



EN 15650:2010



**FIRE DAMPER  
FDMA**

These technical specifications state a row of manufactured sizes and models of fire dampers (further only dampers) FDMA. It is valid for production, designing, ordering, delivery, assembly and operation.

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## II. GENERAL INFORMATION

### 1. Description

- 1.1. Fire dampers are shutters in ducts of air-conditioning devices that prevent spreading the fire and combustion products from one fire segment to the other one by means of closing the duct in the points of fire separating constructions.
- 1.2. Basic dampers parameters
- fire damper tests provided according to EN 1366-2 and EN 15650.
  - fire damper classified according to EN 13501-3 + A1 as  
**EI 90 (ve ho i↔o) S**  
alternatively **EI 120 (ve ho i↔o) S**, depending on installation variant
  - casing (external) leakage classified as class C according to EN 1751
  - closed blade (internal) leakage classified as class 2 according to EN 1751
  - fulfil all the prescribed requirements of EN 15650, art. 4.2.2. Protection against corrosion
  - dampers are classified as C10000 (cycling test) according to EN 15650
- 1.3. Dampers blade automatically closes air duct using a shutting spring or an actuating mechanism back spring. The shutting spring is started by releasing an initiation lever. The impulse for releasing the lever can be either a manual one, a thermal one or an electromagnetic one. The back spring of the actuating mechanism is started when the thermoelectrical starting mechanism BAE 72B-S is activated, when a reset button on BAE 72B-S is pushed or when a power supply of the actuating mechanism is stopped.
- 1.4. The damper is sealed with a silicon packing against smoke penetration after closing the blade. At the same time, the damper blade is bedded in a material which enlarges its capacity and air proofs the air duct.
- 1.5. Operation of the dampers does not depend on the direction of air circulation. The dampers can be located in an arbitrary position.
- 1.6. Square dampers have two inspection holes. Round dampers have one inspection hole, since the shutting device and the inspection hole can be set into the most advantageous position (with respect to the operation and manipulation with the control device).
- 1.7. Exact damper function is provided under the following conditions:
- a) Maximum air circulation speed: 12 m.s<sup>-1</sup>  
Maximum pressure difference: 1200 Pa
  - b) Dampers could be displaced into position "CLOSED" only in case that ventilator, or Air Handling Unit is switched off. The goal is the securing of proper closing and safe function of Fire Damper in case of Fire.
  - c) The air circulation in the whole damper section must be secured as steady on whole surface.
- 1.8. Dampers are designed for macroclimatic areas with mild climate according to EN 60 721-3-3.
- 1.9. Dampers are suitable for systems without abrasive, chemical and adhesive particles.
- 1.10. Temperature in the place of installation is permitted to range from - 20°C to + 50°C.
- 1.11. If is not noticed other way, all dimensions and weight are in millimeters and kilograms.
- 1.12. In this document are used next signs and units.

Key :

w	[m.s <sup>-1</sup> ]	air velocity
Δp	[Pa]	pressure loss
L <sub>w</sub>	[dB]	level of acoustic output
ξ	[ ]	pressure loss coefficient
ρ	[kg.m <sup>-3</sup> ]	density
A,B, a, c, e, f	[mm]	dimension
S	[m <sup>2</sup> ]	area

## 2. Design

- 2.1.** Design with mechanical control
- 2.1.1.** Design with mechanical control with a thermal protective fuse which actuates the shutting device within 120 seconds at latest after the nominal start temperature 73 °C has been reached. Automatic initiation of the shutting device is not activated if the temperature does not exceed 70 °C. In case that other start temperatures are required, thermal fuses with nominal start temperature + 104 °C or +147 °C can be supplied (this requirement must be specified in the order).
- 2.1.2.** Design with mechanical control according to the paragraph 2.1.1. can be complemented with a terminal switch signaling of the damper blade position "CLOSED" or "OPEN".
- 2.1.3.** Design with mechanical control according to the paragraphs 2.1.1. and 2.1.2. can be complemented with initiation by means of an electromagnet. The voltage of the electromagnet can be AC 230V, AC/DC 24V. By voltage AC 230 V is damper equipped by electromagnet EM230. By voltage AC/DC 24 V is damper equipped by electromagnet EM230 with pre-pulse switch SIEM24. SEIM24 activates the electromagnet after capacitor charge witch is placed inside of SIEM24. It takes about 10 sec. Charging time depends on the current supply. For reliable operation is necessary connect to electromagnet or pre-pulse switch appropriate supply for 20 to 30 sec. After activation of electromagnet is released initiation lever and damper is closed. After activation is initiation lever released. If is damper set up in position "OPEN" is necessary unlock initiation lever by pulling of electromagnet core.
- 2.1.4.** Design intended for the environment ZONE 1 and 2 with mechanical control and thermal protective fuse or with terminal switches (signaling of the flap blade position "CLOSED" or "OPEN"), or with an electromagnet (AC 230 V). These designs are identical with the designs mentioned in the paragraphs 2.1.1. to 2.1.3. and they have modifications to meet conditions for inexplusive dampers.
- 2.2.** Design with actuating mechanism
- 2.2.1.** FDMA is always equipped by actuating mechanism BLF(BF) 24-T or BLF(BF) 230-T (further only "actuating mechanism"). After being connected to power supply AC/DC 24V or 230V, the actuating mechanism displaces the damper blade into operation position "OPEN" and at the same time it pre-stretches its back spring. When the actuating mechanism is under voltage, the damper blade is in the position "OPEN" and the back spring is pre-stretched. Time needed for full opening of the flap blade from the position "CLOSED" to the position "OPEN" is maximum 140 sec. If the actuating power supply is cut off (due to loss of supply voltage, activation of thermoelectrical actuating mechanism or pushing the reset button on the thermoelectrical starting mechanism BAE 72B-S), the back spring displaces the damper blade into the breakdown position "CLOSED". The time of displacing the blade from the position "OPEN" to the position "CLOSED" takes maximum 16 sec. In case that the power supply is restored again (the blade can be in any position), the actuating mechanism starts to re-displace the damper blade into the position "OPEN". A thermoelectrical starting mechanism BAE 72B-S, which contains two thermal fuses Tf1 and Tf2/Tf3, is a part of the actuating mechanism. These fuses are activated when temperature +72 °C has been exceeded (the fuse Tf1 when the temperature around the damper and the fuses Tf2/Tf3 when the temperature inside the air-conditioning piping has been exceeded). After the thermal fuse Tf1 or Tf2/Tf3 has been activated, the power supply is permanently and irreversibly cut off and the actuating mechanism, by means of the pre-stretched spring, displaces the damper blade into the breakdown position "CLOSED".
- 2.2.2.** Design with the communication and supply device BKN 230-24 and the actuating mechanism BF 24-T-ST (BLF 24-T-ST). It simplifies electrical wiring and interconnection of fire flap valves. It facilitates on site check and enables central control and checks of fire damper by means of a simple 2-conductor wiring. BKN 230-24 functions as a decentralized network device for supplying the actuating mechanism BF 24-T-ST (BLF 24-T-ST) with a spring back drive on one hand and on the other hand it transmits the signal informing about the flap valve position OPERATION and FAILURE through 2-conductor wiring to the central. Control command SWITCHED ON - SWITCHED OFF from the central through BKN 230-24 goes through the same wiring to the actuating mechanism.

To simplify the connection, the actuating mechanism BF 24-T-ST (BLF 24-T-ST) is equipped with connecting plugs that are inserted directly to BKN 230-24. BKN 230-24 is supplied with a conductor and an EURO plug to be connected to the 230V mains. 2- conductor wiring is connected to BKN 230-24 by means of terminals 6 and 7. If the drive is supposed to be controlled without any signal from the central, it can be switched on by means of a bridge between the terminals 3 and 4. A green LED pilot light on BKN 230-24 is on when voltage is present in the drive (AC 24V). If the button on BAE 72-S is switched on or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION ) is disconnected, the damper position will be "FAILURE".

- 2.2.3.** Design with the communication and supply device BKN 230-24MP and actuating mechanism BF24TL-T-ST for connection to MP-Bus. BKN 230-24MP supplies to intelligent actuating mechanisms of fire dampers BF 24TL-T-ST decentrally needed power supply. In this way can be realize long MP-Bus communications (up to 800 m). Up to 8 Bus nodes can be parallel connected and controlled by Master device (DDC with interface). More information in Belimo catalogue.
- 2.2.4.** Design with the communication and supply device BKN 230-24LON and actuating mechanisms of fire dampers BF 24TL-T-ST for cooperation with control units based on technology LonWorks. BKN 230-24LON complements actuating mechanism for integrated safety function and converts digital protocol MP from actuating mechanism to LonTalk and back. More information in Belimo catalogue.
- 2.2.5.** Signaling of the damper blade positions "OPEN" and "CLOSED" is provided by means of two integrated, invariably set terminal switches.
- 2.2.6.** Design with actuating mechanism ExMax-15-BF AC 230V and AC/DC 24 V with thermoelectrical starting mechanism intended for the environment ZONE 1 and 2. For this design can not be used communication, supply and control devices Belimo. If is necessary to use analogical variants contact manufacturer.
- 2.3.** Communication and control devices
- 2.3.1.** BKS 24-1B communication and control device is used for control and checks of fire dampers with the BF 24-T-ST (BLF 24-T-ST) actuating mechanism in conjunction with the BKN 230-24 supply and communication device. BKS 24-1B receives information about the situation of the fire damper through the BKN 230-24 supply and communication device and issues controlling commands. The device is intended for building in into the distribution board. Light diodes on the front side of the device signalise the operating situations of the damper and breakdowns of the whole system. Potentialless auxiliary contacts enable connection to the master control system (signaling of the damper position, failure reports, release of the ventilators etc.). While a flashing green LED pilot light signalises damper blade motion towards the given position, the same pilot light reports reaching the required position when shining constantly. If the flap blade, with respect to the given time, does not reach the required position, then a red LED pilot light starts to flash and at the same time, the failure contact is active. Once the damper blade reaches the given position, this contact is deactivated. The LED pilot light keeps flashing unless the failure is unblocked by means of the RESET button. Except for reporting failures, other three auxiliary contacts are available. Contacts showing operating and failure position of the damper are active when the damper is in the given position. Function check can be done by pressing and holding the button "RESET/TEST" for longer time. While holding the button, the damper blade moves in the direction of the failure position. Fault function is indicated by the LED pilot light. BKS 24-1B can be connected by means of ZSO-11 11 pole connector for DIN 35 mm panel.
- 2.3.2.** BKS 24-9A communication and control device is used for group control and checks of 1 to 9 fire dampers with the actuating mechanism BF 24-T-ST (BLF 24-T-ST) in connection with the supply and communication device BKN 230-24. Signalisation of the damper position is individual; the damper can be controlled and tested only as a group. BKS 24-9A is intended for use in the distribution board and displays the operation situations and failure reports of the connected fire dampers. It is possible to signalise functions such as the damper position and failure reports or to transmit them further to the system by means of integrated auxiliary switches. BKS 24-9A receives signals from BKN 230-24 through the two-conductor wiring and issues control commands. Proper damper operation is indicated by two light LED diodes:

Control ON = position OPERATION

Control OFF = position FAILURE

If the fire damper do not reach the given position in time tolerable for displacing, the appropriate light diode FAILURE starts to flash and K1 contact is opened (current failure). In case that the faulty damper finally reaches its given position, K1 is closed and the failure report light shines (the failure is saved in memory). K2 - the auxiliary contact - is used for signaling of the flap position to the master device. Function of this auxiliary contact can be programmed through the terminal 14 according to the Tab. 2.3.1.

Tab. 2.3.1. BKS 24 -9A contacts K1 and K2

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

Function check can be done in the position OPERATION by means of pushing the TEST button. While the button is pushed, the flap blade is turning into the position FAILURE. Fault function is indicated by a report "FAILURE". Assamby and connection BKS 24 - 9A can be made by DIN 35 mm panel. It is connected by two 9-pole plug-in connectors.

2.4. Dampers design are given in the Tab. 2.4.1. It shall be marked with the second additional digit after the dot in the ordering key.

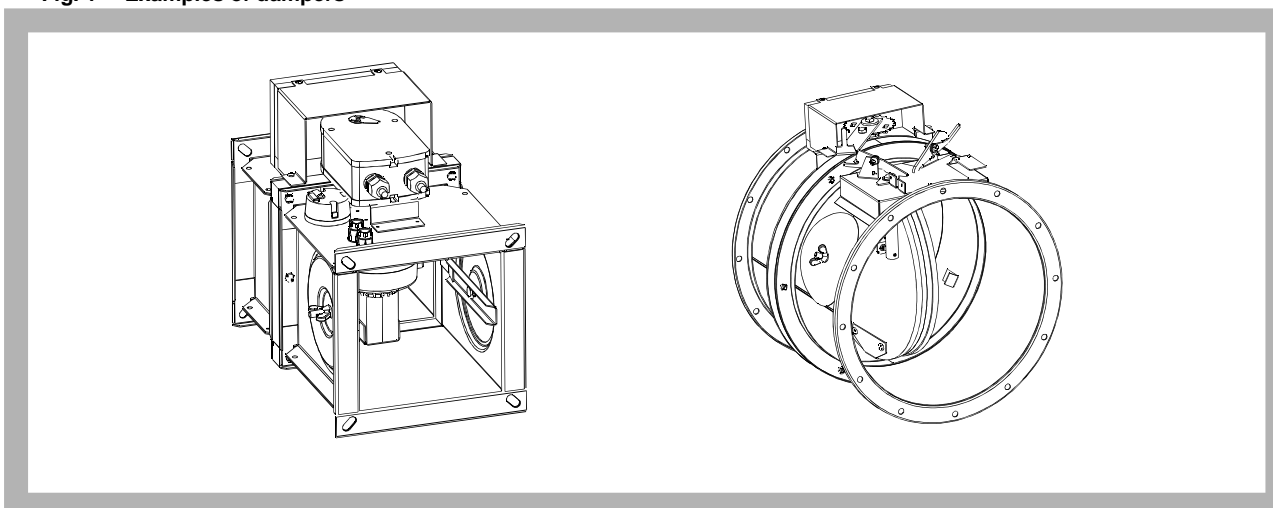
Tab. 2.4.1. Dampers design

Dampers design	Additional digit
Manual and thermal	.01
Manual and thermal (ZONE 1, 2)	.02
Manual and thermal with a terminal switch ("CLOSED")	.11
Manual and thermal with a terminal switch ("CLOSED") (ZONE 1, 2)	.12
Manual, thermal and with an electromagnet AC 230 V	.20
Manual, thermal and with an electromagnet AC 24 V	.21
Manual, thermal and with an electromagnet DC 24 V	.22
Manual, thermal and with an electromagnet AC 230 V, with a terminal switch ("CLOSED")	.23
Manual, thermal and with an electromagnet AC 24 V, with a terminal switch ("CLOSED")	.24
Manual, thermal and with an electromagnet DC 24 V, with a terminal switch ("CLOSED")	.25
Manual, thermal and with an electromagnet AC 230 V (ZONE 2 )	.30
Manual, thermal and with an electromagnet AC 230 V, with a terminal switch ("CLOSED") (ZONE 2)	.33
With actuating mechanism BF 230-T (BLF 230-T)	.40
With actuating mechanism ExMax-15-BF AC 230 V, with thermoelectrical starting mechanism (ZONE 1,2)	.42
With actuating mechanism BF 24-T (BLF 24-T)	.50
With actuating mechanism ExMax-15-BF AC/DC 24 V, with thermoelectrical starting mechanism (ZONE 1,2)	.52

Dampers design	Additional digit
With communication and supply device BKN 230-24 and actuating mechanism BF 24-T-ST (BLF 24-T-ST)	.60
With communication and supply device BKN 230-24MP and actuating mechanism BF 24TL-T-ST (Top-Line) for connection to MP-Bus	.62
With communication and supply device BKN 230-24LON and with actuating mechanism BF 24TL-T-ST (Top-Line) for connection to LonWorks	.64
Manual and thermal with two terminal switches ("OPEN", "CLOSED")	.80
Manual and thermal with two terminal switches ("OPEN", "CLOSED") (ZONE 1,2)	.81
Manual, thermal and with an electromagnet AC 230 V and two terminal switches ("OPEN", "CLOSED")	.82
Manual, thermal and with an electromagnet AC 24 V and two terminal switches ("OPEN", "CLOSED")	.83
Manual, thermal and with an electromagnet DC 24 V and two terminal switches ("OPEN", "CLOSED")	.84
Manual, thermal and with an electromagnet AC 230 V and two terminal switches ("OPEN", "CLOSED") (ZONE 2)	.85

Some designs is possible supply with optical smoke detector MHG 231. For more information contact manufacturer.

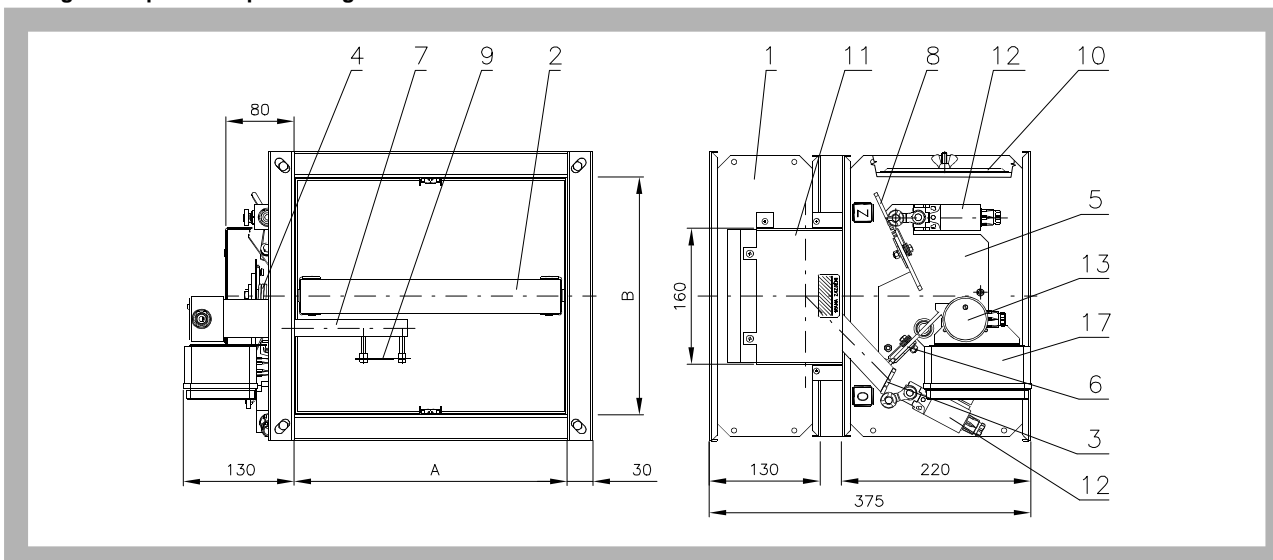
Fig. 1 Examples of dampers



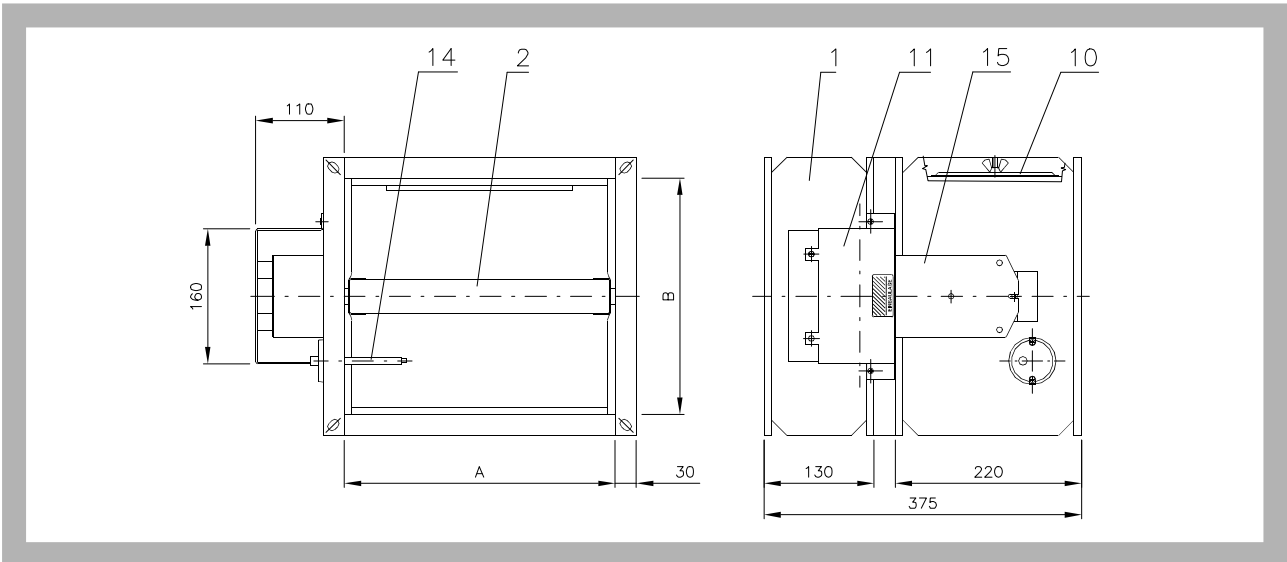
### 3. Dimestions, weights

#### 3.1. Square dampers

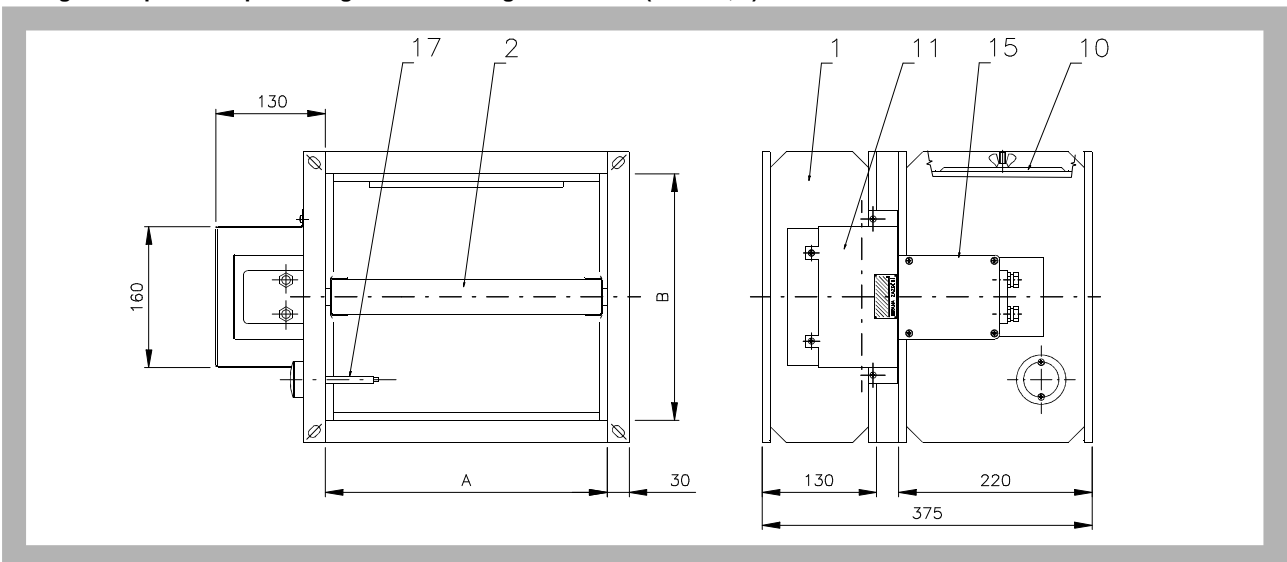
Fig. 2 Square damper - design manual and thermal



**Fig. 3 Square damper - design with actuating mechanism**



**Fig. 4 Square damper - design with actuating mechanism (ZONE 1, 2)**



**3.2. Round dampers**

**Fig. 5 Round damper - design manual and thermal**

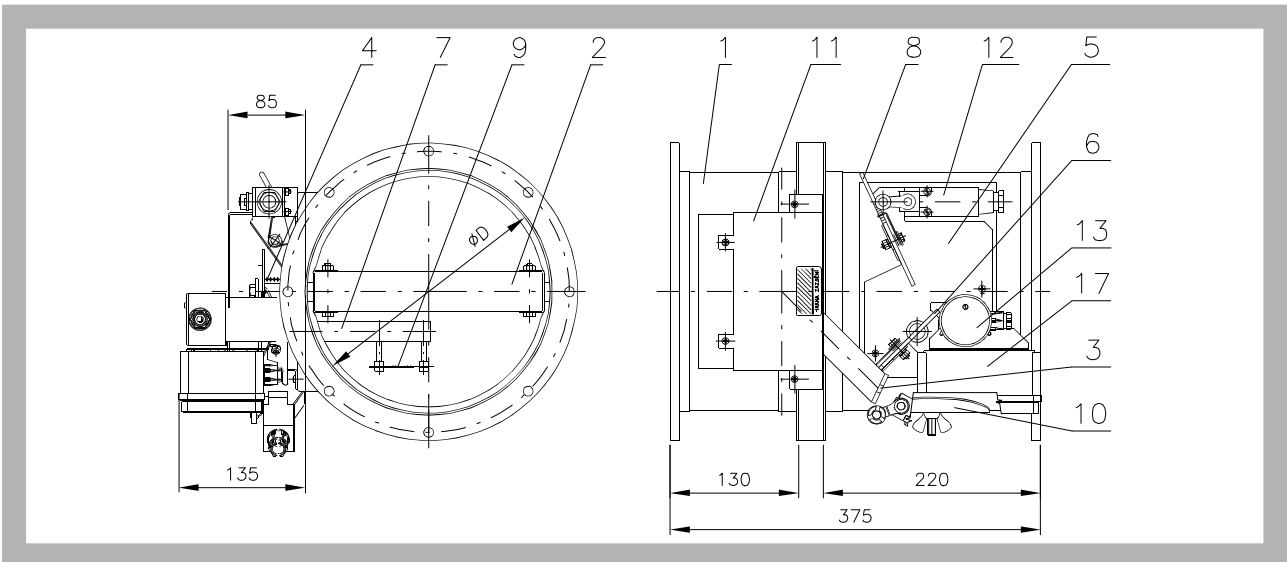




Fig. 6 Round damper - design with actuating mechanism

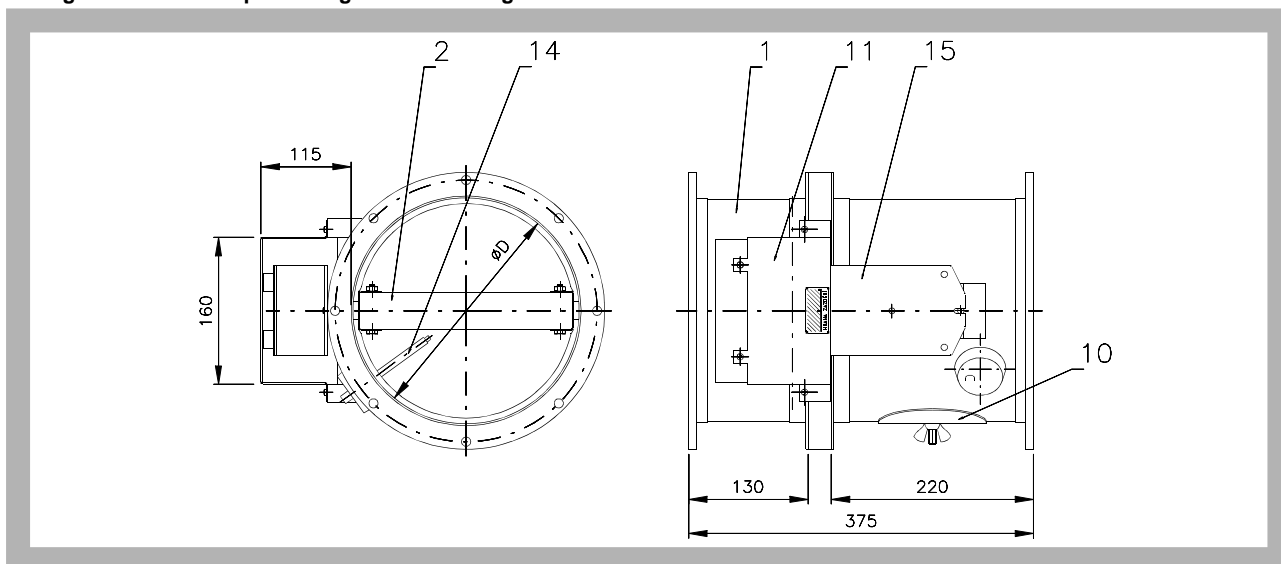
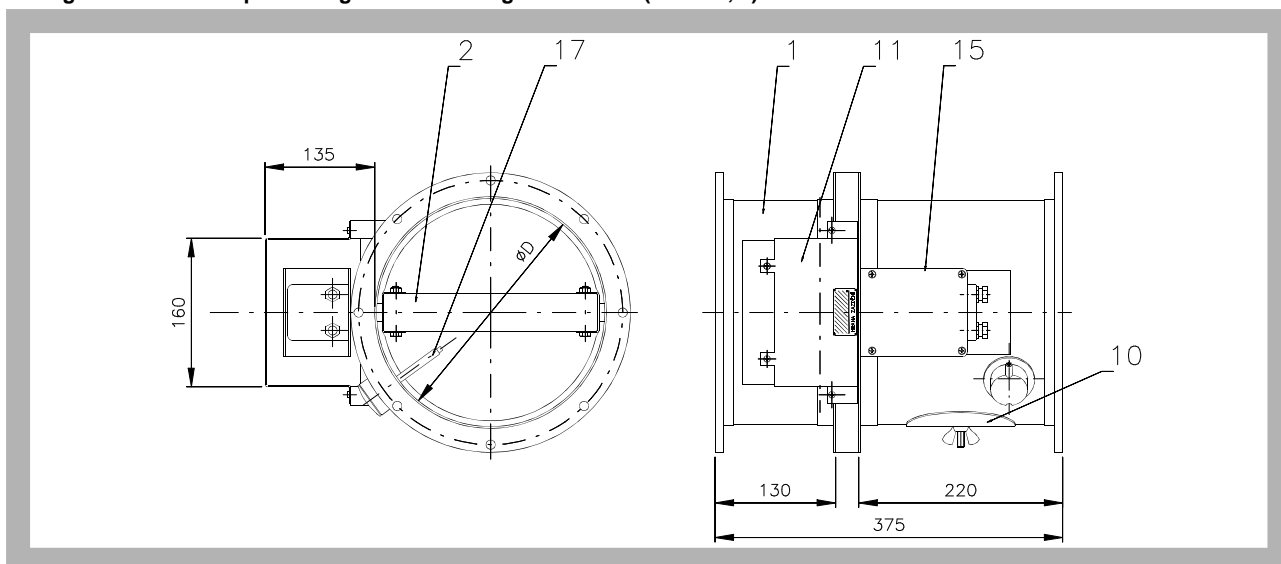


Fig. 7 Round damper - design with actuating mechanism (ZONE 1, 2)



**Position:**

- |                     |                              |   |
|---------------------|------------------------------|---|
| 1. Damper body      | 7. Starting mechanism        | 13. Electromagnet                                 |
| 2. Damper blade     | 8. Pawl                      | 14. BAE 72B-S thermoelectrical starting mechanism |
| 3. Control lever    | 9. Thermal protective fuse   | 15. Actuating mechanism                           |
| 4. Shutting spring  | 10. Inspection hole covering | 16. Thermoelectrical starting mechanism           |
| 5. Base plate       | 11. Protective covering      | 17. Pulse switch SIEM24                           |
| 6. Initiation lever | 12. Terminal switch          |   |

3.3. Square dampers - dimensions, weights and effective area

Tab. 3.3.1. Square dampers - dimensions, weights and effective area

A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type	A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
180 x 180	-	-	9	10,5	0,0192	BLF	300 x 450	-	105	18	21	0,1092	BLF
x 200	-	-	9,5	11	0,0224	BLF	x 500	-	130	19,5	22,5	0,1232	BLF
x 250	-	5	10,5	12	0,0304	BLF	x 550	10	155	20,5	23,5	0,1372	BLF
200 x 180	-	-	9,5	11	0,0216	BLF	x 560	15	160	21	24	0,1400	BLF
x 200	-	-	10	11,5	0,0252	BLF	x 630	50	195	22,5	25,5	0,1596	BLF
x 250	-	5	11	12,5	0,0342	BLF	x 650	60	205	23	26	0,1652	BLF
x 300	-	30	12	13,5	0,0432	BLF	x 710	90	235	24,5	27,5	0,1820	BLF
x 315	-	37	12,5	14	0,0459	BLF	x 750	110	255	25,5	28,5	0,1932	BLF
x 355	-	57	13	15	0,0531	BLF	x 800	135	280	27	30	0,2072	BF
x 400	-	80	14	16	0,0612	BLF	x 900	185	330	29,5	32,5	0,2352	BF
x 450	-	105	15	18	0,0702	BLF	x 1000	235	380	32	35	0,2632	BF
x 500	-	130	16,5	18	0,0792	BLF	315 x 200	-	-	12	13,5	0,0413	BLF
x 550	10	155	17,5	20,5	0,0882	BLF	x 250	-	5	13,5	15	0,0561	BLF
x 560	15	160	17,5	20,5	0,0900	BLF	x 300	-	30	14,5	16,5	0,0708	BLF
x 630	50	195	19	22	0,1026	BLF	x 315	-	37	15	16,5	0,0752	BLF
x 650	60	205	19,5	22,5	0,1062	BLF	x 355	-	57	16	17,5	0,0870	BLF
x 710	90	235	21	24	0,1170	BLF	x 400	-	80	17	19	0,1003	BLF
x 750	110	255	21,5	24,5	0,1242	BLF	x 450	-	105	18,5	21,5	0,1151	BLF
x 800	135	280	23	26	0,1332	BLF	x 500	-	130	19,5	22,5	0,1298	BLF
x 900	185	330	25	28	0,1512	BLF	x 550	10	155	21	24	0,1446	BLF
x 1000	235	380	27	30	0,1692	BF	x 560	15	160	21,5	24,5	0,1475	BLF
250 x 180	-	-	10,5	12	0,0276	BLF	x 630	50	195	23	26	0,1682	BLF
x 200	-	-	10,5	12,5	0,0322	BLF	x 650	60	205	23,5	26,5	0,1741	BLF
x 250	-	5	12	13,5	0,0437	BLF	x 710	90	235	25	28	0,1918	BLF
x 300	-	30	13	15	0,0552	BLF	x 750	110	255	26	29	0,2036	BF
x 315	-	37	13,5	15	0,0587	BLF	x 800	135	280	27,5	30,5	0,2183	BF
x 355	-	57	14,5	16	0,0679	BLF	x 900	185	330	30	33	0,2478	BF
x 400	-	80	15,5	17	0,0782	BLF	x 1000	235	380	32,5	35,5	0,2773	BF
x 450	-	105	16,5	19,5	0,0897	BLF	355 x 200	-	-	13	14,5	0,0469	BLF
x 500	-	130	18	21	0,1012	BLF	x 250	-	5	14	16	0,0637	BLF
x 550	10	155	19	22	0,1127	BLF	x 300	-	30	15,5	17	0,0804	BLF
x 560	15	160	19	22	0,1150	BLF	x 315	-	37	16	17,5	0,0854	BLF
x 630	50	195	21	24	0,1311	BLF	x 355	-	57	17	18,5	0,0988	BLF
x 650	60	205	21,5	24,5	0,1357	BLF	x 400	-	80	18	20	0,1139	BLF
x 710	90	235	22,5	25,5	0,1495	BLF	x 450	-	105	19,5	22,5	0,1307	BLF
x 750	110	255	23,5	26,5	0,1587	BLF	x 500	-	130	21	24	0,1474	BLF
x 800	135	280	25	28	0,1702	BLF	x 550	10	155	22,5	25,5	0,1642	BLF
x 900	185	330	27	30	0,1932	BF	x 560	15	160	22,5	25,5	0,1675	BLF
x 1000	235	380	29,5	32,5	0,2162	BF	x 630	50	195	24,5	27,5	0,1910	BLF
300 x 200	-	-	11,5	13,5	0,0392	BLF	x 650	60	205	25	28	0,1977	BLF
x 250	-	5	13	14,5	0,0532	BLF	x 710	90	235	26,5	29	0,2178	BF
x 300	-	30	14	16	0,0672	BLF	x 750	110	255	27,5	30,5	0,2312	BF
x 315	-	37	14,5	16,5	0,0714	BLF	x 800	135	280	29	32	0,2479	BF
x 355	-	57	15,5	17,5	0,0826	BLF	x 900	185	330	32	35	0,2814	BF
x 400	-	80	17	18,5	0,0952	BLF	x 1000	235	380	34,5	37,5	0,3149	BF

A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type	A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
<b>400 x 200</b>	-	-	13,5	15,5	0,0532	BLF	<b>x 355</b>	-	57	22	23,5	0,1564	BLF
<b>x 250</b>	-	5	15	17	0,0722	BLF	<b>x 400</b>	-	80	23,5	25	0,1802	BLF
<b>x 300</b>	-	30	16,5	18	0,0912	BLF	<b>x 450</b>	-	105	25	28	0,2067	BLF
<b>x 315</b>	-	37	17	18,5	0,0969	BLF	<b>x 500</b>	-	130	27	30	0,2332	BLF
<b>x 355</b>	-	57	18	20	0,1121	BLF	<b>x 550</b>	10	155	28,5	31,5	0,2597	BLF
<b>x 400</b>	-	80	19,5	21	0,1292	BLF	<b>x 560</b>	15	160	29	32	0,2650	BLF
<b>x 450</b>	-	105	21	24	0,1482	BLF	<b>x 630</b>	50	195	31	34	0,3021	BF
<b>x 500</b>	-	130	22,5	25,5	0,1672	BLF	<b>x 650</b>	60	205	32	35	0,3127	BF
<b>x 550</b>	10	155	23,5	26,5	0,1862	BLF	<b>x 710</b>	90	235	34	37	0,3445	BF
<b>x 560</b>	15	160	24	27	0,1900	BLF	<b>x 750</b>	110	255	35,5	38,5	0,3657	BF
<b>x 630</b>	50	195	26	29	0,2166	BLF	<b>x 800</b>	135	280	37	40	0,3922	BF
<b>x 650</b>	60	205	26,5	29,5	0,2242	BLF	<b>x 900</b>	185	330	40,5	43,5	0,4452	BF
<b>x 710</b>	90	235	28,5	31,5	0,2470	BF	<b>x 1000</b>	235	380	44	47	0,4982	BF
<b>x 750</b>	110	255	29,5	32,5	0,2622	BF	<b>560 x 200</b>	-	-	16,5	18,5	0,0756	BLF
<b>x 800</b>	135	280	31	34	0,2812	BF	<b>x 250</b>	-	5	18,5	20	0,1026	BLF
<b>x 900</b>	185	330	34	37	0,3192	BF	<b>x 300</b>	-	30	20	22	0,1296	BLF
<b>x 1000</b>	235	380	36,5	39,5	0,3572	BF	<b>x 315</b>	-	37	20,5	22,5	0,1377	BLF
<b>450 x 200</b>	-	-	14,5	16,5	0,0602	BLF	<b>x 355</b>	-	57	22	23,5	0,1593	BLF
<b>x 250</b>	-	5	16	18	0,0817	BLF	<b>x 400</b>	-	80	23,5	25,5	0,1836	BLF
<b>x 300</b>	-	30	17,5	19,5	0,1032	BLF	<b>x 450</b>	-	105	25,5	28,5	0,2106	BLF
<b>x 315</b>	-	37	18	20	0,1097	BLF	<b>x 500</b>	-	130	27	30	0,2376	BLF
<b>x 355</b>	-	57	19,5	21	0,1269	BLF	<b>x 550</b>	10	155	29	32	0,2646	BLF
<b>x 400</b>	-	80	20,5	22,5	0,1462	BLF	<b>x 560</b>	15	160	29,5	32,5	0,2700	BF
<b>x 450</b>	-	105	22	25	0,1677	BLF	<b>x 630</b>	50	195	31,5	34,5	0,3078	BF
<b>x 500</b>	-	130	24	27	0,1892	BLF	<b>x 650</b>	60	205	32	35	0,3186	BF
<b>x 550</b>	10	155	25,5	28,5	0,2107	BLF	<b>x 710</b>	90	235	34,5	37,5	0,3510	BF
<b>x 560</b>	15	160	25,5	28,5	0,2150	BLF	<b>x 750</b>	110	255	35,5	38,5	0,3726	BF
<b>x 630</b>	50	195	27,5	30,5	0,2451	BLF	<b>x 800</b>	135	280	37,5	40,5	0,3996	BF
<b>x 650</b>	60	205	28,5	31,5	0,2537	BLF	<b>x 900</b>	185	330	41	44	0,4536	BF
<b>x 710</b>	90	235	30	33	0,2795	BF	<b>x 1000</b>	235	380	44,5	47,5	0,5076	BF
<b>x 750</b>	110	255	31,5	34,5	0,2967	BF	<b>600 x 200</b>	-	-	17,5	20,5	0,0812	BLF
<b>x 800</b>	135	280	33	36	0,3182	BF	<b>x 250</b>	-	5	19	22	0,1102	BLF
<b>x 900</b>	185	330	36	39	0,3612	BF	<b>x 300</b>	-	30	21	24	0,1392	BLF
<b>x 1000</b>	235	380	39	42	0,4042	BF	<b>x 315</b>	-	37	21,5	24,5	0,1479	BLF
<b>500 x 200</b>	-	-	15,5	17	0,0672	BLF	<b>x 355</b>	-	57	23	26	0,1711	BLF
<b>x 250</b>	-	5	17	19	0,0912	BLF	<b>x 400</b>	-	80	24,5	27,5	0,1972	BLF
<b>x 300</b>	-	30	19	20,5	0,1152	BLF	<b>x 450</b>	-	105	26,5	29,5	0,2262	BLF
<b>x 315</b>	-	37	19,5	21	0,1224	BLF	<b>x 500</b>	-	130	28,5	31,5	0,2552	BLF
<b>x 355</b>	-	57	20,5	22,5	0,1416	BLF	<b>x 550</b>	10	155	30	33	0,2842	BLF
<b>x 400</b>	-	80	22	23,5	0,1632	BLF	<b>x 560</b>	15	160	30,5	33,5	0,2900	BF
<b>x 450</b>	-	105	23,5	26,5	0,1872	BLF	<b>x 630</b>	50	195	33	36	0,3306	BF
<b>x 500</b>	-	130	25,5	28,5	0,2112	BLF	<b>x 650</b>	60	205	33,5	36,5	0,3422	BF
<b>x 550</b>	10	155	27	30	0,2352	BLF	<b>x 710</b>	90	235	36	39	0,3770	BF
<b>x 560</b>	15	160	27	30	0,2400	BLF	<b>x 750</b>	110	255	37,5	40,5	0,4002	BF
<b>x 630</b>	50	195	29,5	32,5	0,2736	BF	<b>x 800</b>	135	280	39	42	0,4292	BF
<b>x 650</b>	60	205	30	33	0,2832	BF	<b>x 900</b>	185	330	42,5	45,5	0,4872	BF
<b>x 710</b>	90	235	32	35	0,3120	BF	<b>x 1000</b>	235	380	46,5	49,5	0,5452	BF
<b>x 750</b>	110	255	33,5	36,5	0,3312	BF	<b>630 x 200</b>	-	-	18	21	0,0854	BLF
<b>x 800</b>	135	280	35	38	0,3552	BF	<b>x 250</b>	-	5	20	23	0,1159	BLF
<b>x 900</b>	185	330	38	41	0,4032	BF	<b>x 300</b>	-	30	21,5	24,5	0,1464	BLF
<b>x 1000</b>	235	380	41,5	44,5	0,4512	BF	<b>x 315</b>	-	37	22,5	25,5	0,1556	BLF
<b>550 x 200</b>	-	-	16,5	18	0,0742	BLF	<b>x 355</b>	-	57	24	27	0,1800	BLF
<b>x 250</b>	-	5	18	20	0,1007	BLF	<b>x 400</b>	-	80	25,5	28,5	0,2074	BLF
<b>x 300</b>	-	30	20	21,5	0,1272	BLF	<b>x 450</b>	-	105	27,5	30,5	0,2379	BLF
<b>x 315</b>	-	37	20,5	22	0,1352	BLF	<b>x 500</b>	-	130	29	32	0,2684	BLF

A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type	A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
<b>630 x 550</b>	10	155	31	34	0,2989	BLF	<b>800 x 900</b>	185	330	51,5	54,5	0,6552	BF
<b>x 560</b>	15	160	31,5	34,5	0,3050	BF	<b>x 1000</b>	235	380	56	59	0,7332	BF
<b>x 630</b>	50	195	34	37	0,3477	BF	<b>900 x 315</b>	-	37	28,5	31,5	0,2244	BLF
<b>x 650</b>	60	205	34,5	37,5	0,3599	BF	<b>x 355</b>	-	57	30,5	33,5	0,2596	BLF
<b>x 710</b>	90	235	37	40	0,3965	BF	<b>x 400</b>	-	80	32,5	35,5	0,2992	BLF
<b>x 750</b>	110	255	38,5	41,5	0,4209	BF	<b>x 450</b>	-	105	35	38	0,3432	BLF
<b>x 800</b>	135	280	40,5	43,5	0,4514	BF	<b>x 500</b>	-	130	37	40	0,3872	BF
<b>x 900</b>	185	330	44	47	0,5124	BF	<b>x 550</b>	10	155	39,5	42,5	0,4312	BF
<b>x 1000</b>	235	380	47,5	50,5	0,5734	BF	<b>x 560</b>	15	160	40	43	0,4400	BF
<b>710 x 250</b>	-	5	21,5	24,5	0,1311	BLF	<b>x 630</b>	50	195	43,5	46,5	0,5016	BF
<b>x 300</b>	-	30	23,5	26,5	0,1656	BLF	<b>x 650</b>	60	205	44,5	47,5	0,5192	BF
<b>x 315</b>	-	37	24	27	0,1760	BLF	<b>x 710</b>	90	235	47	50	0,5720	BF
<b>x 355</b>	-	57	25,5	28,5	0,2036	BLF	<b>x 750</b>	110	255	49	52	0,6072	BF
<b>x 400</b>	-	80	27,5	30,5	0,2346	BLF	<b>x 800</b>	135	280	51,5	54,5	0,6512	BF
<b>x 450</b>	-	105	29,5	32,5	0,2691	BLF	<b>x 900</b>	185	330	56	59	0,7392	BF
<b>x 500</b>	-	130	31,5	34,5	0,3036	BLF	<b>x 1000</b>	235	380	60,5	63,5	0,8272	BF
<b>x 550</b>	10	155	33,5	36,5	0,3381	BF	<b>1000 x 400</b>	-	80	35	38	0,3332	BLF
<b>x 560</b>	15	160	34	37	0,3450	BF	<b>x 450</b>	-	105	37,5	40,5	0,3822	BF
<b>x 630</b>	50	195	36,5	39,5	0,3933	BF	<b>x 500</b>	-	130	40	43	0,4312	BF
<b>x 650</b>	60	205	37,5	40,5	0,4071	BF	<b>x 550</b>	10	155	42,5	45,5	0,4802	BF
<b>x 710</b>	90	235	40	43	0,4485	BF	<b>x 560</b>	15	160	43	46	0,4900	BF
<b>x 750</b>	110	255	41,5	44,5	0,4761	BF	<b>x 630</b>	50	195	47	50	0,5586	BF
<b>x 800</b>	135	280	43,5	46,5	0,5106	BF	<b>x 650</b>	60	205	48	51	0,5782	BF
<b>x 900</b>	185	330	47,5	50,5	0,5796	BF	<b>x 710</b>	90	235	51	54	0,6370	BF
<b>x 1000</b>	235	380	51,5	54,5	0,6486	BF	<b>x 750</b>	110	255	53	56	0,6762	BF
<b>750 x 250</b>	-	5	22,5	25,5	0,1387	BLF	<b>x 800</b>	135	280	55,5	58,5	0,7252	BF
<b>x 300</b>	-	30	24,5	27,5	0,1752	BLF	<b>x 900</b>	185	330	60,5	63,5	0,8232	BF
<b>x 315</b>	-	37	25	28	0,1862	BLF	<b>x 1000</b>	235	380	65,5	68,5	0,9212	BF
<b>x 355</b>	-	57	26,5	29,5	0,2154	BLF	<b>1100 x 400</b>	-	80	38	41	0,3672	BF
<b>x 400</b>	-	80	28,5	31,5	0,2482	BLF	<b>x 450</b>	-	105	40,5	43,5	0,4212	BF
<b>x 450</b>	-	105	30,5	33,5	0,2847	BLF	<b>x 500</b>	-	130	43	46	0,4752	BF
<b>x 500</b>	-	130	32,5	35,5	0,3212	BLF	<b>x 550</b>	10	155	46	49	0,5292	BF
<b>x 550</b>	10	155	35	38	0,3577	BF	<b>x 560</b>	15	160	46,5	49,5	0,5400	BF
<b>x 560</b>	15	160	35	38,5	0,3650	BF	<b>x 630</b>	50	195	50	53	0,6156	BF
<b>x 630</b>	50	195	38	41	0,4161	BF	<b>x 650</b>	60	205	51,5	54,5	0,6372	BF
<b>x 650</b>	60	205	39	42	0,4307	BF	<b>x 710</b>	90	235	54,5	57,5	0,7020	BF
<b>x 710</b>	90	235	41,5	44,5	0,4745	BF	<b>x 750</b>	110	255	56,5	59,5	0,7452	BF
<b>x 750</b>	110	255	43	46	0,5037	BF	<b>x 800</b>	135	280	59,5	62,5	0,7992	BF
<b>x 800</b>	135	280	45	48	0,5402	BF	<b>x 900</b>	185	330	65	68	0,9072	BF
<b>x 900</b>	185	330	49,5	52,5	0,6132	BF	<b>x 1000</b>	235	380	70	73	1,0152	BF
<b>x 1000</b>	235	380	53,5	56,5	0,6862	BF	<b>1250 x 500</b>	-	130	47,5	50,5	0,5412	BF
<b>800 x 250</b>	-	5	23,5	26,5	0,1482	BLF	<b>x 550</b>	10	155	50,5	53,5	0,6027	BF
<b>x 300</b>	-	30	25,5	28,5	0,1872	BLF	<b>x 560</b>	15	160	51,5	54,5	0,6150	BF
<b>x 315</b>	-	37	26,5	29,5	0,1989	BLF	<b>x 630</b>	50	195	55,5	58,5	0,7011	BF
<b>x 355</b>	-	57	28	31	0,2301	BLF	<b>x 650</b>	60	205	56,5	59,5	0,7257	BF
<b>x 400</b>	-	80	30	33	0,2652	BLF	<b>x 710</b>	90	235	60	63	0,7995	BF
<b>x 450</b>	-	105	32	35	0,3042	BLF	<b>x 750</b>	110	255	62,5	65,5	0,8487	BF
<b>x 500</b>	-	130	34	37	0,3432	BLF	<b>x 800</b>	135	280	65,5	68,5	0,9102	BF
<b>x 550</b>	10	155	36,5	39,5	0,3822	BF	<b>* x 900</b>	185	330	71,5	74,5	1,0332	BF
<b>800 x 560</b>	15	160	37	40	0,3900	BF	<b>* x 1000</b>	235	380	77,5	80,5	1,1562	BF
<b>x 630</b>	50	195	40	43	0,4446	BF	<b>1400 x 500</b>	-	130	52	55	0,6072	BF
<b>x 650</b>	60	205	40,5	43,5	0,4602	BF	<b>x 550</b>	10	155	55,5	58,5	0,6762	BF
<b>x 710</b>	90	235	43,5	46,5	0,5070	BF	<b>x 560</b>	15	160	56	59	0,6900	BF
<b>x 750</b>	110	255	45	48	0,5382	BF	<b>* x 630</b>	50	195	60,5	63,5	0,7866	BF
<b>x 800</b>	135	280	47	50	0,5772	BF	<b>* x 650</b>	60	205	62	65	0,8142	BF

A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type	A x B	a	c	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type
			Design							Design			
			Manual	Actuat. mech.						Manual	Actuat. mech.		
<b>1400* x 710</b>	90	235	66	69	0,8970	BF	<b>1500* x 750</b>	110	255	72,5	75,5	1,0212	BF
<b>* x 750</b>	110	255	68,5	71,5	0,9522	BF	<b>* x 800</b>	135	280	75,5	78,5	1,0952	BF
<b>* x 800</b>	135	280	71,5	74,5	1,0212	BF	<b>* x 900</b>	185	330	82,5	85,5	1,2432	BF
<b>* x 900</b>	185	330	78	81	1,1592	BF	<b>* x 1000</b>	235	380	89,5	92,5	1,3912	BF
<b>* x 1000</b>	235	380	84,5	87,5	1,2972	BF	<b>1600* x 630</b>	50	195	67,5	70,5	0,9006	BF
<b>1500 x 500</b>	-	130	55	58	0,6512	BF	<b>* x 650</b>	60	205	69	72	0,9322	BF
<b>x 550</b>	10	155	58,5	61,5	0,7252	BF	<b>* x 710</b>	90	235	73,5	76,5	1,0270	BF
<b>x 560</b>	15	160	59,5	62,5	0,7400	BF	<b>* x 750</b>	110	255	76	79	1,0902	BF
<b>* x 630</b>	50	195	64	67	0,8436	BF	<b>* x 800</b>	135	280	80	83	1,1692	BF
<b>* x 650</b>	60	205	65,5	68,5	0,8732	BF	<b>* x 900</b>	185	330	87	90	1,3272	BF
<b>* x 710</b>	90	235	69,5	79,5	0,9620	BF	<b>* x 1000</b>	235	380	94	97	1,4852	BF

\* dampers in those dimensions are equipped with two shutting springs

### 3.4. Round dampers - dimensions, weights and effective area

Tab. 3.4.1. Round dampers - dimensions, weights and effective area

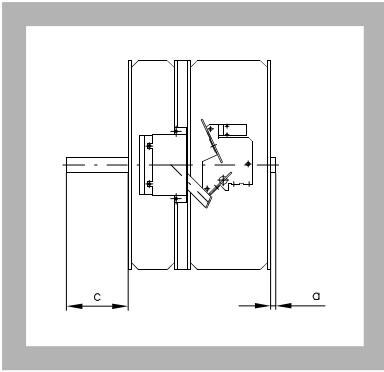
Size øD	a	c	e	f	Weight		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Actuat. mech. type
					Design			
					Manual	Actuat. mech.		
<b>180</b>	-	-	-	-	7	8,5	0,0137	BLF
<b>200</b>	-	-	-	-	8	9,5	0,0182	BLF
<b>225</b>	-	-	-	-	8,5	10	0,0248	BLF
<b>250</b>	-	5	-	-	9	10,5	0,0323	BLF
<b>280</b>	-	20	-	-	10	11,5	0,0427	BLF
<b>315</b>	-	37	-	-	11	12,5	0,0565	BLF
<b>355</b>	-	57	-	7	13	14,5	0,0747	BLF
<b>400</b>	-	80	-	30	15	18	0,0982	BLF
<b>450</b>	-	105	-	55	17	20	0,1279	BLF
<b>500</b>	-	130	-	80	20	23	0,1617	BLF
<b>560</b>	15	160	-	110	23	26	0,2073	BF
<b>630</b>	50	195	-	145	27	30	0,2677	BF
<b>710</b>	90	235	40	185	32	35	0,3461	BF
<b>800</b>	135	280	85	230	38	41	0,4464	BF
<b>900</b>	185	330	135	280	56	59	0,5727	BF
<b>1000</b>	235	380	185	330	74	77	0,7147	BF

### 3.5. Blades overlaps

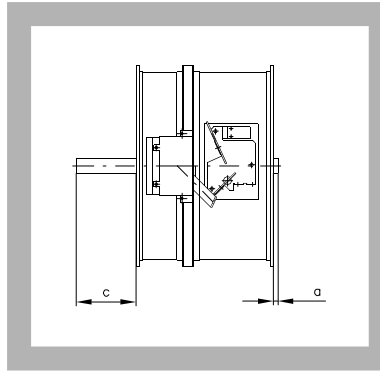
- For square fire damper (Fig. 8a) the open damper blade overlaps the damper body from dimension  $B \geq 245$  mm by the value "c" or "a" and "c"  
These values are specified in the Tab. 3.3.1.
- For round fire damper (Fig. 8b) the open damper blade overlaps the damper body from dimension  $\varnothing 245$  mm by the value "c" or "a" and "c"  
These values are specified in the Tab. 3.4.1.
- For round fire damper (Fig. 8c) for SPIRO ducts the open damper blade overlaps the damper body from dimension  $\varnothing 355$  mm by the value "f" or "e" and "f"  
These values are specified in the Tab. 3.4.1

Values "a" and "c" or "e" and "f" has to be respected when projecting related air-conditioning ducts.

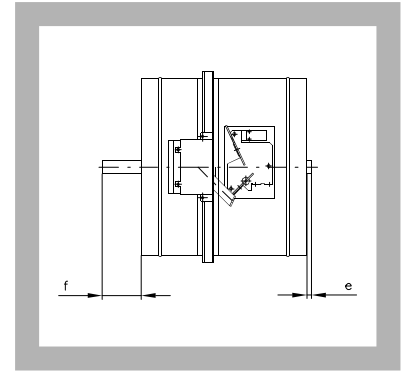
**Fig. 8a Overlaps of square dampers**



**Fig. 8b Overlaps of round dampers**

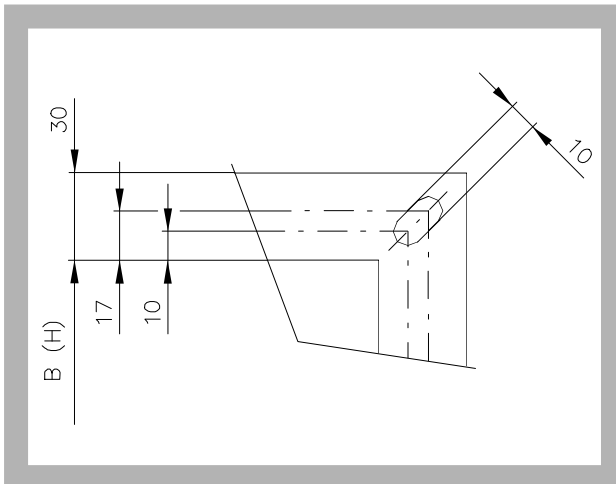


**Fig. 8c Overlaps of SPIRO dampers**

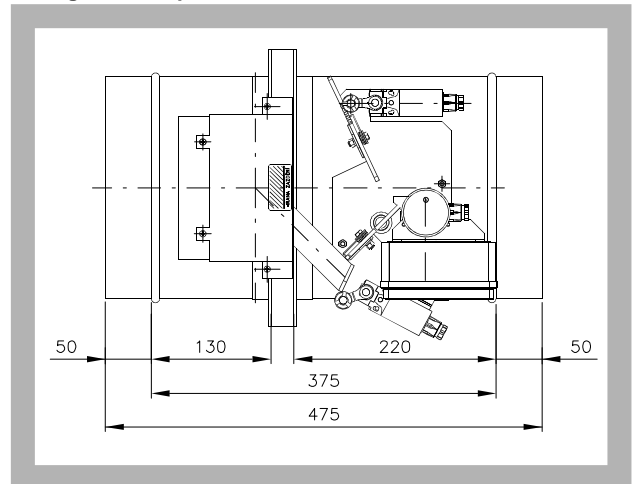


- 3.6. For the design .60 (with BKN supply and communication device) add to weight of the damper with an actuating mechanism (from the Tab. 3.3.1. and 3.4.1.) the weight of BKN (0.5 kg).
- 3.7. Square dampers can be supplied on the customer's demands in all subdimension of the above mentioned range.
- 3.8. Flanges of square fire dampers are 30 mm wide with oval hole (Fig. 9). Dimensions of damper connecting flanges are in accordance with EN 12 220. In case of damper installation into SPIRO duct, round dampers are supplied without the flanges so as it is possible to connect them with external joints (it is necessary to specify this requirement in the order). Damper length for SPIRO duct is 475 mm (Fig. 10).

**Fig. 9 Flange of square damper**



**Fig. 10 Damper for SPIRO duct**

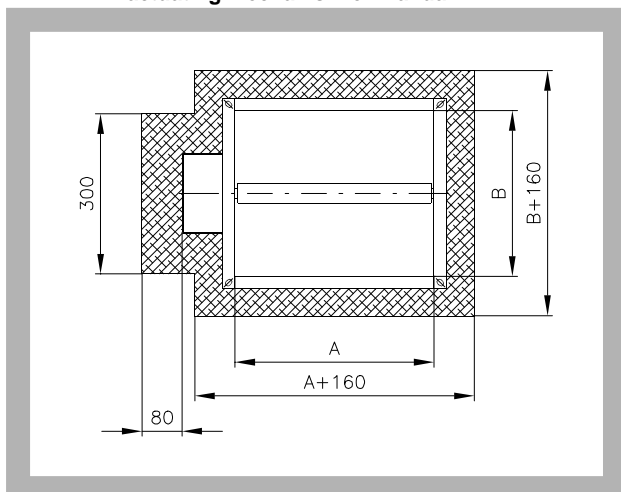


#### **4. Placement and Assembly**

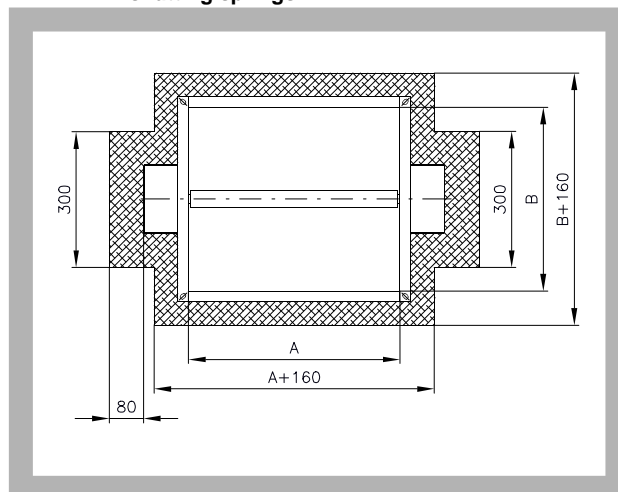
- 4.1. Fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating constructions. Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.
- 4.2. To provide needed access space to the control device, all other objects must be situated at least 350 mm from the control parts of the damper. Inspection hole must be accessible.
- 4.3. The distance between the fire damper and the construction (wall, ceiling) must be minimum 75 mm. In case that two or more dampers are supposed to be installed in one fire separating construction, the distance between the adjacent dampers must be at least 200 mm according to EN 1366-2 paragraph 13.5.

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

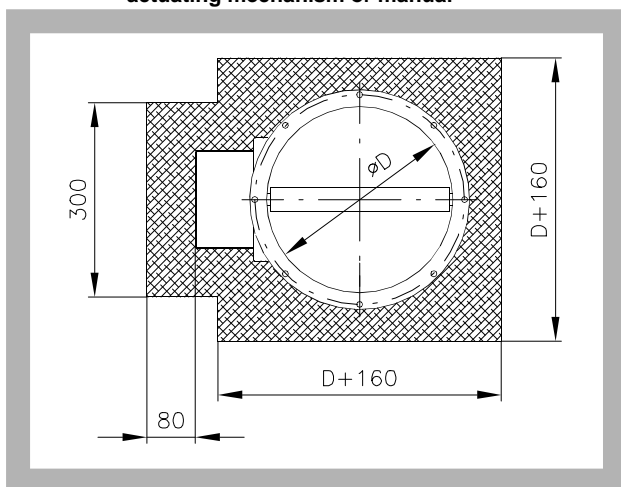
**Fig. 11 Installation opening - square damper with actuating mechanism or manual**



**Fig. 12 Installation opening - square damper with two shutting springs**



**Fig. 13 Installation opening - round damper with actuating mechanism or manual**



**4.4. Examples of fire damper installing**

- 4.4.1. The fire damper can be integrated into a solid wall construction made e.g. of normal concrete/masonry, porous concrete with minimum thickness 100 mm or into solid ceiling construction made e.g. of normal concrete/porous concrete with minimum thickness 150 mm. Recommended structural holes are specified in Fig. 11-13.
- 4.4.2. The fire damper can be integrated into a gypsum wall construction with fire classification EI 90.
- 4.4.3. The fire damper can also be integrated outside the wall construction. Duct and the damper part between the wall construction and the damper blade (labelled with BUILD IN EDGE on the protective covering) must be protected with fire-fighting insulation. For square dampers with A side dimension (the side with inspection holes) 800 mm and more it is necessary to reinforce the damper body with a thin wall profile 60x30x2.5 attached by means of M6 bolts and special holders (Fig. 30). The body reinforcement must also be protected with fire-fighting insulation.

**5. Statement of installations**

**5.1. Statement of installations**

**Tab. 5.1.1. Statement of installations**

Damper typ	FDMA installation	Classification	Figure
<b>Square (max. size 1600x1000)</b>	Damper installed in a solid wall construction min. thickness 100 mm. Space between damper and wall is filled by mortar, gypsum. <i>(notice 1)</i>	EIS 120 EIS 90	14
	Damper installed in a solid ceiling construction min. thickness 150 mm. Space between damper and wall is filled by mortar, gypsum. <i>(notice 2)</i>	EIS 120 EIS 90	15
	Damper installed in a solid wall construction min. thickness 100 mm. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> . Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ). <i>(notice 1)</i>	EIS 90	16
	Damper installed in a gypsum wall construction, classification EI 90. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> . Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ).	EIS 90	17
	Damper installed in a solid ceiling construction, classification EI 90. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> . Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ). <i>(notice 2)</i>	EIS 90	18
	Damper installed outside a solid ceiling construction. Space between duct and wall is filled by mortar, gypsum. Insulation of duct and fire damper is made by stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m <sup>3</sup> ), EIS 90, thickness 60 mm <i>(notice 2,3,4)</i>	EIS 90	19
	Damper installed outside a solid wall construction. Space between duct and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> . Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ). Insulation of duct and fire damper is made by stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m <sup>3</sup> ), EIS 90, thickness 60 mm <i>(notice 1,3,4)</i>	EIS 90	20
	Damper installed outside a gypsum wall construction, classification EI 90. Space between duct and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> . Surface covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ). Insulation of duct and fire damper is made by stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m <sup>3</sup> ), EIS 90, thickness 60 mm <i>(notice 3,4)</i>	EIS 90	21
<b>Round (size 180-1000)</b>	Damper installed in a solid wall construction min. thickness 100 mm. Space between damper and wall is filled by mortar, gypsum. <i>(notice 1)</i>	EIS 120 EIS 90	22
	Damper installed in a solid ceiling construction min. thickness 150 mm. Space between damper and wall is filled by mortar, gypsum. <i>(notice 2)</i>	EIS 120 EIS 90	23
	Damper installed in a solid wall construction min. thickness 100 mm. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> . Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ). <i>(notice 1)</i>	EIS 90	24
	Damper installed in a gypsum wall construction, classification EI 90. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> . Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ).	EIS 90	25



Damper typ	FDMA installation	Classification	Figure
Round (size 180-1000)	Damper installed in a solid ceiling construction, classification EI 90. Space between damper and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> ). Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ). (notice 2)	EIS 90	23
	Damper installed outside a solid ceiling construction. Space between duct and wall is filled by mortar, gypsum. Insulation of duct and fire damper is made by stone wool with one side stitched wire fencing (min. density 80 kg/m <sup>3</sup> ). Placed in two layers, total thickness 100 mm (60+40 mm or 50+50 mm). (notice 2,3)	EIS 90	24
	Damper installed outside a solid wall construction. Space between duct and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> ). Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. Density 870 kg/m <sup>3</sup> ). Insulation of duct and fire damper is made by stone wool with one side stitched wire fencing (min. density 80 kg/m <sup>3</sup> ). Placed in two layers, total thickness 100 mm (60+40 mm or 50+50 mm). (notice 1,3)	EIS 90	25
	Damper installed outside a gypsum wall construction. Space between duct and wall is filled by mineral stone wool min. density 140 kg/m <sup>3</sup> ). Surface is covered by fire protection mastic min. thickness 1 mm and cement lime plate min. thickness 15 mm (min. density 870 kg/m <sup>3</sup> ). Insulation of duct and fire damper is made by stone wool with one side stitched wire fencing (min. density 80 kg/m <sup>3</sup> ). (notice 3)	EIS 90	26

**NOTICE:**

- 1) Solid wall construction: normal concrete/masonry or porous concrete with minimum thickness tl. 100 mm
- 2) Solid ceiling construction: normal concrete/masonry or porous concrete with minimum thickness tl. 150 mm
- 3) analogical approved fire insulation system = identical thickness, identical  $\rho$ , identical reaction to fire, analogical  $\lambda$  and  $c_p$
- 4) Reinforcement of damper dimension „A“ for  $A \geq 800$

Fig. 30 Fixing of reinforcement to damper body, damper placement outside wall or ceiling construction ( $A \geq 800$ )

Fig. 14

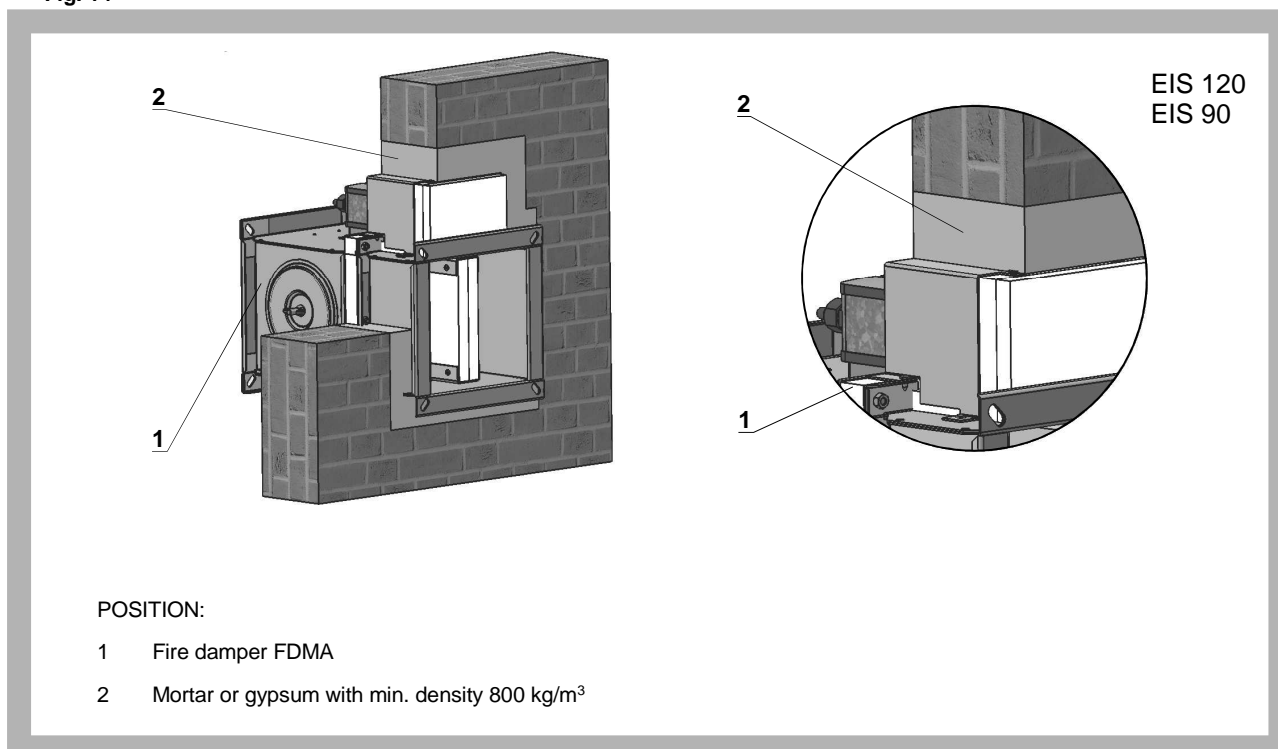
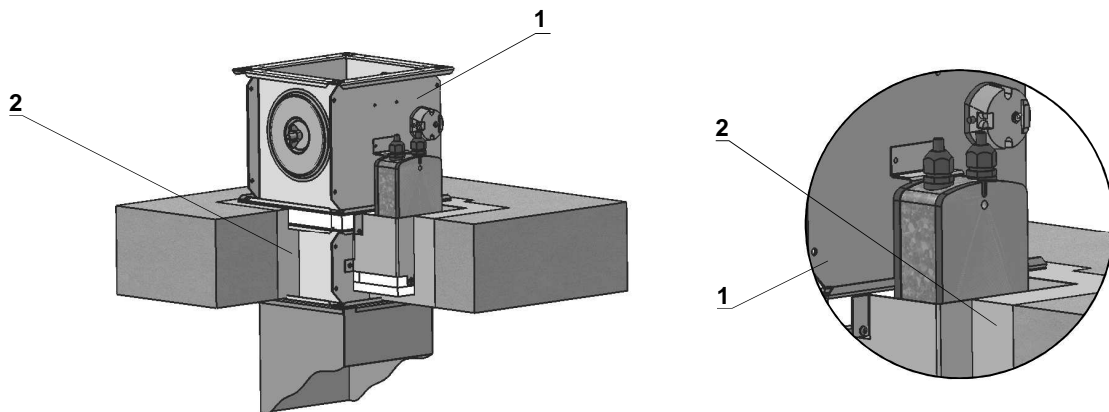


Fig. 15

EIS 120  
EIS 90

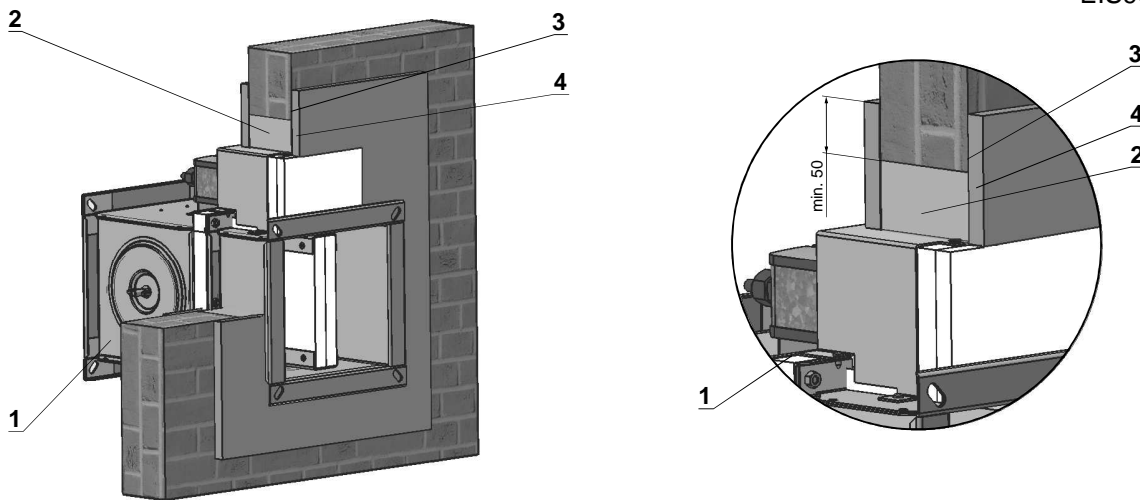


POSITION:

- 1 Fire damper FDMA
- 2 Mortar or gypsum with min. density 800 kg/m<sup>3</sup>

Fig. 16

EIS90



POSITION:

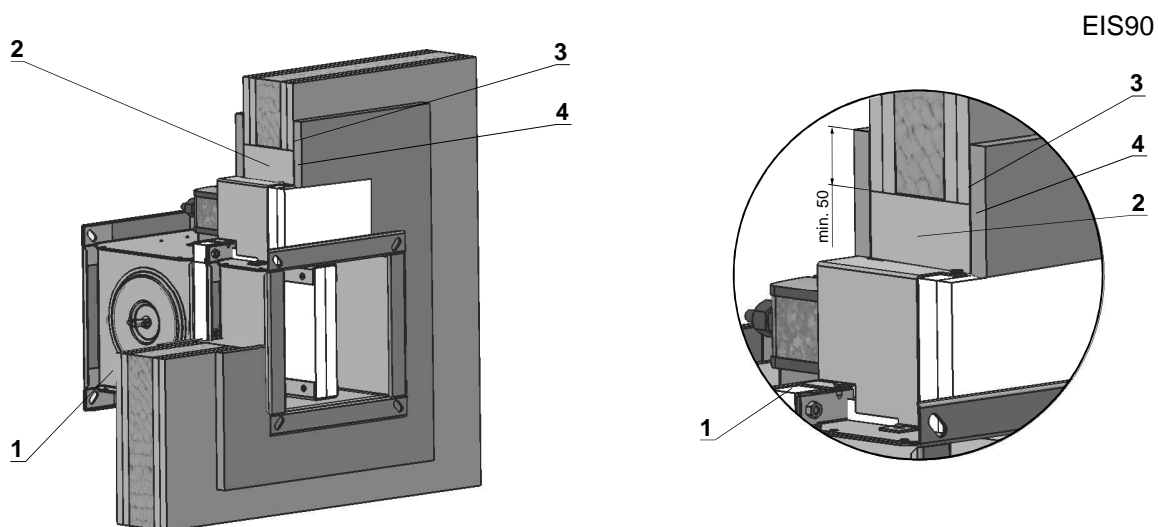
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)

Used materials - example\*:

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

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

Fig. 17



POSITION:

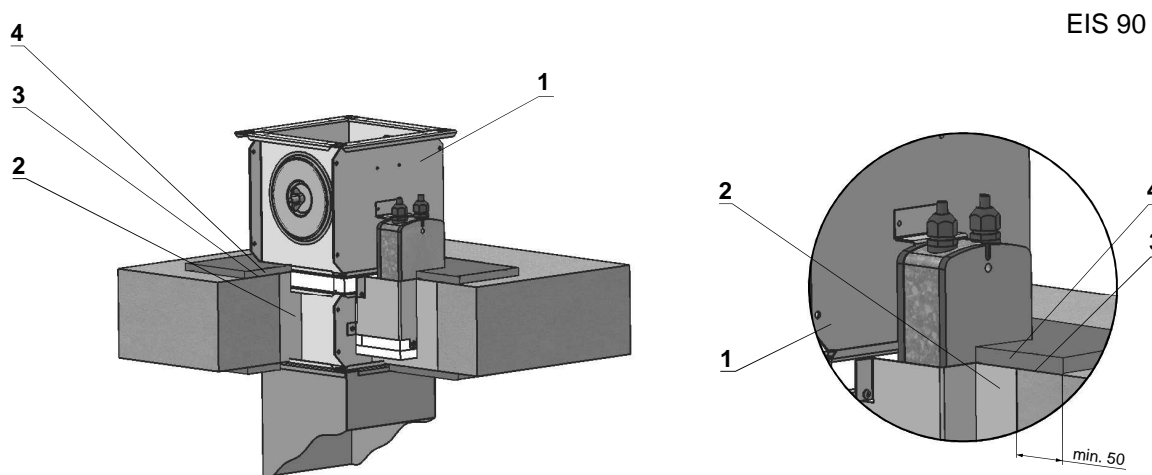
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)

Used materials - example\*:

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

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

Fig. 18



POSITION:

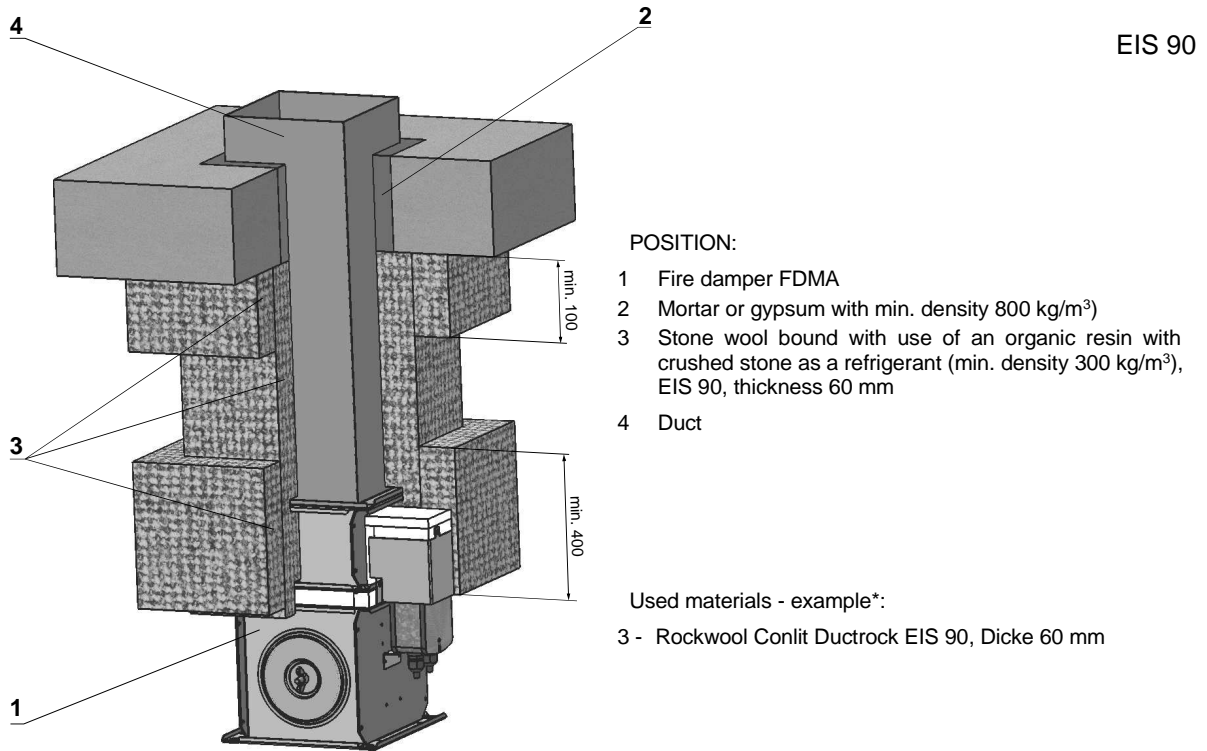
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)

Used materials - example\*:

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

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

Fig. 19



POSITION:

- 1 Fire damper FDMA
- 2 Mortar or gypsum with min. density 800 kg/m<sup>3</sup>
- 3 Stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m<sup>3</sup>), EIS 90, thickness 60 mm
- 4 Duct

Used materials - example\*:

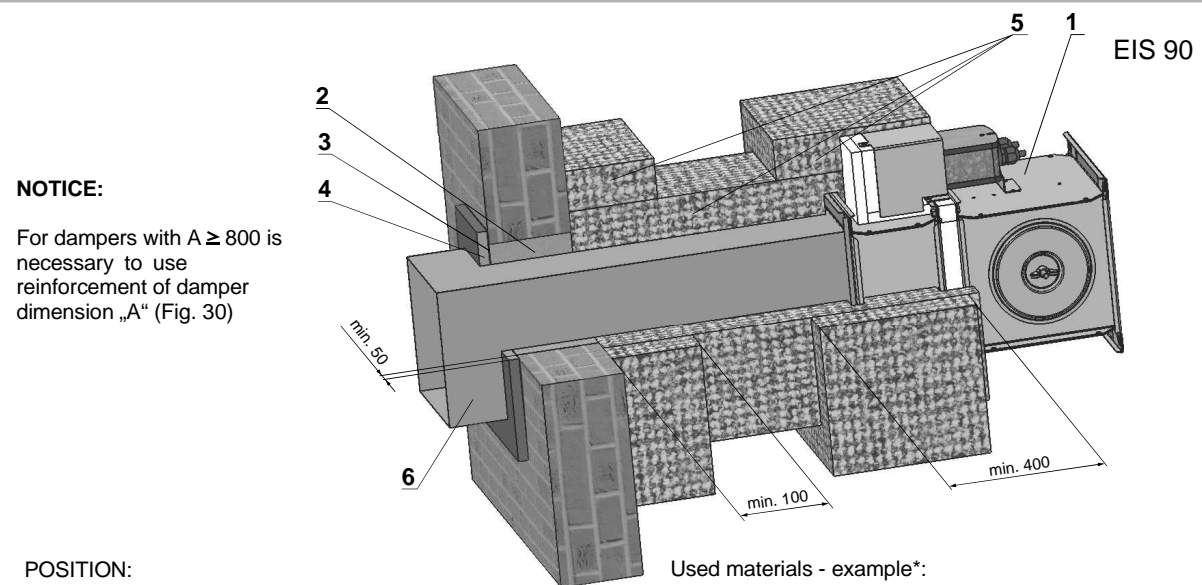
- 3 - Rockwool Conlit Ductrock EIS 90, Dicke 60 mm

NOTICE:

For dampers with  $A \geq 800$  is necessary to use reinforcement of damper dimension „A“ (Fig. 30)

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

Fig. 20



NOTICE:

For dampers with  $A \geq 800$  is necessary to use reinforcement of damper dimension „A“ (Fig. 30)

POSITION:

- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)
- 5 Stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m<sup>3</sup>), EIS 90, thickness 60 mm
- 6 Duct

Used materials - example\*:

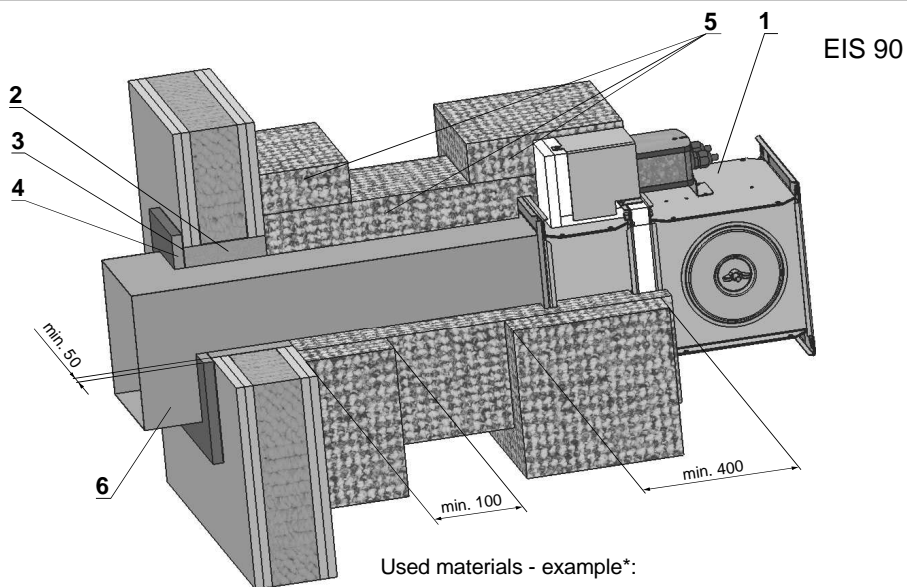
- 2 - Promapyr, Rockwool Steprock HD
- 3 - Promastop - P, K
- 4 - Promatect - H
- 5 - Rockwool Conlit Ductrock EIS 90, Dicke 60 mm

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

Fig. 21

**NOTICE:**

For dampers with  $A \geq 800$  is necessary to use reinforcement of damper dimension „A“ (Fig. 30)



**POSITION:**

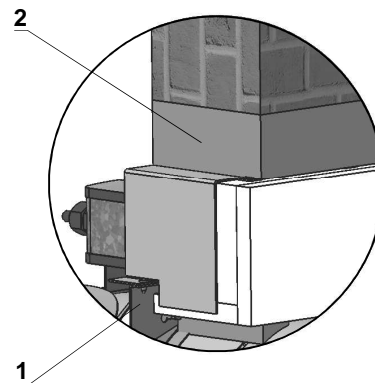
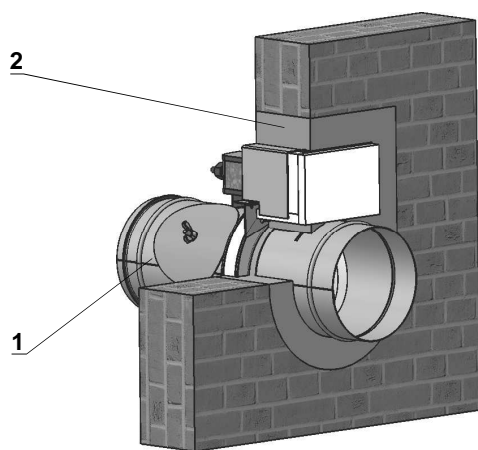
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)
- 5 Stone wool bound with use of an organic resin with crushed stone as a refrigerant (min. density 300 kg/m<sup>3</sup>), EIS 90, thickness 60 mm
- 6 Duct

**Used materials - example\*:**

- 2 - Promapyr, Rockwool Steprock HD
- 3 - Promastop - P, K
- 4 - Promatect - H
- 5 - Rockwool Conlit Ductrock EIS 90, Dicke 60 mm

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

Fig. 22



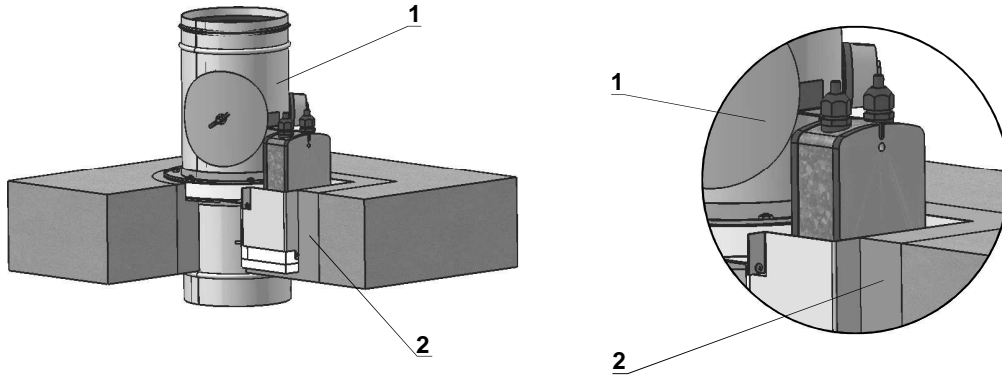
EIS 120  
EIS 90

**POSITION:**

- 1 Fire damper FDMA
- 2 Mortar or gypsum with min. density 800 kg/m<sup>3</sup>)

Fig. 23

EIS 120  
EIS 90

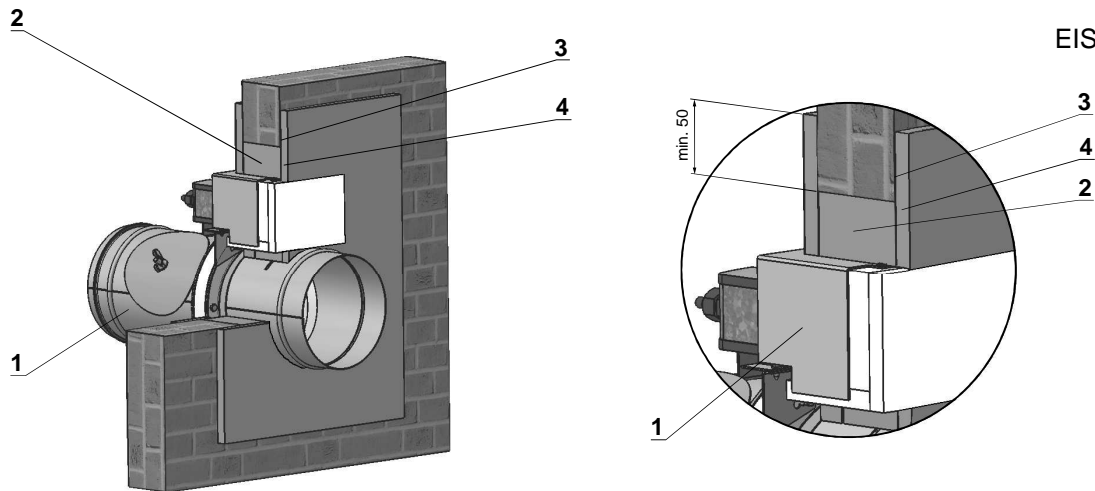


POSITION:

- 1 Fire damper FDMA
- 2 Mortar or gypsum with min. density 800 kg/m<sup>3</sup>)

Fig. 24

EIS 90



POSITION:

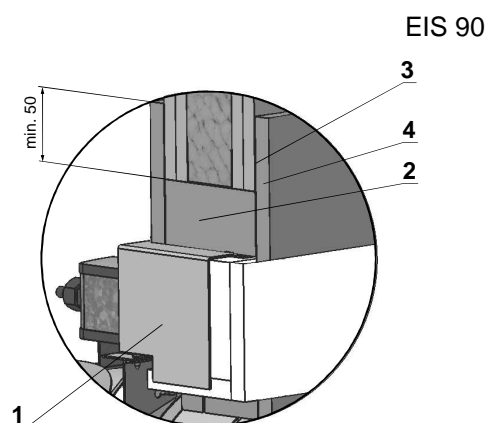
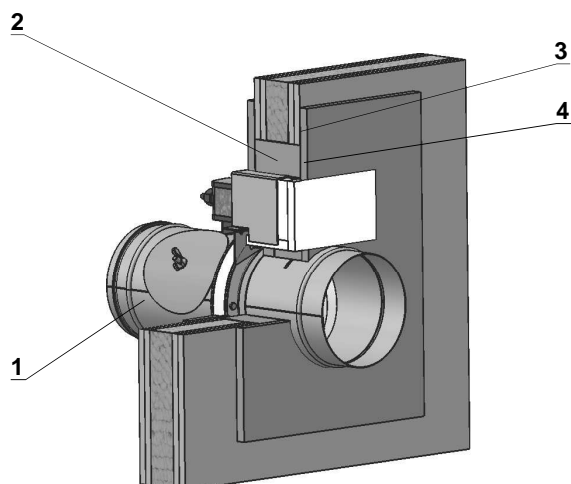
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)

Used materials - example\*:

- 2 - Promapyr, Rockwool Steprock HD
- 3 - Promastop - P, K
- 4 - Promactect - H

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

Fig. 25



POSITION:

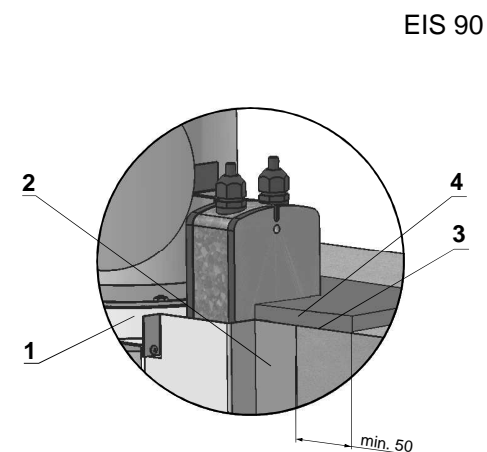
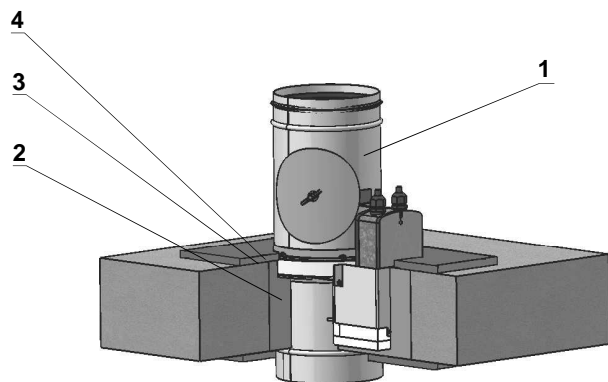
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)

Used materials - example\*:

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

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

Fig. 26



POSITION:

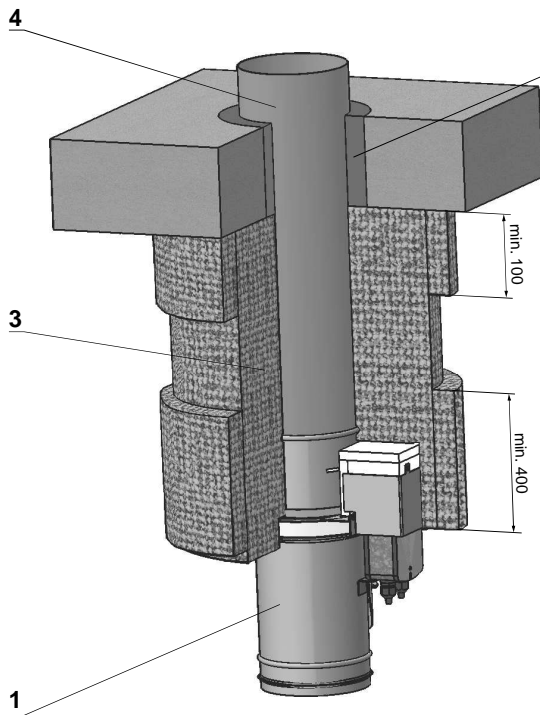
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)

Used materials - example\*:

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

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

Fig. 27



EIS 90

POSITION:

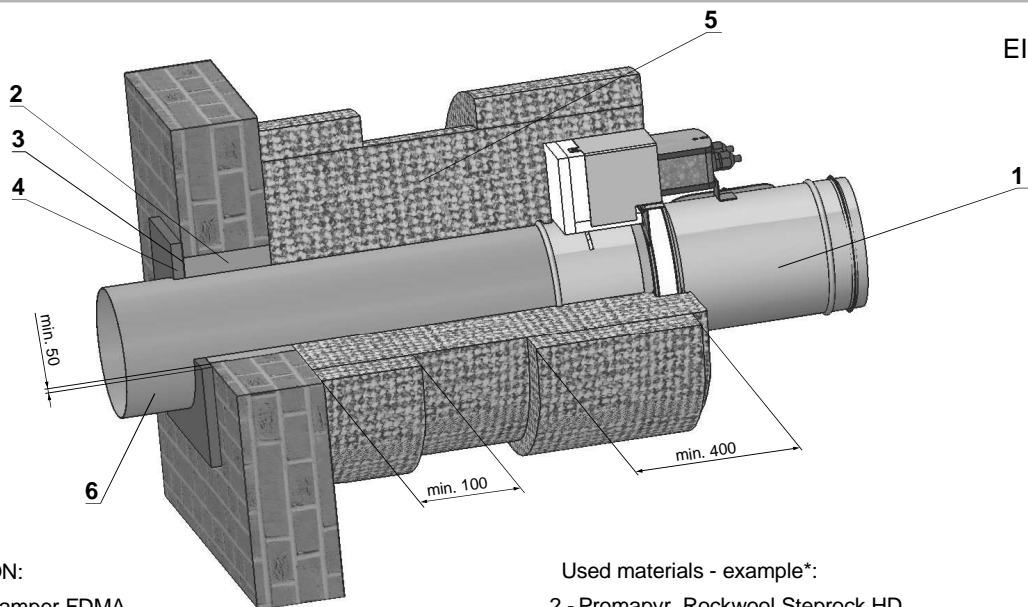
- 1 Fire damper FDMA
- 2 Mortar or gypsum with min. density 800 kg/m<sup>3</sup>
- 3 Stone wool with one side stitched wire fencing (min. density 105 kg/m<sup>3</sup>), total thickness 180 mm (e.g. three layers thickness 60 mm)
- 4 Duct

Used materials - example\*:

- 3 - Rockwool Wired Mat 105 thickness 3x60 mm

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

Fig. 28



EIS 90

POSITION:

- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)
- 5 Stone wool with one side stitched wire fencing (min. density 105 kg/m<sup>3</sup>), total thickness 180 mm (e.g. three layers thickness 60 mm)
- 6 Duct

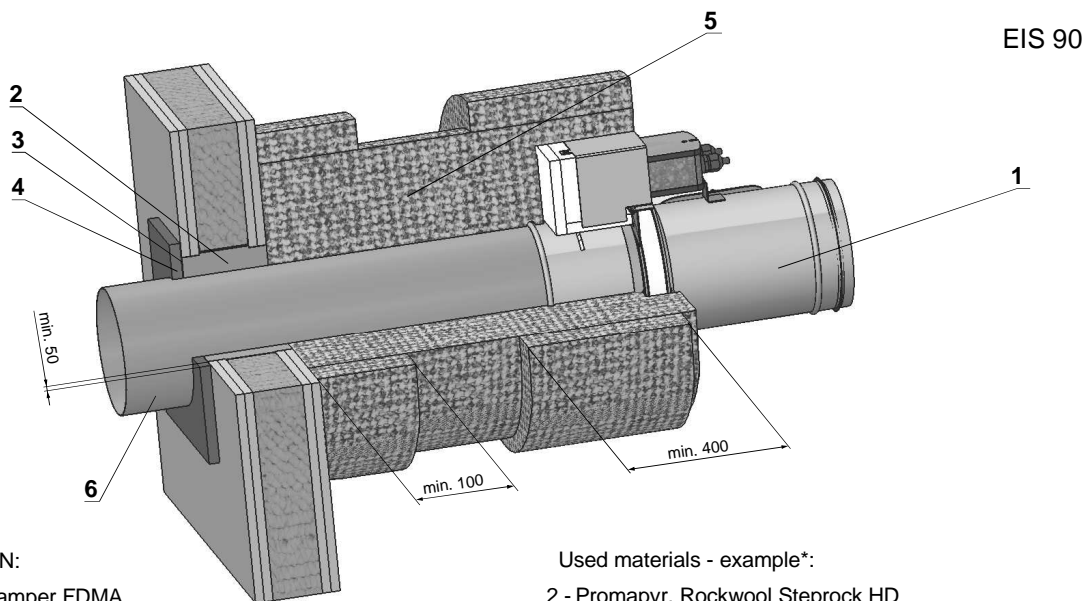
Used materials - example\*:

- 2 - Promapyr, Rockwool Steprock HD
- 3 - Promastop - P, K
- 4 - Promatect - H
- 5 - Rockwool Wired Mat 105 thickness 3x60 mm

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



Fig. 29



POSITION:

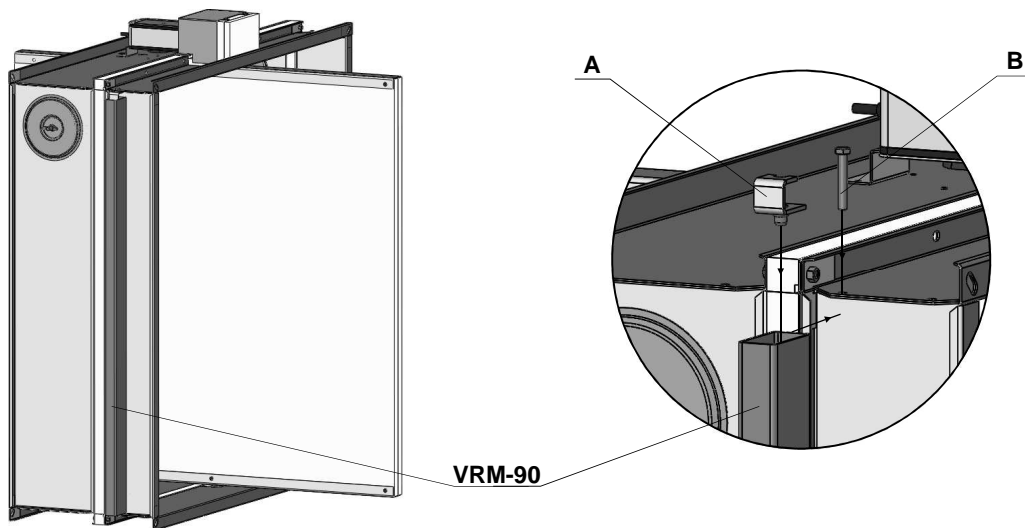
- 1 Fire damper FDMA
- 2 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 3 Fire protection mastic min. thickness 1 mm
- 4 Cement lime plate min. thickness 15 mm (min. density 870 kg/m<sup>3</sup>)
- 5 Stone wool with one side stitched wire fencing (min. density 105 kg/m<sup>3</sup>), total thickness 180 mm (e.g. three layers thickness 60 mm)
- 6 Duct

Used materials - example\*:

- 2 - Promapyr, Rockwool Steprock HD
- 3 - Promastop - P, K
- 4 - Promatect - H
- 5 - Rockwool Wired Mat 105 thickness 3x60 mm

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

Fig. 30 Fixing of reinforcement to damper body (A ≥ 800)



- 1.) Insert part A into reinforcement VRM-90
- 2.) Set up nut of the part A under correct hole
- 3.) Lock screw B
- 4.) It has to be done on each side of VRM-90

**III. TECHNICAL DATA**

**6. Pressure loss**

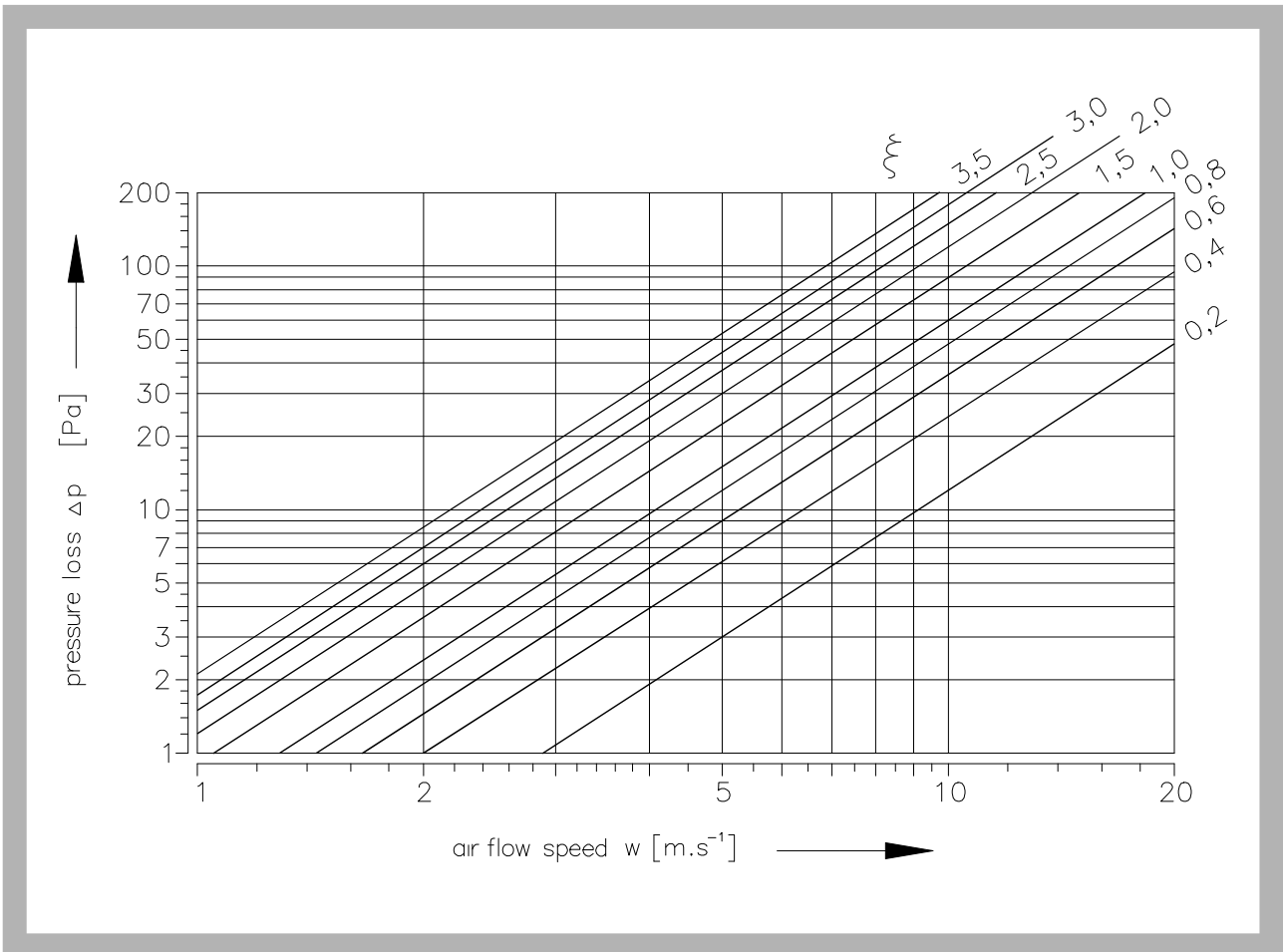
**6.1. Pressure loss calculation**

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

$\Delta p$	[Pa]	pressure loss
$w$	[m.s <sup>-1</sup> ]	air flow speed in nominal damper section
$\rho$	[kg.m <sup>-3</sup> ]	air density
$\xi$	[-]	coefficient of local pressure loss for the nominal damper section (see Tab. 7.1.1.)

**6.2. Determination of pressure loss by using diagram 6.2.1.  $\rho = 1,2 \text{ kg.m}^{-3}$**

**Diagram 6.2.1. Pressure losses for air density  $\rho = 1,2 \text{ kg.m}^{-3}$**



## 7. Coefficient of local pressure loss

### 7.1. Coefficient of local pressure loss $\xi$ (-) - square dampers

Tab. 7.1.1. Coefficient of local pressure loss - square dampers

A	B													
	180	200	250	315	355	400	450	500	560	630	710	800	900	1000
180	1,849	1,476	0,983	0,703	0,608	0,535	0,478	0,437	0,400	0,369	0,343	0,322	0,304	0,291
200	1,737	1,385	0,921	0,658	0,569	0,500	0,446	0,407	0,373	0,344	0,320	0,300	0,284	0,271
250	1,553	1,236	0,819	0,583	0,504	0,442	0,394	0,360	0,330	0,304	0,282	0,264	0,250	0,239
315	1,415	1,124	0,743	0,528	0,456	0,400	0,356	0,325	0,297	0,274	0,254	0,238	0,225	0,215
355	1,359	1,079	0,713	0,506	0,436	0,383	0,341	0,311	0,284	0,262	0,243	0,228	0,215	0,205
400	1,312	1,041	0,687	0,487	0,420	0,368	0,328	0,299	0,273	0,252	0,234	0,219	0,207	0,197
450	1,271	1,009	0,665	0,471	0,406	0,356	0,317	0,289	0,264	0,243	0,226	0,211	0,199	0,190
500	1,240	0,983	0,648	0,459	0,395	0,346	0,308	0,281	0,257	0,236	0,219	0,205	0,194	0,185
560	1,211	0,960	0,632	0,447	0,385	0,337	0,300	0,274	0,250	0,230	0,214	0,200	0,189	0,180
630	1,184	0,938	0,617	0,437	0,376	0,329	0,293	0,267	0,244	0,225	0,208	0,195	0,184	0,176
710	1,160	0,919	0,604	0,427	0,368	0,322	0,287	0,261	0,239	0,220	0,204	0,191	0,180	0,172
800	1,140	0,903	0,593	0,419	0,361	0,316	0,281	0,256	0,234	0,215	0,200	0,187	0,176	0,168
900	1,122	0,888	0,583	0,412	0,355	0,310	0,276	0,252	0,230	0,212	0,196	0,184	0,173	0,165
1000	1,108	0,877	0,576	0,407	0,350	0,306	0,273	0,248	0,227	0,209	0,193	0,181	0,171	0,163
1120	1,095	0,867	0,569	0,402	0,345	0,302	0,269	0,245	0,224	0,206	0,191	0,179	0,168	0,161
1250	1,084	0,857	0,562	0,397	0,342	0,299	0,266	0,242	0,221	0,203	0,189	0,176	0,166	0,159
1400	1,073	0,849	0,557	0,393	0,338	0,296	0,263	0,240	0,219	0,201	0,187	0,175	0,165	0,157
1500	1,067	0,844	0,554	0,391	0,336	0,294	0,262	0,238	0,218	0,200	0,186	0,174	0,164	0,156
1600	1,062	0,840	0,551	0,389	0,334	0,293	0,260	0,237	0,216	0,199	0,185	0,173	0,163	0,155

### 7.2. Coefficient of local pressure loss $\xi$ (-) - round dampers

Tab. 7.2.1. Coefficient of local pressure loss - round dampers

D	180	200	225	250	280	315	355	400	450	500	560	630	710	800	900	1000
$\xi$	3,546	2,124	1,291	0,877	0,609	0,438	0,328	0,255	0,205	0,173	0,147	0,127	0,111	0,099	0,09	0,083

**8. Noise data**

**8.1.** Level of acoustic output corrected with filter A.

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

$L_{WA}$  [dB(A)] level of acoustic output corrected with filter A

$L_{W1}$  [dB] level of acoustic output  $L_{W1}$  related to the 1 m<sup>2</sup> section (see Tab. 8.3.1. a 8.3.2)

$S$  [m<sup>2</sup>] effective area of the damper

$K_A$  [dB] correction to the weight filter A (viz Tab. 8.3.3.)

**8.2.** Level of acoustic output in octave ranges.

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

$L_{Woct}$  [dB] spectrum of acoustic output in octave range

$L_{W1}$  [dB] level of acoustic output  $L_{W1}$  related to the 1 m<sup>2</sup> section (see Tab. 8.3.1. a 8.3.2)

$S$  [m<sup>2</sup>] effective area of the damper

$L_{rel}$  [dB] relative level expressing the shape of the spectrum (see Tab. 8.3.3.)

**8.3.** Table of acoustics values

**Tab. 8.3.1. Level of acoustic output  $L_{W1}$ [dB] related to the 1 m<sup>2</sup> section - square dampers**

$w$ [m.s <sup>-1</sup> ]	$\xi$ [-]											
	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1	1,5	2	2,5
2	15,5	18,7	20,9	22,6	24,0	25,2	26,3	27,2	28,0	31,2	33,4	35,1
3	26,1	29,2	31,5	33,2	34,6	35,8	36,9	37,8	38,6	41,7	44,0	45,7
4	33,6	36,7	39,0	40,7	42,1	43,3	44,3	45,3	46,1	49,2	51,5	53,2
5	39,4	42,5	44,8	46,5	47,9	49,1	50,2	51,1	51,9	55,0	57,3	59,0
6	44,1	47,3	49,5	51,3	52,7	53,9	54,9	55,8	56,6	59,8	62,0	63,8
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
8	51,6	54,8	57,0	58,8	60,2	61,4	62,4	63,3	64,1	67,3	69,5	71,3
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
10	57,4	60,6	62,8	64,6	66,0	67,2	68,2	69,1	70,0	73,1	75,3	77,1
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
12	62,2	65,4	67,6	69,3	70,7	71,9	73,0	73,9	74,7	77,9	80,1	81,8

Tab. 8.3.2. Level of acoustic output  $L_{w1}$ [dB] related to the 1 m<sup>2</sup> section - round dampers

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

Tab. 8.3.3. Correction to the weight filter A - square and round dampers

w [m.s <sup>-1</sup> ]	2	3	4	5	6	7	8	9	10	11	12
$K_A$ [dB]	-15,0	-11,8	-9,8	-8,4	-7,3	-6,4	-5,7	-5,0	-4,5	-4,0	-3,6

Tab. 8.3.4. Relative level expressing the shape of the spectrum  $L_{rel}$  - square and round dampers

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

**9. Electrical Components, Connection Diagrams**

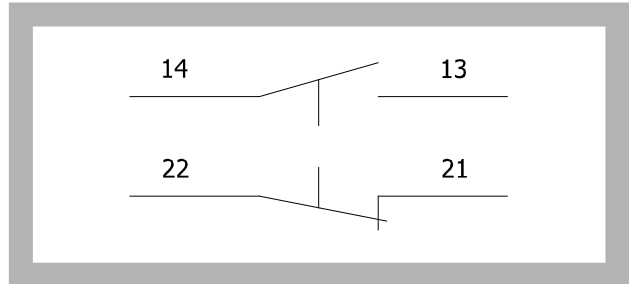
**9.1. Terminal switches**

**9.1.1. Terminal switches for non explosive environment**

**Tab. 9.1.1. Terminal switch XCKN2118G-11**

Terminal switch XCKN2118G-11	
Nominal voltage, current	AC 240 V; 3 A DC 250 V; 0,1 A
Degree of protection	IP 65
Ambient temperature	-15 °C ... +70 °C

**Fig. 31 Terminal switch XCKN2118G-11**

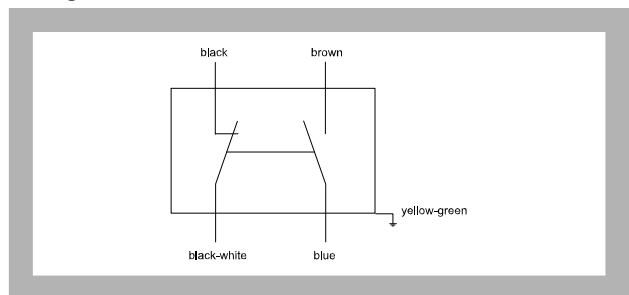


**9.1.2. Terminal switches for in explosive environment (ZONE 1, 2)**

**Tab. 9.1.2. Terminal switch XCW - A 115**

Terminal switch XCW - A 115	
Max. nominal voltage	AC 500 V
Max. nominal pulse current	6 A
Inexplosive design	EE x d II c T6
Ambient temperature	-20 °C ... +40 °C

**Fig. 32 Terminal switch XCW - A 115**



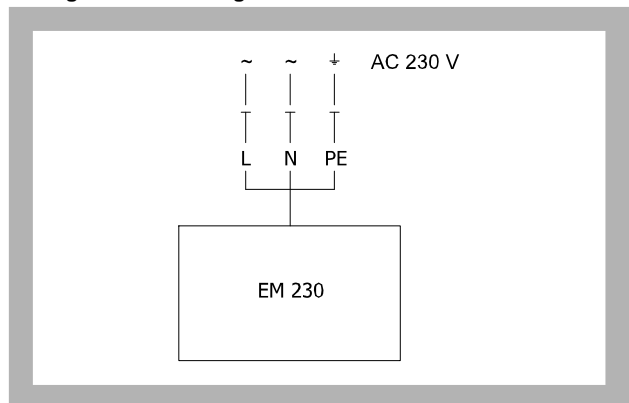
**9.2. Electromagnets**

**9.2.1. Electromagnets for non explosive environment**

**Tab. 9.2.1. Electromagnet EM230**

Elektromagnet EM230	
Nominal voltage	AC 230 V / 50 Hz
Attraction current	1,2 A
Degree of protection	IP 40
Ambient temperature	-10 °C ... +40 °C
Connection	cable 1m, 3x0,75mm <sup>2</sup>

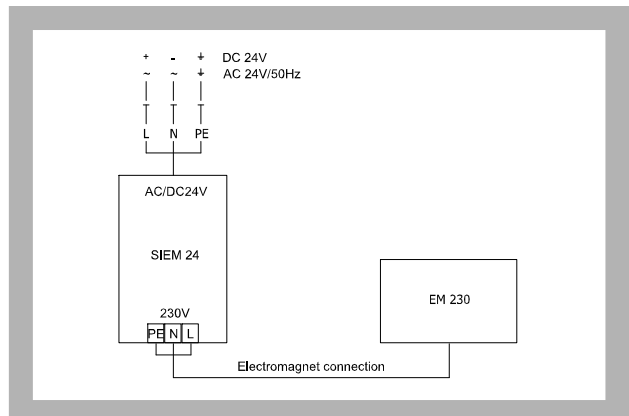
**Fig. 33 Electromagnet EM230**



**Tab. 9.2.2. Electromagnet EM230 with pulse switch SIEM24**

Electromagnet EM230 with pulse switch SIEM24	
Nominal voltage	AC 24 V / 50 Hz DC 24 V
Attraction current	1 A
Degree of protection	IP 40
Ambient temperature	-10 °C ... +40 °C
Switching frequency	max. 1x per minute
Connection	cable 1m, 3x0,75mm <sup>2</sup>

**Fig. 34 Electromagnet EM230 with pulse switch SIEM24**

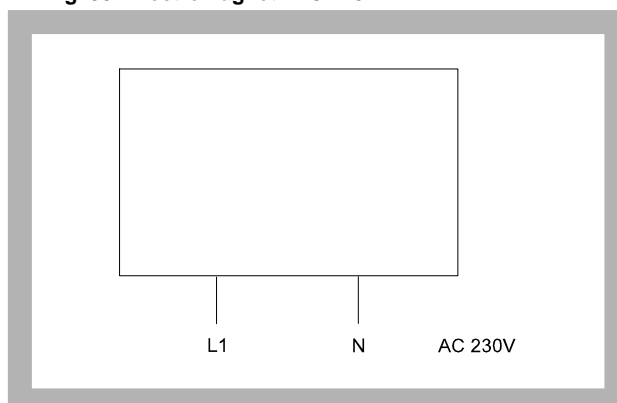


9.2.2. Electromagnets for inexplusive environment

Tab. 9.2.2. Electromagnet EVJ 1151- N

Electromagnet EVJ 1151- N	
Nominal voltage	AC 230 V / 50 Hz
Attraction current	1,25 A
Attraction input	320 VA
Inexplusive design	II3G/D EExeIIIT4
Ambient temperature	-20 °C ... +40 °C

Fig. 35 Electromagnet EVJ 1151- N



Electromagnets of EVJ type are provided with double insulation protection against dangerous contact of live parts.

9.3. Actuating mechanism

9.3.1. Actuating mechanism for non explosive environment

Tab. 9.3.1. Actuating mechanism BELIMO BLF 24-T(-ST), BLF 230-T

Actuating mechanism BELIMO	BLF 24-T(-ST)	BLF 230-T
Nominal voltage	AC 24 V 50/60 Hz DC 24 V	AC 230 V 50/60 Hz
Power consumption - motoring - holding	5 W 2,5 W	5 W 3 W
Dimensioning	7 VA (Imax 5,8 A @ 5 ms)	7 VA (Imax 150 mA @ 10 ms)
Protection class	III	II
Degree of protection	IP 54	
Running time - motor - spring return	40..75 sec ~ 20 sec	
Ambient temperature - normal duty - safety duty - non-operating temperature	- 30 °C ... + 50 °C The safe position will be attained up to max. 75°C - 40 °C ... + 50 °C	
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm <sup>2</sup> cable 1 m, 6 x 0,75 mm <sup>2</sup> (BLF 24-T(-ST)) with plug-in connectors	
Thermal trips	Tf1: duct outside temperature 72 °C Tf2/Tf3: duct inside temperature 72 °C	

Fig. 36 Actuating mechanism BELIMO BLF 24-T(-ST)

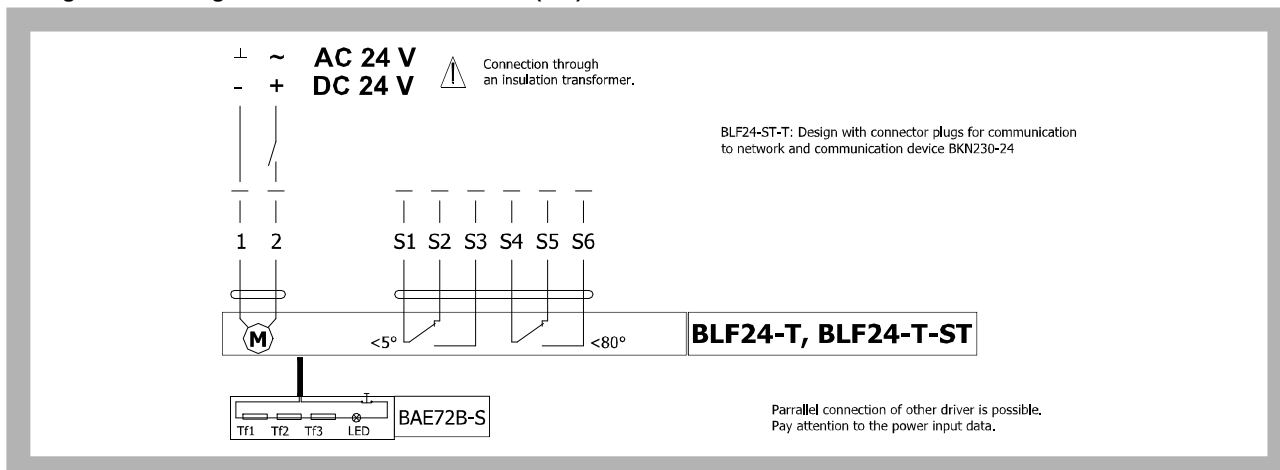
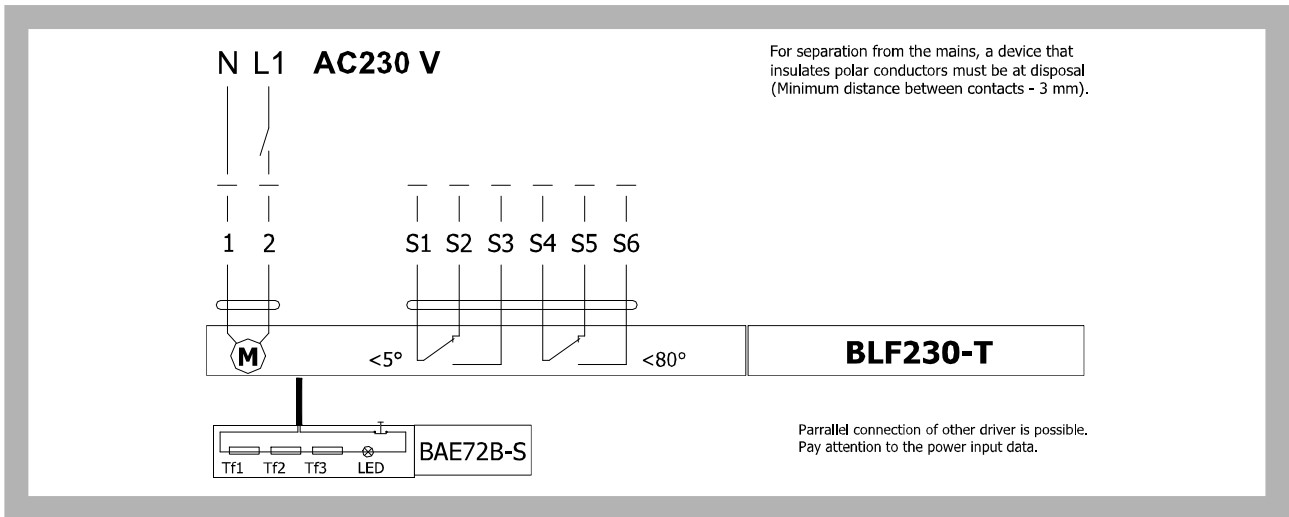


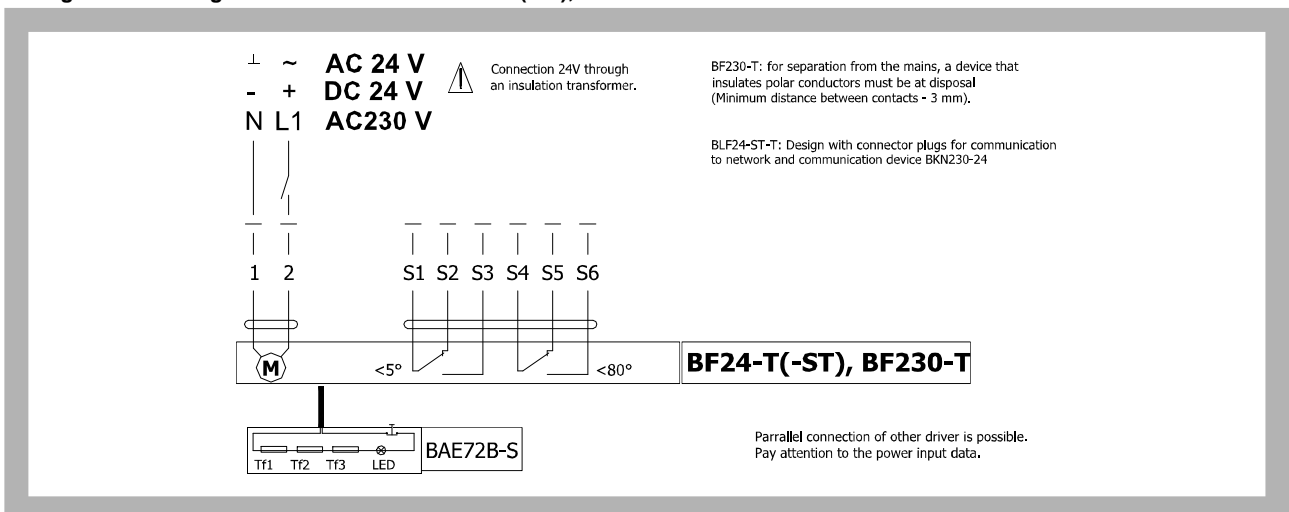
Fig. 37 Actuating mechanism BELIMO BLF 230-T



Tab. 9.3.2. Actuating mechanism BELIMO BF 24-T(-ST), BF 230-T

Actuating mechanism BELIMO	BF 24-T(-ST)	BF 230-T
Nominal voltage	AC 24 V 50/60 Hz DC 24 V	AC 230 V 50/60 Hz
Power consumption - motoring - holding	7 W 2 W	8 W 3 W
Dimensioning	10 VA (Imax 8,3 A @ 5 ms)	12,5 VA (Imax 500 mA @ 5 ms)
Protection class	III	II
Degree of protection	IP 54	
Running time - motor - spring return	140 sec ~ 16 sec	
Ambient Temperature - normal duty - safety duty - non-operating temperature	- 30 °C ... + 50 °C The safe position will be attained up to max. 75°C - 40 °C ... + 50 °C	
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm <sup>2</sup> cable 1 m, 6 x 0,75 mm <sup>2</sup> (BF 24-T(-ST)) with plug-in connectors	
Thermal trips	Tf1: duct outside temperature Duct 72 °C Tf2/Tf3: duct inside temperature Duct 72 °C	

Fig. 38 Actuating mechanism BELIMO BF 24-T(-ST), BF 230-T

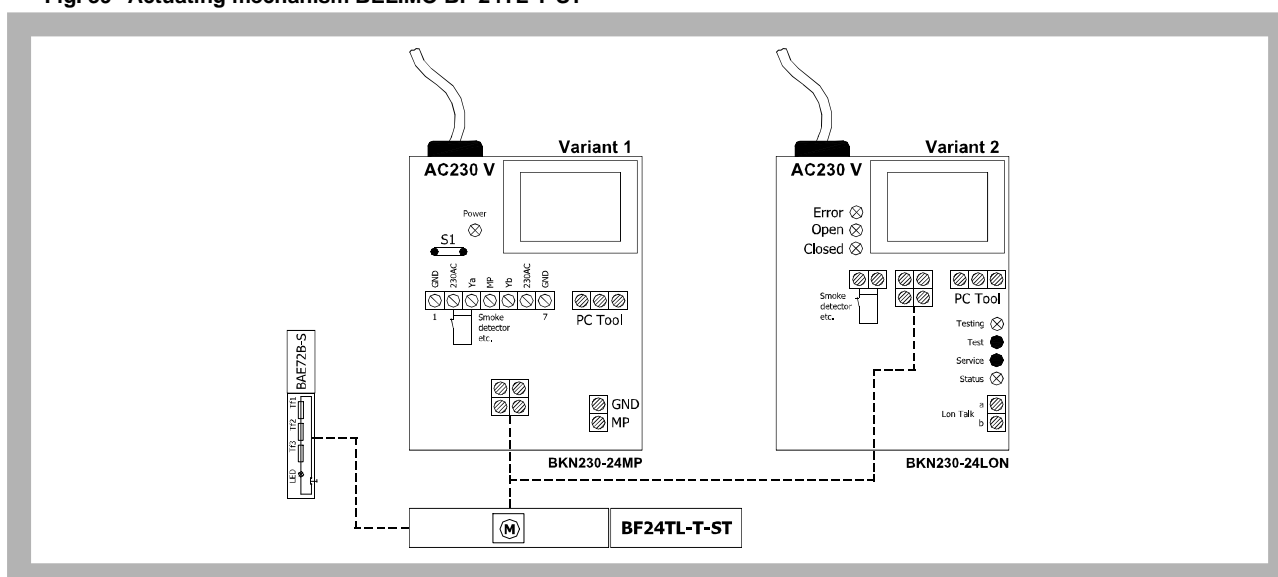




Tab. 9.3.3. Actuating mechanism BELIMO BF 24TL-T-ST

Actuating mechanism BELIMO	BF 24TL-T-ST
Nominal voltage	AC 24 V 50/60Hz DC 24 V
Power consumption - motoring - holding	7 W 2 W
Dimensioning	10 VA (I <sub>max</sub> 8,3 A @ 5 ms)
Protection class	III
Degree of protection	IP 54
Running time - motor - spring return	140 sec ~ 16 sec
Ambient temperature Non-operating temperature	- 20 °C ... + 50 °C - 40 °C ... + 50 °C
Connection	Connector for BKN 230-24LON and BKN 230-24MP cable 1 m, 4 x 0,75 mm <sup>2</sup> halogen-free

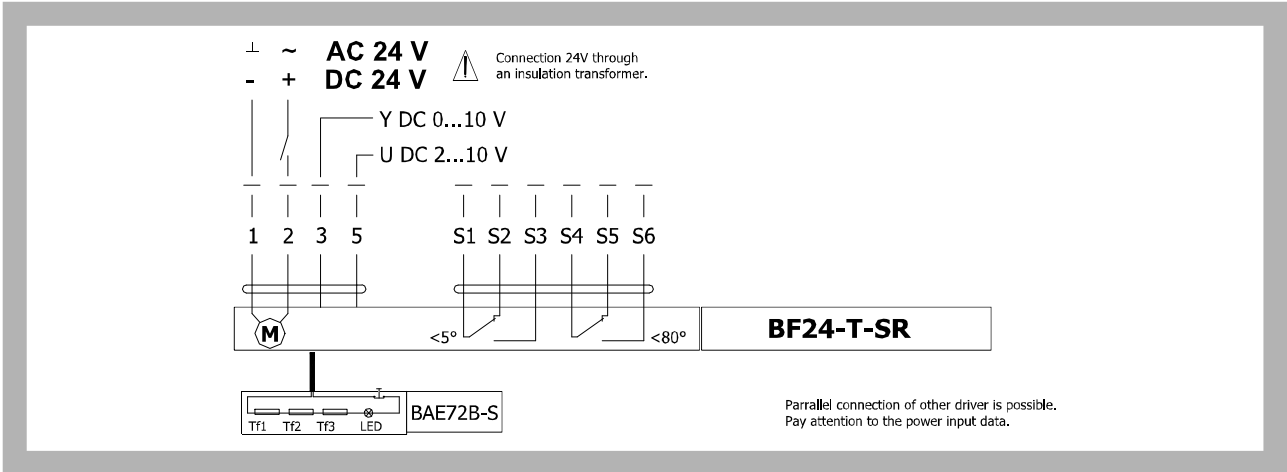
Fig. 39 Actuating mechanism BELIMO BF 24TL-T-ST



Tab. 9.3.4. Actuating mechanism with thermoelectrical starting mechanism and stepless regulation BF24-T-SR

Actuating mechanism BELIMO	BF24-T-SR
Nominal voltage	AC 24 V 50/60Hz DC 24 V
Power consumption - motoring - holding	7 W 2 W
Dimensioning	10 VA (I <sub>max</sub> 8,3 A @ 5 ms)
Protection class	III
Degree of protection	IP 54
Running time - motor - spring return	150 sec ~ 16 sec
Ambient temperature - normal duty - safety duty - non-operating temperature	- 30 °C ... + 50 °C -The safe position will be attained up to max. 75°C - 40 °C ... + 50 °C
Connection - motor - auxiliary switch	1 m, 2 x 0,75 mm <sup>2</sup> 1 m, 6 x 0,75 mm <sup>2</sup>

Fig. 40 Actuating mechanism BELIMO BF 24-T-SR

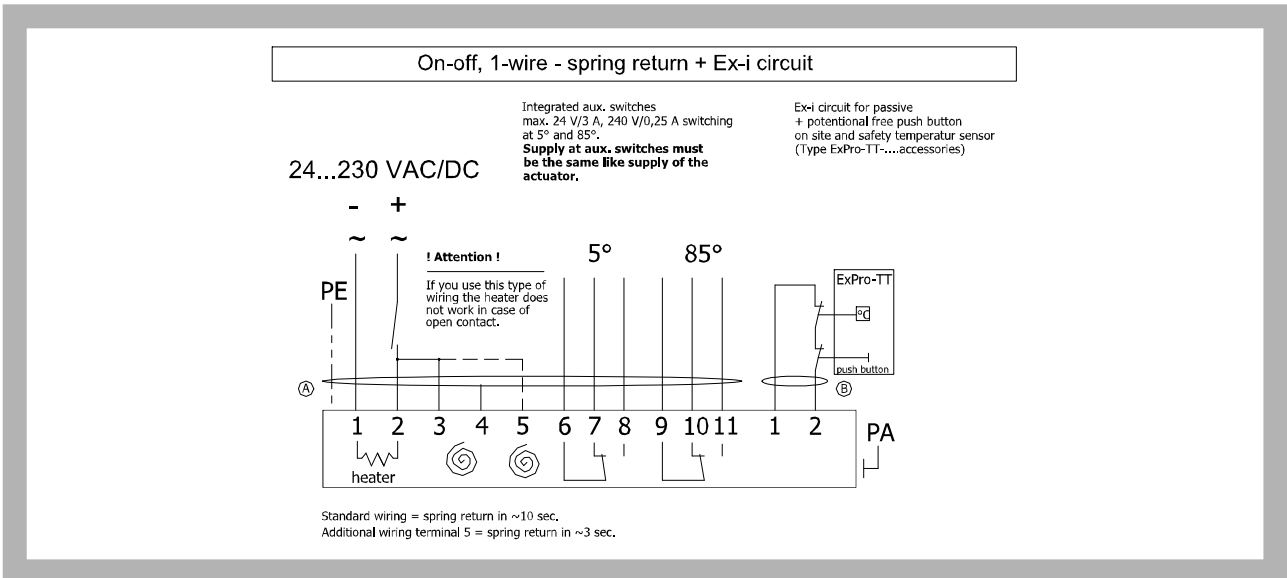


9.3.2. Actuating mechanism for inexplusive environment

Tab. 9.3.5. Actuating mechanism Schischek ExMax-15-BF

Actuating mechanism Schischek	ExMax-15-BF
Nominal voltage	AC 24/230 V 50/60Hz
Power consumption - motoring - holding	max. 20 W max. 12 W
Protection class	I
Degree of protection	IP 65
Inexplusive design	II2G EEx d ia IIC T6/T5 gases, fog, steam, ZONE 1, 2
Running time - motor - spring return	~ 30 sec. ~ 10 sec.
Ambient temperature Non-operating temperature	- 40°C ... + 40°C for T6, - 40°C ... + 50°C for T5 - 40°C ... +70°C Humidity according EN 60 335-1
Connection	Connection box ExBox-BF for power supply and auxiliary switches connection

Fig. 41 Actuating mechanism Schischek ExMax-15-BF

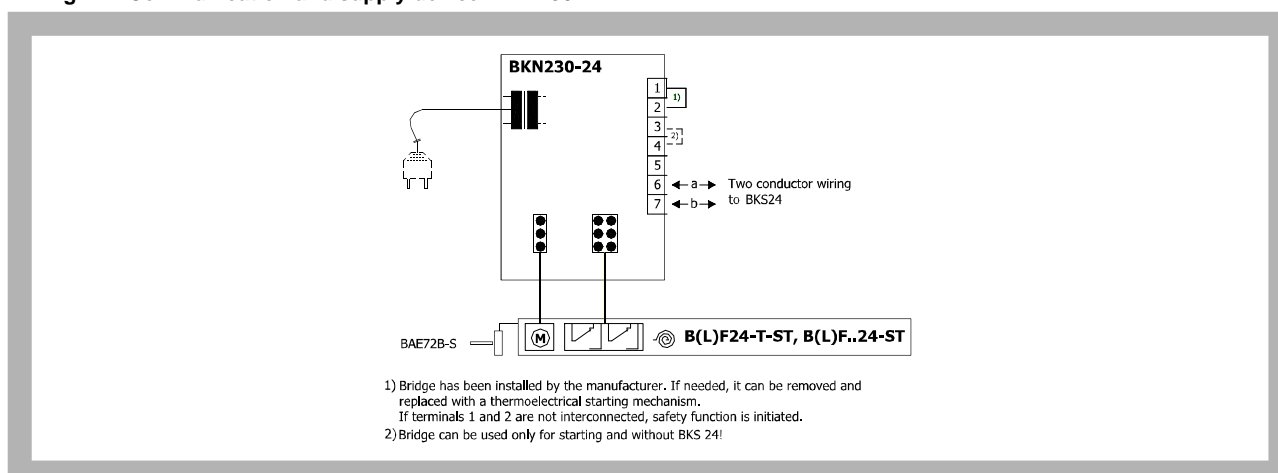


9.4. Communication and supply device

Tab. 9.4.1. Communication and supply device BKN 230-24

Communication and supply device	BKN 230-24
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	11 VA (including actuating mechanism with spring return)
Protection Class	II
Degree of protection	IP 42
Ambient temperature Non-operating temperature	- 20 °C ... + 50 °C - 40 °C ... + 80 °C
Connection - net - motor - terminal board	cable 0,9 m with EURO plug type 26 6-pole connector, 3-pole connector screw terminals for cable 2x1,5 mm <sup>2</sup>

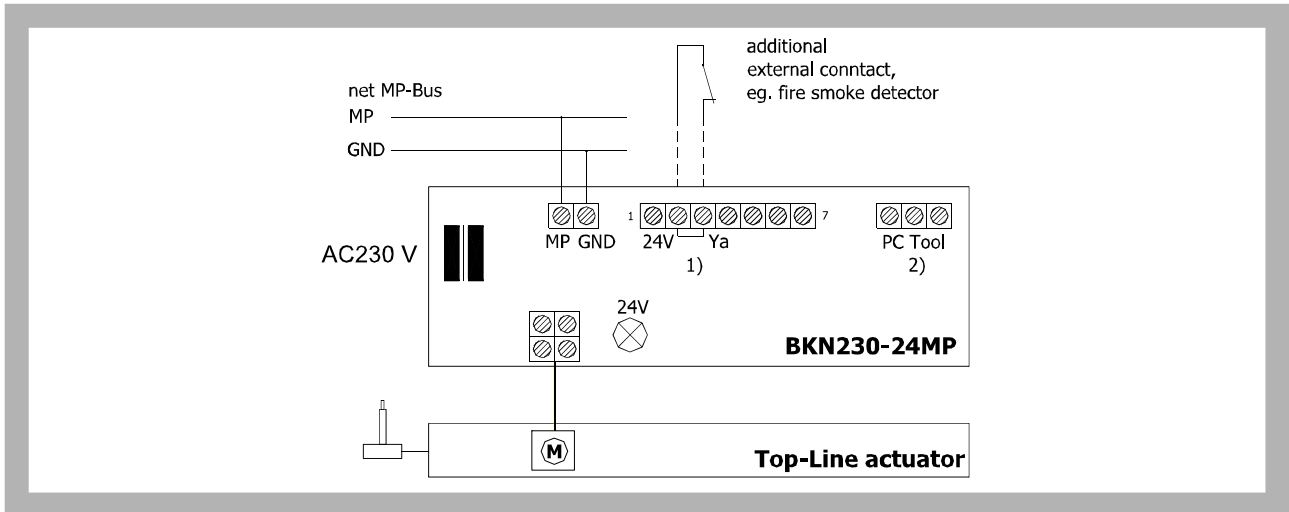
Fig. 42 Communication and supply device BKN 230-24



Tab. 9.4.2. Communication and supply device BKN 230-24MP

Communication and supply device	BKN 230-24MP
Nominal voltage	AC 230 V 50/60Hz
Power consumption	11 W (including actuator mechanism)
Dimensioning	13 VA (including actuator mechanism)
Protection Class	II
Degree of protection	IP 40
Ambient temperature Non-operating temperature	- 30 °C ... + 50 °C - 40 °C ... + 80 °C
Connection - net - motor (BF...-Top) - net MP - starting mechanism (variable) - Top-Line PC-Tool (via ZIP-RS232)	cable 1m, with EURO plug 4-pole connector screw terminal 2-pole screw terminal 2-pole 3-pole connector

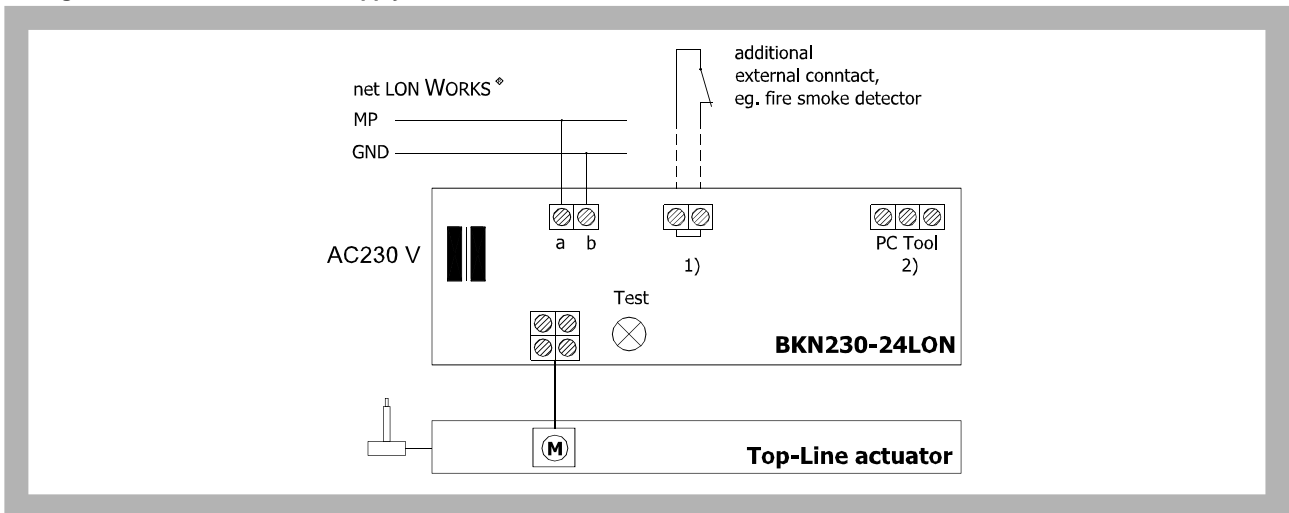
Fig. 43 Communication and supply device BKN 230-24MP



Tab. 9.4.3. Communication and supply device BKN 230-24LON

Communication and supply device	BKN 230-24LON
Nominal voltage	AC 230 V 50/60Hz
Power consumption	14 W (including actuating mechanism)
Dimensioning	16 VA (including actuating mechanism)
Protection Class	II
Degree of protection	IP 40
Ambient temperature Non-operating temperature	- 30 °C ... + 50 °C - 40 °C ... + 80 °C
Connection - net - actuator (BF...-Top) - net LonWorks® - starting mechanism (optional) - Top-Line PC-Tool (via ZIP-RS232)	cable 1m, with Euro plug 4-pole connector screw terminal 2-pole screw terminal 2-pole 3-pole connector

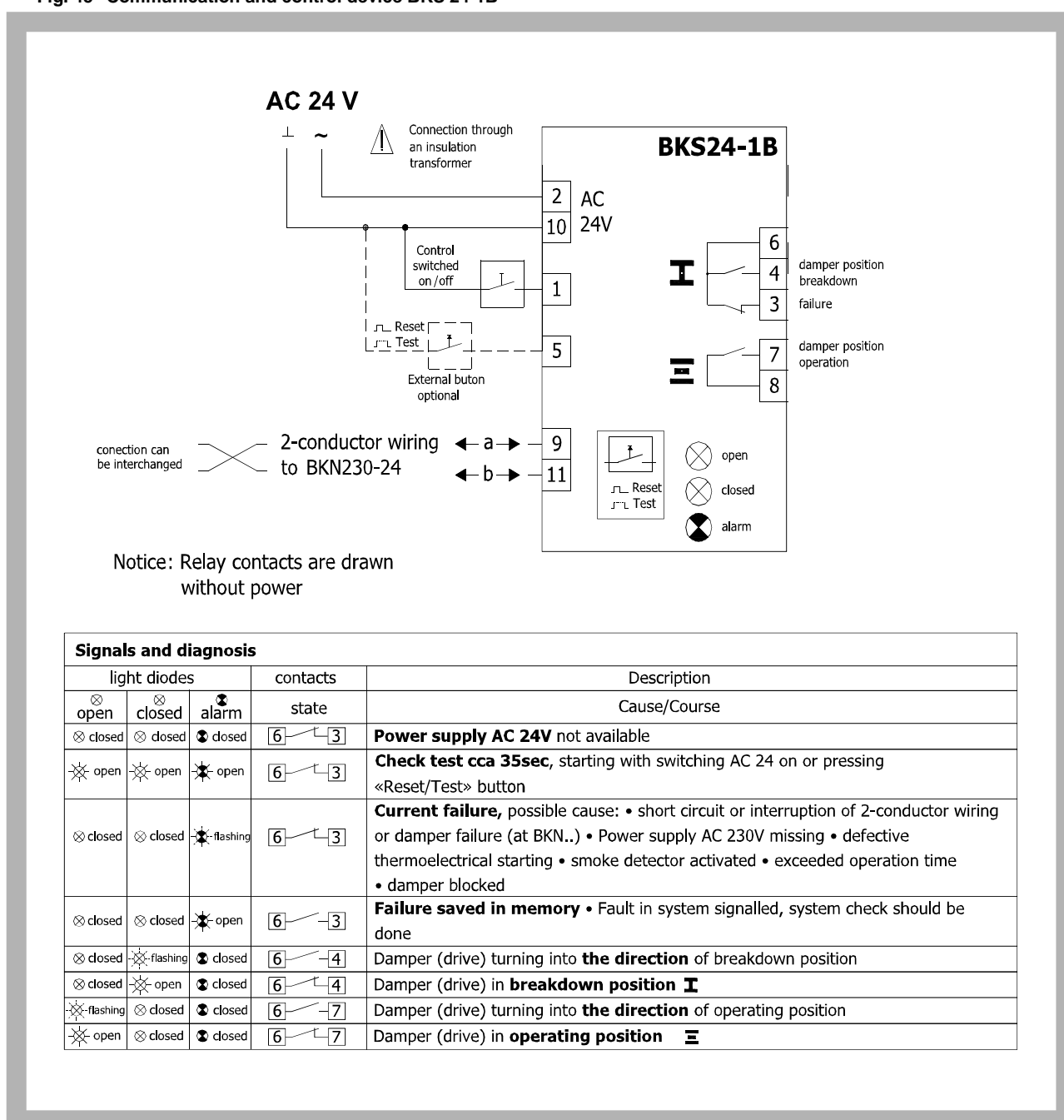
Fig. 44 Communication and supply device BKN 230-24LON



Tab. 9.4.4. Communication and control device BKS 24-1B

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

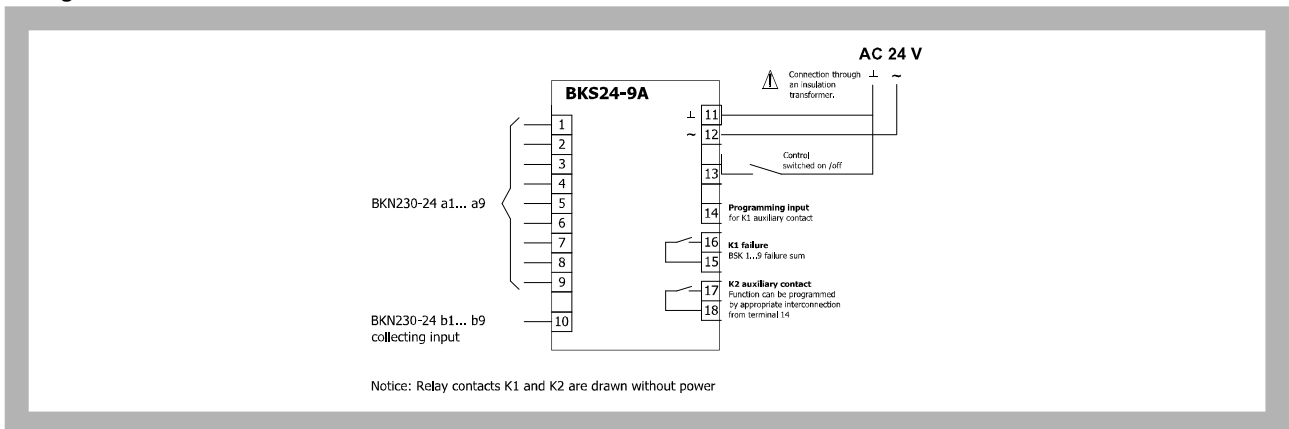
Fig. 45 Communication and control device BKS 24-1B



Tab. 9.4.5. Communication and control device BKS 24-9A

Communication and control device	BKS 24-9A
Nominal voltage	AC 24 V 50/60Hz
Power consumption	3,5 W
Dimensioning	5,5 VA
Protection Class	III
Degree of protection	IP 30
Ambient temperature	0 ... + 50 °C
Connection	terminal 2 x 1,5 mm <sup>2</sup>

Fig. 46 Communication and control device BKS 24-9A

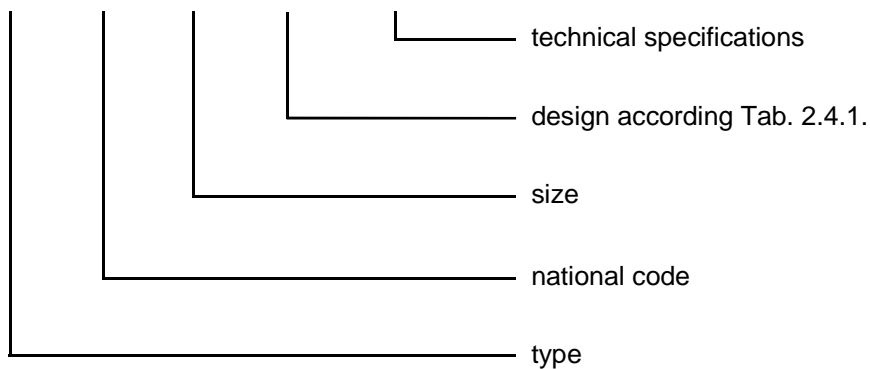


#### IV. ORDERING INFORMATION

##### 10. Ordering key

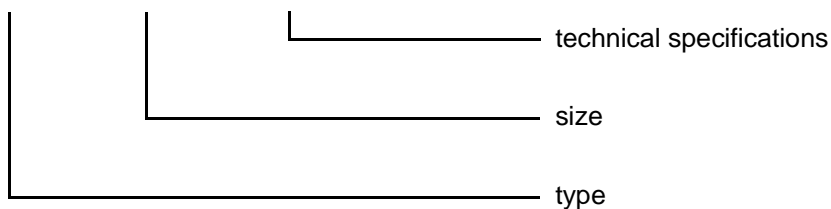
###### 10.1. Fire damper

**FDMA / XX 800x400 - .40 TPM 018/01**



###### 10.2. Reinforcement - damper placement outside wall or ceiling construction and dimension A ≥ 800

**VRM-90 800x400 TPM 018/01**




## V. PRODUCT DATA

### 11. DATA LABEL

- 11.1. Data label is placed on the damper body.

Fig. 47 Data label

<b>MANDÍK</b>		MANDÍK, a.s. 267 24 Hostomice	Dobříšská 550 Czech Republic
FIRE DAMPER: FDMA-S			
CLASSIFICATION: EI 90 (ve ho i ↔ o) S			
DIMENSION:		DESIGN:	
SERIAL NUMBER:		WEIGHT (kg):	
TPM018/01	Certificate: 1391-CPD-0114/2012	12	EN 15650:2010  1391

## VI. MATERIAL, FINISHING

### 12. Material

- 12.1. Damper bodies are supplied in the standard design made of galvanized plate without any other surface finish.
- 12.2. Damper blades are made of fire resistant asbestos free boards made of mineral fibres.
- 12.3. Damper controls are made of galvanized materials with no other surface finish.
- 12.4. Springs are galvanized.
- 12.5. Thermal protective fuses are made of sheet brass, thickness = 0.5 mm.
- 12.6. Fasteners is galvanized.
- 12.7. According to the customer's requirements, damper body, control, springs and jointing material can be made of stainless material.

## VII. INSPECTION, TESTING

### 13. Inspection, testing

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

## VIII. TRANSPORTATION AND STORAGE

### 14. Logistic terms

- 14.1. Dampers are transported by box freight vehicles without direct weather impact, there must not occur any sharp shocks and ambient temperature must not exceed + 40 °C. Dampers must be protected against mechanic damages when transported and manipulated. During transportation, the damper blade must be in the "CLOSED" position.

- 14.2.** Dampers are stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -5 °C to +40 °C and maximum relative humidity 80 %. Dampers must be protected against mechanic damages when transported and manipulated.

## VIII. ASSEMBLY, ATTENDANCE, MAINTENANCE AND REVISIONS

### 15. Assembly

- 15.1.** Assembly, maintenance and damper check can be done only by qualified persons, i.e. "AUTHORIZED PERSONS" that have been trained by the manufacturer.
- 15.1.1.** Trainings are done by the firm MANDÍK that makes out a proficiency "CERTIFICATE" which is valid for 5 years. It can be renewed by the "AUTHORIZED PERSONS" themselves, directly at the manufacturer.
- 15.1.2.** When the "CERTIFICATE" expires, it becomes invalid and is eliminated from the trainer's registration.
- 15.1.3.** Only professional personnel that undertake guarantee for the completed work can be trained.
- 15.2.** All effective safety standards and directives must be observed during fire damper assembly.
- 15.3.** Flange and screw joints must be conductively connected to protect against dangerous contact. 2 galvanized fan shape pads that are placed under the head of one screw and a fastened nut are used for conductive connection.
- 15.4.** To ensure reliable fire damper function it is necessary to avoid blocking the closing mechanism and contact surfaces with collected dust, fibre and sticky materials and solvents.
- 15.5.** Manual operation

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

### 16. Entry into service and revisions

- 16.1.** Before entering the dampers into operation after assembly and after sequential revisions, checks and functionality tests of all designs including operation of the electrical components must be done. After entering into operation, these revisions must be done according to requirement set by national regulations.
- 16.1.1.** 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 so that the damper is put into condition in which it is able to function and meanwhile he is obliged to provide the fire protection another appropriate way.
- 16.1.2.** 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.
- 16.2.** Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out for all designs.
- 16.2.1.** Visual inspection of proper damper integration, inside damper area, damper blade, contact surfaces and silicon sealing.
- 16.2.2.** Inspection hole 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.
- 16.3.** Before entering the dampers with manual control into operation after their assembly and by sequential checks, checks according 16.2. and following checks must be carried out.



- 16.3.1. Check of thermal protective fuse and closing mechanism.
- 16.3.2. Exert pressure on double arm initiation lever with a spring to release the control lever and check its displacement into the "CLOSED" position. Closing must be smart and the control lever must be firmly locked with a pawl. In case that the closing is not smart enough and the control lever is not locked with the pawl in the "CLOSED" position, higher pre-stretch of the closing spring must be set using a ratchet wheel.
- 16.3.3. Proper function of the thermal fuse can be checked when the fuse is removed from the starting mechanism pin. The pin must be taken out and the initiation lever must be turned over. If this is not possible, then the pin and the starting mechanism spring must be checked or the base plate must be replaced. The base plate is attached to the damper body with three M5 screws and nuts.
- 16.3.4. Displacing the damper blade into "OPEN" position is done the following way:  
Release the pawl exerting pressure and return the control lever into the second outlying position where the lever is hold by the initiation lever.
- 16.3.5. In case of the flap valve with an electromagnet check the control lever displacement into the "CLOSED" position after connecting to power supply.
- 16.4. Before entering the dampers with actuating mechanism into operation after their assembly and by sequential checks, checks according 16.2. and following checks must be carried out.
- 16.4.3. Check of blade displacement into the breakdown position "CLOSED" can be done after cutting off the actuating mechanism supply (e.g. by pressing the RESET button at the thermoelectrical starting mechanism BAE 72B-S or cutting off the supply from ELECTRICAL FIRE SIGNALISATION). Check of blade displacement back into the "OPEN" position can be done after restoration of power supply (e.g. By releasing the RESET button or restoration of supply from ELECTRICAL FIRE SIGNALISATION).

## **17. Spare parts**

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

## **18. Restore function of actuating mechanism after fuses initiation**

- 18.1. If is fuse Tf1 initiated (duct outside temperature) than is necessary to change thermoelectrical starting mechanism BAE72B-S. Whereas is initiation temperature higher than actuator mechanism operating temperature +50°C, recommended actuating mechanism manufacturer make complete revision or change actuating mechanism and thermoelectrical starting mechanism.
- 18.2. If are fuses Tf2/Tf3 (duct inside temperature) than is possible change only part ZBAE72, or ZBAE95 (according initiating temperature).

Producent

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