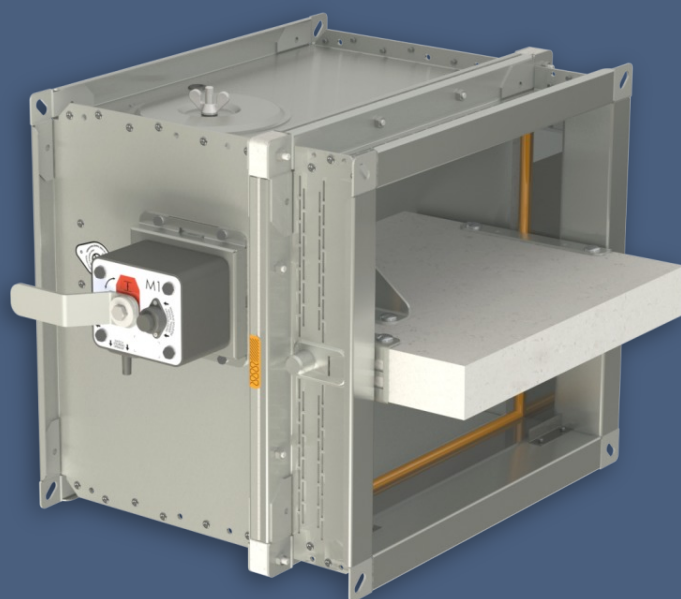
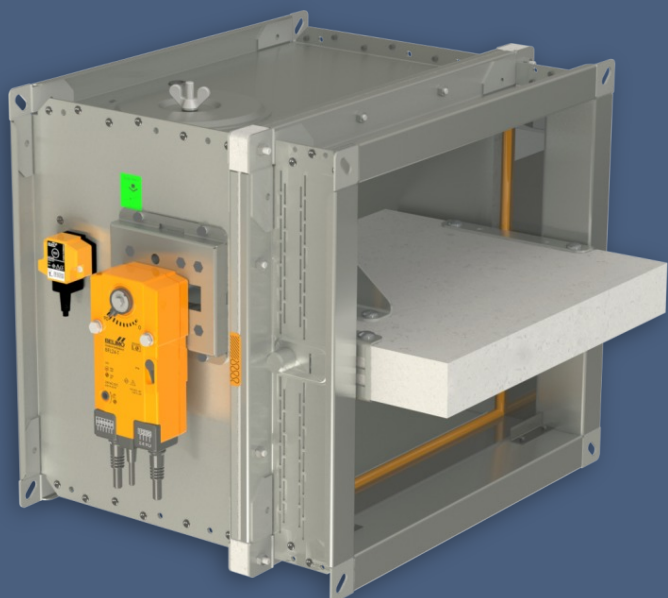


FDMQ 120

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 120
It is valid for production, designing, ordering, delivery, maintenance and operation.

CONTENT

I. GENERAL.....	3
Description.....	3
II. DESIGN.....	4
Design with manual control.....	4
Design with spring return actuator.....	6
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
Installation in solid wall construction.....	25
Installation outside solid wall construction.....	29
Installation in gypsum wall construction.....	31
Installation outside gypsum wall construction.....	35
Installation in shaft wall.....	39
Installation in solid ceiling construction.....	40
V. SUSPENSION SYSTEMS.....	43
Example of duct connection.....	47
VI. TECHNICAL DATA.....	48
Pressure loss.....	48
Noise data.....	50
VII. MATERIAL, FINISHING.....	51
VIII. TRANSPORTATION, STORAGE AND WARRANTY.....	52
Logistic terms.....	52
Warranty.....	52
IX. ASSEMBLY, ATTENDANCE AND MAINTENANCE.....	53
Entry into service and revisions.....	57
X. ORDERING INFORMATIONS.....	59
Ordering key.....	59
Accessories.....	59
Data label.....	60

I. GENERAL

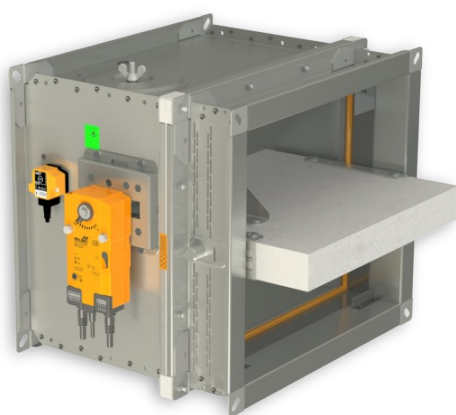
Description

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.

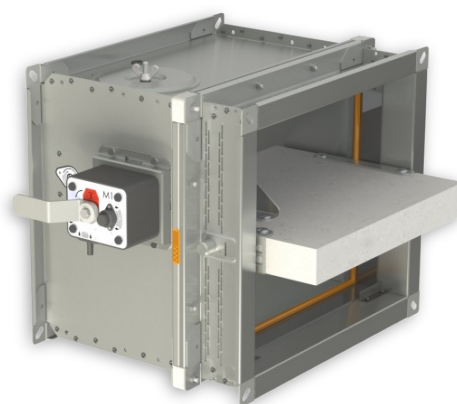
Damper blade automatically closes air duct using a closing spring or a spring return actuator. The closing spring is actuated by pressing a button on the manual control or by melting a thermal fuse.

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 120 with spring return actuator



FDMQ 120 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 min. ATC 3 (old marking "C") acc. to EN 1751, Internal leakage min. 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 120/01/XX/X
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

Working conditions

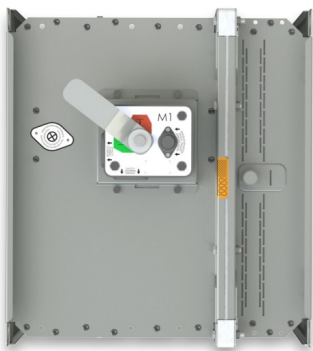
- Exact damper function is provided under the following conditions:
 - maximum air velocity 12 m/s
 - maximum pressure difference 1200 Pa
 - the air circulation in the whole damper section must be secured steady over the entire surface.
- Dampers can be installed with horizontal blade axis.
- Dampers 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).



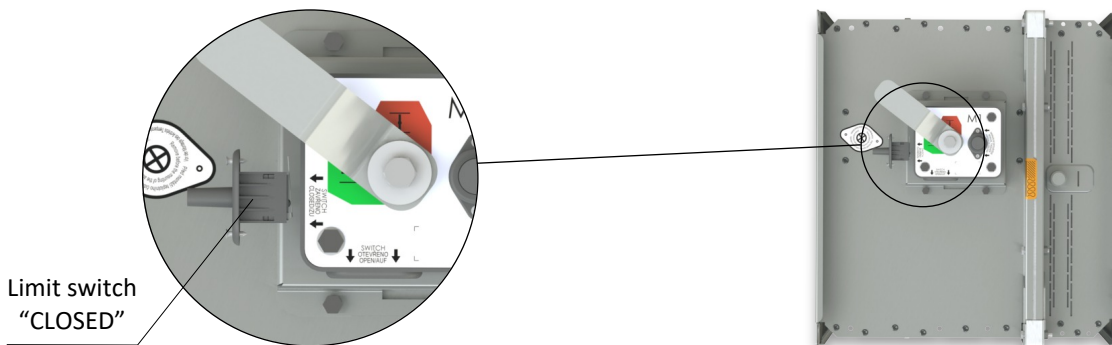
Design .01

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

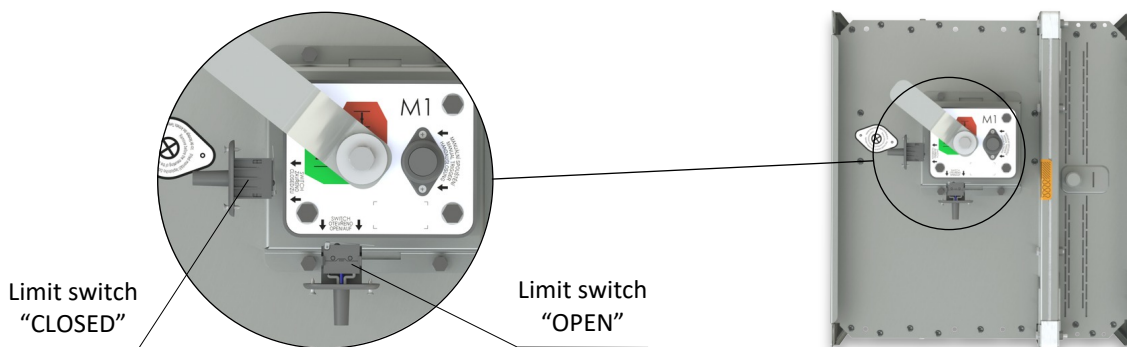
- Design .01 with manual control can be complemented with a limit switch signaling of the damper blade position "CLOSED".
- Cable is connected directly to limit switch.
- Limit switch detail → see page 5



Design .11

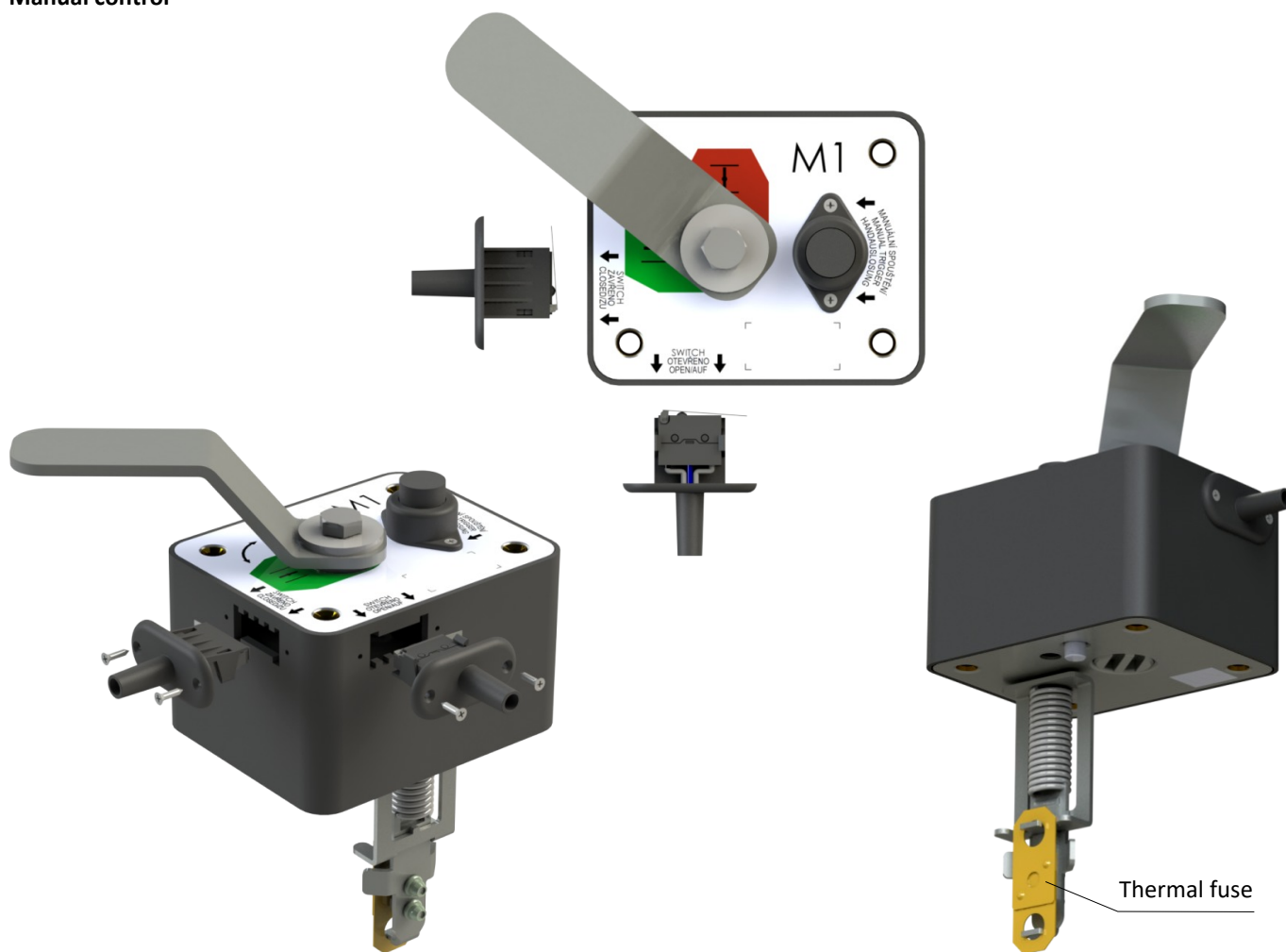
Design .80

- 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

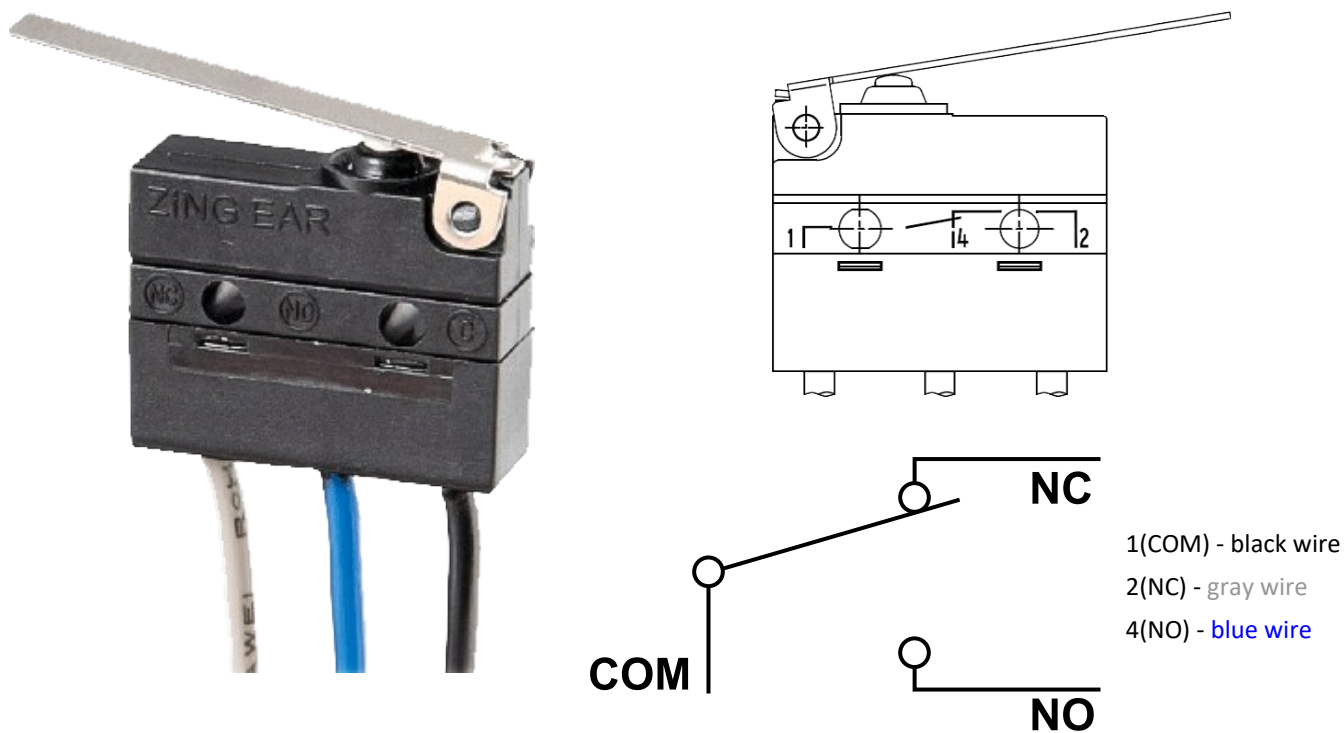


Design .80

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

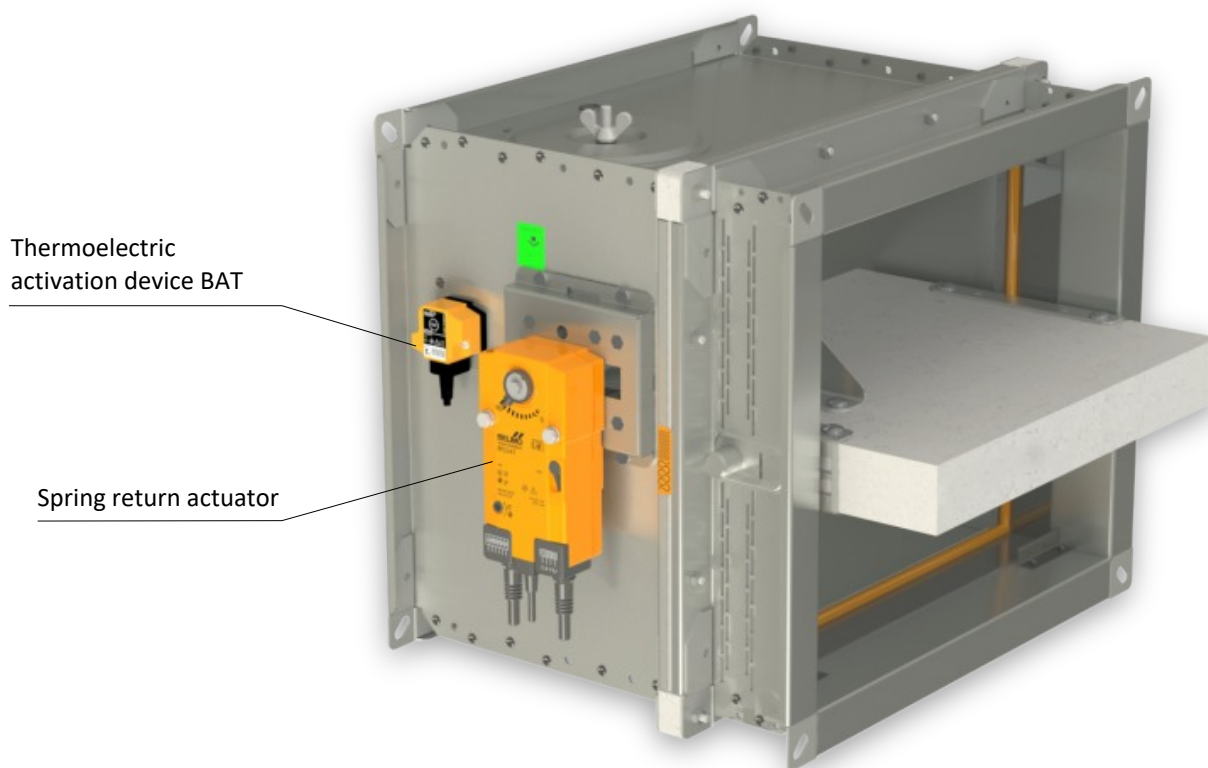
This limit switch is possible to connect in two following ways

- 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

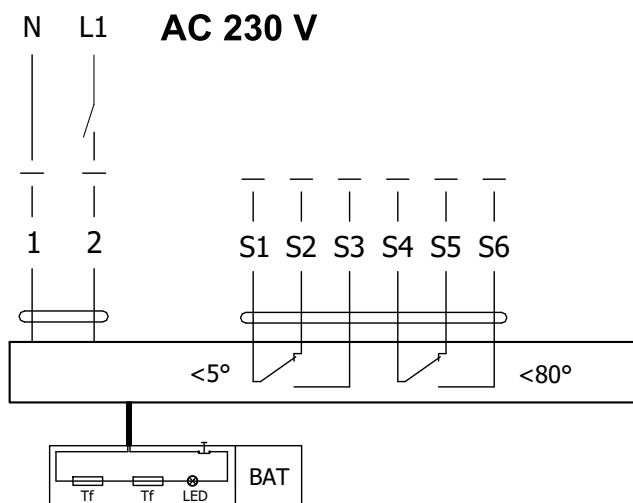
Design .40 and .50

- 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.

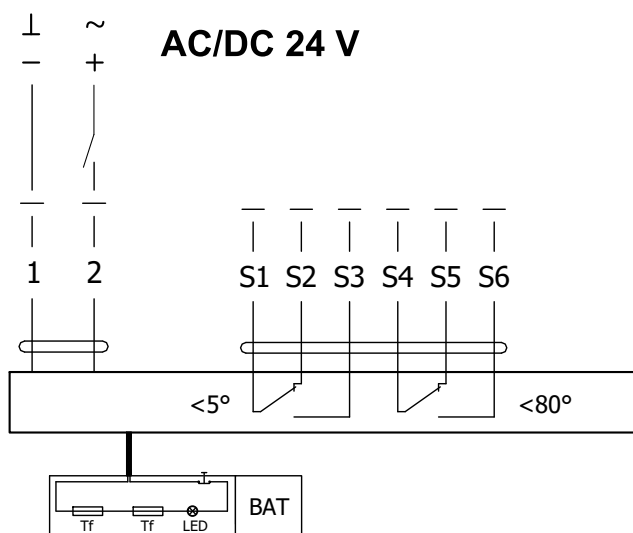


Design .40 and .50

Actuator BELIMO BFL 230-T



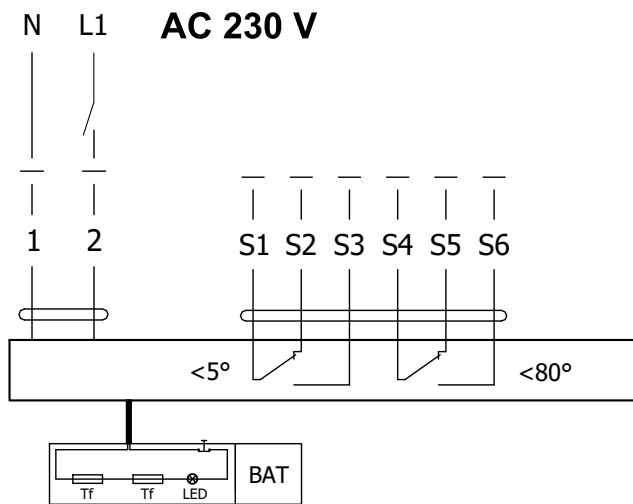
Actuator BELIMO BFL 24-T(-ST)



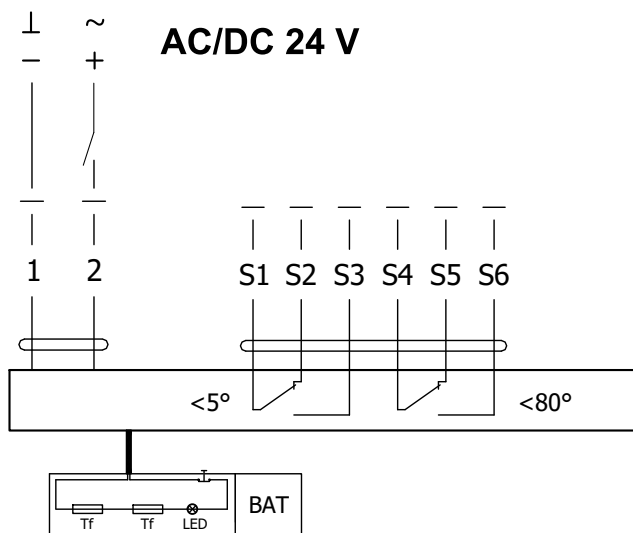
Actuator BELIMO BFL 230-T(-ST), BFL 24-T(-ST)

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

Actuator BELIMO BFN 230-T



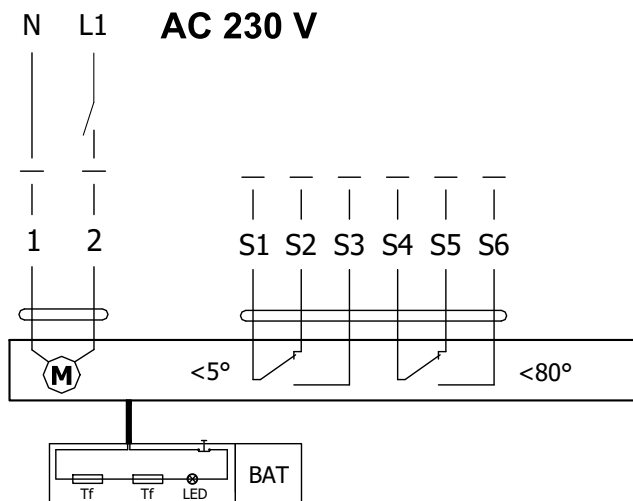
Actuator BELIMO BFN 24-T(-ST)



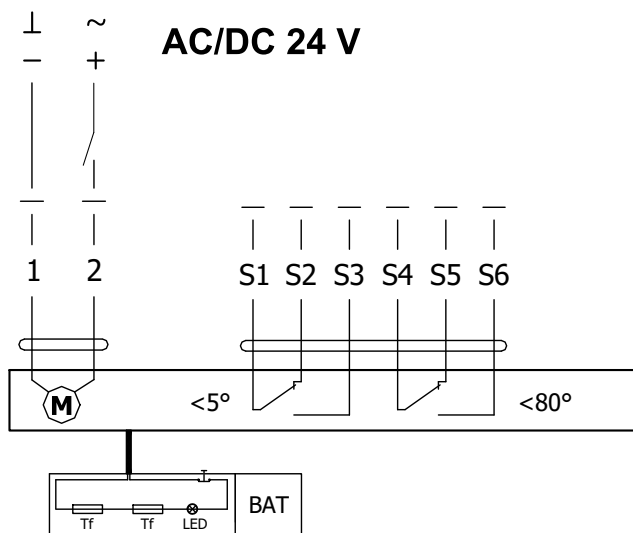
Actuator BELIMO BFN 230-T(-ST), BFN 24-T(-ST)

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

Actuator BELIMO BF 230-TN



Actuator BELIMO BF 24-TN (-ST)



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

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

Thermoelectric activation device BAT

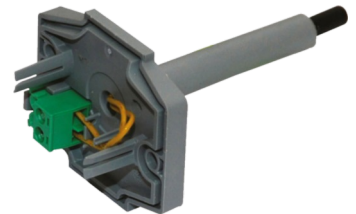
- If the thermal fuse Tf1 is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. Thermoelectric activation device BAT is integral part of the actuator.
- If the thermal fuse Tf2 is interrupted (due to temperature inside the duct), only the spare part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



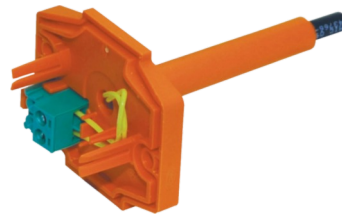
BELIMO ZBAT 72
Black (BK) = 72°C (standard)



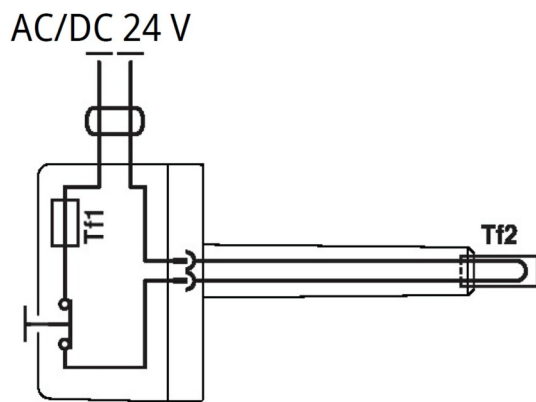
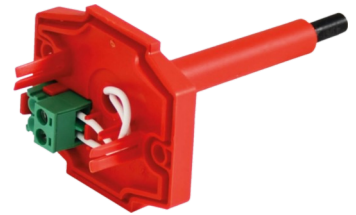
BELIMO ZBAT 95
Grey (GY) = 95°C



BELIMO ZBAT 120
Orange (OG) = 120°C



BELIMO ZBAT 140
Red (RD) = 140°C



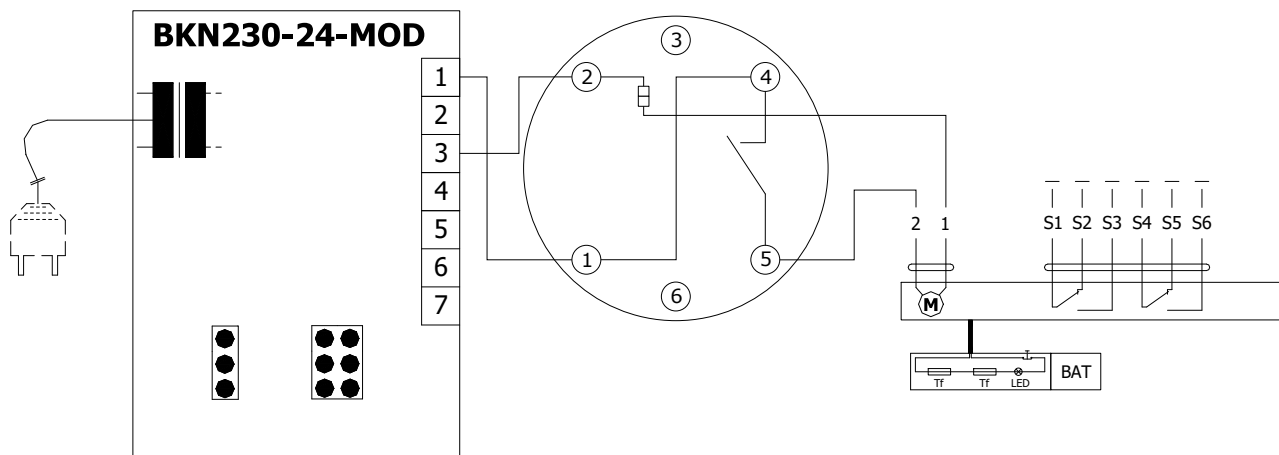
Thermoelectric activation device BAT 72 (95/120/140)

Power voltage	AC/DC 24 V 50/60Hz
Rated current	1 A
AC/DC throughput resistance	<1 Ω
Protection class	III
Degree of protection	IP 54
Probe length	65 mm
Ambient temperature	-30°C ... +50°C
Storage temperature	-40°C ... +50°C
Ambient humidity	Max. 95% RH, non-condensing
Connection supply	Cable 1 m, 2 x 0.5 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

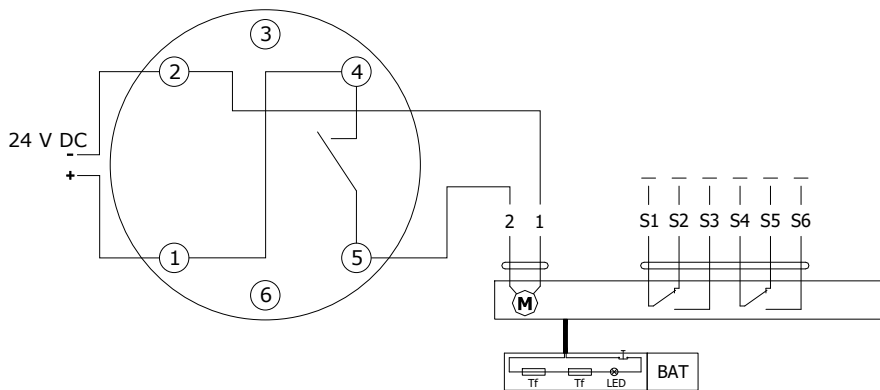
Design .41 and .51

- 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

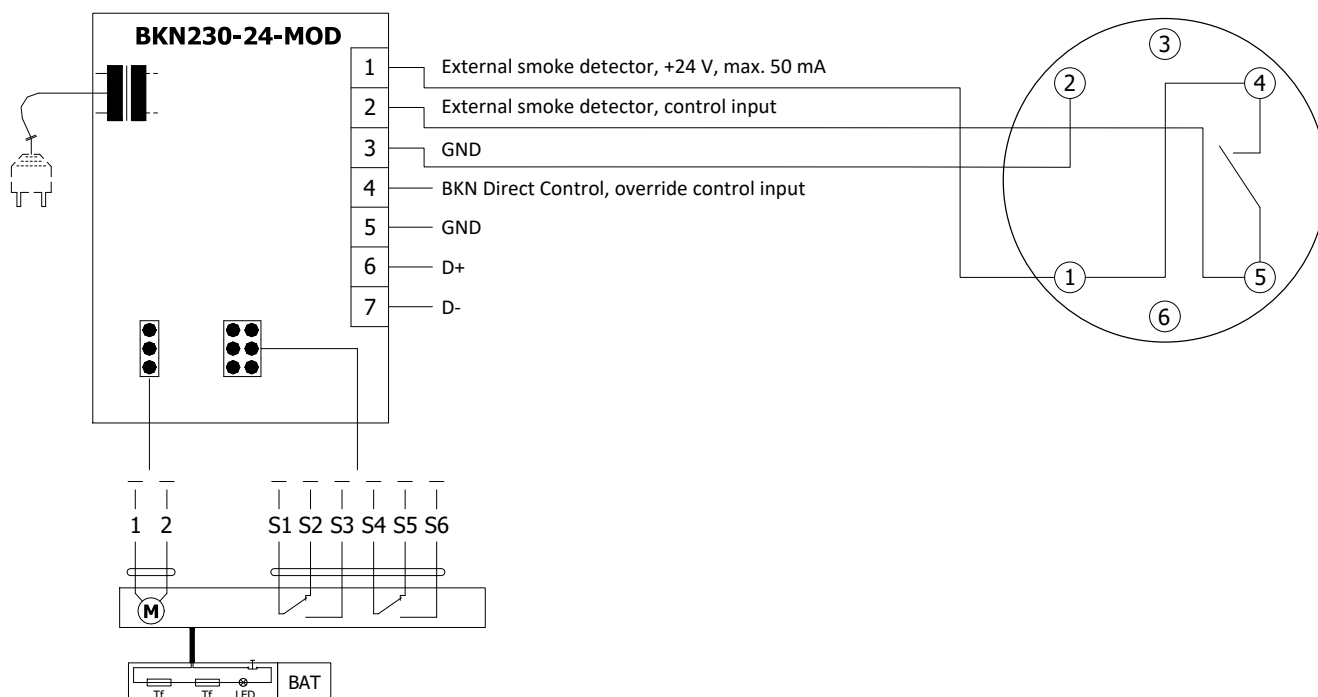
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3 W (operating position)
Dimensioning	14 VA (including actuator)
Protection Class	II
Degree of protection	IP 40
Ambient temperature	-20°C ... +50°C
Non-operating temperature	-40°C ... +80°C
Connection - net	cable 0,9 m with EURO plug type 26
- motor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

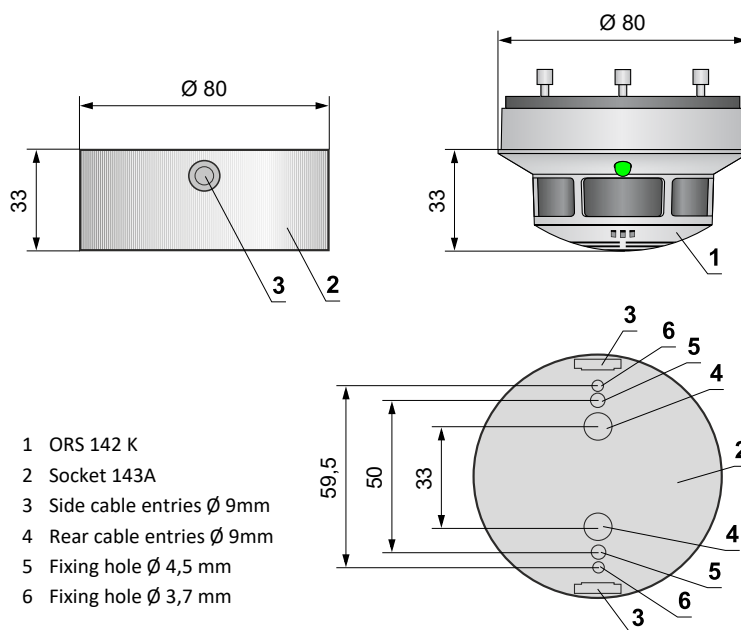
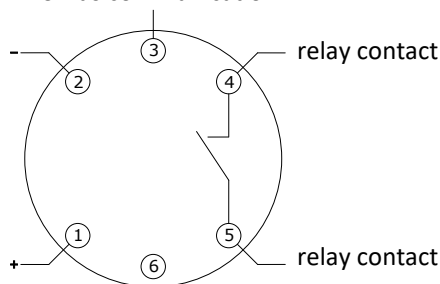
ORS 142 K



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	-

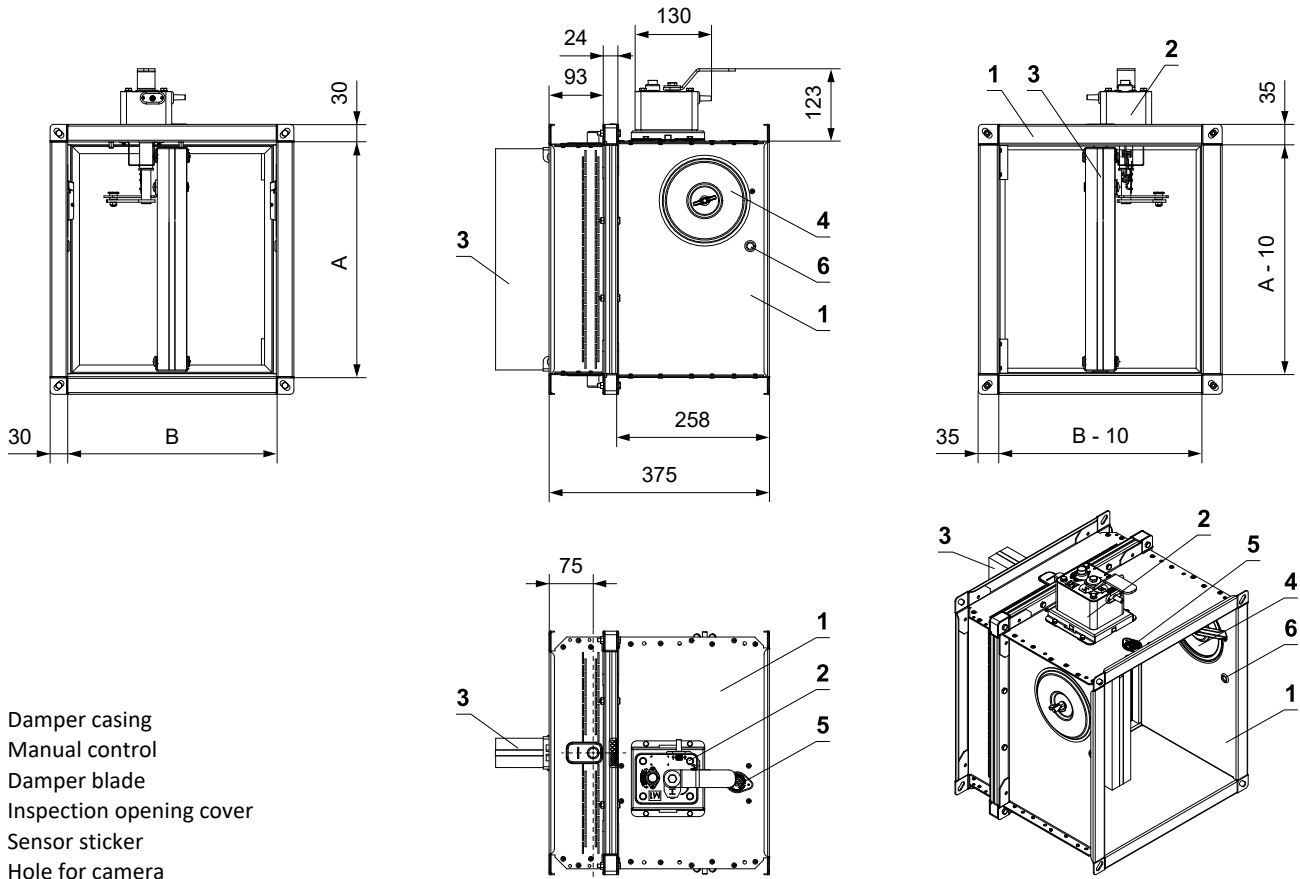
- 1 ORS 142 K
- 2 Socket 143A
- 3 Side cable entries Ø 9mm
- 4 Rear cable entries Ø 9mm
- 5 Fixing hole Ø 4,5 mm
- 6 Fixing hole Ø 3,7 mm

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

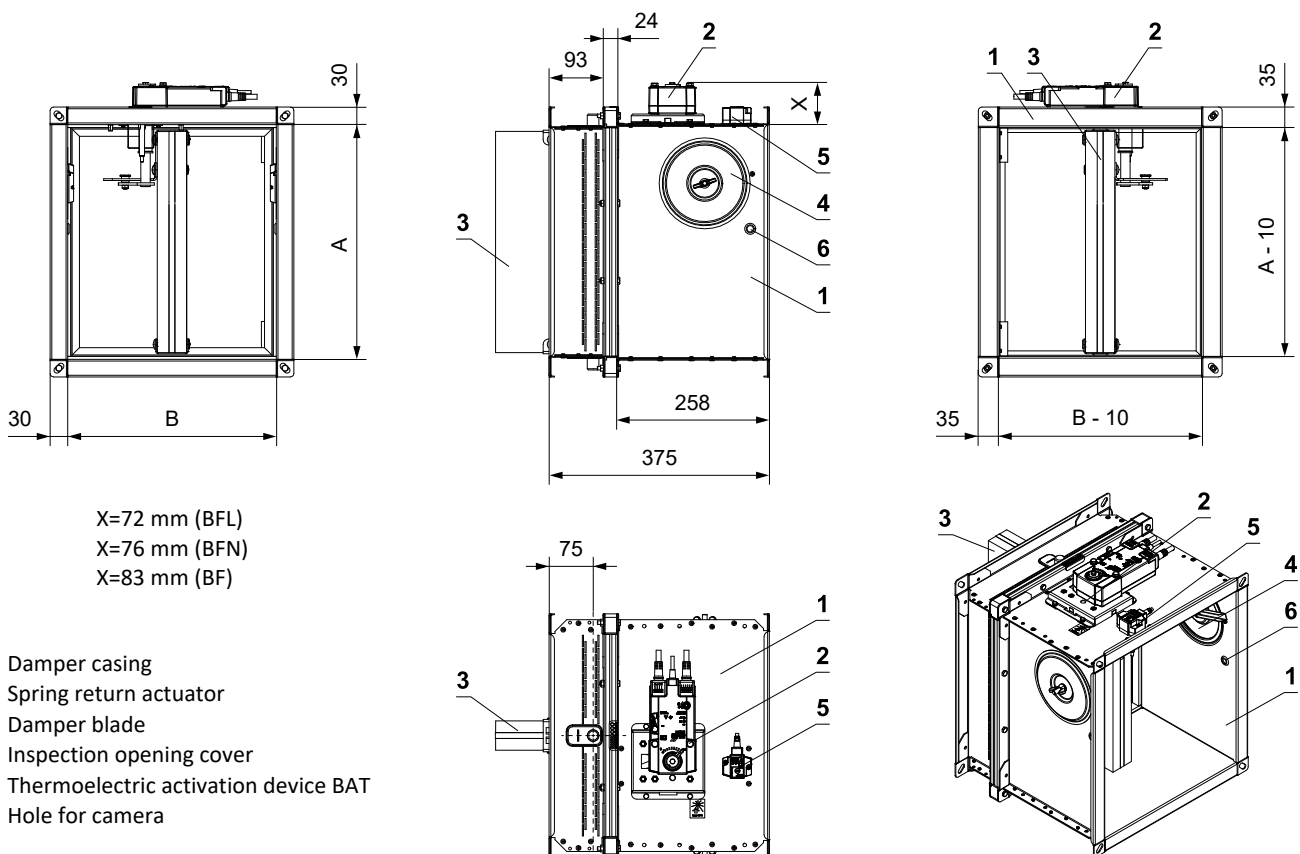
III. DIMENSIONS

FDMQ 120 with manual control



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

FDMQ 120 with spring return actuator

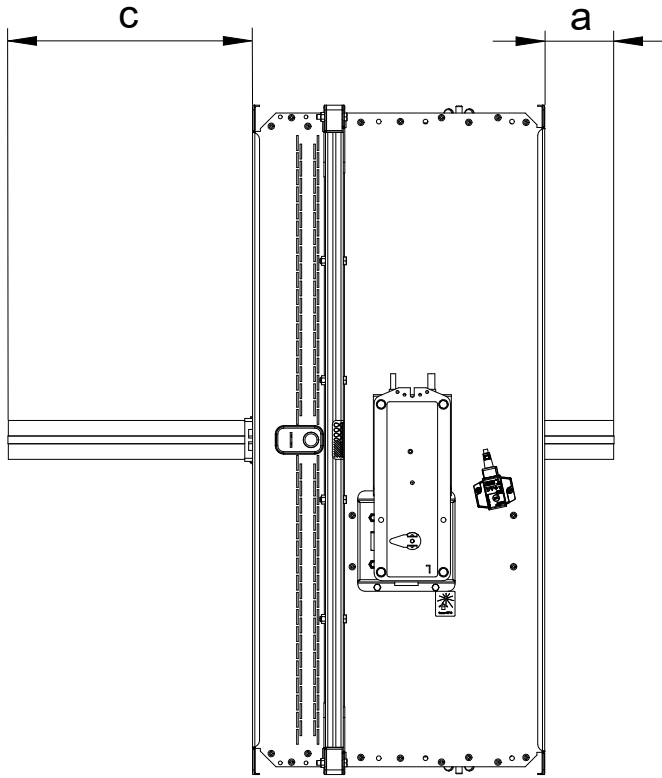


X=72 mm (BFL)
 X=76 mm (BFN)
 X=83 mm (BF)

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

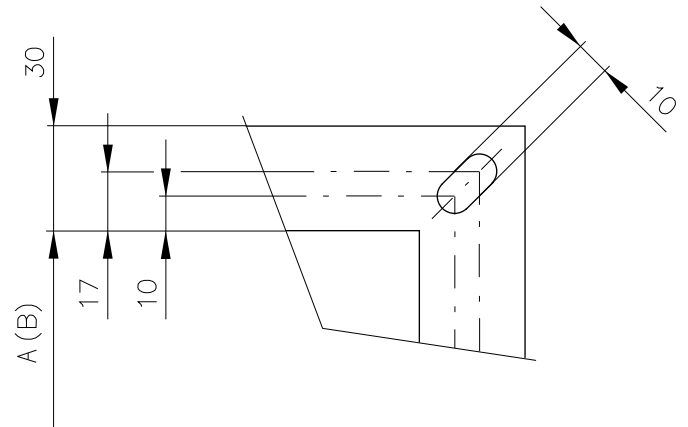
Damper blade overlaps

- 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

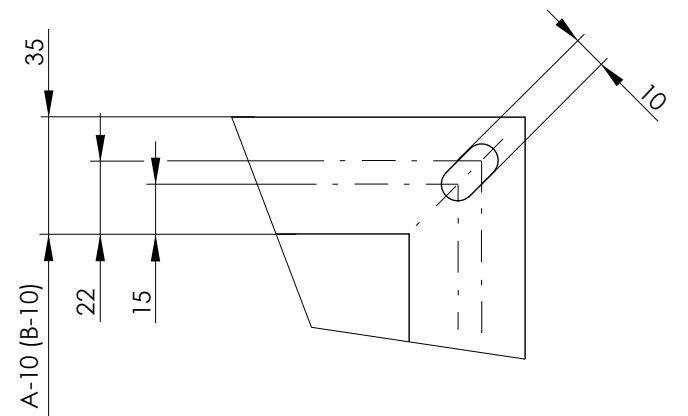


Values "a" and "c" has to be respected when projecting following air-conditioning duct.

Flange of a damper - CONTROL SIDE



Flange of a damper - INSTALLATION SIDE



Flanges of dampers are 30 mm wide with oval hole.

Technical parameters

A x B [mm]	Damper blades overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Effective area Sef [m²]	Spring return actuator	Manual control						
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*									
150 x	-	-	8,3	8,4	0,0094	BFL	M1	200 x	650	3	248	20,1	20,2	0,1006	BFL						
	-	13	8,8	8,9	0,0131				700	28	273	21,2	21,6	0,1094	BFN	M2					
	-	23	9,1	9,2	0,0156				710	33	278	21,4	21,8	0,1111							
	-	35,5	9,7	9,8	0,0188				750	53	298	22,2	22,6	0,1181							
	-	48	10,2	10,3	0,0219				800	78	323	23,2	23,6	0,1269							
	-	63	10,7	10,8	0,0256				BFL	M2	225 x	150	-	-	10,0	10,1	0,0150	BFL	M1		
	-	73	11,3	11,4	0,0281							180	-	13	10,6	10,7	0,0210				
	-	80,5	11,5	11,6	0,0300							200	-	23	11,0	11,1	0,0250				
	-	100,5	12,5	12,6	0,0350							225	-	36	11,7	11,8	0,0300				
	-	123	13,4	13,5	0,0406							250	-	48	12,3	12,4	0,0350				
	-	148	14,3	14,4	0,0469							280	-	63	12,9	13,0	0,0410				
	-	173	15,2	15,3	0,0531							300	-	73	13,5	13,6	0,0450				
	-	198	15,8	15,9	0,0594							315	-	80,5	13,9	14,0	0,0480				
	-	203	16,0	16,1	0,0606							355	-	100,5	15,0	15,1	0,0560				
-	223	16,7	16,8	0,0656	400	-	123	16,0				16,1	0,0650								
-	238	17,3	17,4	0,0694	450	-	148	17,1				17,2	0,0750								
180 x	-	-	9,1	9,2	0,0116	BFL	M1	250 x				500	-	173	18,2	18,3	0,0850			BFL	M2
	-	13	9,7	9,8	0,0163							550	-	198	19,0	19,1	0,0950				
	-	23	10,1	10,2	0,0194							560	-	203	19,2	19,3	0,0970				
	-	36	10,7	10,8	0,0233				600	-	223	20,1	20,5	0,1050							
	-	48	11,2	11,3	0,0271				630	-	238	20,8	21,2	0,1110							
	-	63	11,8	11,9	0,0318				650	3	248	21,2	21,6	0,1150							
	-	73	12,4	12,5	0,0349				700	28	273	22,3	22,7	0,1250							
	-	80,5	12,7	12,8	0,0372				710	33	278	22,5	22,9	0,1270							
	-	100,5	13,7	13,8	0,0434				750	53	298	23,4	23,8	0,1350							
	-	123	14,6	14,7	0,0504				800	78	323	24,5	24,9	0,1450							
	-	148	15,6	15,7	0,0581				BFL	M2	250 x	150	-	-	10,4	10,5	0,0169	BFL	M1		
	-	173	16,6	16,7	0,0659							180	-	13	12,1	12,2	0,0236				
	-	198	14,4	14,5	0,0736							200	-	23	11,5	11,6	0,0281				
	-	203	17,5	17,6	0,0752							225	-	36	12,3	12,4	0,0338				
-	223	18,3	18,4	0,0814	250	-	48	12,8				12,9	0,0394								
-	238	18,9	19,0	0,0860	280	-	63	13,5				13,6	0,0461								
3	248	19,3	19,4	0,0891	300	-	73	14,2				14,3	0,0506								
28	273	20,3	20,7	0,0969	315	-	80,5	14,5				14,6	0,0540								
33	278	20,5	20,9	0,0984	355	-	100,5	15,7				15,8	0,0630								
53	298	21,3	21,7	0,1046	400	-	123	16,7				16,8	0,0731								
78	323	22,2	22,6	0,1124	450	-	148	17,9				18,0	0,0844								
200 x	-	-	9,5	9,6	0,0131	BFL	M1	250 x				500	-	173	19,0	19,1	0,0956			BFL	M2
	-	13	10,1	10,2	0,0184							550	-	198	19,9	20,0	0,1069				
	-	23	10,5	10,6	0,0219							560	-	203	20,1	20,2	0,1091				
	-	36	11,2	11,3	0,0263				600	-	223	21,1	21,5	0,1181							
	-	48	11,7	11,8	0,0306				630	-	238	21,8	22,2	0,1249							
	-	63	12,3	12,4	0,0359				650	3	248	22,3	22,7	0,1294							
	-	73	12,9	13,0	0,0394				700	28	273	23,4	23,8	0,1406							
	-	80,5	13,2	13,3	0,0420				710	33	278	23,6	24,0	0,1429							
	-	100,5	14,3	14,4	0,0490				750	53	298	24,6	25,0	0,1519							
	-	123	15,2	15,3	0,0569				800	78	323	25,7	26,1	0,1631							
	-	148	16,2	16,3	0,0656				BFL	M2	280 x	150	-	-	11,0	11,1	0,0191	BFL	M1		
	-	173	17,3	17,4	0,0744							180	-	13	11,7	11,8	0,0268				
	-	198	18,0	18,1	0,0831							200	-	23	12,2	12,3	0,0319				
	-	203	18,2	18,3	0,0849							225	-	36	12,9	13,0	0,0383				
-	223	19,1	19,2	0,0919	250	-	48	13,5				13,6	0,0446								
-	238	19,7	19,8	0,0971	280	-	63	14,3				14,4	0,0523								

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 blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
280 x	300	-	73	14,9	15,0	0,0574	BFL	315 x	710	33	278	26,4	26,8	0,1842	BFL	M1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	315	-	80,5	15,3	15,4	0,0612			355	-	100,5	16,5	16,6	0,0714			400	-	123	17,6	17,7	0,0829	450	-	148	18,9	19,0	0,0956	500	-	173	20,1	20,2	0,1084	550	-	198	21,0	21,1	0,1211	560	-	203	21,3	21,7	0,1237	600	-	223	22,3	22,7	0,1339	630	-	238	23,0	23,4	0,1415	650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4	0,0206	BFL	355 x	450	-	148	21,4	21,5	0,1238	BFL	M2	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-	148	22,8	22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																							
	355	-	100,5	16,5	16,6	0,0714			400	-	123	17,6	17,7	0,0829			450	-	148	18,9	19,0	0,0956	500	-	173	20,1	20,2	0,1084	550	-	198	21,0	21,1	0,1211	560	-	203	21,3	21,7	0,1237	600	-	223	22,3	22,7	0,1339	630	-	238	23,0	23,4	0,1415	650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-	148			21,4	21,5	0,1238	BFL	M2	180			-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x		150	-	-	11,6	11,7	0,0218			BFL	400 x	450	-	148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28		273	26,1	26,5	0,1813	355 x	150			-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																														
	400	-	123	17,6	17,7	0,0829			450	-	148	18,9	19,0	0,0956			500	-	173	20,1	20,2	0,1084	550	-	198	21,0	21,1	0,1211	560	-	203	21,3	21,7	0,1237	600	-	223	22,3	22,7	0,1339	630	-	238	23,0	23,4	0,1415	650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5	0,1238			BFL	M2	180			-			13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x			150	-	-	11,6	11,7	0,0218					BFL	400 x	450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8		25,2	0,1668	700	28		273			26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																					
	450	-	148	18,9	19,0	0,0956			500	-	173	20,1	20,2	0,1084			550	-	198	21,0	21,1	0,1211	560	-	203	21,3	21,7	0,1237	600	-	223	22,3	22,7	0,1339	630	-	238	23,0	23,4	0,1415	650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2	180					-			13			12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x				150	-	-	11,6	11,7	0,0218							BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610		650	3	248	24,8		25,2			0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																												
	500	-	173	20,1	20,2	0,1084			550	-	198	21,0	21,1	0,1211			560	-	203	21,3	21,7	0,1237	600	-	223	22,3	22,7	0,1339	630	-	238	23,0	23,4	0,1415	650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180					-					13			12,1			12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x					150	-	-	11,6	11,7	0,0218											BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-		238	24,3	24,7	0,1610		650			3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																			
	550	-	198	21,0	21,1	0,1211			560	-	203	21,3	21,7	0,1237			600	-	223	22,3	22,7	0,1339	630	-	238	23,0	23,4	0,1415	650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-					13					12,1			12,2			0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x						150	-	-	11,6	11,7	0,0218															BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6		24,0	0,1680	630	-		238			24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																										
	560	-	203	21,3	21,7	0,1237			600	-	223	22,3	22,7	0,1339			630	-	238	23,0	23,4	0,1415	650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-						13					12,1					12,2			0,0289			200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x							150	-	-	11,6	11,7	0,0218																			BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407		600	-	223	23,6		24,0			0,1680	630	-		238					24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																	
	600	-	223	22,3	22,7	0,1339			630	-	238	23,0	23,4	0,1415			650	3	248	23,5	23,9	0,1466	700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-						13						12,1					12,2					0,0289			200			-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x								150	-	-	11,6	11,7	0,0218																							BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-		203	22,6	23,0	0,1407		600			-	223	23,6		24,0					0,1680	630	-		238					24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																								
	630	-	238	23,0	23,4	0,1415			650	3	248	23,5	23,9	0,1466			700	28	273	24,7	25,1	0,1594	710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-						13						12,1						12,2					0,0289					200			-			23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x									150	-	-	11,6	11,7	0,0218																											BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3		22,7	0,1378	560	-		203			22,6	23,0	0,1407		600					-	223	23,6		24,0					0,1680	630	-		238					24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																															
	650	3	248	23,5	23,9	0,1466			700	28	273	24,7	25,1	0,1594			710	33	278	25,0	25,4	0,1619	750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-						13						12,1						12,2						0,0289					200					-			23			12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x										150	-	-	11,6	11,7	0,0218																															BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233		550	-	198	22,3		22,7			0,1378	560	-		203					22,6	23,0	0,1407		600					-	223	23,6		24,0					0,1680	630	-		238					24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																						
	700	28	273	24,7	25,1	0,1594			710	33	278	25,0	25,4	0,1619			750	53	298	26,0	26,4	0,1721	800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-						13						12,1						12,2						0,0289						200					-					23			12,6			12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x											150	-	-	11,6	11,7	0,0218																																			BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-		173	21,5	21,6	0,1233		550			-	198	22,3		22,7					0,1378	560	-		203					22,6	23,0	0,1407		600					-	223	23,6		24,0					0,1680	630	-		238					24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994													
	710	33	278	25,0	25,4	0,1619			750	53	298	26,0	26,4	0,1721			800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-						13						12,1						12,2						0,0289						200						-					23					12,6			12,7			0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x												150	-	-	11,6	11,7	0,0218																																							BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2		20,3	0,1088	500	-		173			21,5	21,6	0,1233		550					-	198	22,3		22,7					0,1378	560	-		203					22,6	23,0	0,1407		600					-	223	23,6		24,0					0,1680	630	-		238					24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994				
	750	53	298	26,0	26,4	0,1721			800	78	323	27,2	27,6	0,1849			300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-		148			21,4	21,5		0,1238			BFL	M2		180						-						13						12,1						12,2						0,0289						200						-						23					12,6					12,7			0,0344			225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x													150	-	-	11,6	11,7	0,0218																																											BFL	400 x			450	-			148	22,8			22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943		450	-	148	20,2		20,3			0,1088	500	-		173					21,5	21,6	0,1233		550					-	198	22,3		22,7					0,1378	560	-		203					22,6	23,0	0,1407		600					-	223	23,6		24,0					0,1680	630	-		238					24,3	24,7	0,1610		650					3	248	24,8		25,2					0,1668	700	28		273					26,1	26,5	0,1813	355 x	150					-	-	11,3	11,4	0,0206	BFL			450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800
800	78	323	27,2	27,6	0,1849	300 x	150	-	-	11,3	11,4	0,0206	BFL	355 x	450	-		148	21,4	21,5	0,1238	BFL		M2			180	-		13			12,1	12,2		0,0289						200						-						23						12,6						12,7						0,0344						225						-						36					13,4					13,5			0,0413			250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7														0,0218	BFL	400 x	450	-	148																																															22,8	22,9			0,1406	BFL			M3	180			-	13	12,4	12,5	0,0305	200	-	23	12,9	13,0	0,0363	225	-	36	13,7	13,8	0,0435	250	-	48	14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450		-	148	20,2	20,3		0,1088			500	-	173		21,5					21,6	0,1233	550		-					198	22,3	22,7		0,1378					560	-	203		22,6					23,0	0,1407	600		-					223	23,6	24,0		0,1680					630	-	238		24,3					24,7	0,1610	650		3					248	24,8	25,2		0,1668					700	28	273		26,1					26,5	0,1813	355 x		150					-	-	11,3	11,4	0,0206					BFL	450 x	450	-	148	21,4			21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289	200	-	23	12,6	12,7	0,0344	225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298
300 x	150	-	-	11,3	11,4		0,0206	BFL	355 x	450	-	148			21,4	21,5		0,1238	BFL	M2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	180	-	13	12,1	12,2		0,0289			200	-	23			12,6	12,7		0,0344			225						-	36		13,4			13,5	0,0413		250						-						48						14,0						14,1						0,0481						280						-					63	14,8					14,9	0,0564	300	-			73	15,7	15,8			0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-	148	22,8	22,9	0,1406	BFL	M3	180	-	13	12,4	12,5	0,0305		200	-	23	12,9	13,0												0,0363	225	-			36	13,7	13,8	0,0435	250	-	48					14,3	14,4			0,0508	280																																	-	63			15,1					15,2			0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2		0,1668	700	28	273	26,1	26,5	0,1813	355 x		150		-	-		11,3	11,4	0,0206		BFL					450 x	450	-		148					21,4	21,5	0,1238		BFL					M1	180	-		13					12,1	12,2	0,0289		200					-	23	12,6		12,7					0,0344	225	-		36					13,4	13,5	0,0413		250					-	48			14,0					14,1	0,0481	280	-	63							14,8	14,9	0,0564	300			-	73			15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																								
	200	-	23	12,6	12,7		0,0344			225	-	36			13,4	13,5		0,0413			250						-	48		14,0			14,1	0,0481		280						-						63						14,8						14,9						0,0564						300					-	73					15,7	15,8	0,0619	315			-	80,5	16,1	16,2			0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-	13	12,4	12,5	0,0305			200	-	23	12,9	13,0	0,0363		225	-	36	13,7	13,8											0,0435	250	-	48			14,3	14,4	0,0508	280	-	63	15,1	15,2	0,0595			300	-			73	16,1			16,2	0,0653																													315	-			80,5					16,5			16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-	148			21,4	21,5	0,1238	BFL	M1	180	-	13				12,1	12,2			0,0289	200		-					23	12,6	12,7								0,0344	225		-					36	13,4	13,5		0,0413					250	-	48		14,0					14,1	0,0481	280		-					63	14,8	14,9		0,0564					300	-			73					15,7	15,8	0,0619	315	-							80,5	16,1	16,2	0,0660			355	-			100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																			
	225	-	36	13,4	13,5		0,0413			250	-	48			14,0	14,1		0,0481			280						-	63		14,8			14,9	0,0564		300						-						73						15,7						15,8						0,0619					315	-					80,5	16,1	16,2	0,0660			355	-	100,5	17,3			17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-	23	12,9	13,0	0,0363			225	-	36	13,7	13,8	0,0435		250	-	48	14,3	14,4										0,0508	280	-	63	15,1			15,2	0,0595	300	-	73	16,1	16,2	0,0653	315	-	80,5	16,5	16,6			0,0696	355			-	100,5			17,7	17,8																									0,0812	400			-					123			18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-	13		12,1	12,2	0,0289	200			-	23	12,6			12,7	0,0344	225	-		36	13,4		13,5		0,0413	250		-	48	14,0								14,1	0,0481		280					-	63	14,8		14,9					0,0564	300	-		73					15,7	15,8	0,0619		315					-	80,5	16,1		16,2					0,0660	355			-					100,5	17,3	17,4	0,0770	400							-	123	18,5	18,6			0,0894	450			-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																														
	250	-	48	14,0	14,1		0,0481			280	-	63			14,8	14,9		0,0564			300						-	73		15,7			15,8	0,0619		315						-						80,5						16,1						16,2					0,0660	355					-	100,5	17,3	17,4			0,0770	400	-	123			18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-	36	13,7	13,8	0,0435			250	-	48	14,3	14,4	0,0508		280	-	63	15,1	15,2									0,0595	300	-	73	16,1	16,2			0,0653	315	-	80,5	16,5	16,6	0,0696	355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9			19,0	0,0943			450	-			148	20,2																					20,3	0,1088			500					-			173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-	23		12,6	12,7	0,0344	225			-	36	13,4	13,5		0,0413	250	-	48		14,0	14,1		0,0481	280	-	63	14,8	14,9	0,0564	300				-	73			15,7	15,8		0,0619					315	-	80,5		16,1					16,2	0,0660	355		-					100,5	17,3	17,4		0,0770					400	-	123		18,5					18,6	0,0894			450					-	148	19,7	19,8	0,1031							500	-	173	21,0			21,1	0,1169			550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																									
	280	-	63	14,8	14,9		0,0564			300	-	73			15,7	15,8		0,0619			315						-	80,5		16,1			16,2	0,0660		355						-						100,5						17,3					17,4	0,0770					400	-	123	18,5			18,6	0,0894	450	-			148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-	48	14,3	14,4	0,0508			280	-	63	15,1	15,2	0,0595		300	-	73	16,1	16,2								0,0653	315	-	80,5	16,5	16,6	0,0696			355	-	100,5	17,7	17,8	0,0812	400	-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173			21,5	21,6			0,1233	550			-	198																	22,3	22,7			0,1378					560			-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-	36		13,4	13,5	0,0413	250			-	48	14,0	14,1		0,0481	280	-	63		14,8	14,9	0,0564	300	-	73	15,7	15,8	0,0619	315	-			80,5	16,1	16,2	0,0660		355	-		100,5		17,3	17,4		0,0770	400	-		123					18,5	18,6	0,0894		450					-	148	19,7		19,8					0,1031	500	-		173					21,0	21,1			0,1169					550	-	198	21,8	22,2							0,1306	560	-	203			22,0	22,4			0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																				
	300	-	73	15,7	15,8		0,0619			315	-	80,5			16,1	16,2		0,0660			355						-	100,5		17,3			17,4	0,0770		400						-						123					18,5	18,6					0,0894	450	-	148			19,7	19,8	0,1031	500			-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-	63	15,1	15,2	0,0595			300	-	73	16,1	16,2	0,0653		315	-	80,5	16,5	16,6							0,0696	355	-	100,5	17,7	17,8	0,0812	400			-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-			203	22,6			23,0	0,1407			600	-													223	23,6			24,0					0,1680			630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-	48		14,0	14,1	0,0481	280			-	63	14,8	14,9		0,0564	300	-	73		15,7	15,8	0,0619	315	-	80,5	16,1	16,2	0,0660	355	-	100,5		17,3	17,4	0,0770	400		-	123		18,5	18,6	0,0894	450	-	148	19,7	19,8		0,1031		500	-		173	21,0	21,1		0,1169					550	-	198		21,8					22,2	0,1306	560		-					203	22,0			22,4					0,1334	600	-	223	23,0							23,4	0,1444	630	-			238	23,8			24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																															
	315	-	80,5	16,1	16,2		0,0660			355	-	100,5			17,3	17,4		0,0770			400						-	123		18,5			18,6	0,0894		450						-					148	19,7					19,8	0,1031	500	-			173	21,0	21,1	0,1169			550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-	73	16,1	16,2	0,0653			315	-	80,5	16,5	16,6	0,0696		355	-	100,5	17,7	17,8						0,0812	400	-	123	18,9	19,0	0,0943	450	-			148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630			-	238			24,3	24,7			0,1610	650									3	248			24,8					25,2			0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-	63		14,8	14,9	0,0564	300			-	73	15,7	15,8		0,0619	315	-	80,5		16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-	123		18,5	18,6	0,0894	450		-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169		550	-	198	21,8	22,2	0,1306	560	-		203		22,0	22,4		0,1334	600	-		223					23,0	23,4	0,1444		630					-	238			23,8					24,2	0,1526	650	3	248							24,3	24,7	0,1581	700			28	273			25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																										
	355	-	100,5	17,3	17,4		0,0770			400	-	123			18,5	18,6		0,0894			450						-	148		19,7			19,8	0,1031		500					-	173					21,0	21,1	0,1169	550			-	198	21,8	22,2			0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-	80,5	16,5	16,6	0,0696			355	-	100,5	17,7	17,8	0,0812		400	-	123	18,9	19,0					0,0943	450	-	148	20,2	20,3	0,1088	500	-	173			21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668			700	28			273	26,1			26,5	0,1813					355 x	150			-					-			11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-	73		15,7	15,8	0,0619	315			-	80,5	16,1	16,2		0,0660	355	-	100,5		17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148		19,7	19,8	0,1031	500		-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223		23,0	23,4	0,1444	630	-	238	23,8	24,2		0,1526		650	3		248	24,3	24,7		0,1581					700	28			273					25,5	25,9	0,1719	710	33							278	25,8	26,2	0,1746			750	53			298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																					
	400	-	123	18,5	18,6		0,0894			450	-	148			19,7	19,8		0,1031			500						-	173		21,0			21,1	0,1169	550	-					198	21,8	22,2	0,1306			560	-	203	22,0			22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-		80,5	16,5	16,6	0,0696					355	-	100,5	17,7	17,8	0,0812			400	-	123	18,9	19,0	0,0943		450	-	148	20,2	20,3				0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3			22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3			11,4	0,0206			BFL	450 x			450	-		148			21,4					21,5			0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-	80,5		16,1	16,2	0,0660	355			-	100,5	17,3	17,4		0,0770	400	-	123		18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173		21,0	21,1	0,1169	550		-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581		700	28	273	25,5	25,9	0,1719	710	33		278		25,8	26,2		0,1746	750			53					298	26,8	27,2	0,1856	800							78	323	28,0	28,4			0,1994																																																																																																																		
	450	-	148	19,7	19,8		0,1031			500	-	173			21,0	21,1		0,1169			550						-	198	21,8	22,2			0,1306	560	-	203	22,0	22,4			0,1334	600	-	223			23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-		80,5	16,5	16,6	0,0696					355	-		100,5	17,7	17,8	0,0812					400	-	123	18,9	19,0	0,0943			450	-	148	20,2	20,3	0,1088		500	-	173	21,5	21,6			0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0			0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206		BFL	450 x	450	-	148	21,4	21,5	0,1238							BFL	M1		180	-	13	12,1					12,2			0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-	100,5		17,3	17,4	0,0770	400			-	123	18,5	18,6		0,0894	450	-	148		19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198		21,8	22,2	0,1306	560		-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298		26,8	27,2	0,1856	800	78	323	28,0			28,4		0,1994																																																																																																																																						
	500	-	173	21,0	21,1		0,1169			550	-	198			21,8	22,2		0,1306			560		-				203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-			238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-		80,5	16,5	16,6	0,0696					355	-		100,5	17,7	17,8	0,0812					400	-		123	18,9	19,0	0,0943					450	-	148	20,2	20,3	0,1088			500	-	173	21,5	21,6	0,1233		550	-	198	22,3	22,7		0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680			630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206		BFL	450 x	450	-	148	21,4				21,5	0,1238	BFL	M1	180	-	13	12,1								12,2	0,0289	200	-		23	12,6		12,7			0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-	123		18,5	18,6	0,0894	450			-	148	19,7	19,8		0,1031	500	-	173		21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203		22,0	22,4	0,1334	600		-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																
	550	-	198	21,8	22,2		0,1306			560	-	203			22,0	22,4	0,1334	600			-		223		23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-		80,5	16,5	16,6	0,0696					355	-		100,5	17,7	17,8	0,0812					400	-		123	18,9	19,0	0,0943					450	-		148	20,2	20,3	0,1088					500	-	173	21,5	21,6	0,1233			550	-	198	22,3	22,7	0,1378		560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650			3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206		BFL	450 x	450	-	148	21,4				21,5	0,1238	BFL	M1				180	-			13	12,1	12,2	0,0289			200	-				23	12,6	12,7	0,0344		225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-		123	18,5	18,6	0,0894					450	-	148		19,7	19,8	0,1031	500			-	173	21,0	21,1		0,1169	550	-	198		21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223		23,0	23,4	0,1444	630		-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																						
	560	-	203	22,0	22,4	0,1334	600			-	223	23,0	23,4	0,1444	630	-	238	23,8			24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-		80,5	16,5	16,6	0,0696					355	-		100,5	17,7	17,8	0,0812					400	-		123	18,9	19,0	0,0943					450	-		148	20,2	20,3	0,1088					500	-		173	21,5	21,6	0,1233					550	-	198	22,3	22,7	0,1378			560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x		450	-	148	21,4	21,5	0,1238				BFL	M1	180	-				13	12,1						12,2	0,0289			200	-	23	12,6			12,7	0,0344				225	-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-		123	18,5	18,6	0,0894					450	-		148	19,7	19,8	0,1031					500	-	173		21,0	21,1	0,1169	550			-	198	21,8	22,2		0,1306	560	-	203		22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238		23,8	24,2	0,1526	650		3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																												
600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7	0,0218	BFL	400 x	450	-		148	22,8	22,9	0,1406	BFL	M3			180	-		13	12,4	12,5	0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-		80,5	16,5	16,6	0,0696					355	-		100,5	17,7	17,8	0,0812					400	-		123	18,9	19,0	0,0943					450	-		148	20,2	20,3	0,1088					500	-		173	21,5	21,6	0,1233					550	-		198	22,3	22,7	0,1378					560	-	203	22,6	23,0	0,1407			600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-	148				21,4	21,5	0,1238	BFL	M1	180						-	13				12,1	12,2						0,0289	200			-	23	12,6	12,7			0,0344	225				-	36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280					-	63		14,8	14,9	0,0564	300					-	73		15,7	15,8	0,0619	315					-	80,5		16,1	16,2	0,0660	355					-	100,5		17,3	17,4	0,0770	400					-	123		18,5	18,6	0,0894	450					-	148		19,7	19,8	0,1031	500					-	173	21,0		21,1	0,1169	550	-			198	21,8	22,2	0,1306		560	-	203	22,0		22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8		24,2	0,1526	650	3		248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																													
630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7		0,0218	BFL	400 x	450	-	148			22,8	22,9		0,1406	BFL	M3	180					-	13		12,4	12,5	0,0305	200					-	23		12,9	13,0	0,0363	225					-	36		13,7	13,8	0,0435	250					-	48		14,3	14,4	0,0508	280					-	63		15,1	15,2	0,0595	300					-	73		16,1	16,2	0,0653	315					-	80,5		16,5	16,6	0,0696	355					-	100,5		17,7	17,8	0,0812	400					-	123		18,9	19,0	0,0943	450					-	148		20,2	20,3	0,1088	500					-	173		21,5	21,6	0,1233	550					-	198	22,3	22,7	0,1378	560	-			203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5	0,1238				BFL	M1	180			-						13	12,1				12,2	0,0289						200	-			23	12,6	12,7	0,0344			225	-				36	13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-					63	14,8		14,9	0,0564	300	-					73	15,7		15,8	0,0619	315	-					80,5	16,1		16,2	0,0660	355	-					100,5	17,3		17,4	0,0770	400	-					123	18,5		18,6	0,0894	450	-					148	19,7		19,8	0,1031	500	-					173	21,0	21,1	0,1169	550	-	198	21,8			22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																			
650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7		0,0218	BFL	400 x	450	-		148			22,8	22,9	0,1406			BFL	M3		180			-					13	12,4		12,5	0,0305	200	-					23	12,9		13,0	0,0363	225	-					36	13,7		13,8	0,0435	250	-					48	14,3		14,4	0,0508	280	-					63	15,1		15,2	0,0595	300	-					73	16,1		16,2	0,0653	315	-					80,5	16,5		16,6	0,0696	355	-					100,5	17,7		17,8	0,0812	400	-					123	18,9		19,0	0,0943	450	-					148	20,2		20,3	0,1088	500	-					173	21,5	21,6	0,1233	550	-	198			22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5		0,1238			BFL	M1	180						-			13						12,1	12,2				0,0289	200						-	23			12,6	12,7	0,0344	225			-	36				13,4	13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63					14,8	14,9		0,0564	300	-	73					15,7	15,8		0,0619	315	-	80,5					16,1	16,2		0,0660	355	-	100,5					17,3	17,4		0,0770	400	-	123					18,5	18,6		0,0894	450	-	148					19,7	19,8	0,1031	500	-	173	21,0			21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																									
700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7		0,0218	BFL	400 x	450	-		148			22,8	22,9		0,1406			BFL	M3	180						-			13					12,4	12,5		0,0305	200	-	23					12,9	13,0		0,0363	225	-	36					13,7	13,8		0,0435	250	-	48					14,3	14,4		0,0508	280	-	63					15,1	15,2		0,0595	300	-	73					16,1	16,2		0,0653	315	-	80,5					16,5	16,6		0,0696	355	-	100,5					17,7	17,8		0,0812	400	-	123					18,9	19,0		0,0943	450	-	148					20,2	20,3	0,1088	500	-	173	21,5			21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5		0,1238			BFL	M1		180					-						13			12,1						12,2	0,0289				200	-						23	12,6			12,7	0,0344	225	-			36	13,4				13,5	0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8					14,9	0,0564		300	-	73	15,7					15,8	0,0619		315	-	80,5	16,1					16,2	0,0660		355	-	100,5	17,3					17,4	0,0770		400	-	123	18,5					18,6	0,0894	450	-	148	19,7	19,8			0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																															
710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7		0,0218	BFL	400 x	450	-		148			22,8	22,9		0,1406			BFL	M3		180					-						13			12,4					12,5	0,0305		200	-	23	12,9					13,0	0,0363		225	-	36	13,7					13,8	0,0435		250	-	48	14,3					14,4	0,0508		280	-	63	15,1					15,2	0,0595		300	-	73	16,1					16,2	0,0653		315	-	80,5	16,5					16,6	0,0696		355	-	100,5	17,7					17,8	0,0812		400	-	123	18,9					19,0	0,0943	450	-	148	20,2	20,3			0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5		0,1238			BFL	M1		180						-					13						12,1			12,2						0,0289	200				-	23						12,6	12,7			0,0344	225	-	36			13,4	13,5				0,0413	250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9					0,0564	300		-	73	15,7	15,8					0,0619	315		-	80,5	16,1	16,2					0,0660	355		-	100,5	17,3	17,4					0,0770	400	-	123	18,5	18,6	0,0894			450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																					
750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7		0,0218	BFL	400 x	450	-		148			22,8	22,9		0,1406			BFL	M3		180						-					13						12,4			12,5					0,0305	200		-	23	12,9	13,0					0,0363	225		-	36	13,7	13,8					0,0435	250		-	48	14,3	14,4					0,0508	280		-	63	15,1	15,2					0,0595	300		-	73	16,1	16,2					0,0653	315		-	80,5	16,5	16,6					0,0696	355		-	100,5	17,7	17,8					0,0812	400	-	123	18,9	19,0	0,0943			450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5		0,1238			BFL	M1		180						-						13					12,1						12,2			0,0289						200	-				23	12,6						12,7	0,0344			225	-	36	13,4			13,5	0,0413				250	-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-	100,5	17,3	17,4	0,0770	400			-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																											
800	78	323	28,0	28,4	0,1994	315 x	150	-	-	11,6	11,7		0,0218	BFL	400 x	450	-		148			22,8	22,9		0,1406			BFL	M3		180						-						13					12,4						12,5			0,0305					200	-		23	12,9	13,0	0,0363					225	-		36	13,7	13,8	0,0435					250	-		48	14,3	14,4	0,0508					280	-		63	15,1	15,2	0,0595					300	-		73	16,1	16,2	0,0653					315	-		80,5	16,5	16,6	0,0696					355	-	100,5	17,7	17,8	0,0812	400			-	123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5		0,1238			BFL	M1		180						-						13						12,1					12,2						0,0289			200						-	23				12,6	12,7						0,0344	225			-	36	13,4	13,5			0,0413	250				-	48	14,0	14,1	0,0481	280	-	63	14,8	14,9	0,0564	300					-	73		15,7	15,8	0,0619	315					-	80,5	16,1	16,2	0,0660	355	-			100,5	17,3	17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																	
315 x	150	-	-	11,6	11,7		0,0218	BFL	400 x	450	-		148			22,8	22,9		0,1406			BFL	M3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	180	-	13	12,4	12,5		0,0305			200	-		23			12,9	13,0		0,0363						225						-						36						13,7					13,8						0,0435			250					-	48		14,3	14,4	0,0508	280					-	63		15,1	15,2	0,0595	300					-	73		16,1	16,2	0,0653	315					-	80,5		16,5	16,6	0,0696	355					-	100,5	17,7	17,8	0,0812	400	-			123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-	148	21,4	21,5	0,1238	BFL	M1	180	-	13	12,1	12,2	0,0289		200	-	23	12,6	12,7		0,0344			225	-		36			13,4	13,5		0,0413						250						-						48						14,0					14,1						0,0481			280						-	63				14,8	14,9						0,0564	300			-	73	15,7	15,8			0,0619	315			-	80,5	16,1	16,2	0,0660	355	-	100,5	17,3	17,4	0,0770	400	-			123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																													
	200	-	23	12,9	13,0		0,0363			225	-		36			13,7	13,8		0,0435						250						-						48						14,3					14,4						0,0508			280					-	63		15,1	15,2	0,0595	300					-	73		16,1	16,2	0,0653	315					-	80,5		16,5	16,6	0,0696	355					-	100,5	17,7	17,8	0,0812	400	-			123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-	13	12,1	12,2	0,0289			200	-	23	12,6	12,7	0,0344		225	-	36	13,4	13,5		0,0413			250	-		48			14,0	14,1		0,0481						280						-						63						14,8					14,9						0,0564			300						-	73				15,7	15,8			0,0619			315	-			80,5	16,1	16,2	0,0660	355	-	100,5	17,3			17,4	0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																								
	225	-	36	13,7	13,8		0,0435			250	-		48			14,3	14,4		0,0508						280						-						63						15,1					15,2						0,0595			300					-	73		16,1	16,2	0,0653	315					-	80,5		16,5	16,6	0,0696	355					-	100,5	17,7	17,8	0,0812	400	-			123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-	23	12,6	12,7	0,0344			225	-	36	13,4	13,5	0,0413		250	-	48	14,0	14,1		0,0481			280	-		63			14,8	14,9		0,0564						300						-						73						15,7					15,8						0,0619			315						-	80,5	16,1			16,2	0,0660			355	-	100,5	17,3	17,4			0,0770	400	-	123	18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																			
	250	-	48	14,3	14,4		0,0508			280	-		63			15,1	15,2		0,0595						300						-						73						16,1					16,2						0,0653			315					-	80,5		16,5	16,6	0,0696	355					-	100,5	17,7	17,8	0,0812	400	-			123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-	36	13,4	13,5	0,0413			250	-	48	14,0	14,1	0,0481		280	-	63	14,8	14,9		0,0564			300	-		73			15,7	15,8		0,0619						315						-						80,5						16,1					16,2						0,0660			355	-					100,5	17,3	17,4	0,0770	400	-	123			18,5	18,6	0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																														
	280	-	63	15,1	15,2		0,0595			300	-		73			16,1	16,2		0,0653						315						-						80,5						16,5					16,6						0,0696			355					-	100,5	17,7	17,8	0,0812	400	-			123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-	48	14,0	14,1	0,0481			280	-	63	14,8	14,9	0,0564		300	-	73	15,7	15,8		0,0619			315	-		80,5			16,1	16,2		0,0660						355						-						100,5						17,3					17,4			0,0770			400			-	123	18,5	18,6			0,0894	450	-	148	19,7	19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																									
	300	-	73	16,1	16,2		0,0653			315	-		80,5			16,5	16,6		0,0696						355						-						100,5						17,7					17,8					0,0812	400			-			123	18,9	19,0	0,0943	450	-	148	20,2	20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-	63	14,8	14,9	0,0564			300	-	73	15,7	15,8	0,0619		315	-	80,5	16,1	16,2		0,0660			355	-		100,5			17,3	17,4		0,0770						400						-						123					18,5	18,6					0,0894	450	-	148			19,7			19,8	0,1031	500	-	173	21,0	21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																				
	315	-	80,5	16,5	16,6		0,0696			355	-		100,5			17,7	17,8		0,0812						400						-						123					18,9	19,0					0,0943	450	-			148	20,2			20,3	0,1088	500	-	173	21,5	21,6	0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-	73	15,7	15,8	0,0619			315	-	80,5	16,1	16,2	0,0660		355	-	100,5	17,3	17,4		0,0770			400	-		123			18,5	18,6		0,0894						450						-					148	19,7					19,8	0,1031	500	-			173	21,0	21,1	0,1169			550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																															
	355	-	100,5	17,7	17,8		0,0812			400	-		123			18,9	19,0		0,0943						450						-					148	20,2					20,3	0,1088	500	-			173	21,5	21,6			0,1233	550	-	198	22,3	22,7	0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-	80,5	16,1	16,2	0,0660			355	-	100,5	17,3	17,4	0,0770		400	-	123	18,5	18,6		0,0894			450	-		148			19,7	19,8		0,1031						500					-	173					21,0	21,1	0,1169	550			-	198	21,8	22,2			0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																										
	400	-	123	18,9	19,0		0,0943			450	-		148			20,2	20,3		0,1088						500					-	173					21,5	21,6	0,1233	550			-	198	22,3	22,7			0,1378	560	-	203	22,6	23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-	100,5	17,3	17,4	0,0770			400	-	123	18,5	18,6	0,0894		450	-	148	19,7	19,8		0,1031			500	-		173			21,0	21,1		0,1169					550	-					198	21,8	22,2	0,1306			560	-	203	22,0			22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																					
	450	-	148	20,2	20,3		0,1088			500	-		173			21,5	21,6		0,1233					550	-					198	22,3	22,7	0,1378			560	-	203	22,6			23,0	0,1407	600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-	123	18,5	18,6	0,0894			450	-	148	19,7	19,8	0,1031		500	-	173	21,0	21,1		0,1169			550	-		198			21,8	22,2	0,1306	560					-	203	22,0	22,4			0,1334	600	-	223			23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																
	500	-	173	21,5	21,6		0,1233			550	-		198			22,3	22,7	0,1378	560					-	203	22,6	23,0			0,1407	600	-	223			23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-		123	18,5	18,6	0,0894					450	-	148	19,7	19,8	0,1031			500	-	173	21,0	21,1	0,1169		550	-	198	21,8	22,2		0,1306			560	-	203	22,0			22,4	0,1334	600	-	223	23,0			23,4	0,1444	630	-			238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																											
	550	-	198	22,3	22,7		0,1378			560	-	203	22,6			23,0	0,1407	600	-	223	23,6			24,0	0,1680	630	-			238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-		123	18,5	18,6	0,0894					450	-		148	19,7	19,8	0,1031					500	-	173	21,0	21,1	0,1169			550	-	198	21,8	22,2	0,1306		560	-	203	22,0	22,4	0,1334	600			-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650			3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																						
	560	-	203	22,6	23,0	0,1407	600			-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650			3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-		123	18,5	18,6	0,0894					450	-		148	19,7	19,8	0,1031					500	-		173	21,0	21,1	0,1169					550	-	198	21,8	22,2	0,1306			560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																	
600	-	223	23,6	24,0	0,1680	630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4	0,0206	BFL	450 x	450	-		148	21,4	21,5	0,1238	BFL	M1			180	-		13	12,1	12,2	0,0289					200	-		23	12,6	12,7	0,0344					225	-		36	13,4	13,5	0,0413					250	-		48	14,0	14,1	0,0481					280	-		63	14,8	14,9	0,0564					300	-		73	15,7	15,8	0,0619					315	-		80,5	16,1	16,2	0,0660					355	-		100,5	17,3	17,4	0,0770					400	-		123	18,5	18,6	0,0894					450	-		148	19,7	19,8	0,1031					500	-		173	21,0	21,1	0,1169					550	-		198	21,8	22,2	0,1306					560	-	203	22,0	22,4	0,1334			600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																							
630	-	238	24,3	24,7	0,1610	650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-	148			21,4	21,5		0,1238	BFL	M1	180					-	13		12,1	12,2	0,0289	200					-	23		12,6	12,7	0,0344	225					-	36		13,4	13,5	0,0413	250					-	48		14,0	14,1	0,0481	280					-	63		14,8	14,9	0,0564	300					-	73		15,7	15,8	0,0619	315					-	80,5		16,1	16,2	0,0660	355					-	100,5		17,3	17,4	0,0770	400					-	123		18,5	18,6	0,0894	450					-	148		19,7	19,8	0,1031	500					-	173		21,0	21,1	0,1169	550					-	198	21,8	22,2	0,1306	560	-			203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																													
650	3	248	24,8	25,2	0,1668	700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5	0,1238			BFL	M1		180			-					13	12,1		12,2	0,0289	200	-					23	12,6		12,7	0,0344	225	-					36	13,4		13,5	0,0413	250	-					48	14,0		14,1	0,0481	280	-					63	14,8		14,9	0,0564	300	-					73	15,7		15,8	0,0619	315	-					80,5	16,1		16,2	0,0660	355	-					100,5	17,3		17,4	0,0770	400	-					123	18,5		18,6	0,0894	450	-					148	19,7		19,8	0,1031	500	-					173	21,0	21,1	0,1169	550	-	198			21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																			
700	28	273	26,1	26,5	0,1813	355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5		0,1238			BFL	M1	180						-			13					12,1	12,2		0,0289	200	-	23					12,6	12,7		0,0344	225	-	36					13,4	13,5		0,0413	250	-	48					14,0	14,1		0,0481	280	-	63					14,8	14,9		0,0564	300	-	73					15,7	15,8		0,0619	315	-	80,5					16,1	16,2		0,0660	355	-	100,5					17,3	17,4		0,0770	400	-	123					18,5	18,6		0,0894	450	-	148					19,7	19,8	0,1031	500	-	173	21,0			21,1	0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																									
355 x	150	-	-	11,3	11,4		0,0206	BFL	450 x	450	-		148			21,4	21,5		0,1238			BFL	M1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	180	-	13	12,1	12,2		0,0289			200	-		23			12,6	12,7		0,0344						225					-						36			13,4					13,5	0,0413		250	-	48	14,0					14,1	0,0481		280	-	63	14,8					14,9	0,0564		300	-	73	15,7					15,8	0,0619		315	-	80,5	16,1					16,2	0,0660		355	-	100,5	17,3					17,4	0,0770		400	-	123	18,5					18,6	0,0894		450	-	148	19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																
	200	-	23	12,6	12,7		0,0344			225	-		36			13,4	13,5		0,0413						250					-						48			14,0					14,1	0,0481		280	-	63	14,8					14,9	0,0564		300	-	73	15,7					15,8	0,0619		315	-	80,5	16,1					16,2	0,0660		355	-	100,5	17,3					17,4	0,0770		400	-	123	18,5					18,6	0,0894		450	-	148	19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																											
	225	-	36	13,4	13,5		0,0413			250	-		48			14,0	14,1		0,0481						280					-						63			14,8					14,9	0,0564		300	-	73	15,7					15,8	0,0619		315	-	80,5	16,1					16,2	0,0660		355	-	100,5	17,3					17,4	0,0770		400	-	123	18,5					18,6	0,0894		450	-	148	19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																						
	250	-	48	14,0	14,1		0,0481			280	-		63			14,8	14,9		0,0564						300					-						73			15,7					15,8	0,0619		315	-	80,5	16,1					16,2	0,0660		355	-	100,5	17,3					17,4	0,0770		400	-	123	18,5					18,6	0,0894		450	-	148	19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	280	-	63	14,8	14,9		0,0564			300	-		73			15,7	15,8		0,0619						315					-						80,5			16,1					16,2	0,0660		355	-	100,5	17,3					17,4	0,0770		400	-	123	18,5					18,6	0,0894		450	-	148	19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	300	-	73	15,7	15,8		0,0619			315	-		80,5			16,1	16,2		0,0660						355					-						100,5			17,3					17,4	0,0770		400	-	123	18,5					18,6	0,0894		450	-	148	19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	315	-	80,5	16,1	16,2		0,0660			355	-		100,5			17,3	17,4		0,0770						400					-						123			18,5					18,6	0,0894		450	-	148	19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	355	-	100,5	17,3	17,4		0,0770			400	-		123			18,5	18,6		0,0894						450					-						148			19,7					19,8	0,1031	500	-	173	21,0	21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	400	-	123	18,5	18,6		0,0894			450	-		148			19,7	19,8		0,1031						500					-					173	21,0			21,1			0,1169	550	-	198	21,8	22,2	0,1306	560	-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	450	-	148	19,7	19,8		0,1031			500	-		173			21,0	21,1		0,1169					550	-					198	21,8	22,2			0,1306	560			-	203	22,0	22,4	0,1334	600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	500	-	173	21,0	21,1		0,1169			550	-		198			21,8	22,2	0,1306	560					-	203	22,0	22,4			0,1334	600	-			223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	550	-	198	21,8	22,2		0,1306			560	-	203	22,0			22,4	0,1334	600	-	223	23,0			23,4	0,1444	630	-			238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	560	-	203	22,0	22,4	0,1334	600			-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650			3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
600	-	223	23,0	23,4	0,1444	630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
630	-	238	23,8	24,2	0,1526	650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
650	3	248	24,3	24,7	0,1581	700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
700	28	273	25,5	25,9	0,1719	710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
710	33	278	25,8	26,2	0,1746	750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
750	53	298	26,8	27,2	0,1856	800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
800	78	323	28,0	28,4	0,1994																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

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 blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control	
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*				
450 x	-	123	22,8	22,9	0,1381	BFL	M1	150	-	-	16,1	16,2	0,0401			
	-	148	24,3	24,7	0,1594			180	-	13	17,2	17,3	0,0562			
	-	173	25,9	26,3	0,1806			200	-	23	18,0	18,1	0,0669			
	-	198	27,0	27,4	0,2019			225	-	36	19,1	19,2	0,0803			
	-	203	27,3	27,7	0,2061	BFN		250	-	48	20,0	20,1	0,0936	BFL	M1	
	-	223	28,5	28,9	0,2231		M2	280	-	63	21,2	21,3	0,1097			
	-	238	29,4	29,8	0,2359			300	-	73	22,2	22,3	0,1204			
	3	248	30,0	30,4	0,2444			315	-	80,5	22,7	22,8	0,1284			
	28	273	31,6	33,7	0,2656			355	-	100,5	24,4	24,5	0,1498			
	33	278	31,9	34,0	0,2699			400	-	123	26,0	26,4	0,1739			
	53	298	33,1	35,2	0,2869	BF		560 x	450	-	148	27,7	28,1	0,2006		
	78	323	34,6	36,7	0,3081		M3	500	-	173	29,8	30,2	0,2274			
	500 x	-	-	15,0	15,1	0,0356			550	-	198	31,1	31,5	0,2541	BFN	
-		13	16,0	16,1	0,0499			560	-	203	31,4	31,8	0,2595			
-		23	16,7	16,8	0,0594			600	-	223	32,9	33,3	0,2809		M2	
-		36	17,8	17,9	0,0713			630	-	238	34,0	36,1	0,2969			
-		48	18,6	18,7	0,0831			650	3	248	34,7	36,8	0,3076			
-		63	19,7	19,8	0,0974	BFL	M1	700	28	273	36,5	38,6	0,3344			
-		73	20,7	20,8	0,1069			710	33	278	36,8	38,9	0,3397	BF		
-		80,5	21,2	21,3	0,1140			750	53	298	38,3	40,4	0,3611			
-		100,5	22,7	22,8	0,1330			800	78	323	40,0	42,1	0,3879		M3	
-		123	24,2	24,3	0,1544			150	-	-	16,9	17,0	0,0431			
450		-	148	25,9	26,3	0,1781	BFN		180	-	13	18,0	18,1	0,0604		
500		-	173	27,5	27,9	0,2019			200	-	23	18,8	18,9	0,0719		
550		-	198	29,0	29,4	0,2256			225	-	36	20,0	20,1	0,0863		
560	-	203	29,3	29,7	0,2304	BFN	M2	250	-	48	21,0	21,1	0,1006	BFL	M1	
600	-	223	30,7	31,1	0,2494			280	-	63	22,2	22,3	0,1179			
630	-	238	31,7	32,1	0,2636			300	-	73	23,2	23,3	0,1294			
650	3	248	32,4	34,5	0,2731			315	-	80,5	23,7	23,8	0,1380			
700	28	273	34,0	36,1	0,2969			355	-	100,5	25,4	25,5	0,1610			
710	33	278	34,4	36,5	0,3016	BF		400	-	123	27,1	27,5	0,1869			
750	53	298	35,7	37,8	0,3206		M3	600 x	450	-	148	29,0	29,4	0,2156		
800	78	323	37,4	39,5	0,3444			500	-	173	31,1	31,5	0,2444	BFN		
550 x	-	-	16,0	16,1	0,0394			550	-	198	32,5	32,9	0,2731			
	-	13	17,0	17,1	0,0551			560	-	203	32,8	33,2	0,2789		M2	
	-	23	17,8	17,9	0,0656			600	-	223	34,4	36,5	0,3019			
	-	36	18,9	19,0	0,0788			630	-	238	35,5	37,6	0,3191			
	-	48	19,8	19,9	0,0919			650	3	248	36,2	38,3	0,3306			
	-	63	20,9	21,0	0,1076	BFL	M1	700	28	273	38,1	40,2	0,3594	BF		
	-	73	21,9	22,0	0,1181			710	33	278	38,5	40,6	0,3651			
	-	80,5	22,5	22,6	0,1260			750	53	298	39,9	42,0	0,3881			
	-	100,5	24,1	24,2	0,1470			800	78	323	41,8	43,9	0,4169		M3	
	400	-	123	25,7	26,1	0,1706			150	-	-	17,4	17,5	0,0454		
	450	-	148	27,4	27,8	0,1969	BFN		180	-	13	18,6	18,7	0,0635		
	500	-	173	29,4	29,8	0,2231			200	-	23	19,4	19,5	0,0756		
	550	-	198	30,7	31,1	0,2494			225	-	36	20,6	20,7	0,0908		
560	-	203	31,1	31,5	0,2546		M2	250	-	48	21,7	21,8	0,1059	BFL	M1	
600	-	223	32,5	32,9	0,2756			280	-	63	22,9	23,0	0,1240			
630	-	238	33,6	35,7	0,2914			300	-	73	23,9	24,0	0,1361			
650	3	248	34,3	36,4	0,3019			315	-	80,5	24,5	24,6	0,1452			
700	28	273	36,1	38,2	0,3281			355	-	100,5	26,3	26,4	0,1694			
710	33	278	36,4	38,5	0,3334	BF		400	-	123	28,0	28,4	0,1966			
750	53	298	37,8	39,9	0,3544		M3	450	-	148	29,9	30,3	0,2269	BFN	M2	
800	78	323	39,6	41,7	0,3806			500	-	173	32,0	32,4	0,2571			

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 blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*			
630 x	550	-	198	33,5	33,9	0,2874	BFN	225	-	36	22,4	22,5	0,1028	M1	
	560	-	203	33,9	34,3	0,2934		250	-	48	23,5	23,6	0,1199		
	600	-	223	35,4	37,5	0,3176		280	-	63	24,9	25,0	0,1404		
	630	-	238	36,6	38,7	0,3358	300	-	73	25,9	26,0	0,1541	BFL		
	650	3	248	37,4	39,5	0,3479	315	-	80,5	26,5	26,6	0,1644			
	700	28	273	39,3	41,4	0,3781	355	-	100,5	28,4	28,8	0,1918	BFN		
	710	33	278	39,7	41,8	0,3842	400	-	123	30,3	30,7	0,2226			
	750	53	298	41,2	43,3	0,4084	450	-	148	32,3	32,7	0,2569			
	800	78	323	43,1	45,2	0,4386	500	-	173	34,6	35,0	0,2911			
	650 x	150	-	-	17,8	17,9	0,0469	M2	710 x	550	-	198	36,3		38,4
180		-	13	19,0	19,1	0,0656	560		-	203	36,7	38,8	0,3322		
200		-	23	19,9	20,0	0,0781	600		-	223	38,4	40,5	0,3596		
225		-	36	21,1	21,2	0,0938	630		-	238	39,6	41,7	0,3802		
250		-	48	22,1	22,2	0,1094	650		3	248	40,4	42,5	0,3939	BF	
280		-	63	23,4	23,5	0,1281	700		28	273	42,5	44,6	0,4281		
300		-	73	24,4	24,5	0,1406	710		33	278	42,9	45,0	0,4350	M3	
315		-	80,5	25,0	25,1	0,1500	750		53	298	44,6	46,7	0,4624		
355		-	100,5	26,8	26,9	0,1750	800		78	323	46,7	48,8	0,4966	M4	
400		-	123	28,6	29,0	0,2031	M1		150	-	-	19,6	19,7	0,0544	M1
450	-	148	30,5	30,9	0,2344	180		-	13	21,0	21,1	0,0761			
500	-	173	32,7	33,1	0,2656	200		-	23	21,9	22,0	0,0906			
550	-	198	34,2	34,6	0,2969	225		-	36	23,3	23,4	0,1088	BFL		
560	-	203	34,6	36,7	0,3031	250		-	48	24,4	24,5	0,1269			
600	-	223	36,2	38,3	0,3281	280		-	63	25,9	26,0	0,1486	M2		
630	-	238	37,3	39,4	0,3469	300		-	73	26,9	27,0	0,1631			
650	3	248	38,1	40,2	0,3594	315		-	80,5	27,5	27,6	0,1740			
700	28	273	40,1	42,2	0,3906	355		-	100,5	29,5	29,9	0,2030			
710	33	278	40,5	42,6	0,3969	400		-	123	31,4	31,8	0,2356	BFN		
750	53	298	42,1	44,2	0,4219	450	-	148	33,6	34,0	0,2719				
800	78	323	44,0	46,1	0,4531	500	-	173	35,9	36,3	0,3081	M2			
700 x	150	-	-	18,7	18,8	0,0506	550	-	198	37,7	39,8		0,3444	M2	
	180	-	13	20,0	20,1	0,0709	560	-	203	38,1	40,2	0,3516			
	200	-	23	20,9	21,0	0,0844	600	-	223	39,8	41,9	0,3806			
	225	-	36	22,2	22,3	0,1013	630	-	238	41,1	43,2	0,4024			
	250	-	48	23,3	23,4	0,1181	650	3	248	42,0	44,1	0,4169	BF		
	280	-	63	24,6	24,7	0,1384	700	28	273	44,1	46,2	0,4531			
	300	-	73	25,7	25,8	0,1519	710	33	278	44,5	46,6	0,4604	M3		
	315	-	80,5	26,3	26,4	0,1620	750	53	298	46,3	48,4	0,4894			
	355	-	100,5	28,2	28,6	0,1890	800	78	323	48,4	50,5	0,5256	M4		
	400	-	123	30,0	30,4	0,2194	M1	150	-	-	20,6	20,7	0,0581		M1
450	-	148	32,0	32,4	0,2531	180		-	13	22,0	22,1	0,0814			
500	-	173	34,3	34,7	0,2869	200		-	23	23,0	23,1	0,0969			
550	-	198	35,9	38,0	0,3206	225		-	36	24,4	24,5	0,1163	BFL		
560	-	203	36,3	38,4	0,3274	250		-	48	25,6	25,7	0,1356			
600	-	223	38,0	40,1	0,3544	280		-	63	27,1	27,2	0,1589	M2		
630	-	238	39,2	41,3	0,3746	300		-	73	28,2	28,3	0,1744			
650	3	248	40,0	42,1	0,3881	800 x		315	-	80,5	28,8	28,9		0,1860	
700	28	273	42,1	44,2	0,4219	355		-	100,5	30,9	31,3	0,2170			
710	33	278	42,5	44,6	0,4286	400		-	123	32,9	33,3	0,2519	BFN		
750	53	298	44,2	46,3	0,4556	450	-	148	35,1	35,5	0,2906				
800	78	323	46,2	48,3	0,4894	500	-	173	37,6	38,0	0,3294	M2			
710 x	150	-	-	18,9	19,0	0,0514	550	-	198	39,4	41,5		0,3681		
	180	-	13	20,2	20,3	0,0719	560	-	203	39,8	41,9	0,3759	BF		
	200	-	23	21,1	21,2	0,0856	600	-	223	41,6	43,7	0,4069			

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 blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control						
	a [mm]	c [mm]	Man. [kg]	Actu. [kg]*					a [mm]	c [mm]	Man. [kg]	Actu. [kg]*									
800 x	630	-	238	43,0	45,1	0,4301	BF	M3	315	-	80,5	36,5	36,9	0,2580	BFN	M2					
	650	3	248	43,9	46,0	0,4456			355	-	100,5	39,0	39,4	0,3010							
	700	28	273	46,1	48,2	0,4844			400	-	123	41,5	41,9	0,3494							
	710	33	278	46,6	48,7	0,4921			450	-	148	44,3	46,4	0,4031							
	750	53	298	48,4	50,5	0,5231			500	-	173	47,4	49,5	0,4569							
	800	78	323	50,6	52,7	0,5619			550	-	198	49,7	51,8	0,5106							
900 x	150	-	-	22,4	22,5	0,0656	BFL	M1	1100 x	560	-	203	50,3	52,4	0,5214	BF	M3				
	180	-	13	24,0	24,1	0,0919			600	-	223	52,6	54,7	0,5644							
	200	-	23	25,1	25,2	0,1094			630	-	238	54,3	56,4	0,5966							
	225	-	36	26,6	26,7	0,1313			650	3	248	55,4	57,5	0,6181							
	250	-	48	27,9	28,0	0,1531			700	28	273	58,2	60,3	0,6719							
	280	-	63	29,5	29,6	0,1794			710	33	278	58,8	60,9	0,6826							
	300	-	73	30,6	30,7	0,1969			750	53	298	61,0	63,1	0,7256							
	315	-	80,5	31,4	31,8	0,2100			800	78	323	63,9	66,0	0,7794							
	355	-	100,5	33,6	34,0	0,2450			1250 x	M2	180	-	13	30,9	31,0			0,1286	BFL	M2	
	400	-	123	35,7	36,1	0,2844					200	-	23	32,4	32,5			0,1531			
1000 x	450	-	148	38,2	38,6	0,3281	BF	M3	225	-	36	34,3	34,4	0,1838	BFN	M4					
	500	-	173	40,9	43,0	0,3719			250	-	48	36,1	36,5	0,2144							
	550	-	198	42,8	44,9	0,4156			280	-	63	38,2	38,6	0,2511							
	560	-	203	43,3	45,4	0,4244			300	-	73	39,4	39,8	0,2756							
	600	-	223	45,3	47,4	0,4594			315	-	80,5	40,3	40,7	0,2940							
	630	-	238	46,7	48,8	0,4856			355	-	100,5	43,0	43,4	0,3430							
	650	3	248	47,7	49,8	0,5031			400	-	123	45,8	46,2	0,3981							
	700	28	273	50,2	52,3	0,5469			450	-	148	48,9	51,0	0,4594							
	710	33	278	50,6	52,7	0,5556			500	-	173	52,3	54,4	0,5206							
	750	53	298	52,6	54,7	0,5906			550	-	198	54,9	57,0	0,5819							
	800	78	323	55,0	57,1	0,6344			560	-	203	55,5	57,6	0,5941							
	1100 x	150	-	-	24,2	24,3			0,0731	BFL	M1	600	-	223			58,0	60,1	0,6431	BF	M3
180		-	13	26,0	26,1	0,1024	630	-	238			59,9	62,0	0,6799							
200		-	23	27,1	27,2	0,1219	650	3	248			61,1	63,2	0,7044							
225		-	36	28,8	28,9	0,1463	700	28	273			64,3	66,4	0,7656							
250		-	48	30,2	30,3	0,1706	710	33	278			64,9	67,0	0,7779							
280		-	63	32,0	32,1	0,1999	750	53	298			67,4	69,5	0,8269							
300		-	73	33,2	33,6	0,2194	800	78	323			70,5	72,6	0,8881							
315		-	80,5	33,9	34,3	0,2340	1400 x	M2	180			-	13	33,9	34,0	0,1444	BFL	M2			
355		-	100,5	36,3	36,7	0,2730			200			-	23	35,5	35,6	0,1719					
1100 x		400	-	123	38,6	39,0	0,3169	BF	M3			225	-	36	37,6	37,7	0,2063	BFN	M4		
		450	-	148	41,2	41,6	0,3656					250	-	48	39,6	40,0	0,2406				
		500	-	173	44,1	46,2	0,4144					280	-	63	41,9	42,3	0,2819				
	550	-	198	46,3	48,4	0,4631	300			-	73	43,1	43,5	0,3094							
	560	-	203	46,8	48,9	0,4729	315			-	80,5	44,1	44,5	0,3300							
	600	-	223	48,9	51,0	0,5119	355			-	100,5	47,1	47,5	0,3850							
	630	-	238	50,5	52,6	0,5411	400			-	123	50,1	52,2	0,4469							
	650	3	248	51,5	53,6	0,5606	450			-	148	53,5	55,6	0,5156							
	700	28	273	54,2	56,3	0,6094	500			-	173	57,1	59,2	0,5844							
	710	33	278	54,7	56,8	0,6191	550			-	198	60,1	62,2	0,6531							
	750	53	298	56,8	58,9	0,6581	560			-	203	60,8	62,9	0,6669							
	800	78	323	59,4	61,5	0,7069	600			-	223	63,5	65,6	0,7219							
1100 x	180	-	13	28,0	28,1	0,1129	BFL	M1	630	-	238	65,5	67,6	0,7631	BF	M4					
	200	-	23	29,2	29,3	0,1344			650	3	248	66,9	69,0	0,7906							
	225	-	36	31,0	31,1	0,1613			700	28	273	70,3	72,4	0,8594							
	250	-	48	32,6	32,7	0,1881			710	33	278	71,0	73,1	0,8731							
	280	-	63	34,5	34,6	0,2204			750	53	298	73,7	75,8	0,9281							
	300	-	73	35,7	36,1	0,2419			800	78	323	77,1	79,2	0,9969							

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 blades overlaps		Weight		Effective area Sef [m ²]	Spring return actuator	Manual control	A x B [mm]	Damper blades overlaps		Weight		Effective area Sef [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	-	13	35,9	36,0	0,1549		1500 x	500	-	173	60,4	62,5	0,6269	
	200	-	23	37,5	37,6	0,1844	BFL		550	-	198	63,5	65,6	0,7006	M3
	225	-	36	39,8	39,9	0,2213			560	-	203	64,3	66,4	0,7154	
	250	-	48	41,9	42,3	0,2581	M2		600	-	223	67,1	69,2	0,7744	M4
	280	-	63	44,4	44,8	0,3024			630	-	238	69,3	71,4	0,8186	
	300	-	73	45,6	46,0	0,3319	BFN		650	3	248	70,7	72,8	0,8481	BF
	315	-	80,5	46,7	47,1	0,3540			700	28	273	74,3	76,4	0,9219	
	355	-	100,5	49,8	50,2	0,4130			710	33	278	75,0	77,1	0,9366	M5
	400	-	123	53,0	55,1	0,4794			750	53	298	77,9	80,0	0,9956	
	450	-	148	56,6	58,7	0,5531	BF		M3	800	78	323	81,5	83,6	1,0694

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

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

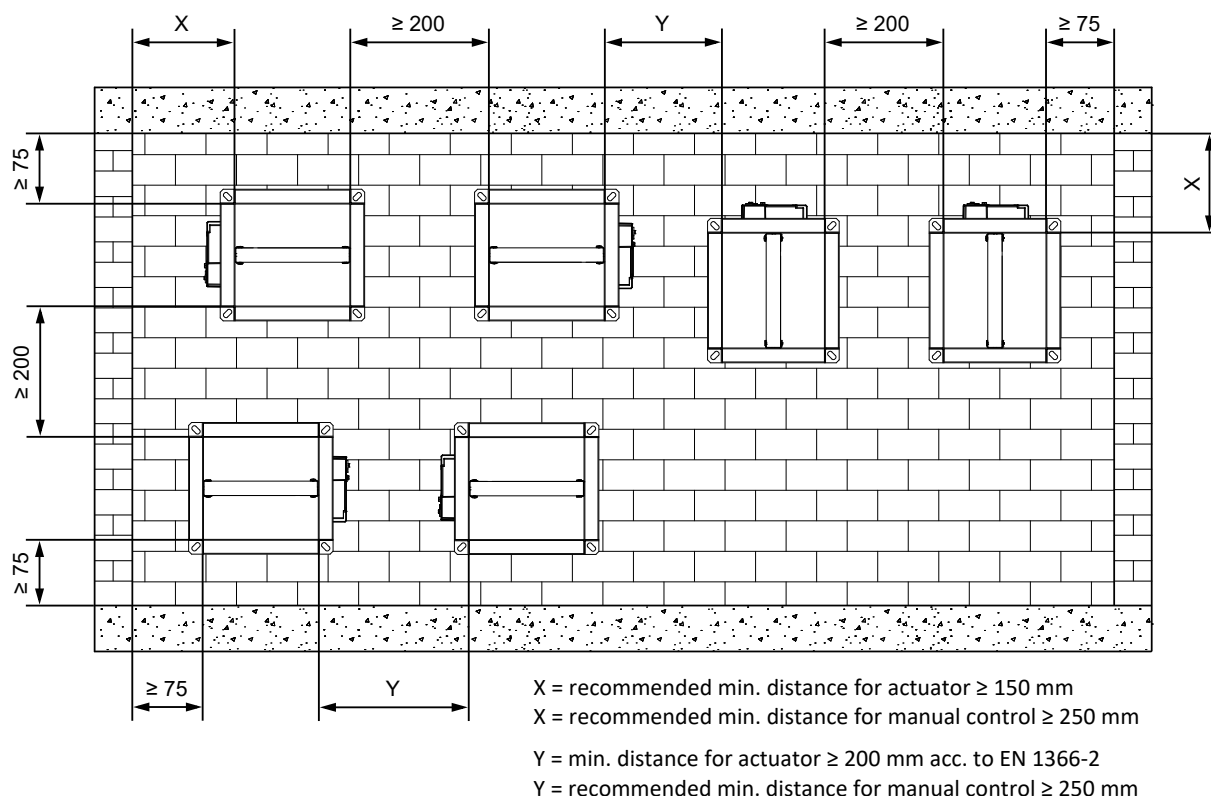
IV. INSTALLATION

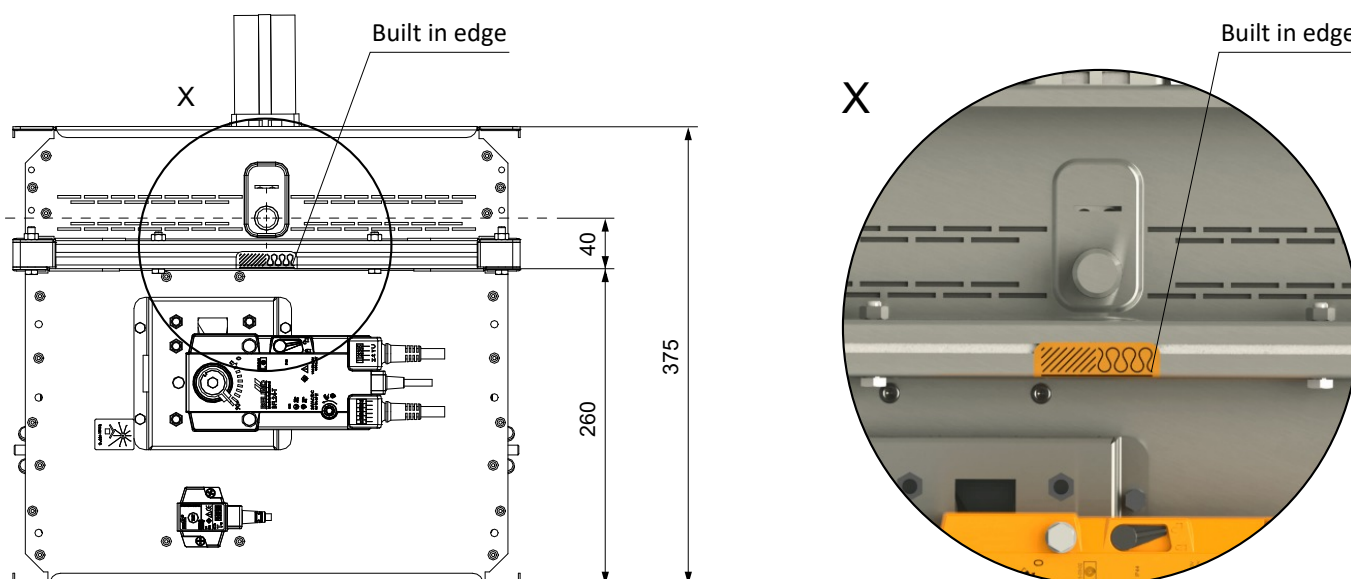
Placement and installation

- 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 42
- 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.

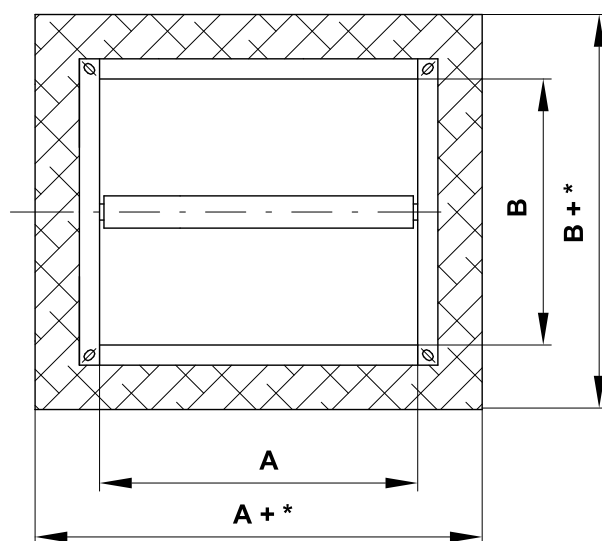
Minimum distance between the fire dampers and the construction

- 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

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

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

- min. $A(B)+100 - 140$, by the type of installation
→ see pages 25 to 42
- max. $A(B)+300$

Ablative Coated Batt

- min. $A(B)+100$
- max. $A(B)+360$

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 damper is installed outside a construction it is necessary to use reinforcing frame VRM-Q 120 → see page 55

Statement of installations

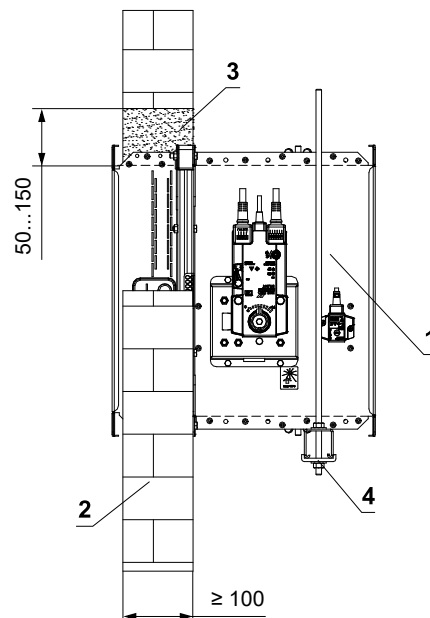
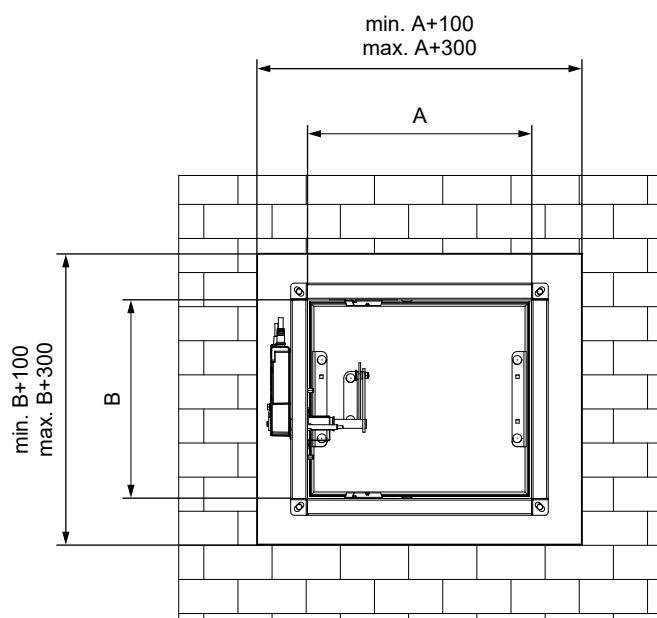
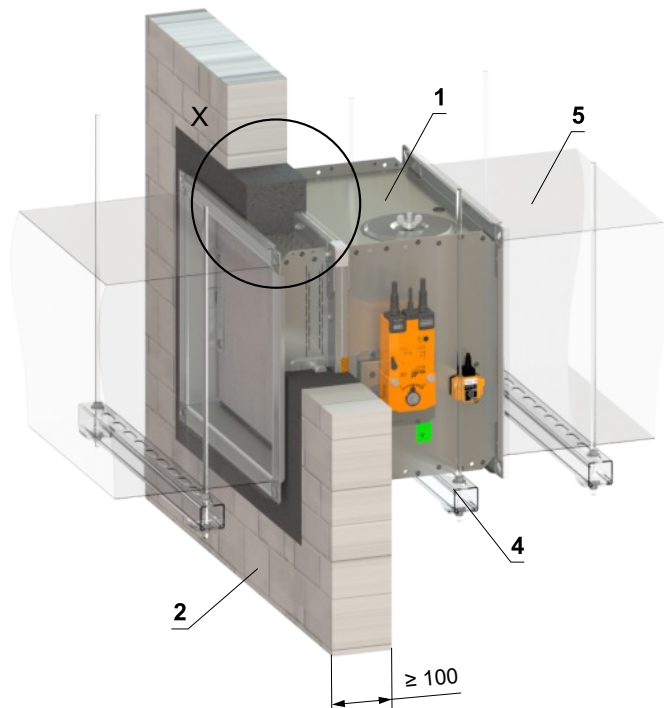
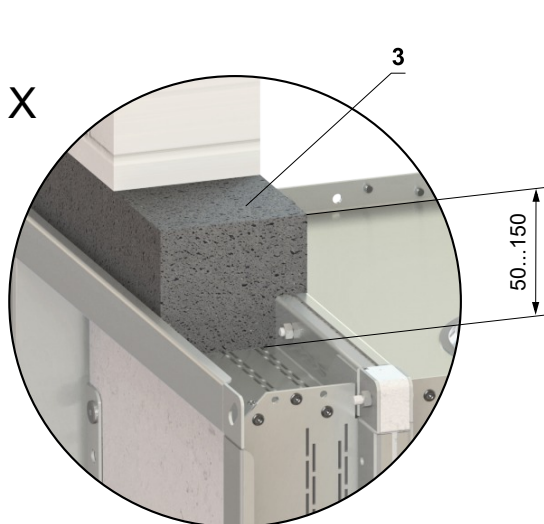
Placement	wall/ceiling min. thickness [mm]	Method of installation	Fire resistance	Page
In solid wall construction	100	Mortar or gypsum	EI 120 (v _e i↔o) S - 500 Pa	25
		2 dampers in battery - mortar or gypsum		26
		4 dampers in battery - mortar or gypsum	EI 120 (v _e i↔o) S	27
		Ablative Coated Batt		28
Outside solid wall construction	100	ISOVER Ultimate Protect - Ablative Coated Batt	EI 120 (v _e i↔o) S	29-30
In gypsum wall construction	100	Mortar or gypsum	EI 120 (v _e i↔o) S - 500 Pa	31
		2 dampers in battery - mortar or gypsum		32
		4 dampers in battery - mortar or gypsum	EI 120 (v _e i↔o) S	33
		Ablative Coated Batt		34
Outside gypsum wall construction	100	ISOVER Ultimate Protect - Ablative Coated Batt		35-36
		Flamebar EN Fire Duct - FPL 110 insulation	EI 120 (v _e i↔o) S	37-38
In shaft wall construction	105	Mortar or gypsum	EI 120 (v _e i↔o) S	39
In solid ceiling construction	150	Mortar or gypsum	EI 120 (h _o i↔o) S - 500 Pa	40
		2 dampers in battery - mortar or gypsum		41
		4 dampers in battery - mortar or gypsum	EI 120 (h _o i↔o) S	42

Installation in solid wall construction

In solid wall construction - mortar or gypsum

EI 120 ($v_e i \leftrightarrow o$) S - 500 Pa

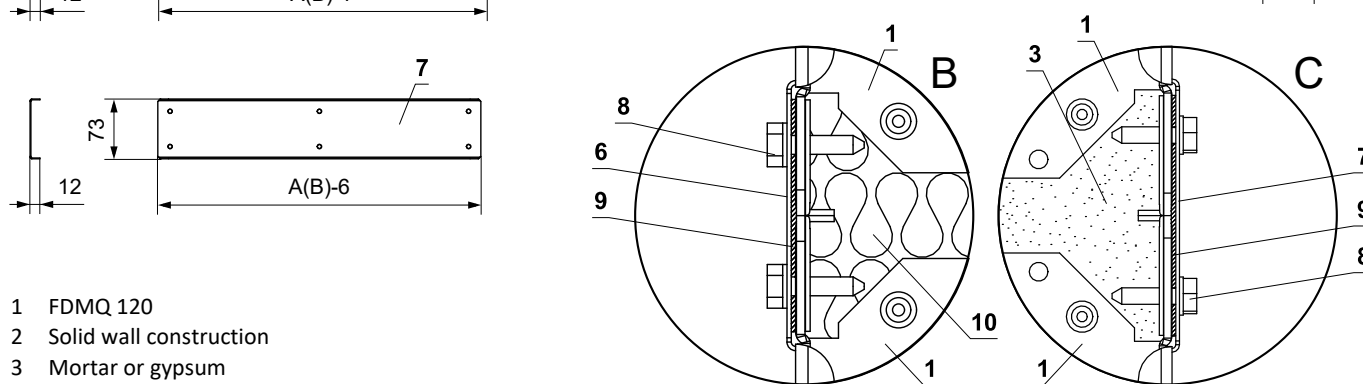
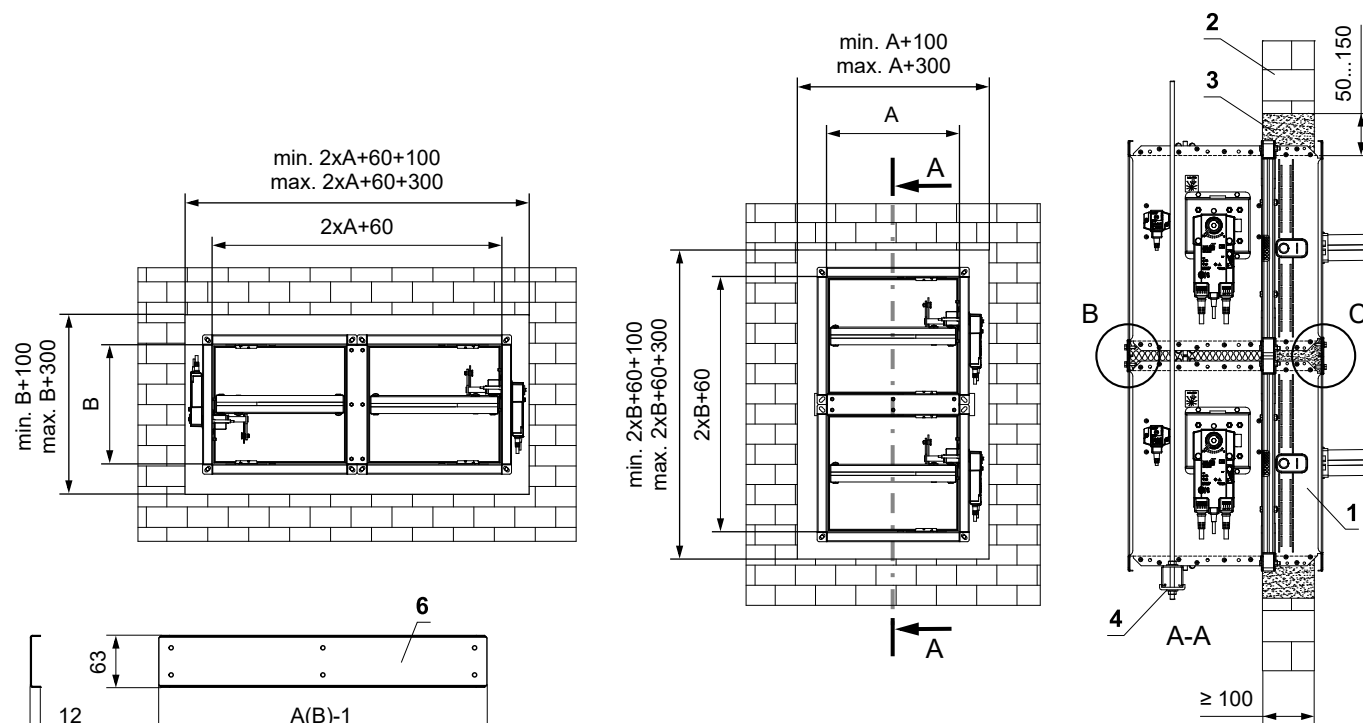
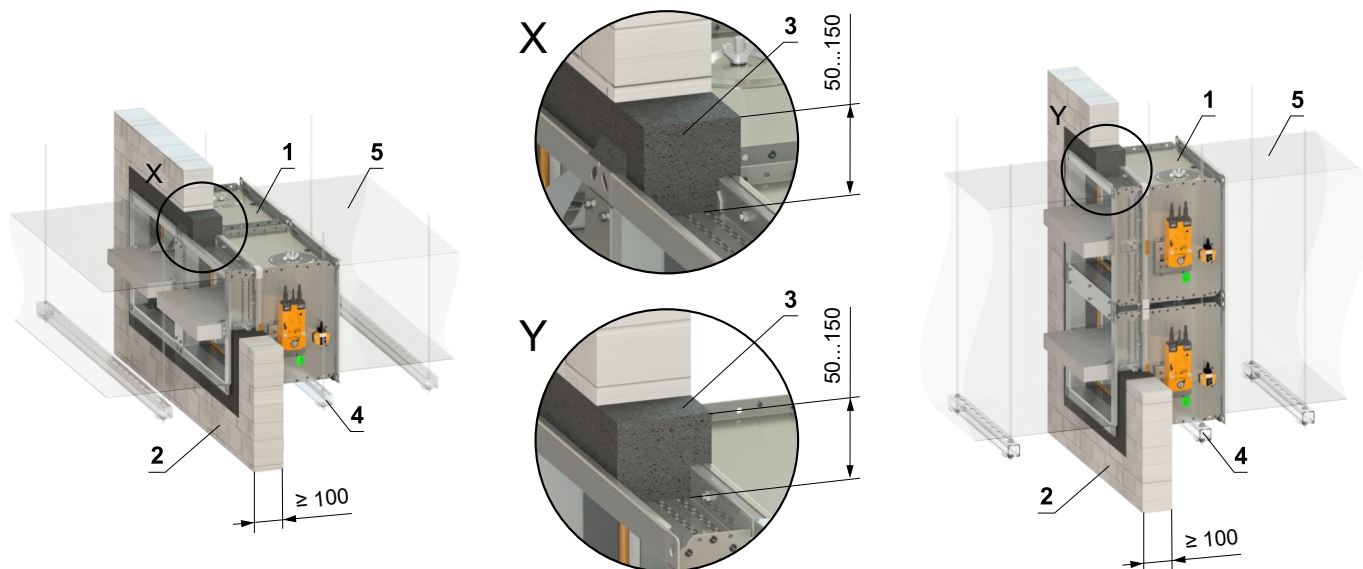
- For connection following duct → see page 47



- 1 FDMQ 120
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct

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

EI 120 (v_e i↔o) S

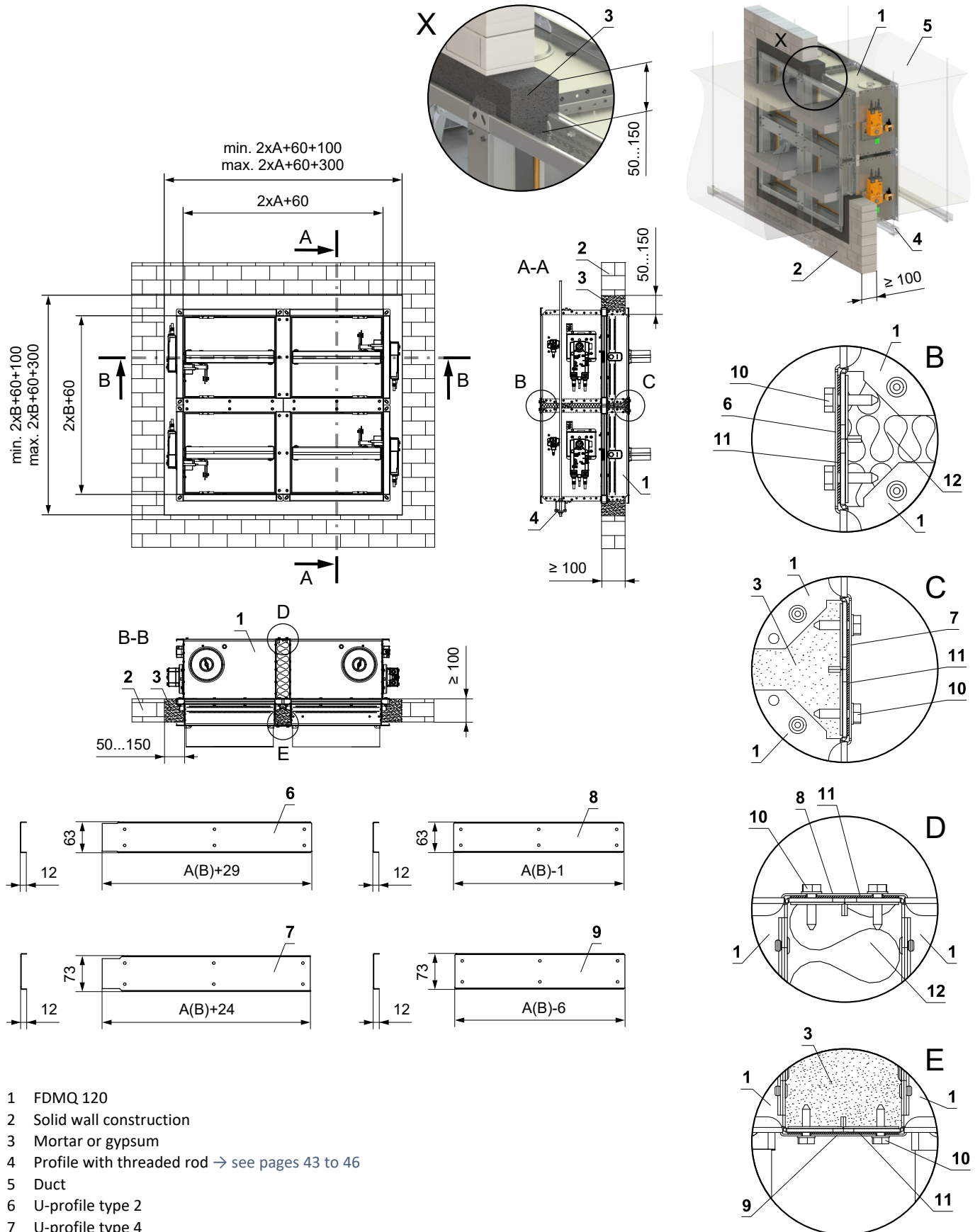


- 1 FDMQ 120
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEK 4,8x18 mm (span ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection following duct → see page 47
- Gap between damper and construction is filled by mortar or gypsum

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

EI 120 (v_e i↔o) S



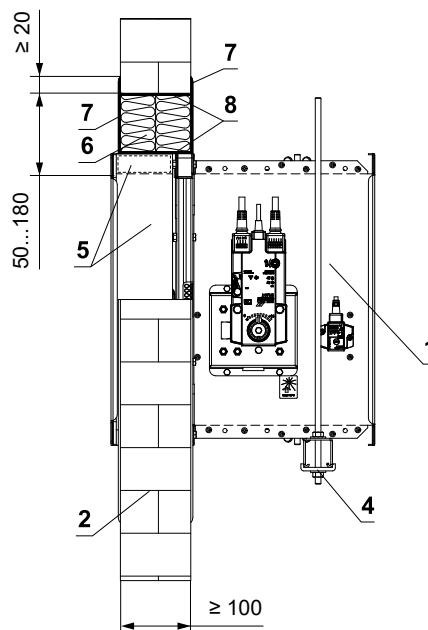
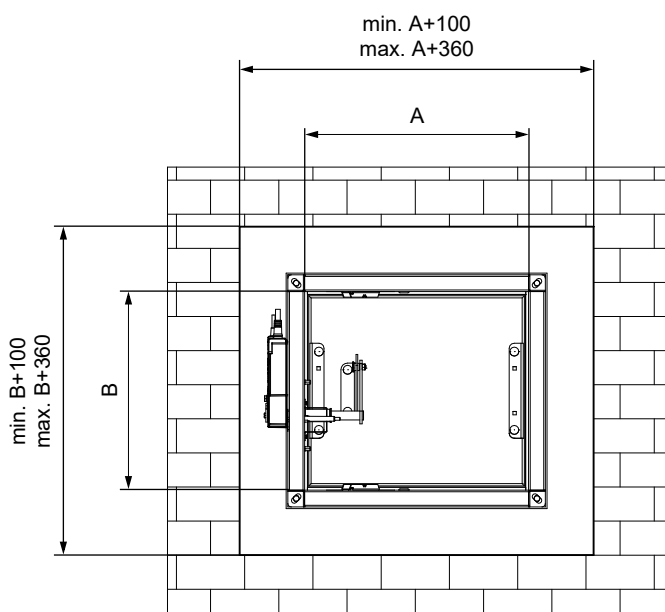
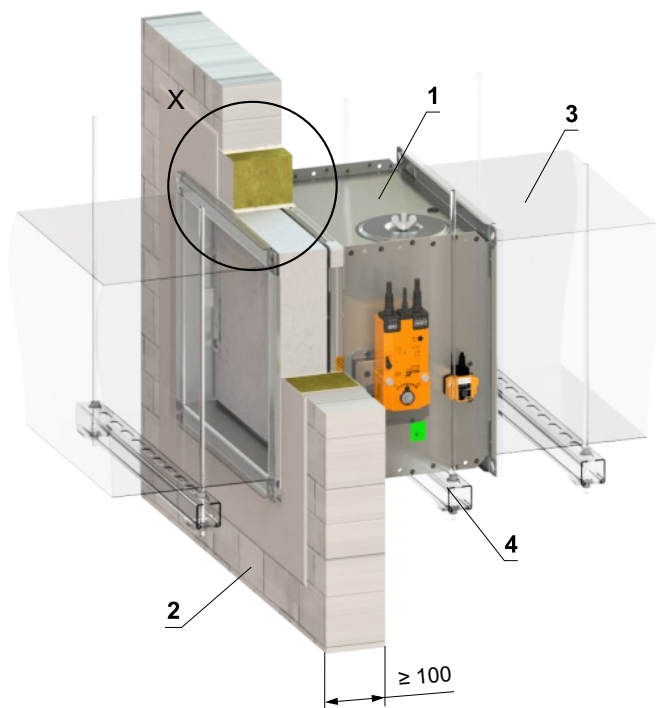
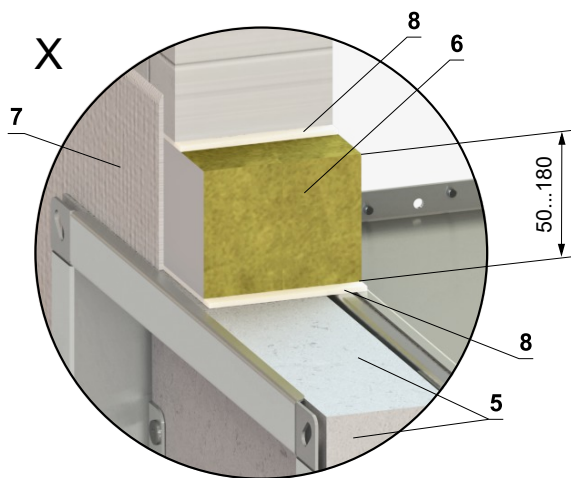
- 1 FDMQ 120
- 2 Solid wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct
- 6 U-profile type 2
- 7 U-profile type 4
- 8 U-profile type 1
- 9 U-profile type 3
- 10 Screw TEK 4,8x18 mm (span ≤ 200 mm)
- 11 Sealing
- 12 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection following duct → see page 47
- Gap between damper and construction is filled by mortar or gypsum

In solid wall construction - Ablative Coated Batt

EI 120 (v_e i↔o) S

■ For connection following duct → see page 47



- 1 FDMQ 120
- 2 Solid wall construction
- 3 Duct
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 56
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

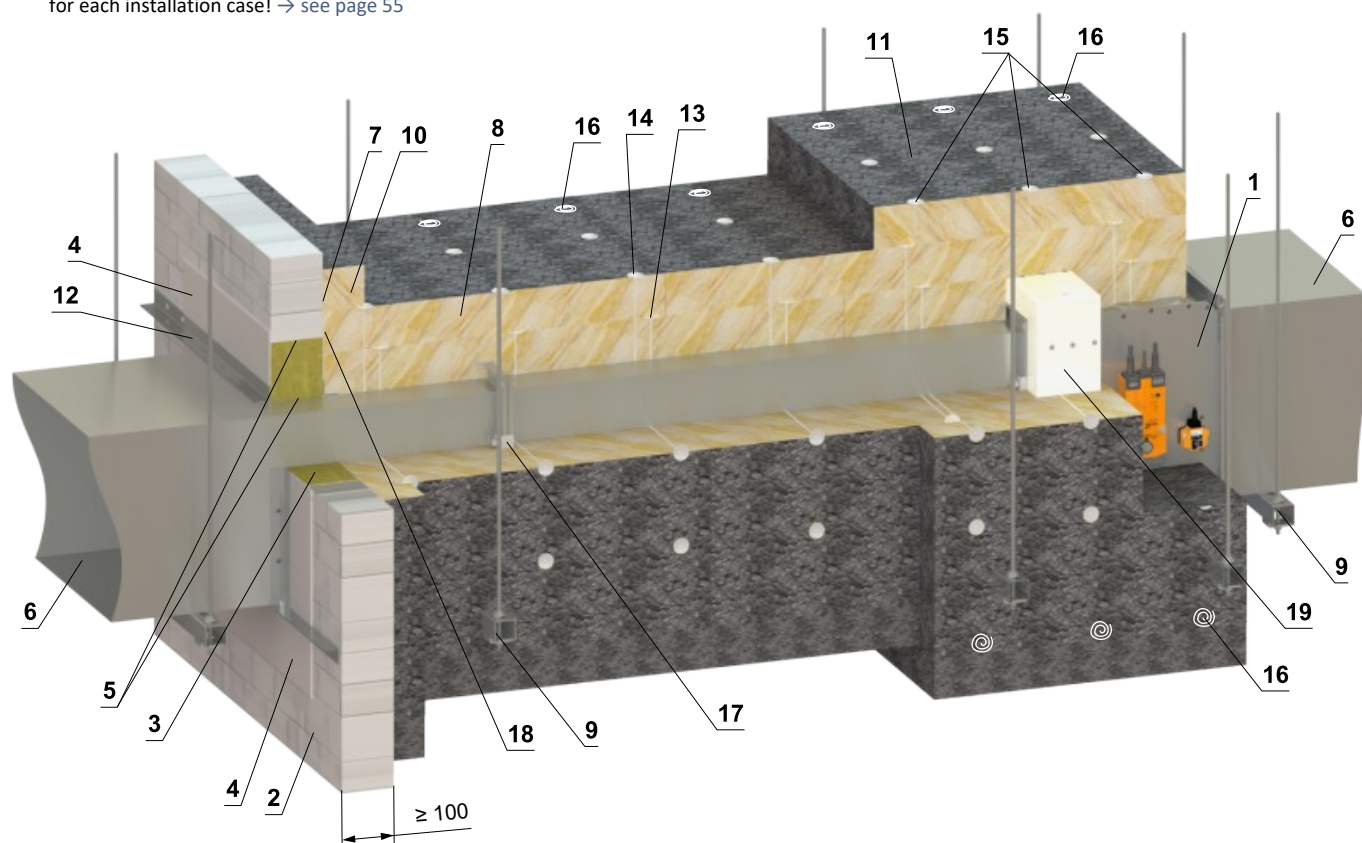
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

Installation outside solid wall construction

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

EI 120 (v_e i↔o) S

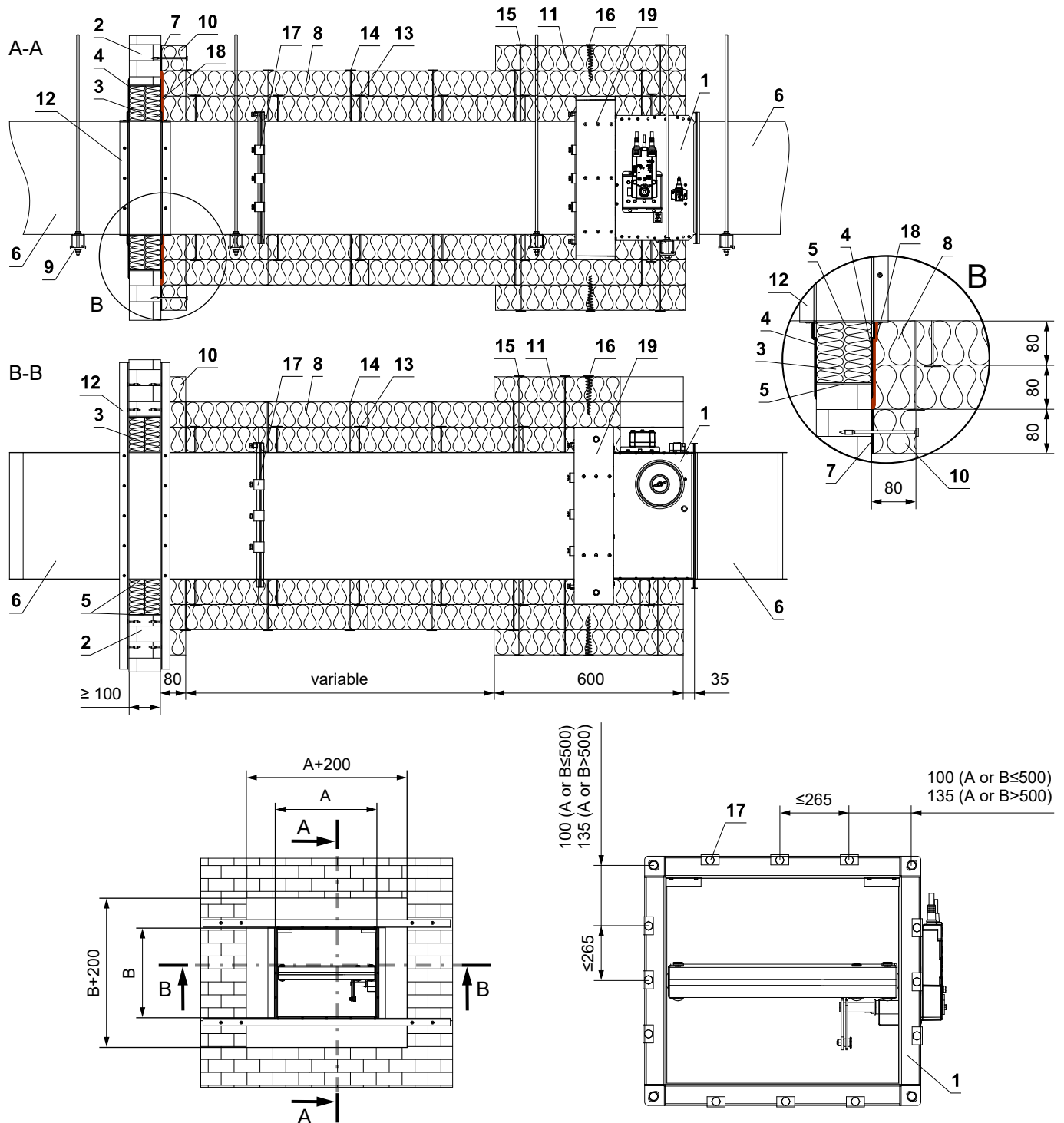
- For connection following duct → see page 47
- Minimum and maximum distance between the wall and fire damper is unlimited.
- When installing the insulation, follow the ISOVER manufacturer's instructions.
- The damper and the duct must be suspended separately.
- The duct must be suspended on both sides 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 anchoring system acc. to national standards.
- The damper inspection openings are covered by insulation and therefore it's necessary to make inspection openings on the connecting duct.
- Load of the suspension system depends on weight of the fire damper and duct system → see page 43
- 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.
- Reinforcing frame VRM-Q 120 must always be used for this type of installation. VRM-Q 120 is not a part of the fire damper and must be ordered separately for each installation case! → see page 55



- | | |
|--|---|
| <p>1 FDMQ 120</p> <p>2 Solid wall construction
Ablative Coated Batt System HILTI*</p> <p>3 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)</p> <p>4 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct</p> <p>5 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing</p> <p>6 Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm, flanges 30 mm, acc. to EN 1507 and DIN 24190</p> <p>7 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction</p> <p>8 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 SLAB 4.0 Alu1)</p> | <p>* 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.</p> <p>9 Profile with threaded rod → see pages 43 to 46</p> <p>10 Duct penetration insulation collar - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm - glued (pos. 7) and fixed with screws to the wall construction</p> <p>11 Insulating collar of the damper and duct connection - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm</p> <p>12 L-profile 30x30x3 mm - dimensions and installation acc. to ISOVER manuf.</p> <p>13 Stud-welded pins 80 mm - quantity and placing acc. to ISOVER manufa.</p> <p>14 Stud-welded pins 160 mm - quantity and placing acc. to ISOVER manufa.</p> <p>15 Stud-welded pins 240 mm - quantity and placing acc. to ISOVER manufa.</p> <p>16 Fire spiral shaped screws - quantity and placing acc. to ISOVER manufa.</p> <p>17 Steel clamp min. screw M8</p> <p>18 ISOVER Protect BSF</p> <p>19 VRM-Q 120 → see page 55</p> |
|--|---|

(continued on next page)

(continuation of installation Outside solid wall construction - ISOVER Ultimate Protect - Ablative Coated Batt)



- 1 FDMQ 120
- 2 Solid wall construction
Ablative Coated Batt System HILTI*
- 3 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 4 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 5 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing
- 6 Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm, flanges 30 mm, acc. to EN 1507 and DIN 24190
- 7 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction
- 8 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 SLAB 4.0 Alu1)
- 9 Profile with threaded rod → see pages 43 to 46
- 10 Duct penetration insulation collar - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm - glued (pos. 7) and fixed with screws to the wall construction
- 11 Insulating collar of the damper and duct connection - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm
- 12 L-profile 30x30x3 mm - dimensions and installation acc. to ISOVER manuf.
- 13 Stud-welded pins 80 mm - quantity and placing acc. to ISOVER manufa.
- 14 Stud-welded pins 160 mm - quantity and placing acc. to ISOVER manufa.
- 15 Stud-welded pins 240 mm - quantity and placing acc. to ISOVER manufa.
- 16 Fire spiral shaped screws - quantity and placing acc. to ISOVER manufa.
- 17 Steel clamp min. screw M8
- 18 ISOVER Protect BSF
- 19 VRM-Q 120 → see page 55

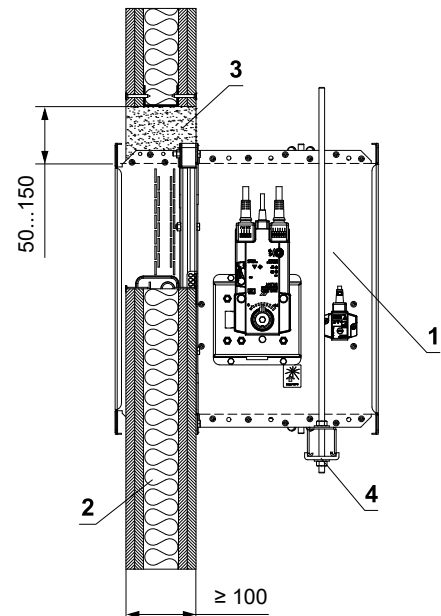
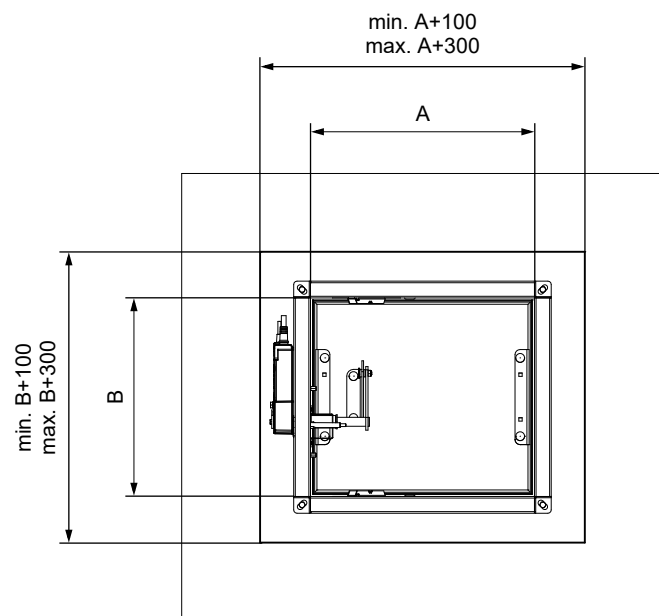
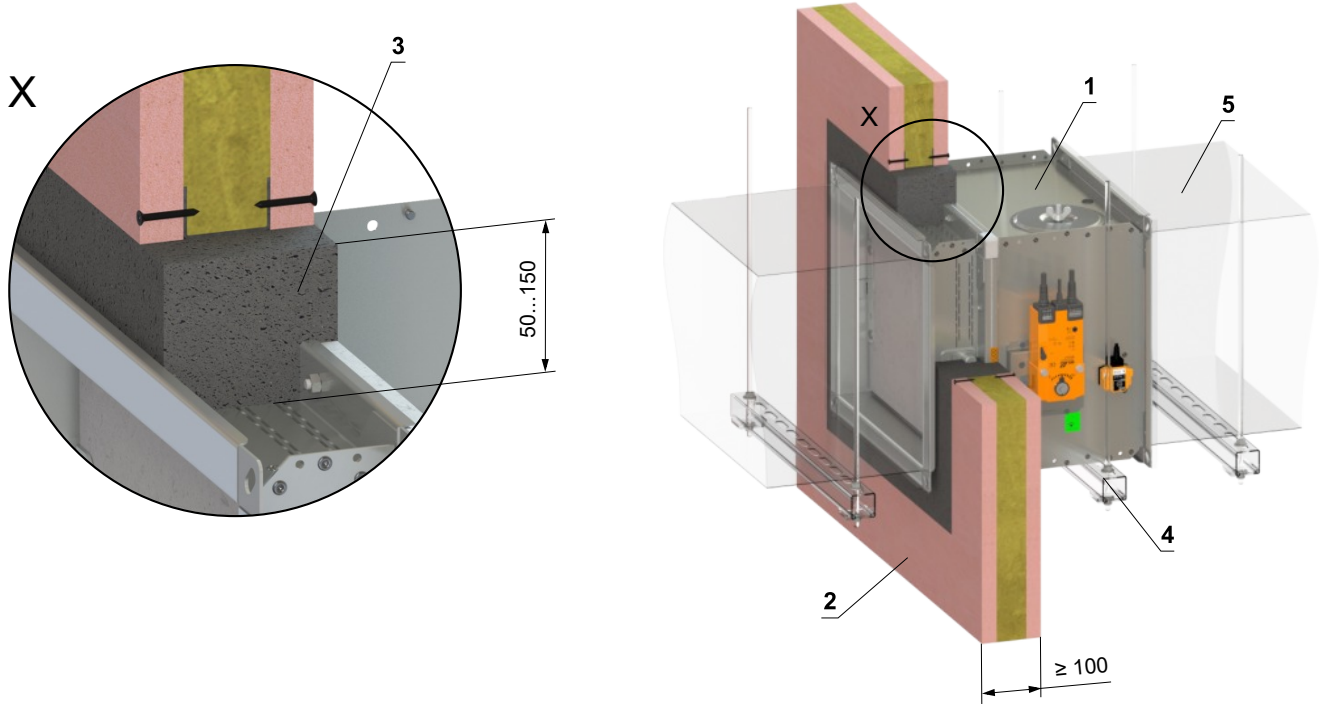
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

Installation in gypsum wall construction

In gypsum wall construction - mortar or gypsum

EI 120 (v_e i↔o) S - 500 Pa

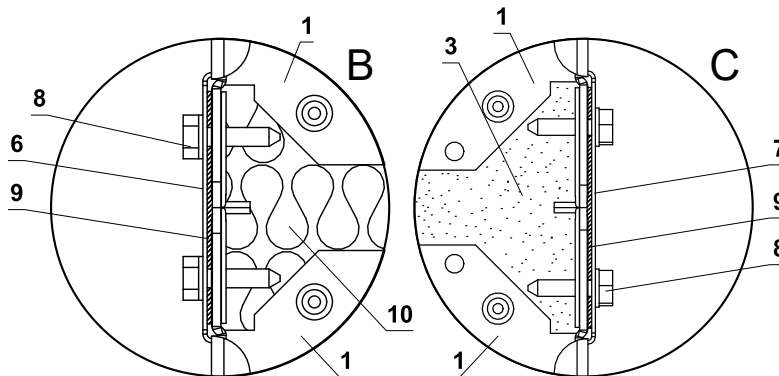
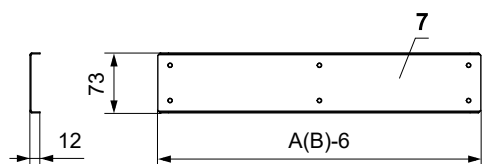
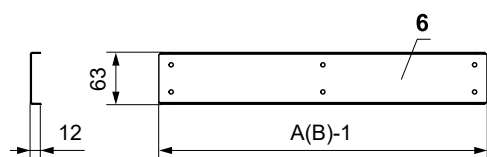
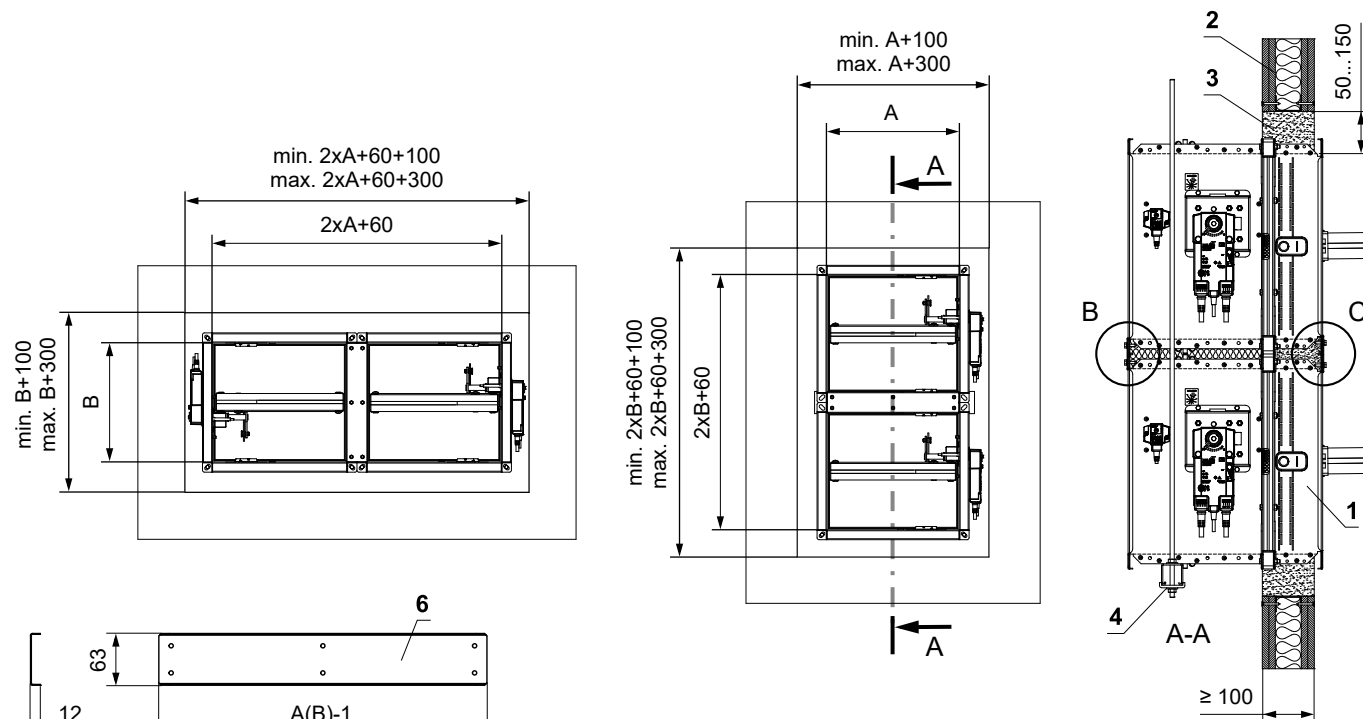
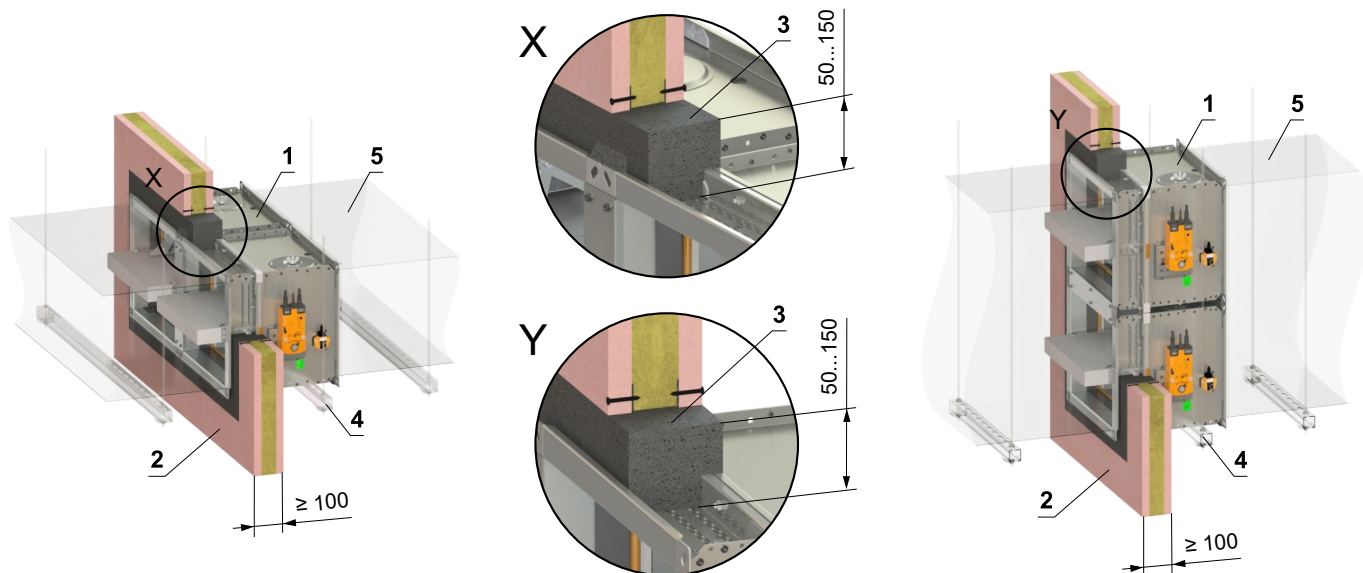
- For connection following duct → see page 47



- 1 FDMQ 120
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct

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

EI 120 (v_e i↔o) S

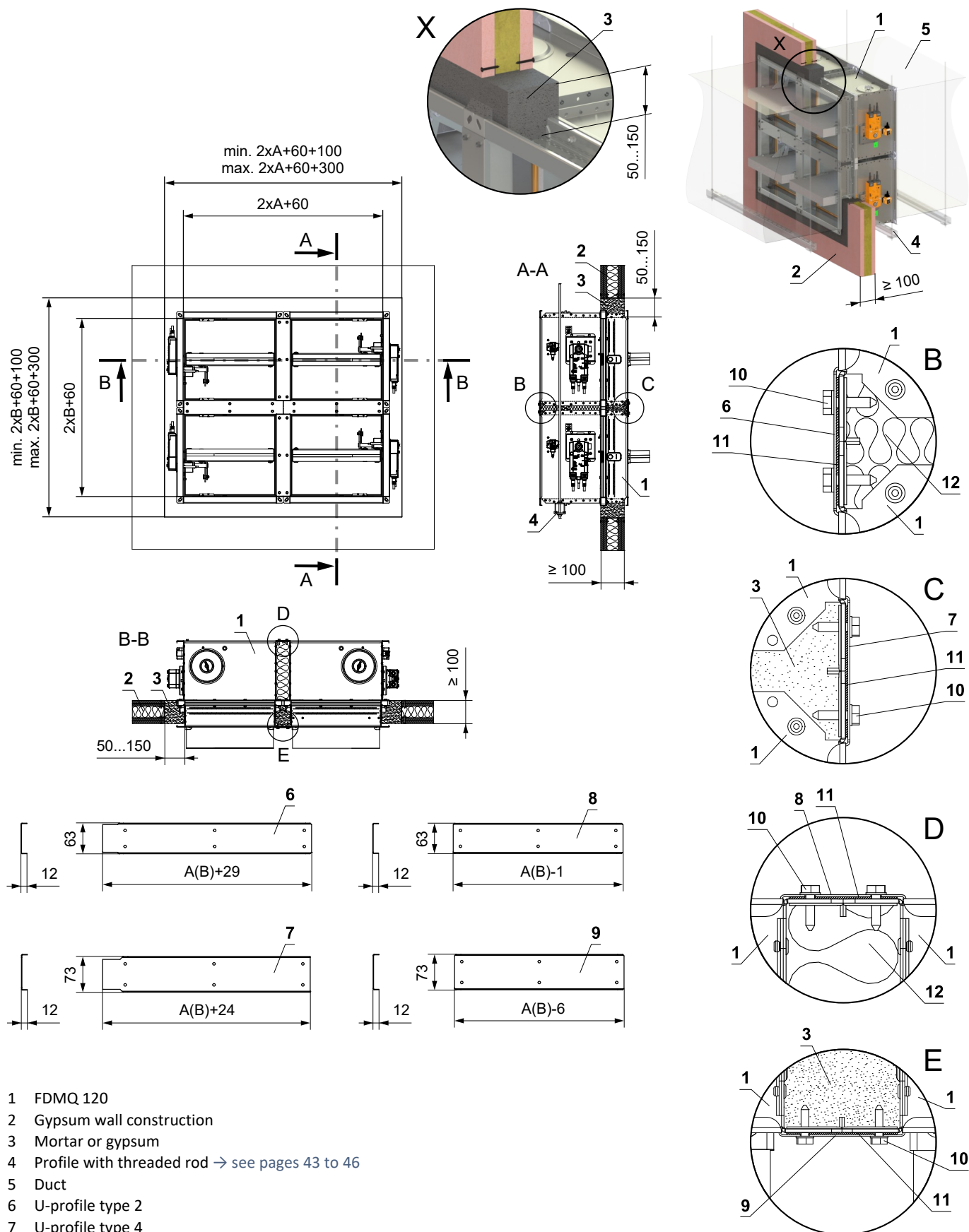


- 1 FDMQ 120
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEK 4,8x18 mm (span ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection following duct → see page 47
- Gap between damper and construction is filled by mortar or gypsum

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

EI 120 (v_e i↔o) S



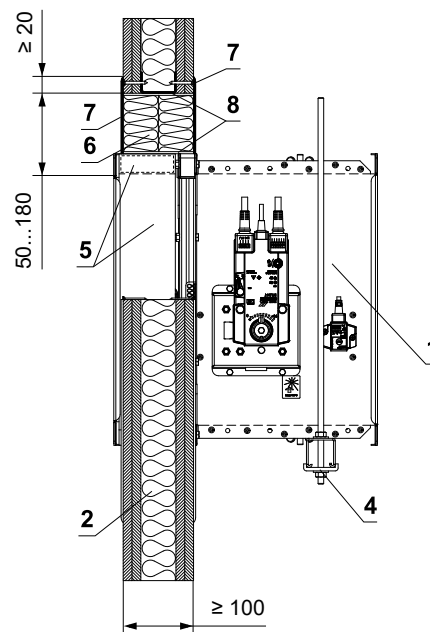
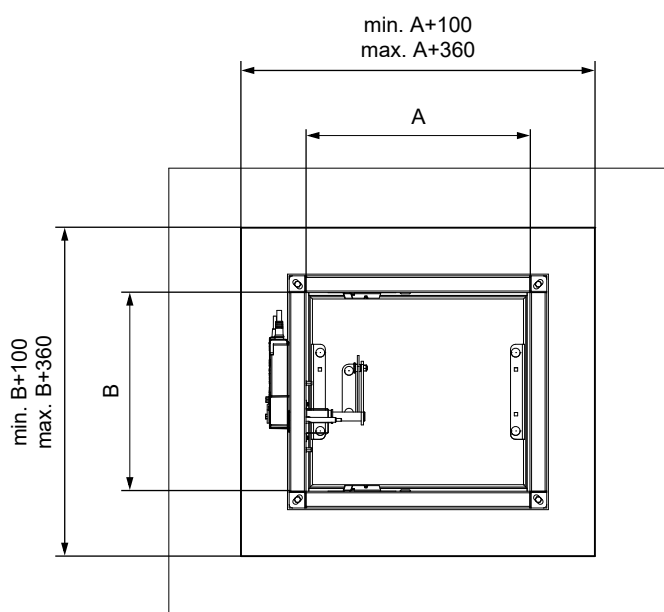
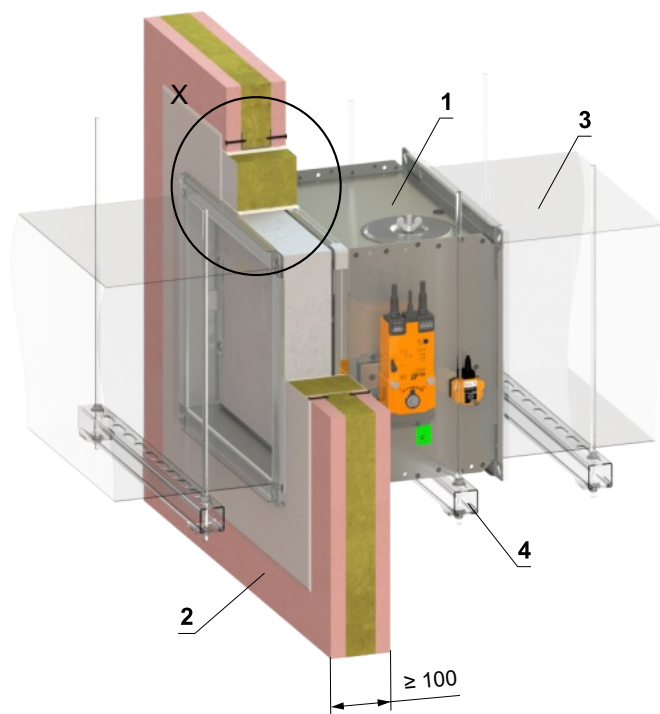
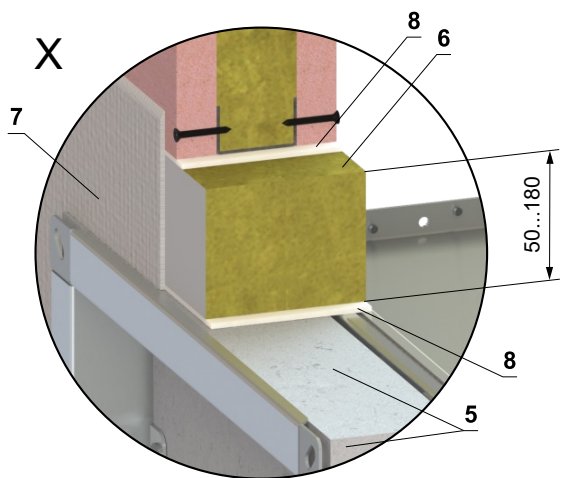
- 1 FDMQ 120
- 2 Gypsum wall construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct
- 6 U-profile type 2
- 7 U-profile type 4
- 8 U-profile type 1
- 9 U-profile type 3
- 10 Screw TEK 4,8x18 mm (span ≤ 200 mm)
- 11 Sealing
- 12 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection following duct → see page 47
- Gap between damper and construction is filled by mortar or gypsum

In gypsum wall construction - Ablative Coated Batt

EI 120 (v_e i↔o) S

- For connection following duct → see page 47



- 1 FDMQ 120
- 2 Gypsum wall construction
- 3 Duct
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Protective cladding board - min. th. 30 mm, min. density 750 kg/m³ (e.g. PROMATECT-MST) → see page 56
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

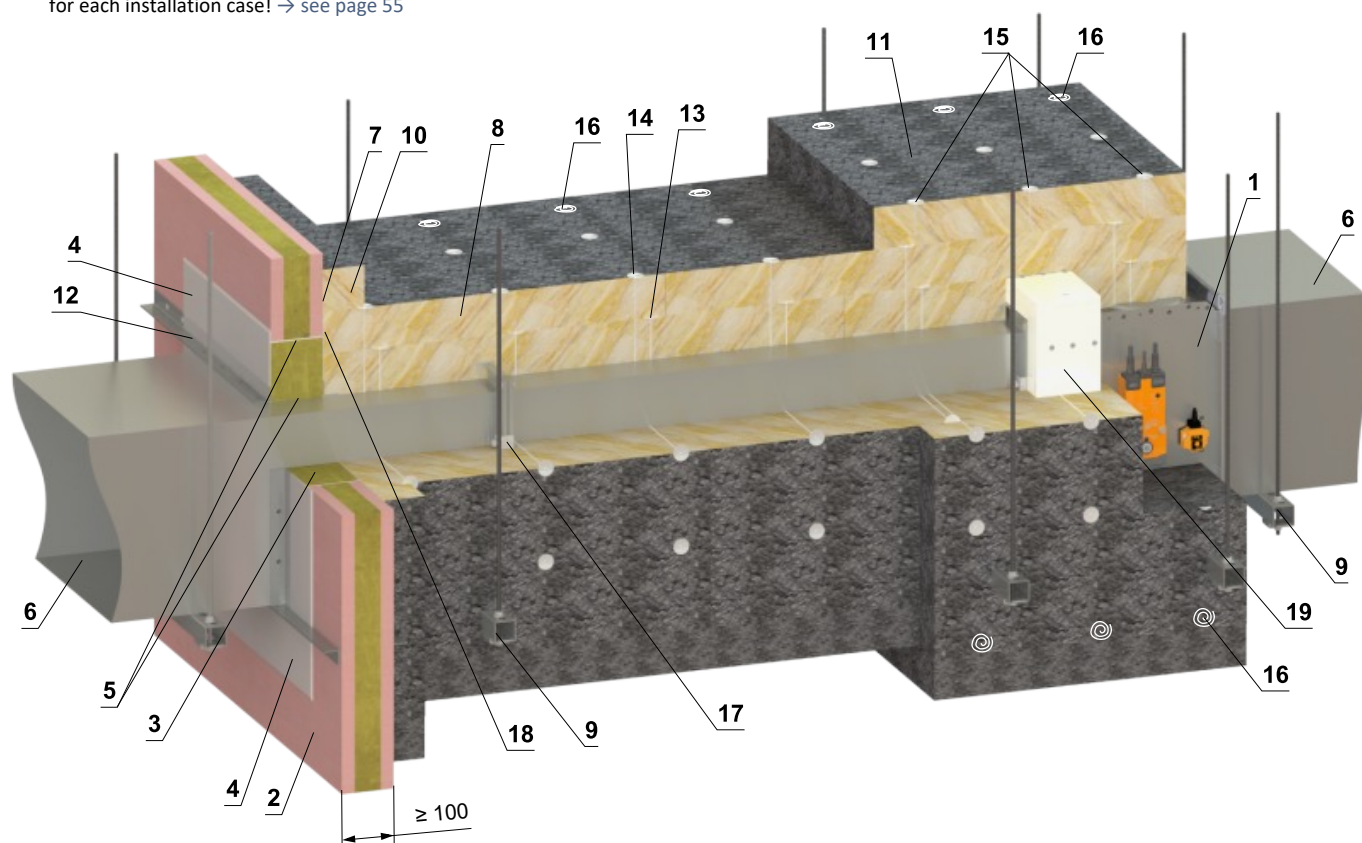
* HILTI system can be replaced by a similar system with the same or higher thickness, density, fire reaction class, tested according to EN 1366-3.

Installation outside gypsum wall construction

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

EI 120 (v_e i↔o) S

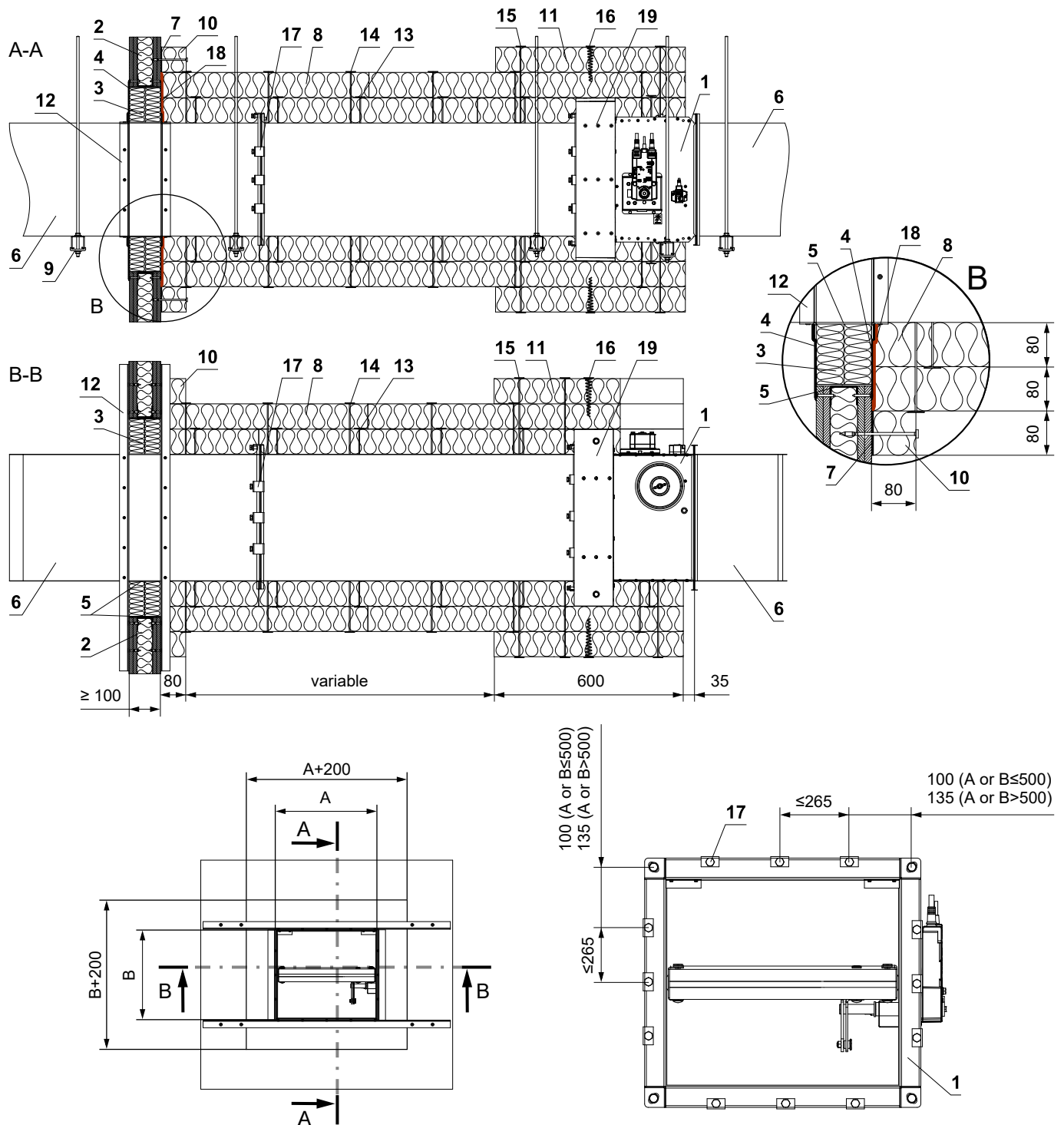
- For connection following duct → see page 47
- Minimum and maximum distance between the wall and fire damper is unlimited.
- When installing the insulation, follow the ISOVER manufacturer's instructions.
- The damper and the duct must be suspended separately.
- The duct must be suspended on both sides 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 anchoring system acc. to national standards.
- The damper inspection openings are covered by insulation and therefore it's necessary to make inspection openings on the connecting duct.
- Load of the suspension system depends on weight of the fire damper and duct system → see page 43
- 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.
- Reinforcing frame VRM-Q 120 must always be used for this type of installation. VRM-Q 120 is not a part of the fire damper and must be ordered separately for each installation case! → see page 55



- | | |
|--|--|
| <ol style="list-style-type: none"> 1 FDMQ 120 2 Gypsum wall construction
Ablative Coated Batt System HILTI* 3 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...) 4 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct 5 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing 6 Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm, flanges 30 mm, acc. to EN 1507 and DIN 24190 7 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction 8 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 SLAB 4.0 Alu1) | <p>* 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.</p> <ol style="list-style-type: none"> 9 Profile with threaded rod → see pages 43 to 46 10 Duct penetration insulation collar - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm - glued (pos. 7) and fixed with screws to the wall construction 11 Insulating collar of the damper and duct connection - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm 12 L-profile 30x30x3 mm - dimensions and installation acc. to ISOVER manuf. 13 Stud-welded pins 80 mm - quantity and placing acc. to ISOVER manufa. 14 Stud-welded pins 160 mm - quantity and placing acc. to ISOVER manufa. 15 Stud-welded pins 240 mm - quantity and placing acc. to ISOVER manufa. 16 Fire spiral shaped screws - quantity and placing acc. to ISOVER manufa. 17 Steel clamp min. screw M8 18 ISOVER Protect BSF 19 VRM-Q 120 → see page 55 |
|--|--|

(continued on next page)

(continuation of installation Outside gypsum wall construction - ISOVER Ultimate Protect - Ablative Coated Batt)



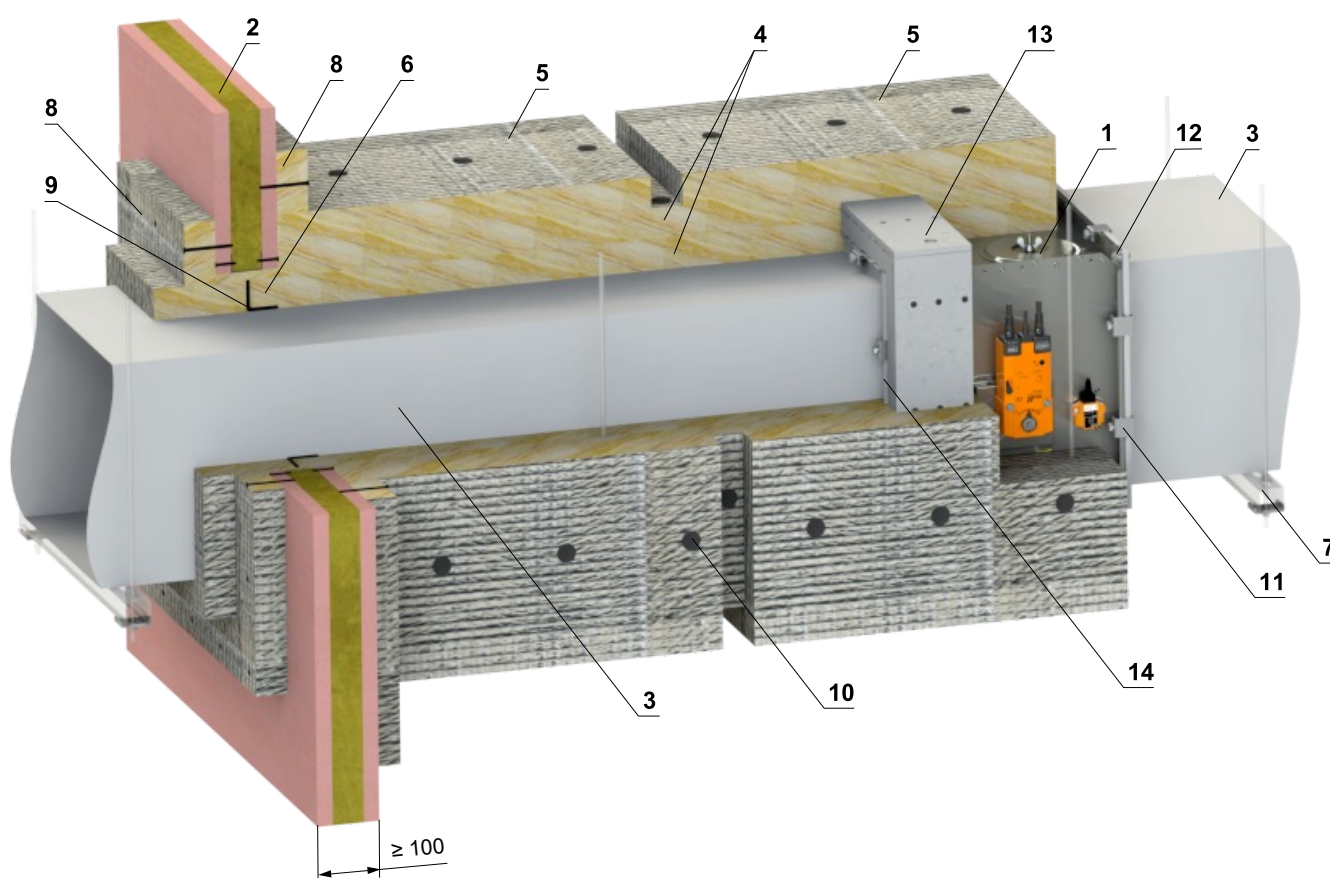
- 1 FDMQ 120
- 2 Gypsum wall construction
Ablative Coated Batt System HILTI*
- 3 Mineral wool board - min. density 140 kg/m³ (HILTI CFS-CT B 1S 140/50...)
- 4 Fire stop coating - th. 1 mm (HILTI CFS-CT...) - coating is overcoated on the support construction and on the damper casing/duct
- 5 Fire-resistant mastic - (HILTI CFS-S ACR...) fill the gap from both sides of the fire separation construction and around the perimeter of penetration and damper casing
- 6 Standard air duct, made of galvanized sheet metal min. thickness 0,8 mm, flanges 30 mm, acc. to EN 1507 and DIN 24190
- 7 ISOVER Protect BSK glue - apply on the insulation and fix it to the fire separation construction
- 8 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 SLAB 4.0 Alu1)
- 9 Profile with threaded rod → see pages 43 to 46
- 10 Duct penetration insulation collar - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm - glued (pos. 7) and fixed with screws to the wall construction
- 11 Insulating collar of the damper and duct connection - ISOVER Ultimate Protect SLAB 4.0 Alu1, th. 80 mm
- 12 L-profile 30x30x3 mm - dimensions and installation acc. to ISOVER manuf.
- 13 Stud-welded pins 80 mm - quantity and placing acc. to ISOVER manufa.
- 14 Stud-welded pins 160 mm - quantity and placing acc. to ISOVER manufa.
- 15 Stud-welded pins 240 mm - quantity and placing acc. to ISOVER manufa.
- 16 Fire spiral shaped screws - quantity and placing acc. to ISOVER manufa.
- 17 Steel clamp min. screw M8
- 18 ISOVER Protect BSF
- 19 VRM-Q 120 → see page 55

* 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.

Outside gypsum wall construction - Flamebar EN Fire Duct - FPL 110 insulation

EI 120 (v_e i↔o) S

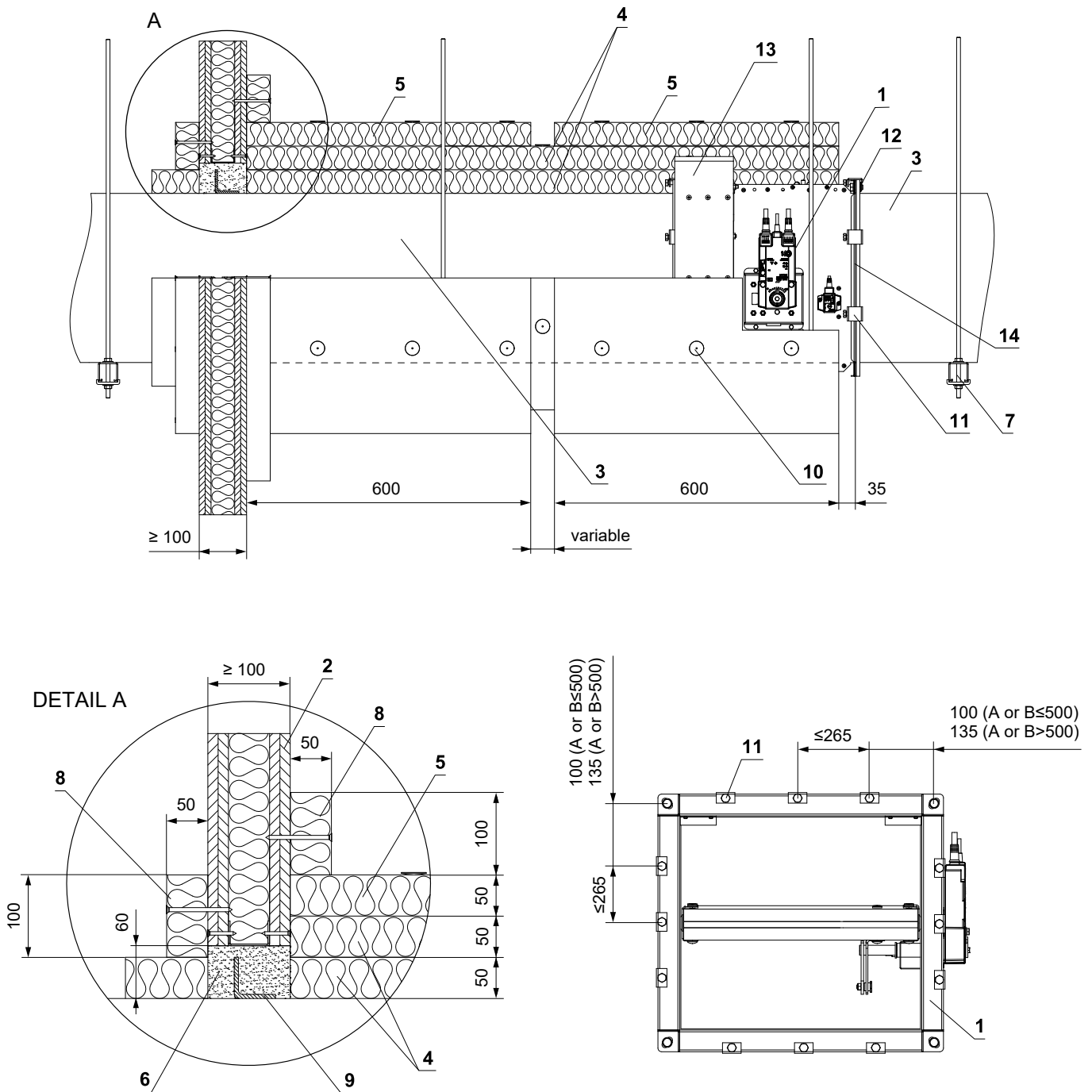
- Minimum and maximum distance between the wall and the fire damper is unlimited.
- The fire damper and duct must be suspended separately.
- The duct must be suspended on both sides of the fire damper in accordance with national standards.
- The duct between the fire damper and the fire separating construction must be suspended using threaded rods and mounting profiles or another suspension system in accordance with national standards.
- Fire damper inspection holes are covered with insulation, therefore it's necessary to install an access door in the connecting duct. (This must be a Flamebar access door if installed in the fire duct.)
- Load on suspension system depends on weight of the fire damper and duct system → see page 43
- Max. length between two suspension systems is 1500 mm.
- Installation must be done in such a way that all load transfer from the fire separating construction to the damper is completely eliminated.
- Reinforcing frame VRM-Q 120 must always be used for this type of installation. VRM-Q 120 is not part of the fire damper and must be ordered separately for each installation! → see page 55



- | | |
|--|---|
| <p>1 FDMQ 120</p> <p>2 Gypsum wall construction</p> <p>3 Flamebar EN fire Duct - made of galvanised sheet metal, thickness is dependant on duct size, type BW18 fire sprayed with Flamebar BW18 (insulated duct), type BW11 fire sprayed with Flamebar BW11 (not insulated duct)</p> <p>4 Insulation - two layers of stone wool FPL 110 SLAB, thickness 2x 50 mm, density 105 kg/m³, the second layer of insulation is provided with aluminium foil on the outside (FPL 110 FOIL FACED SLAB) - visible edges of mineral wool are covered with self-adhesive aluminium tape</p> <p>5 Insulation collar - additional insulation of the fire damper and gypsum wall construction - third layer of insulation FPL 110 FOIL FACED SLAB, thickness 50 mm and width 600 mm</p> <p>6 Filling - FPL 110 mineral wool - fill the gap between the duct and the wall</p> <p>7 Fixing profile with threaded rod → see pages 43 to 46</p> | <p>8 Penetration insulation pattern - FPL 110 FOIL FACED SLAB, thickness 50 mm - glued with Idenden 10-450 and fixed with screws to the wall construction</p> <p>9 Reinforcement of the duct - steel L-profile 50x50x5 mm or flange to Flamebar spec. on all sides of the duct within 100 mm of the wall</p> <p>10 Insulation pins - riveted to the duct - after the insulation boards are pushed over the insulation pins, secure the ends with disc plates in each insulation layer</p> <p>11 Steel clamp - flange connection with Flamebar G-Clamps with M8 bolts, max. spacing 200 mm</p> <p>12 Bolt assembly - flange connection at corners - M10 bolt and nut</p> <p>13 VRM-Q 120 → see page 55</p> <p>14 Sealing - all joints between duct segments are insulated with Flamebar Fibre Gasket self-adhesive tape and Flamebar Intumescent Sealant</p> |
|--|---|

(continued on next page)

(continuation of installation Outside gypsum wall construction - FPL duct - Rockwool insulation)

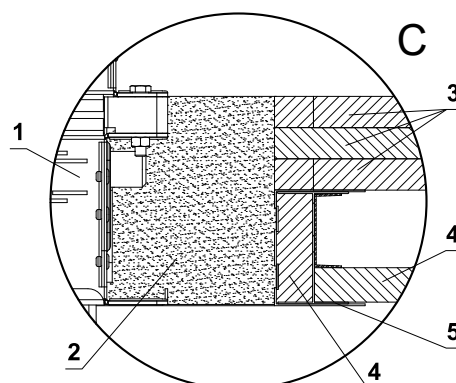
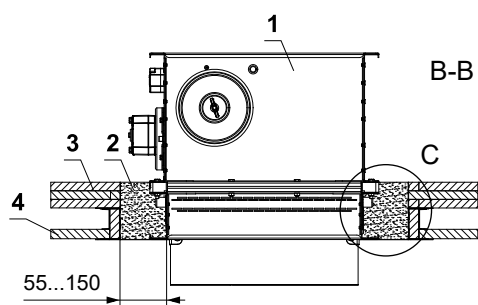
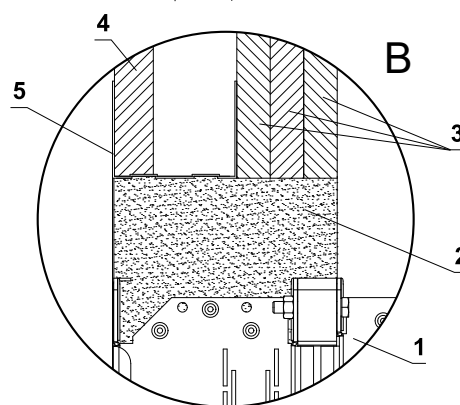
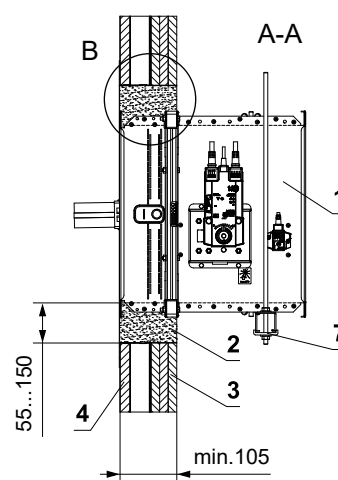
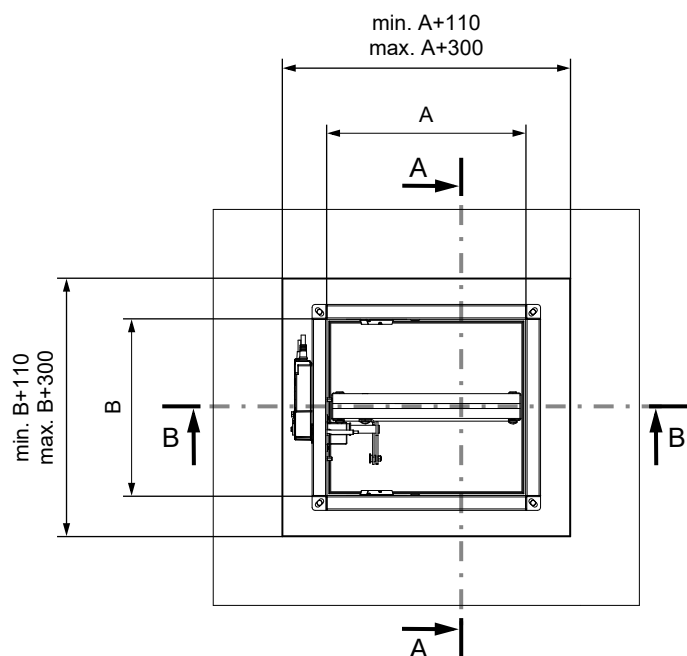
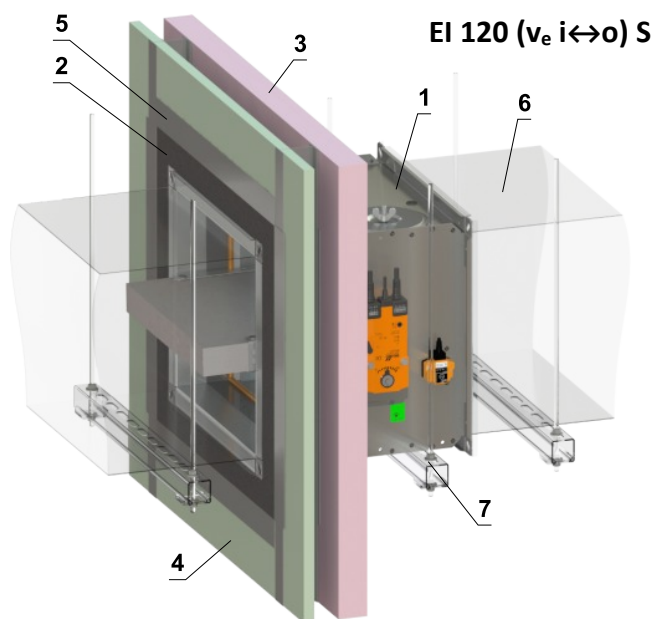


- 1 FDMQ 120
- 2 Gypsum wall construction
- 3 Flamebar EN fire Duct - made of galvanised sheet metal, thickness is dependant on duct size, type BW18 fire sprayed with Flamebar BW18 (insulated duct), type BW11 fire sprayed with Flamebar BW11 (not insulated duct)
- 4 Insulation - two layers of stone wool FPL 110 SLAB, thickness 2x 50 mm, density 105 kg/m³, the second layer of insulation is provided with aluminium foil on the outside (FPL 110 FOIL FACED SLAB) - visible edges of mineral wool are covered with self-adhesive aluminium tape
- 5 Insulation collar - additional insulation of the fire damper and gypsum wall construction - third layer of insulation FPL 110 FOIL FACED SLAB, thickness 50 mm and width 600 mm
- 6 Filling - FPL 110 mineral wool - fill the gap between the duct and the wall
- 7 Fixing profile with threaded rod → see pages 43 to 46
- 8 Penetration insulation pattress - FPL 110 FOIL FACED SLAB, thickness 50 mm - glued with Idenden 10-450 and fixed with screws to the wall construction
- 9 Reinforcement of the duct - steel L-profile 50x50x5 mm or flange to Flamebar spec. on all sides of the duct within 100 mm of the wall
- 10 Insulation pins - riveted to the duct - after the insulation boards are pushed over the insulation pins, secure the ends with disc plates in each insulation layer
- 11 Steel clamp - flange connection with Flamebar G-Clamps with M8 bolts, max. spacing 200 mm
- 12 Bolt assembly - flange connection at corners - M10 bolt and nut
- 13 VRM-Q 120 → see page 55
- 14 Sealing - all joints between duct segments are insulated with Flamebar Fibre Gasket self-adhesive tape and Flamebar Intumescent Sealant

Installation in shaft wall

In shaft wall - mortar or gypsum

- For connection following duct → see page 47
- Maximum size for FDMQ 120 in shaftwall is 1500mm x 650mm
- Damper can be installed on either side of the wall.
- It is possible to use e.g. wall type A306030, A306035... from www.british-gypsum.com or RNS 121, RNS 122... from www.siniat.co.uk
- It is possible to use walls that have the same or greater thickness and density of boards than the walls listed below (more layers of boards can also be used)
- Follow the instructions of the shaft wall manufacturer.



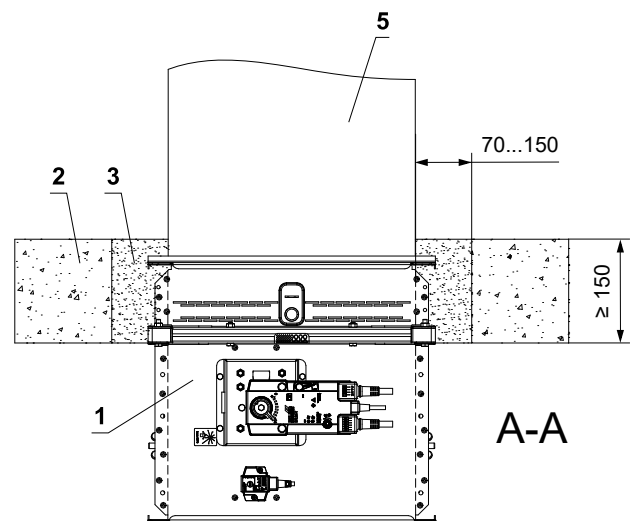
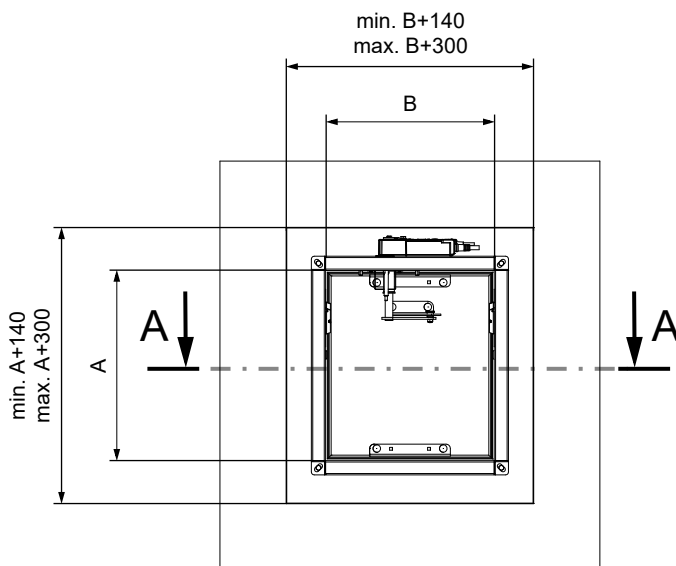
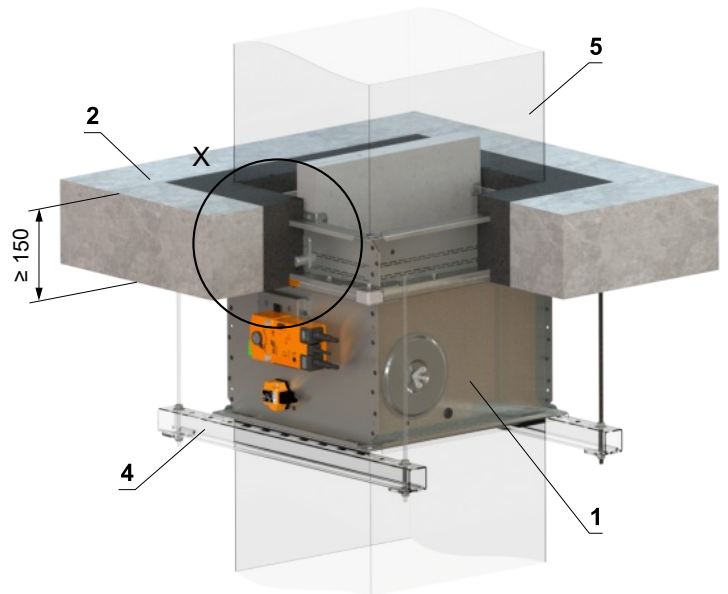
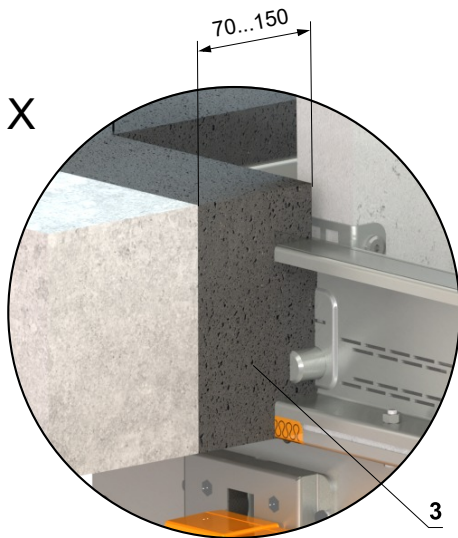
- 1 FDMQ 120
- 2 Mortar or gypsum
- 3 Plasterboard EN 520 - Type F - min. 3x15 mm
- 4 Plasterboard EN 520 - Type F - min. 1x19 mm
- 5 Plasterboard profile
- 6 Duct
- 7 Profile with threaded rod → see pages 43 to 46

Installation in solid ceiling construction

In solid ceiling construction - mortar or gypsum

EI 120 ($h_o \leftrightarrow o$) S - 500 Pa

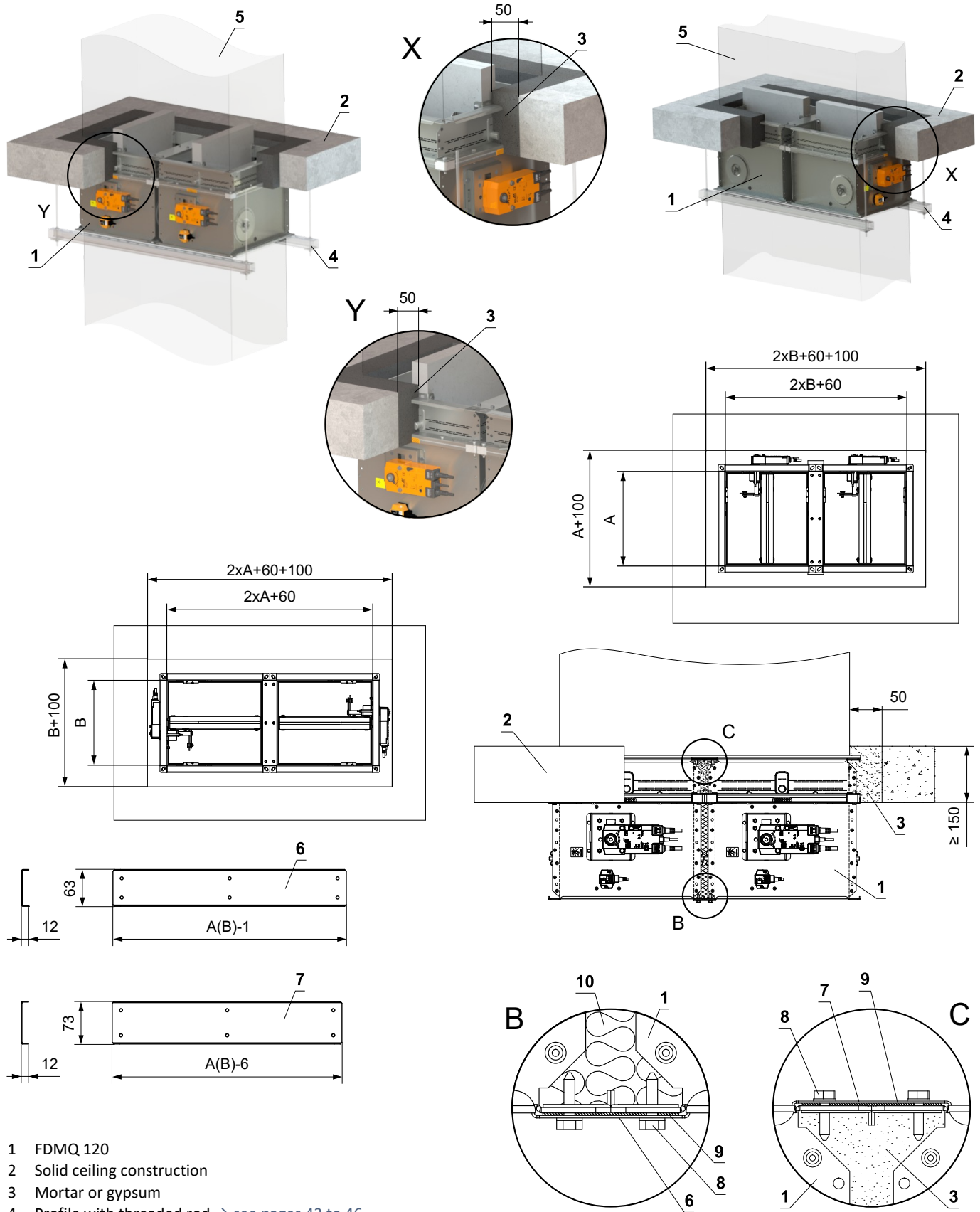
- For connection following duct → see page 47



- 1 FDMQ 120
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct

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

EI 120 (h_o i↔o) S

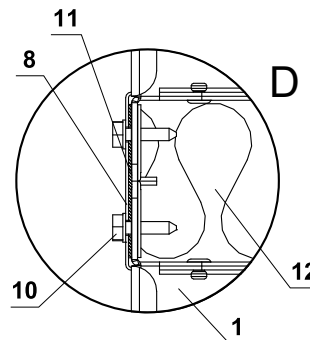
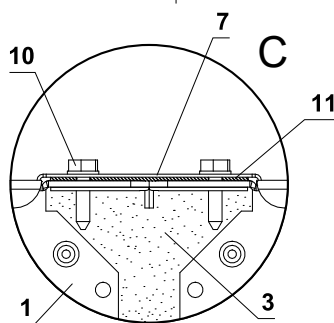
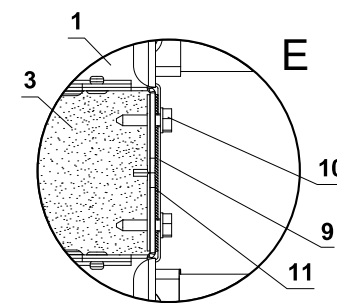
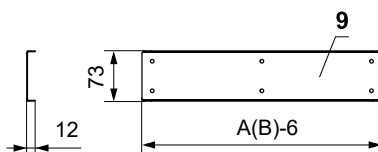
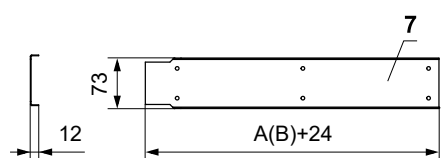
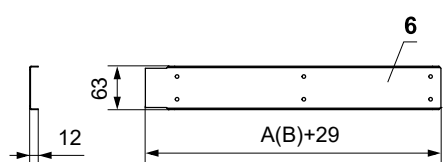
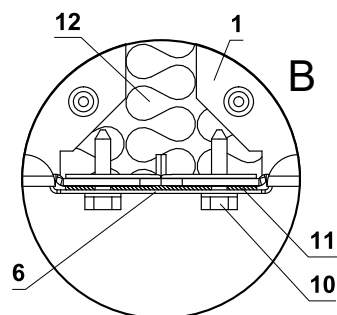
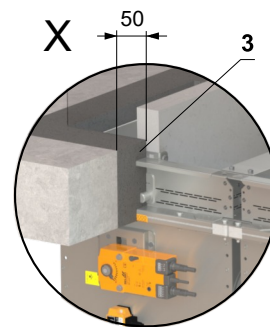
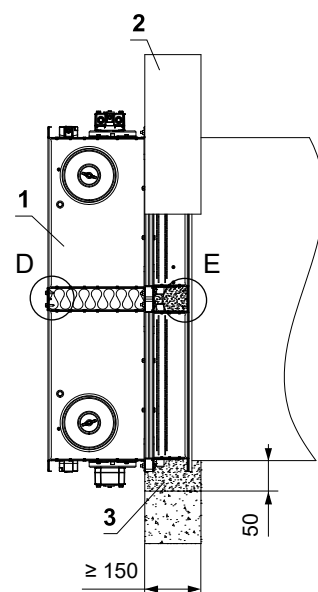
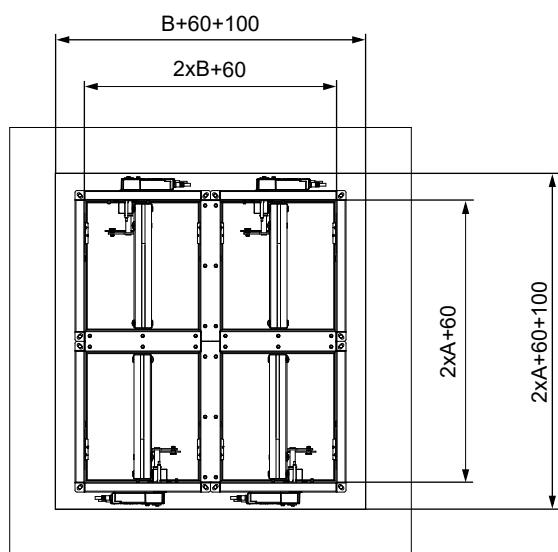
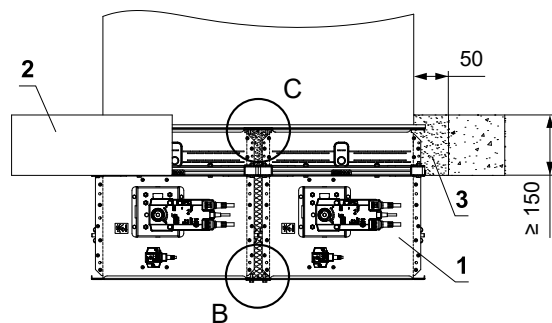
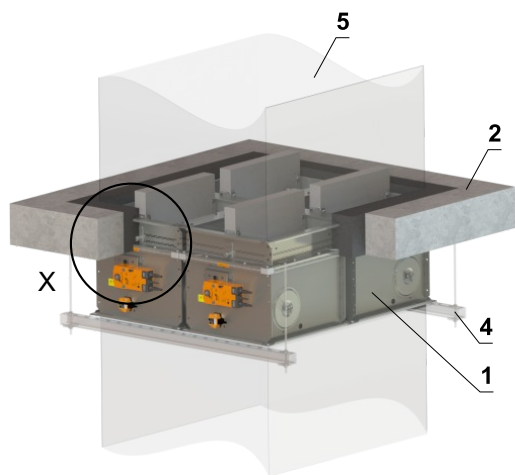


- 1 FDMQ 120
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct
- 6 U-profile type 3
- 7 U-profile type 1
- 8 Screw TEK 4,8x18 mm (span ≤ 200 mm)
- 9 Sealing
- 10 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

- For connection following duct → see page 47
- Gap between damper and construction is filled by mortar or gypsum

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

EI 120 (h_o i↔o) S



- 1 FDMQ 120
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Profile with threaded rod → see pages 43 to 46
- 5 Duct
- 6 U-profile type 2
- 7 U-profile type 4
- 8 U-profile type 1
- 9 U-profile type 3
- 10 Screw TEK 4,8x18 mm (span ≤ 200 mm)
- 11 Sealing
- 12 Insulation board made of mineral wool - recommended for easy filling of gap with mortar/gypsum.

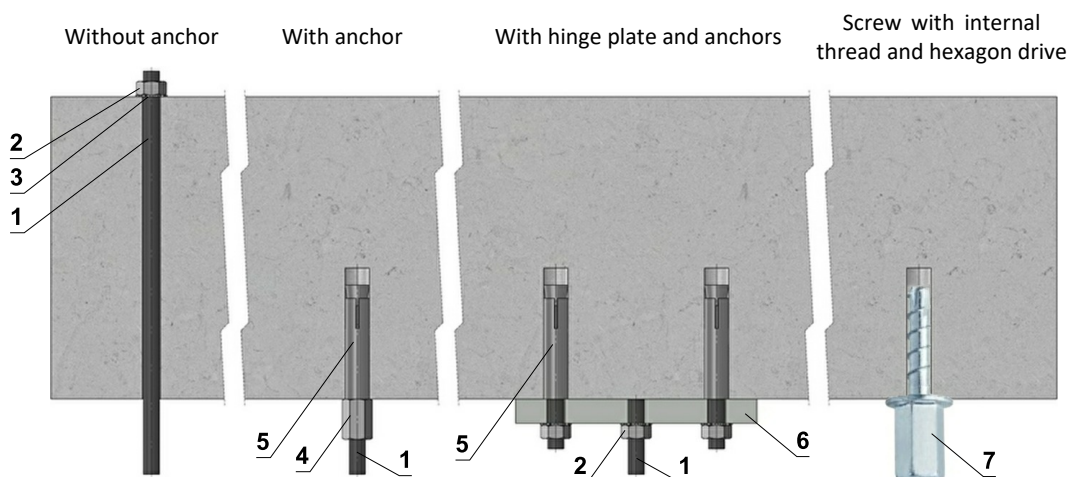
- For connection following duct → see page 47
- Gap between damper and construction is filled by mortar or gypsum

V. SUSPENSION SYSTEMS

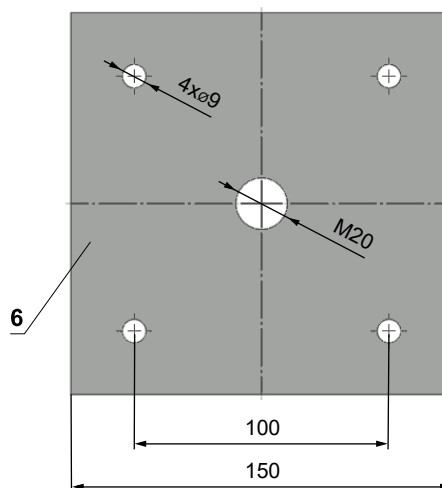
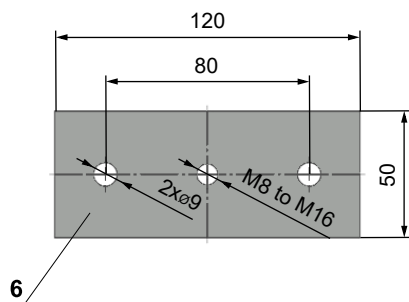
Mounting to the ceiling wall

- 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



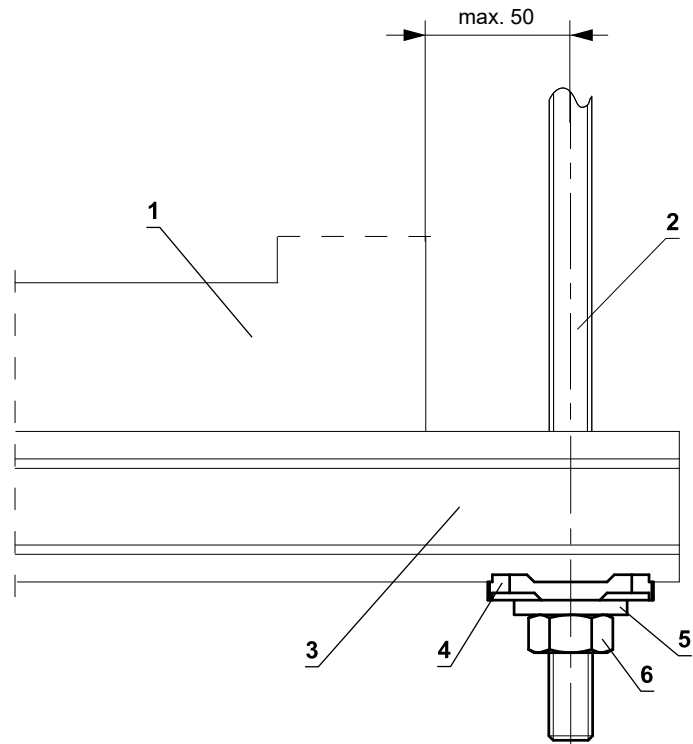
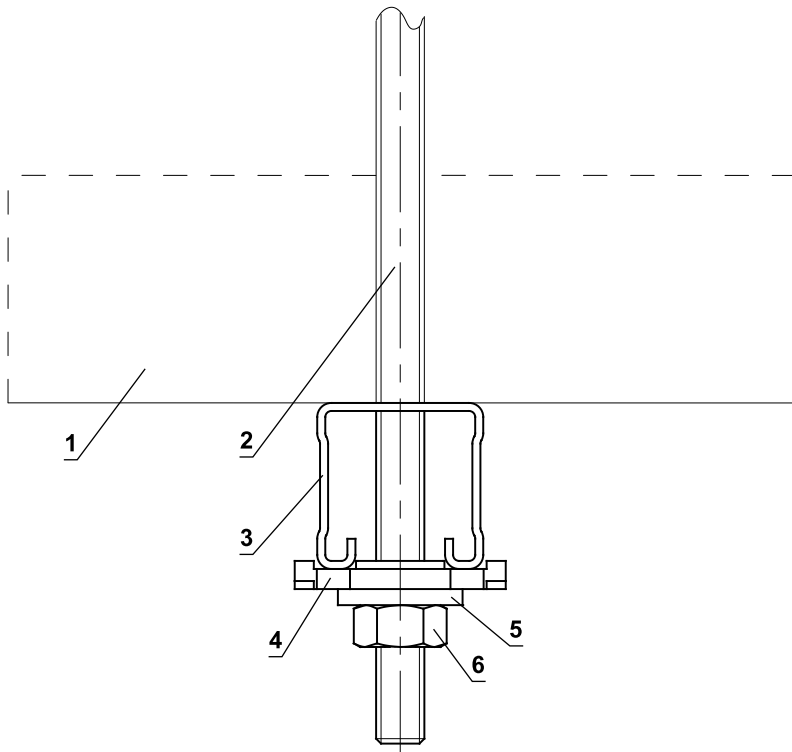
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

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)

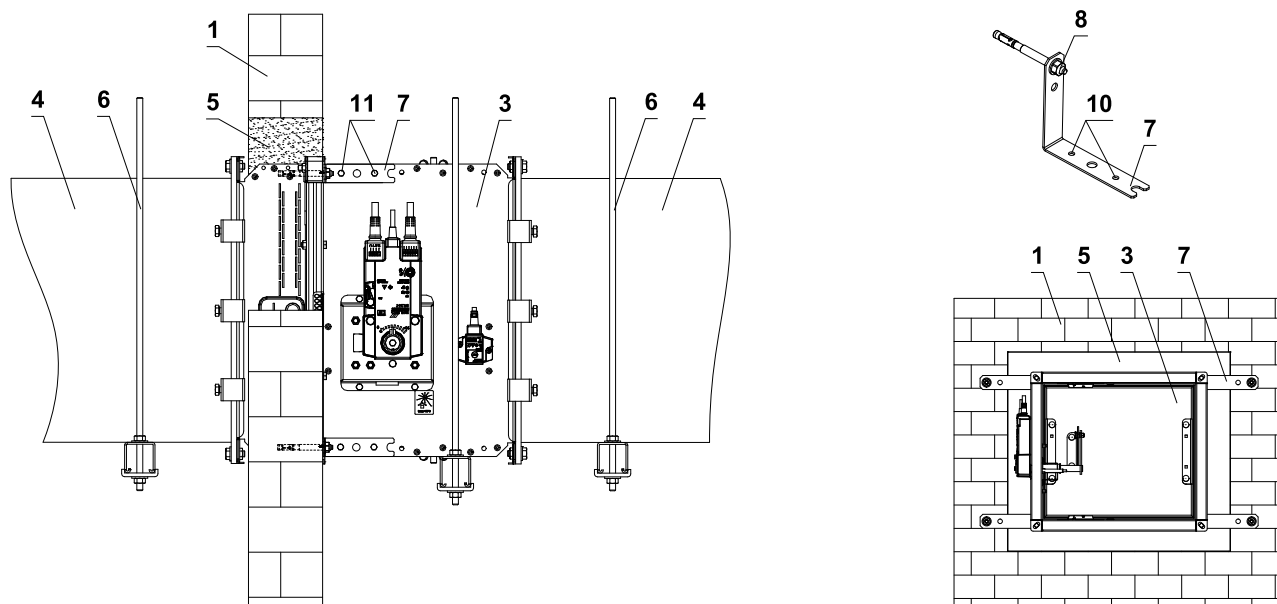
Example of placing of mounting profiles HILTI



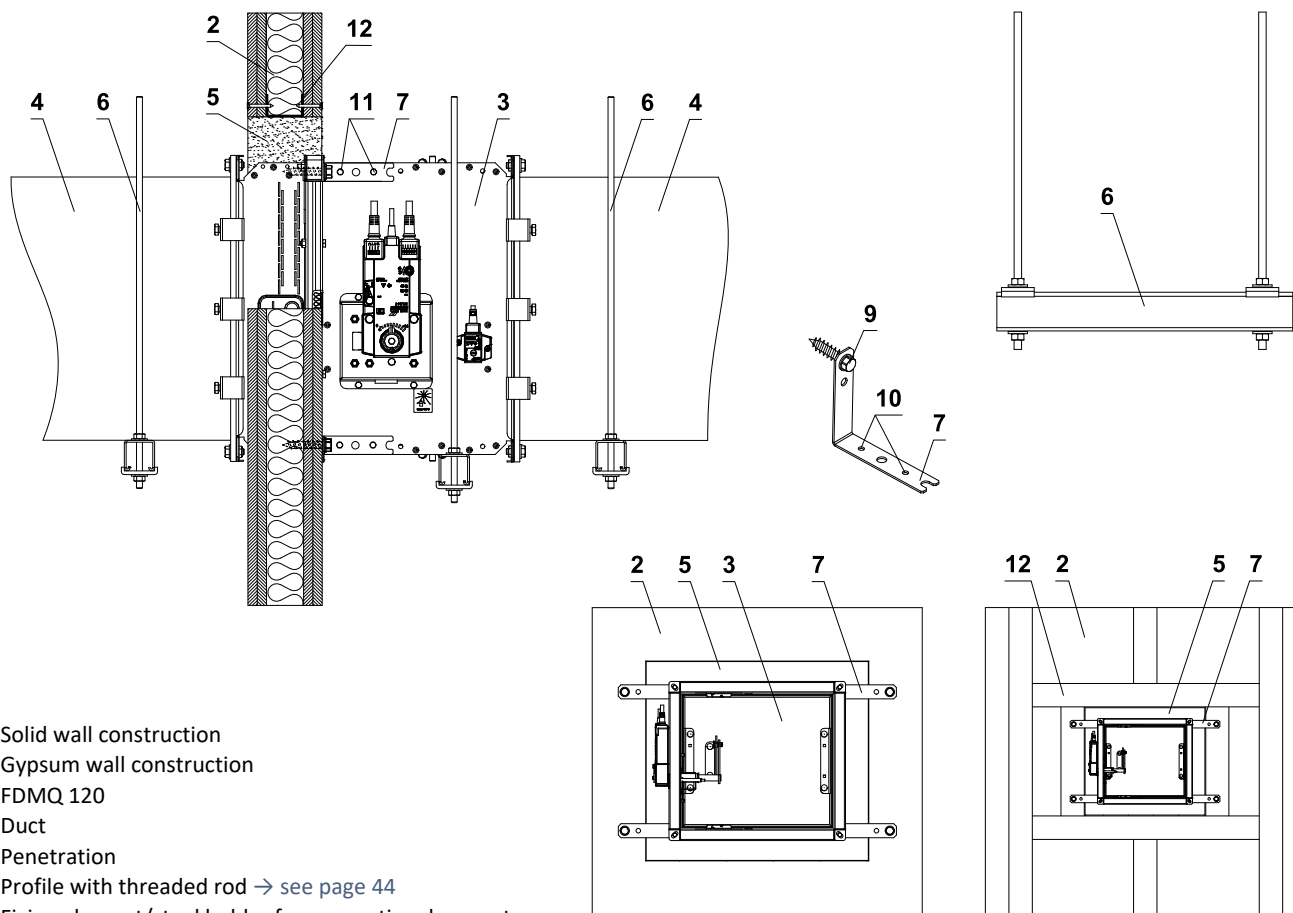
- 1 FDMQ 120
- 2 Threaded rod M8 - M12
- 3 Support HILTI MQ-41 or MQ-41/3
- 4 Bored plate HILTI MQZ-L
- 5 Washer for M8 - M12
- 6 Nut M8 - M12

Example of fixing FDMQ 120 to the wall

In solid wall construction



In gypsum wall construction



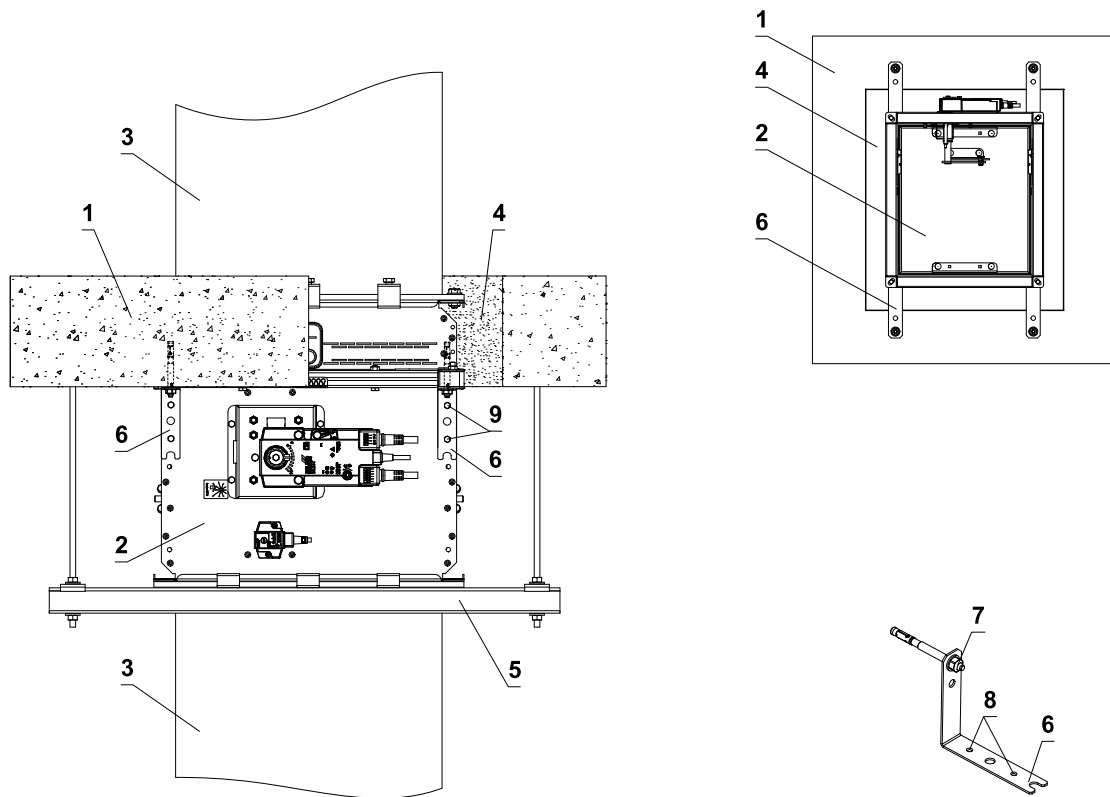
- 1 Solid wall construction
- 2 Gypsum wall construction
- 3 FDMQ 120
- 4 Duct
- 5 Penetration
- 6 Profile with threaded rod → see page 44
- 7 Fixing element/steel holder for connecting damper to the wall (optional accessories MANDIK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
- 8 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

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 120 to the ceiling

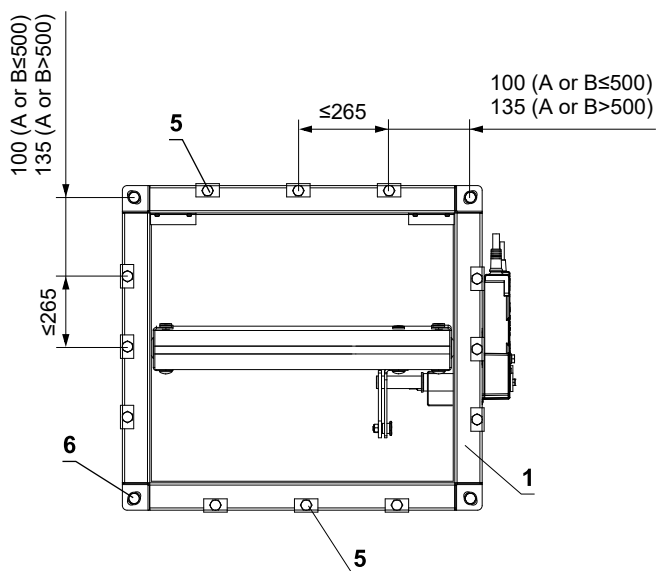
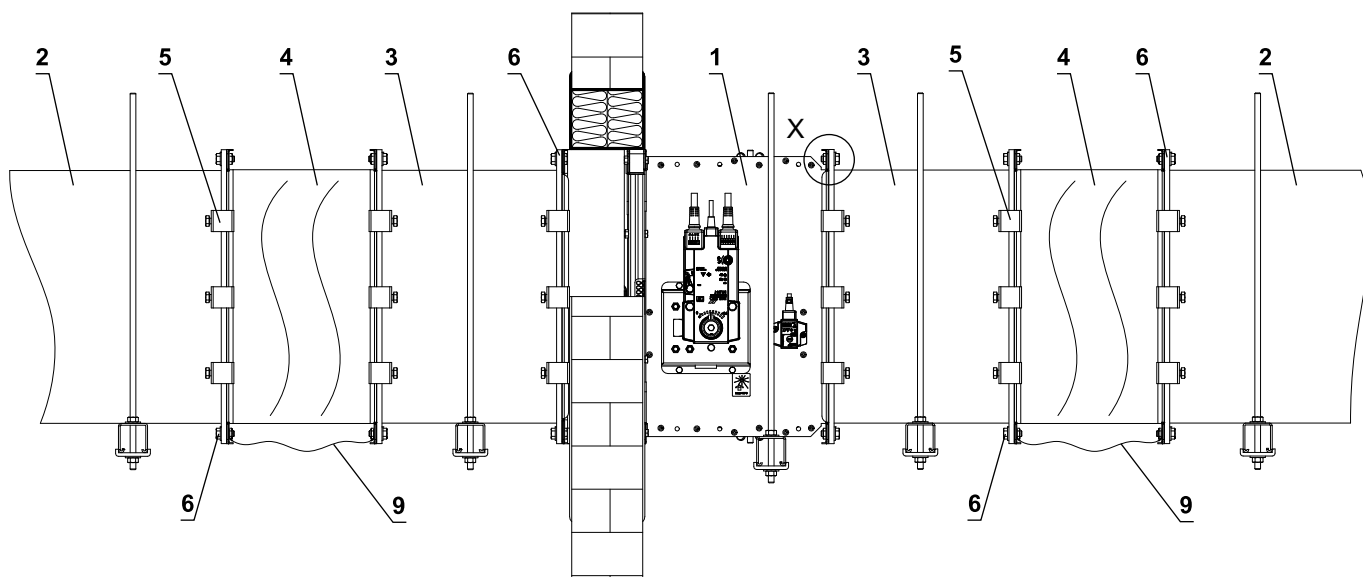
In solid ceiling construction



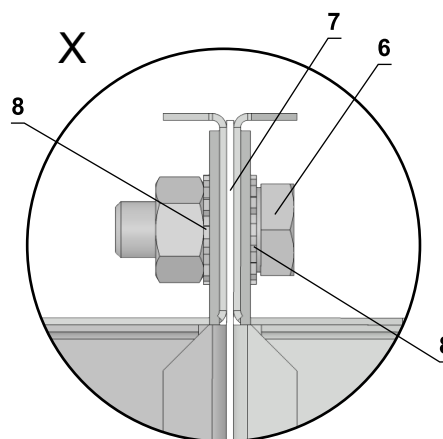
- 1 Solid ceiling construction
- 2 FDMQ 120
- 3 Duct
- 4 Penetration
- 5 Profile with threaded rod → see page 44
- 6 Fixing element/steel holder for connecting damper to the ceiling (optional accessories MANDIK, a.s. or sheet metal min. thickness 2 mm and min. width 60 mm)
- 7 Nut M8 with anchor
- 8 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



* min. one connection must be electrically conductive

- 1 FDMQ 120
- 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

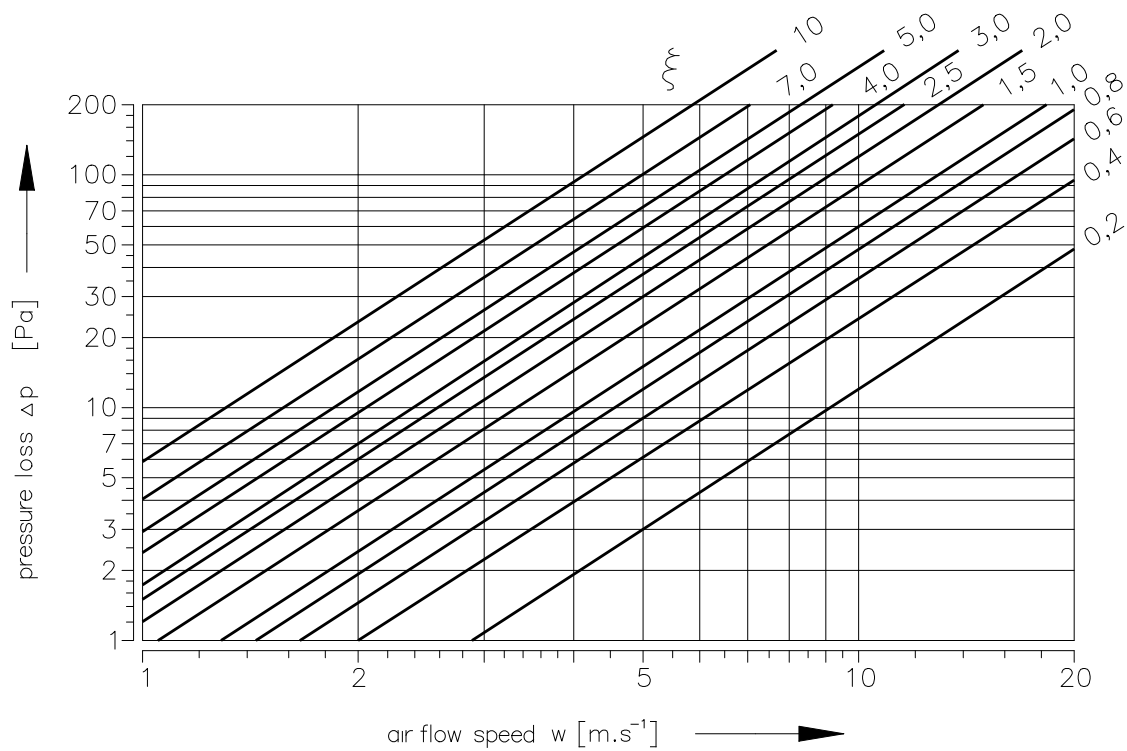
Pressure loss

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 49

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	3,522	3,307	3,081	2,980	2,850	2,704	2,629	2,510	2,421	2,326	2,252	2,187	2,166	2,139
180	2,557	2,389	2,236	2,153	2,064	1,962	1,889	1,802	1,727	1,664	1,610	1,569	1,547	1,529
200	1,972	1,843	1,723	1,653	1,590	1,502	1,451	1,383	1,325	1,276	1,235	1,201	1,186	1,172
225	1,522	1,465	1,321	1,197	1,173	1,141	1,106	1,067	1,015	0,964	0,948	0,917	0,891	0,881
250	1,249	1,164	1,083	1,044	1,008	0,952	0,902	0,867	0,828	0,799	0,772	0,752	0,739	0,732
280	1,133	1,032	1,002	0,960	0,926	0,881	0,827	0,781	0,728	0,705	0,685	0,673	0,665	0,650
300	1,041	0,947	0,896	0,861	0,823	0,775	0,729	0,677	0,648	0,635	0,601	0,592	0,587	0,584
315	0,865	0,803	0,749	0,724	0,693	0,658	0,618	0,595	0,569	0,546	0,527	0,513	0,503	0,499
355	0,735	0,684	0,638	0,609	0,585	0,556	0,528	0,506	0,483	0,464	0,448	0,436	0,428	0,424
400	0,640	0,596	0,555	0,529	0,509	0,481	0,463	0,439	0,420	0,402	0,389	0,377	0,371	0,367
450	0,567	0,527	0,490	0,470	0,452	0,430	0,405	0,387	0,370	0,355	0,343	0,332	0,330	0,324
500	0,514	0,478	0,443	0,426	0,413	0,387	0,369	0,350	0,334	0,321	0,310	0,301	0,298	0,293
550	0,490	0,455	0,421	0,405	0,390	0,367	0,344	0,326	0,317	0,300	0,289	0,287	0,278	0,275
560	0,469	0,434	0,404	0,390	0,371	0,349	0,334	0,318	0,303	0,291	0,281	0,273	0,270	0,266
600	0,439	0,409	0,384	0,368	0,355	0,333	0,316	0,301	0,289	0,281	0,270	0,259	0,253	0,244
630	0,429	0,398	0,370	0,357	0,343	0,322	0,306	0,291	0,278	0,267	0,257	0,250	0,237	0,243
650	-	0,379	0,356	0,342	0,329	0,309	0,297	0,284	0,266	0,257	0,250	0,240	0,229	0,233
700	-	0,375	0,348	0,333	0,321	0,306	0,289	0,275	0,262	0,250	0,244	0,234	0,222	0,221
710	-	0,368	0,343	0,329	0,316	0,300	0,285	0,268	0,257	0,247	0,237	0,230	0,219	0,219
750	-	0,354	0,330	0,321	0,309	0,286	0,271	0,260	0,246	0,238	0,230	0,222	0,219	0,215
800	-	0,344	0,320	0,309	0,297	0,282	0,264	0,251	0,239	0,229	0,221	0,215	0,211	0,209

B	A													
	600	630	650	700	710	750	800	900	1000	1100	1250	1400	1500	
150	2,112	2,091	2,083	2,067	2,062	2,044	2,029	1,992	1,972	-	-	-	-	
180	1,513	1,495	1,480	1,469	1,462	1,449	1,436	1,412	1,394	1,377	1,363	1,348	1,340	
200	1,154	1,144	1,131	1,123	1,120	1,109	1,099	1,080	1,066	1,053	1,040	1,031	1,024	
225	0,874	0,861	0,841	0,833	0,824	0,817	0,810	0,795	0,785	0,775	0,758	0,744	0,740	
250	0,725	0,714	0,705	0,704	0,698	0,693	0,685	0,673	0,665	0,656	0,648	0,641	0,638	
280	0,645	0,641	0,617	0,612	0,606	0,601	0,593	0,585	0,576	0,563	0,549	0,540	0,530	
300	0,569	0,554	0,550	0,549	0,548	0,541	0,532	0,524	0,507	0,496	0,490	0,488	0,480	
315	0,493	0,487	0,481	0,479	0,476	0,470	0,467	0,459	0,452	0,447	0,442	0,436	0,434	
355	0,419	0,414	0,408	0,405	0,404	0,399	0,397	0,389	0,384	0,379	0,374	0,370	0,368	
400	0,363	0,358	0,352	0,351	0,350	0,345	0,343	0,336	0,331	0,327	0,324	0,321	0,318	
450	0,319	0,315	0,311	0,310	0,309	0,306	0,301	0,296	0,293	0,289	0,286	0,281	0,280	
500	0,288	0,285	0,284	0,281	0,279	0,276	0,273	0,268	0,264	0,261	0,258	0,256	0,254	
550	0,272	0,269	0,264	0,259	0,256	0,254	0,253	0,248	0,245	0,242	0,237	0,234	0,232	
560	0,264	0,259	0,256	0,255	0,253	0,250	0,248	0,244	0,240	0,236	0,233	0,231	0,230	
600	0,242	0,241	0,239	0,238	0,237	0,233	0,228	0,226	0,222	0,219	0,216	0,214	0,212	
630	0,240	0,237	0,234	0,233	0,232	0,229	0,226	0,223	0,220	0,217	0,213	0,211	0,209	
650	0,230	0,227	0,225	0,223	0,222	0,219	0,216	0,210	0,208	0,206	0,201	0,198	0,196	
700	0,219	0,219	0,218	0,217	0,215	0,213	0,211	0,207	0,204	0,202	0,199	0,196	0,194	
710	0,217	0,217	0,216	0,215	0,214	0,212	0,209	0,205	0,201	0,199	0,197	0,195	0,193	
750	0,211	0,208	0,206	0,205	0,204	0,203	0,201	0,197	0,193	0,189	0,187	0,185	0,183	
800	0,206	0,203	0,201	0,200	0,199	0,197	0,194	0,191	0,188	0,186	0,183	0,182	0,181	

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 acoustics 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 boards of homogeneous material Promatect-H, connected with 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 120, provided by the manufacturer, is completely void if actuating, closing and control devices are unprofessionally handled by untrained workers or if electric components, i.e. limit switches, actuators, communication and supply devices and thermoelectric activation devices are dismantled.
- The warranty is void if dampers are used for other purposes, devices and working conditions than those allowed by these technical conditions or if the dampers are mechanically damaged during handling.
- If the dampers are damaged by transport, a record must be written down with the forwarder at reception for later complaint.

IX. ASSEMBLY, ATTENDANCE AND MAINTENANCE

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

Manual operation - actuator control without electric voltage

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

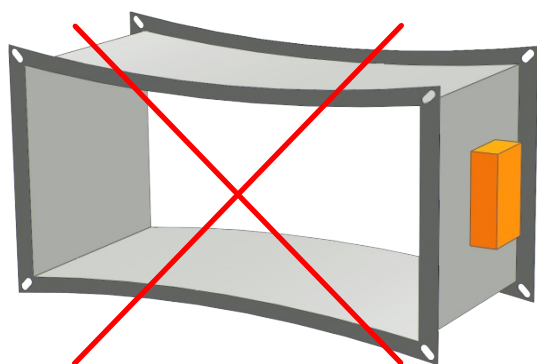
Limit switches

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

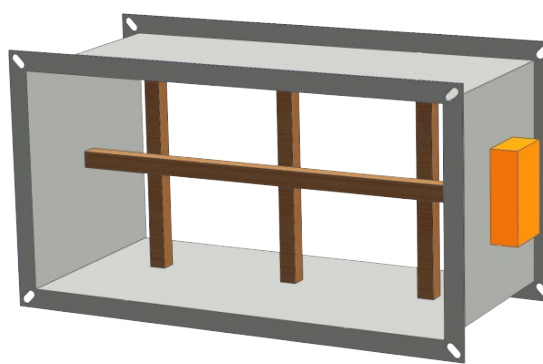
Installation / fixing the damper

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

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

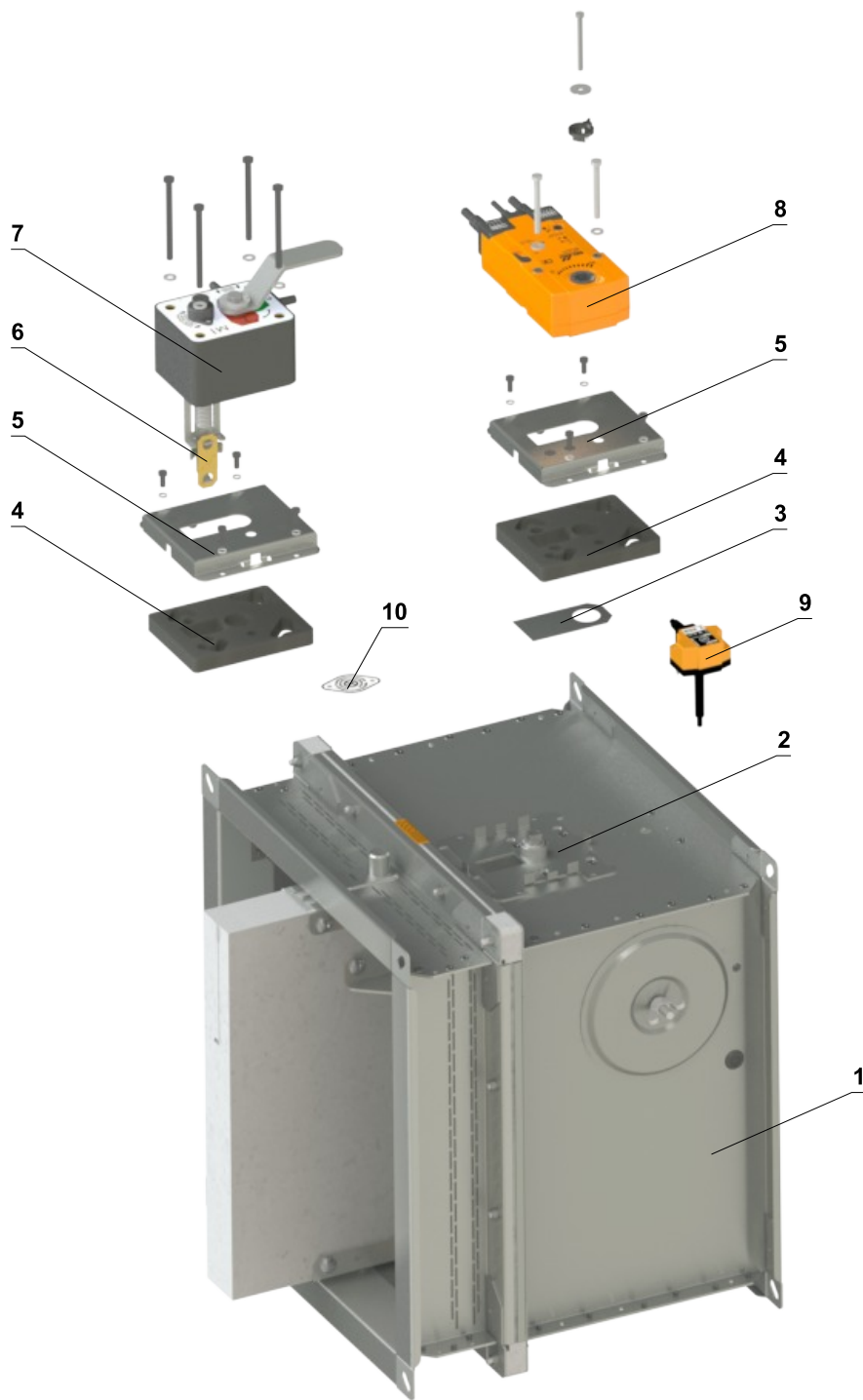


WRONG!



Reinforcement of the casing with wooden beams

Change of manual control for the actuator or vice versa

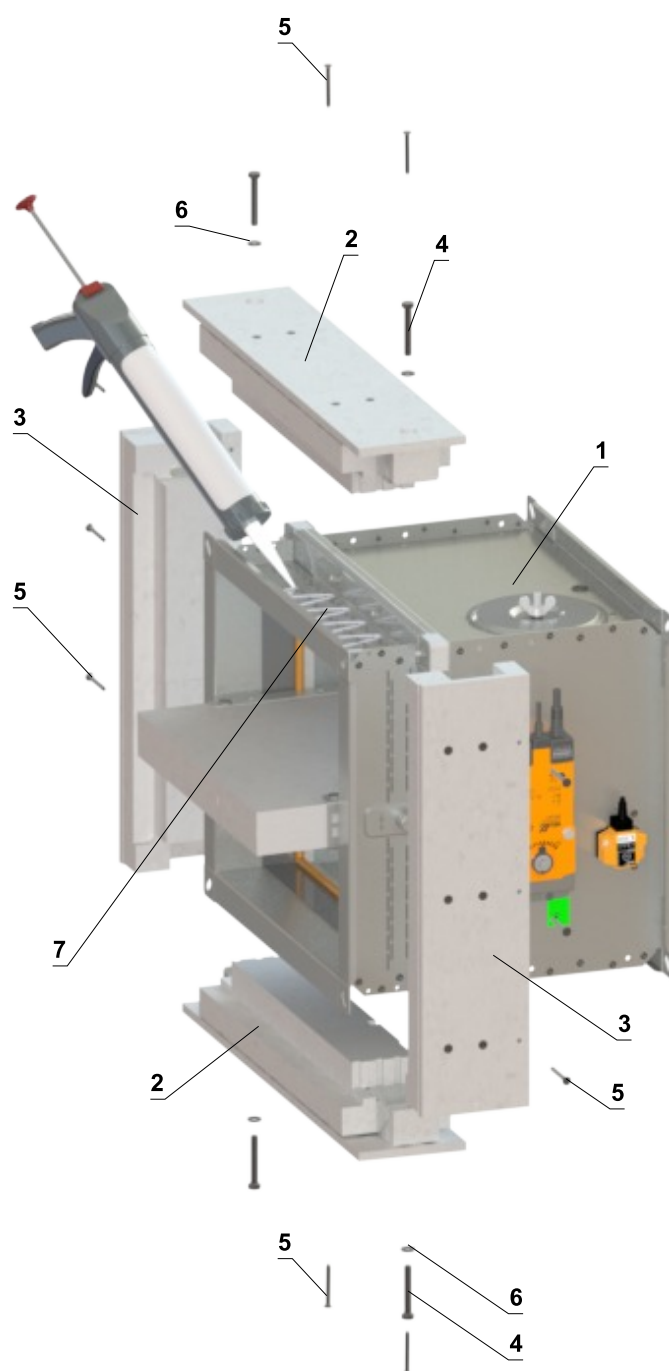
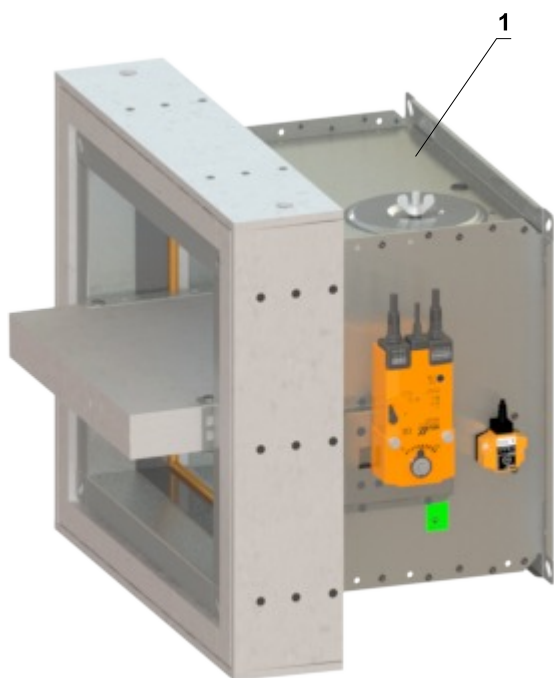


- | | |
|-------------------------------|--|
| 1 Damper | 6 Thermal fuse |
| 2 Mounting plate | 7 Manual control |
| 3 Sealing cover | 8 Spring return actuator |
| 4 Sealing of a mounting plate | 9 Thermoelectric activation device BAT |
| 5 Cover of a mounting plate | 10 Sensor sticker |

Reinforcing frame VRM-Q 120

- For damper installation outside wall construction is necessary to use reinforcing frame VRM-Q 120
- Fastening material is included in the package except glue K84
- Install reinforcing frame only after connecting duct.

Fixing reinforcing frame VRM-Q 120 to the damper casing



Installation procedure

- 1) Apply K84 glue over the entire surface
- 2) Attach the frame parts to the damper and screw it in the corners using M8x60 mm hexagon head screws DIN 931 with M8/8.4 washers DIN 7349
- 3) Screw 5x60 mm screws into the predrilled holes

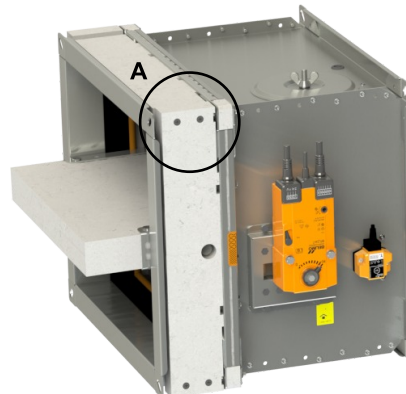
- 1 FDMQ 120
- 2 Part A of VRM-Q 120
- 3 Part B of VRM-Q 120
- 4 Hexagon head screw M8x60 mm DIN 931
- 5 Screw 5x60 mm
- 6 Washer M8/8,4 DIN 7349
- 7 Glue K-84 PROMAT

Protective cladding boards

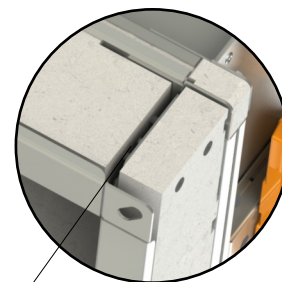
- Protective cladding boards must be used as part of the penetration filling of installation with Ablative Coated Batt.
- Can be ordered from MANDIK (installed on the damper or as an accessory) or can be sourced from local supplier
- If protective cladding boards are required, this must be specified 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

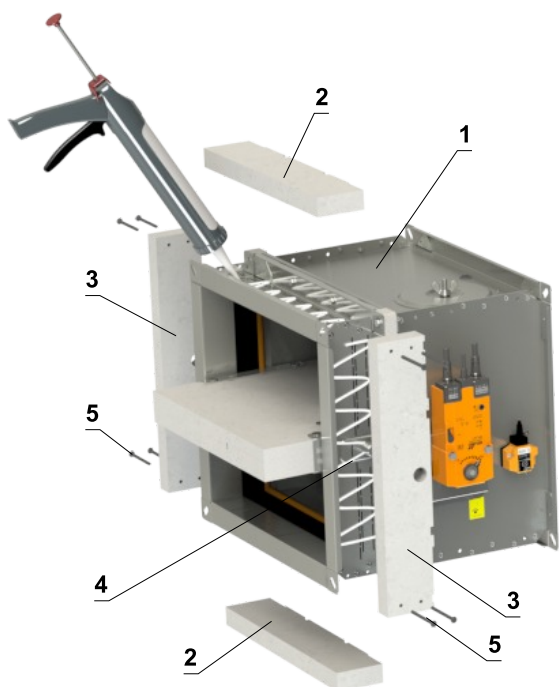
- 1) Apply K84 glue over the entire surface
- 2) Attach protective cladding boards to the damper and glue them to the casing
- 3) Screw parts A and B together using 4x screw 5x70 mm
- 4) Completely fill the gaps with glue



DETAIL A

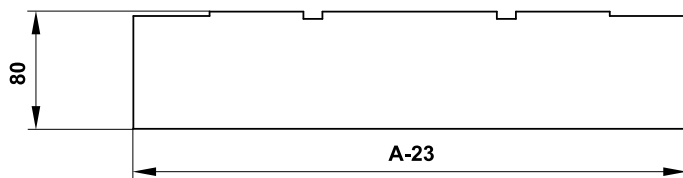


Completely fill the gaps between boards!

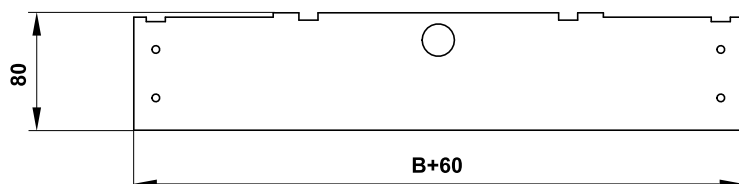


- 1 FDMQ 120
- 2 Part A of protective cladding boards
- 3 Part B of protective cladding boards
- 4 Glue PROMAT K-84
- 5 Screw 5x70 mm

Part A



Part B



- Detailed dimensions of protective cladding boards on request

Entry into service and revisions

- Before putting the damper into operation, serviceability checks and functional tests must be carried out including testing of functionality of all electrical elements. After putting into operation these serviceability checks must be carried at least twice a year. If no defect is found during two subsequent serviceability checks, these checks can be carried out once a year.
- In case that dampers are found unable to serve for their function for any cause, it must be clearly marked. The operator is obliged to ensure that the damper is put into condition in which it is ready for function and meanwhile he is obliged to provide the fire protection by another appropriate way.
- Results of regular checks, imperfections found and 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 actuator, following checks must be carried out

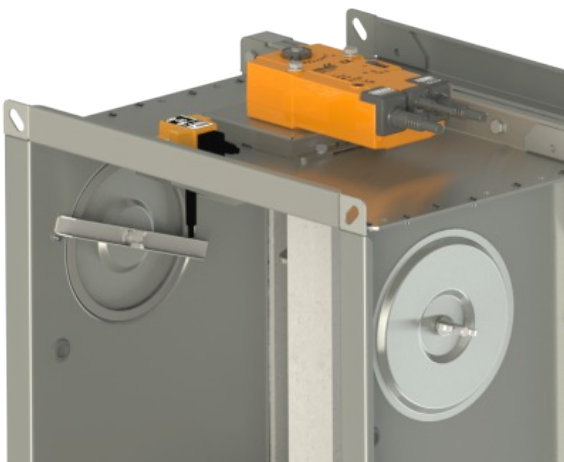
- Check the rotation of the blade to "CLOSED" failure position after disconnection the power supply of the actuator (e.g. by pressing the test button on the thermoelectric activation device BAT or by disconnection the power supply from electrical fire signalization). Check the rotation of the blade back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

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

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

Before putting the dampers into operation and during subsequent function checks, the following checks must be carried out for dampers with optical smoke detector

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



Inspection opening detail

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

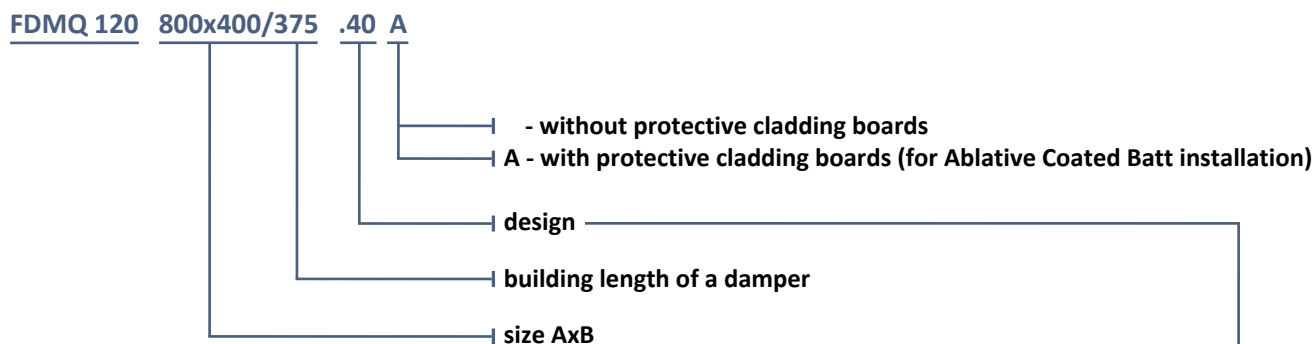
How to proceed after Tf1 or Tf2 fuses have been activated

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

X. ORDERING INFORMATIONS

Ordering key

Fire damper



EXAMPLE:

FDMQ 120 800x400/375 .40 A - 800x400-damper size, /375-building length of a damper, .40-damper design, A-with protective cladding boards

Damper design	Additional digit
Manual control and thermal	.01
Manual control and thermal with a terminal switch („CLOSED“)	.11
Manual control and thermal with two terminal switches („OPEN“, „CLOSED“)	.80
With actuator BF 230-TN (BFL, BFN 230-T) - voltage AC 230 V	.40
With actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K and with supply device BKN 230-24-MOD (voltage AC 230 V)	.41
With actuator BF 24-TN (BFL, BFN 24-T) - voltage AC/DC 24 V	.50
With actuator BF 24-TN (BFL, BFN 24-T), with smoke detector ORS 142 K (voltage AC/DC 24 V)	.51
With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST)	.63
With communication and supply device BKN 230-24-MOD, with actuator BF 24-TN-ST (BFL, BFN 24-T-ST) and with smoke detector ORS 142 K	.63S

Accessories

Reinforcing frame VRM-Q 120




Protective cladding boards



Data label

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

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

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

MANDÍK[®]
www.mandik.com