

KTM-O

Fire Damper – round

Technical *Documentation*



TM **S M A Y**



2434

 SMAY Sp. z o.o.
 17
 CSWU: 1438-CPR-0529
 DWU: 020-CPR-2017

EN 15650:2010 Fire damper

type: KTM-O-E, KTM-O-S

Nominal activation conditions/sensitivity:	
Closing/opening during the test at the right time	Pass
Response time/Closure time:	Pass
Reliability	50 cycles <120S
Fire resistance:	
Fire Integrity - E Fire Insulation - I Smoke leakage - S Mechanical stability (under E) Maintenance of the cross section (under E)	EI 120 (ve h _o i↔o) S EI 90 (ve i↔o) S EI 60 (ve i↔o) S EI 30 (ve i↔o) S
Durability:	
Opening and closing cycle test	KTM-O-E: 10 000 cycles <120S KTM-O-S: 100 cycles <120S

Version 6.15

SMAY reserves the right to make changes to this document.

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1. INTRODUCTION

The purpose of technical documentation is to familiarize the user with the intended use, design, operation principle, installation, periodic maintenance and operation of product.

2. LEGAL REGULATIONS

The KTM-O fire dampers are certified by the Scientific and Research Centre for Fire Protection – the National Research Institute, **Certificate of Constancy of Performance No. 1438-CPR-0529**.

The KTM-O fire dampers are designed for application in general ventilation systems as cut-off partitions separating the fire-engulfed zone from the remaining part of the building (normally open). The purpose of these dampers is to prevent the spread of fire, heat and smoke.

The dampers are designed, manufactured and tested in accordance with the following standards: **PN-EN 15650** "Ventilation for buildings – Fire dampers" and **PN-EN 13501-3** "Fire classification of construction products and building elements – Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers."

The effectiveness of the dampers is confirmed by tests according to **PN-EN 1366-2** "Fire resistance tests for service installations – Part 2: Fire dampers."

The KTM-O fire damper is classified as tightness class B (housing tightness) on the basis of tests carried out according to **PN-EN 1751** "Ventilation for buildings. Air terminal devices. Aerodynamic testing of dampers and valves."

3. INTENDED USE

The KTM-O fire dampers are classified in the following fire resistance classes and may be installed in the following building partitions:

a. EI 120 (ho ve i↔o) S

- floors with 150 mm in thickness or more, and a fire resistance class EI120 or higher
- rigid walls with 115 mm in thickness or more, and EI120 or a higher fire resistance class (e.g. concrete walls, solid brick walls, cellular concrete block walls, hollow masonry unit walls or concrete slab walls)
- flexible walls, 125 mm in thickness or more and EI 120 or a higher fire resistance class (thicker, higher density, more board layers)

b. EI 90 (ve i↔o) S

- flexible standard walls, 100 mm in thickness or more and EI90 or a higher fire resistance (thicker, greater density, more board layers)
- rigid walls, 100 mm in thickness or more, and EI90 or a higher fire resistance class (e.g. concrete walls, non-hollow brick walls, cellular concrete block walls, hollow masonry unit walls or concrete slab walls).
- away from rigid walls with 120 mm in thickness or more, and EI90 or a higher fire resistance class (e.g. concrete walls, solid brick walls, cellular concrete block walls, hollow masonry unit walls or concrete slab walls)

c. EI 60 (ve i↔o) S

- rigid walls, 100 mm in thickness or more, as well as EI60 or a higher fire resistance class (e.g. concrete walls, solid brick walls, cellular concrete block walls, hollow masonry unit walls or concrete slab walls)

d. EI 30 (ve i↔o) S

- rigid walls, 75 mm in thickness or more, as well as EI60 or a higher fire resistance class (e.g. concrete walls, solid brick walls, cellular concrete block walls, hollow masonry unit walls or concrete slab walls)
- flexible standard walls, 75 mm in thickness or more and EI30 or a higher fire resistance (thicker, greater density, more board layers)

Table 1. Table of fire resistance

Construction type	Minimum thickness of building partition mm	Fire resistance class	Sealing type
Ceiling	≥150 mm	EI 120 (h _o i↔o) S	MORTAR
Rigid wall	≥115 mm	EI 120 (v _e i↔o) S	MORTAR
	≥100 mm	EI 60 (v _e i↔o) S	MORTAR
Rigid wall	≥125 mm	EI 120 (v _e i↔o) S	MINERAL WOOL
	≥100 mm	EI 90 (v _e i↔o) S	MINERAL WOOL
	≥75 mm	EI 30 (v _e i↔o) S	MINERAL WOOL
Flexible wall	≥125 mm	EI 120 (v _e i↔o) S	MINERAL WOOL
	≥100 mm	EI 90 (v _e i↔o) S	MINERAL WOOL
	≥75 mm	EI 30 (v _e i↔o) S	MINERAL WOOL
Montage away from rigid wall construction (silicate boards)	≥120 mm	EI 90 (v _e i↔o) S	MINERAL WOOL

Where:

E – fire integrity,

I – fire insulation,

S – smoke leakage,

120/90/60/30 – duration of fulfilment of E, I and S criteria, expressed in minutes,

v_e – damper installed directly in the wall,

h_o – damper installed directly in the floor,

i↔o – operating effectiveness criteria are met from the inside to the outside (fire inside), and from the outside to the inside (fire outside).

The KTM-O fire dampers may also be installed in buildings partitions with a lower fire resistance rating. In this case, the damper fire resistance rating is equal to the partition fire resistance rating, subject to the smoke leakage criterion

The KTM-O fire dampers may be installed in vertical building partitions with either horizontal or vertical rotation axis, with any actuator position.

The KTM-O fire dampers may be installed in either inner or external buildings partitions, as also at a distance from them. In case of external wall installation, use of finishing element is required (intake or exhaust), which will protect from influence of atmospheric factors. Drive system (actuator or spring mechanism) should be installed inside facility. It is recommended to use dampers in special execution (impregnated fireproof boards, anti-corrosive steel elements).

4. TECHNICAL DESCRIPTION

The KTM-O-S dampers (with a spring mechanism) and the KTM-O-E dampers (with an electric spring-return actuator) consist of a housing of a round cross-section, a moving, single-axis isolating baffle and an actuating mechanism with a release device.

The damper housing and its interacting elements are made of galvanized steel sheet. Both ends of the housing are adapted for sleeve or nipple connection, allowing easy connection between the duct and the damper.

There are intumescent seals on the outer and inner surfaces of the housing, in the place of perforation, around the closed isolating baffle. Their characteristic feature is that their volume increases at high temperatures, tightly filling all leaks between the baffle and the body.

The isolating baffle of the damper is made of calcium-silicate board, and a rubber seal is installed on its perimeter, ensuring the damper integrity at ambient temperature.

The KTM-O damper is provided with actuating springs, which store energy when the baffle is being opened, which is then used to close the baffle. The open position of the baffle is ensured by a thermal fuse with nominal activation temperature $70 \pm 5^\circ\text{C}$ (optional $95 \pm 5^\circ\text{C}$), and which is placed in special bolted strikes. The baffle closes when the thermal fuse is activated after the actuating temperature is exceeded. Damage to the thermal fuse results in disconnection of bolted strikes, and rotation of the baffle into closed position, which is caused by the release of actuating springs. The movement of the baffle is limited by a buffer.

The KTM-O-E damper is provided with an electric spring return actuator BFL or BF series manufactured by BELIMO, and the BAT or BAE thermal fuse (72°C), constituting damper's drive system supplied by the 230 V AC or 24 V AC/DC voltage. After the voltage has been supplied, the actuator rotates the baffle to the open position. The baffle closes due to voltage loss or when the thermal fuse is activated (the return spring in the actuator closes the baffle by returning to the non-stressed position).

During normal operation of the system, the KTM-O dampers are in the open position. If a fire breaks out, the damper baffle rotates to the closed position.

The permissible flow rate in a connection duct for the KTM-O-E dampers with an actuator is 12 m/s and 8 m/s for the KTM-O-S dampers with a spring mechanism.

The range of dampers covers diameters from DN100 to DN250. The primary type series includes the following sizes: **DN100, DN125, DN160, DN200, DN250.**

The KTM-O dampers are designed for two connection types, i.e. sleeve and nipple

Depending on the operating range and type of the actuation system used, the dampers are marked as follows:

- a. **KTM-O-S** - dampers with a spring mechanism
- b. **KTM-O-E** - dampers with electric actuator and return spring

The length of the KTM-O-S dampers may be $150 \div 350$ m for the sleeve version and $195 \div 395$ m for the nipple version. The length of the KTM-O-E dampers may be $262 \div 462$ mm for the sleeve version and $307 \div 507$ for the nipple version.

The primary length type series comprises the following sizes:

- a. **150 mm** – sleeve version with spring mechanism,
- b. **195 mm** – nipple version with spring mechanism,
- c. **262 mm** – sleeve version with electric actuator,
- d. **307 mm** – nipple version with electric actuator.

The dampers may also be fitted with limit switches indicating open or closed position of the baffle.

In a special version, resistant to aggressive environments, all components of the damper are made of stainless steel, whereas the damper baffle is impregnated with a fire-resistant board impregnation.

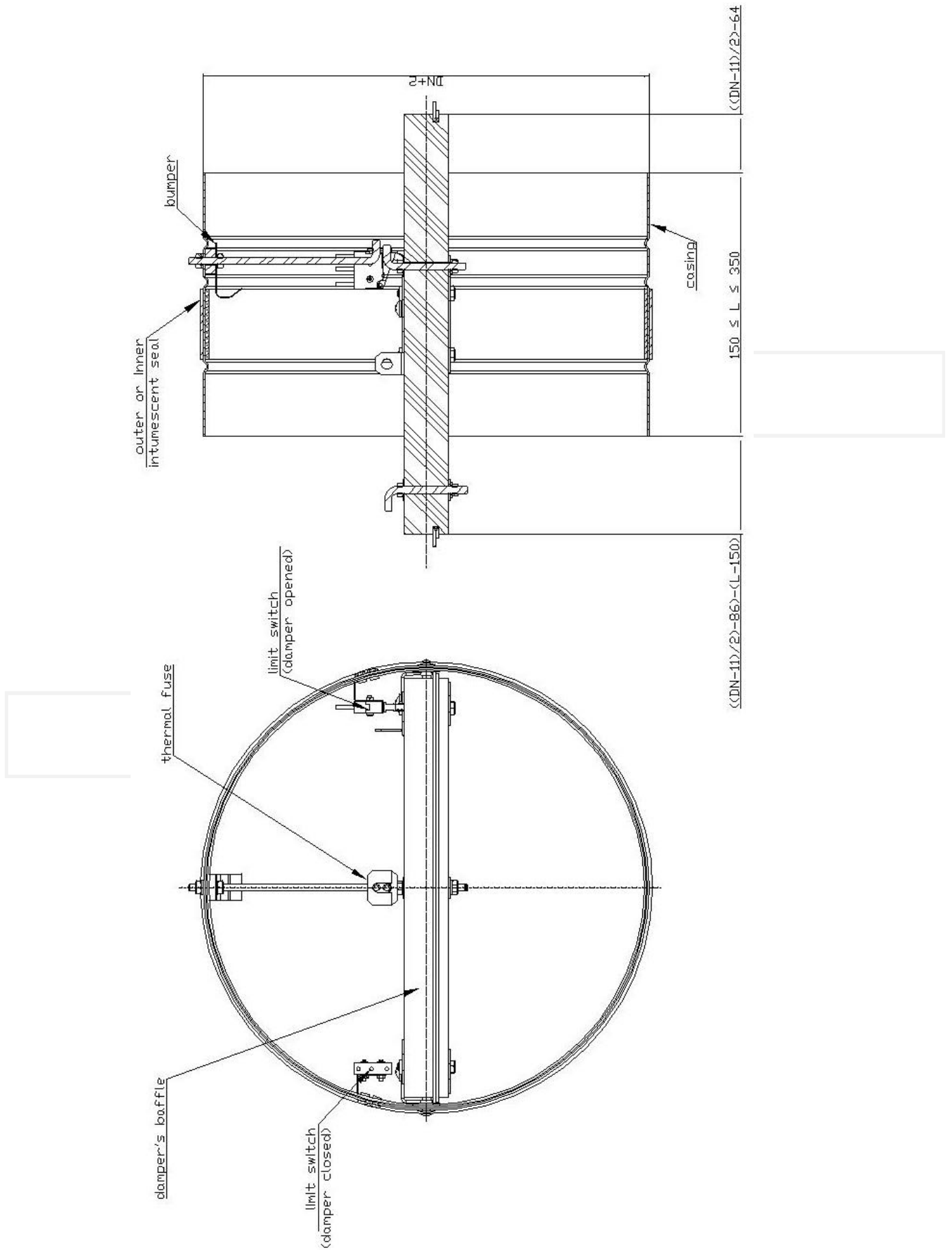


Figure 1. KTM-O-S damper (with spring mechanism, sleeve connections)

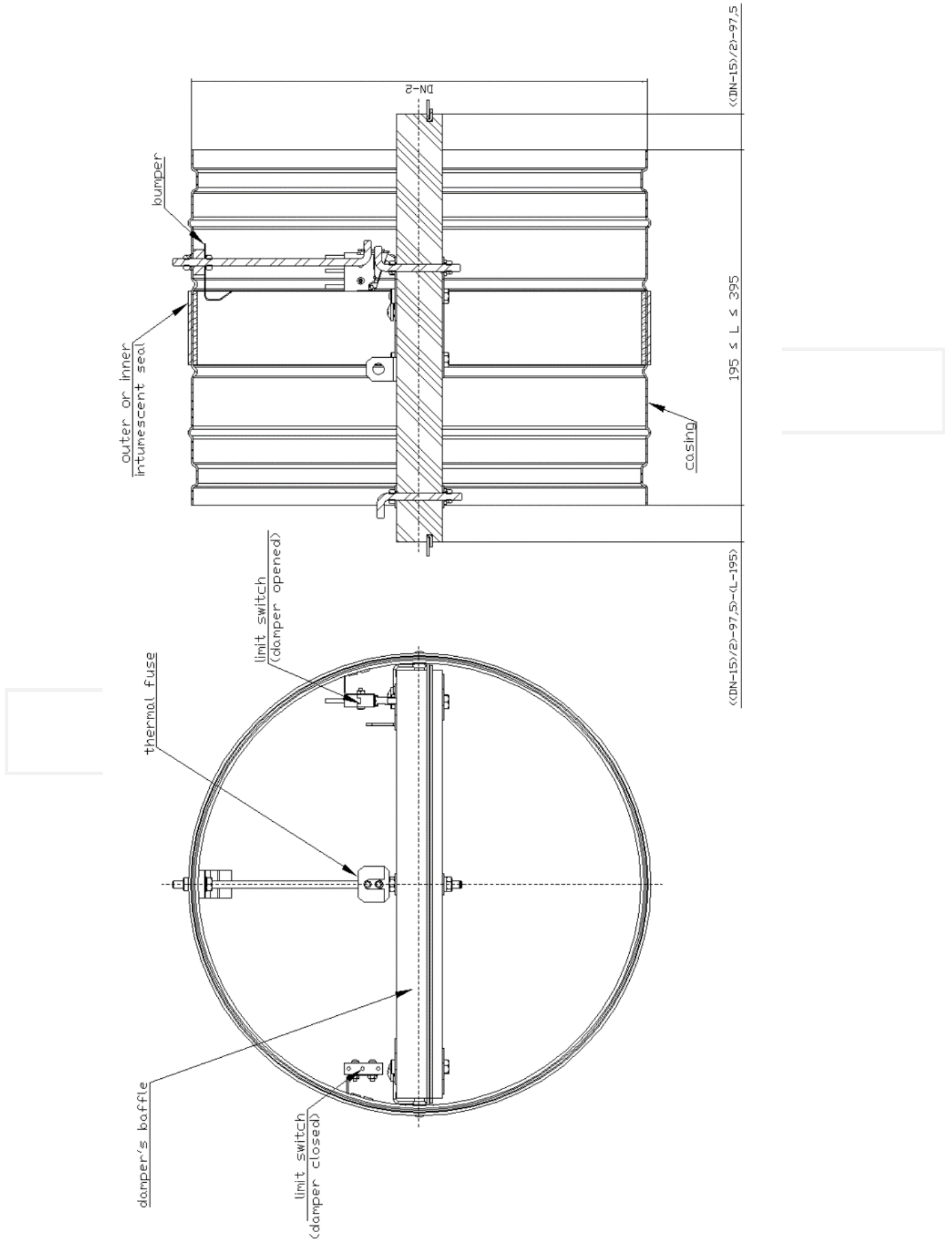


Figure 2. KTM-O-S damper (with spring mechanism, nipple connections)

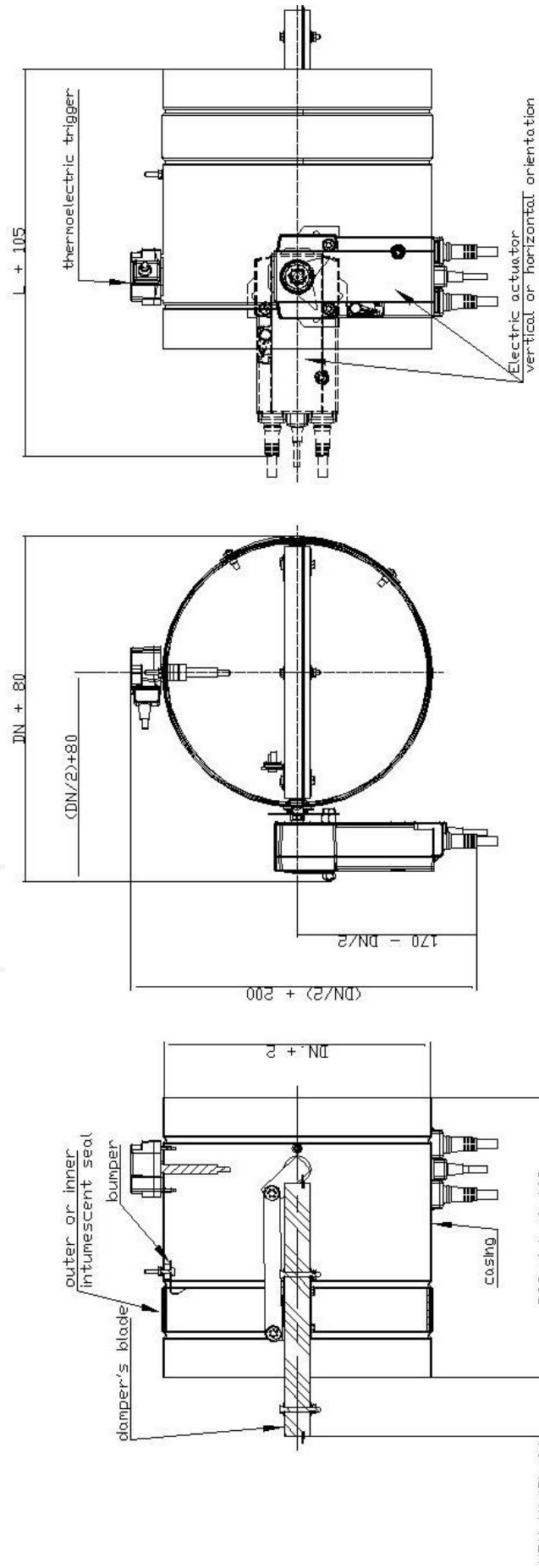


Figure 3. KTM-O-E damper (with electric actuator, sleeve connections)

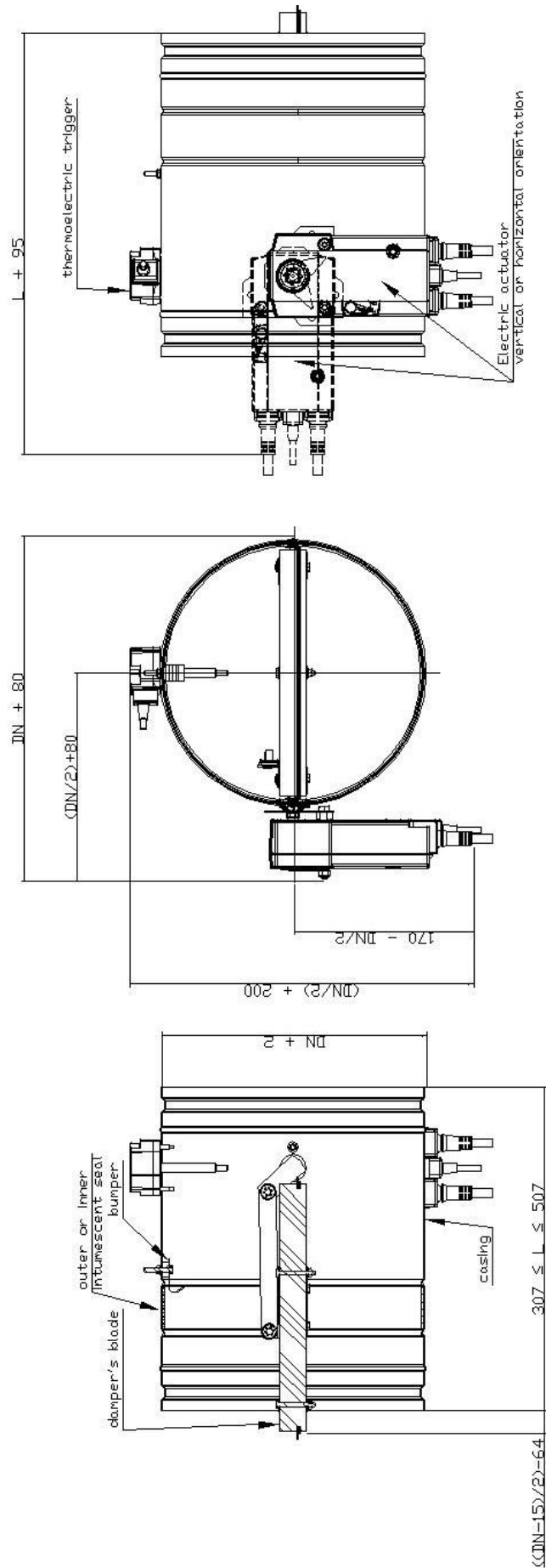


Figure 4. KTM-O-E damper (with electric actuator, nipple connections)

Table 2. KTM-O dampers weight [kg]

DN	KTM-O-S Sleeve	KTM-O-S Nipple	KTM-O-E Sleeve	KTM-O-E Nipple
100	0,8	0,9	3,1	3,2
125	0,9	1,0	3,3	3,4
160	1,1	1,3	3,7	3,9
200	1,4	1,6	4,1	4,3
250	1,7	2,0	4,6	4,9

5. BELIMO ELECTRIC ACTUATORS USED IN KTM-O

Spring-return 90° actuator BFL series, combined with thermoelectric tripping device BAT:

- BFL230-T,
- BFL24-T,
- BFL24-T-ST.

where:

ST – connection plug.



Spring-return 90° actuator BF series, combined with thermoelectric tripping device BAE:

- BF230-TN,
- BF24-TN,
- BF24-TN-ST,
- BF24-TL-TN-ST

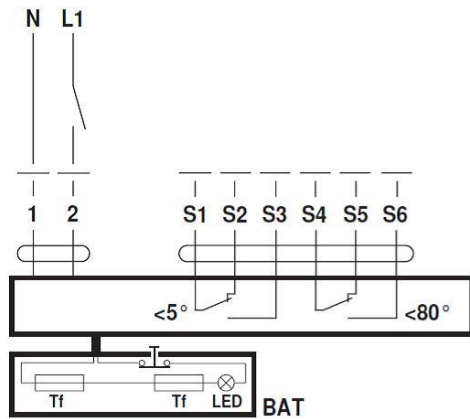
where:

ST – connection plug,
 TL- communicative control.



Wiring diagram BFL230-T

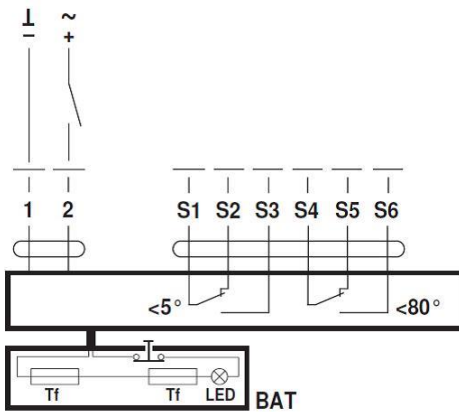
AC 230 V, open-close


Cable colours:

 1 = blue
 2 = brown
 S1 = violet
 S2 = red
 S3 = white
 S4 = orange
 S5 = pink
 S6 = grey
 Tf: Thermal fuse (see "Technical data")

Wiring diagram BFL24-T

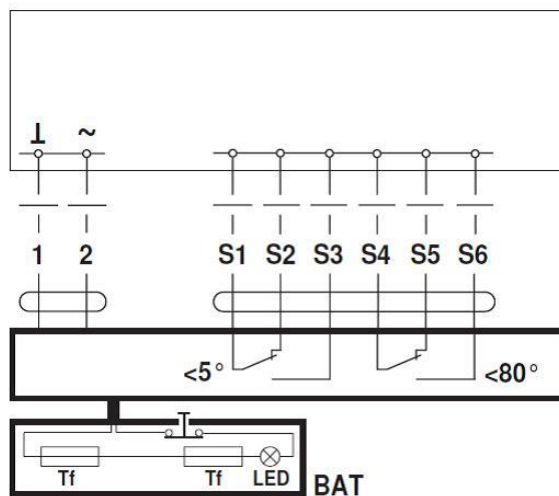
AC/DC 24 V, open-close


Cable colours:

 1 = black
 2 = red
 S1 = violet
 S2 = red
 S3 = white
 S4 = orange
 S5 = pink
 S6 = grey
 Tf: Thermal fuse (see "Technical data")

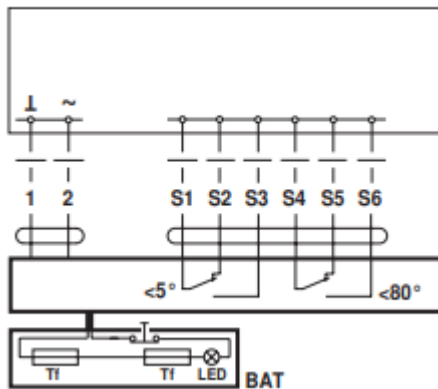
Wiring diagram BFL24-T-ST

AC/DC 24 V, open-close



Wiring diagram BF24-TN-ST

AC/DC 24 V, open-close


Technical data:

	BFL230-T	BFL24-T (-ST)
Nominal voltage	AC 230 V	AC/DC 24 V
Nominal voltage frequency	50/60 Hz	50/60 Hz
Nominal voltage range	AC 198...264 V	AC 19.2...28.8 V / DC 21.6...28.8 V
Power consumption in operation	3.5 W	2.5 W
Power consumption in rest position	1.1 W	0.8 W
Power consumption for wire sizing	6.5 VA	4 VA
Power consumption for wire sizing note	I _{max} 4 A @ 5 ms	I _{max} 8.3 A @ 5 ms
Auxiliary switch	2 x SPDT	2 x SPDT
Switching capacity auxiliary switch	1 mA...3 (0.5 inductive) A, AC 250 V	1 mA...3 (0.5 inductive) A, AC 250 V
Switching points auxiliary switch	5° / 80°	5° / 80°
Connection supply / control	Cable 1 m, 2 x 0.75 mm ² (halogen-free)	Cable 1 m, 2 x 0.75 mm ² (halogen-free)
Connection auxiliary switch	Cable 1 m, 6 x 0.75 mm ² (halogen-free)	Cable 1 m, 6 x 0.75 mm ² (halogen-free)
Cable length thermoelectric tripping device	0.5 m	0.5 m
Torque motor	Min. 4 Nm	Min. 4 Nm
Torque spring return	Min. 3 Nm	Min. 3 Nm
Direction of rotation motor	Can be selected by mounting L/R	Can be selected by mounting L/R
Manual override	With position stop	With position stop
Angle of rotation	Max. 95°	Max. 95°
Running time motor	<60 s / 90°	<60 s / 90°
Running time spring-return	20 s @ -10...55°C / <60 s @ -30...-10°C	20 s @ -10...55°C / <60 s @ -30...-10°C
Sound power level motor	<43 dB(A)	<43 dB(A)
Sound power level spring-return	<62 dB(A)	<62 dB(A)
Spindle driver	Form fit 12x12 mm, Continuous hollow shaft	Form fit 12x12 mm, Continuous hollow shaft
Position indication	Mechanically, with pointer	Mechanically, with pointer
Service life	Min. 60,000 safety positions	Min. 60,000 safety positions
Response temperature thermal fuse	Duct outside temperature 72°C Duct inside temperature 72°C	Duct outside temperature 72°C Duct inside temperature 72°C
Protection class IEC/EN	II Protective insulated	III Safety extra-low voltage
Protection class auxiliary switch IEC/EN	II Protective insulated	II Protective insulated
Degree of protection IEC/EN	IP54 in all mounting positions	IP54 in all mounting positions
EMC	CE according to 2014/30/EU	CE according to 2014/30/EU
Low voltage directive	CE according to 2014/35/EU	CE according to 2014/35/EU
Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14	IEC/EN 60730-1 and IEC/EN 60730-2-14
Mode of operation	Type 1.AA.B	Type 1.AA.B
Rated impulse voltage supply / control	4 kV	0.8 kV
Control pollution degree	3	3
Ambient temperature normal operation	-30...55°C	-30...55°C
Ambient temperature safety operation	The safety position will be attained up to max. 75°C	The safety position will be attained up to max. 75°C
Non-operating temperature	-40...55°C	-40...55°C
Ambient humidity	95% r.h., non-condensing	95% r.h., non-condensing
Maintenance	Maintenance-free	Maintenance-free
Weight	1.2 kg	1.2 kg

Technical data:
BF230-TN

Electrical data	Nominal voltage	AC 230 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 198...264 V
	Power consumption in operation	8.5 W
	Power consumption in rest position	3 W
	Power consumption for wire sizing	11 VA
	Power consumption for wire sizing note	I _{max} 0.5 A @ 5 ms
	Auxiliary switch	2 x SPDT
	Switching capacity auxiliary switch	1 mA...6 A (3 A inductive), DC 5 V...AC 250 V (II reinforced insulation)
	Switching points auxiliary switch	5° / 80°
	Connection supply / control	Cable 1 m, 2 x 0.75 mm ² (halogen-free)
	Connection auxiliary switch	Cable 1 m, 6 x 0.75 mm ² (halogen-free)
Functional data	Torque motor	18 Nm
	Torque fail-safe	12 Nm
	Direction of rotation motor	Can be selected by mounting L/R
	Manual override	with position stop
	Angle of rotation	Max. 95°
	Running time motor	<120 s / 90°
	Running time fail-safe	16 s @ -10...55°C / <60 s @ -30...-10°C
	Running time fail-safe note	@ -10...55°C / <60 s @ -30...-10°C
	Sound power level, motor	45 dB(A)
	Sound power level, fail-safe	63 dB(A)
	Mechanical interface	Form fit 12x12 mm, Non-continuous hollow shaft
	Position indication	Mechanically, with pointer
Service life	Min. 60'000 safety positions	
Safety	Protection class IEC/EN	II reinforced insulation
	Protection class auxiliary switch IEC/EN	II reinforced insulation
	Degree of protection IEC/EN	IP54 in all mounting positions
	EMC	CE according to 2014/30/EU
	Low voltage directive	CE according to 2014/35/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Mode of operation	Type 1.AA.B
	Rated impulse voltage supply / control	4 kV
	Control pollution degree	3
	Ambient temperature normal operation	-30...50°C
	Ambient temperature safety operation	The safety position will be attained up to max. 75°C
	Storage temperature	-40...50°C
Ambient humidity	Max. 95% r.H., non-condensing	
Servicing	maintenance-free	
Weight	Weight	3.1 kg

Technical data:
BF24-TN

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	7 W
	Power consumption in rest position	2 W
	Power consumption for wire sizing	10 VA
	Power consumption for wire sizing note	I_{max} 8.3 A @ 5 ms
	Auxiliary switch	2 x SPDT
	Switching capacity auxiliary switch	1 mA...6 A (3 A inductive), DC 5 V...AC 250 V (II reinforced insulation)
	Switching points auxiliary switch	5° / 80°
Connection supply / control	Cable 1 m, 2 x 0.75 mm ² (halogen-free)	
Connection auxiliary switch	Cable 1 m, 6 x 0.75 mm ² (halogen-free)	
Functional data	Torque motor	18 Nm
	Torque fail-safe	12 Nm
	Direction of rotation motor	Can be selected by mounting L/R
	Manual override	with position stop
	Angle of rotation	Max. 95°
	Running time motor	<120 s / 90°
	Running time fail-safe	16 s $t_{amb} = 20^{\circ}C$
	Running time fail-safe note	$t_{amb} = 20^{\circ}C$
	Sound power level, motor	45 dB(A)
	Sound power level, fail-safe	63 dB(A)
	Mechanical interface	Form fit 12x12 mm, Non-continuous hollow shaft
	Position indication	Mechanically, with pointer
	Service life	Min. 60'000 safety positions
Safety	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
	Protection class auxiliary switch IEC/EN	II reinforced insulation
	Degree of protection IEC/EN	IP54 in all mounting positions
	EMC	CE according to 2014/30/EU
	Low voltage directive	CE according to 2014/35/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Mode of operation	Type 1.AA.B
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature normal operation	-30...50°C
	Ambient temperature safety operation	The safety position will be attained up to max. 75°C
	Storage temperature	-40...50°C
	Ambient humidity	Max. 95% r.H., non-condensing
	Servicing	maintenance-free
	Weight	Weight

6. CONDITIONS OF TRANSPORT AND STORAGE

Fire dampers KTM-O should be stored in cardboard boxes and/or on pallets. Fire dampers should be stored indoors, providing protection against atmospheric agents, at a minimum temperature of +5°C.

Do not allow mechanical damage of damper, that may be caused e.g. blows or dropping.

After each transport, visual inspection of each fire damper must be carried out.

7. INSTALLATION TECHNOLOGY

Before installing the fire dampers, make sure that there are no damage, during transport or storage, that could block the baffle.

Check that the baffle can be opened and closed (full opening and closing position). To open fire dampers KTM-O-E use the actuator key.

The opening and closing must proceed smoothly (not stepwise).

Do not pull by baffle to open or close fire damper, it may cause permanent damage, not covered by the warranty.

During KTM-O-S damper test, with size DN>125, while opening baffle, fold back the bumper (as shown on the fig. 5) so as to unlock the bolt caught on it, allowing free rotation of the baffle.

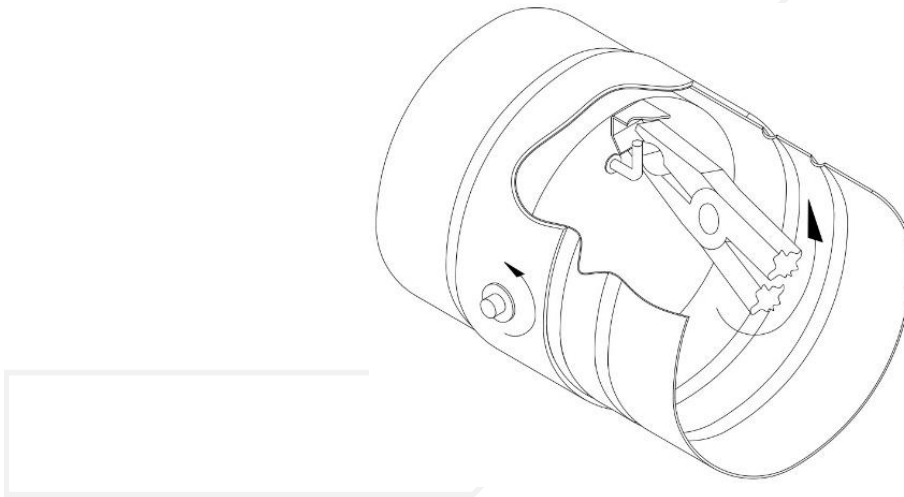


Figure 5. KTM-O-S baffle opening method

Before installing, secure the fire damper, by dust and dirt, using a foil or other screening material. It can prevent components of fire damper by damage.

Dampers to preserve of the declared resistance, insulation and smoke leakage EIS120, EIS90, EIS60, EIS30, should be installed on wall, which was classified as EIS120, EIS90, EIS60, EIS30. It is allowed to install KTM-O dampers in wall with other fire-resistance, should be remembered that fire-resistance in this situation is resistance of lowest classified (in this regard) element in this system.

Ducts made of flammable and non-flammable materials can be connected to the damper. Ducts should be installed that they cannot load the damper during fire. Ducts lengthening during fire can be compensated by support and knee.

ATTENTION: Distance between fire dampers or fire damper and construction elements must be:

- a) min. 10 mm between fire damper, which are installed in different ventilating wires,
- b) min. 10 mm between fire damper and construction element (wall/ceiling).

During the installation of dampers, if the spacing between them is less than 200 mm and/or the distance from the adjacent building partition is less than 75 mm, it is necessary to use a one-sided flange made of 15 mm gypsum fiberboard (GKF) in accordance with the subsection 7.7.

This requirement does not apply to building partitions that have a thickness at least 15 mm greater than the required minimum wall thickness.

7.1. INSTALLATION TECHNOLOGY - CEILING

- Make an opening in the ceiling with the 40 [mm] (acceptable $40 \div 80$ [mm]) greater than the nominal dimensions of the fire damper: DN+40.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the ceiling, and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the ceiling with cement, cement-lime mortar or concrete.
- After the mortar has dried (about 48 hours), remove the supports or suspension, check the fire damper correct operation and leave it in open position (installing in KTM-O damper thermal fuse as shown on the fig. 6).

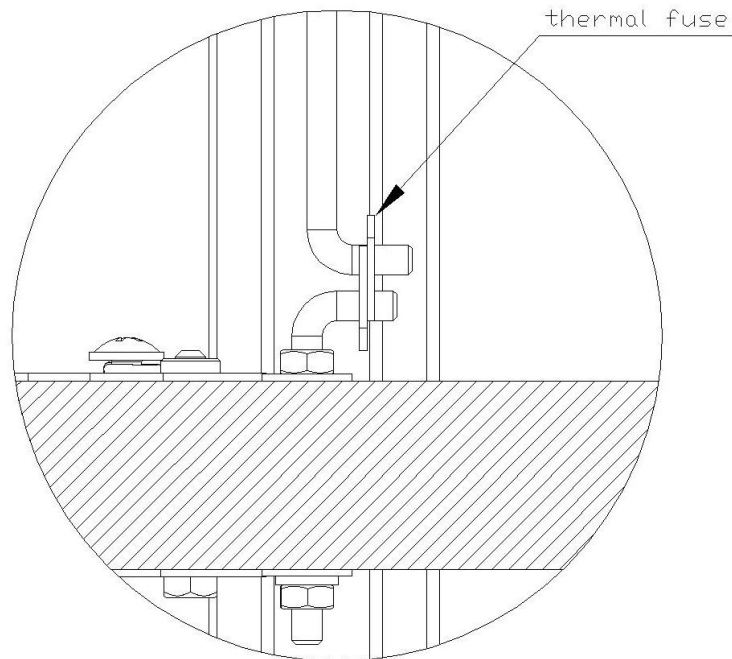


Figure 6. Thermal fuse installation method

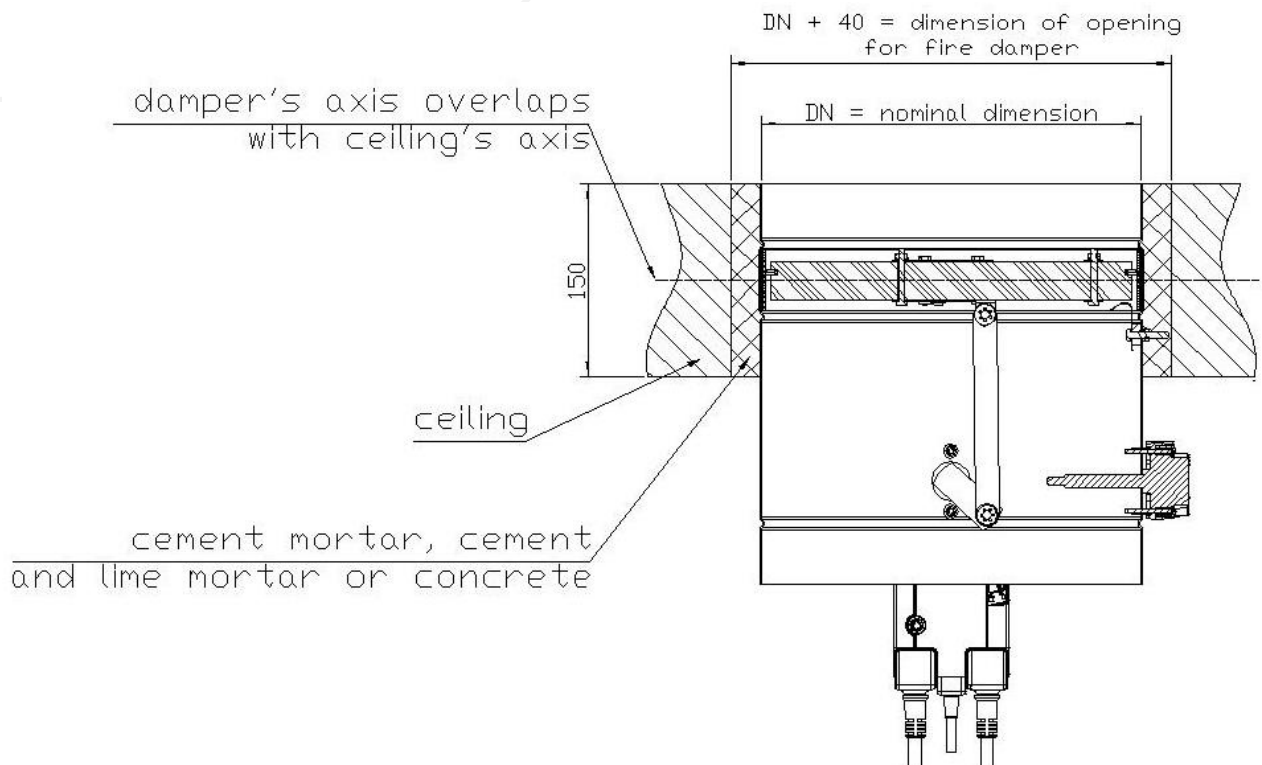


Figure 7. Installation of KTM-O fire dampers in ceiling

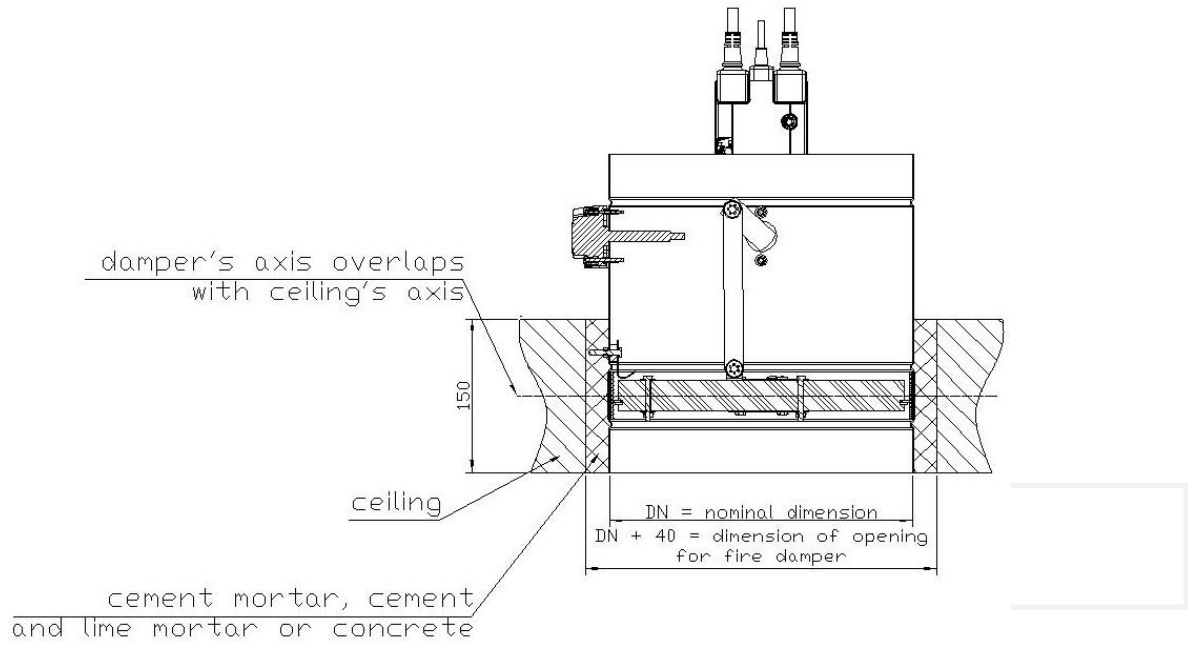


Figure 8. Installation of KTM-O fire dampers in ceiling

7.2. INSTALLATION TECHNOLOGY – RIGID WALL

a) INSTALLATION USING MORTAR

- Make an opening in the wall with the 40 [mm] (acceptable $40 \div 80$ [mm]) greater than the nominal dimensions of the fire damper: $DN+40$.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the wall, and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the wall with cement, cement-lime mortar or concrete.
- After the mortar has dried (about 48 hours), remove the supports or suspensions, check the fire damper correct operation and leave it in open position (installing in KTM-O damper thermal fuse as shown on the fig. 6).

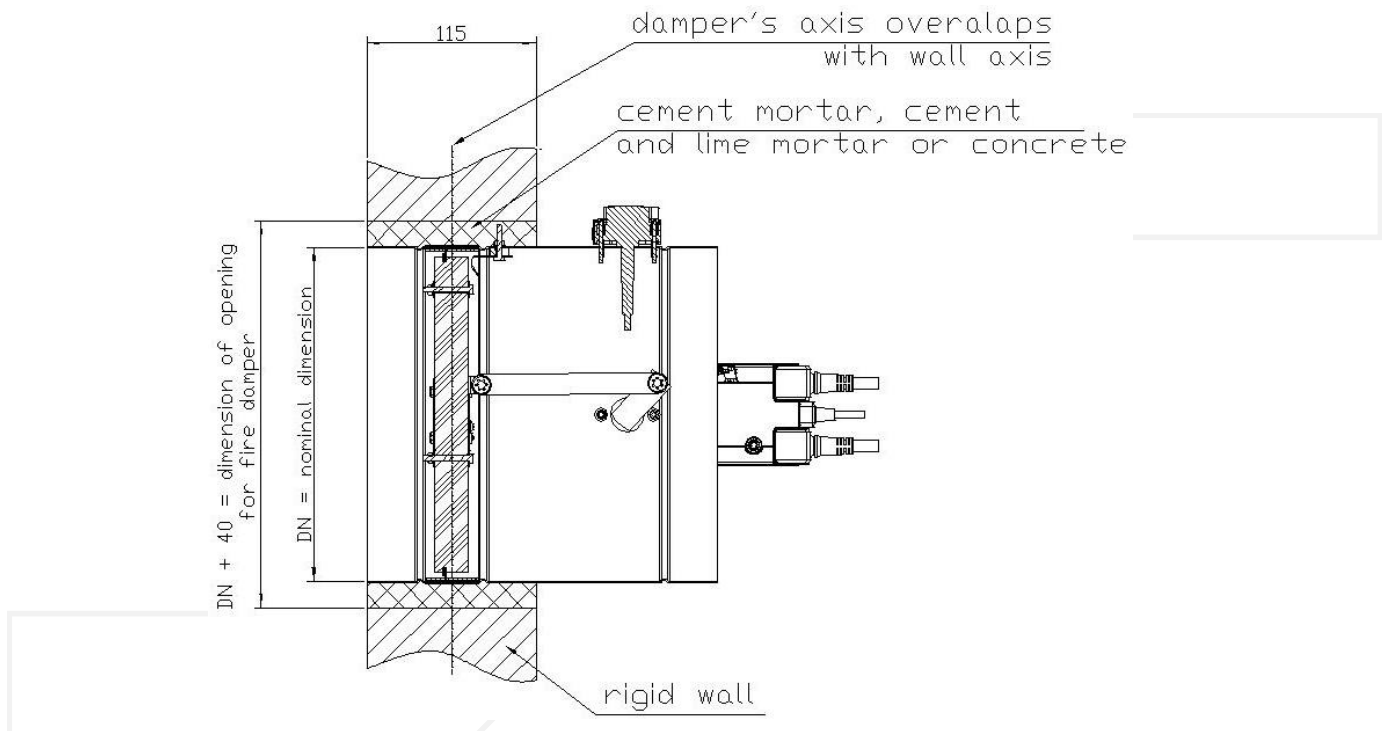


Figure 9. Installation of KTM-O fire dampers in rigid wall with 115 mm thickness

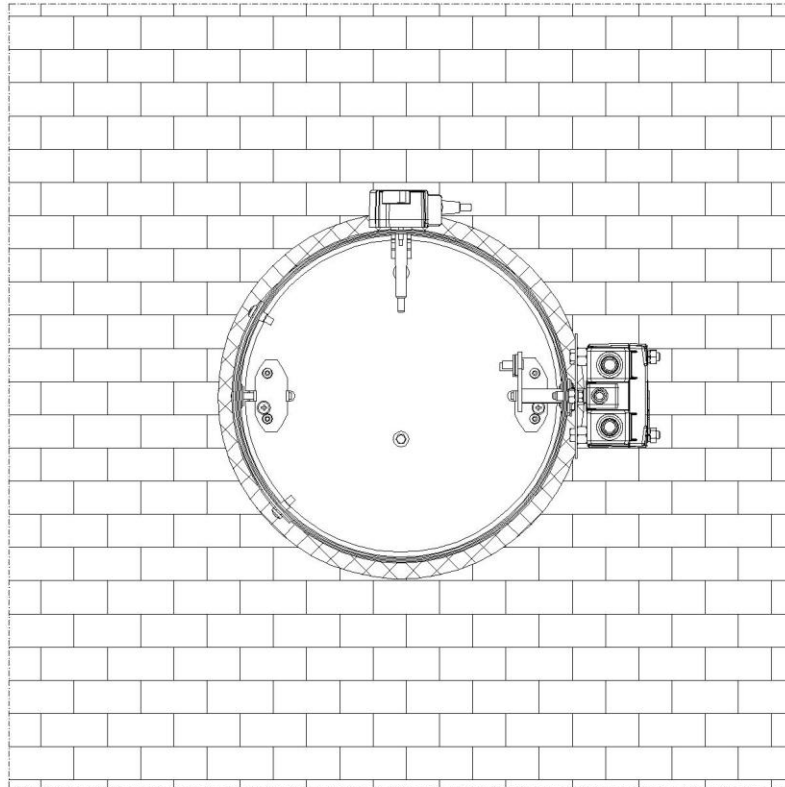


Figure 10. Installation of KTM-O fire dampers in rigid wall with horizontal rotation axis of baffle

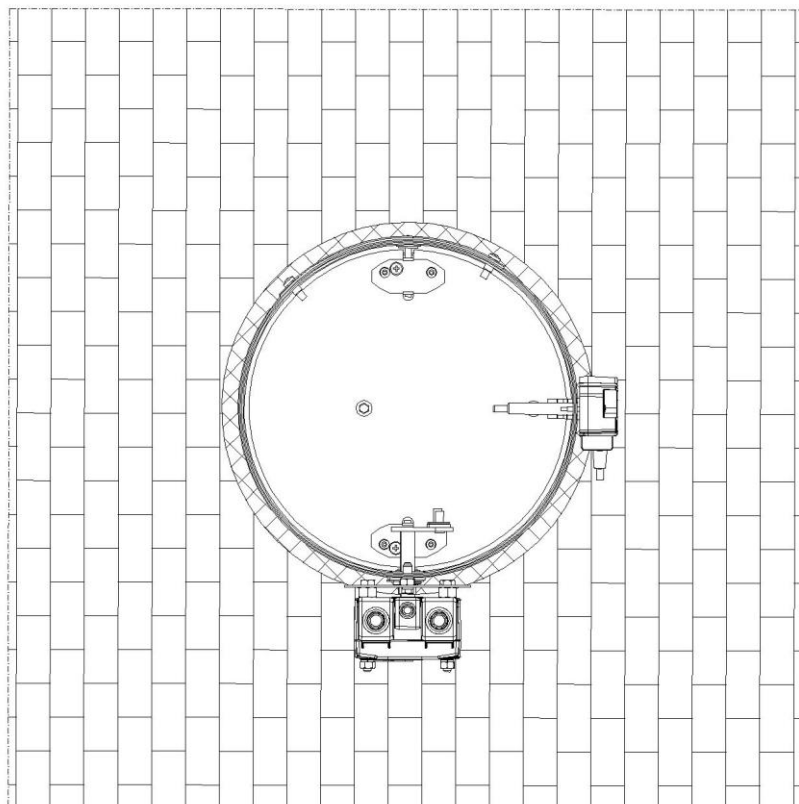


Figure 11. Installation of KTM-O fire dampers in rigid wall with vertical rotation axis of baffle

b) INSTALLATION USING MINERAL WOOL

- Make an opening in the wall with the 40 [mm] (acceptable 40 ÷ 80 [mm]) greater than the nominal dimensions of the fire damper: $B=DN+40$ and $H=DN+40$.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the wall, and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the wall with non-flammable mineral wool of high density, 100 kg/m³ or more.
- Seal the place of filling with mineral wool using the sealing compounds Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Mount collar, both side of wall, made of GKF boards, 12,5 mm thick and $DN+ 320$ mm wide, using screws (with a cut hole for the damper). For easy assembly, the collar can be made of two parts.
- After mounting the collar, remove the supports or suspension, check the fire damper correct operation and leave it in open position (installing in KTM-O-S damper thermal fuse as shown on the fig. 6).

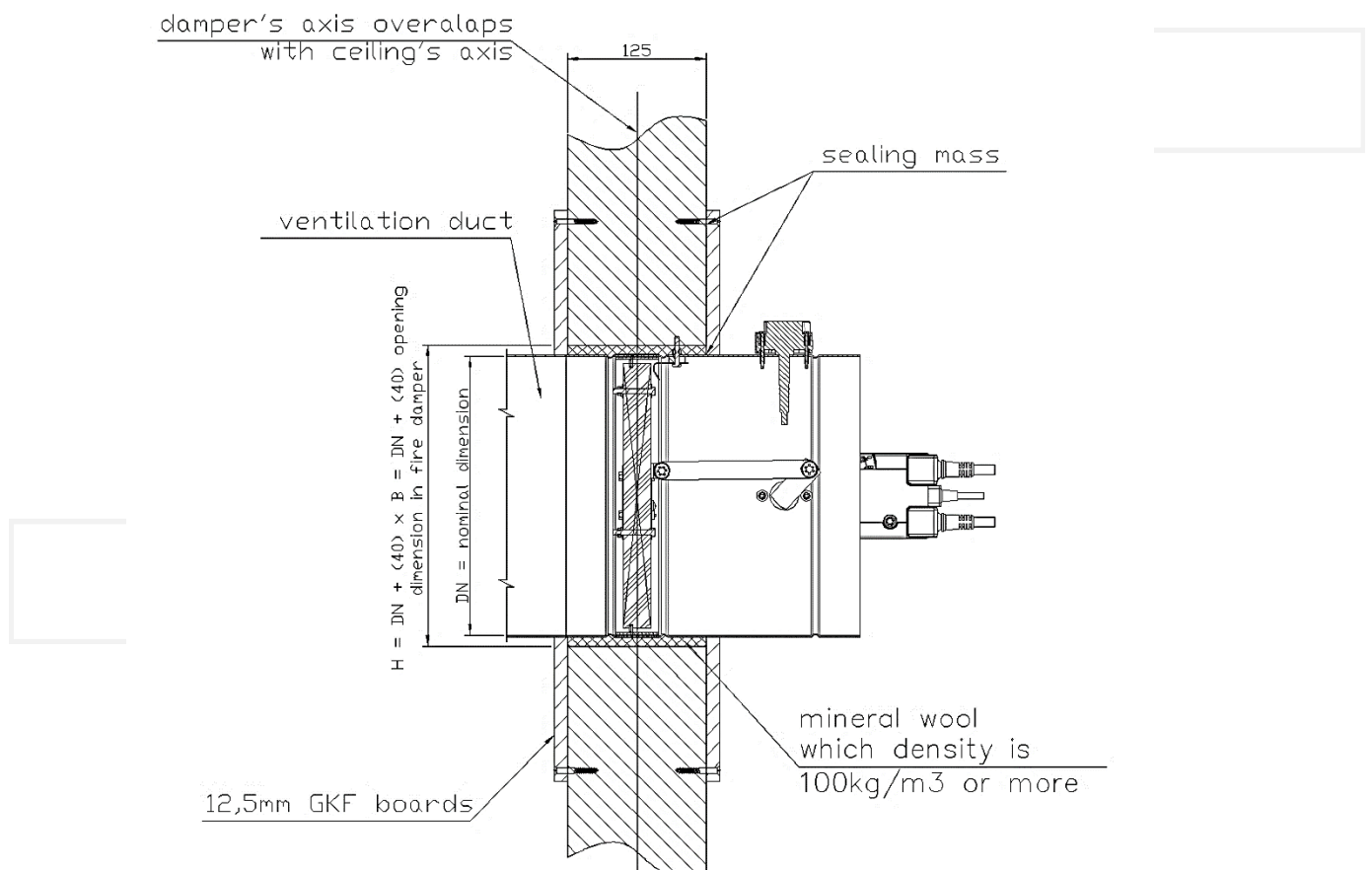


Figure 12. Installation of KTM-O fire dampers in rigid wall with vertical rotation axis of baffle

7.3. INSTALLATION TECHNOLOGY – FLEXIBLE WALL

- Make an opening in the wall with the 40 [mm] (acceptable $40 \div 80$ [mm]) greater than the nominal dimensions of the fire damper: $B=DN+40$ and $H=DN+40$.
- Make a frame of two layers of GKF boards, 12,5 mm thick and the width relative to the width of opening, mounting by screws remembering to carefully seal the contact edges with a mastic: Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the wall, and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the wall with non-flammable mineral wool of high density, 100 kg/m³ or more.
- Seal the place of filling with mineral wool using the sealing compounds Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Mount collar, both side of wall, made of GKF boards, 12,5 mm thick and $DN+ 320$ mm wide, using screws (with a cut hole for the damper). For easy assembly, the collar can be made of two parts.
- After mounting the collar, remove the supports or suspension, check the fire damper correct operation and leave it in open position (installing in KTM-O damper thermal fuse as shown on the fig. 6).

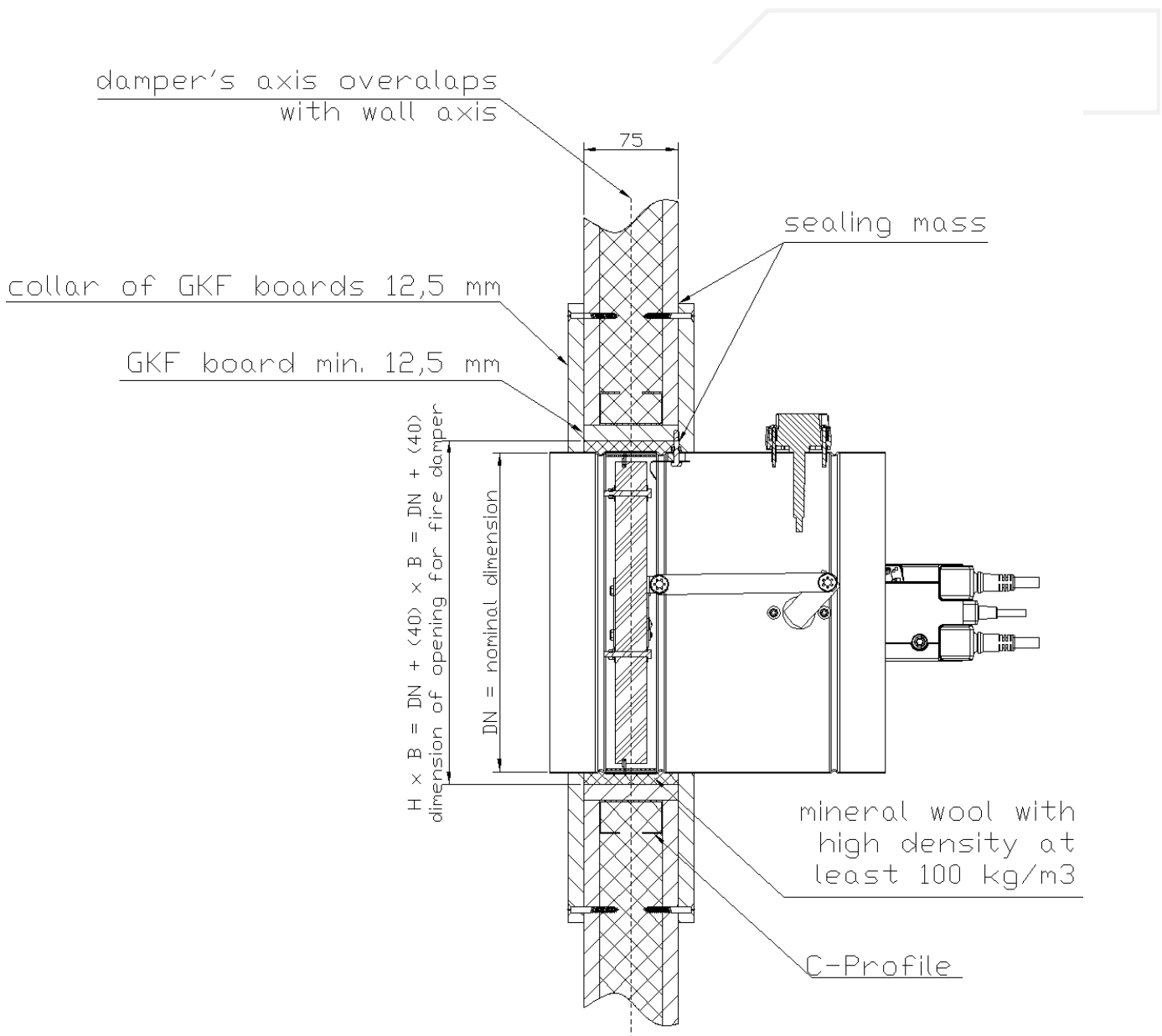


Figure 13. Installation method of fire dampers KTM-O in flexible wall with 75 mm thickness

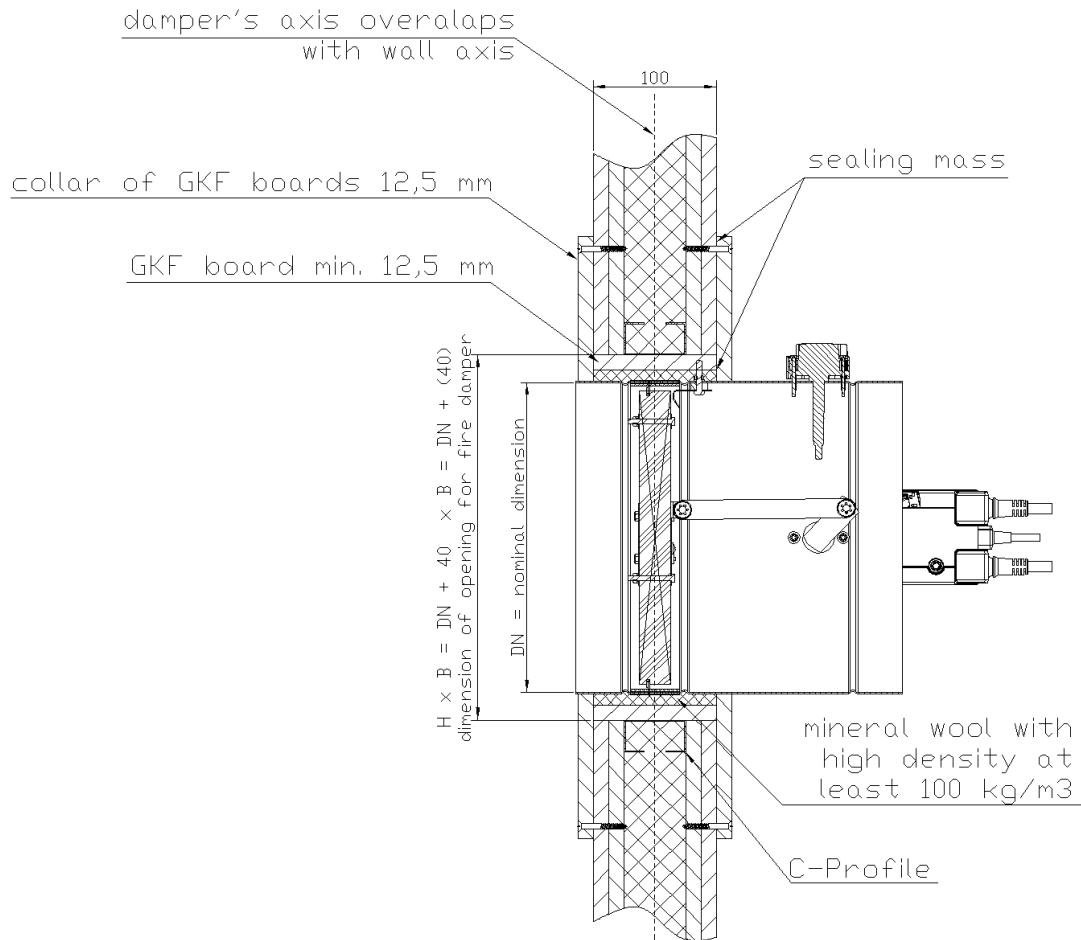


Figure 14. Installation method of fire dampers KTM-O in flexible wall with 100 mm thickness

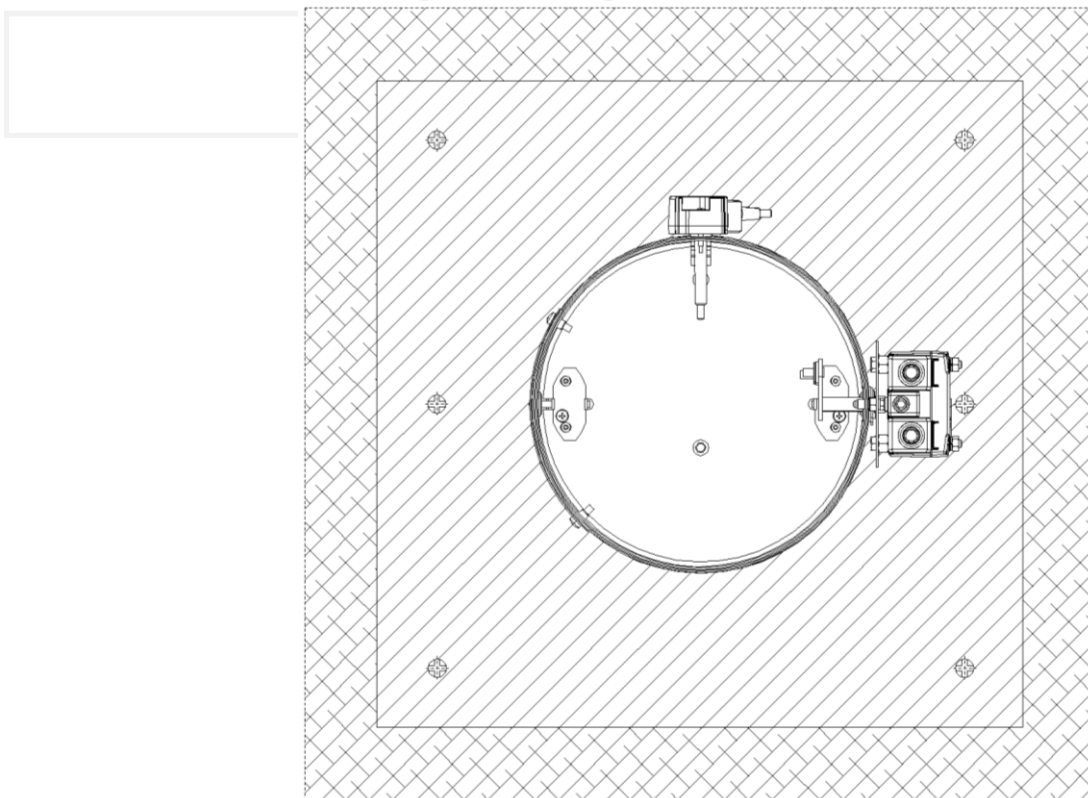


Figure 15. Installation method of fire dampers KTM-O in flexible wall with horizontal rotation axis of baffle

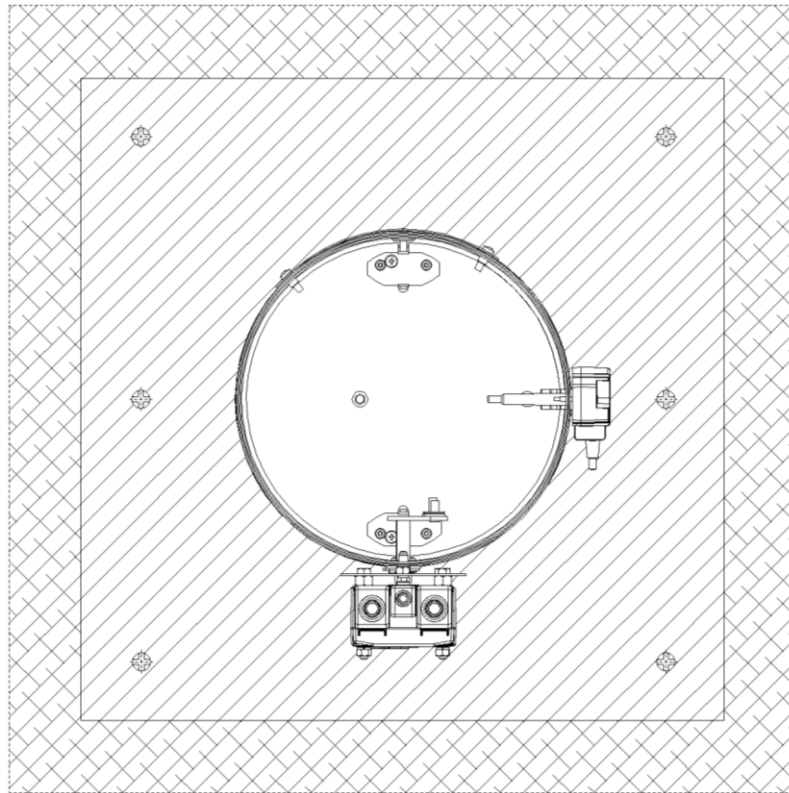


Figure 16. Installation method of fire dampers KTM-O in flexible wall with vertical rotation axis of baffle

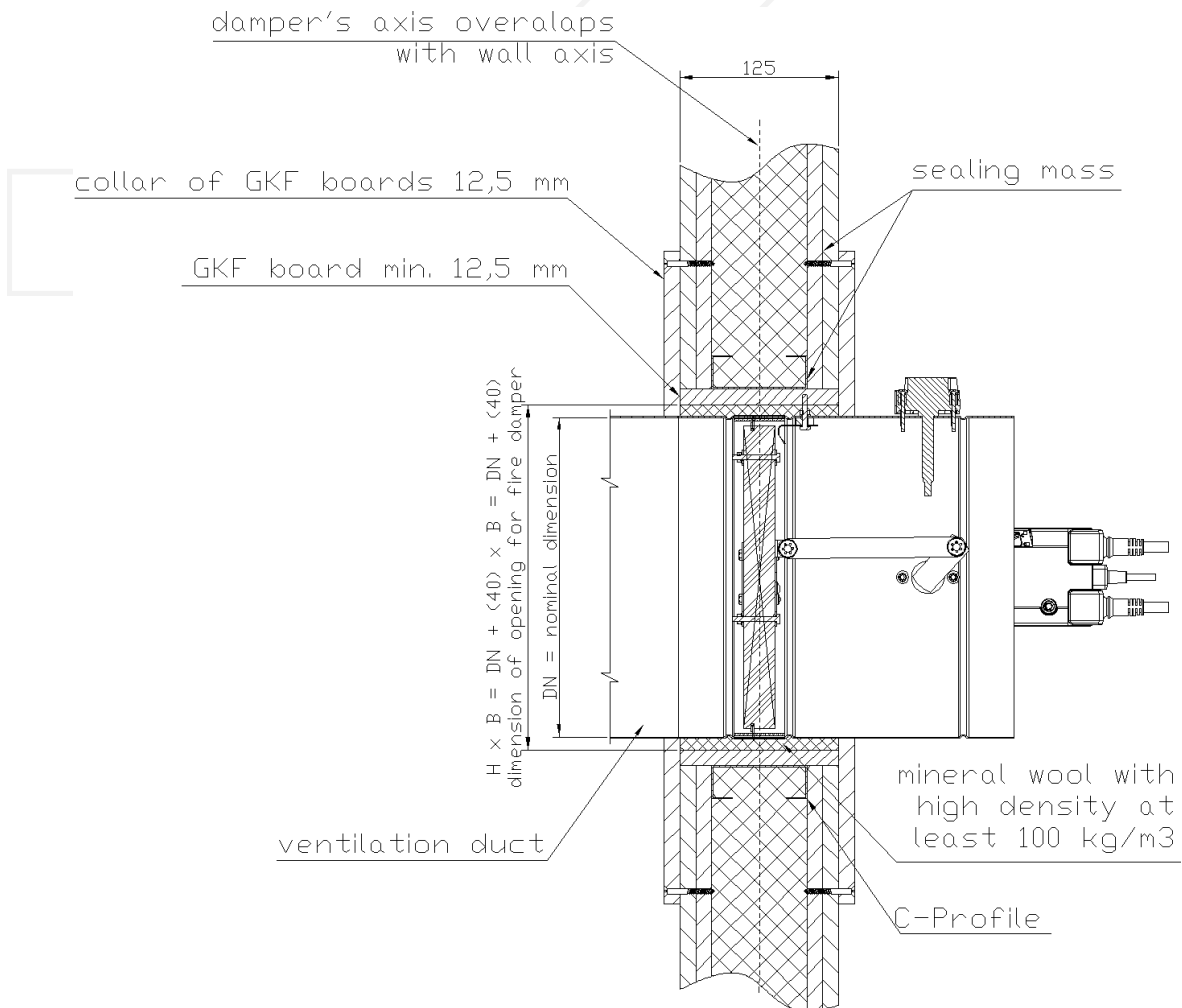


Figure 17. Installation method of fire dampers KTM-O in flexible wall with 125 mm thickness

7.4. INSTALLATION TECHNOLOGY – FLEXIBLE WALL WITH ONE-SIDED ACCESS

- Make an opening in the wall with the 40 [mm] (acceptable $40 \div 80$ [mm]) greater than the nominal dimensions of the fire damper: $B=DN+40$ and $H=DN+40$. The opening of the external GKF board on the side without access should have a dimension equal to the nominal dimension DN of the damper.
- Make a frame of two layers of GKF boards, 12,5 mm thick and the width relative to the width of opening, mounting by screws remembering to carefully seal the contact edges with a mastic: Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the wall (Fig. 18), and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the wall with non-flammable mineral wool of high density, 100 kg/m³ or more.
- Seal the place of filling with mineral wool using the sealing compounds Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Mount collar, both side of wall, made of GKF boards, 12,5 mm thick and DN+ 320 mm wide, using screws (with a cut hole for the damper). For easy assembly, the collar can be made of two parts.
- After mounting the collar, remove the supports or suspension, check the fire damper correct operation and leave it in open position (installing in KTM-O damper thermal fuse as shown on the fig. 6).

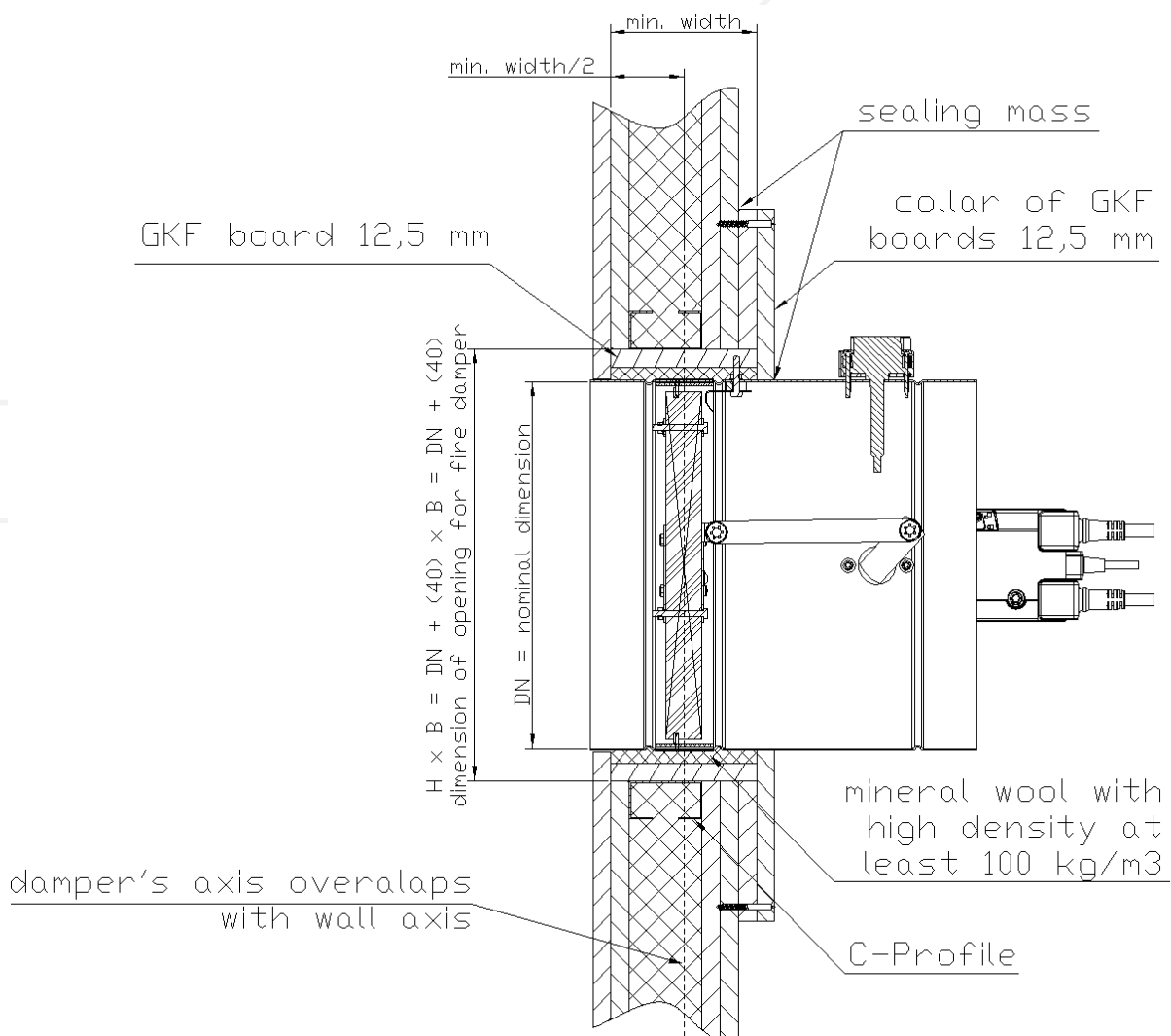


Figure 18. Installation method of fire dampers KTM-O in flexible walls structures one-sided access

7.5. INSTALLATION TECHNOLOGY – WALL AND CEILING STRUCTURES OF GREAT THICKNESS

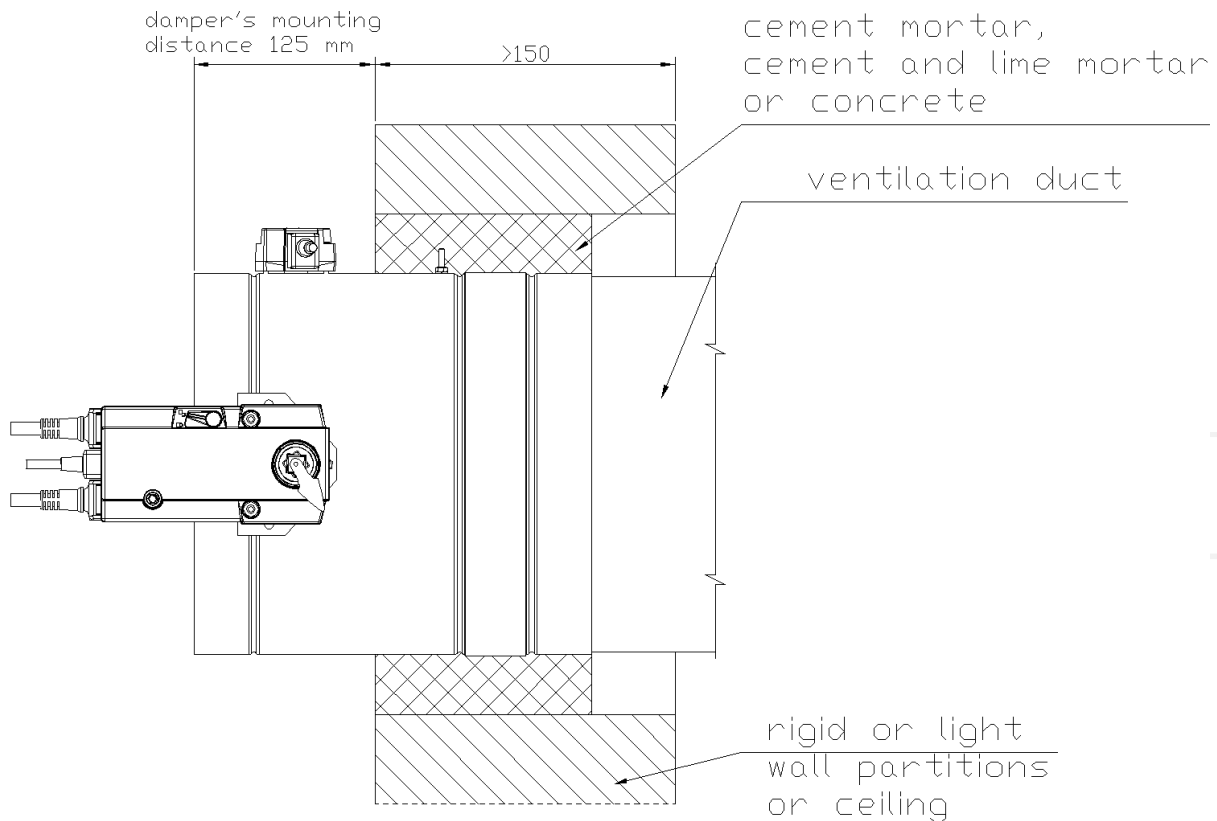


Figure 19. Installation method of fire dampers KTM-O in structures thicker than 150 mm

In rigid and flexible wall construction and in ceiling with thickness less or equal to 150 mm, KTM-O fire dampers are mounted in such a way that the damper baffle axis coincides with the axis of the wall or ceiling.

Whereas in case of walls and ceilings with thickness higher than 150 mm: the KTM-O fire dampers are mounted in such a way, that the damper installation limit i.e. 125 mm, is maintained (as in figure 19).

7.6. INSTALLATION TECHNOLOGY – MONTAGE AWAY FROM RIGID WALL

- Make an opening in the wall with the dimensions 100 [mm] greater than the nominal dimensions of the fire damper DN+100.
- Push the ventilation duct into the installation opening and support or suspend it so that the channel and opening alignment are maintained.
- Install the closed damper to the ventilation duct, additionally support or suspend it.
- On the mineral wool coverage section, apply 1mm PROMASTOP CC (made by PROMAT) layer.
- The PROMASTOP CC layer has to be applied on fire barrier in the place where the wool was sealed on both sides, with a size about DN + 320.
- Wrap the ventilation duct and the damper at the appropriate length of mineral wool with high density at least 100 kg/m³.
- When the mineral wool is mounted, check correct functionality of the damper, then leave it in the open position.
- The maximum length of the duct is L=1000 mm.

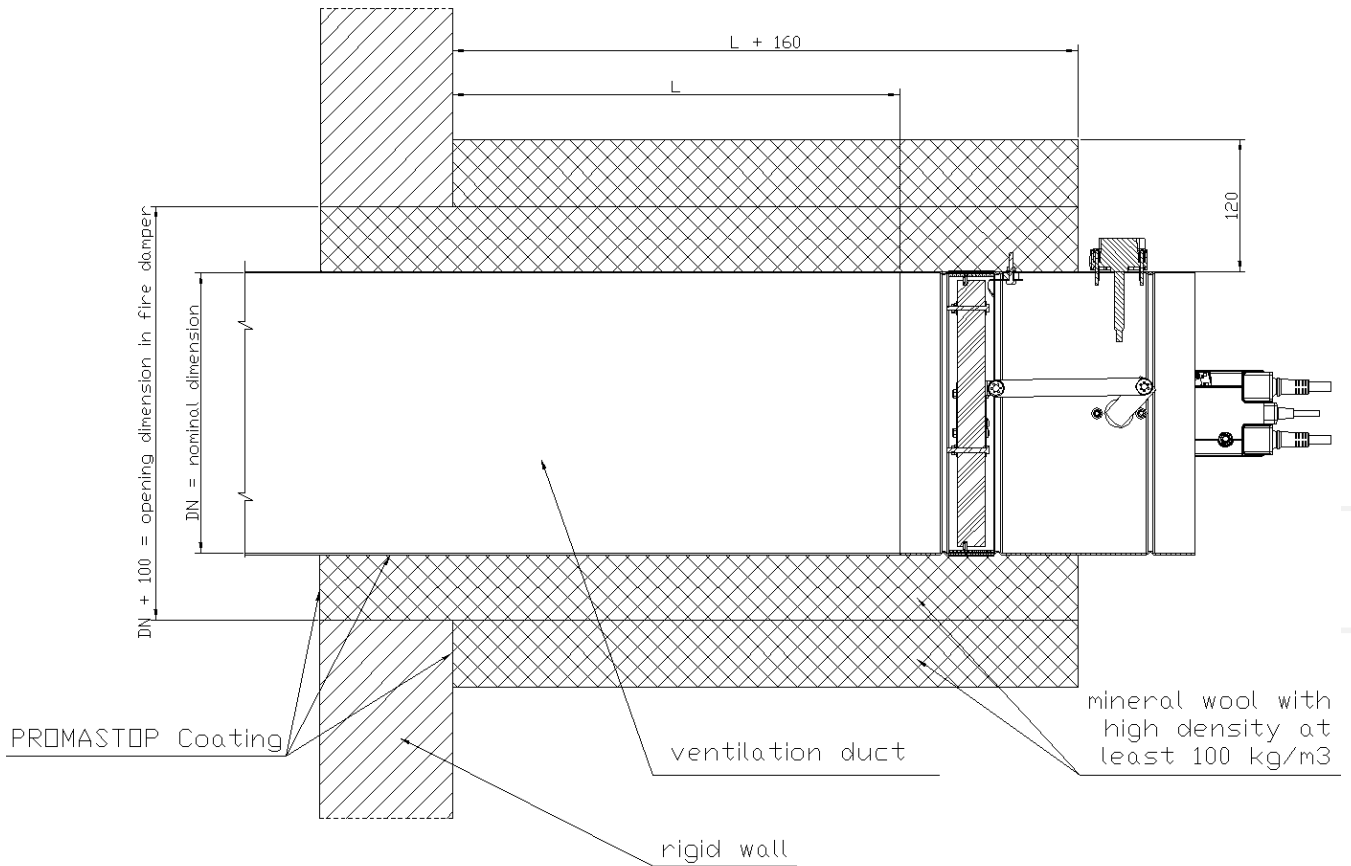


Figure 20. Installation method of KTM-O fire dampers away from wall construction.

7.7. INSTALLATION TECHNOLOGY – INSTALLATION WITH MINIMUM DISTANCES

A. RIGID WALL – INSTALLATION USING MORTAR

- Make an opening in the wall with the 40 [mm] (acceptable 40 ÷ 80 [mm]) greater than the nominal dimensions of the fire damper: $B=DN+40$ and $H=DN+40$, alternatively round holes with diameter $DN+40$.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the wall, and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the wall with non-flammable mineral wool of high density, 100 kg/m³ or more.
- Install using screws, on the actuator side a collar made of GKF boards 15 mm thick with the resulting dimensions (Fig. 22, 24, 26, 28) depending on the number of fire dampers and the distance from the ceiling and/or wall (with the opening for the fire dampers. For simple assembly, the frame can be made of two parts.
- After mounting the collar, remove the supports or suspension, check the fire damper correct operation and leave it in open position (installing in KTM-O damper thermal fuse as shown on the fig. 6).
- After the mortar has dried, apply a 1 mm thick layer of Promastop coating fireproofing compound to the other side of the building partition.

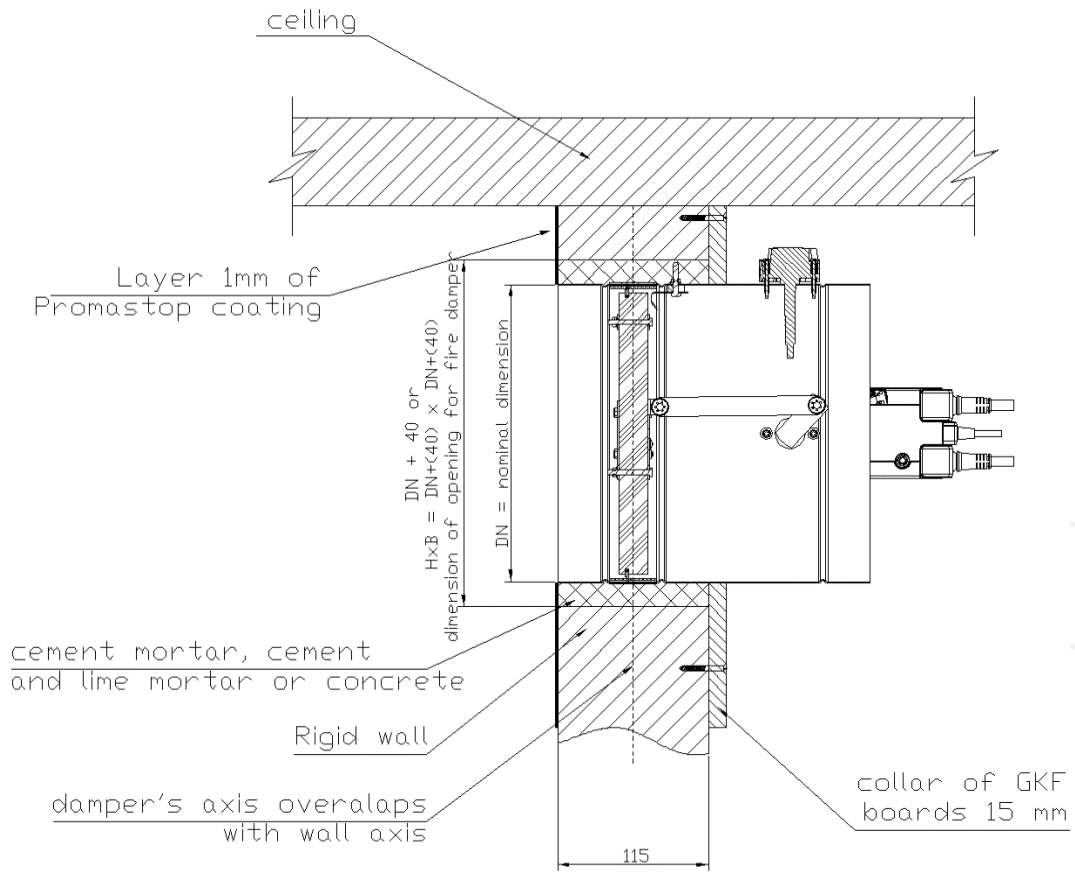


Figure 21. Installation method of KTM-O with minimum distances from adjacent fire dampers and from the ceiling.

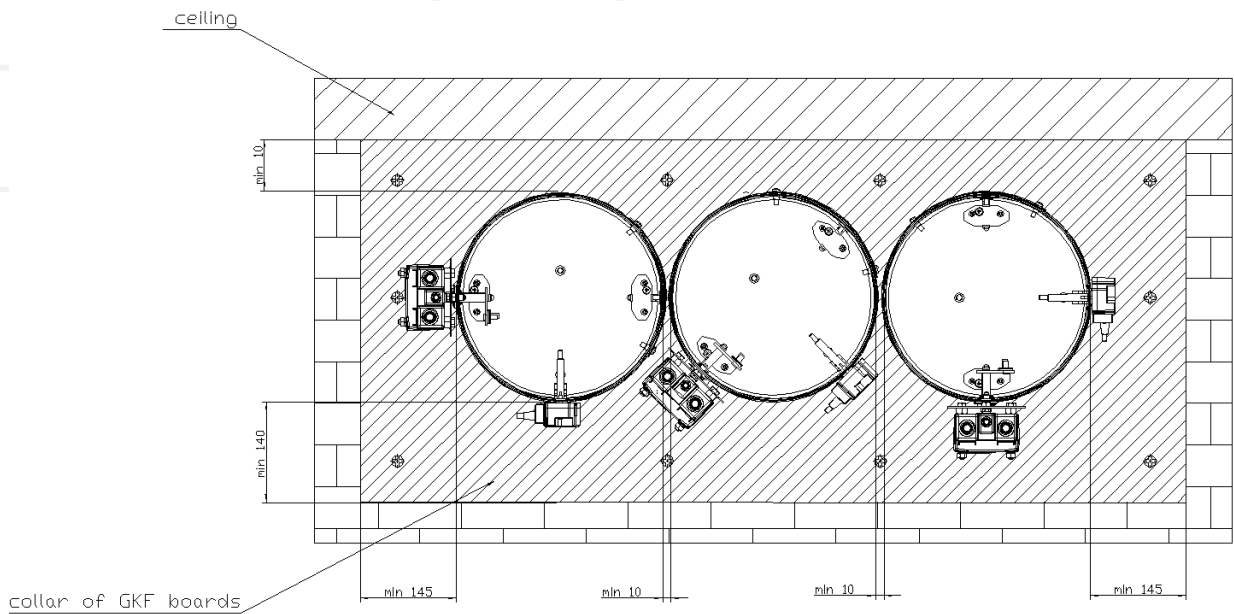


Figure 22. Installation method of KTM-O with minimum distances from adjacent fire dampers and from the ceiling.

B. RIGID WALL – INSTALLATION USING MORTAR

- Make an opening in the wall with the 40 [mm] (acceptable $40 \div 80$ [mm]) greater than the nominal dimensions of the fire damper: $B=DN+40$ and $H=DN+40$, alternatively round holes with diameter $DN+40$.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the wall, and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the wall with non-flammable mineral wool of high density, 100 kg/m³ or more.
- Seal the place of filling with mineral wool using the sealing compounds Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Mount collar, both side of wall, made of GKF boards, 12,5 mm thick and $DN+320$ mm wide, using screws (with a cut hole for the damper). For easy assembly, the collar can be made of two parts.
- Install using screws, on the actuator side a collar made of GKF boards 15 mm thick with the resulting dimensions (Fig. 22, 24, 26, 28) depending on the number of fire dampers and the distance from the ceiling and/or wall (with the opening for the fire dampers. For simple assembly, the frame can be made of two parts.
- After mounting the collar, remove the supports or suspension, check the fire damper correct operation and leave it in open position (installing in KTM-O damper thermal fuse as shown on the fig. 6).
- After the mortar has dried, apply a 1 mm thick layer of Promastop coating fireproofing compound to the other side of the building partition.

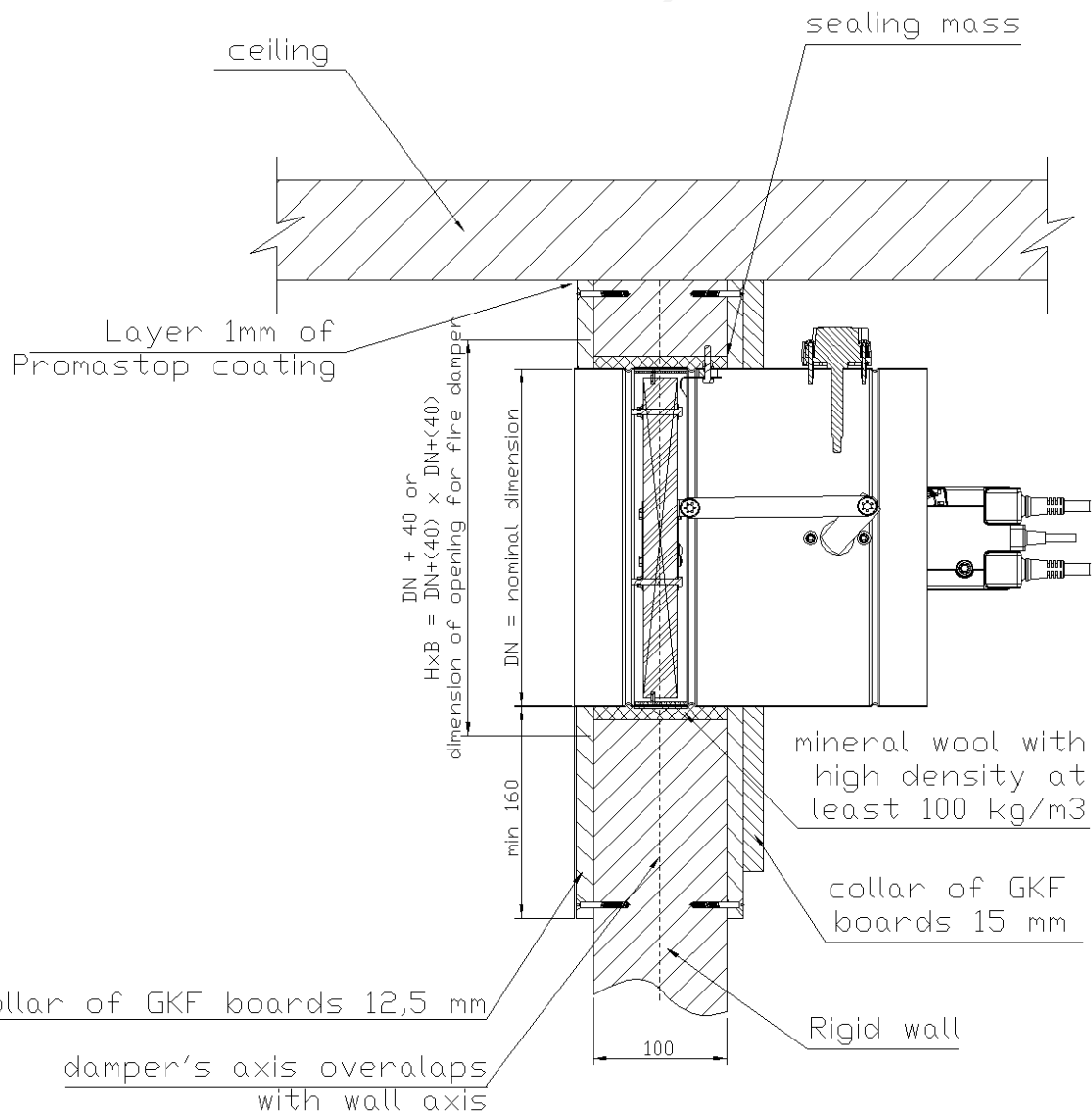


Figure 23. Installation method of KTM-O with minimum distances from adjacent building partition.

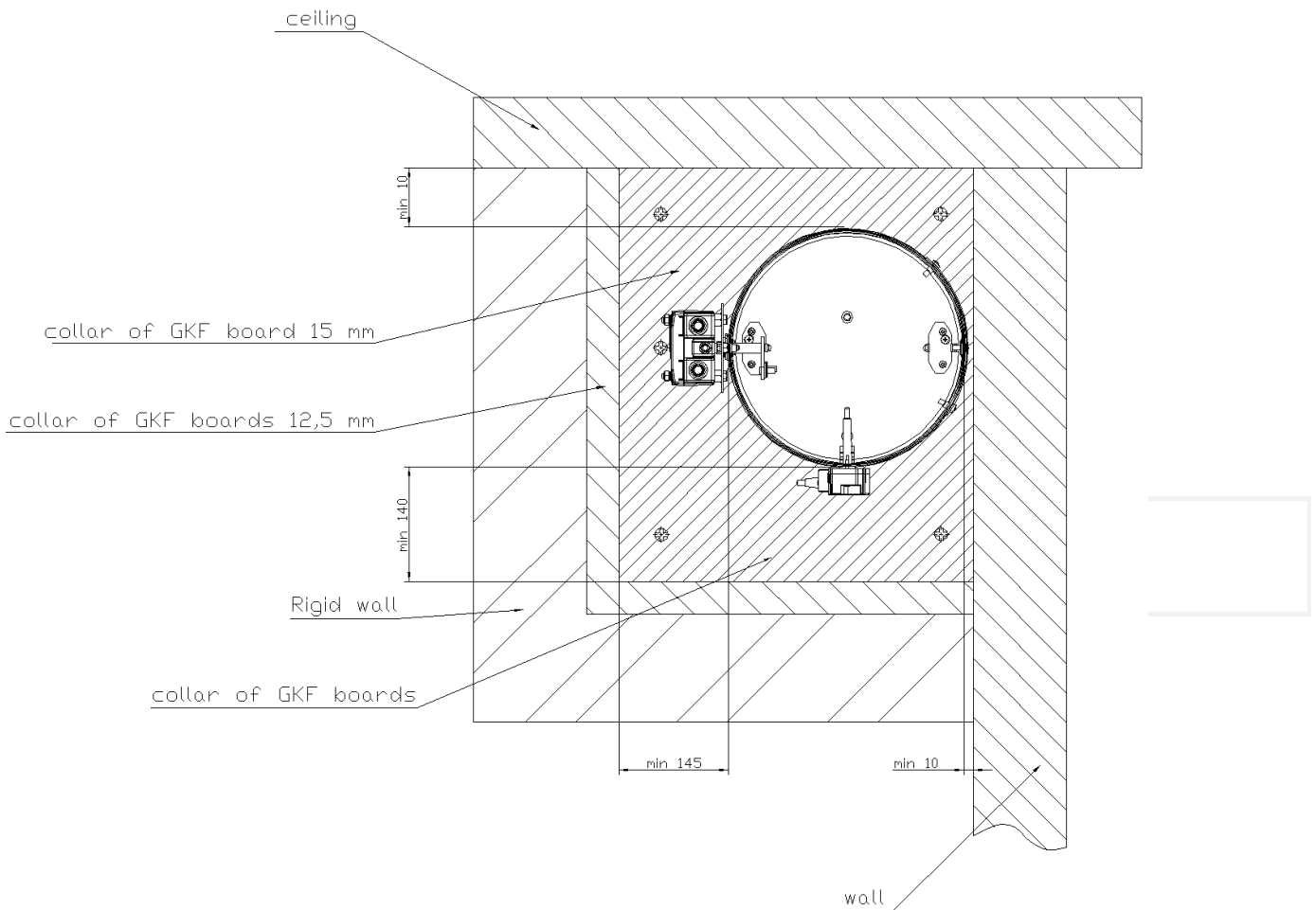


Figure 24. Installation method of KTM-O with minimum distances from adjacent building partition.

C. FLEXIBLE WALL

- Make an opening in the wall with the 40 [mm] (acceptable $40 \div 80$ [mm]) greater than the nominal dimensions of the fire damper: $B=DN+40$ and $H=DN+40$, alternatively round holes with diameter $DN+40$.
- Make a frame of two layers of GKF boards, 12,5 mm thick and the width relative to the width of opening, mounting by screws remembering to carefully seal the contact edges with a mastic: Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Put the closed fire damper into the installation opening and support or suspend, in this way that an axis of the fire baffle matches the axis of the wall, and ensure a concentricity of fire damper and installation opening.
- After setting the fire damper as described, fill the gap between the fire damper and the wall with non-flammable mineral wool of high density, 100 kg/m³ or more.
- Seal the place of filling with mineral wool using the sealing compounds Hilti Firestop Coating CP 673, Promastop-CC, Promaseal-Mastic or Soudal Firesilicone B1 FR.
- Mount collar, both side of wall, made of GKF boards, 12,5 mm thick and $DN+ 320$ mm wide, using screws (with a cut hole for the damper). For easy assembly, the collar can be made of two parts.
- Install using screws, on the actuator side a collar made of GKF boards 15 mm thick with the resulting dimensions (Fig. 22, 24, 26, 28) depending on the number of fire dampers and the distance from the ceiling and/or wall (with the opening for the fire dampers. For simple assembly, the frame can be made of two parts.
- After mounting the collar, remove the supports or suspension, check the fire damper correct operation and leave it in open position (installing in KTM-O damper thermal fuse as shown on the fig. 6).
- After the mortar has dried, apply a 1 mm thick layer of Promastop coating fireproofing compound to the other side of the building partition.

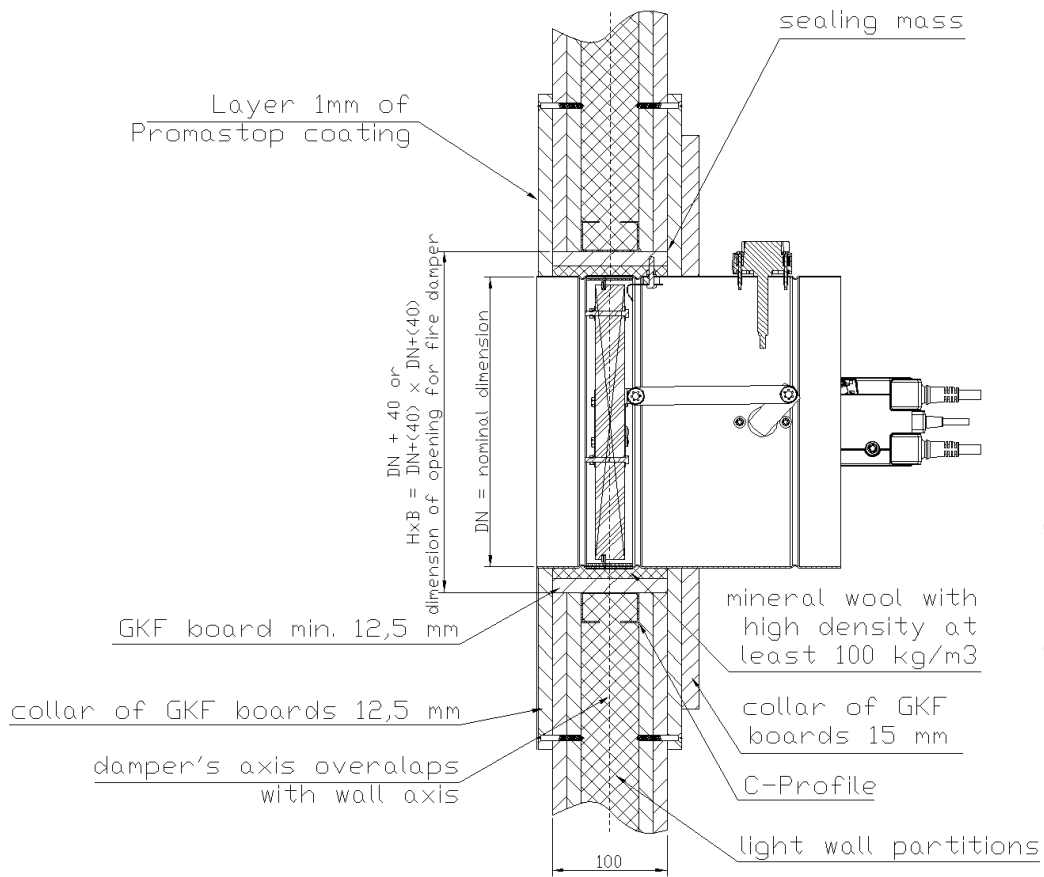


Figure 25. Installation method of KTM-O with minimum distances from wall.

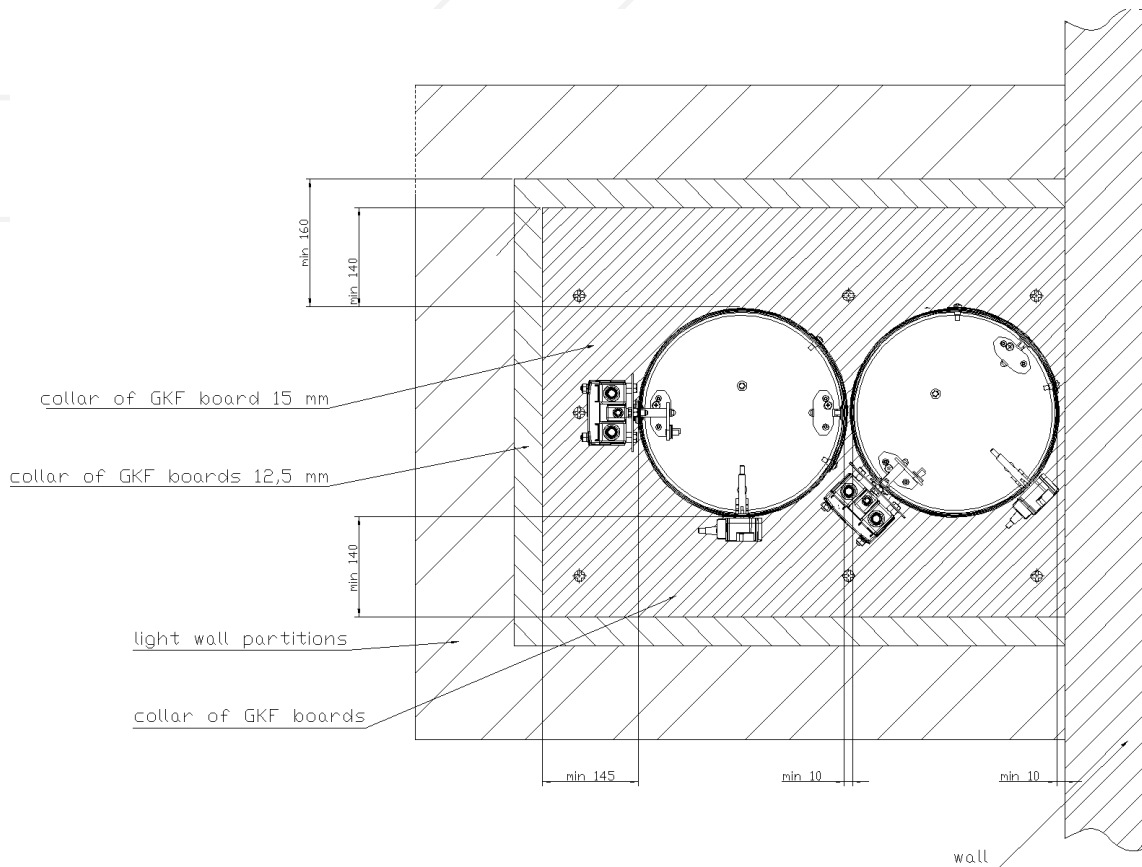


Figure 26. Installation method of KTM-O with minimum distances from wall.

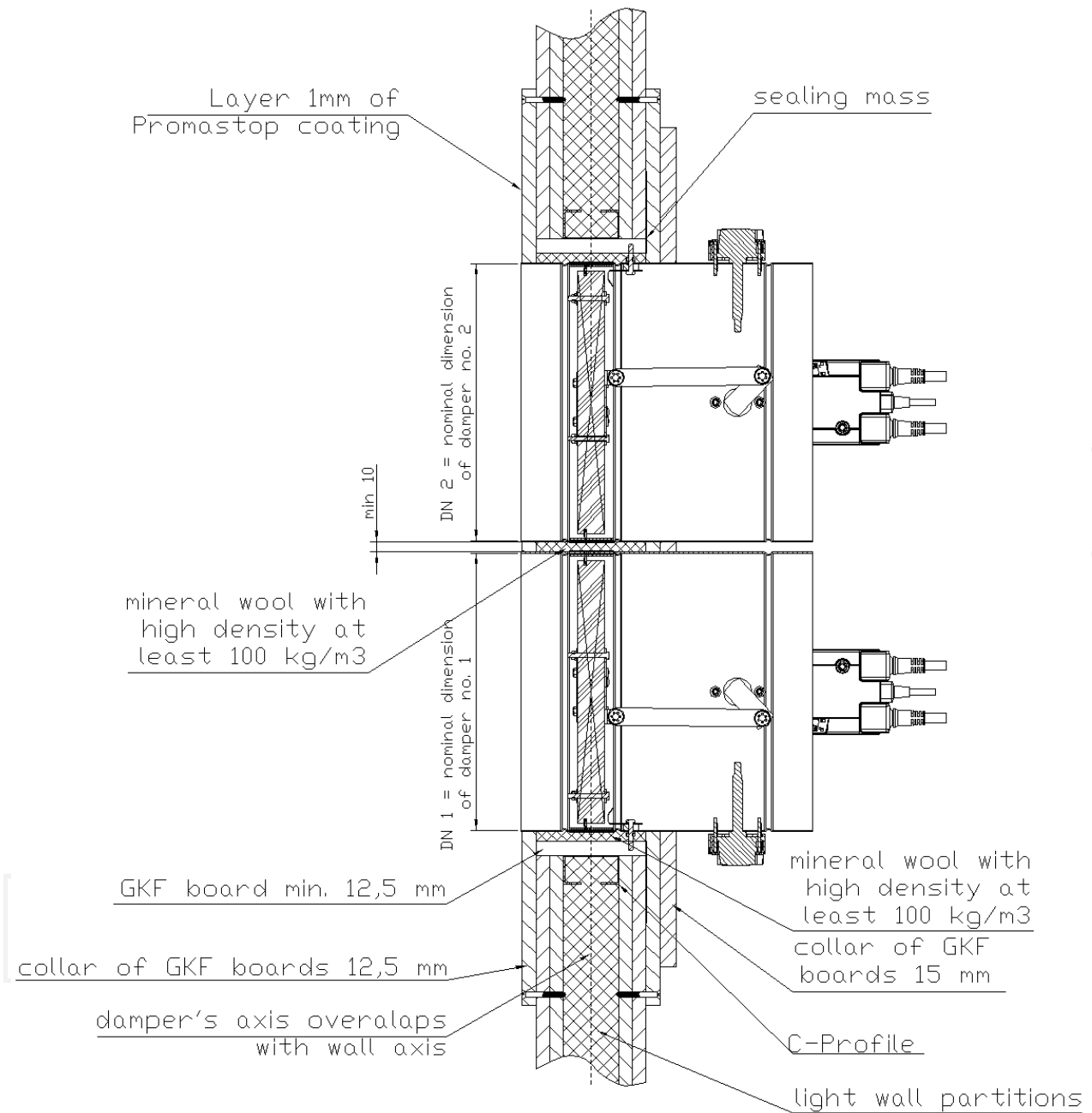


Figure 27. Installation method of KTM-O with minimum distances from adjacent fire dampers.

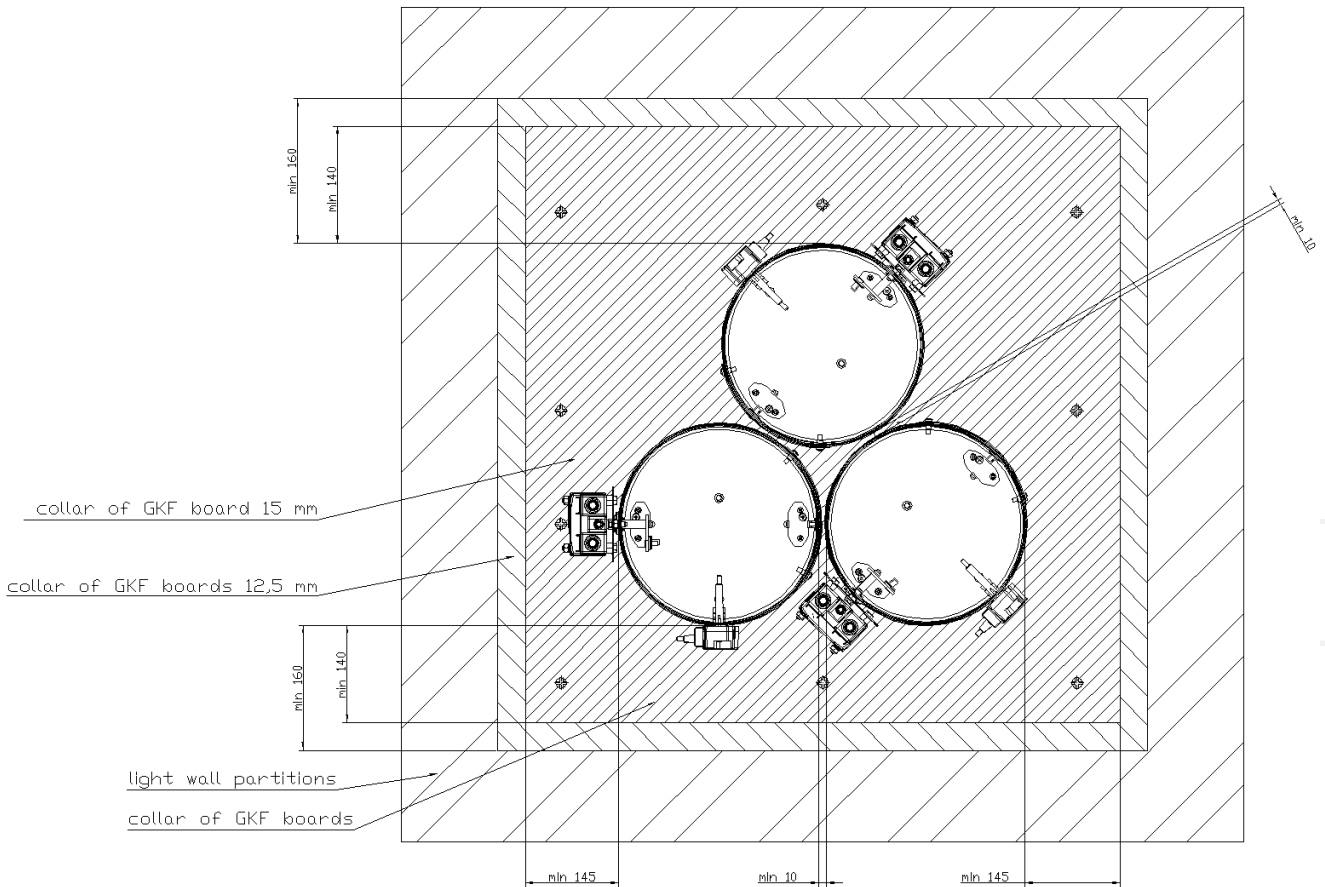


Figure 28. Installation method of KTM-O with minimum distances from adjacent fire dampers.

The examples provided in subsection 7.7 are applicable to both rigid and flexible walls. When considering individual solutions, attention should be paid to the construction method specific to each wall. A common element for every standard thickness construction is an additional flange made of 15 mm thick GKF board.

8. CONNECTION DIAGRAM OF LIMIT SWITCHES IN THE KTM-O DAMPER

Microswitches D2SW-3L2M (OMRON) are used in KTM-O fire dampers as limit switches to signal the baffle position. By the microswitch it is possible to connect two circuits, normally closed and normally open (closing only at the moment of contact with baffle),

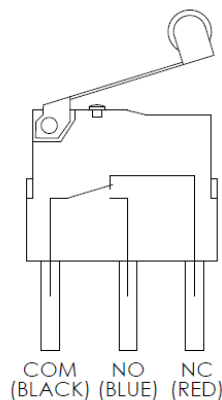


Figure 29. Connection diagram of D2SW-3L2M limit switches

9. PRINCIPLE OF MAINTENANCE

Before started any operation and maintenance works it is recommended to get to know with this documentation. This responsibility falls mostly on workers which will operate device/systems during operation and service works. In case of lack of trained personnel (which have specific technical skills) service works should be made by SMAY Service or SMAY Authorized service.

Damage to the KTM-O damper resulting from non-compliance with the guidelines included in this documentation, will not be subject to warranty repairs.

Exchange and modification of device components can be done, just by SMAY Service or SMAY Authorized service (does not apply to exchange thermal fuse).

Factory sealed elements, should have undamaged, original seals, installed by SMAY Service or SMAY Authorized service.

After installation of the KTM-O fire damper, when running the system, it is recommended to carry out regular checks and record them as shown in table below. It is recommended to repeat checks at intervals or at least once every 6 months.

In order to check the proper functioning of fire damper, in particular:

- a. KTM-O-E fire damper
 - Make a visual inspection of the interior of fire damper, determine the condition of the baffle and seal, whether there are no damage or dirt that could block the fire baffle during closing.
 - Check the fire damper without disconnecting the supply voltage from the actuator
 - The opening and closing test should be carried out by positioning the baffle from control system („open“ and „closed“ position read on the position indicator located on the actuator).
 - After doing the above, leave the fire damper in the open position.
 - Make a control protocol.

- b. KTM-O-S fire damper
 - Make a visual inspection of the interior of fire damper, determine the condition of the baffle and seal, whether there are no damage or dirt that could block the fire baffle during closing.
 - Check the wiring of the limit switches
 - If thermal fuse is installed, take it off and check correct closing of the baffle. Check if the baffle is stationary after closed.
 - After doing the above, leave the fire damper in the open position, installing thermal fuse thermal fuse on „L-type“ screw.
 - Make a control protocol.

In the housing of fire damper there is an inspection opening, which enables making an inspection and checking the condition of the drive system. Inspection opening is sealed by ceramic gasket and it is installed by M5x16 screws.



Figure 30. Inspection opening in KTM-O damper

Fire damper can be cleaned with a dry or damp cloth. Dirt and other pollution can be cleaned with generally available cleaners. Do not use aggressive, caustic cleaners and sharp tools.

Table 3. Recommended checks

Fire damper type	
Control date	
Check actuator wiring condition, if doesn't damaged	
Check limit switch wiring condition, if doesn't damaged	
Check cleanliness in fire damper, clean if necessary	
Check baffle and seal condition, if necessary report a problem	
Confirm correct operation of safe shutdown of the fire damper, if necessary report a problem	
Confirm correct operation of the fire damper when OPEN and CLOSE, using the control system and physical observation	
Confirm correct operation of limit switches in OPEN and CLOSED positions, if necessary report a problem	
Confirm that the fire damper meets its function as a part of the control system	
Confirm that the fire damper remains its working position	
ATTENTION: Fire dampers are usually part of ventilation system. In this case, the entire system should be checked according to the operating and maintenance requirements.	

Table 4. Diagnostic card

Diagnostic card			
No.	Symptoms of malfunction	Causes of malfunction	How to remove malfunction
1	No signaling opening/closing fire damper	1. Failure to fully open the baffle (wrong connected ventilation duct) 2. Improperly connected wires of limit switch 3. Damaged actuator	1. Removing the cause of blocking baffle 2. Correct wiring 3. Replacing the actuator with a new one (after consulting with fire damper's manufacturer)
2	No actuator response after connecting power	1. Damaged actuator 2. Damaged temperature sensor 3. Locked baffle	1. Replacing the actuator with a new one (after consulting with fire damper's manufacturer) 2. Replacing the temperature sensor to a new one 3. Removing the cause of blocking baffle
3	No possibility of opening the fire damper with actuator by key	1. Broken mechanism in the actuator (too rapid rotation) 2. Locked baffle	1. Replacing the actuator with a new one (after consulting with fire damper's manufacturer) 2. Removing the cause of blocking baffle

10. TERMS OF WARRANTY

- a. The manufacturer provides guarantee for the delivered product for a period of 24 months from the date of sale or another period agreed in the contract. There is a possibility of extending the guarantee, provided that a separate Maintenance and Service Agreement is signed between the manufacturer and the owner/manager of the facility.
- b. The basis for complaint handling is to file a complaint within the warranty period, within 7 days of the defect being discovered. Make the product available in the state in which it appeared to be defective, together with a detailed description of the technical problem and documents confirming the performance of any inspection provided by the manufacturer and periodic maintenance.
- c. The manufacturer undertakes to remove the defect within 2 working days of receiving the notification. The manufacturer undertakes to remove the defect within 21 working days from the date of receipt of the application together with the complete set of documents, and in the case of necessity to bring in hard-to-reach materials or parts, the repair will be carried out within the shortest technically reasonable time.
- d. The warranty period is extended by the duration of the repair.
- e. The warranty is valid in the cases described in the OWG.
- f. OWG & OWS documents are available on the website www.smay.pl
- g. Above terms of warranty apply only in Poland.