MANDÍK®

SMOKE DAMPER

DM-S

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

I. CONTENT

II. GENERAL INFORMATION

1. Description

Fig. 1   DM-S

1.1.   Smoke dampers are installed in duct served for smoke outlet. Damper closes the smoke duct. Dampers are installed in the position "OPEN". Dampers blade automatically closes air duct using an actuating mechanism back spring. The back spring of the actuating mechanism is started when the thermoelectrical starting mechanism BAT is activated, when a reset button on BAT is pushed or when a power supply of the actuating mechanism is stopped.

1.2.   Damper characteristics

- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3+A1 as E 30 ve, ho (i↔o) S or E 90 (ho i→o) or E 60 (ho i→o) S or E 90 (ve i→o) S
- Fire resistance ES 30 (ES 60, E 90)
- ES Certificate of conformity No. 1391-CPR-2016/0083
- Declaration of Performance No. PM/DM-S/01/20/1
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

1.3.   Working conditions

Right damper function is secured under the following conditions:

    a) Maximum air circulation speed: 12 m/s
       Maximum pressure difference: 1200 Pa
    b) Dampers could be displaced into position "CLOSED" only in case that ventilator is switched off. The goal is the securing of proper closing and safe function of Smoke Damper in case of Fire.
    c) The air circulation in the whole damper section must be secured as steady on whole surface.

Operation of the dampers does not depend on the direction of air circulation. The dampers can be located in an arbitrary position.

Dampers are suitable for systems without abrasive, chemical and adhesive particles.

Dampers are designed for macroclimatic areas with mild climate according to EN 60 721-3-3.

Temperature in the place of installation is permitted to range from - 30°C to + 50°C.

3

2. Design

2.1. DM-S

DM-S is always equipped by actuating mechanism BFL (BFN, BF) 24-T (further only "actuating mechanism"). After being connected to power supply AC/DC 24V, 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 140s. 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 BAT), 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 s. 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 BAT, which contains two thermal fuses Tf1 and Tf2, 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 when the temperature inside the air-conditioning piping has been exceeded). After the thermal fuse Tf1 or Tf2 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".

3. Dimestions, weights

3.1. Dimensions

Fig. 2   Smoke damper DM-S
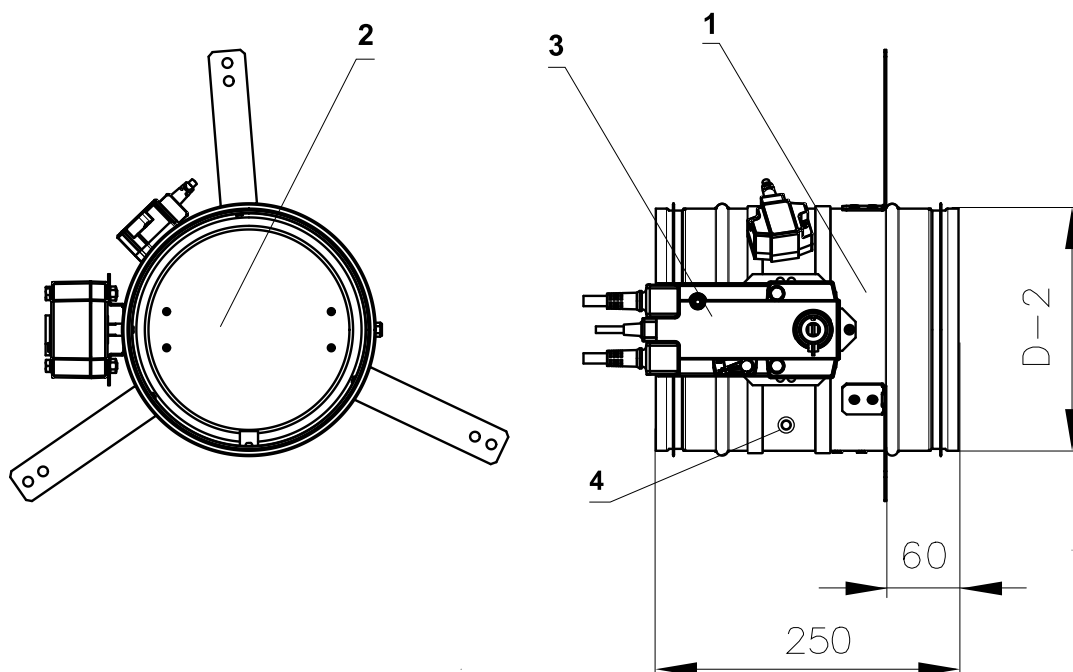
Position:

|			
1	Damper body	3	Actuating mechanism
2	Damper blade	4	Inspection hole for camera

3.2. Weight and effective area

Tab. 3.2.1. Weight and effective area - DM-S

Size ⌀D	a	c	Weight [kg]	Effective area S_{ef} [m²]	Actuating mechanism
100	-	-	2,6	0,0057	BFL
125	-	-	2,8	0,0097	BFL
140	-	-	2,9	0,0125	BFL
160	-	-	3,2	0,0168	BFL
180	-	-	3,3	0,0217	BFL
200	-	-	3,5	0,0273	BFL
250	-	5	4,0	0,0440	BFL
315	28	38	4,6	0,0715	BFN
350	45,5	55,5	4,9	0,0886	BFN
355	48	58	5,0	0,0918	BFN
400	70	80	5,5	0,1176	BFN
500	120	130	6,6	0,1863	BFN
630	185	195	14,0	0,2138	BF

3.3. For round smoke damper the open damper blade overlaps the damper body from dimension ⌀ 250 by the "c" or "a" and "c" values. These values are specified in the Tab. 3.2.1.

Value has to be respected when projecting related air-conditioning piping.

**Fig. 3   Values "a" and "c" DM-S**
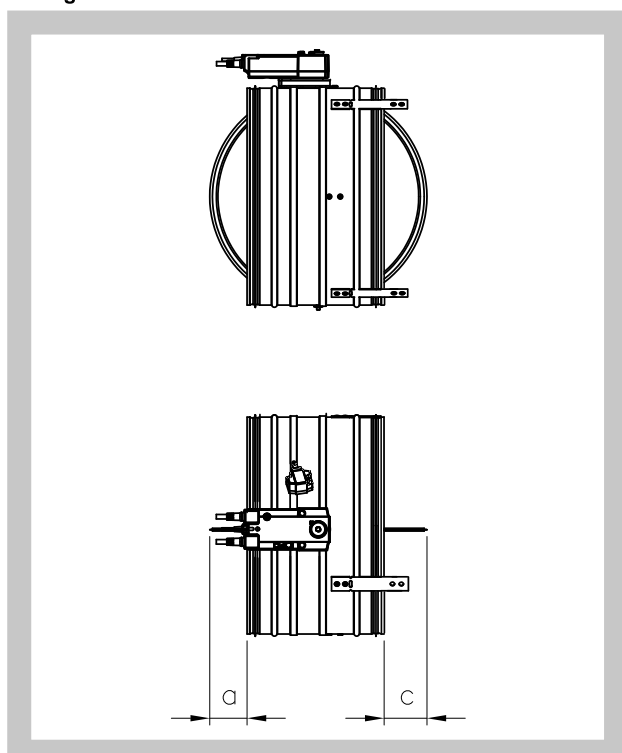
4. Placement and Assembly

4.1.   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.   The distance between the smoke damper and the construction (wall, ceiling) must be min. 75mm. 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 min. 200 mm according to EN 1366-2 paragraph 13.5.

Fig. 4   Placement of the openings in the wall
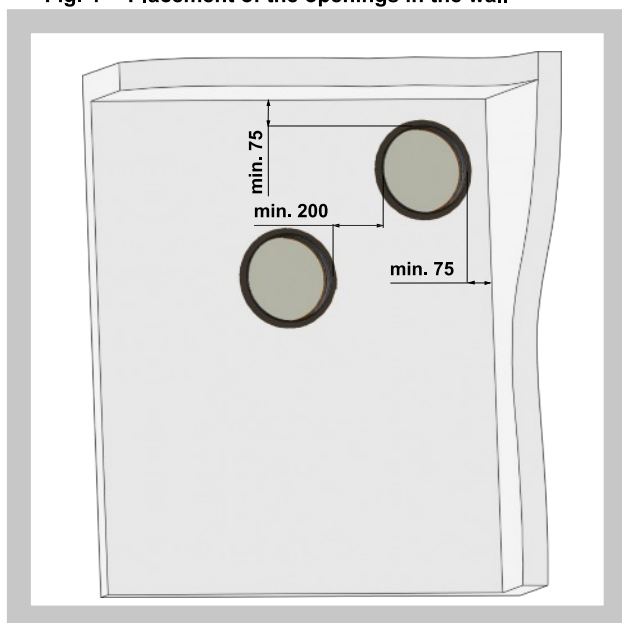
4.3.   The control mechanism has to be protected (covered) against damage and pollution during installation process.

4.4.   All smoke dampers have 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.

4.5.   Dampers are with rubber tightness and glued all the way around.

4.6.   Installation opening dimensions

Fig. 5   Installation opening dimensions DM-S
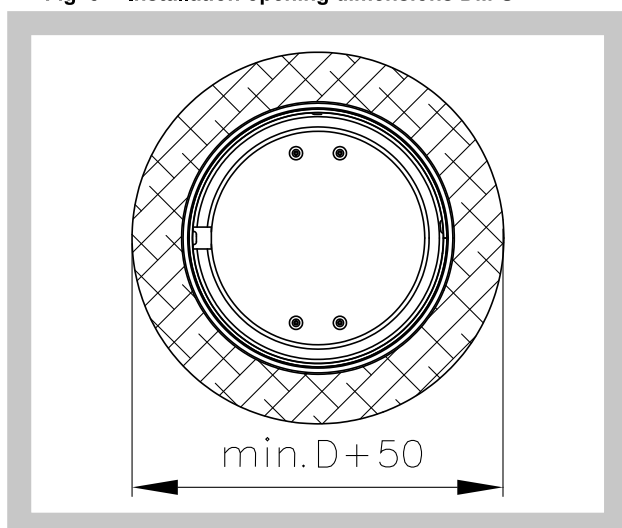
5. Statement of installations

5.1. Statement of installations

5.2. Examples of smoke damper installing

The smoke damper can be installed 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 installation openings are specified in Fig. 5.

The smoke damper can be installed into a gypsum wall construction with minimum thickness 100 mm

The smoke damper can also be installed outside of wall (ceiling) construction.

Tab. 5.2.1. Statement of installations

Damper type	DM-S installation	Classification	Figure
DM-S	Damper installed in a solid wall construction. Space between damper and wall is filled by mortar, gypsum or another approved fire sealing system for damper installation.	ES 30	6
	Damper installed in a solid wall construction. Space between damper and wall is filled by mineral stone wool (min. density 140 kg/m³) or another approved fire insulation system. Surface is covered by fire protection mastic (Promastop P,K) or equal min. thickness 1 mm.	ES 30	7
	Damper installed in a gypsum wall construction. Space between damper and wall is filled by mortar, gypsum or another approved fire sealing system for damper installation.	ES 30	8
	Damper installed in a gypsum wall construction. Space between damper and wall is filled by mineral stone wool (min. density 140 kg/m³) or another approved fire insulation system. Surface is covered by fire protection mastic (Promastop P,K) or equal min. thickness 1 mm.	ES 30	9
	Damper installed in a solid ceiling construction. Space between damper and ceiling is filled by mortar, gypsum or another approved fire sealing system for damper installation.	ES 30	10
	Damper installed in a solid ceiling construction. Space between damper and wall is filled by mortar, gypsum or another approved fire insulation system. Surface is covered by fire protection mastic (Promastop P,K) or equal min. thickness 1 mm.	ES 30	11
	Damper installed outside of a solid wall construction. Space between damper and wall is filled by mortar, gypsum or another approved fire sealing system for damper installation.	ES 30	12
	Damper installed outside of a solid wall construction. Space between damper and wall is filled by mineral stone wool (min. density 140 kg/m³) or another approved fire insulation system. Surface is covered by fire protection mastic (Promastop P,K) or equal min. thickness 1 mm.	ES 30	13
	Damper installed outside of a gypsum wall construction. Space between damper and wall is filled by mortar, gypsum or another approved fire sealing system for damper installation.	ES 30	14
	Damper installed outside of a gypsum wall construction. Space between damper and wall is filled by mineral stone wool (min. density 140 kg/m³) or another approved fire insulation system. Surface is covered by fire protection mastic (Promastop P,K) or equal min. thickness 1 mm.	ES 30	15
	Damper installed outside of a solid ceiling construction. Space between damper and wall is filled by mortar, gypsum or another approved fire sealing system for damper installation.	ES 30	16
	Damper installed outside of a solid ceiling construction. Space between damper and wall is filled by mortar, gypsum or another approved fire sealing system for damper installation.	ES 30	17
	Damper installed outside of a solid ceiling construction. Space between damper and wall is filled by mortar, gypsum or another approved fire sealing system for damper installation. BEWARE OF FIRE SIDE!	E 90, ES 60	18
	Damper installed outside of a gypsum wall construction. Space between damper and wall is filled by mortar and gypsum or another approved fire sealing system for damper installation. BEWARE OF FIRE SIDE!	ES 90	19

Appropriate isolation and installation materials for fire resistance ES 30 should be used. Producer of these materials is random (Isover, Protecta, Rockwool etc.). Used materials must be approved and have min. the same fire resistance as required for the damper - E 30 S, or higher.

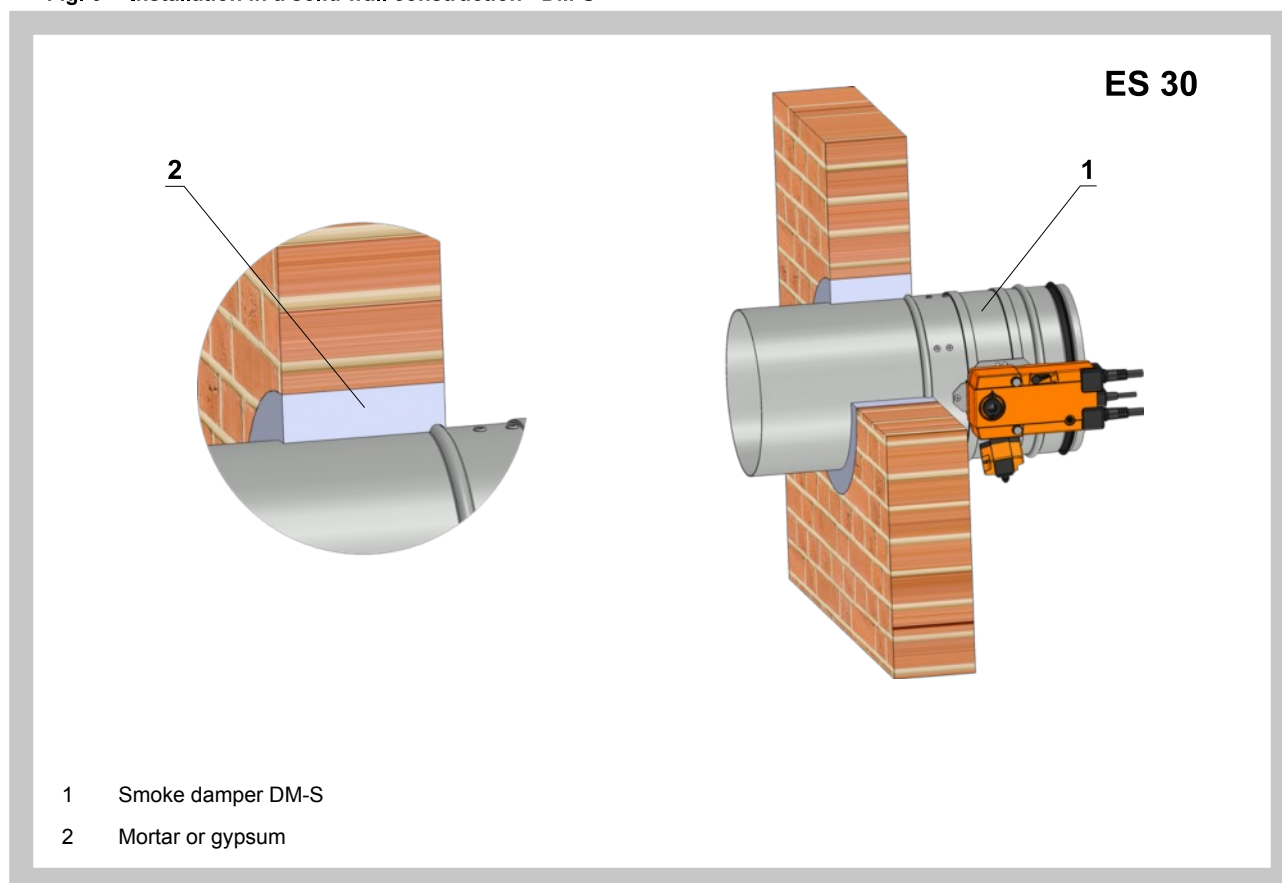**Fig. 6   Installation in a solid wall construction - DM-S**

ES 30

1   Smoke damper DM-S

2   Mortar or gypsum

Fig. 7   Installation in a solid wall construction - DM-S

ES 30

1   Smoke damper DM-S

2   Stuffing box (mineral stone wool min. density 140 kg/m³) or another approved fire sealing system for damper installation

3   Fire protection mastic Promastop P,K or equal min. thickness 1 mm
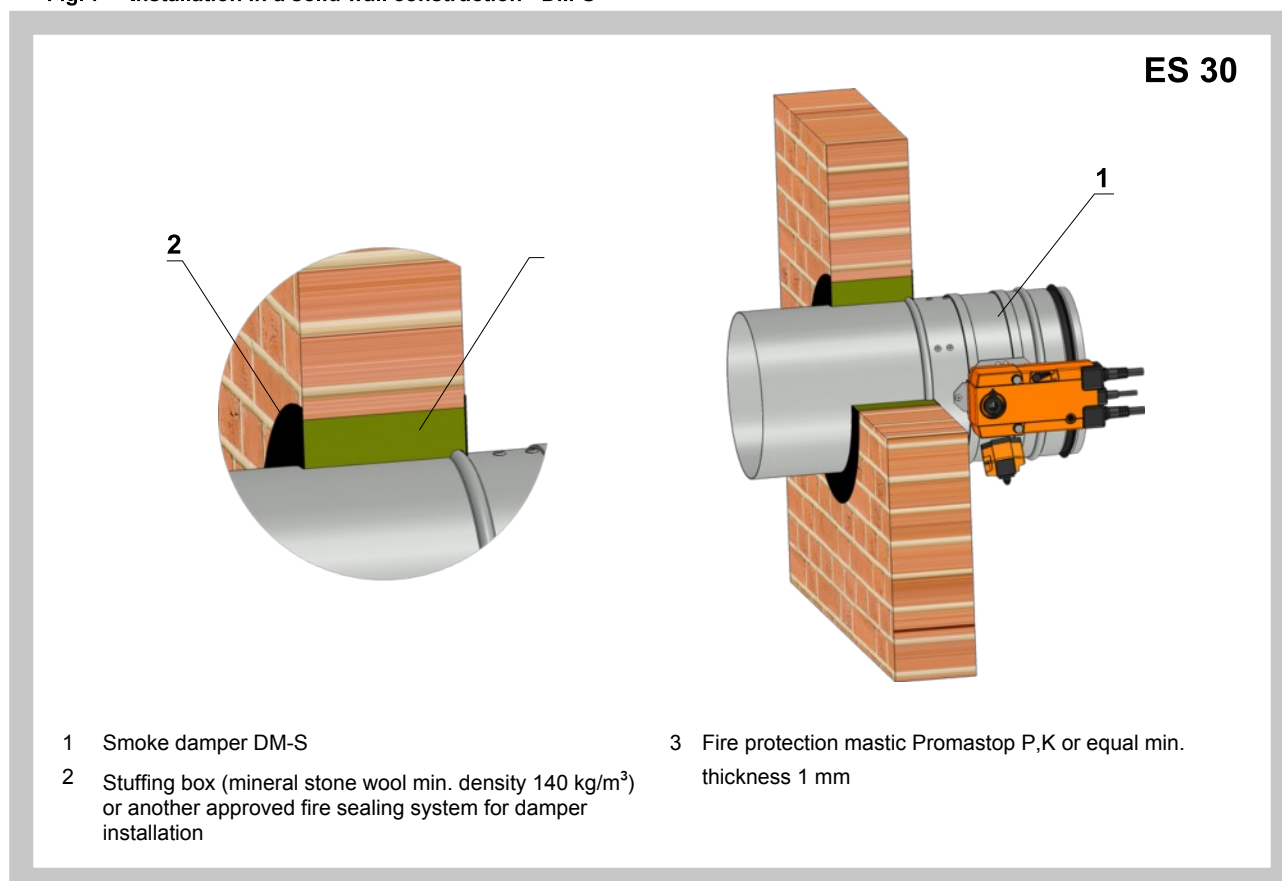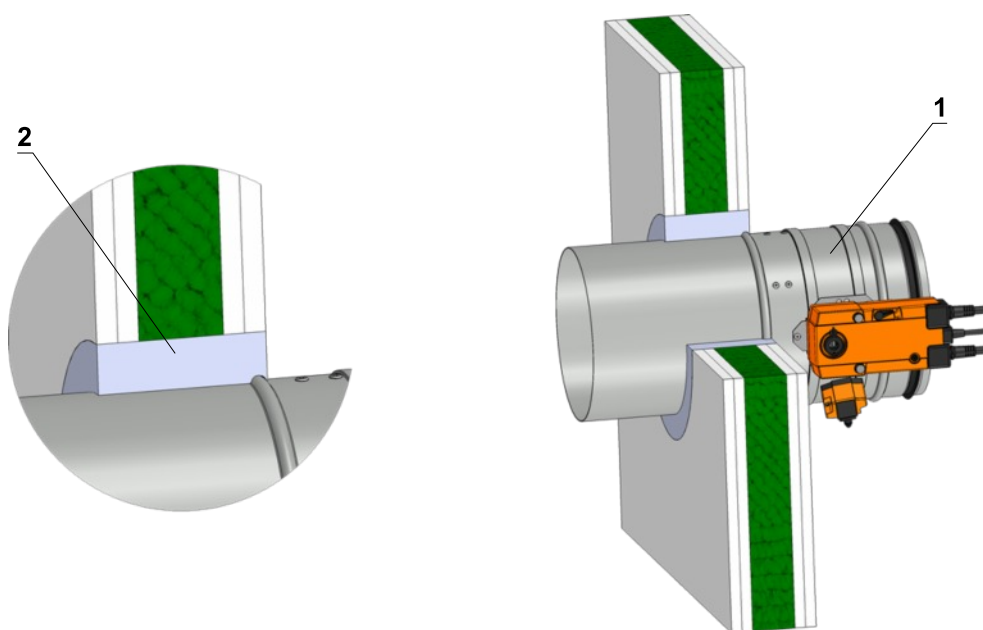
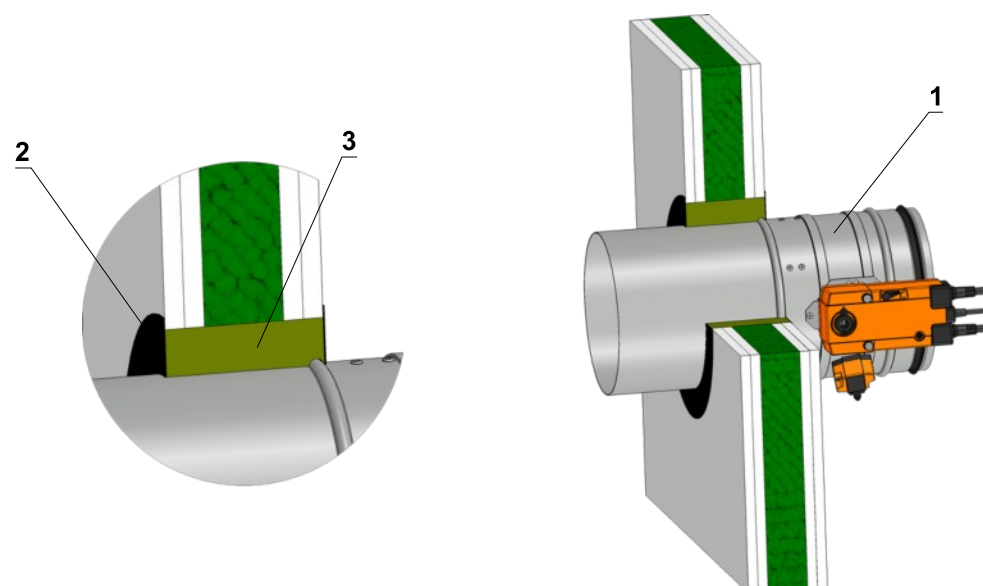**Fig. 8   Installation in a gypsum wall construction - DM-S**

ES 30

1   Smoke damper DM-S

2   Mortar or gypsum

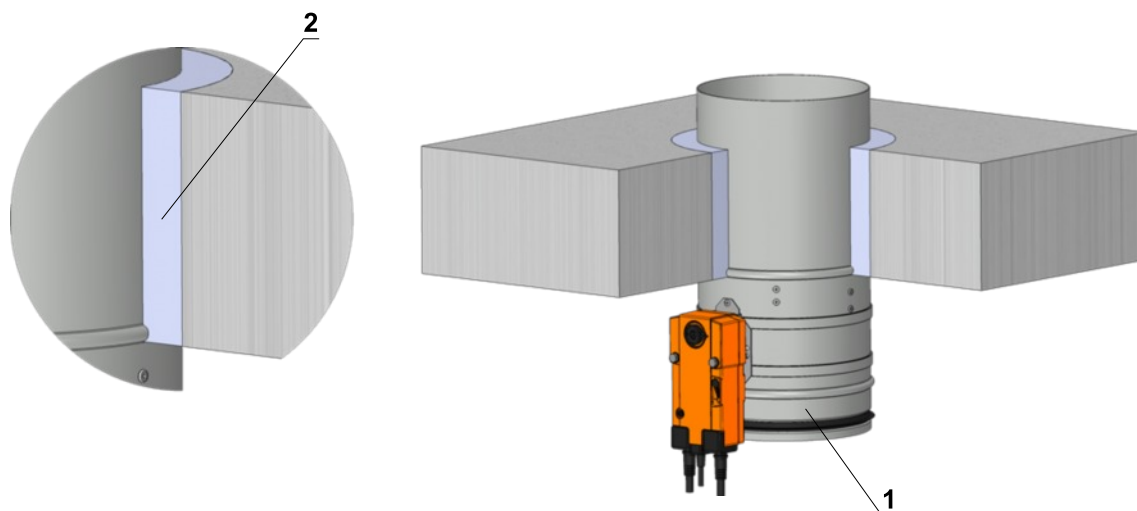**Fig. 9   Installation in a gypsum wall construction - DM-S**

ES 30

1   Smoke damper DM-S

2   Stuffing box (mineral stone wool min. density 140 kg/m³) or another approved fire sealing system for damper installation

3   Fire protection mastic Promastop P,K or equal min. thickness 1 mm

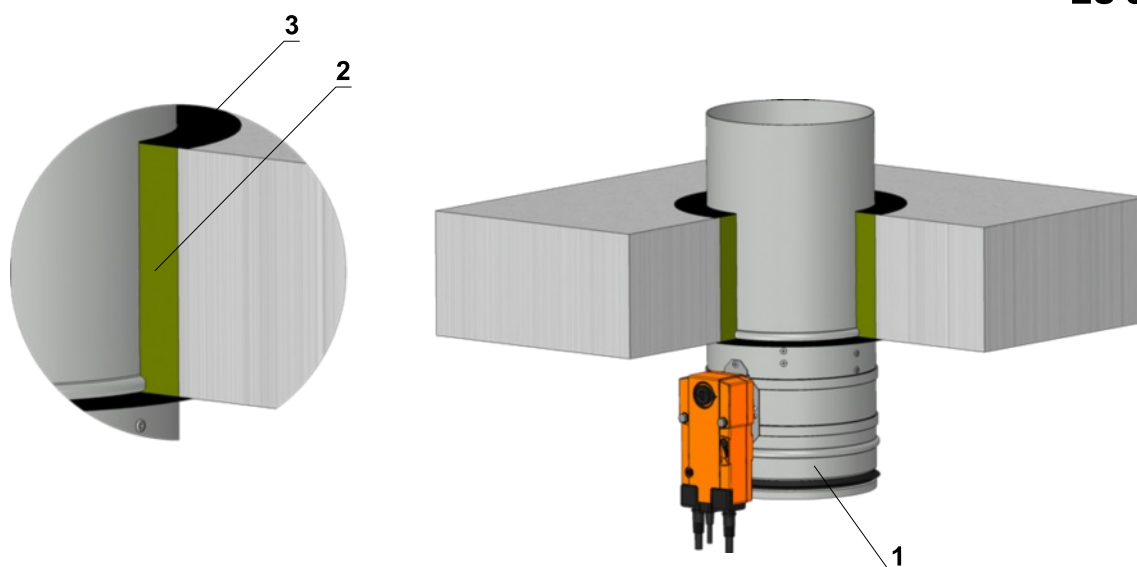**Fig. 10 Installation in a solid ceiling construction - DM-S**

ES 30

1   Smoke damper DM-S

2   Mortar or gypsum

Fig. 11 Installation in a solid ceiling construction - DM-S
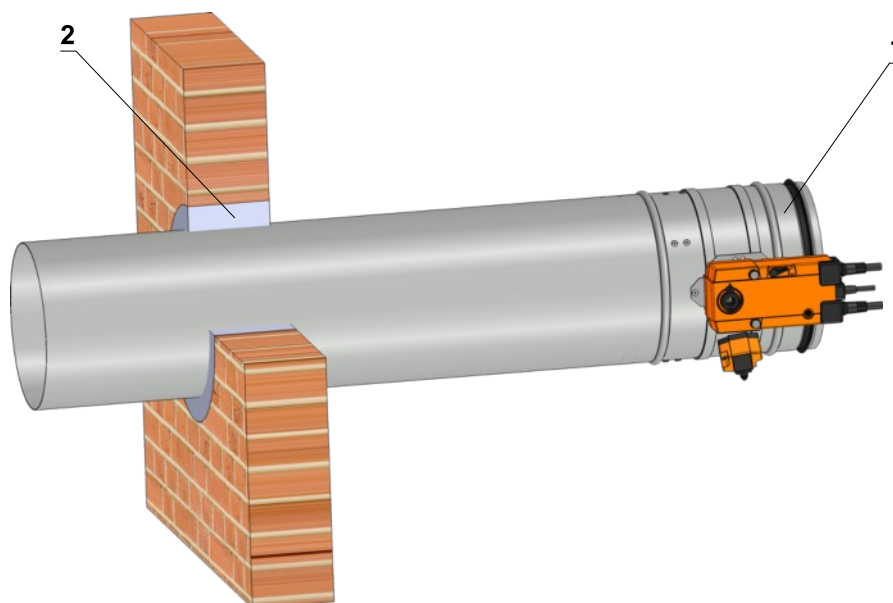

ES 30

1   Smoke damper DM-S

2   Stuffing box (mineral stone wool min. density 140 kg/m³) or another approved fire sealing system for damper installation

3   Fire protection mastic Promastop P,K or equal min. thickness 1 mm

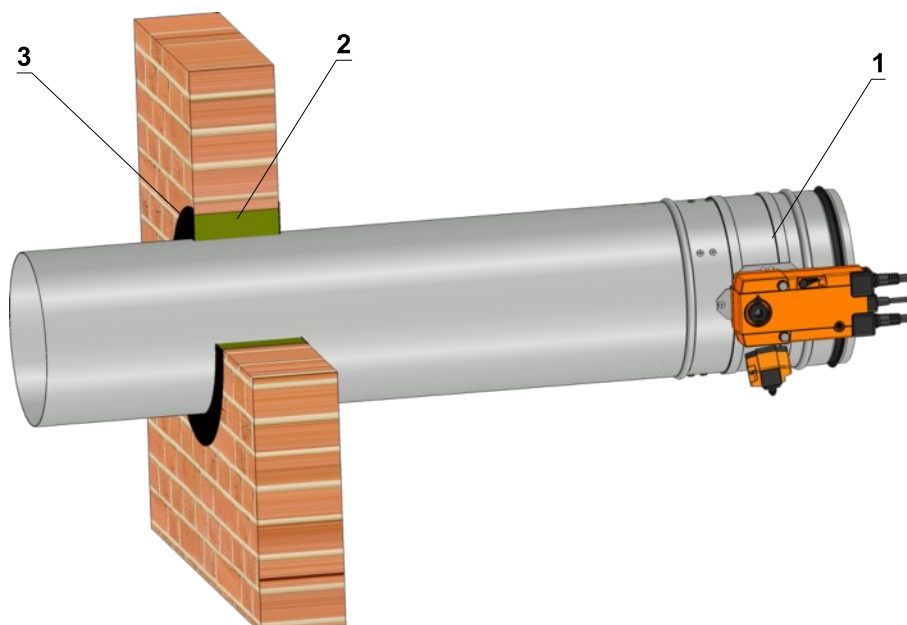**Fig. 12   Damper installed outside of a solid wall construction - DM-S**

ES 30

1   Smoke damper DM-S

2   Mortar or gypsum

Fig. 13   Damper installed of a solid wall construction - DM-S
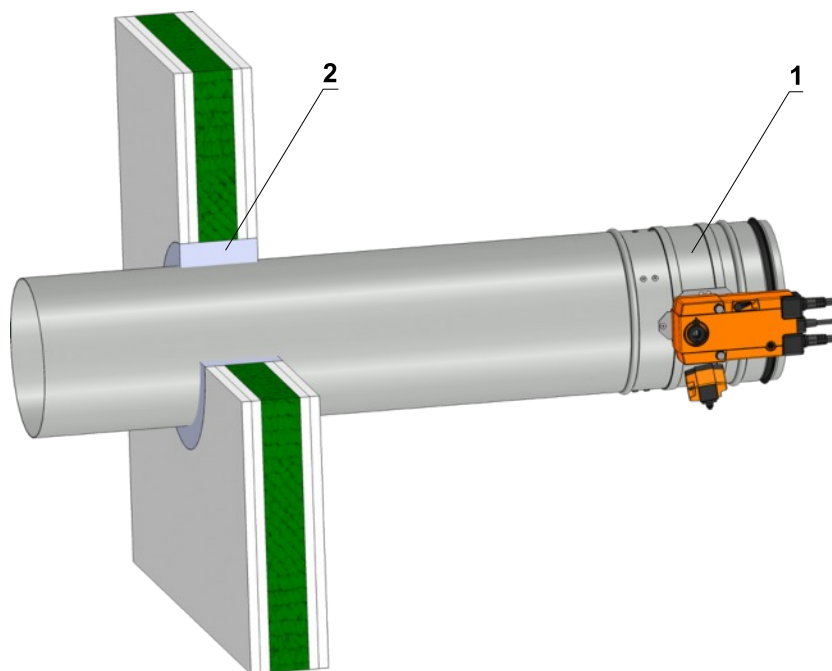

ES 30

1   Smoke damper DM-S

2   Stuffing box (mineral stone wool min. density 140 kg/m³) or another approved fire sealing system for damper installation

3   Fire protection mastic Promastop P,K or equal min. thickness 1 mm

Fig. 14   Damper installed of a gypsum wall construction DM-S

ES 30

1   Smoke damper DM-S

2   Mortar or gypsum

Fig.15   Damper installed outside of a gypsum wall construction - DM-S

ES 30

1 Smoke damper DM-S	3 Fire protection mastic Promastop P,K or equal min. thickness 1 mm
2 Stuffing box (mineral stone wool min. density 140 kg/m^3) or another approved fire sealing system for damper installation	

Fig. 16 Damper installed outside of a solid ceiling construction - DM-S
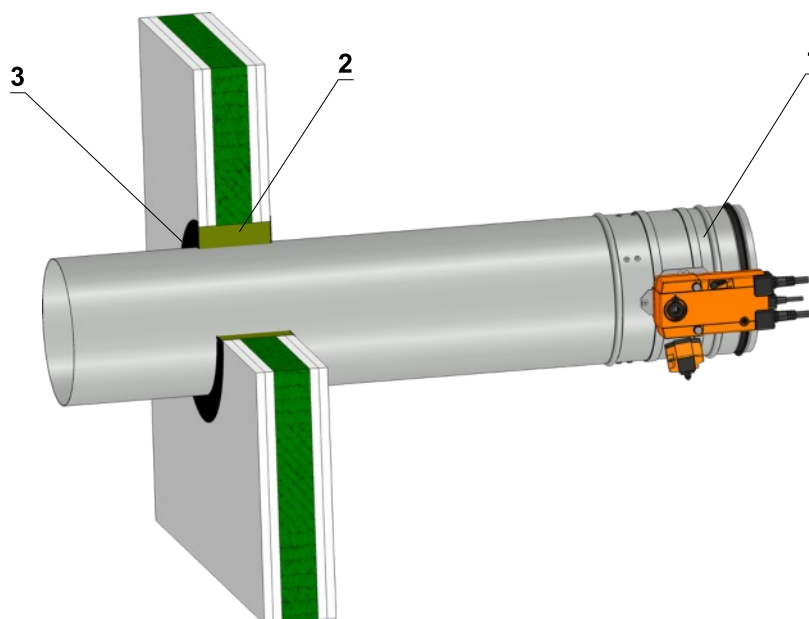
ES 30

1   Smoke damper DM-S

2   Mortar or gypsum

Fig. 17 Damper installed outside of a solid ceiling construction - DM-S

ES 30

1   Smoke damper DM-S

2   Stuffing box (mineral stone wool min. density 140 kg/m³) or another approved fire sealing system for damper installation

3   Fire protection mastic Promastop P,K or equal min. thickness 1 mm

Fig. 18 Damper installed outside of a solid ceiling construction - on the other side from the fire

E 90 (ho i -›o)
E 60 (ho i -›o) S

1

2

150

FIRE SIDE

1   Smoke damper DM-S

2   Mortar or gypsum
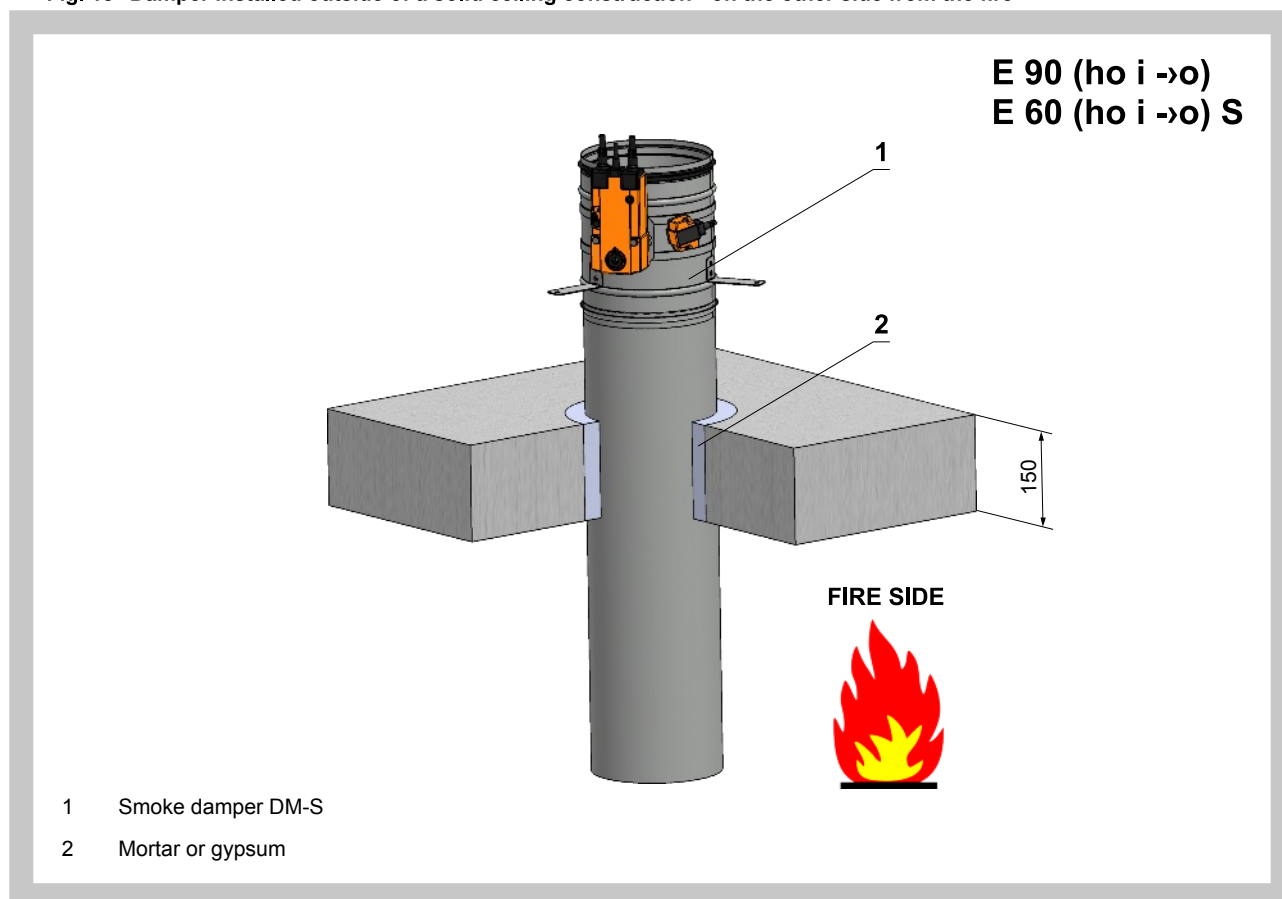
Fig. 19 Damper installed outside of a gypsum wall construction – on the other side from the fire

E 90 (ve i -›o) S

3

2

1

FIRE SIDE
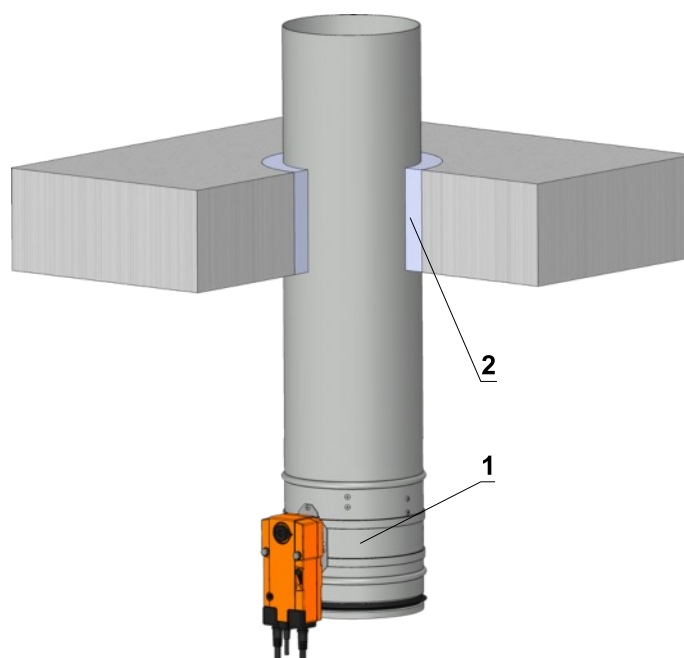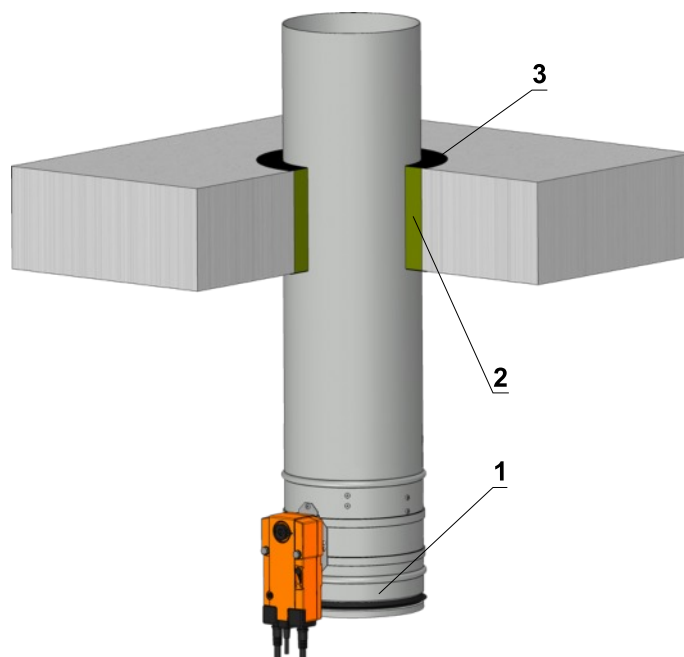
1   Smoke damper DM-S

2   Stuffing box (mineral stone wool min. density 140 kg/m³) or another approved fire sealing system for damper installation

3   Fire protection mastic Promastop P,K or equal min. thickness 1 mm
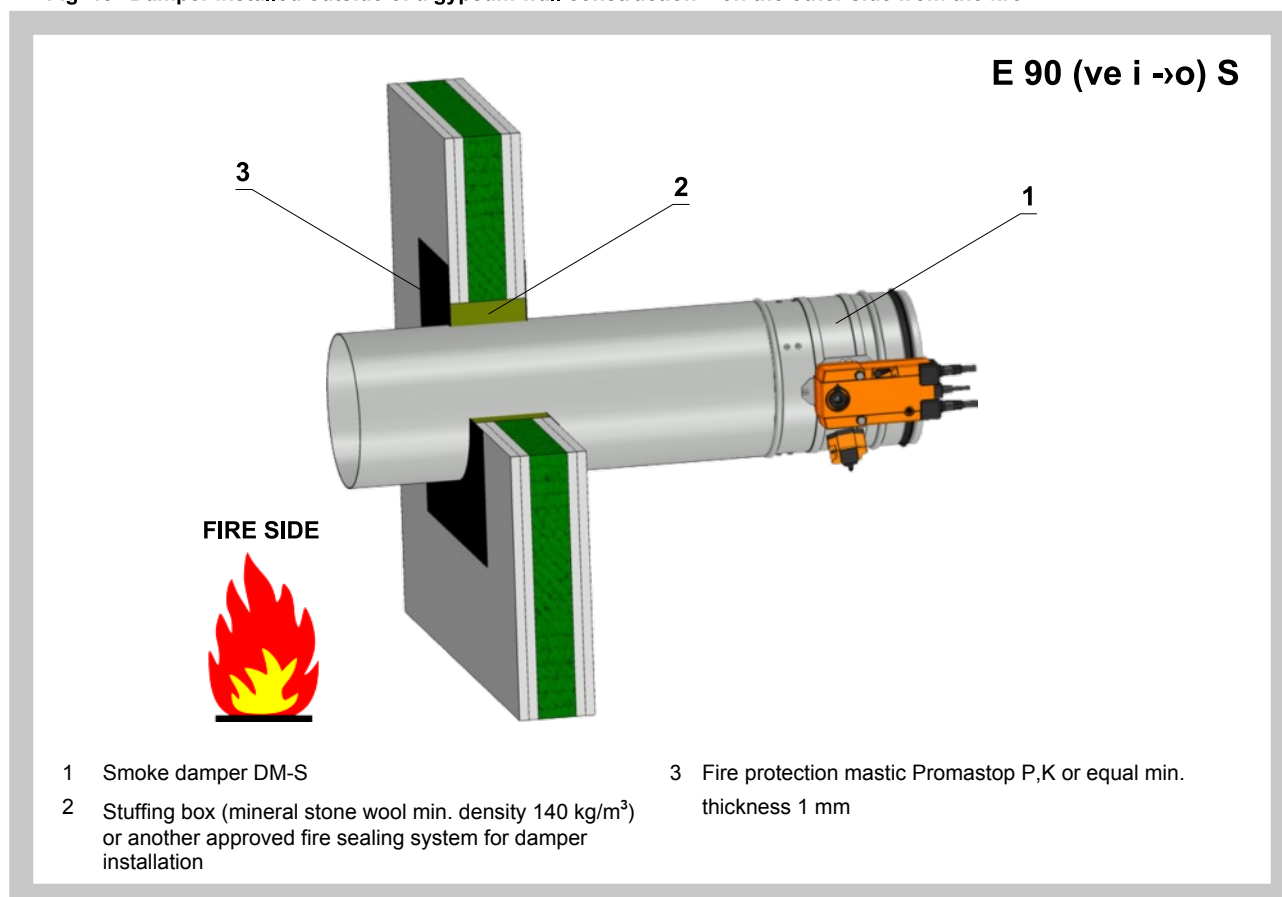
III. TECHNICAL DATA

6. Pressure loss, noise data

Tab. 6.1.1. DM-S - pressure losses, noise data

| Size		v [m.s⁻¹] 3	4	5	6	7	8	9	10	Size		v [m.s⁻¹] 3	4	5	6	7	8	9	10
100	$\dot{V}$ [m³.h⁻¹]	85	113	141	170	198	226	254	283	315	$\dot{V}$ [m³.h⁻¹]	842	1122	1403	1683	1964	2244	2525	2806
	v_{ef} [m.s⁻¹]	4	6	7	8	10	11	12	14		v_{ef} [m.s⁻¹]	3	4	5	7	8	9	10	11
	L_{WA} [dB]	19	26	32	37	41	45	48	50		L_{WA} [dB]	6	13	19	24	28	31	34	37
	$\triangle p$ [Pa]	12	21	33	47	64	84	106	131		$\triangle p$ [Pa]	1	1	2	3	4	5	6	8
125	$\dot{V}$ [m³.h⁻¹]	133	177	221	265	309	353	398	442	350	$\dot{V}$ [m³.h⁻¹]	1039	1385	1732	2078	2425	2771	3117	3464
	v_{ef} [m.s⁻¹]	4	5	6	8	9	10	11	13		v_{ef} [m.s⁻¹]	3	4	5	7	8	9	10	11
	L_{WA} [dB]	20	27	33	38	42	45	48	51		L_{WA} [dB]	7	14	20	25	29	32	35	38
	$\triangle p$ [Pa]	9	16	25	36	49	65	82	101		$\triangle p$ [Pa]	1	1	2	2	3	4	5	7
140	$\dot{V}$ [m³.h⁻¹]	166	222	277	333	388	443	499	554	355	$\dot{V}$ [m³.h⁻¹]	1069	1425	1782	2138	2494	2851	3207	3563
	v_{ef} [m.s⁻¹]	4	5	6	7	9	10	11	12		v_{ef} [m.s⁻¹]	3	4	5	6	8	9	10	11
	L_{WA} [dB]	20	27	33	38	42	45	48	51		L_{WA} [dB]	6	13	19	24	28	32	35	37
	$\triangle p$ [Pa]	8	14	21	31	42	55	69	86		$\triangle p$ [Pa]	1	1	1	2	3	4	5	6
160	$\dot{V}$ [m³.h⁻¹]	217	290	362	434	507	579	651	724	400	$\dot{V}$ [m³.h⁻¹]	1357	1810	2262	2714	3167	3619	4072	4524
	v_{ef} [m.s⁻¹]	4	5	6	7	8	10	11	12		v_{ef} [m.s⁻¹]	3	4	5	6	7	9	10	11
	L_{WA} [dB]	18	25	31	36	40	43	46	49		L_{WA} [dB]	6	14	20	24	28	32	35	38
	$\triangle p$ [Pa]	5	10	15	22	30	39	49	61		$\triangle p$ [Pa]	0	1	1	1	2	3	3	4
180	$\dot{V}$ [m³.h⁻¹]	275	366	458	550	641	733	824	916	500	$\dot{V}$ [m³.h⁻¹]	2121	2827	3534	4241	4948	5655	6362	7069
	v_{ef} [m.s⁻¹]	4	5	6	7	8	9	11	12		v_{ef} [m.s⁻¹]	3	4	5	6	7	8	9	11
	L_{WA} [dB]	17	24	30	35	39	42	46	48		L_{WA} [dB]	4	12	18	22	26	30	33	36
	$\triangle p$ [Pa]	4	7	11	16	22	29	36	45		$\triangle p$ [Pa]	0	0	1	1	1	1	2	2
200	$\dot{V}$ [m³.h⁻¹]	339	452	565	679	792	905	1018	1131	630	$\dot{V}$ [m³.h⁻¹]	3367	4489	5611	6733	7855	8978	10100	11222
	v_{ef} [m.s⁻¹]	3	5	6	7	8	9	10	12		v_{ef} [m.s⁻¹]	4	6	7	9	10	12	13	15
	L_{WA} [dB]	16	23	29	34	38	41	44	47		L_{WA} [dB]	4	12	18	22	26	30	33	36
	$\triangle p$ [Pa]	3	5	8	11	15	20	25	31		$\triangle p$ [Pa]	0	0	0	1	1	1	2	2
250	$\dot{V}$ [m³.h⁻¹]	530	707	884	1060	1237	1414	1590	1767										
	v_{ef} [m.s⁻¹]	3	4	6	7	8	9	10	11										
	L_{WA} [dB]	12	20	26	30	34	38	41	44										
	p [Pa]	1	3	4	6	8	11	13	17										

7. Electrical Components, Connection Diagrams

7.1. Actuating mechanism

Tab. 7.1.1. Actuating mechanism BELIMO BFL 24-T, BFN 24-T

| Actuating mechanism BELIMO	BFL, BFN 24-T(-ST)
Nominal voltage	AC 24 V 50/60 Hz DC 24 V
Power consumption - motoring - holding	2,5/4 W 0,8/1,4 W
Dimensioning	4/6 VA (Imax 8,3 A @ 5 ms)
Protection class	III
Degree of protection	IP 54
Running time - motor - spring return	<60 s ~ 20 s
Ambient temperature - normal duty - safety duty - non-operating temperature	- 30 °C … 55 °C The safe position will be attained up to max. 75°C - 40 °C … 55 °C
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm² (BFL/BFN 24-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm² (BFL/BFN 24-T-ST) with 6-pin plug-in connectors
Thermal trips	duct outside temperature 72 °C duct inside temperature 72 °C

Fig. 20 Actuating mechanism BELIMO BFL 24-T, BFN 24-T
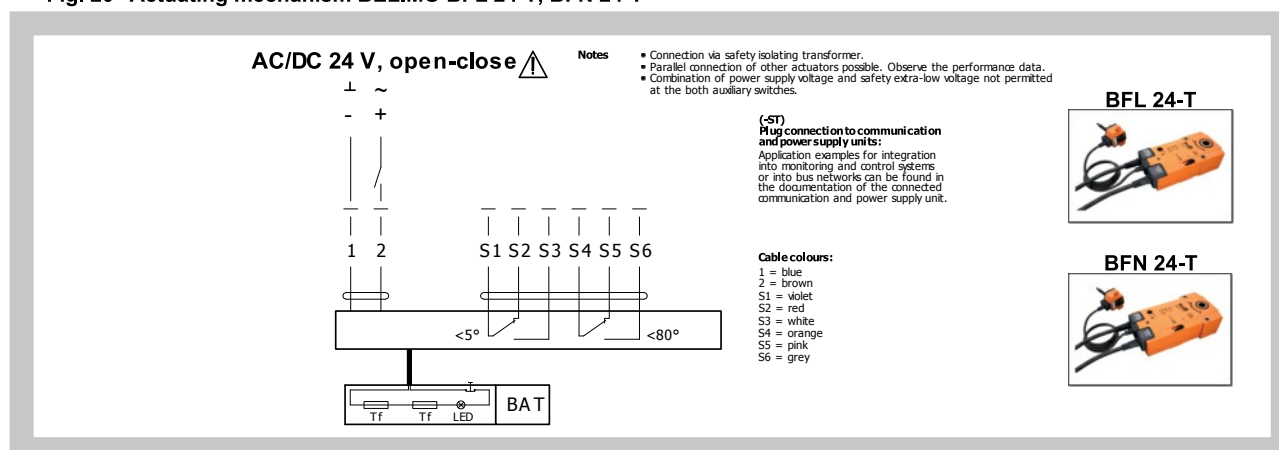
Tab. 7.1.2. Actuating mechanism BELIMO BF 24-T

Actuating mechanism BELIMO	BF 24-T
Nominal voltage	AC 24 V 50/60 Hz DC 24 V
Power consumption - motoring - holding	7 W 2 W
Dimensioning	10 VA (Imax 8,3 A @ 5 ms)
Protection Class	III
Degree of protection	IP 54
Running time - motor - spring return	140 s ~ 16 s
Ambient Temperature - normal duty - safety duty - non-operating temperature	- 30 °C … + 50 °C The safe position will be attained up to max. 75°C - 40 °C … + 50 °C
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm² cable 1 m, 6 x 0,75 mm²
Thermal trips (Only for FDMA)	Tf1: duct outside temperature 72°C Tf2: duct inside temperature 72°C

Fig. 21   Actuating mechanism BELIMO BF 24-T
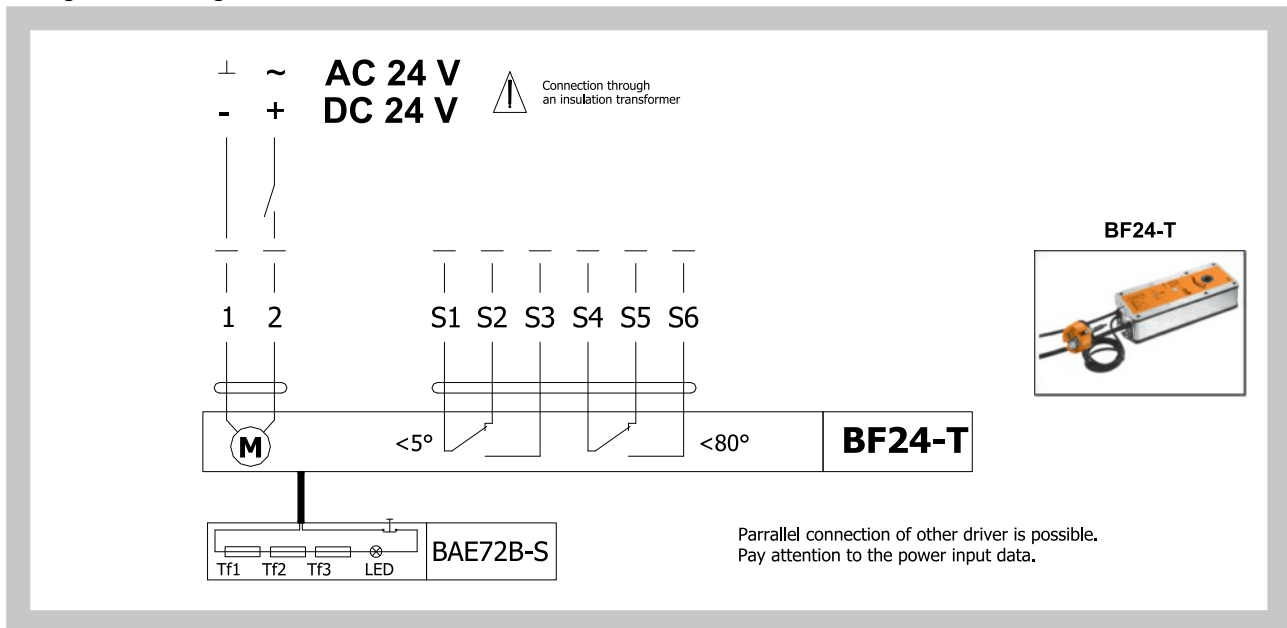
IV. MATERIAL, FINISHING

8. Material

8.1.   Damper bodies are supplied in the design made of galvanized plate without any other surface finish.

8.2.   Fasteners is galvanized.

V. INSPECTION, TESTING

9. Inspection, testing

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

VI. TRANSPORTATION AND STORAGE

10. Logistic terms

10.1.   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.

10.2.   Dampers are stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -30 °C to +40 °C and maximum relative humidity 95 % (avoid condensation on the damper body). Dampers must be protected against mechanic damages when transported and manipulated.

VII. ASSEMBLY, ATTENDANCE, MAINTENANCE AND REVISIONS

11. Assembly

11.1.   All effective safety standards and directives must be observed during smoke damper assembly.

11.2.   To ensure reliable smoke damper function it is necessary to avoid blocking the closing mechanism and contact surfaces with collected dust, fibre and sticky materials and solvents.
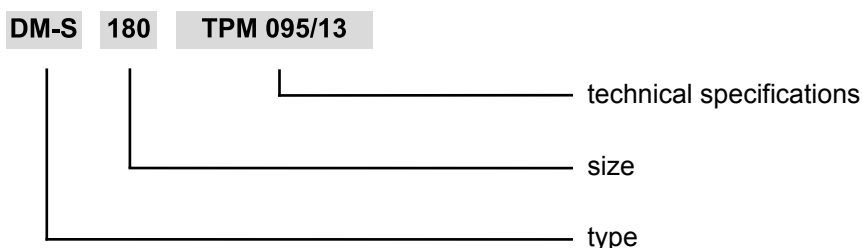
11.3. Manual operation

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.

12. Entry into service and revisions

12.1. 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.

12.1.1. 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.

12.1.2. 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.

12.2. Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out.

12.2.1. Visual inspection of proper damper integration, inside damper area, damper blade, contact surfaces and silicon sealing.

12.2.3. 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 BAT 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).

VIII. ORDERING INFORMATION

13. Ordering key

| DM-S | 180 | TPM 095/13 |

technical specifications

size

type