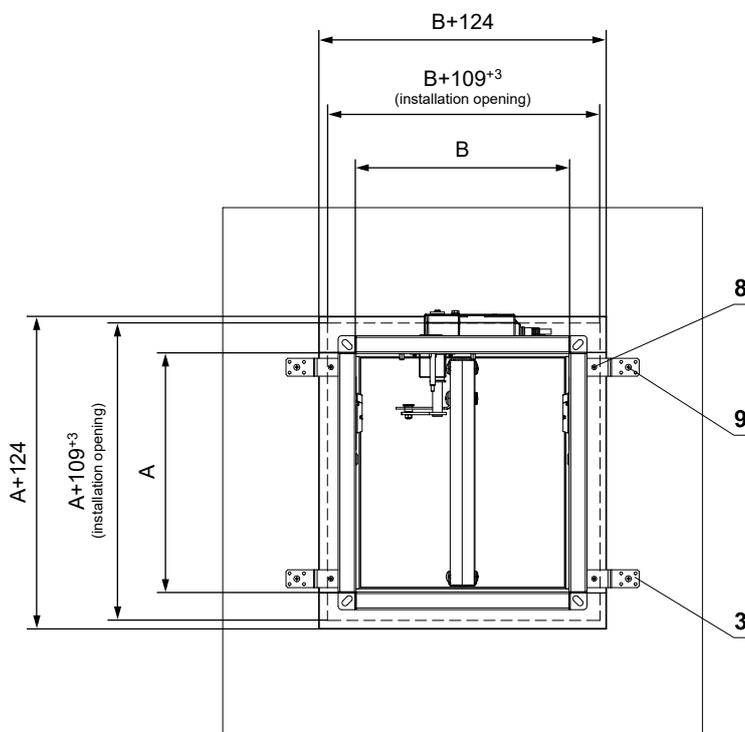
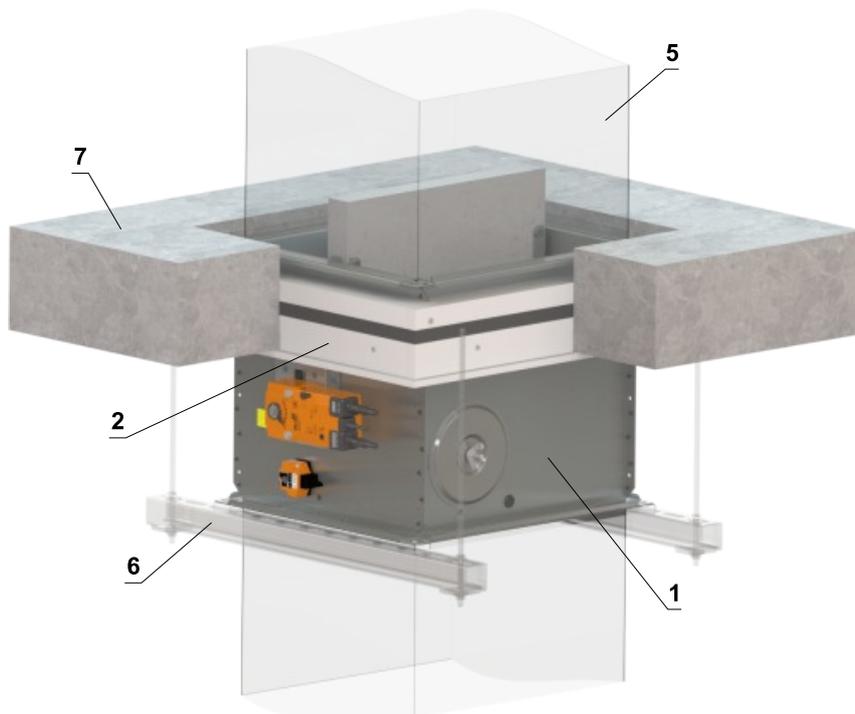
Number of brackets $X = ZA + ZB$ Number of screws $Y = 2 \times X$

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

Solid ceiling construction - installation frame E1

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- Installation frame can be installed on the damper or delivered separately
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.



- 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 74 to 77
- 7 Solid ceiling construction
- 8 Screw 4x16 mm to attach bracket to the frame
- 9 Screw 5x60 mm to attach bracket to the construction

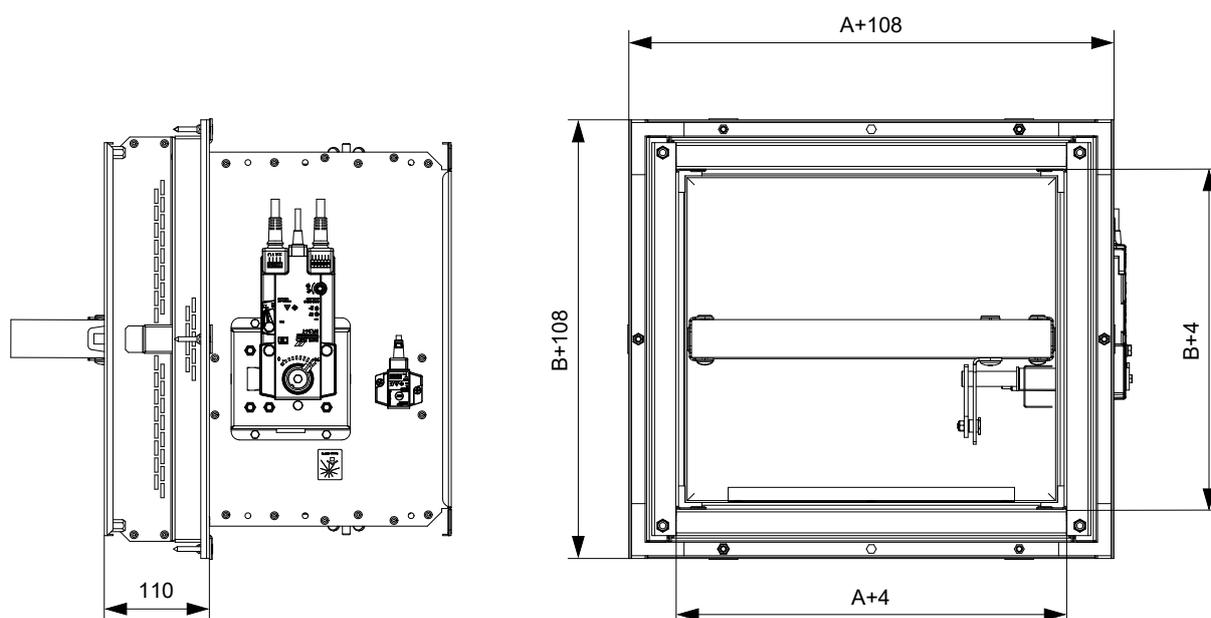
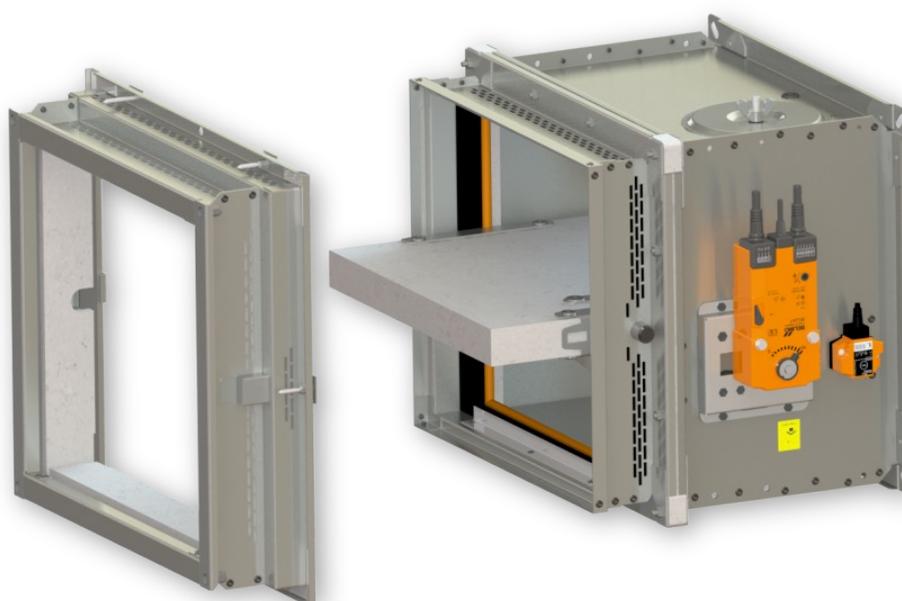
Number of brackets X = ZA + ZB Number of screws Y = 2 x X

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

Installation frame E2

- Installation frame E2 is designed for installation with steel insert and mortar or gypsum into:
 - Solid wall construction
 - Solid ceiling construction
- The damper is equipped with an intumescent sealing on the casing. This sealing fills the gap between the steel insert and the damper in the event of a fire
- **Solid wall th. 100 mm or solid ceiling th. 150 mm**
- Material:
 - Installation frame - galvanized steel
 - Fasteners - galvanized steel

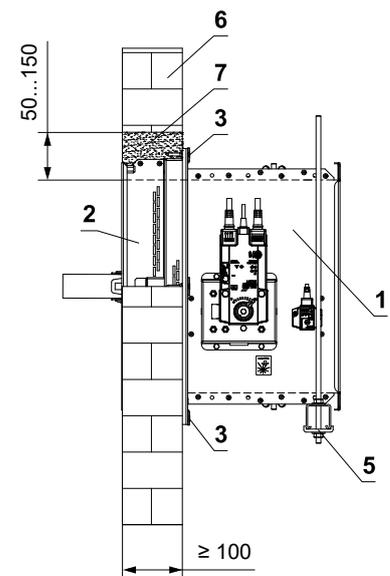
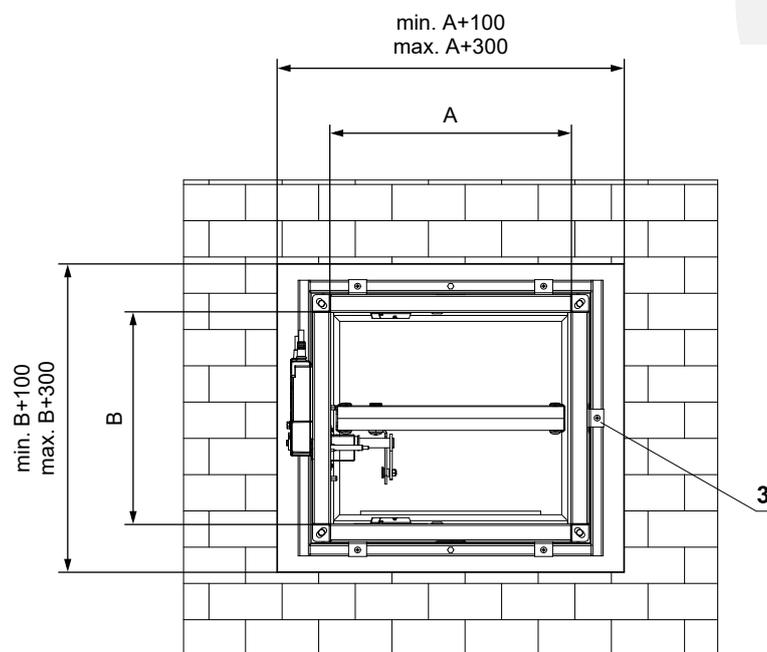
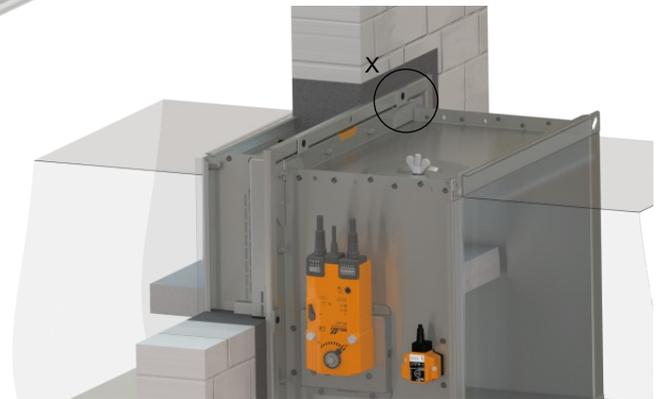
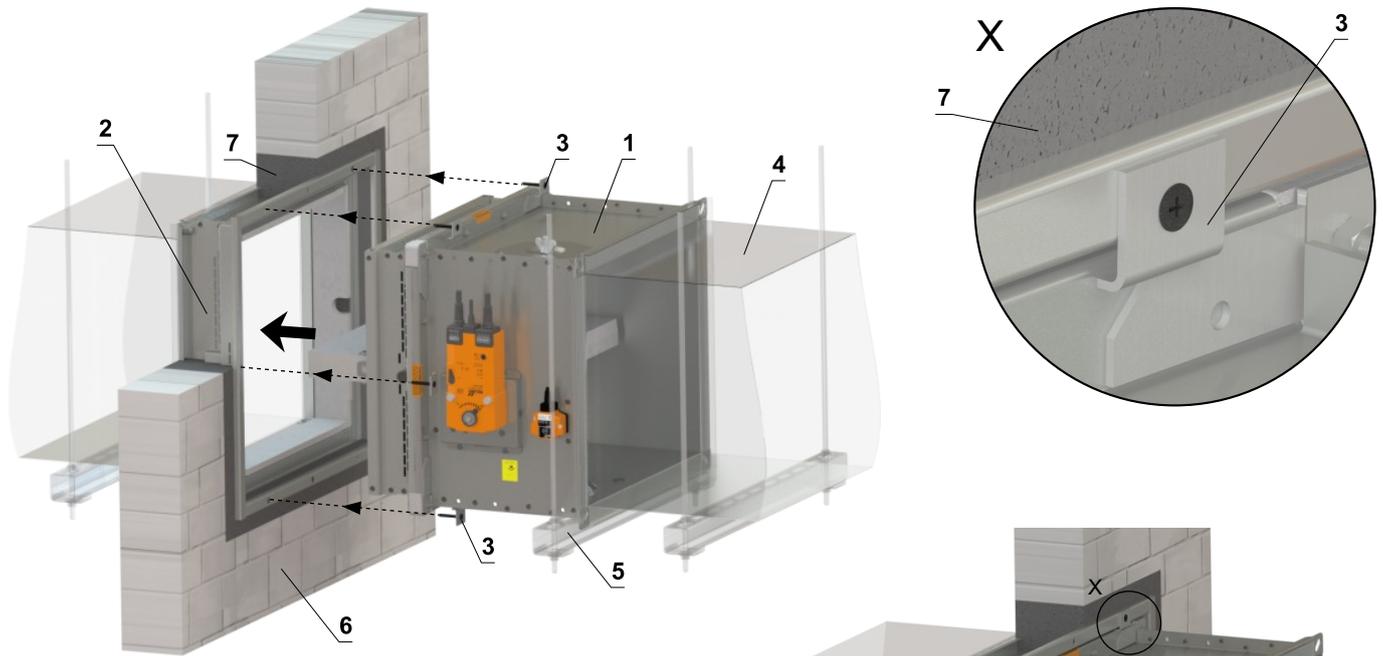
Installation frame E2



In solid wall construction - installation frame E2

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- The installation frame can only be delivered installed on the damper.

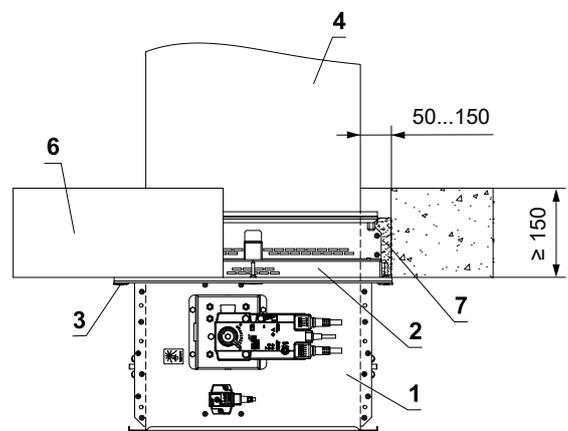
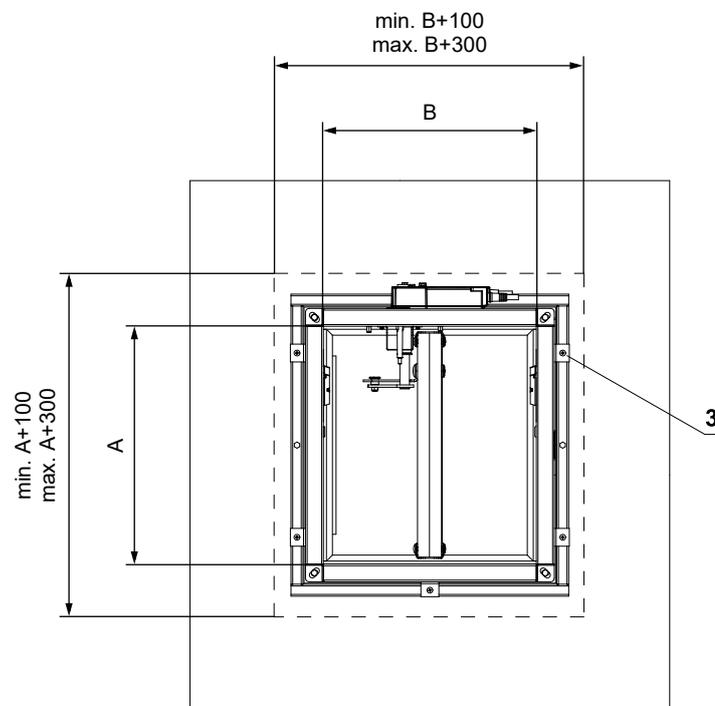
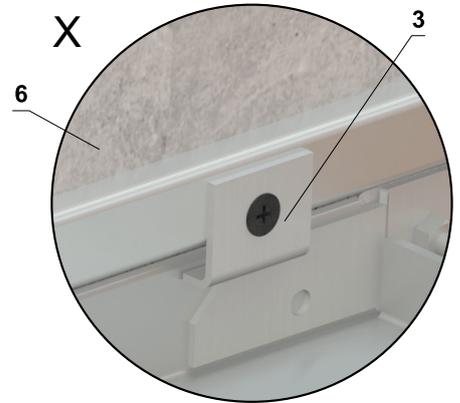
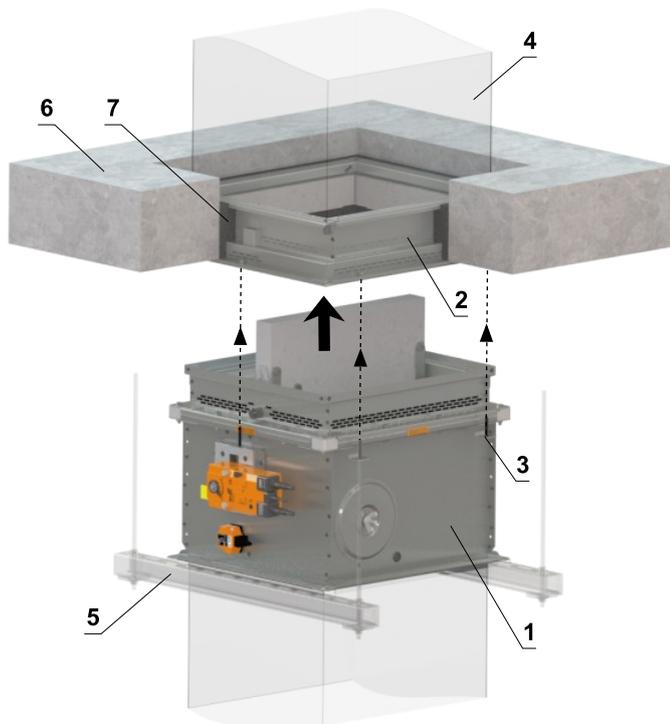


- 1 FDMQ
- 2 Installation frame
- 3 Mounting of the damper to the frame (delivered with frame)
- 4 Duct
- 5 Profile with threaded rod → see pages 74 to 77
- 6 Solid wall construction
- 7 Mortar or gypsum

In solid ceiling construction - installation frame E2

El 90 (h_o i↔o) S

- For connection of following duct → see page 78
- The installation frame can only be delivered installed on the damper.
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.

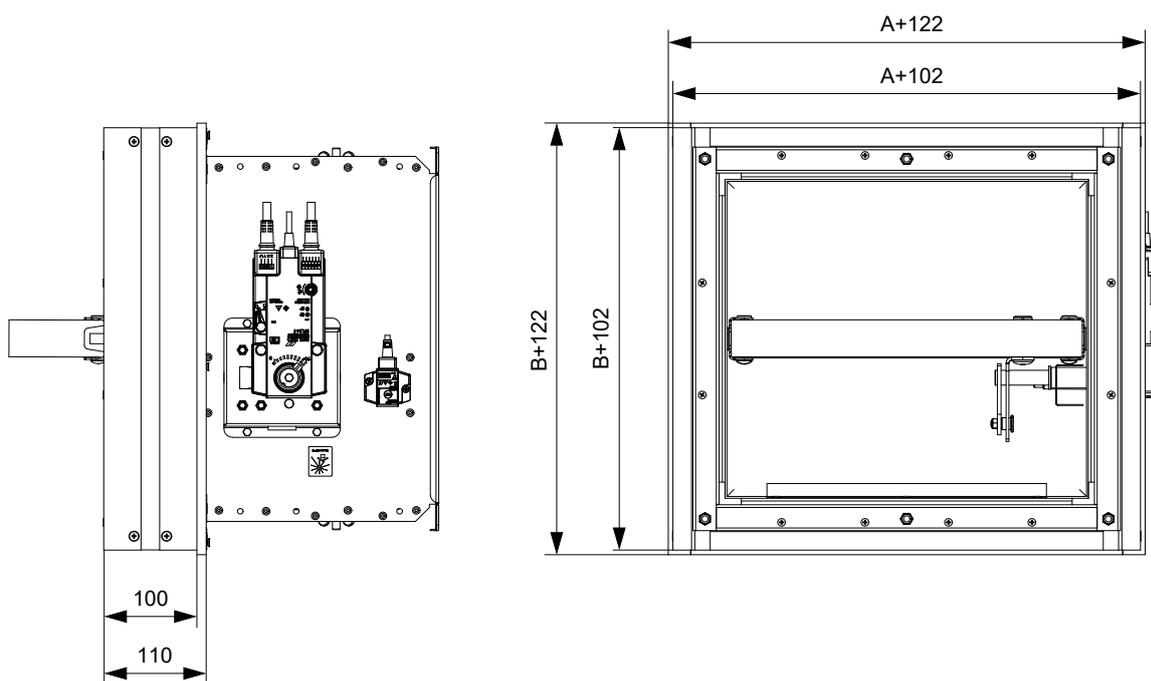
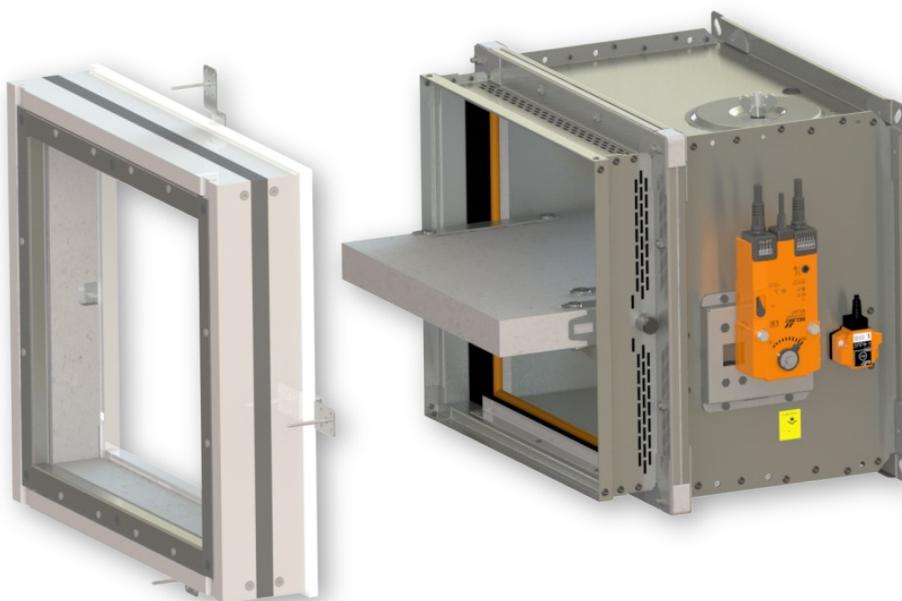


- 1 FDMQ
- 2 Installation frame
- 3 Mounting of the damper to the frame (delivered with frame)
- 4 Duct
- 5 Profile with threaded rod → see pages 74 to 77
- 6 Solid ceiling construction
- 7 Mortar or gypsum

Installation frame E3

- Installation frame E3 is designed for installation into:
 - Gypsum wall construction
- The damper is equipped with an intumescent sealing on the casing. This sealing fills the gap between the damper casing and frame in the event of a fire. The frame is equipped with an intumescent sealing on external side. This sealing fills the gap between the frame and construction in the event of a fire
- **Gypsum wall th. 100 mm**
- Material:
 - Installation frame - cement-lime boards and galvanized steel
 - Fasteners - galvanized steel

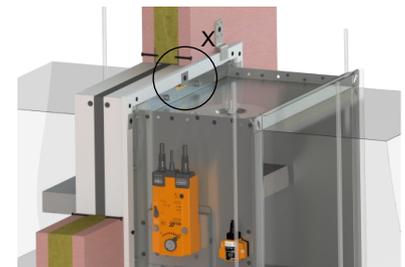
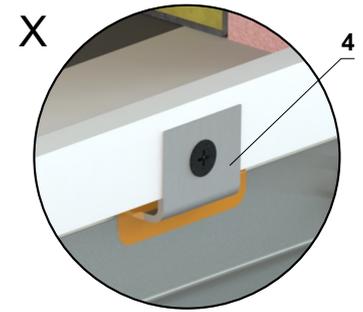
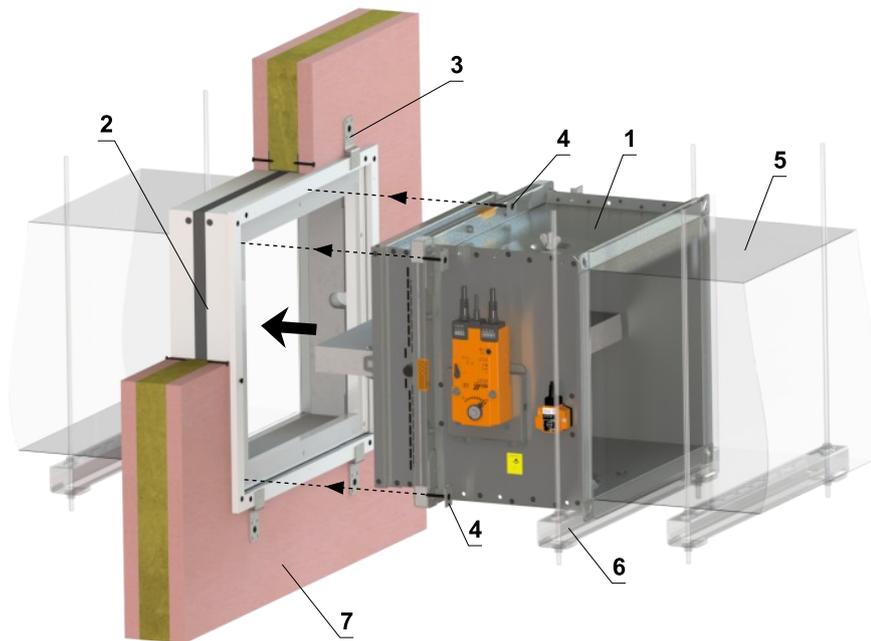
Installation frame E3



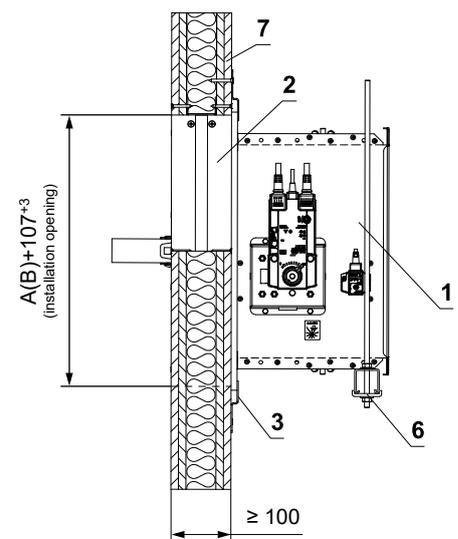
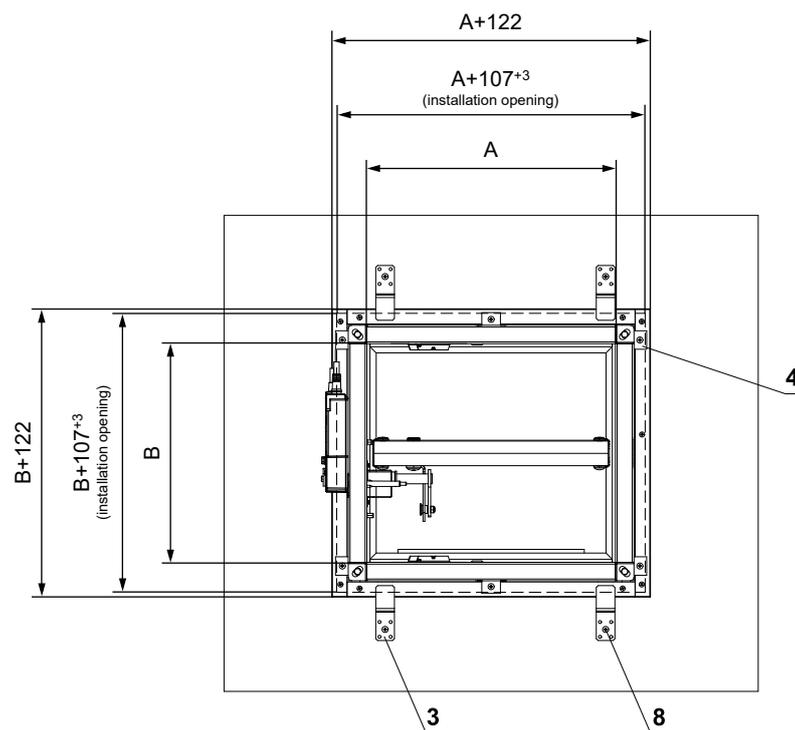
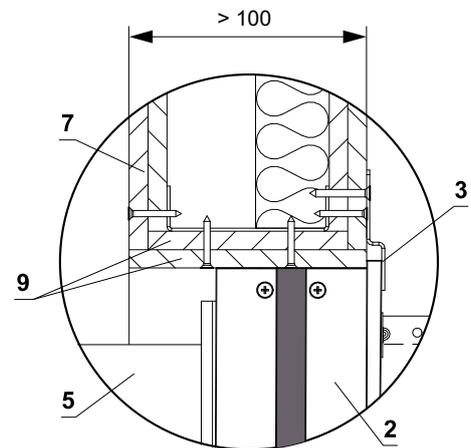
In gypsum wall construction - installation frame E3

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- The installation frame can only be delivered installed on the damper.
- The installation opening is lined with a UW/CW profile.



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 Duct
- 6 Profile with threaded rod → see pages 74 to 77
- 7 Gypsum wall construction
- 8 Screw 5x60 mm to attach bracket to the construction
- 9 Additional boards made from plasterboard

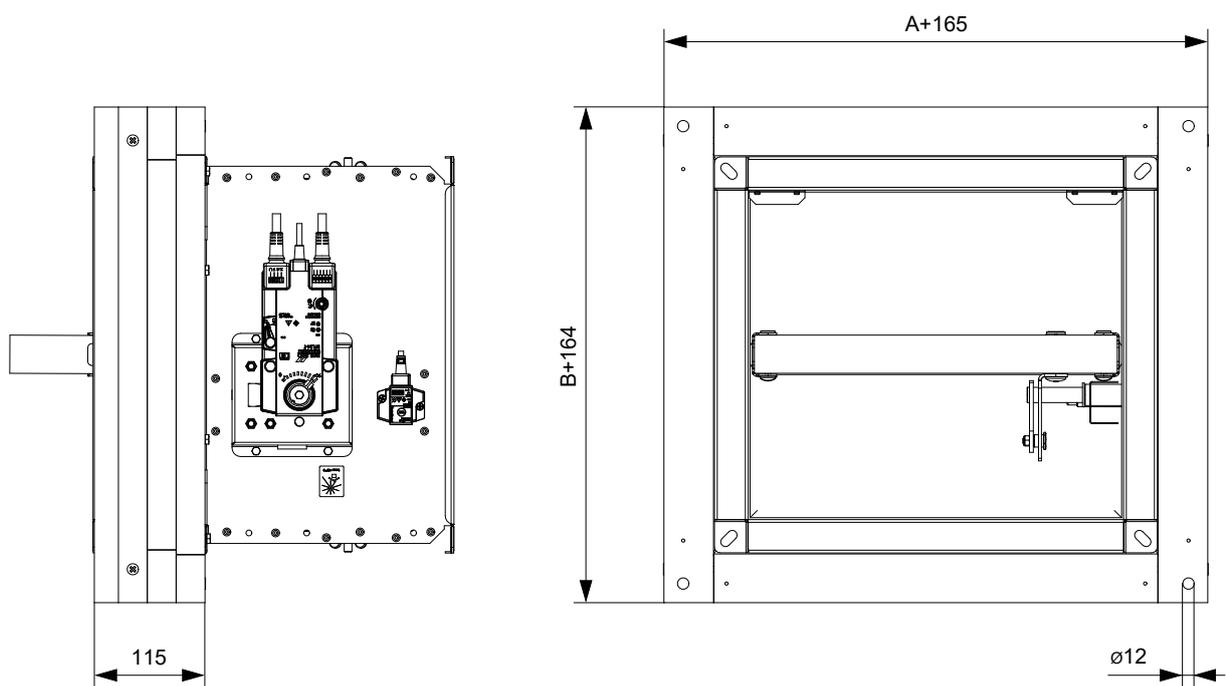
Number of brackets X = ZA + ZB Number of screws Y = 2 x X

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

Installation frame E4

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

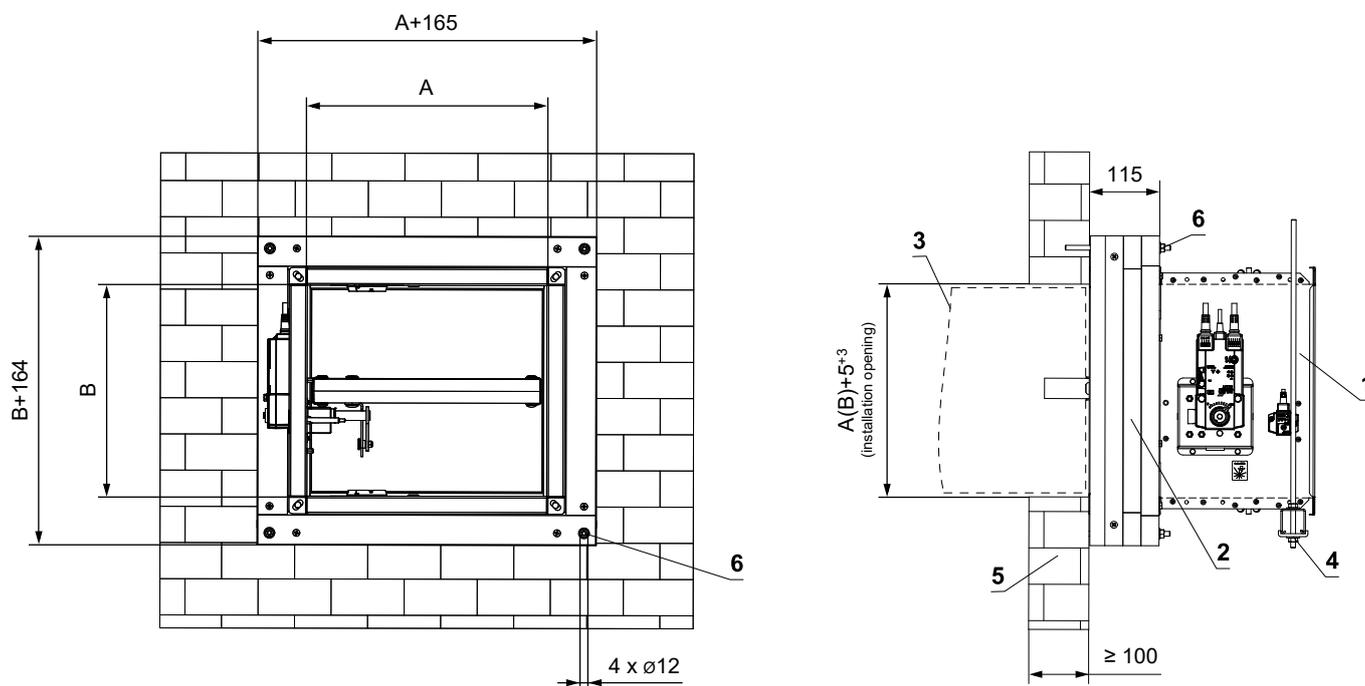
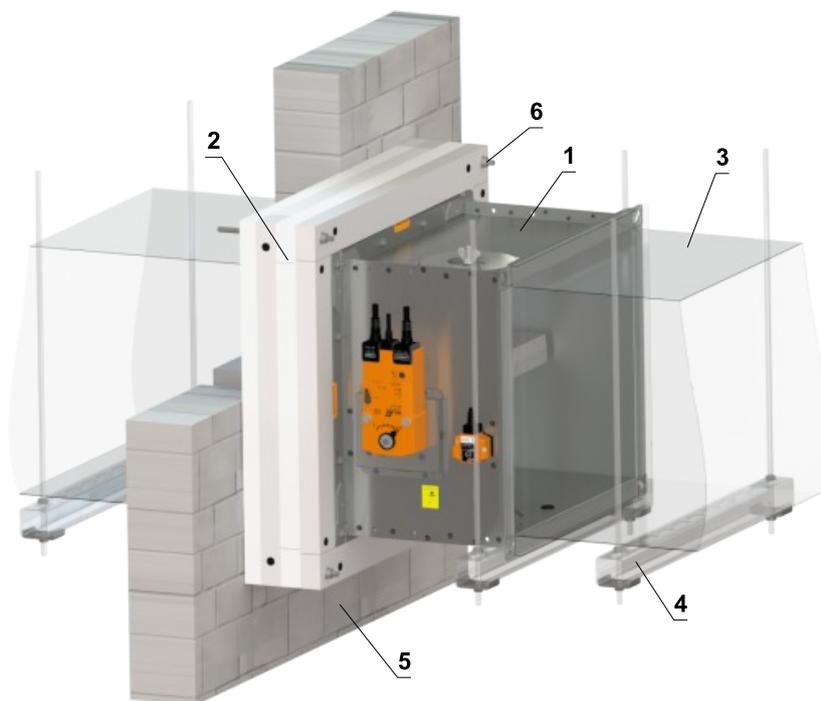
Installation frame E4



In solid wall construction - installation frame E4

EI 90 (v_e i↔o) S

- For connection of following duct → see page 78
- Installation frame can be installed on the damper or delivered separately

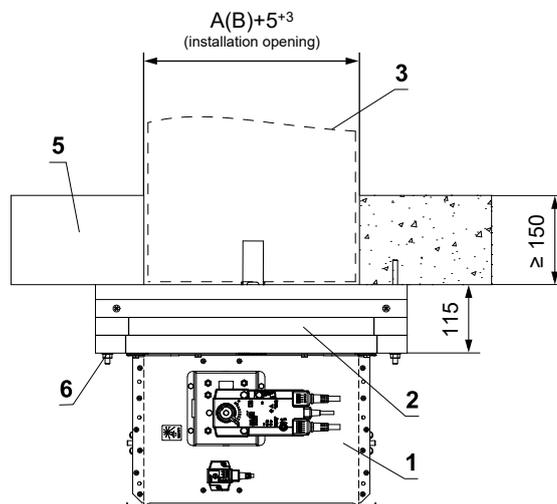
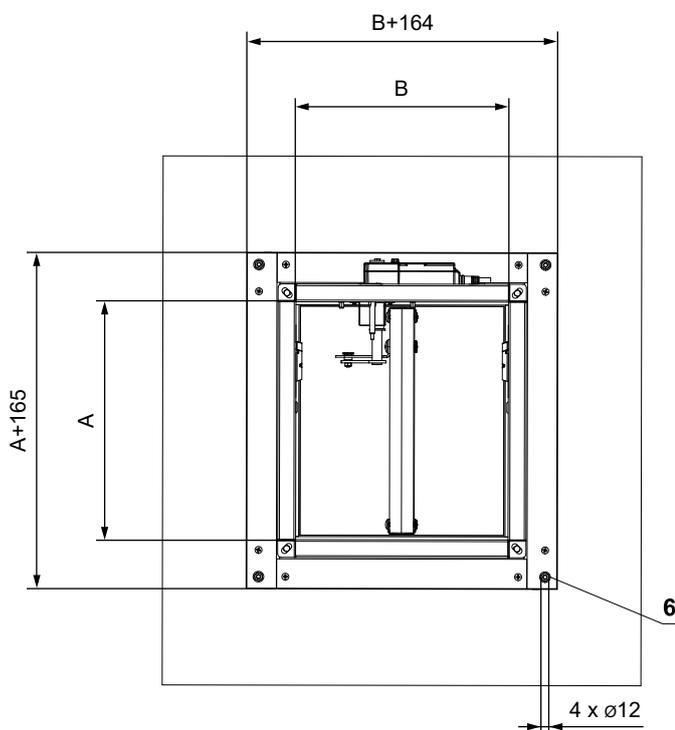
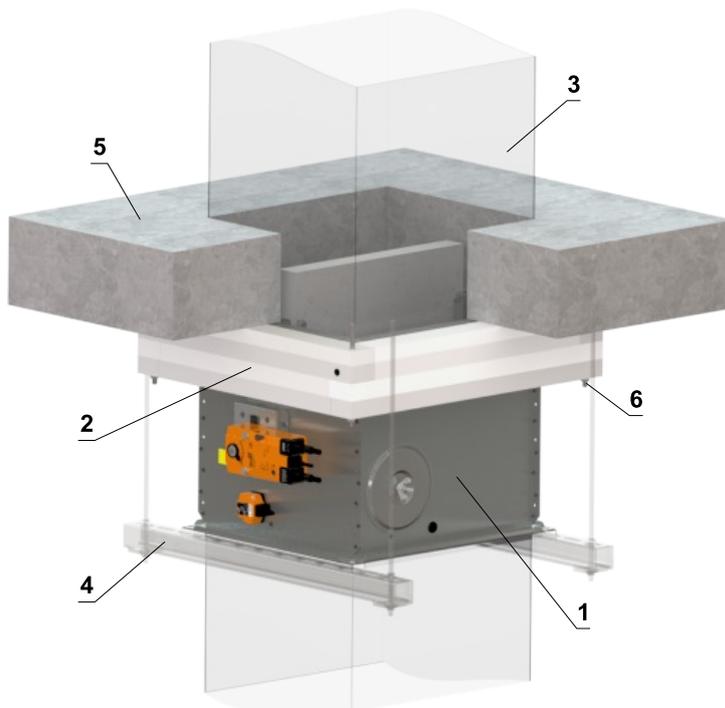


- 1 FDMQ
- 2 Installation frame - apply HILTI CFS-S ACR mastic at the entire area and glue it to the fire separating construction
- 3 Duct
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Solid wall construction
- 6 Holes for fixing the frame with threaded rods or steel anchors (material for fixing the frame is not included)

In solid ceiling construction - installation frame E4

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- Installation frame can be installed on the damper or delivered separately
- The damper can be installed from both sides of the construction, i.e. from the top or the bottom side of the ceiling.

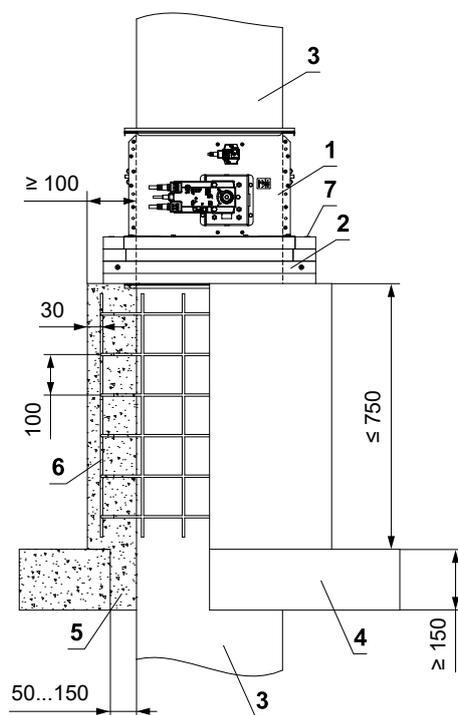
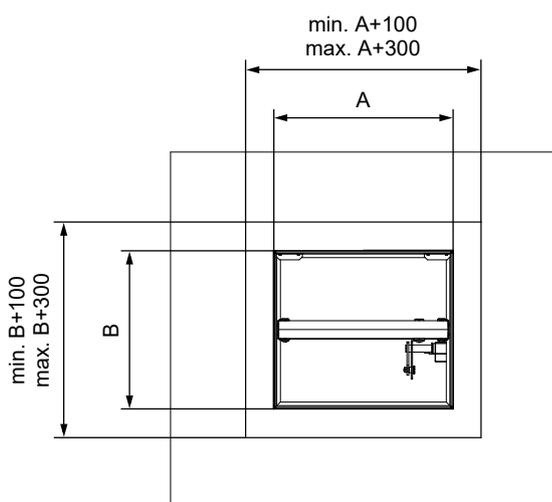
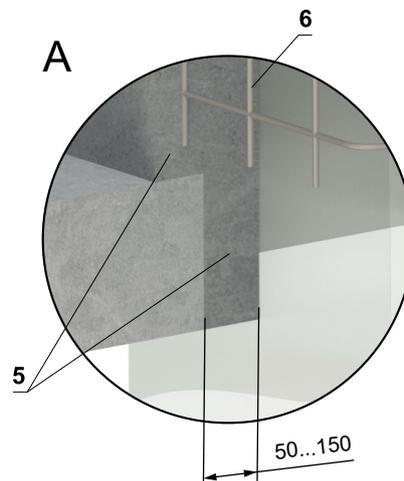
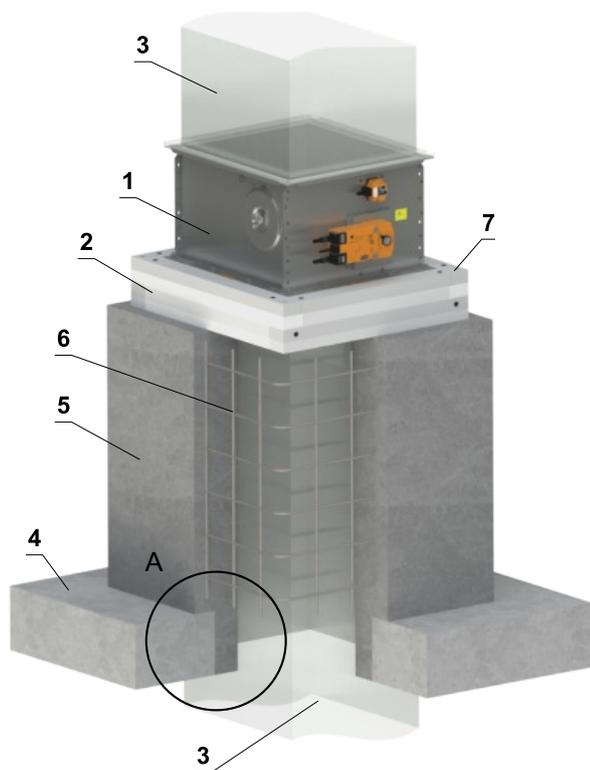


- 1 FDMQ
- 2 Installation frame - apply HILTI CFS-S ACR mastic at the entire area and glue it to the fire separating construction
- 3 Duct
- 4 Profile with threaded rod → see pages 74 to 77
- 5 Solid ceiling construction
- 6 Holes for fixing the frame with threaded rods or steel anchors (material for fixing the frame is not included)

Outside solid ceiling construction - concreting - installation frame E4

EI 90 (h_o i↔o) S

- For connection of following duct → see page 78
- 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 74
- Max. distance between two suspension systems is 1500 mm
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers
- Installation frame can be installed on the damper or delivered separately

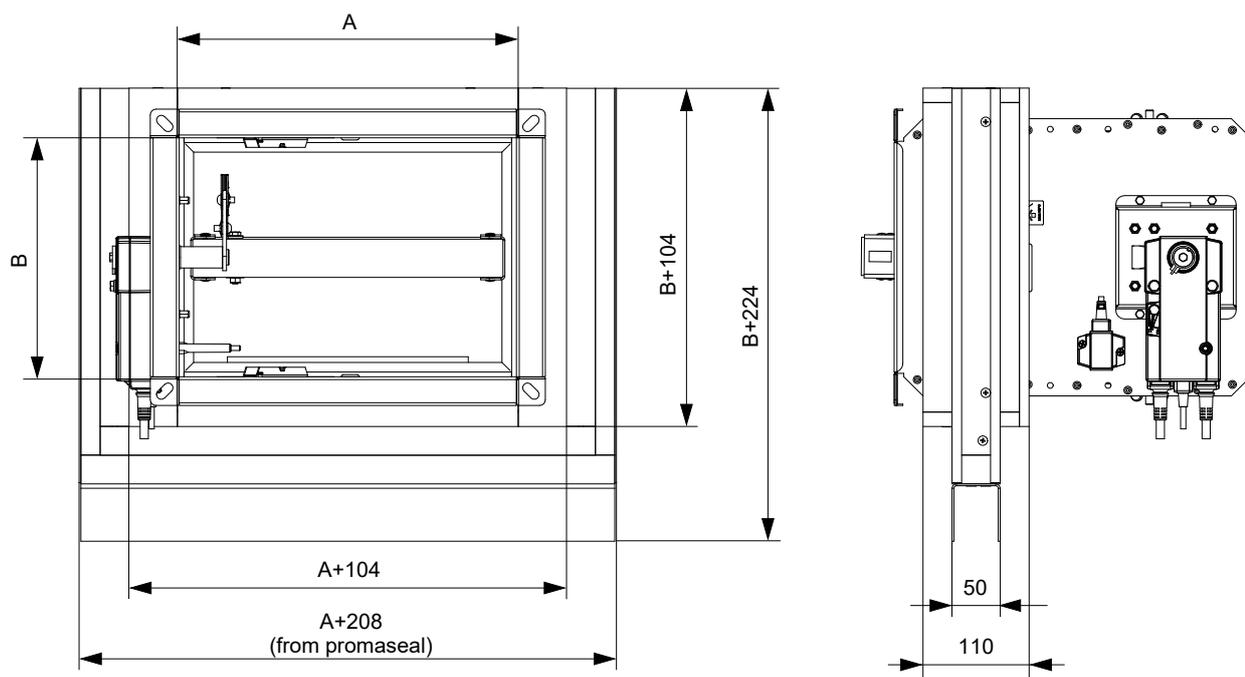
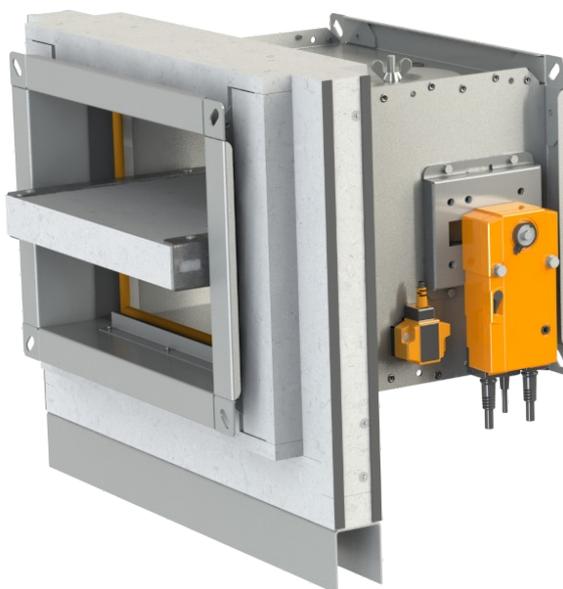


- 1 FDMQ
- 2 Installation frame - apply HILTI CFS-S ACR mastic at the entire area and glue it to the fire separating construction
- 3 Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm
- 4 Solid ceiling construction
- 5 Concrete B20
- 6 Rebar - steel rod \varnothing 6 mm, mesh hole 100 mm
- 7 Holes for fixing the frame with threaded rods or steel anchors (frame fixing material not included)

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 or ≥ 115 mm
- Installation frame is equipped with an intumescent sealing on the inside and outside. This sealing fills the gap between the damper casing and frame and between the frame and construction in the event of a fire
- Position of the damper can be directly on the ceiling or at a distance of max. 80 mm from the ceiling
- Material:
 - Installation frame - cement-lime boards and galvanized steel
 - Fasteners - galvanized steel

Installation frame E5

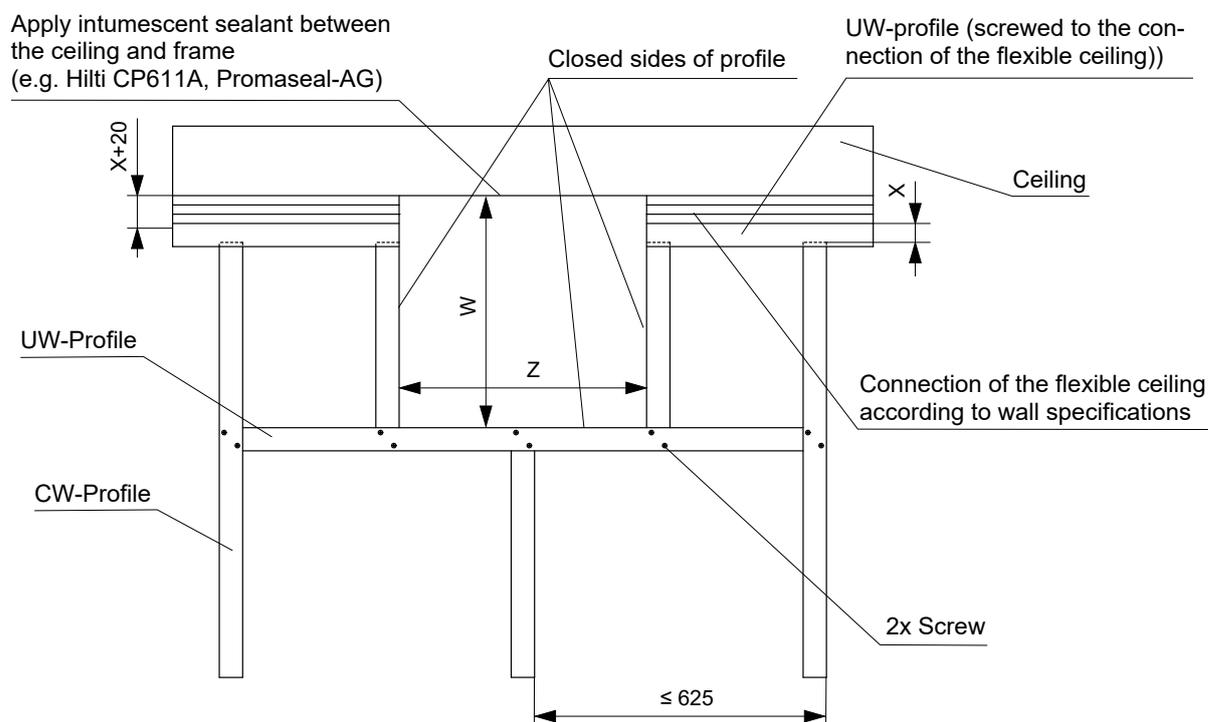
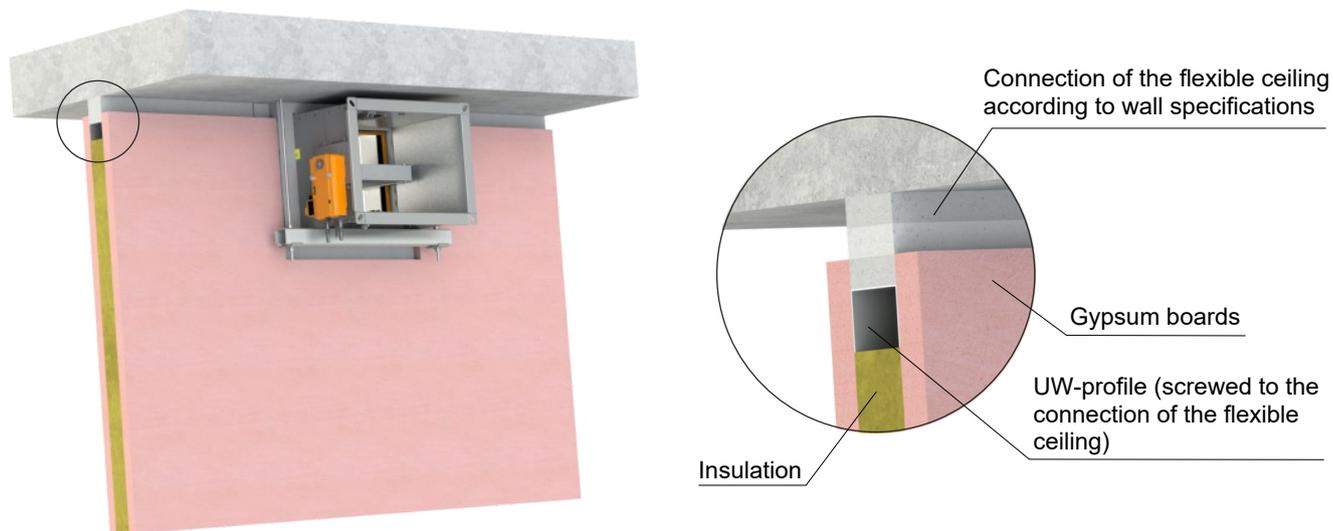


In gypsum wall construction - flexible ceiling - installation frame E5

Installation directly on the ceiling

EI 90 (v_e i↔o) S

- Detailed instructions for installation E5 frame → see manual
- For connection of following duct → see page 78
- Installation frame can be installed on the damper or delivered separately
- Gypsum construction must be made in accordance with the specifications of the wall system manufacturer



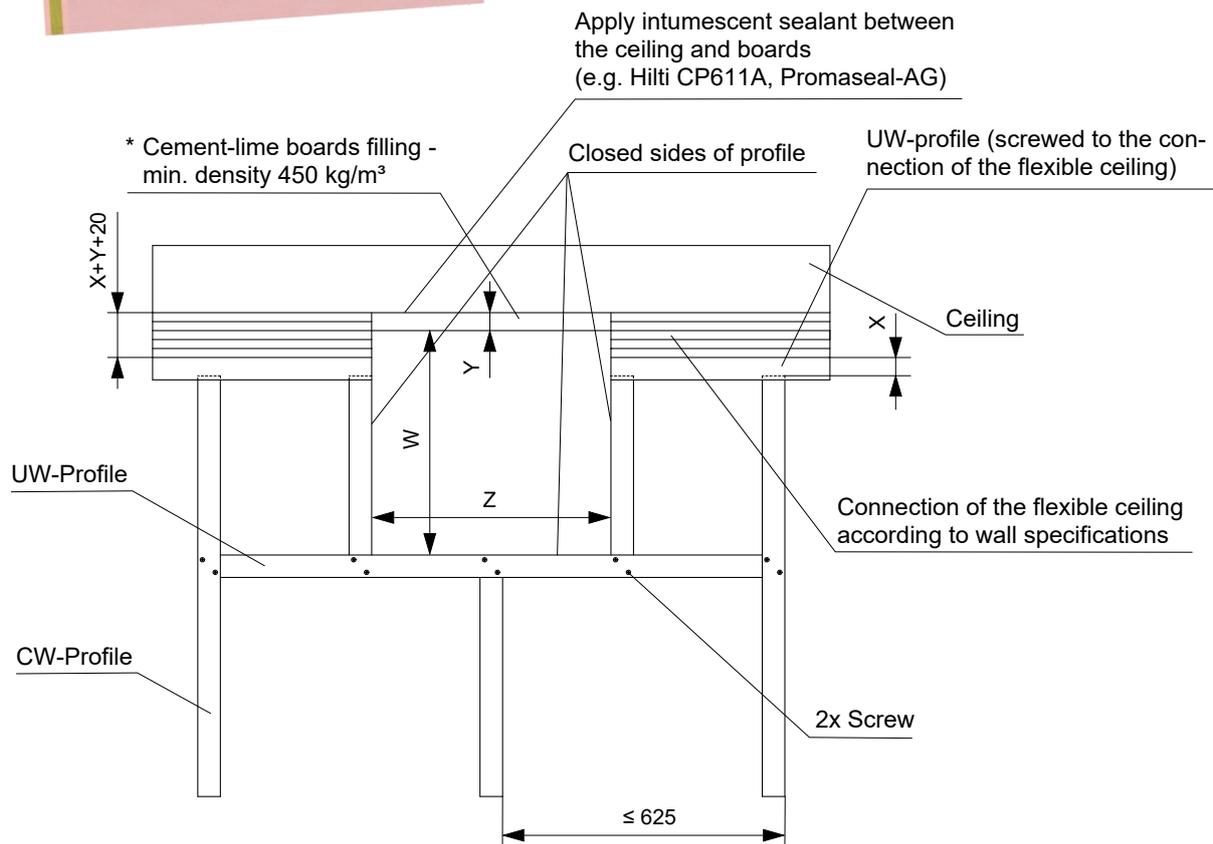
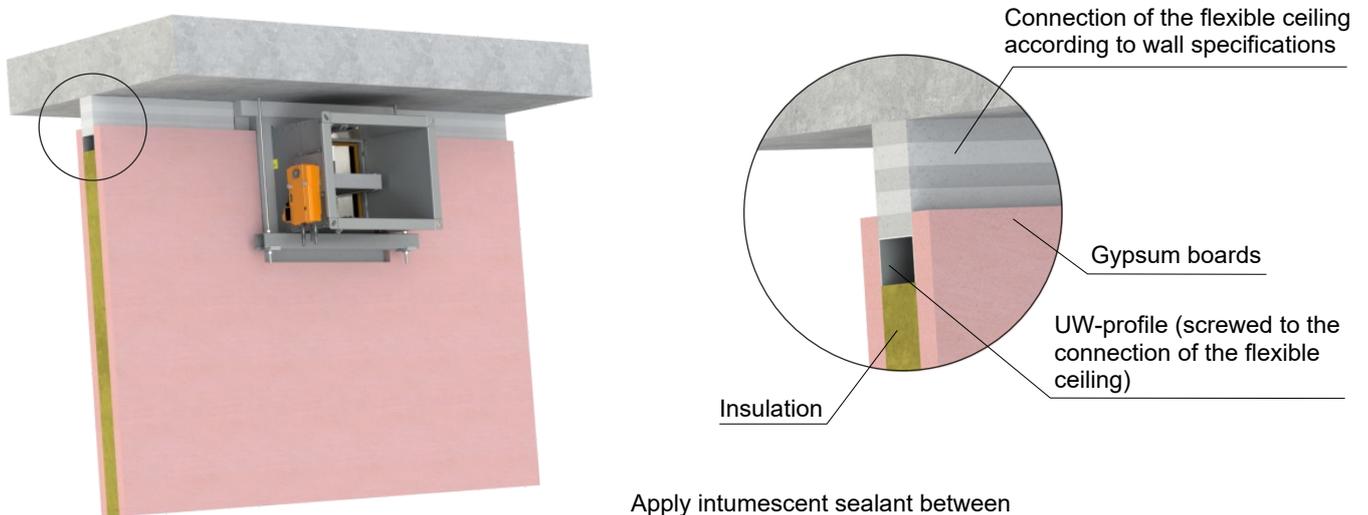
Installation frame	W [mm]	Z [mm]
E5	B + 224 + X	A + 208 + (2 x F)

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

Installation at a maximum distance of 80 mm from the ceiling

EI 90 (v_e i↔o) S

- Detailed instructions for installation E5 frame → see manual
- For connection of following duct → see page 78
- Installation frame can be installed on the damper or delivered separately
- Gypsum construction must be made in accordance with the specifications of the wall system manufacturer



Installation frame	W [mm]	Z [mm]
E5	$B + 224 + X + Y$	$A + 208 + (2 \times F)$

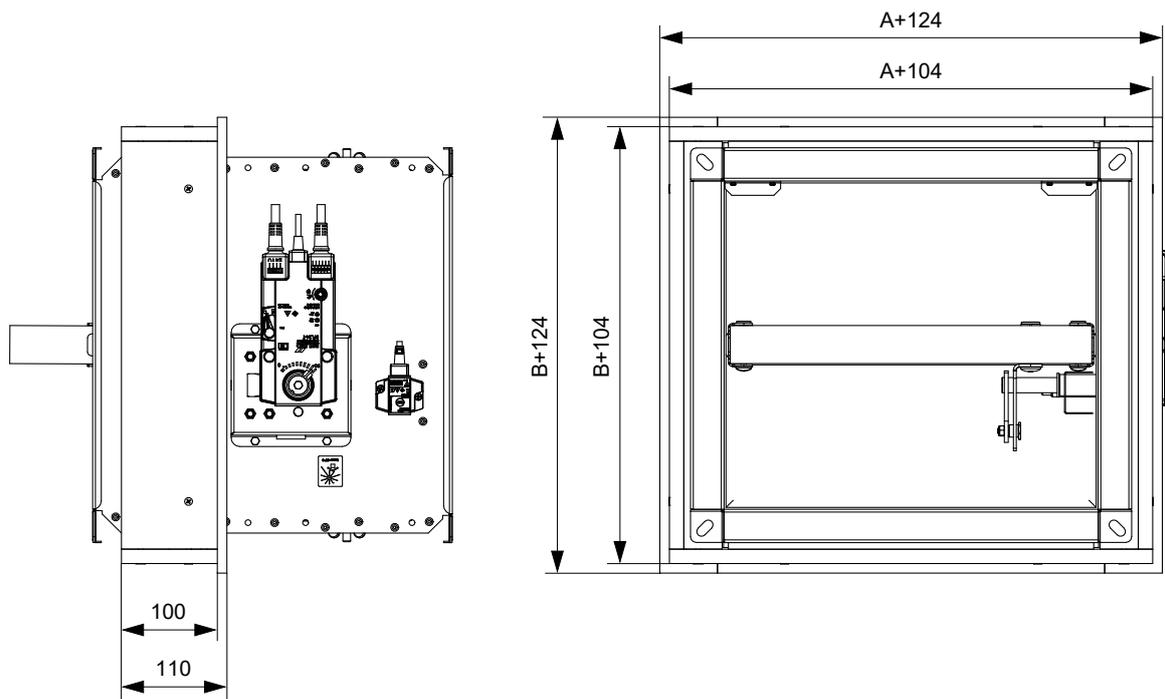
* Width of the boards for frame E5 = 110 mm

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

Installation frame E6

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

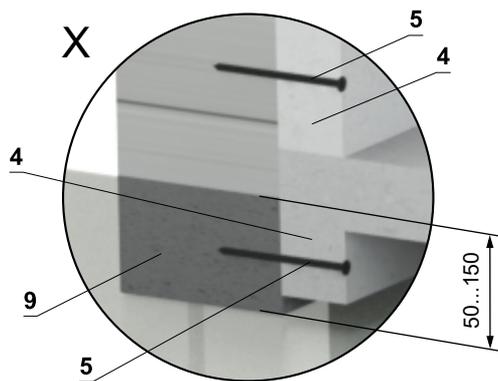
Installation frame E6



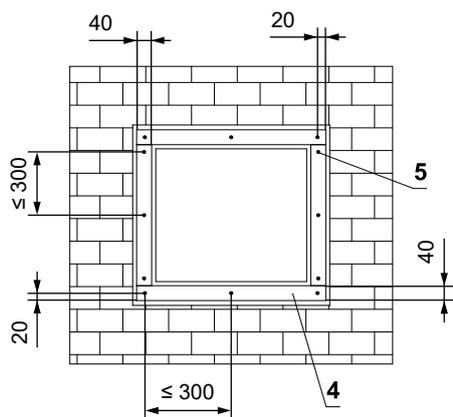
Outside solid wall construction - insulation from fire-resistant boards - mortar or gypsum - installation frame E6

EI 90 (v_e i↔o) S

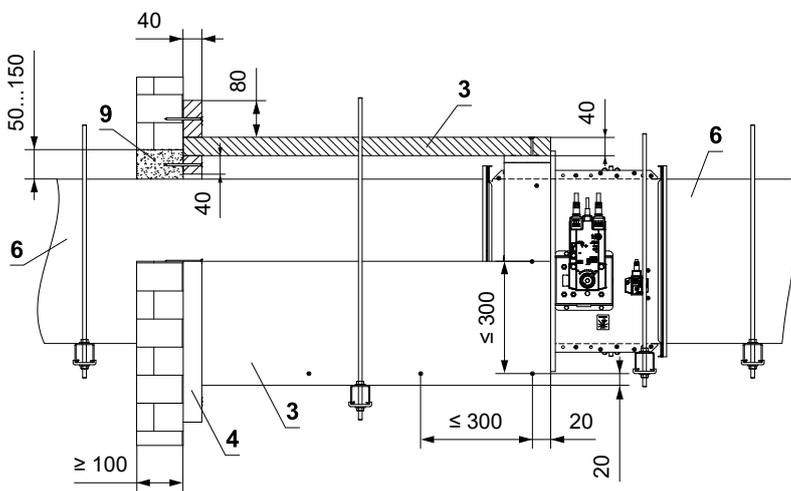
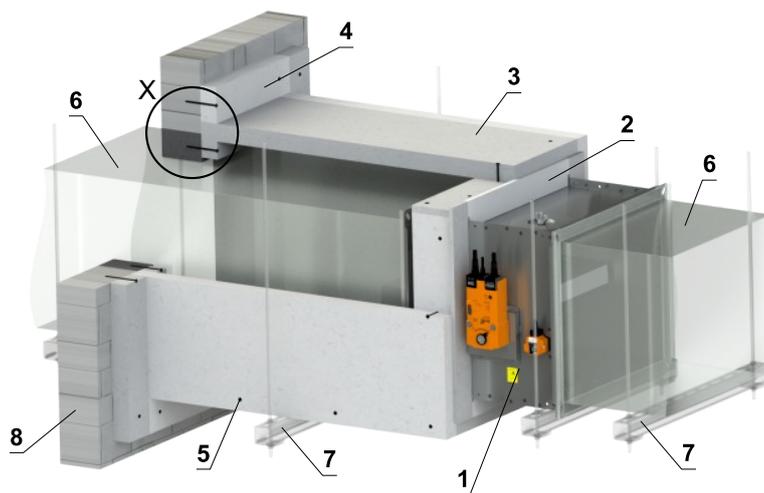
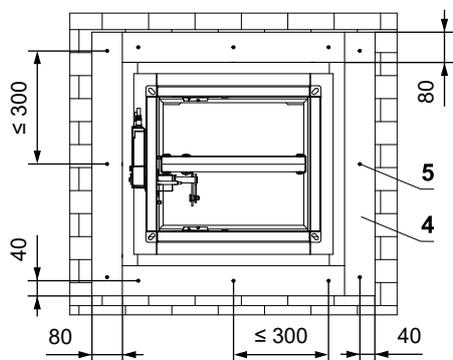
- For connection of following duct → see page 78
- Minimum and maximum distance between the wall and fire damper is unlimited
- Insulation must be suspended using threaded rods and mounting profiles or other mounting system, according to national standards
- Duct inside the insulation must be suitably 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 74
- 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



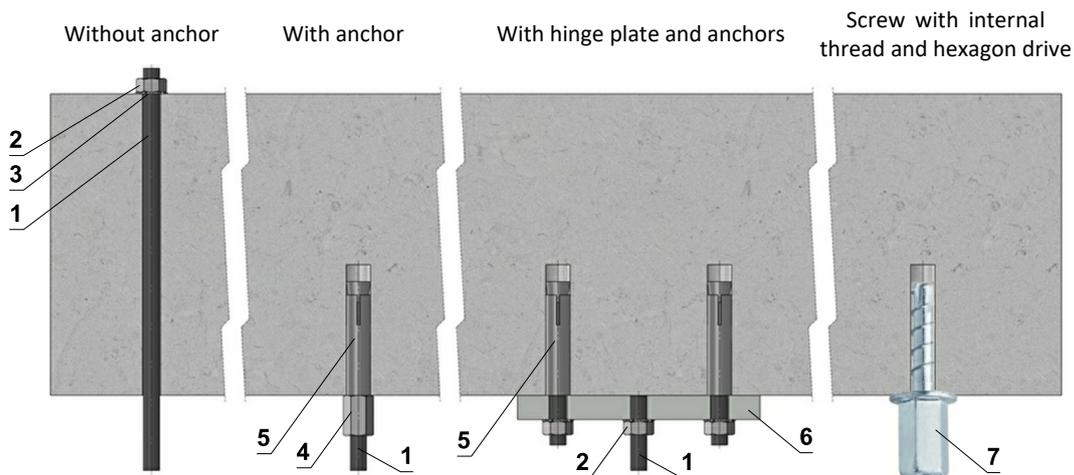
- | | |
|---|--|
| <ul style="list-style-type: none"> 1 FDMQ 2 Installation frame 3 Insulation made of cement-lime board - min. thickness 40 mm, min. density 450 kg/m³ (e.g. PROMATECT-L). All parts are glued with glue Promat K84 and secured with screws 4x80 mm 4 Additional board made of cement-lime board - min. thickness 40 mm, min. density 450 kg/m³ (e.g. PROMATECT-L). Apply HILTI CFS-S ACR mastic at the entire area and secure it with screws 4x80 mm | <ul style="list-style-type: none"> 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 74 to 77 8 Solid wall construction 9 Mortar or gypsum |
|---|--|

V. SUSPENSION SYSTEMS

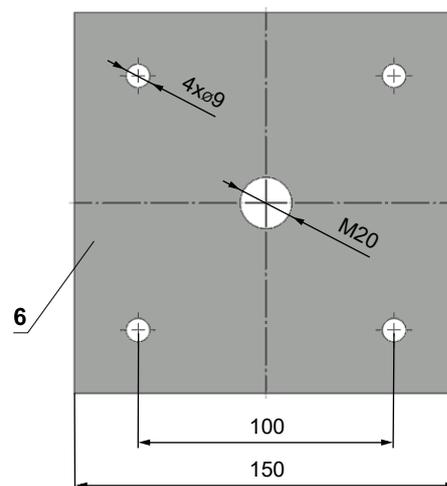
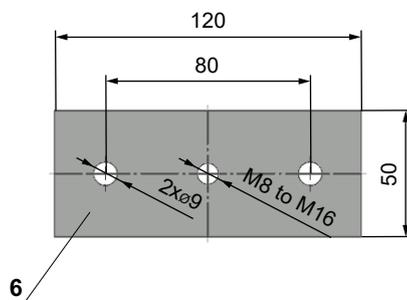
Mounting to the ceiling wall

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

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



Hinge plates



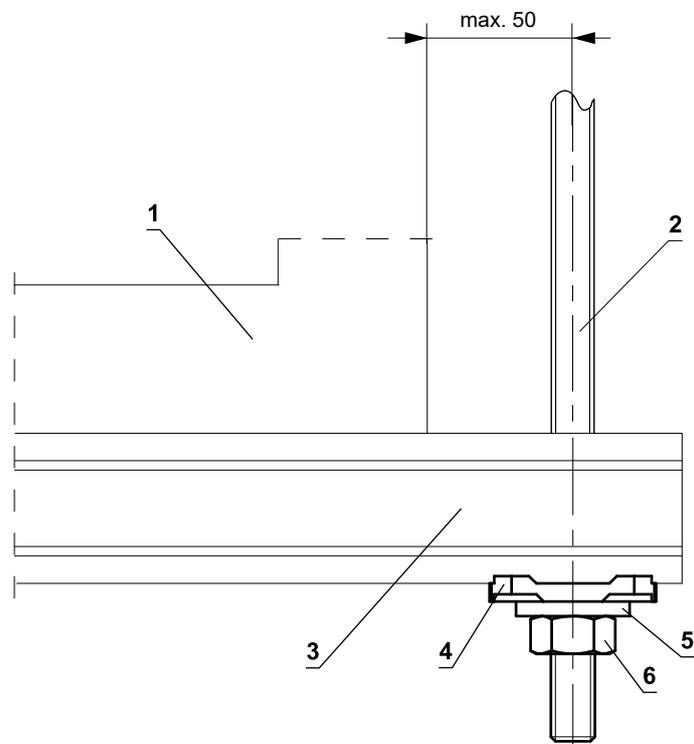
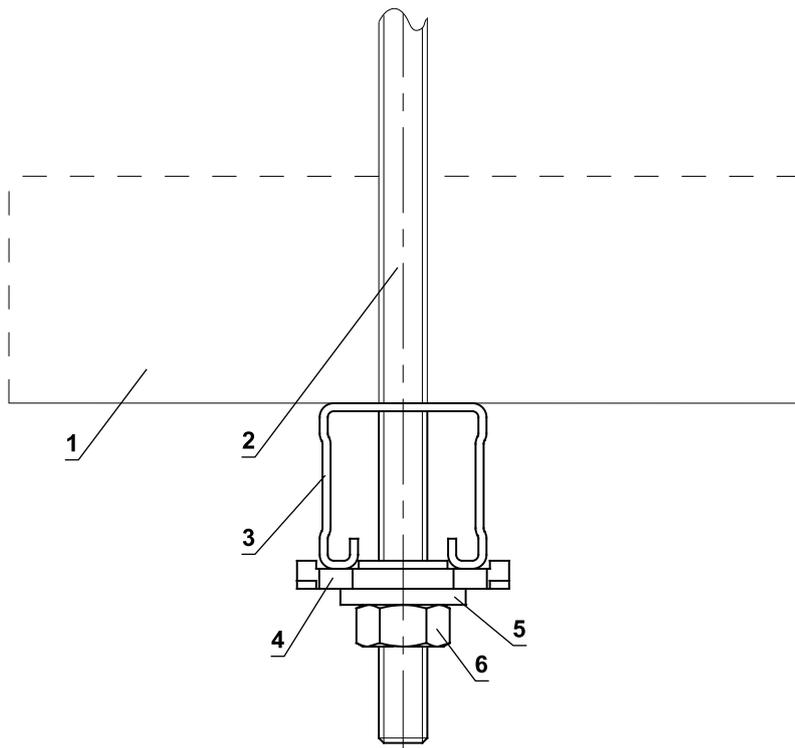
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

Load capacities of threaded rods at the required fire resistance 60 min. $t \le 120 \text{ min.}$

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

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

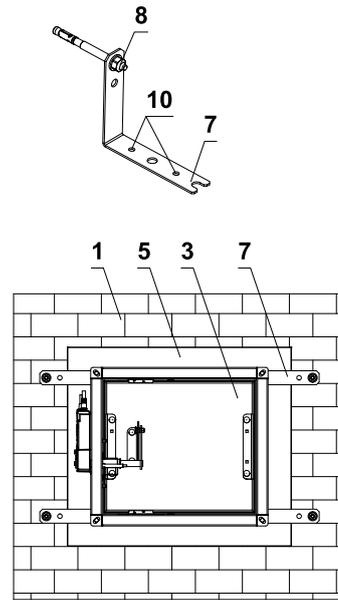
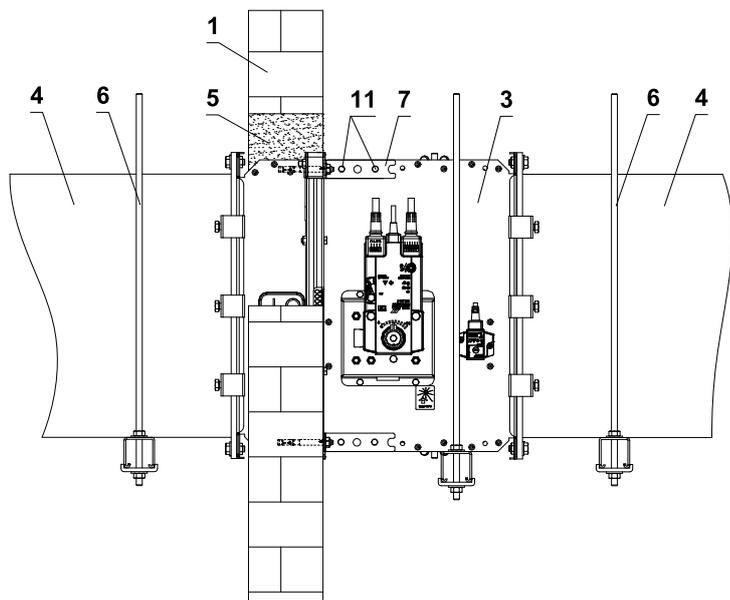
Example of placing of mounting profiles HILTI



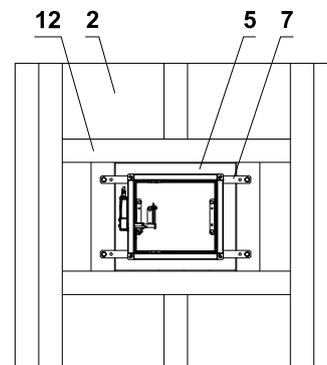
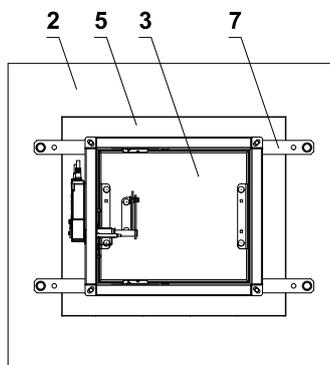
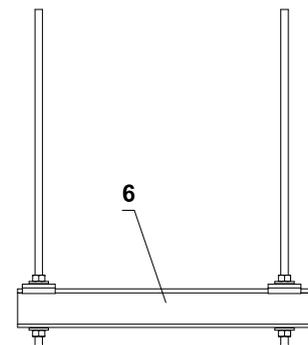
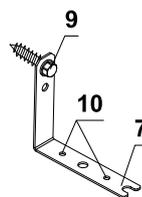
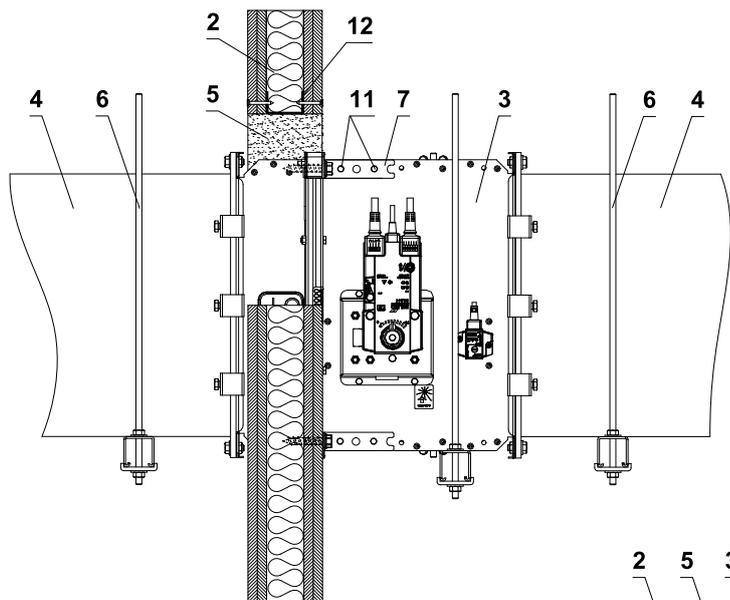
- 1 FDMQ
- 2 Threaded rod M8 - M12
- 3 Support HILTI MQ-41 or MQ-41/3
- 4 Bored plate HILTI MQZ-L
- 5 Washer for M8 - M12
- 6 Nut M8 - M12

Example of fixing FDMQ to the wall ceiling

In solid wall construction



In gypsum wall construction

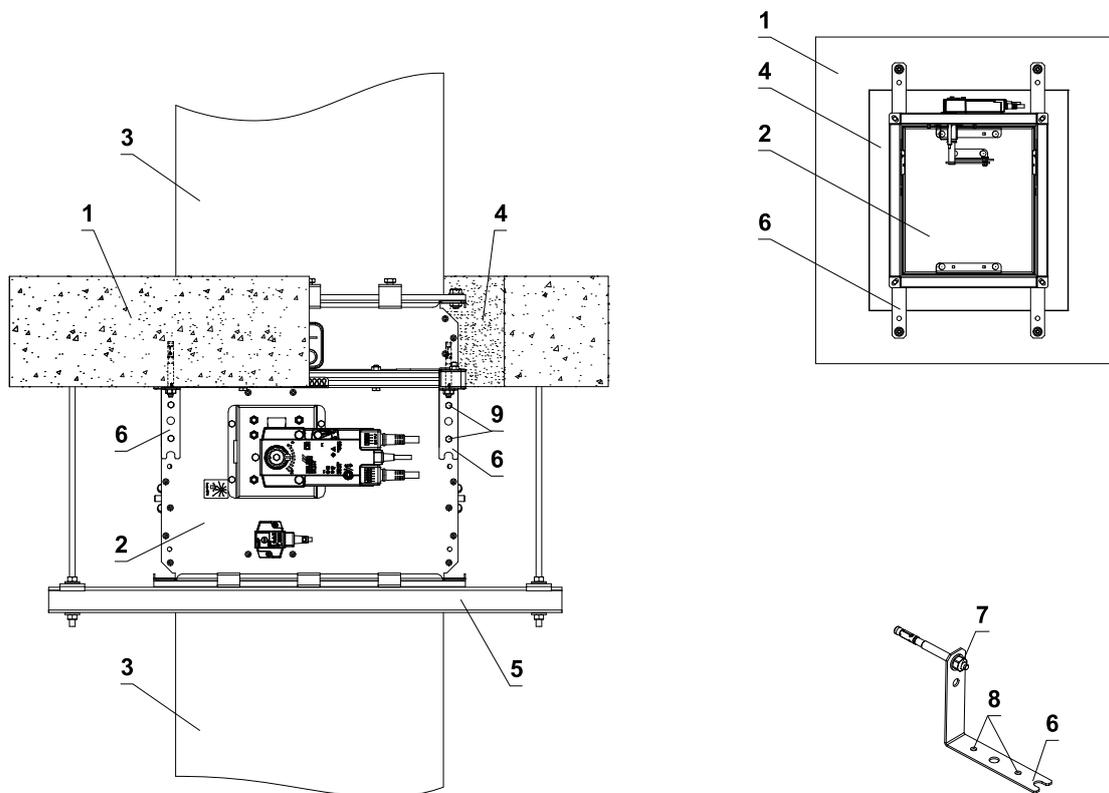


- 1 Solid wall construction
- 2 Gypsum wall construction
- 3 FDMQ
- 4 Duct
- 5 Penetration
- 6 Profile with threaded rod → see page 75
- 7 Fixing element/steel bracket for fixing the damper to the wall (optional accessories from MANDÍK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
- 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.

Example of fixing FDMQ to the ceiling

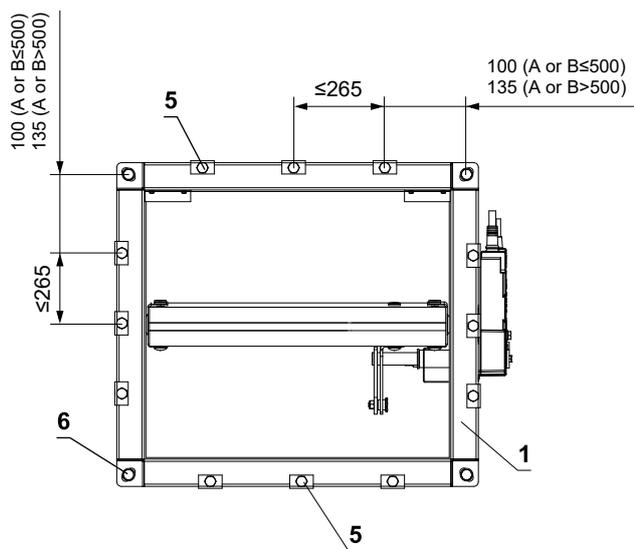
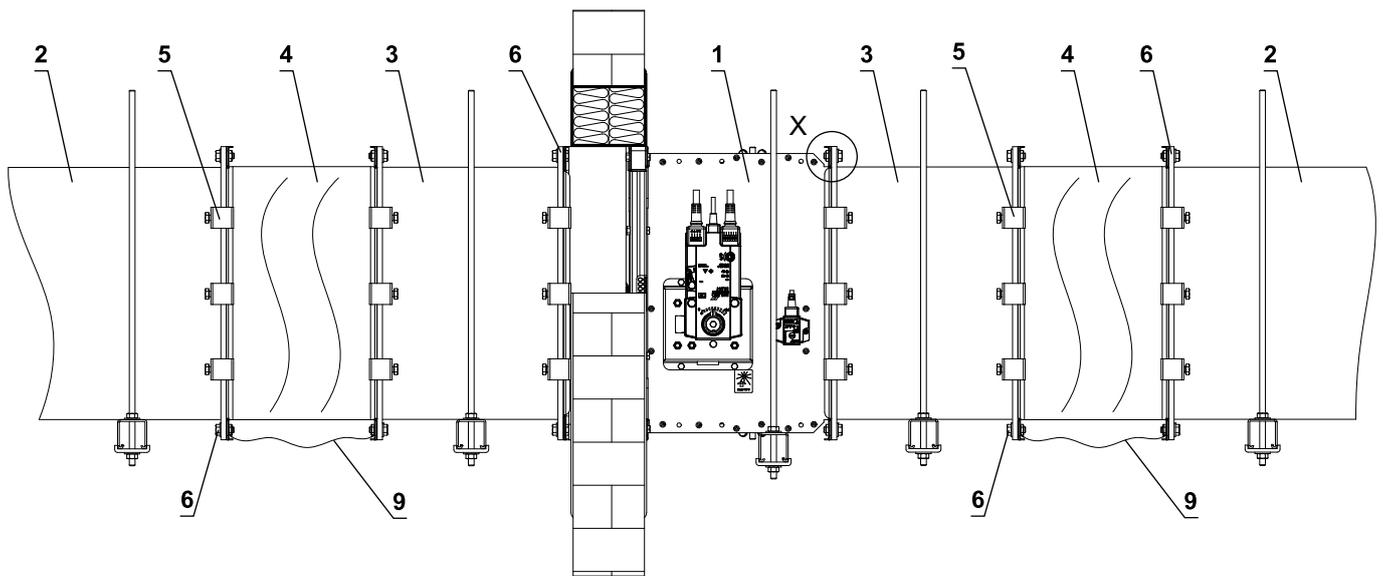
In solid ceiling construction



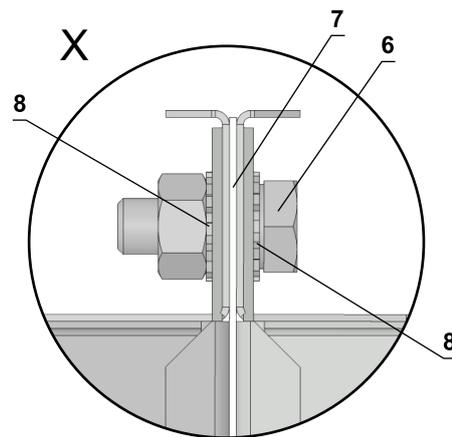
- 1 Solid ceiling construction
- 2 FDMQ
- 3 Duct
- 4 Penetration
- 5 Profile with threaded rod → see page 75
- 6 Fixing element/steel bracket for fixing the damper to the wall (optional accessories from MANDÍK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
- 7 Nut M8 with anchor
- 8 Installation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

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

VI. TECHNICAL DATA

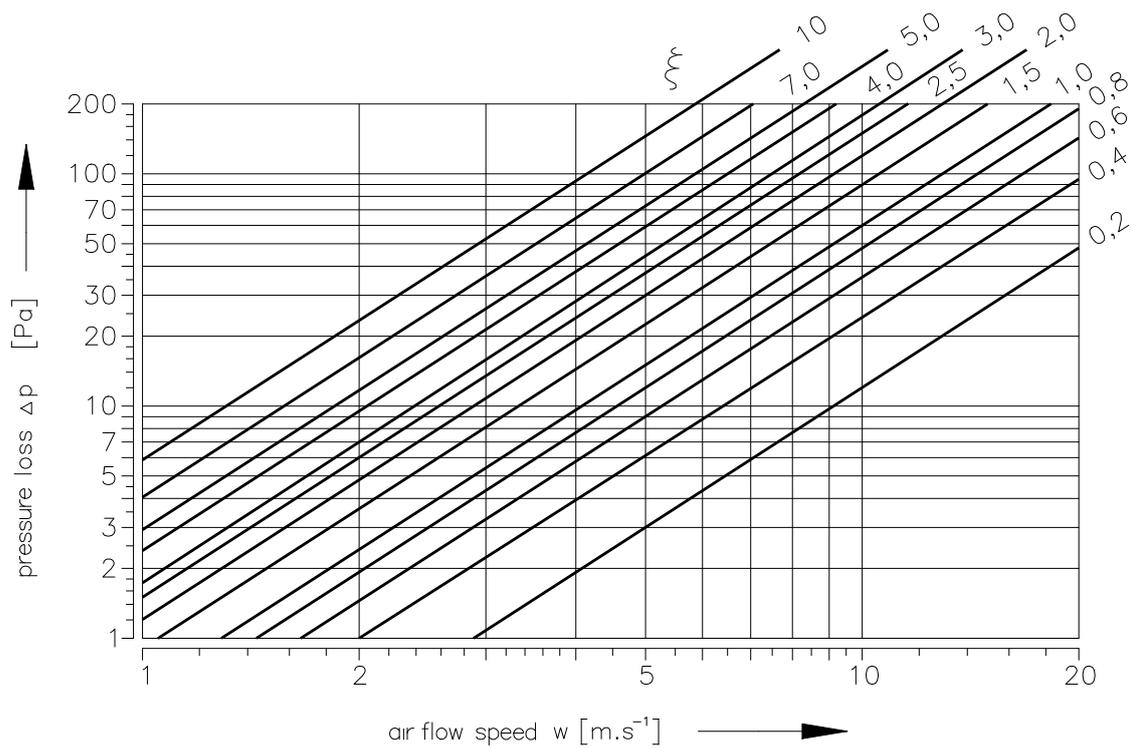
Pressure loss

Pressure loss calculation

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

Δp	[Pa]	pressure loss
w	[m/s]	air flow speed in nominal damper section
ρ	[kg/m ³]	air density
ξ	[-]	coefficient of local pressure loss for the nominal damper section → see page 80

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



Coefficient of local pressure loss

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	

Noise data

Level of acoustic output corrected with filter A

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

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

Level of acoustic output in octave ranges

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

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

Tables of acoustic values

Level of acoustic output L_{W1} [dB] related to the 1 m ² section																	
w [m/s]	ξ [-]																
	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1	1,5	2	2,5	3	4	5	8	10
2	15,5	18,7	20,9	22,6	24	25,2	26,3	27,2	28	31,2	33,4	35,1	36,5	38,8	40,5	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	45,7	47,1	49,4	51,1	54,7	56,5
4	33,6	36,7	39	40,7	42,1	43,3	44,3	45,3	46,1	49,2	51,5	53,2	54,6	56,9	58,6	62,2	64
5	39,4	42,5	44,8	46,5	47,9	49,1	50,2	51,1	51,9	55	57,3	59	60,4	62,7	64,4	68	69,8
6	44,1	47,3	49,5	51,3	52,7	53,9	54,9	55,8	56,6	59,8	62	63,8	65,2	67,4	69,2	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	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
9	54,7	57,9	60,1	61,8	63,2	64,4	65,5	66,4	67,2	70,4	72,6	74,3	75,7	78	79,7	83,4	85,1
10	57,4	60,6	62,8	64,6	66	67,2	68,2	69,1	70	73,1	75,3	77,1	78,5	80,7	82,5	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	83,2	85	88,6	90,3
12	62,2	65,4	67,6	69,3	70,7	71,9	73	73,9	74,7	77,9	80,1	81,8	83,2	85,5	87,2	90,9	92,6

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

Relative level expressing the shape of the spectrum L_{rel}								
w [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	-4,1	-5,9	-9,4	-14,6	-21,5	-30,0	-40,3
6	-4,2	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4
7	-4,5	-3,9	-4,9	-7,5	-11,9	-17,9	-25,7	-35,1
8	-4,9	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2
9	-5,2	-3,9	-4,3	-6,4	-10,1	-15,6	-22,7	-31,5
10	-5,5	-4	-4,1	-5,9	-9,4	-14,6	-21,5	-30
11	-5,9	-4,1	-4	-5,6	-8,9	-13,8	-20,4	-28,8
12	-6,2	-4,3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6

VII. MATERIAL, FINISHING

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

Specifications for stainless-steel design:

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

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

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

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

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

VIII. TRANSPORTATION, STORAGE AND WARRANTY

Logistic terms

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

Warranty

- The manufacturer provides a warranty of 24 months from the date of dispatch for the dampers.
- In case of using a Schischek actuator, the manufacturer provides a 12-month warranty for the actuator from the date of shipment.
- The warranty for fire dampers 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 dismantled.
- The warranty is void if dampers are used for other purposes, devices and working conditions than those allowed by these technical conditions or if the dampers are mechanically damaged during handling.
- If the dampers are damaged by transport, a record must be written down with the forwarder at reception for later complaint.

IX. ASSEMBLY, ATTENDANCE AND MAINTENANCE

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

Manual operation - actuator control without electric voltage

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

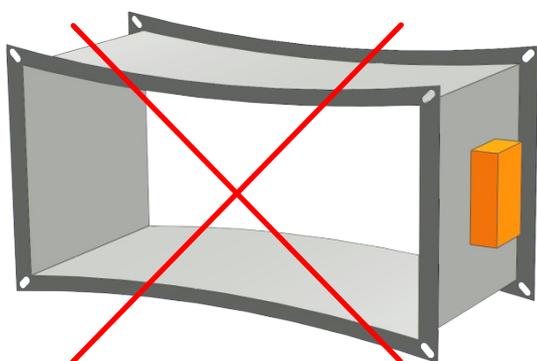
Limit switches

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

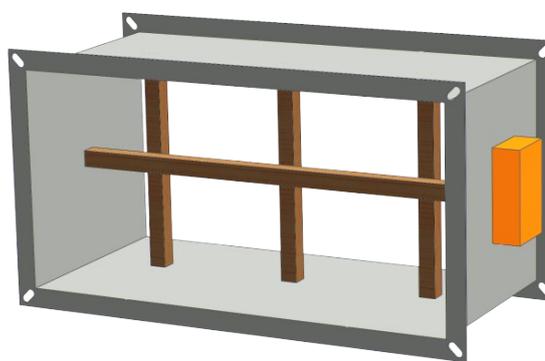
Installation / fixing the damper

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

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

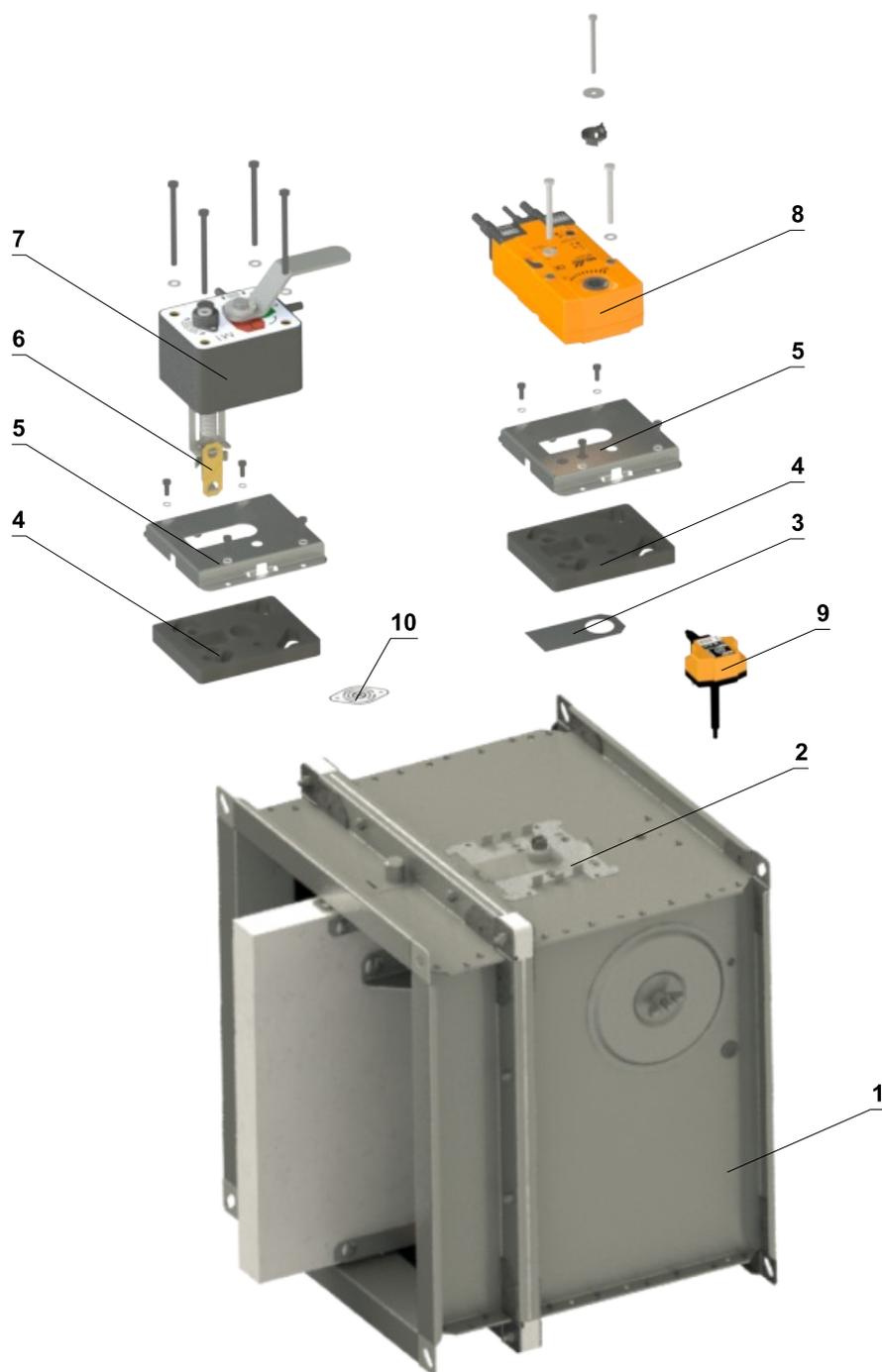


WRONG!



Reinforcement of the casing with wooden beams

Change of manual control for the actuator or vice versa

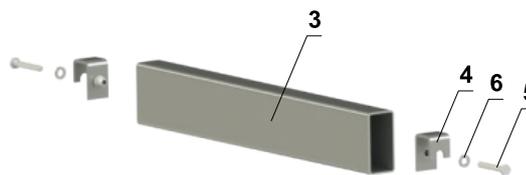
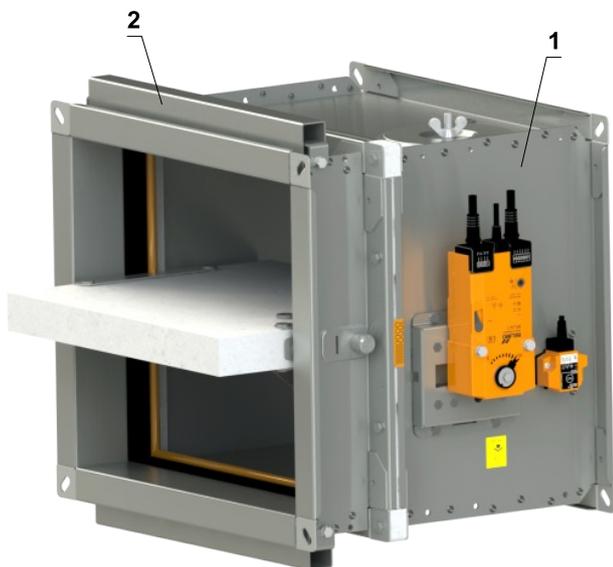


- | | |
|-------------------------------|--|
| 1 Damper | 6 Thermal fuse |
| 2 Mounting plate | 7 Manual control |
| 3 Sealing cover | 8 Spring return actuator |
| 4 Sealing of a mounting plate | 9 Thermoelectric activation device BAT |
| 5 Cover of a mounting plate | 10 Sensor sticker |

Reinforcement frame VRM-Q

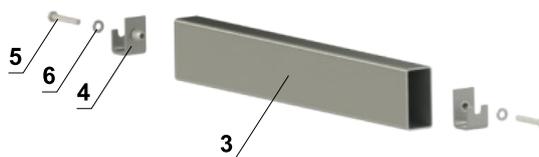
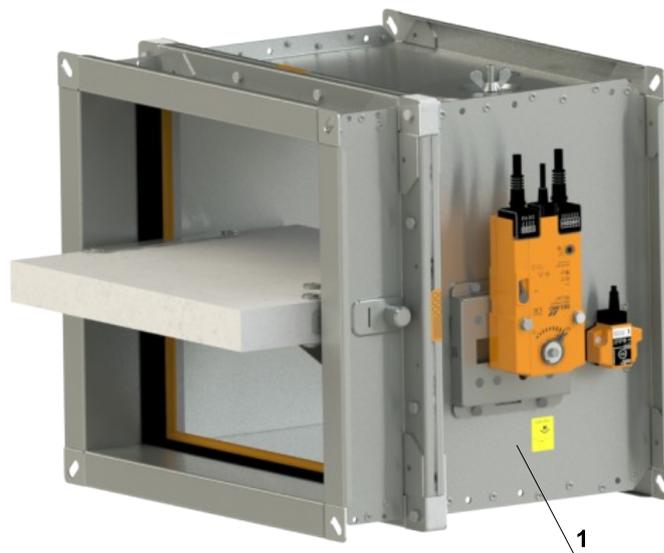
- If the damper is installed outside the fire separation construction, a damper side A \geq 800 mm and fire resistance is EI 90 S, VRM-Q reinforcement frame must be used.
- For lower fire resistance than EI 90 S, VRM-Q reinforcement frame is not necessary!
- VRM-Q is mounted only on "A" sides

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



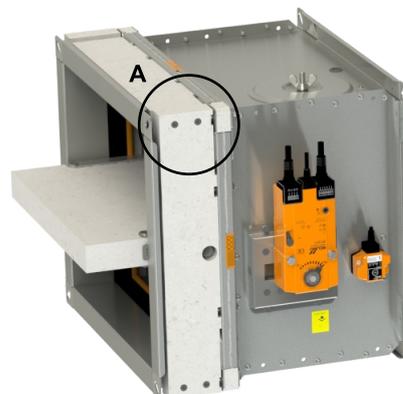
- 1 FDMQ
- 2 VRM-Q
- 3 Part A of VRM-Q
- 4 Part B of VRM-Q
- 5 Hexagon head screw M6x40 mm DIN 931
- 6 Washer M6/6,4 DIN 7349

Protective cladding boards

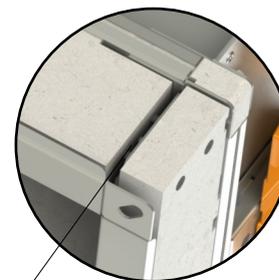
- Protective cladding boards must be used as part of the penetration filling of installation with Ablative Coated Batt.
- Can be ordered from MANDIK (installed on the damper or as an accessory) or can be sourced from local supplier
- If protective cladding boards are required, this must be specified in the ordering key
- Protective cladding boards are made of PROMATECT-MST, thickness 30 mm.
- Glue K84 is not included in the package

Installation procedure

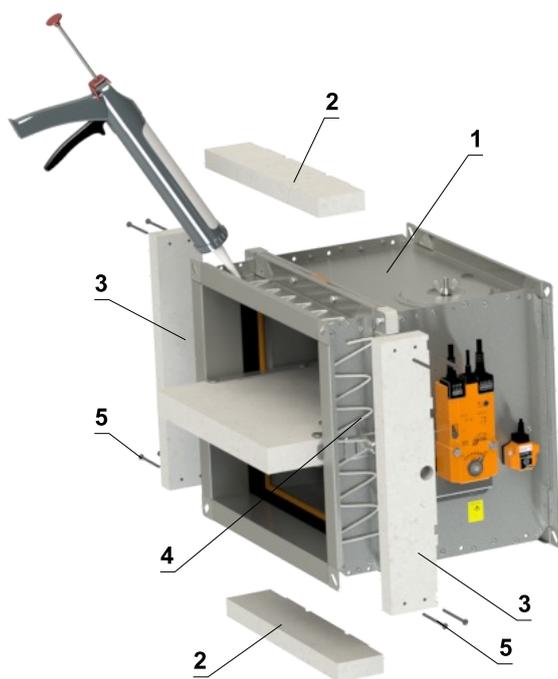
- 1) Apply K84 glue over the entire surface
- 2) Attach protective cladding boards on all sides of a fire damper and glue them on the damper casing
- 3) Screw parts A and B using four screws 5x70 mm
- 4) Completely fill the gaps with glue



DETAIL A

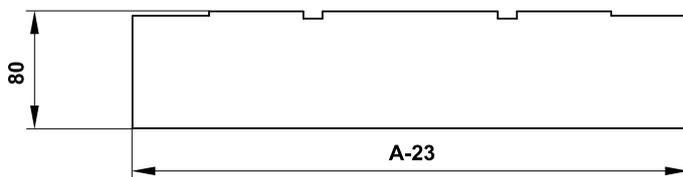


Completely fill the gaps between boards!

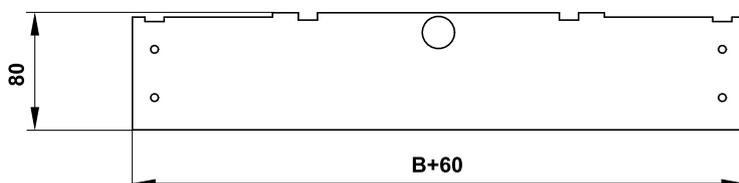


- 1 FDMQ
- 2 Part A
- 3 Part B
- 4 Glue PROMAT K-84
- 5 Screw 5x70 mm

Part A



Part B



- Detailed dimensions of protective cladding boards on request.

Commissioning and revisions

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

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

Check of a manual control and thermal fuse

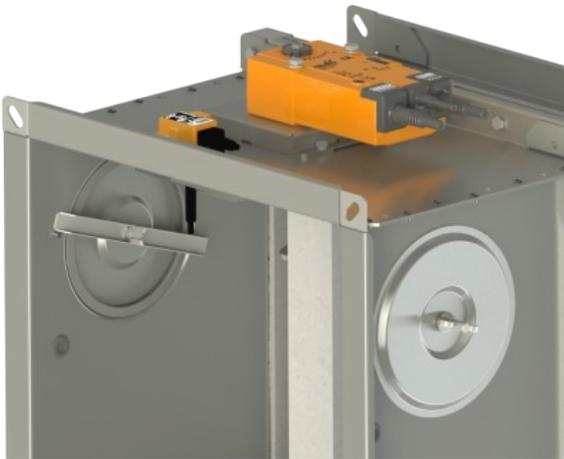
- **To check the function of the manual control proceed as follows:**
- Turn the damper blade to "CLOSED" position as follows:
 - The damper blade is in "OPEN" position.
 - Press the control button of the manual control to turn the damper blade to "CLOSED" position.
 - Check the damper blade rotation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

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.



Inspection opening detail

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

How to proceed after Tf1 or Tf2 fuses have been activated

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

X. ORDERING INFORMATIONS

Ordering key



EXAMPLES:

FDMQ EN 500x250/375 .40 Q30-ZN

Fire damper FDMQ, dimension 500x250 mm, built length 375 mm, control design with spring return actuator AC 230 V, standard activation temperature 72 °C, flange dimension 30 mm, galvanized material variant, without installation kit/frame, standard silicon seal.

FDMQ EN 500x250/375 .40 120 E1 Q30-ZN IW G

Fire damper FDMQ, dimension 500x250 mm, built length 375 mm, control design with spring return actuator AC 230 V, activation temperature 120 °C, with installation frame E1, flange dimension 30 mm, galvanized material variant, impregnation against humidity, rubber cold seal.

1| Fire damper type - FDMQ

2| Country of destination

3| Damper dimensions A x B → see pages 16 to 21

"A" is the width of the damper
 "B" is the height of the damper

4| Built length - 375 mm

5| Damper design

.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)
.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)
.40	With actuator BF 230-TN (BFL, BFN 230-T) - voltage AC 230 V
.41	With actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K and with supply device BKN 230-24-MOD (voltage AC 230 V)
.42	With actuator ExMax-15-BF, with thermoelectric activation device ExPro-TT (Zone 1,2) - supply voltage range 24 to 230 VAC/DC
.50	With actuator BF 24-TN (BFL, BFN 24-T) - voltage AC/DC 24 V
.51	With actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K (voltage AC/DC 24 V)
.63	With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST)
.63S	With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST) and with smoke detector ORS 142 K

- If dampers with installation frame are required, that must be specified separately in the order. The installation frame can be installed on the damper or delivered separately.
- Detailed information for ATEX dampers (ZONE 1,2) → see Appendix

6| Activation temperature

Manual control		Spring return actuator control	
	72 °C *		72 °C *
104	104 °C	95	95 °C
147	147 °C	120	120 °C
		140	140 °C

* Standard activation temperature

8| Flange dimension

Q30	Flange width 30 mm
-----	--------------------

7| Installation kit/frame

	Without installation kit/frame
A	With protective cladding boards (for Ablative Coated Batt installation)
VRM-Q	Reinforcing frame VRM-Q
E1	Installation frame E1
E2*	Installation frame E2
E3*	Installation frame E3
E4*	Installation frame E4
E5	Installation frame E5
E6	Installation frame E6

* Available only for dampers with a built length of 375 mm

** Only comes installed on the damper and cannot be purchased separately

9| Material and other design options

ZN	Galvanized
A2	Stainless steel 1.4301 (AISI 304)
A4	Stainless steel 1.4404 (AISI 316L) - included damper blade impregnation against chemical - type PROMAT SR

10| Surface treatment

	Without surface treatment
IW	Damper blade impregnation, impregnating agent PROMAT 2000 - impregnation against humidity
IA	Damper blade impregnation, impregnating agent PROMAT SR - impregnation against chemical

11| Cold seal variant

	Silicone rubber *
G	Silicone-free rubber

* Standard cold seal

Accessories

Protective cladding boards



1| Accessory type - cladding boards

2| Fire damper type - FDMQ

3| Damper dimensions A x B → see pages 16 to 21

Reinforcing frame VRM-Q



1| Accessory type - reinforcing frame VRM-Q

2| Fire damper type - FDMQ

3| Damper dimensions A x B → see pages 16 to 21

Installation frame E



1| Installation frame type E1/E2/E3/E4/E5/E6

2| Fire damper type - FDMQ

3| Damper dimensions A x B → see pages 16 to 21

Data label

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

MANDÍK [®]		MANDÍK, a.s. Dobříšská 550, 267 24 Hostomice, Czech Republic		
FIRE DAMPER - XXXX			 MANUAL	
DIMENSION:		DESIGN:		
SERIAL.NO.:		WEIGHT (kg):		
CLASSIFICATION:				
TPM XXX/XX	Cert. No.: 1391-CPR-XXXX/XXXX, DoP: PM/XXXX/XX/XX/X	XX	EN 15650:2010	CE 1391

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

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