

WKS25

Technical Manual
Installation type with fire resistance class
English
FIRE DAMPER
RECTANGULAR SERIES WKS25 - 500 Pa
Cert. N° 1812-CPR-1046



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1. OVERVIEW

1.1. Description

Fire dampers WKS25 are devices for use in heating, ventilation and air-conditioning (HVAC) systems at fire boundaries to maintain compartmentation and protect means of escape in case of fire. They satisfy integrity, insulation and smoke leakage criteria for the declared time of fire resistance.

Tested and classed in accordance with EN 1366-2 and EN 13501-3 regulations with 500 Pa depression.

Studied and optimized for small size ducts and reduced installation space focusing on aerulic and acoustical performance.

1.3. European Standards applied

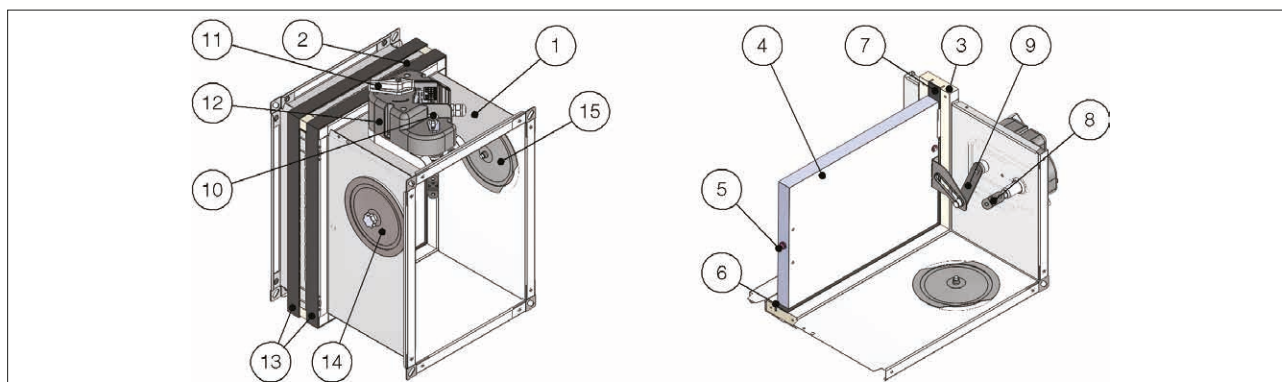
CE certification	EN 15650
Test	EN 1366-2
Classification	EN 13501-3
Thermal fuse reliability	ISO 10294-4
Air tightness	EN 1751
Resistance to corrosive environments	EN 60068-2-52

1.4. Certifications and approvals

CE Certificate of Constancy of Performance	n° 1812-CPR-1046	Efectis
NF certification *Refer to specification Notice Technique NF*	n° 28/06	AFNOR
VKF-AEAI Approval (Switzerland)	n° 25207	VKF-AEAI
RISE Approval (Sweden)	n° SC0197-16	RISE

1.5. Components

1. Casing made from galvanized carbon steel or stainless steel
2. Thermal labyrinth
3. Silicate frame
4. Damper blade made from refracting material
5. Blade pivot
6. Cold smoke air seal gasket
7. Intumescent graphite gasket on inside of casing for the hot seal of the blade once closed
8. Temperature controlled closing device (thermal fuse)
9. Blade actioning device
10. Manual closing device (Test button)
11. Manual reset lever
12. Protection box
13. Intumescent graphite gasket on outside of casing
14. OPTIONAL Inspection opening side 'A' for base ≥ 150 mm
15. OPTIONAL Inspection opening side 'C' for base ≥ 150 mm



1.6. Available dimensions

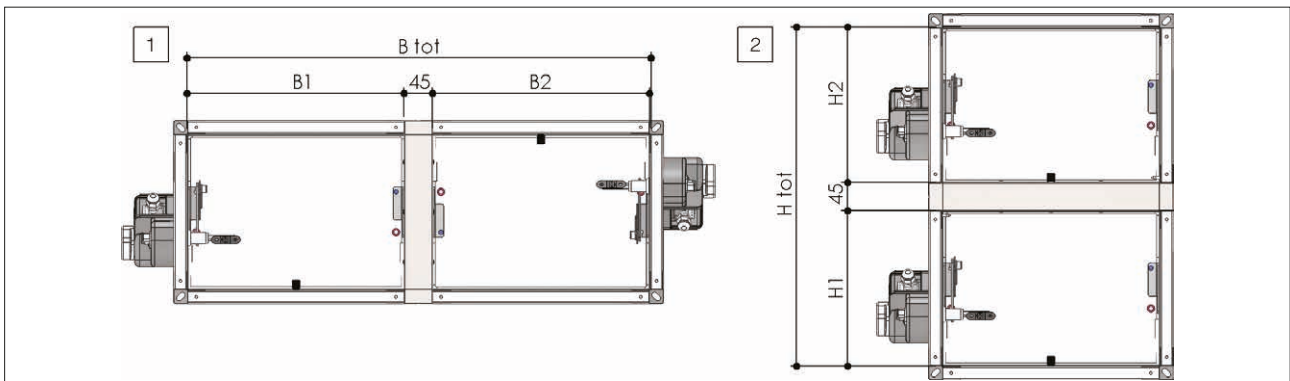
1.6.1. Single fire dampers

Fire dampers are available in all base-height combination indicated below

Base	mm	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Height	mm	200	250	300	350	400	450	500	550	600						

1.6.2. Fire dampers pairing for big ducts dimensions

1. Side by side paired fire dampers
2. Vertically paired fire dampers



Side by side paired fire dampers

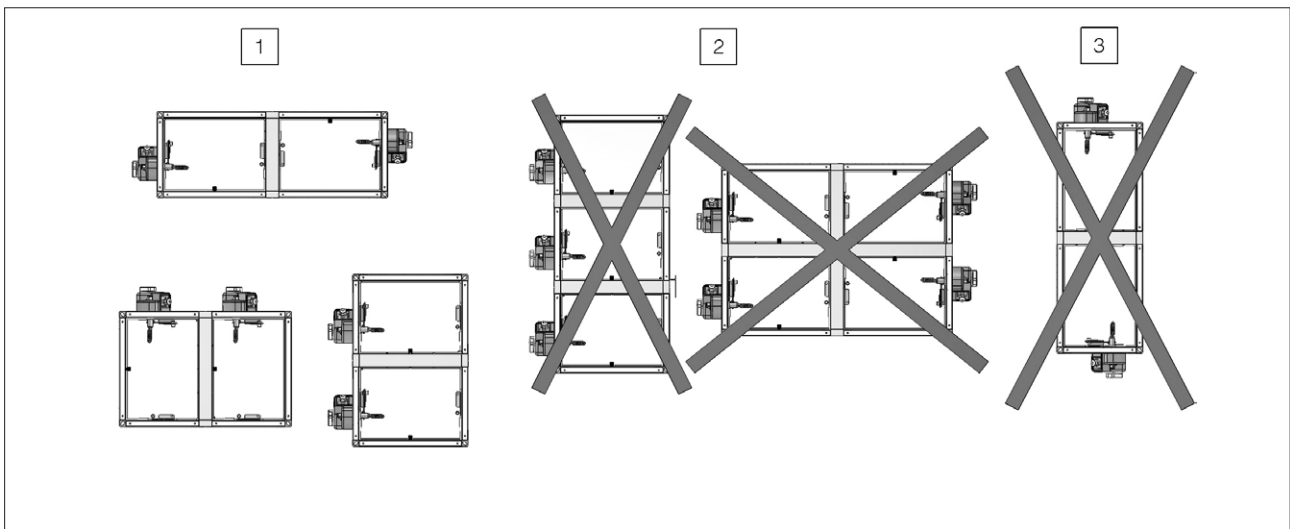
Required base	mm	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
B _{tot}	mm	845	895	945	995	1045	1095	1145	1195	1245	1295	1345	1395	1445	1495	1545	1595	1645
B ₁	mm	400	400	450	450	500	500	550	550	600	600	650	650	700	700	750	750	800
B ₂	mm	400	450	450	500	500	550	550	600	600	650	650	700	700	750	750	800	800

Vertically paired fire dampers

Required height	mm	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250
H _{tot}	mm	645	695	745	795	845	895	945	995	1045	1095	1145	1195	1245
H ₁	mm	300	300	350	350	400	400	450	450	500	500	550	550	600
H ₂	mm	300	350	350	400	400	450	450	500	500	550	550	600	600

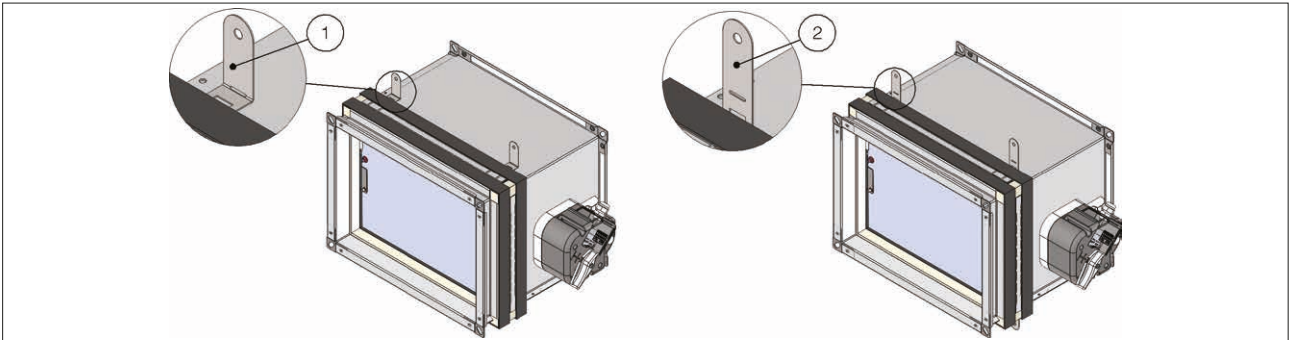
From the requested dimensions, it is possible to identify the closest effective achievable sizes.

1. It is allowed to pair two fire dampers. Maximum paired size: 1645x600, 1245x800, 800x1245.
2. It is forbidden to pair three or more fire dampers.
3. It is forbidden to vertically pair two fire dampers with vertical axis.



1.7. Fixing flaps

1. Bend for walls 100 mm thick or higher
2. Bend for walls 70 mm thick or higher

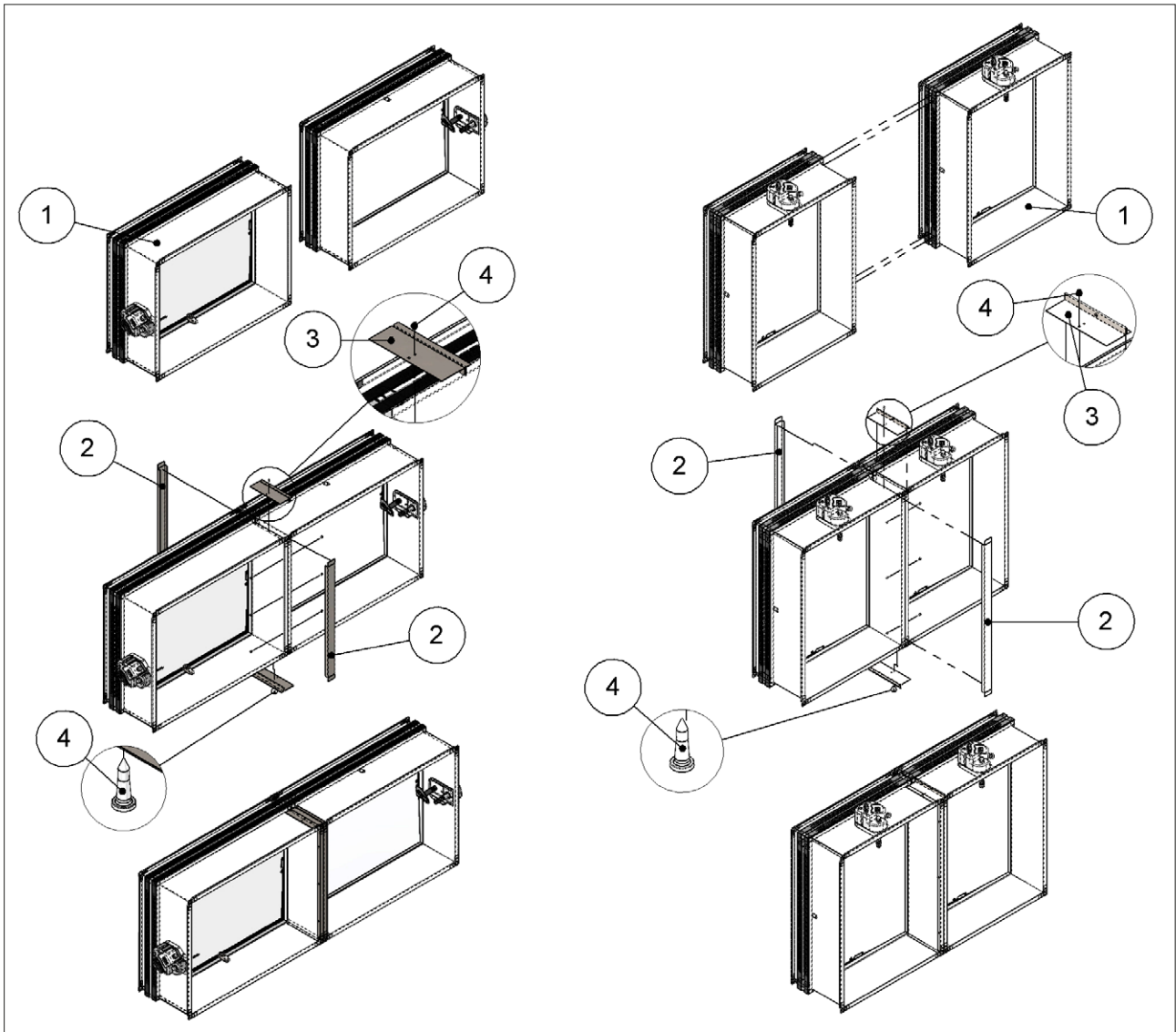


1.8. Fire dampers pairing

The patented WKS25 rectangular fire dampers can be paired side-by-side or vertically (not more than two) using the custom connection kit (see section Accessories and spare parts [p. 45](#)).

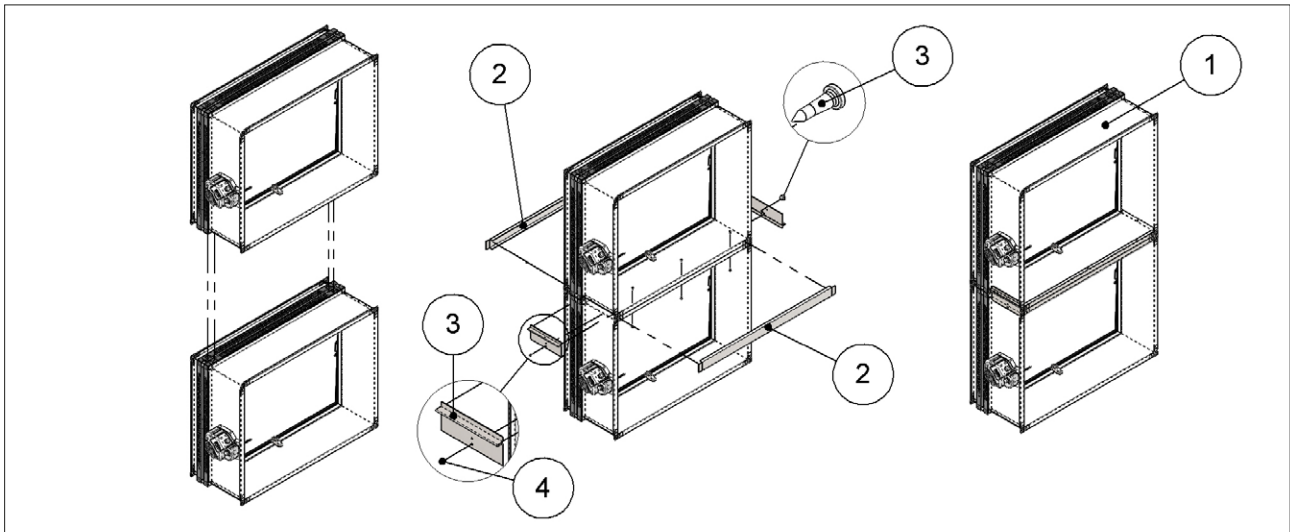
The pair of dampers, may be installed in vertical wall in the same way as a single damper.

1. WKS25 Fire damper
2. Steel profile designed as a function of the pairing length
3. Steel plate
4. Fixing screws



- It is forbidden to pair three or more fire dampers.

1. WKS25 Fire damper
2. Steel profile designed as a function of the pairing length
3. Steel plate
4. Fixing screws



- It is forbidden to pair three or more fire dampers.
- It is forbidden to vertically pair two fire dampers with vertical axis.

1.9. Performances

Performance	Reference standard	Class
Thermal fuse testing	ISO 10294-4	Compliant
Open and Close cycle reliability	EN 15650	Compliant
Resistance to corrosion in humid and saline environments	EN 60068-2-52	Degree of severity 2
Casing tightness	EN 1751	Class C
Blade seal	EN 1751	Class 2 minimum

1.10. Fire resistance classification according to EN 13501-3-2009

		EI 120 S (500 Pa)	EI 90 S (500 Pa)	EI 60 S (500 Pa)	EI 30 S (500 Pa)
Rigid wall	EI 120 S Installation within vertical rigid wall p. 23				
	Wall minimum thickness 100 mm Wall minimum density 550 kg/m ³ Plasterboard and rock wool 100 kg/m ³ sealing ve (i↔o)	D min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600
Flexible wall	EI 120 S Installation within vertical light wall (plasterboard) p. 25				
	Wall minimum thickness 100 mm Wall rock wool density up to 100 kg/m ³ (optional) Plasterboard sealing ve (i↔o)	D min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600
	EI 90 S Installation within vertical light wall (gypsum blocks wall) p. 28				
	Wall minimum thickness 70 mm Wall minimum density 995 kg/m ³ Plasterboard sealing ve (i↔o)	D -	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600
	EI 120 S Installation within vertical light wall (gypsum blocks wall) p. 29				
	Wall minimum thickness 100 mm Wall minimum density 995 kg/m ³ Plasterboard sealing ve (i↔o)	D min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600	B x H min 100 x 200 max 800 x 600

B x H are fire damper minimum and maximum nominal dimensions (base x height) in mm

ve Vertical installation
ho Horizontal installation
(i↔o) Origin of fire irrelevant
Pa Pascal of depression
E Integrity
I Thermal insulation
S Smoke seal
W Wet method sealing
D Dry method sealing
Cert. N° 1812-CPR-1046

1.10.1. Installations within vertical light wall (Shaft wall)

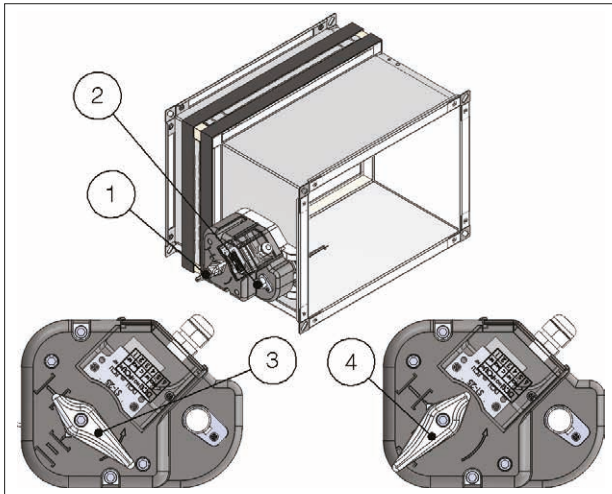
		EI 90 S (300 Pa)	EI 60 S (300 Pa)	EI 30 S (300 Pa)
Flexible wall	EI 90 S Installation within vertical light wall (Shaft wall) p. 31			
	Wall minimum thickness 90 mm Plasterboard sealing ve (i↔o)	D min 100 X 200 max 800 X 600	B X H min 100 X 200 max 800 X 600	B X H min 100 X 200 max 800 X 600

1.11. Mechanism type

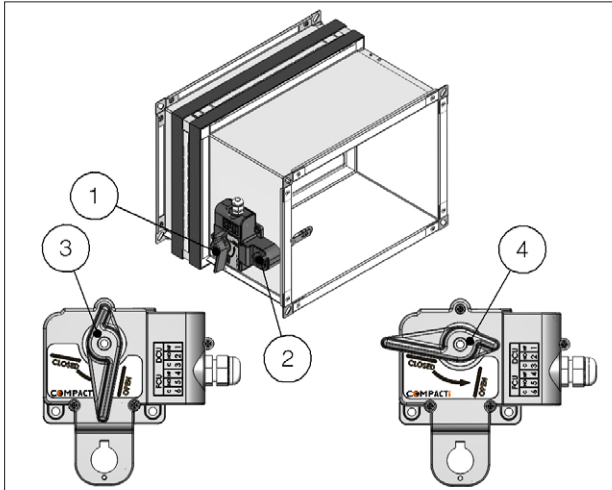
Mechanism type selection must be done according to national legislation and according to building type where fire damper will be installed. In particular it must be considered if fire alarm system or smoke detection system need specific control over the fire damper or if periodic controls (such as opening and closing) are required.

1.11.1. Manual and compact manual

Manual



Compact manual



1. Manual opening lever
2. Manual closing button
3. Lever position when the blade is open
4. Lever position when the blade is closed

Blade closing mode

Automatic closing with thermal fuse.

The control mechanism has a thermosensitive element that automatically closes the blade when the temperature in the duct exceeds 70°C (or 95°C for the fire damper with 95°C thermal fuse).

It is possible to close the damper by pressing the indicated button.

Blade opening mode

Make sure that the damper is open before the ventilation system start-up, otherwise there is a risk of product malfunction.

It is possible to open the damper blade by rotating the lever anticlockwise.

In case of closed damper as a result of the action of the thermosensitive element, it is possible to manually reopen the damper by rotating the lever counterclockwise once the element has been replaced.

Position indication microswitches

On request, the fire damper can be supplied with position microswitches (S2 optional) that signal the blade position (open or closed). Refer to the section Electrical connections [p.32](#) for more details.

Closing by remote control

Not available

Temperature calibration of thermosensitive element for automatic damper closing

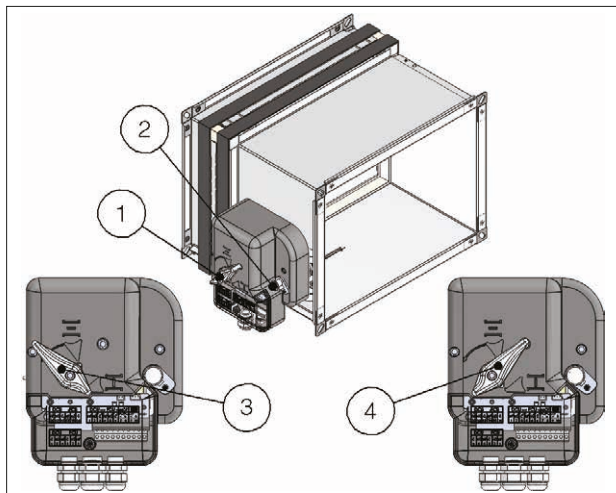
70 °C±7 °C (Standard)

95 °C±9 °C (On request).

CAUTION: The compact mechanism is not interchangeable with other types of manual mechanism.

1.11.2. Manual with magnet

1. Manual opening lever
2. Manual closing button
3. Lever position when the blade is open
4. Lever position when the blade is closed



Blade closing mode

Automatic closing with thermal fuse.

The control mechanism has a thermosensitive element that automatically closes the blade when the temperature in the duct exceeds 70°C (or 95°C for the fire damper with 95°C thermal fuse).

It is possible to close the damper by pressing the indicated button.

It is possible to remotely close the fire damper.

The manual command mechanism with magnet is equipped with an electromagnet which, in case power is interrupted (interruption magnet version) or when power is supplied (input magnet version), commands the closing of the damper.

Blade opening mode

Make sure that the damper is open before the ventilation system start-up, otherwise there is a risk of product malfunction.

In case of closed damper by pressing the closing button or remotely by electromagnet, it is possible to manually open the fire damper blade by rotating the lever anticlockwise. In case of closed damper as a result of the action of the thermosensitive element, it is possible to manually reopen the damper by rotating the lever counterclockwise once the element has been replaced.

Position indication microswitches

It is advisable to install the fire damper with position microswitches (S2 optional) which signal the position of the blade (open or closed). Refer to the section Electrical connections [p. 32](#) for more details.

Closing by remote control

With power supply input or interruption magnet.

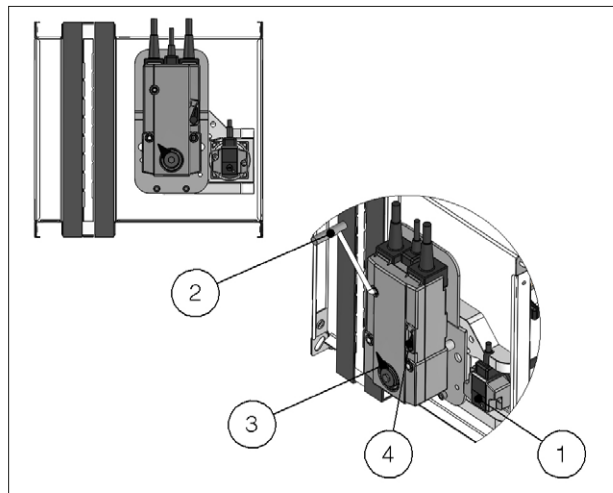
Temperature calibration of thermosensitive element for automatic damper closing

70 °C±7 °C (Standard)

95 °C±9 °C (On request).

1.11.3. Belimo motorized version

1. Manual closing switch
2. Manual opening lever
3. Position indicator
4. Blade locking lever



Blade closing mode

Automatic closing with thermal fuse.

The control mechanism has a thermosensitive element that automatically closes the blade when the temperature in the duct or in the room exceeds 72°C (or 95°C for the 95°C version).

To close the damper when the motor is connected, press the switch on the temperature sensor or cut off the power supply.

Blade opening mode

Make sure that the damper is open before the ventilation system start-up, otherwise there is a risk of product malfunction.

To open the damper with the electric motor driven actuator, provide power supply to the motor. Refer to the section Electrical connections [p. 32](#) for further information.

To manually open the damper, use the handle supplied and carefully rotate clockwise to the 90° indicator. To hold the damper in open position operate on the lever indicated in figure.

During the manual opening of the damper, power must not be supplied to the motor.

Position indication microswitches

The motorized versions are supplied with two microswitches to show the blade's position (open or closed). Refer to the section Electrical connections [p. 32](#) for further information.

Closing by remote control

If power to the motor is cut off, the blade will close.

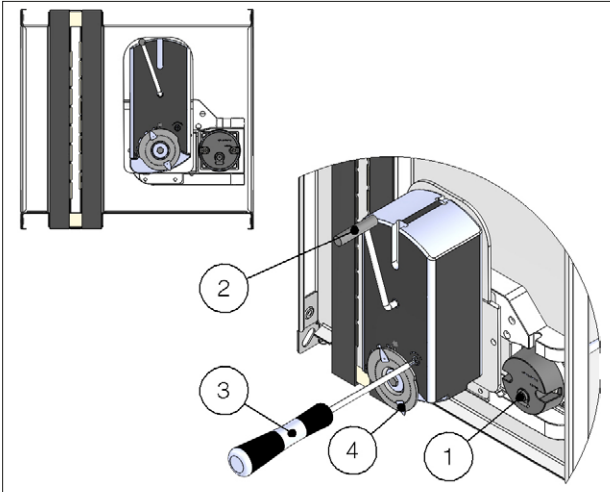
Temperature calibration of thermosensitive element for automatic damper closing

72 °C±7 °C (Standard)

95 °C±9 °C (On request).

1.11.4. Siemens motorized version

1. Manual closing switch
2. Manual opening lever
3. Screwdriver
4. Position indicator



Blade closing mode

Automatic closing with thermal fuse.

The control mechanism has a thermosensitive element that automatically closes the blade when the temperature in the duct or in the room exceeds 72°C (or 95°C for the 95°C version).

To close the damper when the motor is connected, press the switch on the temperature sensor or cut off the power supply.

Blade opening mode

Make sure that the damper is open before the ventilation system start-up, otherwise there is a risk of product malfunction.

To open the damper with the electric motor driven actuator, provide power supply to the motor. Refer to the section Electrical connections [p. 32](#) for further information.

To manually open the damper, use the handle supplied and carefully rotate counterclockwise to the 90 °C indicator. To hold the damper in open position, rotate the screw anticlockwise as shown in the picture.

During the manual opening of the damper, power must not be supplied to the motor.

Position indication microswitches

The motorized versions are supplied with two microswitches to show the blade's position (open or closed). Refer to the section Electrical connections [p. 32](#) for further information.

Closing by remote control

If power to the motor is cut off, the blade will close.

Temperature calibration of thermosensitive element for automatic damper closing

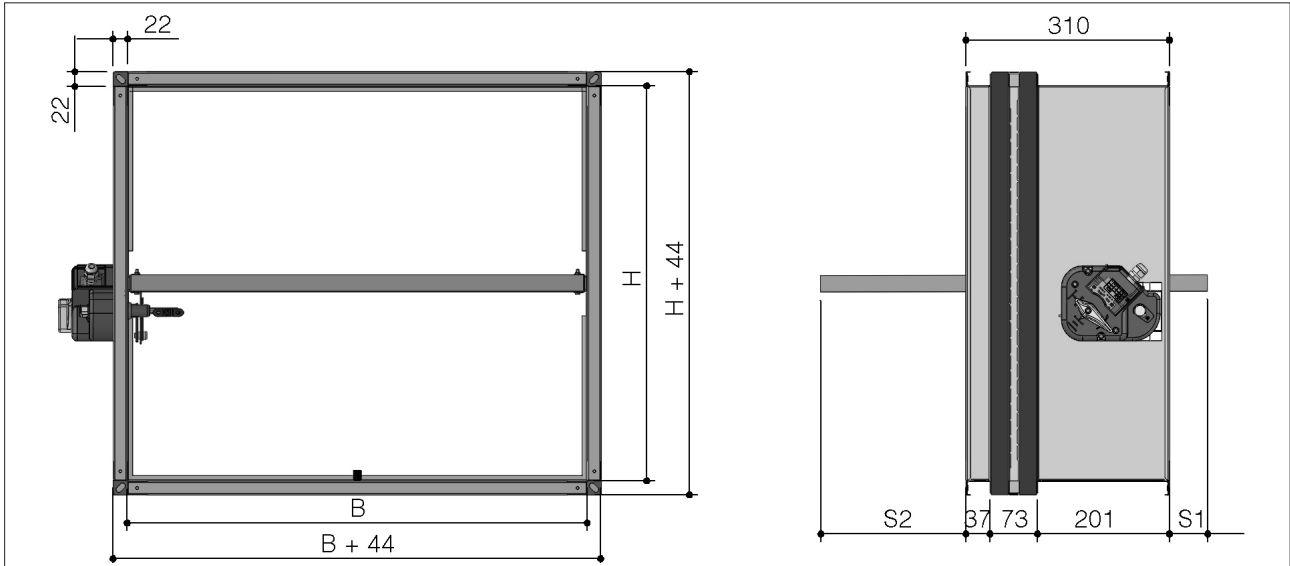
72 °C±7 °C (Standard)

95 °C±9 °C (On request).

2. TECHNICAL DATA

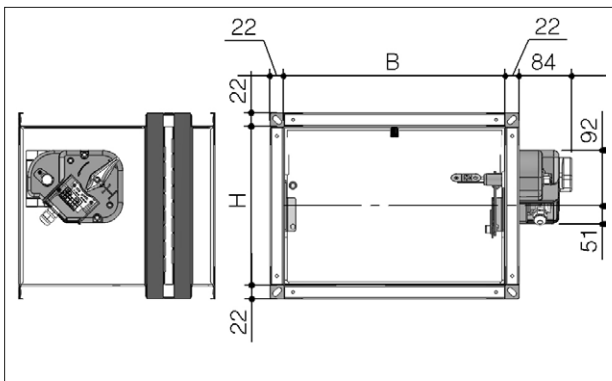
The sizes shown are in mm.

2.1. Dimension

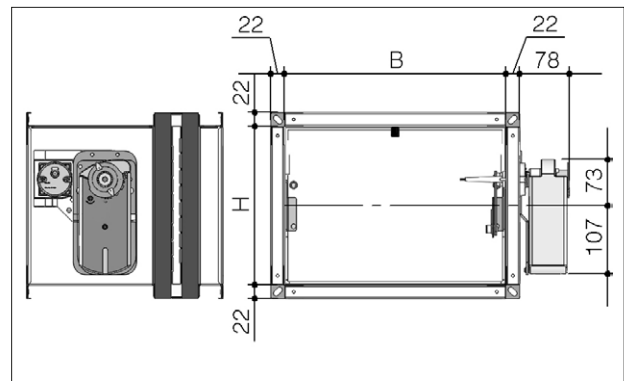


H nominal height	mm	200	250	300	350	400	450	500	550	600
S1 blade exposition	mm	0	0	0	0	0	0	7,5	32,5	57,5
S2 blade exposition	mm	21,5	46,5	71,5	96,5	121,5	146,5	171,5	196,5	221,5

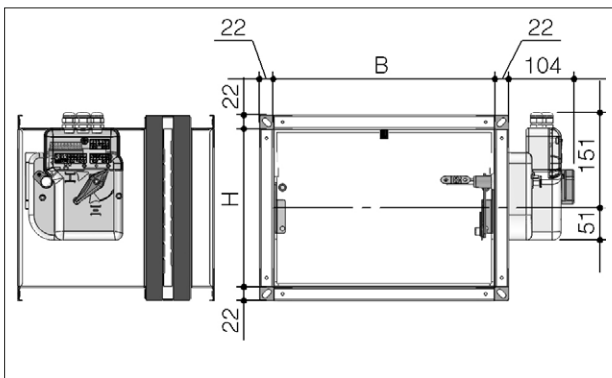
2.1.1. Manual



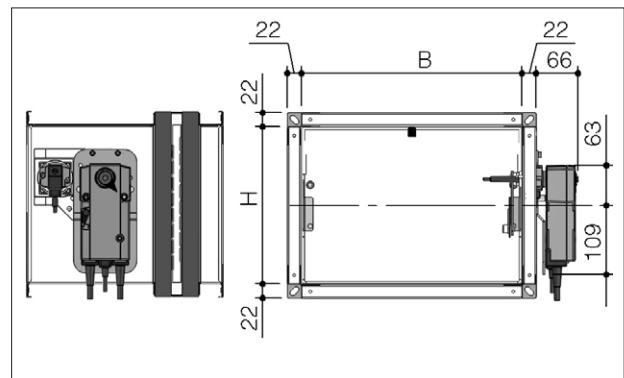
2.1.3. Siemens motorized version



2.1.2. Manual with magnet



2.1.4. Belimo motorized version



2.2. Weights

Base	Height								
	200	250	300	350	400	450	500	550	600
100	4,0	5,0	5,0	6,0	6,0	7,0	7,0	8,0	8,0
150	5,0	6,0	6,0	7,0	7,0	8,0	8,0	9,0	9,0
200	6,0	6,0	7,0	7,0	8,0	9,0	9,0	10,0	10,0
250	6,0	7,0	8,0	8,0	9,0	10,0	10,0	11,0	12,0
300	7,0	8,0	8,0	9,0	10,0	10,0	11,0	12,0	13,0
350	7,0	8,0	9,0	10,0	11,0	11,0	12,0	13,0	14,0
400	8,0	9,0	10,0	11,0	11,0	12,0	13,0	14,0	15,0
450	9,0	10,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0
500	9,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0
550	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0
600	10,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0	20,0
650	11,0	12,0	13,0	15,0	16,0	17,0	18,0	19,0	21,0
700	12,0	13,0	14,0	15,0	17,0	18,0	19,0	21,0	22,0
750	12,0	14,0	15,0	16,0	18,0	19,0	20,0	22,0	23,0
800	13,0	14,0	16,0	17,0	18,0	20,0	21,0	23,0	24,0

Weights in kg

Manual version. Motorized version: +1 kg

3. INSTALLATION

The sizes shown are in mm.

3.1. Intended use

The MP3 fire dampers are "Devices for use in heating, ventilation and air conditioning (HVAC) systems at fire boundaries to maintain compartmentation and protect means of escape in case of fire" according to the 3.1 paragraph of EN 15650:2010 standard.

It is compulsory to install the fire damper according to the instructions indicated in the technical data sheet and manual to maintain the declared performances and, in particular, the fire classes.

Use permitted in any civil and industrial building.

Use permitted in saline atmosphere, for example:

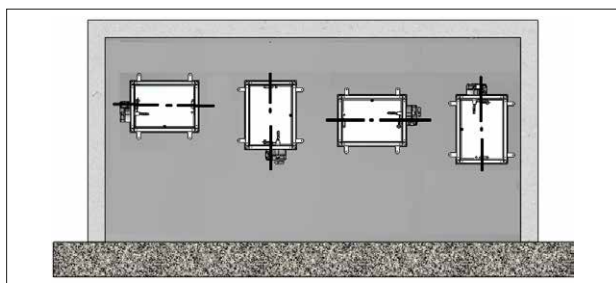
- maritime and port environments;
- fish markets;
- slaughterhouses;
- cheese makers.

3.2. Not allowed uses

- Use with installations different to those described in the technical data sheet and manual;
- use as smoke control damper;
- use as shut off damper;
- use in external environments without adequate protection from atmospheric conditions;
- use in explosive environments;
- use on board of ships;
- use in cooker extraction hoods;
- use in pneumatic conveying systems of dust or corn;
- use in ventilation systems within locations subject to chemical contamination;
- use in non inspectable environments;
- installation in fire resistant false ceilings crossings;
- use in ventilation ducts where condensation can occur.

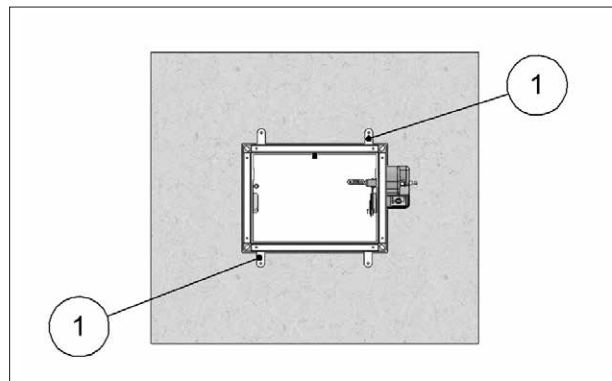
3.3. Blade rotation axis positioning

The fire damper can be installed both with the blade axis positioned vertically or horizontally.



3.4. Positioning brackets before fixing

1. Positioning brackets



3.5. Installation of flexible connectors in order to balance out the ventilation ducts expansion

ATTENTION: the following indications must be considered binding only if legislation or local regulation where the fire dampers are installed require the use of flexible connectors.

Flexible connectors compensate any duct thermal expansion and wall bending in case of fire.

Flexible connectors are used to limit fire damper stresses due to external forces in case of fire and to preserve fire resistance class.

In general it is always appropriate the use of flexible connectors for the followings installations:

- light walls;
- Plasterboard and rock wool or Fire Batt (Weichschott) sealing;
- Applique fixing system.

Flexible connector must be normal flammability and in case of fire the grounding bonding should disconnect to guarantee the complete separation between fire damper and connected air duct.

When flexible connectors made of conductive material (e.g. aluminum) are used, no additional grounding bonding is required.

Despite flexible connector installation, the fire damper must be installed in the construction support so that its weight does not affect damper's installation position both during normal operation and in case of fire.

It is recommended not to compress flexible connectors in the installation phase.

Flexible connector must be at least 100mm long and in order that possible duct thermal expansions are balanced. Take care that the flexible connector does not interfere with opening / closing movement of the blade.

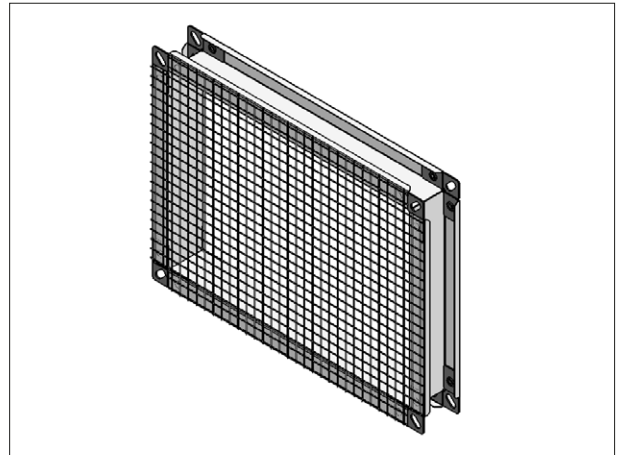
Refer to the section Technical data [p. 13](#) for blade exposition values.

3.6. Transfer Application (application not connected to air ducts on one or both sides)

Note: For this application please refer to national legislation to verify if any specific obligation is required.

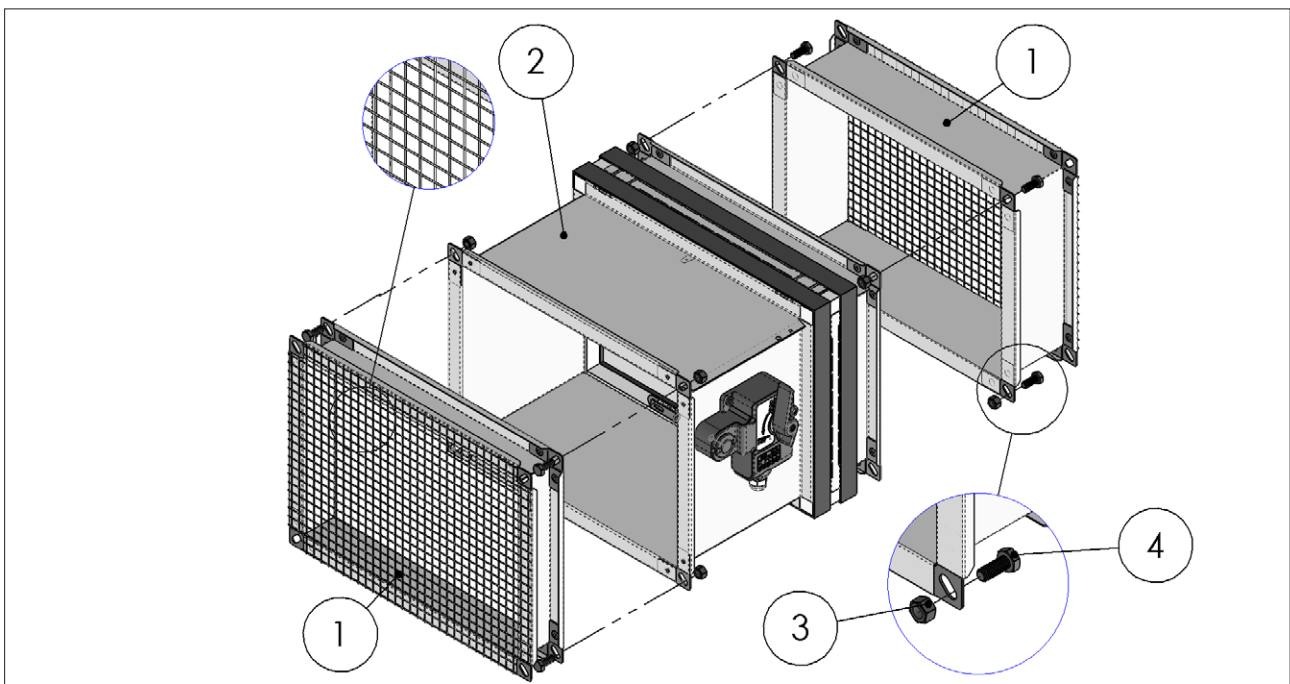
Following tests performed as per EN 1366-2, section 6.3.6 Standard, it is possible to install the fire damper free from air duct from one or both sides.

- Attention: fire resistance classification for transfer application is conform to section Fire resistance classification according to EN 13501-3-2009 p. 9 limited to EI 120S if the ducted classification is higher.
- End cap with mesh shall be mounted on the side not connected to air duct.
- End cap with mesh is made from galvanized steel sheet and includes nuts and screws for fixing on fire damper.
- End cap with mesh is supplied not installed on the fire damper.
- Refer to the section How to order (transfer Application) p. 17 for codes to use.



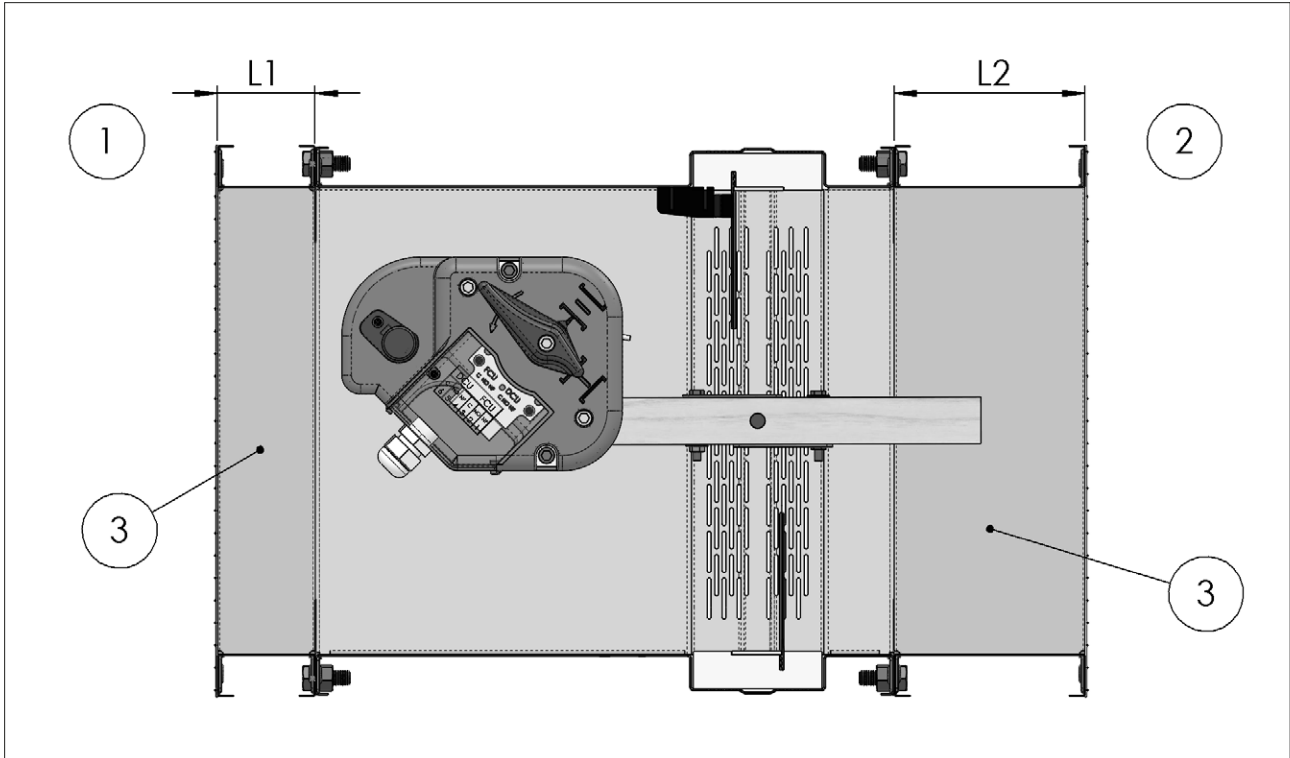
3.6.1. Components (Transfer Application)

- | | | | |
|----|--|----|----------|
| 1. | Extension duct with net, 12 x 12 mm mesh opening | 3. | M8 nut |
| 2. | Fire damper | 4. | M8 screw |



3.6.2. Technical data (Transfer Application)

- | | | | |
|----|-------------------------|----|--|
| 1. | Mechanism side | L1 | End cap length mechanism side |
| 2. | Mechanism opposite side | L2 | End cap length mechanism opposite side |
| 3. | End cap with mesh | H | Nominal height of fire damper |



Length of end cap with mesh depending on fire damper height H.

H	L1	L2
200	50	50
250	50	100
300	50	100
350	50	150
400	50	150
450	50	200
500	50	200
550	50	250
600	100	250

- H Nominal height of fire damper
L1 End cap length mechanism side
L2 End cap length mechanism opposite side

3.6.3. How to order (transfer Application)

Type	FMWK004V	End cap with mesh with flange 22,5 mm
Base	XYZ	Nominal base dimension (mm)
Height	XYZ	Nominal height dimension (mm)
Length	XYZ	Length dimension (mm)

Examples	Code
End cap with mesh length 50 mm for fire damper 400x300 not connected to air ducts on mechanism side	FMWK004V400-300-050
End cap with mesh length 200 mm for fire damper 550x450 not connected to air ducts on mechanism opposite side	FMWK004V550-450-200
End caps with mesh length 50 mm (mechanism side) and length 200 mm (mechanism opposite side) with mesh for fire damper 600x500 not connected to air ducts on both sides	FMWK004V600-500-050 FMWK004V600-500-200

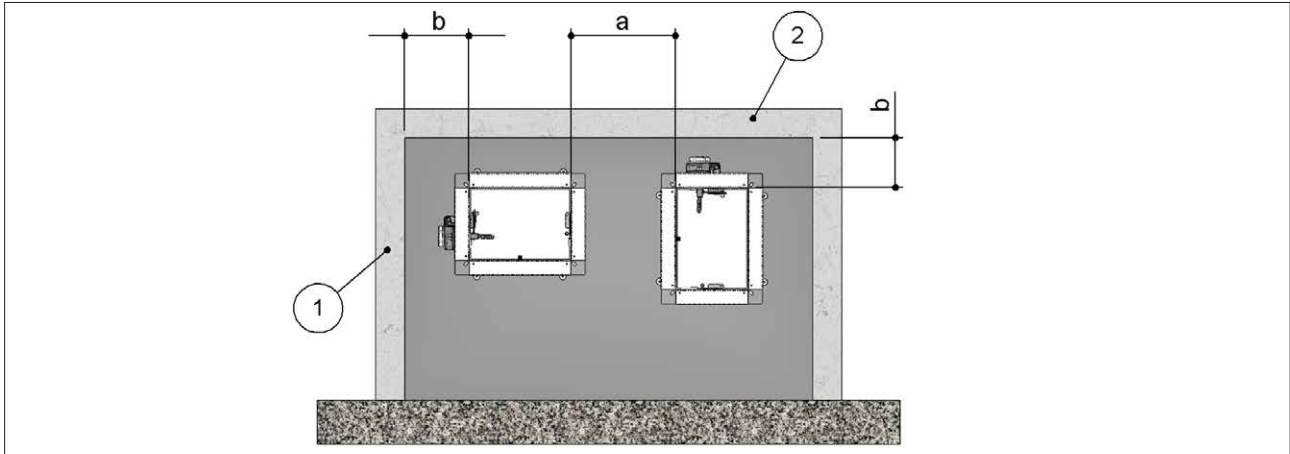
3.7. Minimum distances

It is recommended to keep enough space (about 200mm) for using or replacing the control mechanism or for maintenance. Also provide the necessary space to remove the ventilation duct from the damper whenever necessary.

In accordance with Articles 7 and 13 of EN 1366-2 respect the minimum distances indicated below.

Minimum distances

1. Side vertical wall
2. Floor
- a. Distance between fire dampers installed within vertical wall
- b. Distance between fire damper and vertical lateral wall / floor

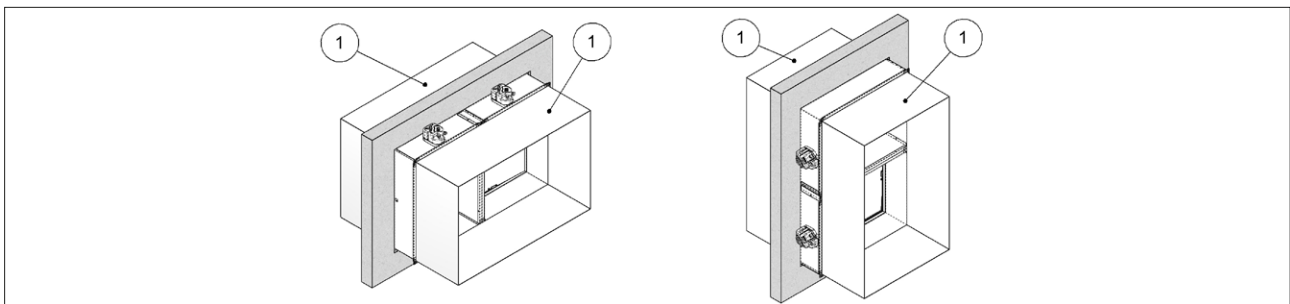


		Fire dampers installed within vertical wall		Fire dampers installed within floor		
	Installation	a [mm]	b [mm]	c [mm]	d [mm]	Paired installation
Rigid wall	EI 120 S Installation within vertical rigid wall p. 23 Plasterboard sealing	44	22	-	-	Yes. One air duct or separated air ducts
	EI 120 S Installation within vertical light wall (plasterboard) p. 25 Plasterboard sealing	44	22	-	-	Yes. One air duct or separated air ducts
Flexible wall	EI 120 S Installation within vertical light wall (gypsum blocks wall) p. 29 Plasterboard sealing	44	22	-	-	Yes. One air duct or separated air ducts
	EI 90 S Installation within vertical light wall (gypsum blocks wall) p. 28 Plasterboard sealing	200	75	-	-	No

The minimum distance between two or more paired installations is 200 mm.

It is forbidden to pair three or more fire dampers.

1. One air duct



3.7.1. Installations within vertical light wall (Shaft wall)

		Fire dampers installed within vertical wall		Fire dampers installed within floor		
Installation		a [mm]	b [mm]	c [mm]	d [mm]	Paired installation
Flexible wall	El 90 S Installation within vertical light wall (Shaft wall) p. 31 Plasterboard sealing	200	75	-	-	No

3.8. Construction supports characteristics

The European standard for fire dampers foresees a precise correlation between the wall/floor characteristics and the fire resistance class obtained, as well as the correlation between wall/floor used for the test and wall/floor used for the actual installation.

The test results obtained on a type of wall/floor are valid also for walls/floor of the same type but with greater thickness and/or density than those used in the test.

For plasterboard walls, the test results are also valid for walls with a greater number of plasterboard layers on each side. As a result, the indicated thickness and density characteristics are to be considered as minimum values.

The wall/floor in which the fire dampers are installed must be fire class certified according to the standards foreseen for the structure.

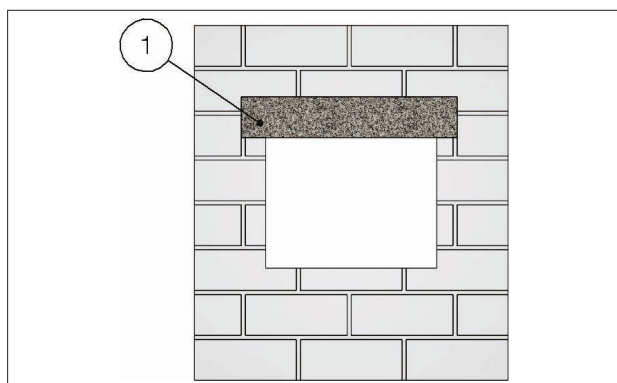
3.8.1. Rigid walls

Can be made with aerated concrete blocks, poured concrete, concrete panels, perforated cell elements in concrete or brick in accordance with the following characteristics:

- minimum thickness 100 mm;
- minimum density 550 kg/m³.

The use of a reinforcing beam above the opening is recommended for walls made from concrete blocks, bricks or in concrete cell elements.

1. Reinforcing beam



3.8.2. Light plasterboard vertical walls

During testing, light plasterboard walls have been used with the following characteristics:

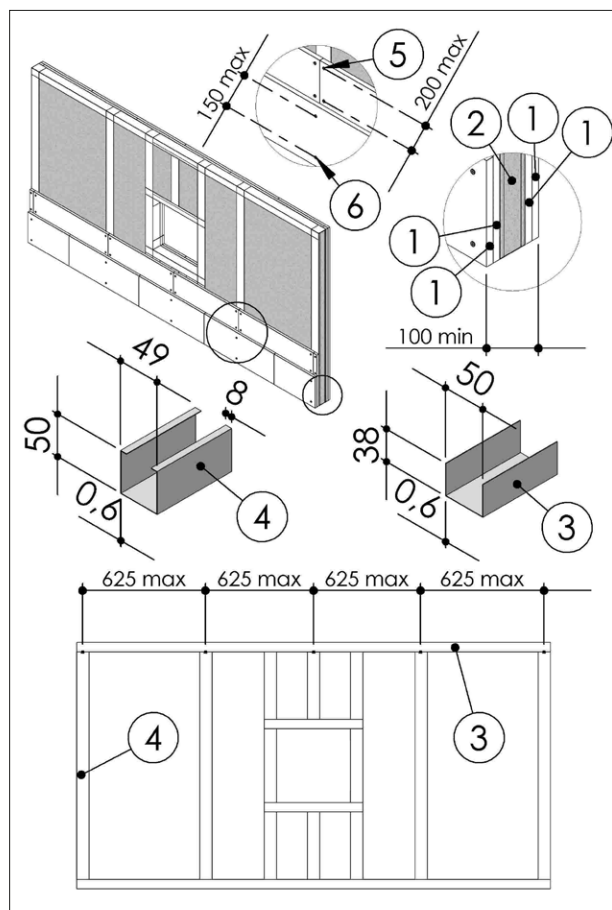
- U-shaped horizontal metal frame (50 mm) and C-shaped vertical frame (49 mm) made from 0,6 mm thick sheet metal;
- Vertical profiles placed with a maximum spacing of 625 mm between each other;
- Filling made of rock wool with density up to 100 kg/m³ (optional);
- Each side is made from two plasterboard layers 12,5 mm thick, unaligned to avoid alignment between the joints of the layer above and below.

The following indications are given for the installation walls:

- metal profiles minimum width: 49 mm;
- metal profiles minimum thickness: 0,6 mm;
- vertical profiles placed with a maximum spacing of 625 mm between each other;

- vertical profile fixing with selfthreading screws or by clinching to the bottom horizontal profile and insertion in the top horizontal profile;
- profiles fixed using self-threading screws or by clinching on every intersection.
- installation of a frame around the damper with base and height where shown in the installation instructions;
- Filling made of rock wool with density up to 100 kg/m³ (optional);
- each side is made from two plasterboard layers 12,5 mm minimum thick, unaligned to avoid alignment between the joints of the layer above and below.
- the front plasterboards layers are fixed using long enough screws to pass through the lower plasterboard and attach to the steel profile underneath.

- | | |
|---|---|
| 1. Plasterboard thickness
12,5 mm | 4. Vertical C-shaped
profile |
| 2. Rock wool density up to
80 kg/m ³ (optional) | 5. Self-drilling screw Ø 3,5
X 25 mm |
| 3. Horizontal U-shaped
profile | 6. Self-drilling screw Ø 3,5
X 35 mm |



3.8.3. Light plasterboard vertical walls with steel reinforcement

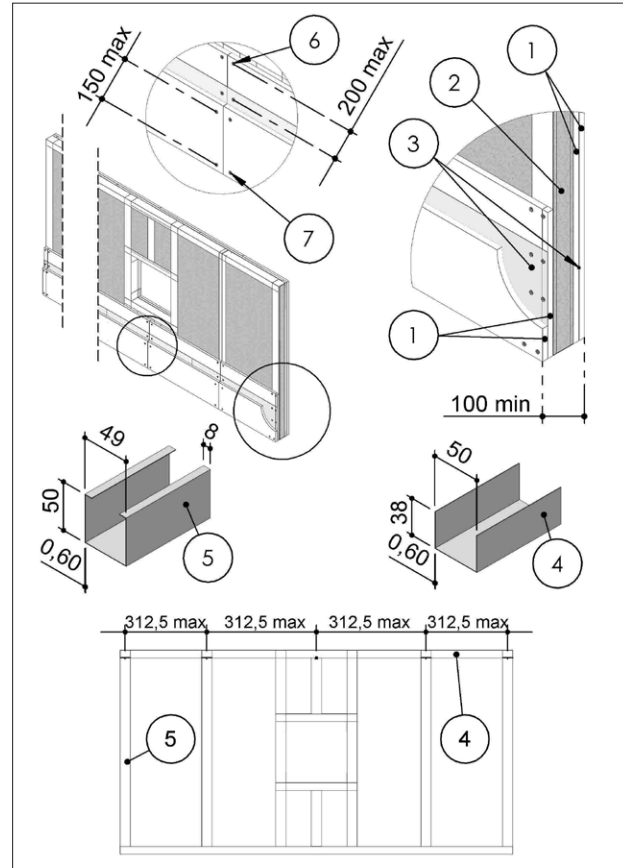
During testing, light plasterboard walls have been used with the following characteristics:

- U-shaped horizontal metal frame (50 mm) and C-shaped vertical frame (49 mm) made from 0,6 mm thick sheet metal;
- Vertical profiles placed with a maximum spacing of 312,5 mm between each other;
- reinforcement sheet;
- Filling made of rock wool with density up to 100 kg/m³ (optional);
- Each side is made from two plasterboard layers 12,5 mm thick, unalinged to avoid alignment between the joints of the layer above and below.

The following indications are given for the installation walls:

- metal profiles minimum width: 49 mm;
- metal profiles minimum thickness: 0,6 mm;
- vertical profiles placed with a maximum spacing of 312,5mm between each other;
- vertical profile fixing with selfthreading screws or by clinching to the bottom horizontal profile and insertion in the top horizontal profile;
- profiles fixed using self-threading screws or by clinching on every intersection.
- installation of a frame around the damper with base and height where shown in the installation instructions;
- Filling made of rock wool with density up to 100 kg/m³ (optional);
- each side is made from two plasterboard layers 12,5 mm minimum thick, unalinged to avoid alignment between the joints of the layer above and below.
- the front plasterboards layers are fixed using long enough screws to pass through the lower plasterboard and attach to the steel profile underneath.

1. Plasterboard thickness 12,5 mm
2. Rock wool density up to 100 kg/m³ (optional)
3. Reinforcement sheet
4. Horizontal U-shaped profile
5. Vertical C-shaped profile
6. Self-drilling screw Ø 3,5 X 25 mm
7. Self-drilling screw Ø 3,5 X 35 mm

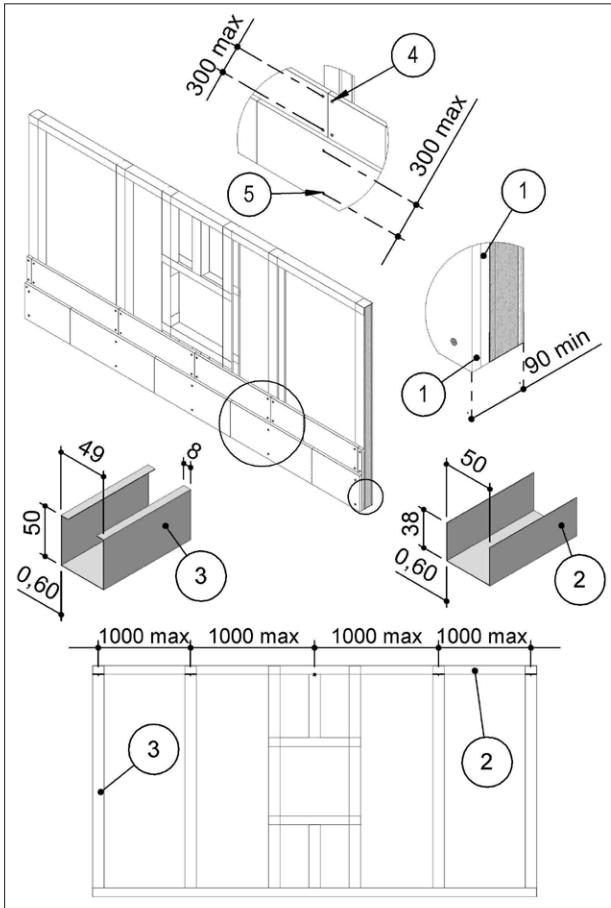


3.8.4. Light plasterboard vertical walls (Shaft wall)

The following indications are given for the installation walls:

- U-shaped horizontal metal frame (minimum width 50 mm) and C-shaped vertical frame (minimum width 49 mm) made from sheet metal (minimum thickness 0,6 mm);
- vertical profiles placed with a maximum spacing of 1000 mm between each other;
- vertical profile fixing with selfthreading screws or by clinching to the bottom horizontal profile and insertion in the top horizontal profile;
- profiles fixed using self-threading screws or by clinching on every intersection.
- installation of a frame around the damper with base and height where shown in the installation instructions;
- one side is made from two plasterboard layers 20 mm minimum thick, unalinged to avoid alignment between the joints of the layer above and below;
- the front plasterboards layers are fixed using long enough screws to pass through the lower plasterboard and attach to the steel profile underneath.

- | | |
|------------------------------------|---|
| 1. Plasterboard thickness
20 mm | 4. Self-drilling screw \varnothing 3,5
X 35 mm |
| 2. Horizontal U-shaped
profile | 5. Self-drilling screw \varnothing 3,5
X 55 mm |
| 3. Vertical C-shaped profile | |



3.8.5. Gypsum blocks light walls

Gypsum blocks wall can be built with special solid gypsum blocks with interlocking shaped edges as indicated in the supplier's instructions and according to the following characteristics:

- minimum thickness 70 or 100 mm according to the type and resistance class required;
- minimum density 995 kg/m³.

It is generally advisable to first build the wall and then provide the opening for the fire damper.

3.9. EI 120 S Installation within vertical rigid wall

The WKS25 fire dampers classified EI 120 S within vertical rigid walls, guarantee fire and heat sealing for 120 minutes only if installed inside walls with a minimum fire resistance class of REI 120, minimum thickness of 100 mm and minimum density of 550 kg/m³.

In accordance with standard EN 1366-2 (Article 13.7) the results of the tests are extended to thicker or higher density walls.

WKS25 series fire dampers can therefore also be installed within walls made of brick or concrete with a minimum thickness of 100 mm.

Comply with the minimum distances indicated on section Minimum distances [p. 18](#).

Before and after installation please perform a functional test. Refer to section Mechanism type for further information [p. 10](#).

3.9.1. Single fire damper wall opening

A rectangular opening must be provided in the wall with a side 50 mm greater than the nominal size of the fire damper. It is advisable not to exceed by more than 10 mm from the indicated sizes so as not to compromise the correct thermal insulation.

The use of a reinforcing beam above the opening is recommended for walls made from concrete blocks, bricks or in concrete cell elements.

For walls built with perforated elements, it is also recommended that the area of the opening be made from full elements (for example aerated concrete blocks) to guarantee the correct adhesion of the mortar.

3.9.2. Paired fire dampers wall opening

A rectangular opening must be provided in the wall with a side 50 mm greater than the nominal size of the paired fire dampers:

- Vertically paired fire dampers

base = damper base + 50 mm

height = height1 + height2 + 45 mm + 50 mm

– Side by side paired fire dampers

base = base1 + base2 + 45 mm + 50 mm

height = damper height + 50 mm.

It is advisable not to exceed by more than 10 mm from the indicated sizes so as not to compromise the correct thermal insulation.

The use of a reinforcing beam above the opening is recommended for walls made from concrete blocks, bricks or in concrete cell elements.

3.9.3. Damper positioning

Lift the fixing flaps located on the fire damper casing. See section Fixing flaps [p. 6](#) for further details.

Position the damper in the opening so that the side of the closing mechanism extends from the wall by 185 mm.

Be careful not to damage the intumescent gasket on the outside of the casing.

Secure the fire damper to the wall using four screws on the four holes of the fixing flaps.

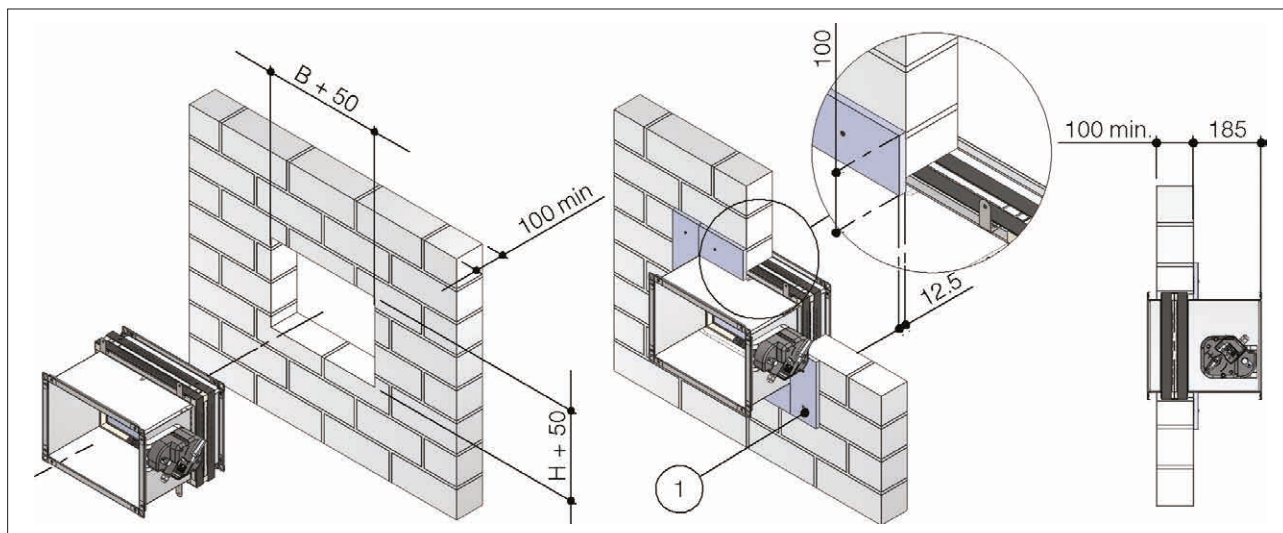
The double test (with the mechanism inside and outside the fire area) demonstrated that there is no preferred direction for the position of the damper, both in relation to air flow and the side with the higher probability of exposure to fire, as indicated in standard EN1366-2 (paragraph 6.2). Close the blade before installing the fire damper.

3.9.4. Filling

It is not necessary to insert any material, but simply cover the gap between the damper and the wall by applying on face of the wall mechanism side a layer of plasterboard, to a total minimum thickness of 12,5 mm, to make a frame 100 mm wide.

Sealing with concrete is not allowed.

- B. Nominal base dimension (mm)
H. Nominal height dimension (mm)
1. Plasterboard infill panel, thickness 12,5 mm



3.10. EI 120 S Installation in vertical rigid wall - Special cases

3.10.1. Installation in contact with ceiling or floor or side wall

Opening dimensions are as indicated in the previous section.

Apply only three plasterboard layers "U" shaped along the three free sides of damper.

This installation is allowed for two fire dampers paired in battery as well.

3.10.2. Corner room installation

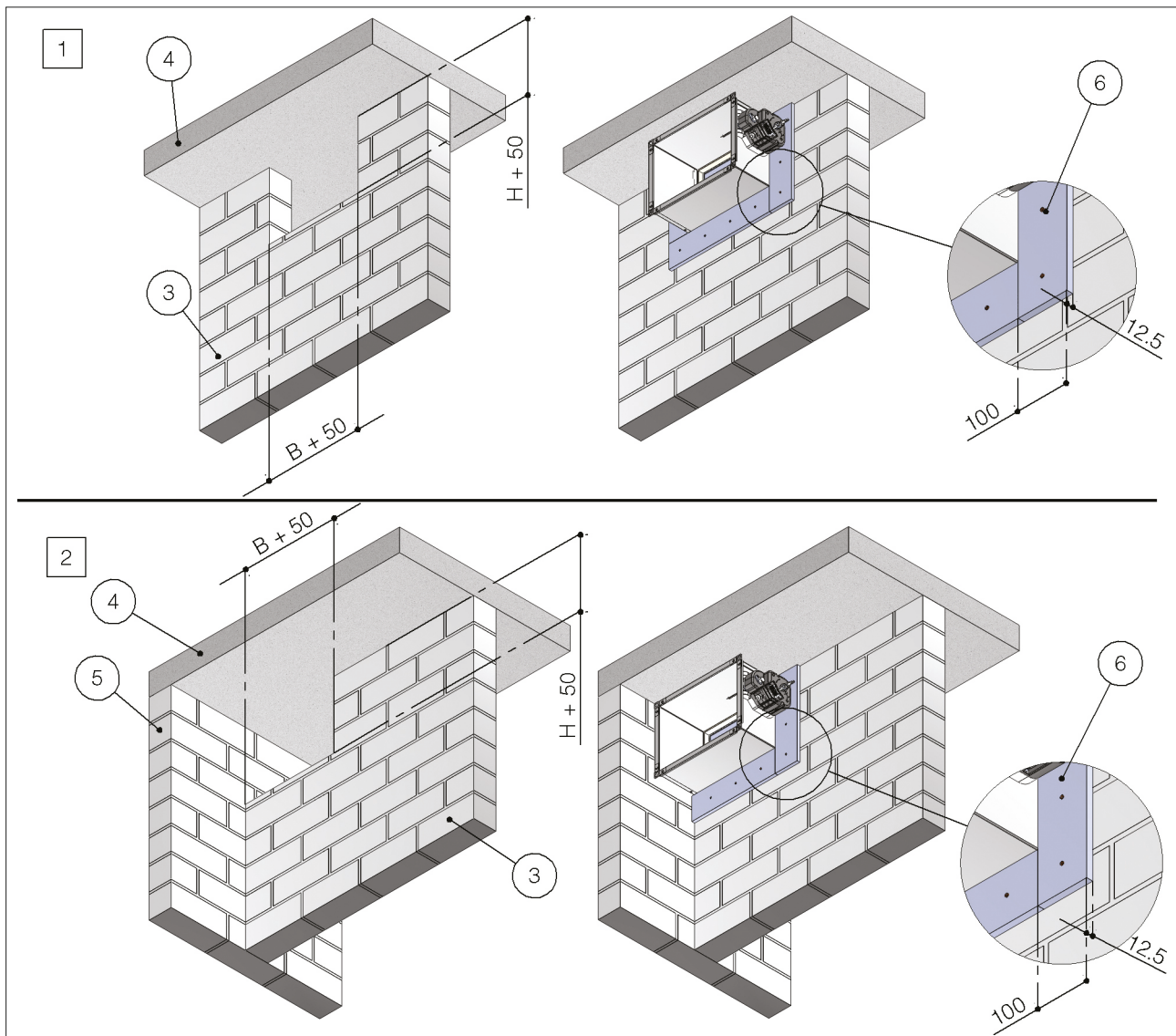
Opening dimensions are as indicated in the previous section.

Apply two plasterboard layers, to compose a "L" shape on the two free sides of the fire damper.

This installation is allowed for two fire dampers paired in battery as well.

In case of two side by side paired fire dampers it is necessary to position the fire dampers with vertical axis, due to the mechanism presence.

- B. Nominal base dimension (mm)
- H. Nominal height dimension (mm)
- 1. Ceiling contact installation
- 2. Corner room installation
- 3. Installation wall
- 4. Ceiling or floor
- 5. Side vertical wall
- 6. Plasterboard infill panel, thickness 12,5 mm



3.11. EI 120 S Installation within vertical light wall (plasterboard)

The WKS25 fire dampers classified EI 120 S within light (plasterboard) walls guarantee fire and heat sealing for 120 minutes only if installed inside walls with a minimum fire resistance class of EI 120 and minimum thickness of 100 mm. Laboratory test were carried out using 100 mm thick wall with two plasterboard layers 12,5 mm thick for side and insulated with rock wool 100 kg/m³ density (optional). In accordance with standard EN 1366-2 (Article 13.7) the results of the tests are extended to thicker or higher density walls.

Comply with the minimum distances indicated on section Minimum distances [p. 18](#).

Before and after installation please perform a functional test. Refer to section Mechanism type for further information [p. 10](#).

3.11.1. Single fire damper wall opening

A rectangular opening must be provided in the wall with a frame made by metal profiles ideal for use with plasterboard (min. thickness 0,6 mm) with a side 75 mm greater

than the nominal size of the damper. It is advisable not to exceed by more than 10 mm from the indicated sizes so as not to compromise the correct thermal insulation. The perimeter of the opening must be covered with a layer of plasterboard as wide as the thickness of the wall.

3.11.2. Paired fire dampers wall opening

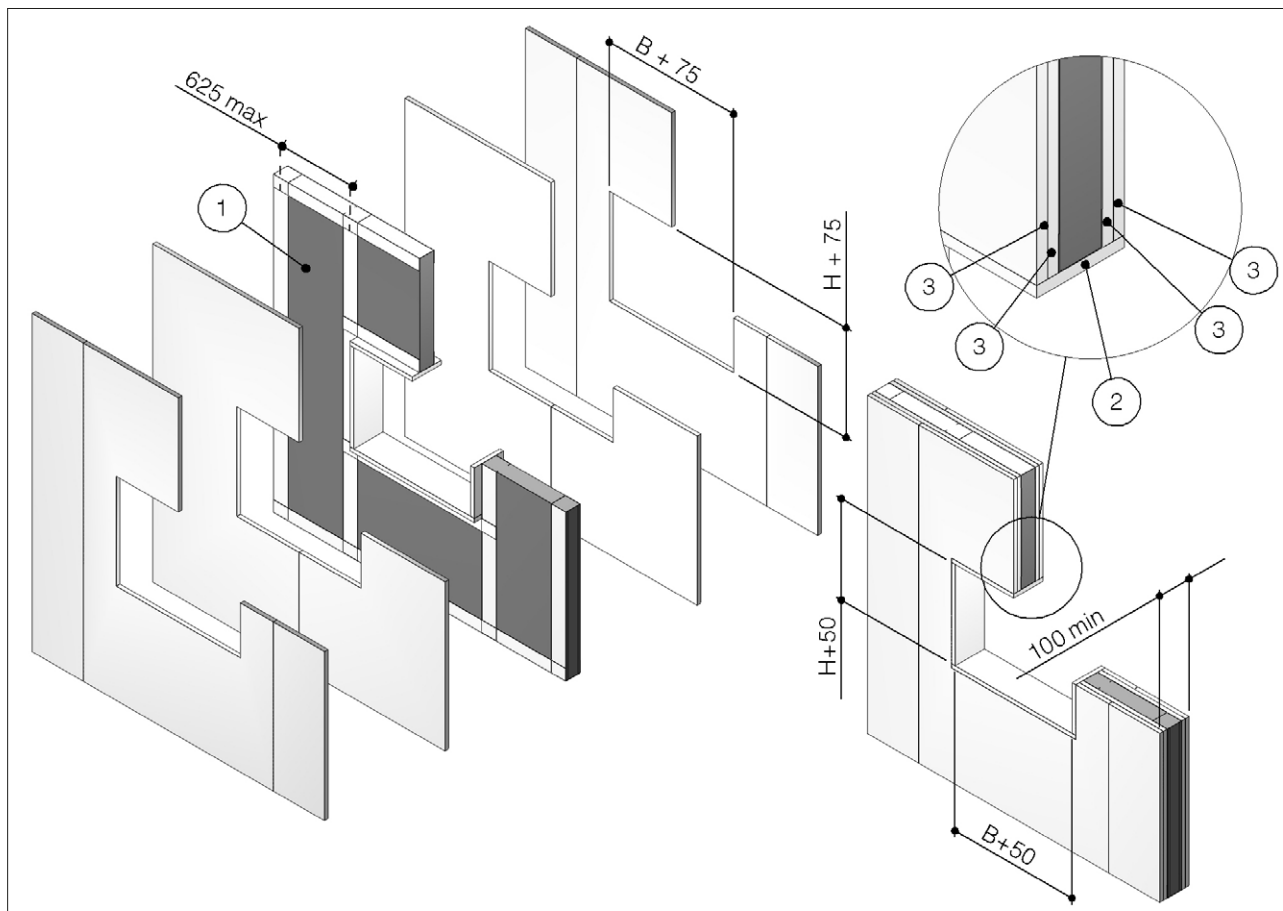
A rectangular opening must be provided in the wall with a frame made by metal profiles ideal for use with plasterboard (min. thickness 0,6 mm) with a side 75 mm greater than the nominal size of the paired dampers:

- Vertically paired fire dampers
 - base = damper base + 75 mm
 - height = height1 + height2 + 45 mm + 75 mm
- Side by side paired fire dampers
 - base = base1 + base2 + 45 mm + 75 mm
 - height = damper height + 75 mm.

The perimeter of the opening must be covered with a layer of plasterboard as wide as the thickness of the wall.

It is advisable not to exceed by more than 10 mm from the indicated sizes so as not to compromise the correct thermal insulation.

- B. Nominal base dimension (mm)
- H. Nominal height dimension (mm)
- 1. Rock wool, 100 kg/m³
- 2. Plasterboard infill panel, thickness 12,5 mm
- 3. Plasterboard thickness 12,5 mm



3.11.3. Damper positioning

Lift the fixing flaps located on the fire damper casing. See section Fixing flaps [p.6](#) for further details.

Position the damper in the opening so that the side of the closing mechanism extends from the wall by 185 mm.

Be careful not to damage the intumescent gasket on the outside the casing.

Secure the fire damper to the wall using four screws on the four holes of the fixing flaps.

The double test (with the mechanism inside and outside the fire area) demonstrated that there is no preferred di-

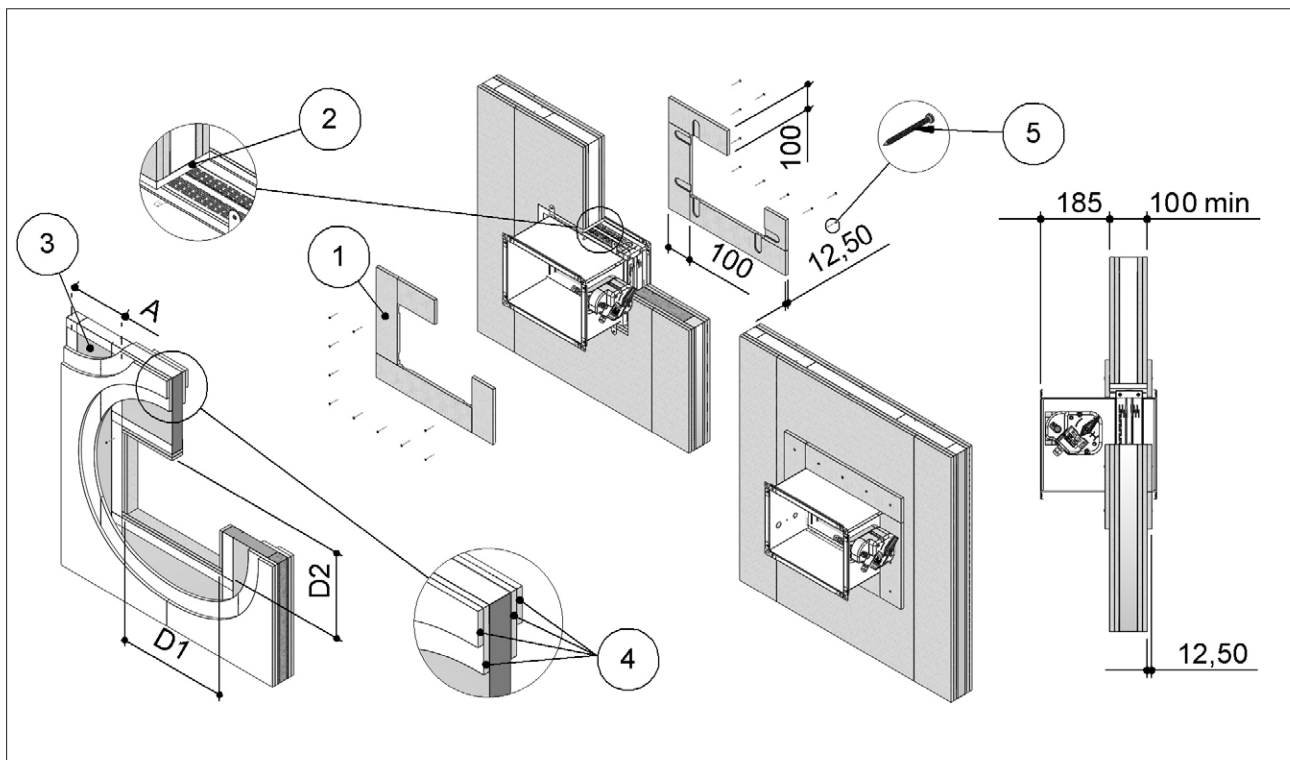
rection for the position of the damper, both in relation to air flow and the side with the higher probability of exposure to fire, as indicated in standard EN1366-2 (paragraph 6.2). Close the blade before installing the fire damper.

3.11.4. Filling

It is not necessary to insert any material, but simply cover the gap between the damper and the wall by applying on face of the wall mechanism side a layer of plasterboard, to a total minimum thickness of 12,5 mm, to make a frame 100 mm wide.

Sealing with concrete is not allowed.

1. Plasterboard infill panel, thickness 12,5 mm
 2. Plasterboard infill panel, thickness 12,5 mm
 3. Rock wool density up to 100 kg/m³ (optional)
 4. Plasterboard thickness 12,5 mm
 5. Self-drilling screw Ø 3,5 X 45 mm
- A Distance between vertical profiles: 625 mm see section Light plasterboard vertical walls [p.20](#) or 312,5 mm see section Light plasterboard vertical walls with steel reinforcement [p.21](#)



3.12. EI 120 S Installation within vertical light wall (plasterboard) - Special cases

3.12.1. Installation in contact with ceiling or floor or side wall

A rectangular opening must be provided in the wall with the three sides made by metal profiles ideal for use with plasterboard. The side parallel to the ceiling or to the wall 75 mm greater than the nominal sizes of the damper and the side perpendicular to the ceiling or to the floor 63 mm greater than the nominal sizes of the damper.

The three metal profiles must be covered with a plasterboard layer 12,5 mm thick, as wide as the thickness of the wall.

No need to apply anything on the wall or on the ceiling. Just apply three plasterboard layers, to compose a "U" shape on the three free sides of the fire damper.

This installation is allowed for two fire dampers paired in battery as well.

3.12.2. Corner room installation

A rectangular opening must be provided in the wall with the two sides made by metal profiles ideal for use with plasterboard. The opening size must be 63 mm greater than the nominal sizes of the damper.

The two metal profiles must be covered with a plasterboard layer 12,5 mm thick, as wide as the thickness of the wall.

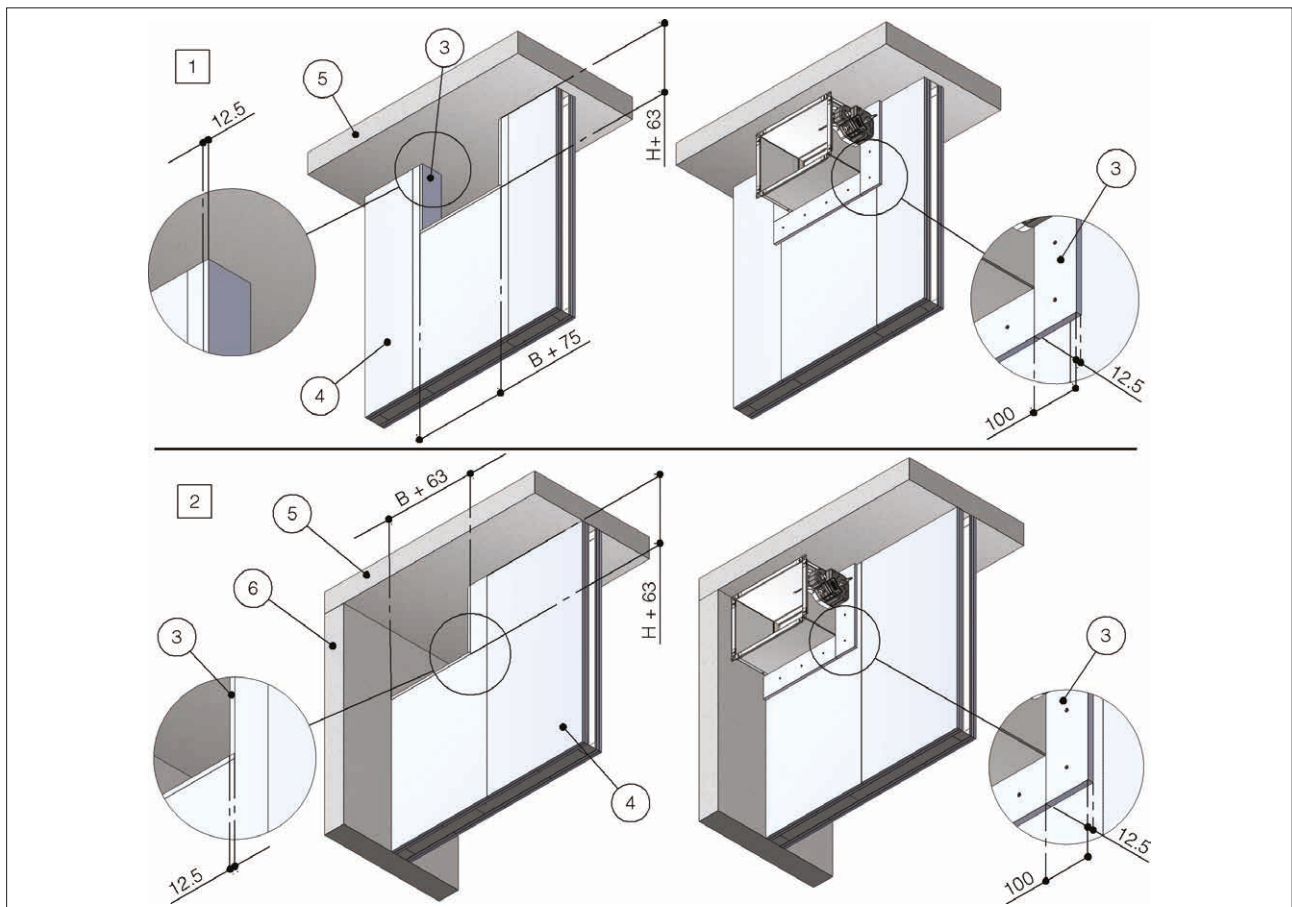
No need to apply anything on the wall or on the ceiling.

Apply two plasterboard layers, to compose a "L" shape on the two free sides of the fire damper.

This installation is allowed for two fire dampers paired in battery as well.

In case of two side by side paired fire dampers it is necessary to position the fire dampers with vertical axis, due to the mechanism presence.

- B. Nominal base dimension (mm)
- H. Nominal height dimension (mm)
- 1. Ceiling contact installation
- 2. Corner room installation
- 3. Plasterboard infill panel, thickness 12,5 mm
- 4. Installation wall
- 5. Ceiling or floor
- 6. Side vertical wall



3.13. EI 90 S Installation within vertical light wall (gypsum blocks wall)

The WKS25 fire dampers classified EI 90 S within vertical light walls built with gypsum blocks "carreaux de plâtre", guarantee fire and heat sealing for 90 minutes only if installed inside walls with a minimum fire resistance class of EI 90, minimum thickness of 70 mm and minimum density of 995 kg/m³.

In accordance with standard EN 1366-2 (Article 13.7) the results of the tests are extended to thicker or higher density walls.

Comply with the minimum distances indicated on section Minimum distances [p. 18](#).

Before and after installation please perform a functional test. Refer to section Mechanism type for further information [p. 10](#).

3.13.1. Wall opening

A rectangular opening must be provided in the wall with a side 50 mm greater than the nominal size of the fire damper.

It is advisable not to exceed by more than 10 mm from the indicated sizes so as not to compromise the correct thermal insulation.

3.13.2. Damper positioning

Lift the fixing flaps located on the fire damper casing. See section Fixing flaps [p. 6](#) for further details.

Position the damper in the opening so that the side of the closing mechanism extends from the wall by 202 mm.

Be careful not to damage the intumescent gasket on the outside the casing.

Secure the fire damper to the wall using four screws on the four holes of the fixing flaps.

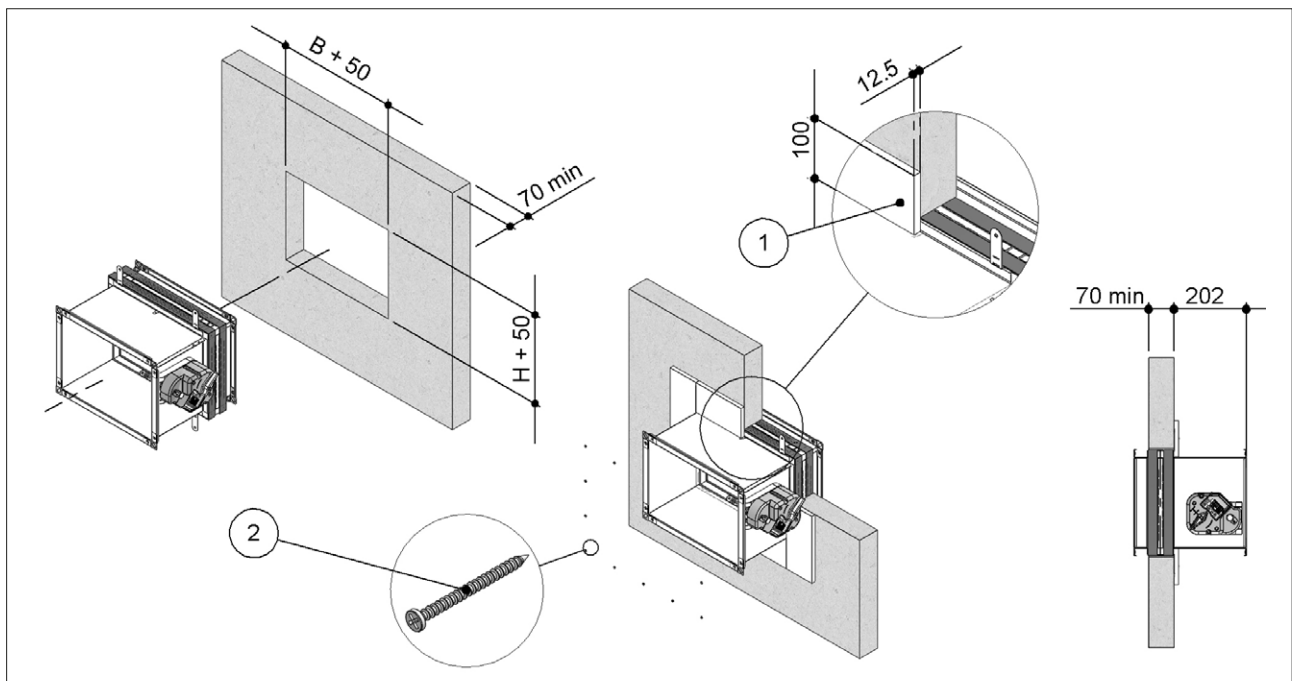
The double test (with the mechanism inside and outside the fire area) demonstrated that there is no preferred direction for the position of the damper, both in relation to air flow and the side with the higher probability of exposure to fire, as indicated in standard EN1366-2 (paragraph 6.2). Close the blade before installing the fire damper.

3.13.3. Filling

It is not necessary to insert any material, but simply cover the gap between the damper and the wall by applying on face of the wall mechanism side a layer of plasterboard, to a total minimum thickness of 12,5 mm, to make a frame 100 mm wide.

Sealing with concrete is not allowed.

- B. Nominal base dimension (mm)
- H. Nominal height dimension (mm)
- 1. Plasterboard infill panel, thickness 12,5 mm
- 2. Self-drilling screw Ø 3,5 X 45 mm



3.14. EI 120 S Installation within vertical light wall (gypsum blocks wall)

Le serrande tagliafuoco serie WKS25 classificate EI 120 S entro parete leggera verticale in blocchi di gesso pieno "carreaux de plâtre" garantiscono l'isolamento dal fuoco e dal calore per 120 minuti solo se installate entro pareti aventi resistenza al fuoco classificata almeno EI 120, spessore minimo 100 mm e densità minima 995 kg/m³.

In accordance with standard EN 1366-2 (Article 13.7) the results of the tests are extended to thicker or higher density walls.

Comply with the minimum distances indicated on section Minimum distances [p. 18](#).

Before and after installation please perform a functional test. Refer to section Mechanism type for further information [p. 10](#).

3.14.1. Single fire damper wall opening

A rectangular opening must be provided in the wall with a side 50 mm greater than the nominal size of the fire damper.

It is advisable not to exceed by more than 10 mm from the indicated sizes so as not to compromise the correct thermal insulation.

3.14.2. Paired fire dampers wall opening

A rectangular opening must be provided in the wall with a side 50 mm greater than the nominal size of the paired fire dampers:

- Vertically paired fire dampers
base = damper base + 50 mm
height = height1 + height2 + 45 mm + 50 mm

- Side by side paired fire dampers
base = base1 + base2 + 45 mm + 50 mm
height = damper height + 50 mm.

It is advisable not to exceed by more than 10 mm from the indicated sizes so as not to compromise the correct thermal insulation.

3.14.3. Damper positioning

Lift the fixing flaps located on the fire damper casing. See section Fixing flaps [p. 6](#) for further details.

Position the damper in the opening so that the side of the closing mechanism extends from the wall by 185 mm.

Be careful not to damage the intumescent gasket on the outside the casing.

Secure the fire damper to the wall using four screws on the four holes of the fixing flaps.

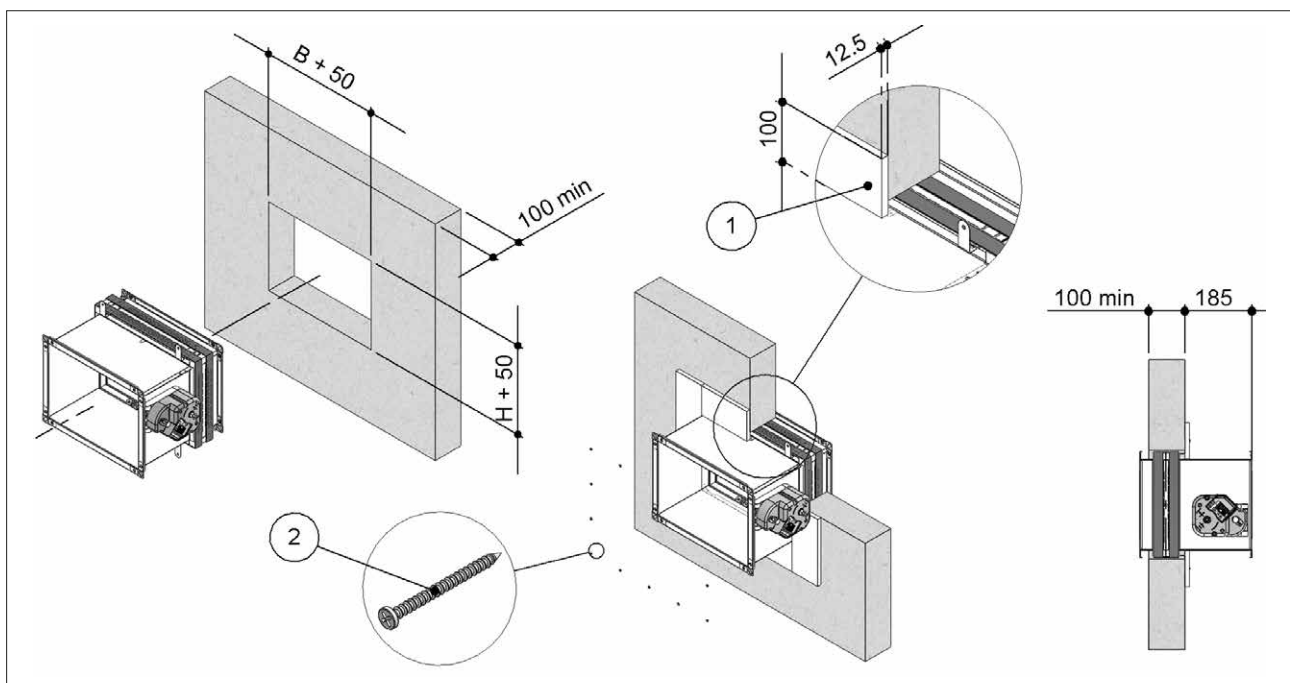
The double test (with the mechanism inside and outside the fire area) demonstrated that there is no preferred direction for the position of the damper, both in relation to air flow and the side with the higher probability of exposure to fire, as indicated in standard EN1366-2 (paragraph 6.2). Close the blade before installing the fire damper.

3.14.4. Filling

It is not necessary to insert any material, but simply cover the gap between the damper and the wall by applying on face of the wall mechanism side a layer of plasterboard, to a total minimum thickness of 12,5 mm, to make a frame 100 mm wide.

Sealing with concrete is not allowed.

- B. Nominal base dimension (mm)
H. Nominal height dimension (mm)
1. Plasterboard infill panel, thickness 12,5 mm
2. Self-drilling screw Ø 3,5 X 45 mm



3.15. EI 120 S Installation within vertical light wall (gypsum blocks wall) - Special cases

3.15.1. Installation in contact with ceiling or floor or side wall

Opening dimensions are as indicated in the previous section.

Apply only three plasterboard layers "U" shaped along the three free sides of damper.

This installation is allowed for two fire dampers paired in battery as well.

3.15.2. Corner room installation

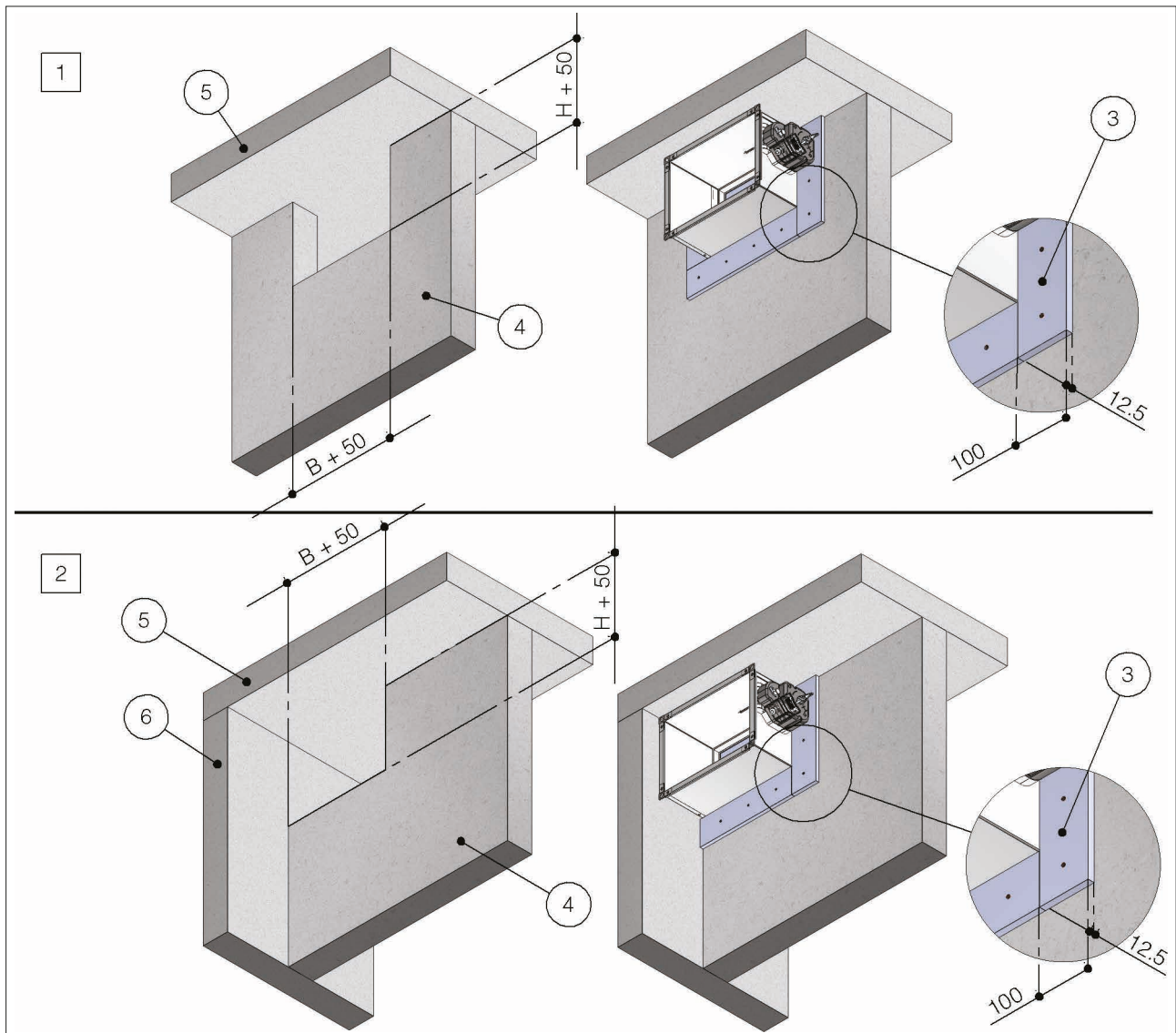
Opening dimensions are as indicated in the previous section.

Apply two plasterboard layers, to compose a "L" shape on the two free sides of the fire damper.

This installation is allowed for two fire dampers paired in battery as well.

In case of two side by side paired fire dampers it is necessary to position the fire dampers with vertical axis, due to the mechanism presence.

1. Ceiling contact installation
2. Corner room installation
3. Plasterboard infill panel, thickness 12,5 mm
4. Installation wall
5. Ceiling or floor
6. Side vertical wall



3.16. Installation within vertical light wall (Shaft wall)

WKS25 fire dampers are tested and approved in:

Fire resistance classification	Hole size "D1 x D2" [mm]	Damper protrusion from the wall "E" [mm]	Wall minimum thickness "S" [mm]	Sealing
EI 90 S Installation within vertical light wall (Shaft wall)				
EI 90 S (300 Pa)	(B+90) x (H+90)	185	90	Plasterboard infill panel, thickness 20 mm

B Nominal base of the damper
H Nominal height of the damper

Refer to the section Construction supports characteristics p. 20 for further information.

Comply with the minimum distances indicated on section Minimum distances p. 18.

Before and after installation please perform a functional test. Refer to section Mechanism type for further information p. 10.

3.16.1. Wall opening

A opening must be provided in the wall as indicated in the table and in the drawing

3.16.2. Damper positioning

Position the damper in the opening so that the side of the closing mechanism extends as indicated in the table and in the drawing.

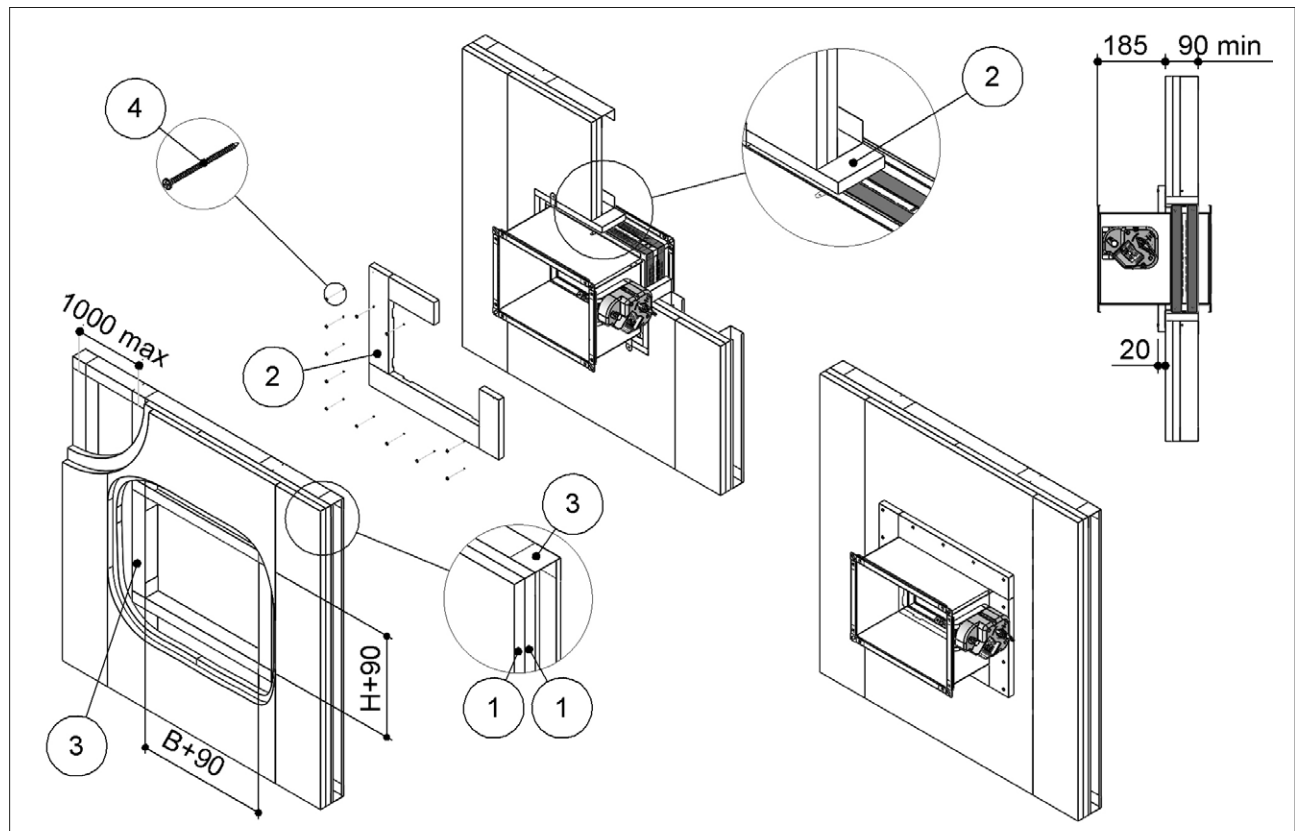
Close the blade before installing the fire damper.

3.16.3. Filling

It is not necessary to insert any material, but simply cover the gap between the damper and the wall by applying on face of the wall mechanism side a layer of plasterboard, to a total minimum thickness of 20 mm, to make a frame 75 mm wide.

Sealing with concrete is not allowed.

- B. Nominal base dimension (mm)
- H. Nominal height dimension (mm)
- 1. Plasterboard thickness 20 mm
- 2. Plasterboard infill panel, thickness 20 mm
- 3. Metal frame
- 4. Self-drilling screw Ø 3,5 X 70 mm



4. ELECTRICAL CONNECTIONS

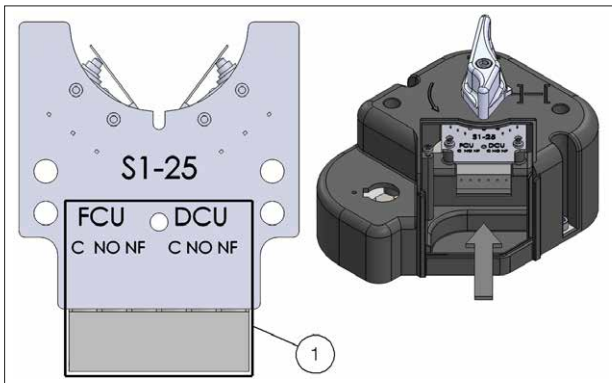
4.1. Electrical wiring

Electrical connections must be done by qualified and trained people.

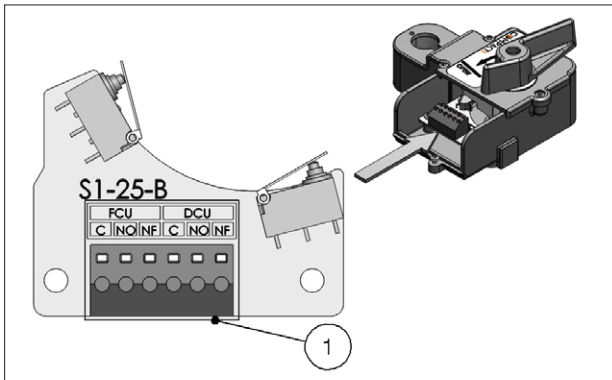
Switch off the power supply before starting any work on the electric elements. Never switch on the power supply during electrical connections.

4.1.1. Manual and compact manual

S1-25 electric board (S2 optional) for blade position microswitches (manual)



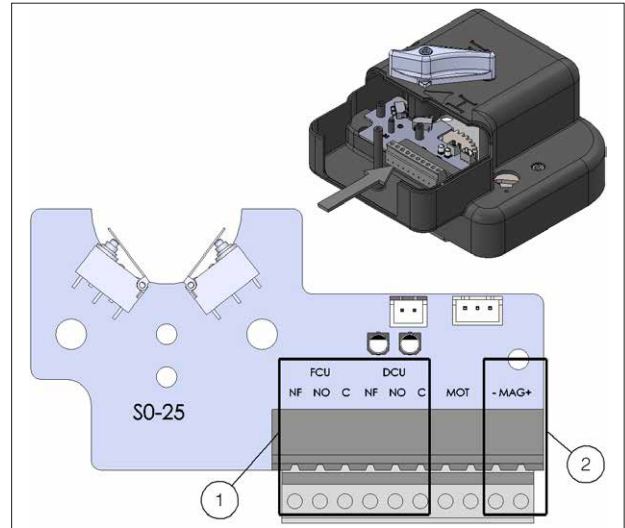
S1-25-B electric board (S2 optional) for blade position microswitches (compact manual)



- 1 Microswitch contacts for blade position
- FCU Closed blade contact
- DCU Open blade contact
- NO Normally open
- C Common
- NF Normally closed

4.1.2. Manual with magnet - MR/MI version (the magnet is powered using 24 V DC / 48 V DC through S0-25 electric board)

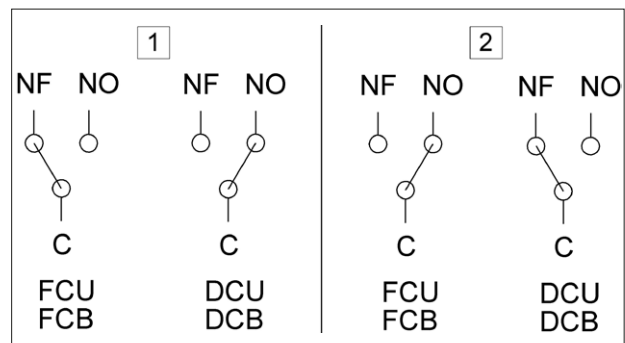
S0-25 electronic board (S2 optional) for 24V DC / 48V DC power supply. Blade position microswitches included



- 1 Microswitch contacts for blade position
- 2 Magnet power supply contacts. 24V DC or 48V DC. Keep to the polarity for input magnet

- MAG Magnet power supply
- FCU Closed blade contact
- DCU Open blade contact
- NO Normally open
- C Common
- NF Normally closed

4.1.3. S2 microswitches position for manual control and magnetic control



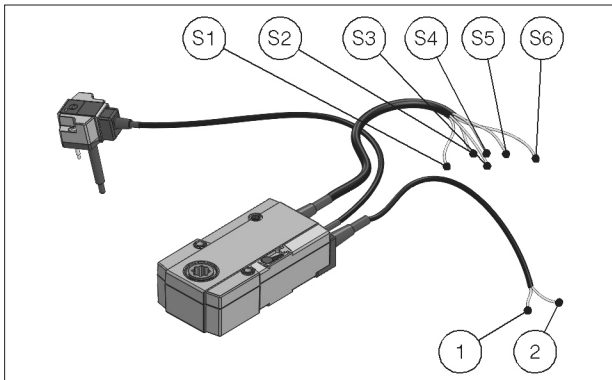
- 1. The fire damper's blade is open (the air flow is allowed)
- 2. The fire damper's blade is closed (the air flow is not allowed)

- FCU Closed blade contact
- DCU Open blade contact

4.1.4. Motorized version

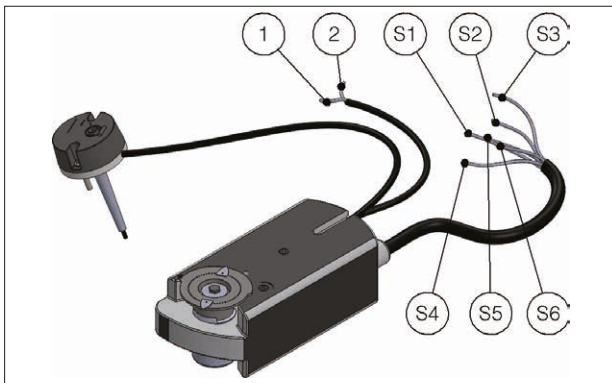
Belimo servomotor:

BFL24T, BFN24T, BF24T, BFL230T, BFN230T, BF230T.



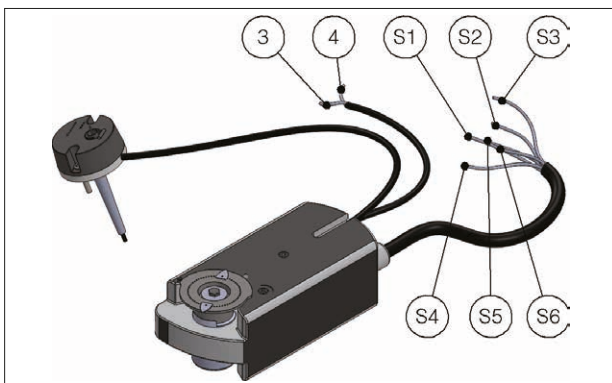
Siemens servomotor:

GRA126, GNA126, GGA126.



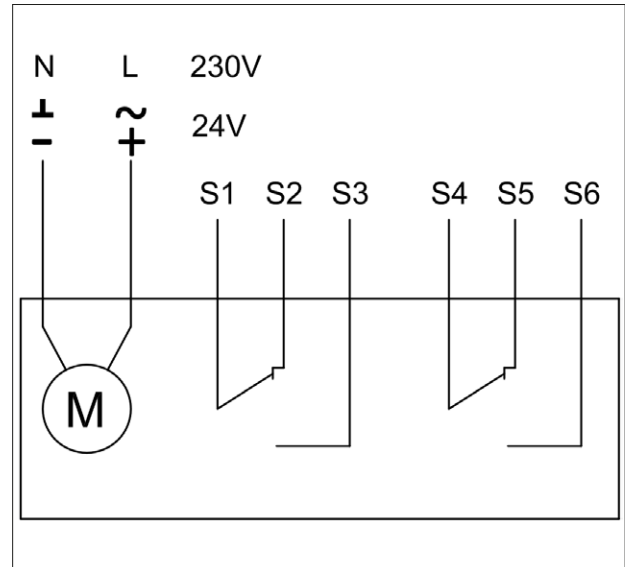
Siemens servomotor:

GRA326, GNA326, GGA326.



Microswitches position for motorized version

- 1 Negative (DC) or neutral (AC)
- 2 Positive (DC) or phase (AC)
- 3 Phase
- 4 Neutral
- S1 Common closed damper microswitch
- S2 Normally closed, closed damper microswitch
- S3 Normally opened, closed damper microswitch
- S4 Common open damper microswitch
- S5 Normally closed, open damper microswitch
- S6 Normally opened, open damper microswitch



Motorized fire dampers electrical wiring

To connect the dampers to the power supply, proceed as follows:

- Check that the voltage and electrical frequency are equivalent to those of the motor of the servomotor (check the motor's information label);
- Make the connections as shown in the below diagram.

4.2. Electrical specifications

Manual and compact manual		Manual with magnet Belimo motorized version Siemens motorized version	
Voltage and power consumption	-	Magnet (WKS25MR/MI): 24/48 V DC (automatic voltage switching on S0-25 electric board for 24V magnet)	
		Power interruption magnet (MR): P = 1,6 W	Power input magnet (MI): P = 3,4 W
		Motor 24V AC/DC (WKS25VSB): Belimo BFL24T Opening: 2,5 W In stand-by: 0,8 W	230V AC motor (WKS25DSB): Belimo BFL230T: Opening: 3,5 W In stand-by: 1,1 W
		Motor 24V AC/DC (WKS25VSS): Siemens GRA126 Opening: 3,5 W In stand-by: 2 W	Motor 230V AC (WKS25VSS): Siemens GRA326 Opening: 4,5 W In stand-by: 3,5 W
Microswitches position contacts	Manual control version: 12VDC / 2A 125VAC / 0,1A	Motorized version: Siemens: AC 24V...230V / 6 (2)A Belimo: DC 5V...AC 250V / 1mA...3A (0,5A)	
Blade closing time	Spring: 1 s	motor: < 30 s	
Protection degree	IP42	IP42 MAGNETIC VERSION IP54 MOTORIZED VERSION	

5. MAINTENANCE AND INSPECTIONS

Fire dampers and control mechanisms do not require routine maintenance.

Extraordinary maintenance (repairs) and periodic inspection operations are the responsibility of the ventilation system operator.

It is recommended to keep enough space (about 200mm) for using or replacing the control mechanism or for maintenance. Also provide the necessary space to remove the ventilation duct from the damper whenever necessary.

It is recommended to provide inspection hatches on both sides of the ducts connected to the fire damper.

The implementation of a periodic inspection plan allows to guarantee the efficiency and functionality of the fire dampers for the fire safety of the building.

5.1. Periodic inspection and cleaning

Periodic inspection shall be performed in accordance with the requirements of the law or by the building regulations or other local regulations.

In the absence of specific regulations (or to their complement), in accordance with point 8.3 of the EN 1560 standard, it is recommended to carry out the following control activities at intervals of no more than 12 months:

- Check the servomotor electrical wiring for damage (where applicable);
- Check end-switch wiring for damage (where applicable);
- Check damper cleanliness and clean where necessary;
- Check the condition of blades and seals, rectify and report where necessary;
- Check the correct opening and closing of the fire damper by manual operation according to the instructions in the technical manual of the fire damper;
- Check the opening and closing operation of the damper controlled by the fire alarm system (if present);
- Check the operation of the end switches in open and closed state, adjust and report if necessary;
- Confirm that the damper fulfils its function as part of the control system (where necessary);
- Check that the damper is left in its normal operating position, which usually corresponds to the open position.

5.2. Repair

For safety reasons, repair activities involving fire-fighting components must be carried out only by qualified personnel.

Only original spare parts supplied by the fire damper manufacturer must be used.

A functional test must be performed after each repair.

At the end of the inspection, cleaning or repair operations, check that the fire damper is in the normal operating position.

Keep records of all inspections, repair activities, any problems encountered and their resolution.

This practice, even when not mandatory, is very useful in practice.

5.3. Disposal

Disposal in case of destruction must be carried out in accordance with national legislation. For electrical and electronic parts also refer to EU Directive 2011/65.

6. SELECTION

6.1. Air flow rates in relation to the diameter

Maximum frontal air speed = 12 m/s

Base (mm)	100			150			200			250		
	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow
Height (mm)	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h
200	0,020	0,014	864	0,030	0,022	1296	0,040	0,031	1728	0,050	0,039	2160
250	0,025	0,019	1080	0,038	0,029	1620	0,050	0,040	2160	0,063	0,051	2700
300	0,030	0,023	1296	0,045	0,036	1944	0,060	0,049	2592	0,075	0,063	3240
350	0,035	0,028	1512	0,053	0,043	2268	0,070	0,059	3024	0,088	0,074	3780
400	0,040	0,032	1728	0,060	0,050	2592	0,080	0,068	3456	0,100	0,086	4320
450	0,045	0,036	1944	0,068	0,057	2916	0,090	0,078	3888	0,113	0,098	4860
500	0,050	0,041	2160	0,075	0,064	3240	0,100	0,087	4320	0,125	0,110	5400
550	0,055	0,045	2376	0,083	0,071	3564	0,110	0,096	4752	0,138	0,122	5940
600	0,060	0,050	2592	0,090	0,078	3888	0,120	0,106	5184	0,150	0,134	6480

Base (mm)	300			350			400			450		
	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow
Height (mm)	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h
200	0,060	0,047	2592	0,070	0,055	3024	0,080	0,063	3456	0,090	0,071	3888
250	0,075	0,061	3240	0,088	0,072	3780	0,100	0,083	4320	0,113	0,093	4860
300	0,090	0,076	3888	0,105	0,089	4536	0,120	0,102	5184	0,135	0,115	5832
350	0,105	0,090	4536	0,123	0,106	5292	0,140	0,121	6048	0,158	0,137	6804
400	0,120	0,105	5184	0,140	0,123	6048	0,160	0,141	6912	0,180	0,159	7776
450	0,135	0,119	5832	0,158	0,140	6804	0,180	0,160	7776	0,203	0,181	8748
500	0,150	0,133	6480	0,175	0,156	7560	0,200	0,180	8640	0,225	0,203	9720
550	0,165	0,148	7128	0,193	0,173	8316	0,220	0,199	9504	0,248	0,225	10692
600	0,180	0,162	7776	0,210	0,190	9072	0,240	0,218	10368	0,270	0,247	11664

Base (mm)	500			550			600			650		
	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow
Height (mm)	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h
200	0,100	0,080	4320	0,110	0,088	4752	0,120	0,096	5184	0,130	0,104	5616
250	0,125	0,104	5400	0,138	0,115	5940	0,150	0,125	6480	0,163	0,136	7020
300	0,150	0,128	6480	0,165	0,141	7128	0,180	0,155	7776	0,195	0,168	8424
350	0,175	0,153	7560	0,193	0,168	8316	0,210	0,184	9072	0,228	0,200	9828
400	0,200	0,177	8640	0,220	0,195	9504	0,240	0,213	10368	0,260	0,232	11232
450	0,225	0,202	9720	0,248	0,222	10692	0,270	0,243	11664	0,293	0,263	12636
500	0,250	0,226	10800	0,275	0,249	11880	0,300	0,272	12960	0,325	0,295	14040
550	0,275	0,250	11880	0,303	0,276	13068	0,330	0,302	14256	0,358	0,327	15444
600	0,300	0,275	12960	0,330	0,303	14256	0,360	0,331	15552	0,390	0,359	16848

Base (mm)	700			750			800		
	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow	Front section	Net section	Maximum air flow
Height (mm)	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h	m ²	m ²	m ³ /h
200	0,140	0,112	6048	0,150	0,120	6480	0,160	0,128	6912
250	0,175	0,147	7560	0,188	0,157	8100	0,200	0,168	8640
300	0,210	0,181	9072	0,225	0,194	9720	0,240	0,207	10368
350	0,245	0,215	10584	0,263	0,231	11340	0,280	0,247	12096
400	0,280	0,250	12096	0,300	0,268	12960	0,320	0,286	13824
450	0,315	0,284	13608	0,338	0,305	14580	0,360	0,325	15552
500	0,350	0,319	15120	0,375	0,342	16200	0,400	0,365	17280
550	0,385	0,353	16632	0,413	0,379	17820	0,440	0,404	19008
600	0,420	0,387	18144	0,450	0,415	19440	0,480	0,444	20736

6.2. Air flow rates as a function of the pressure drop

$\Delta P = 5 \text{ Pa}$

Base (mm)	100		150		200		250		300	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	198	17,9	328	20,5	455	21,9	615	24,0	781	25,7
250	290	22,3	481	25,0	666	26,3	901	28,4	1144	30,2
300	396	26,0	656	28,6	908	29,9	1228	32,1	1560	33,8
350	514	29,0	852	31,7	1180	33,0	1595	35,1	2026	36,9
400	627	31,0	1038	33,7	1438	35,0	1943	37,1	2469	38,9
450	759	33,1	1257	35,8	1740	37,1	2352	39,3	2988	41,1
500	891	34,8	1476	37,5	2044	38,8	2763	41,0	3510	42,8
550	1044	36,7	1729	39,4	2394	40,7	3236	42,9	4111	44,7
600	1178	37,8	1952	40,5	2703	41,8	3654	44,0	4642	45,8

Base (mm)	350		400		450		500		550	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	957	27,1	1121	28,0	1308	29,1	1485	29,8	1653	30,3
250	1403	31,6	1643	32,4	1917	33,6	2177	34,3	2422	34,8
300	1913	35,2	2240	36,1	2613	37,2	2968	38,0	3302	38,4
350	2485	38,3	2910	39,2	3395	40,3	3856	41,1	4290	41,5
400	3027	40,3	3545	41,2	4136	42,4	4697	43,1	5226	43,5
450	3665	42,5	4291	43,4	5006	44,5	5686	45,3	6326	45,7
500	4305	44,2	5041	45,1	5881	46,3	6679	47,0	7431	47,5
550	5041	46,1	5903	47,0	6887	48,1	7822	48,9	8702	49,3
600	5692	47,2	6666	48,1	7776	49,3	8832	50,0	9827	50,5

Base (mm)	600		650		700		750		800	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	1835	30,9	2012	31,4	2193	31,9	2380	32,3	2555	32,5
250	2689	35,4	2949	35,9	3215	36,4	3488	36,8	3745	37,0
300	3666	39,0	4019	39,5	4382	40,0	4755	40,4	5105	40,7
350	4762	42,2	5222	42,6	5693	43,1	6178	43,5	6632	43,8
400	5802	44,2	6362	44,7	6936	45,2	7526	45,6	8080	45,8
450	7024	46,4	7701	46,9	8397	47,3	9111	47,8	9781	48,0
500	8250	48,1	9046	48,6	9863	49,1	10702	49,5	11490	49,7
550	9661	50,0	10593	50,5	11550	51,0	12533	51,4	13455	51,6
600	10910	51,1	11962	51,6	13042	52,1	14152	52,5	15193	52,8

$\Delta P = 10 \text{ Pa}$

Base (mm)	100		150		200		250		300	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	280	26,0	464	28,7	643	30,0	869	32,1	1104	33,8
250	411	30,5	680	33,2	942	34,5	1274	36,6	1618	38,4
300	560	34,2	928	36,8	1285	38,1	1736	40,3	2206	42,0
350	727	37,3	1205	39,9	1669	41,2	2256	43,4	2866	45,2
400	886	39,3	1468	42,0	2033	43,3	2748	45,4	3491	47,2
450	1073	41,5	1777	44,1	2461	45,5	3327	47,6	4226	49,4
500	1260	43,2	2088	45,9	2891	47,2	3908	49,4	4964	51,2
550	1476	45,1	2445	47,8	3386	49,1	4576	51,3	5813	53,0
600	1666	46,2	2760	48,9	3823	50,3	5168	52,5	6565	54,2

Base (mm)	350		400		450		500		550	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	1354	35,2	1585	36,1	1849	37,2	2101	37,9	2337	38,4
250	1984	39,7	2324	40,6	2711	41,8	3079	42,5	3426	43,0
300	2705	43,4	3168	44,3	3695	45,5	4197	46,2	4669	46,6
350	3514	46,6	4115	47,4	4801	48,6	5453	49,3	6066	49,8
400	4281	48,6	5013	49,5	5849	50,6	6643	51,4	7391	51,8
450	5182	50,8	6069	51,7	7080	52,9	8042	53,6	8947	54,1
500	6088	52,6	7129	53,5	8317	54,6	9446	55,4	10509	55,8
550	7129	54,5	8348	55,3	9739	56,5	11062	57,3	12307	57,7
600	8050	55,6	9427	56,5	10997	57,7	12491	58,4	13897	58,9

Base (mm)	600		650		700		750		800	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	2595	39,0	2845	39,5	3102	40,0	3366	40,4	3613	40,6
250	3803	43,6	4170	44,0	4547	44,5	4933	44,9	5296	45,2
300	5184	47,3	5684	47,7	6198	48,2	6725	48,6	7220	48,9
350	6735	50,4	7385	50,9	8052	51,4	8737	51,8	9379	52,1
400	8205	52,5	8997	53,0	9809	53,5	10644	53,9	11427	54,1
450	9933	54,7	10891	55,2	11875	55,7	12885	56,1	13833	56,3
500	11668	56,5	12793	56,9	13948	57,4	15135	57,8	16249	58,1
550	13663	58,4	14981	58,8	16334	59,3	17724	59,8	>Qmax	--
600	15429	59,5	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--

$\Delta P = 15 \text{ Pa}$

Base (mm)	100		150		200		250		300	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	343	30,8	569	33,4	787	34,7	1064	36,8	1352	38,6
250	503	35,3	833	37,9	1154	39,2	1560	41,4	1982	43,1
300	686	39,0	1136	41,6	1573	42,9	2127	45,1	2702	46,8
350	891	42,1	1476	44,8	2044	46,1	2763	48,2	3510	50,0
400	1085	44,1	1798	46,8	2490	48,1	3366	50,3	4276	52,1
450	1314	46,3	2177	49,0	3015	50,3	4075	52,5	5176	54,3
500	1543	48,1	2557	50,8	3541	52,1	4786	54,3	6080	56,1
550	1807	50,0	2994	52,7	4147	54,0	5605	56,2	7120	58,0
600	2041	51,1	3381	53,9	4682	55,2	6329	57,4	>Qmax	--

Base (mm)	350		400		450		500		550	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	1658	39,9	1942	40,8	2265	42,0	2573	42,7	2862	43,1
250	2430	44,5	2846	45,4	3320	46,5	3771	47,3	4196	47,7
300	3313	48,2	3879	49,1	4526	50,3	5140	51,0	5719	51,5
350	4304	51,4	5040	52,3	5880	53,4	6678	54,2	7430	54,6
400	5243	53,4	6140	54,3	7163	55,5	8136	56,2	9052	56,7
450	6347	55,7	7433	56,6	8671	57,7	>Qmax	--	>Qmax	--
500	7456	57,5	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--
550	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--
600	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--

Base (mm)	600		650		700		750		800	
	Q	Lw	Q	Lw	Q	Lw	Q	Lw	Q	Lw
Height (mm)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)	m ³ /h	dB(A)
200	3178	43,8	3484	44,2	3799	44,7	4122	45,1	4426	45,4
250	4658	48,3	5107	48,8	5568	49,3	6042	49,7	6487	50,0
300	6349	52,1	6962	52,6	7590	53,1	8236	53,5	8842	53,7
350	8249	55,3	9044	55,7	9861	56,2	10700	56,6	11487	56,9
400	10049	57,3	11019	57,8	12014	58,3	>Qmax	--	>Qmax	--
450	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--
500	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--
550	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--
600	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--	>Qmax	--

6.3. Air flow rates as a function of generated sound levels

L_w = 30 dB(A)

Base (mm)	100		150		200		250		300	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	328	13,7	486	11,0	638	9,8	787	8,2	928	7,1
250	398	9,4	589	7,5	772	6,7	953	5,6	1124	4,8
300	465	6,9	689	5,5	903	4,9	1115	4,1	1315	3,6
350	531	5,3	787	4,3	1031	3,8	1273	3,2	1502	2,7
400	596	4,5	883	3,6	1157	3,2	1429	2,7	1686	2,3
450	660	3,8	977	3,0	1281	2,7	1582	2,3	1867	2,0
500	722	3,3	1070	2,6	1404	2,4	1733	2,0	2045	1,7
550	785	2,8	1162	2,3	1524	2,0	1882	1,7	2221	1,5
600	846	2,6	1253	2,1	1644	1,8	2029	1,5	2395	1,3

Base (mm)	350		400		450		500		550	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	1074	6,3	1212	5,8	1346	5,3	1482	5,0	1617	4,8
250	1301	4,3	1468	4,0	1630	3,6	1796	3,4	1959	3,3
300	1522	3,2	1717	2,9	1908	2,7	2102	2,5	2293	2,4
350	1738	2,4	1962	2,3	2179	2,1	2401	1,9	2619	1,9
400	1951	2,1	2202	1,9	2446	1,7	2695	1,6	2940	1,6
450	2160	1,7	2438	1,6	2709	1,5	2985	1,4	3256	1,3
500	2366	1,5	2671	1,4	2968	1,3	3270	1,2	3568	1,2
550	2570	1,3	2901	1,2	3224	1,1	3552	1,0	3876	1,0
600	2772	1,2	3129	1,1	3477	1,0	3831	0,9	4180	0,9

Base (mm)	600		650		700		750		800	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	1749	4,5	1878	4,4	2006	4,2	2140	4,0	2273	4,0
250	2119	3,1	2277	3,0	2431	2,9	2594	2,8	2755	2,7
300	2480	2,3	2664	2,2	2845	2,1	3036	2,0	3225	2,0
350	2834	1,8	3044	1,7	3251	1,6	3469	1,6	3685	1,5
400	3181	1,5	3417	1,4	3650	1,4	3894	1,3	4136	1,3
450	3523	1,3	3785	1,2	4042	1,2	4313	1,1	4581	1,1
500	3860	1,1	4147	1,1	4429	1,0	4726	1,0	5020	1,0
550	4193	0,9	4505	0,9	4812	0,9	5134	0,8	5454	0,8
600	4523	0,9	4859	0,8	5190	0,8	5538	0,8	5883	0,7

Lw = 40 dB(A)

Base (mm)	100		150		200		250		300	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	503	32,2	745	25,8	977	23,1	1206	19,3	1422	16,6
250	607	21,8	900	17,5	1179	15,7	1456	13,1	1718	11,3
300	709	16,0	1050	12,8	1376	11,5	1699	9,6	2004	8,3
350	808	12,3	1196	9,9	1568	8,8	1936	7,4	2285	6,4
400	904	10,4	1340	8,3	1757	7,5	2169	6,2	2559	5,4
450	1000	8,7	1481	6,9	1942	6,2	2397	5,2	2829	4,5
500	1093	7,5	1620	6,0	2124	5,4	2622	4,5	3095	3,9
550	1186	6,5	1757	5,2	2304	4,6	2844	3,9	3357	3,3
600	1277	5,9	1892	4,7	2481	4,2	3064	3,5	3616	3,0

Base (mm)	350		400		450		500		550	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	1645	14,8	1856	13,7	2062	12,4	2272	11,7	2478	11,2
250	1987	10,0	2242	9,3	2490	8,4	2744	7,9	2993	7,6
300	2319	7,4	2617	6,8	2907	6,2	3203	5,8	3494	5,6
350	2643	5,7	2983	5,3	3314	4,8	3651	4,5	3983	4,3
400	2961	4,8	3342	4,4	3713	4,0	4091	3,8	4463	3,6
450	3273	4,0	3694	3,7	4105	3,4	4523	3,2	4934	3,0
500	3581	3,5	4042	3,2	4491	2,9	4949	2,7	5399	2,6
550	3884	3,0	4385	2,8	4872	2,5	5369	2,4	5857	2,3
600	4184	2,7	4723	2,5	5248	2,3	5784	2,1	6310	2,1

Base (mm)	600		650		700		750		800	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	2680	10,7	2878	10,2	3073	9,8	3279	9,5	3483	9,3
250	3237	7,2	3477	7,0	3713	6,7	3962	6,4	4208	6,3
300	3779	5,3	4060	5,1	4335	4,9	4626	4,7	4913	4,6
350	4309	4,1	4629	3,9	4943	3,8	5274	3,6	5602	3,6
400	4828	3,5	5187	3,3	5539	3,2	5910	3,1	6278	3,0
450	5338	2,9	5735	2,8	6125	2,7	6536	2,6	6942	2,5
500	5841	2,5	6276	2,4	6703	2,3	7152	2,2	7597	2,2
550	6337	2,2	6809	2,1	7272	2,0	7759	1,9	8243	1,9
600	6827	2,0	7335	1,9	7835	1,8	8360	1,7	8881	1,7

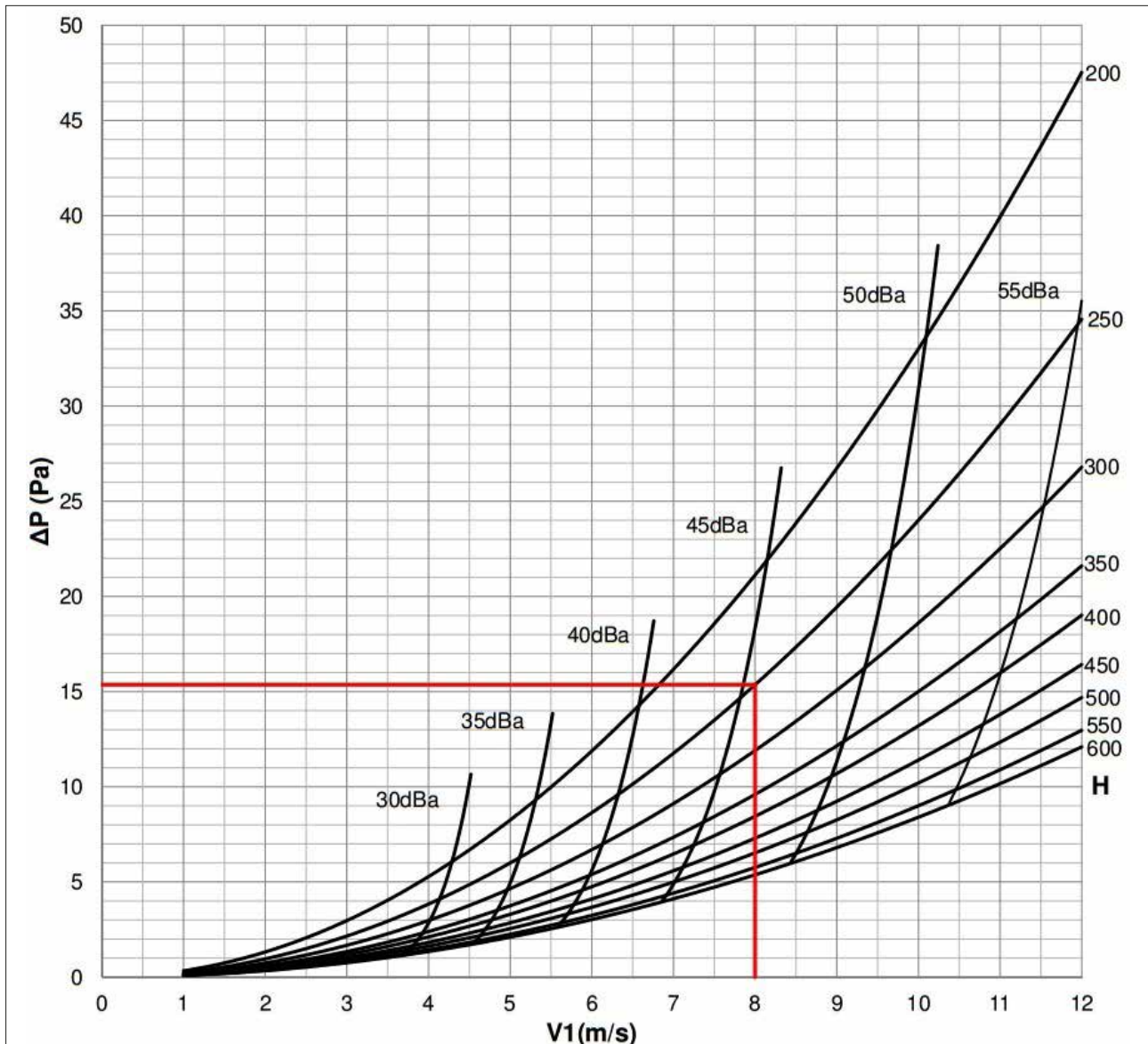
Lw = 45 dB(A)

Base (mm)	100		150		200		250		300	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	623	49,4	923	39,5	1209	35,4	1493	29,5	1761	25,4
250	751	33,4	1112	26,7	1458	23,9	1799	19,9	2123	17,2
300	875	24,4	1296	19,5	1699	17,5	2097	14,6	2474	12,6
350	996	18,7	1475	15,0	1934	13,4	2387	11,2	2817	9,7
400	1114	15,8	1650	12,6	2164	11,3	2672	9,5	3153	8,2
450	1230	13,1	1823	10,5	2390	9,4	2951	7,9	3483	6,8
500	1345	11,4	1992	9,1	2613	8,2	3226	6,8	3807	5,9
550	1458	9,8	2159	7,8	2832	7,0	3497	5,8	4127	5,0
600	1569	8,9	2324	7,1	3049	6,4	3764	5,3	4443	4,6

Base (mm)	350		400		450		500		550	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	2037	22,6	2298	21,0	2552	19,0	2812	17,9	3067	17,2
250	2456	15,3	2771	14,2	3078	12,9	3391	12,1	3699	11,7
300	2862	11,2	3230	10,4	3588	9,4	3953	8,9	4312	8,5
350	3259	8,6	3678	8,0	4086	7,2	4502	6,8	4911	6,6
400	3648	7,3	4117	6,7	4574	6,1	5040	5,8	5498	5,5
450	4029	6,0	4548	5,6	5053	5,1	5568	4,8	6074	4,6
500	4405	5,2	4972	4,9	5525	4,4	6088	4,2	6641	4,0
550	4775	4,5	5390	4,2	5989	3,8	6600	3,6	7200	3,4
600	5141	4,1	5803	3,8	6448	3,4	7106	3,2	7753	3,1

Base (mm)	600		650		700		750		800	
	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP	Q	ΔP
Height (mm)	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa	m ³ /h	Pa
200	3317	16,3	3563	15,7	3805	15,0	4059	14,5	4311	14,2
250	4001	11,1	4298	10,6	4589	10,2	4896	9,8	5201	9,6
300	4665	8,1	5011	7,8	5352	7,5	5710	7,2	6065	7,1
350	5313	6,2	5708	6,0	6095	5,7	6504	5,5	6908	5,4
400	5948	5,3	6390	5,0	6824	4,8	7281	4,7	7734	4,6
450	6571	4,4	7060	4,2	7540	4,0	8045	3,9	8546	3,8
500	7185	3,8	7720	3,6	8245	3,5	8797	3,4	9345	3,3
550	7790	3,3	8370	3,1	8940	3,0	9539	2,9	10133	2,8
600	8388	3,0	9013	2,8	9626	2,7	10271	2,6	10911	2,6

6.4. Pressure drop and sound level graph for base 400 mm



Example

B = Base [mm]	B = 350
H = Height [mm]	H = 250
Q = Air flow [m ³ /h]	Q = 2520 m ³ /h
V ₁ = Frontal air speed [m/s]	V ₁ = 8 m/s
ΔP = Pressure drop [Pa]	From graph: $\Delta P = 15 \times 1,05 = 15,8$ Pa
L _w = Sound level [dB(A)]	From graph: $L_w = 45,5 - 0,3 = 45,2$ dB(A)
F = Central frequency octave band [Hz]	

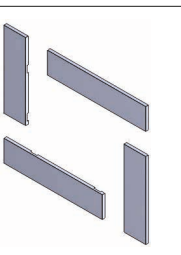
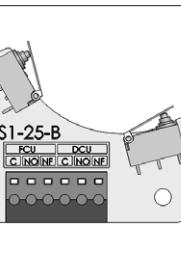

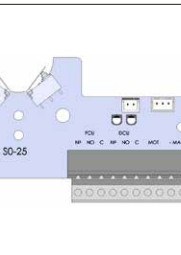
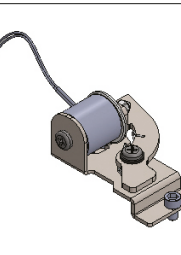
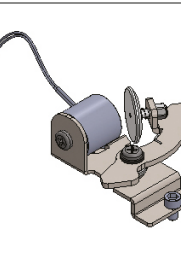
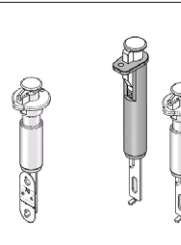
6.5. Correction for base different than 400 mm

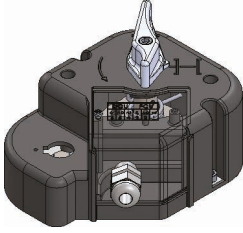
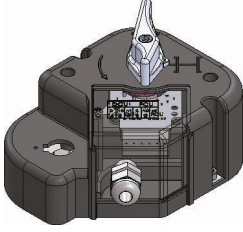
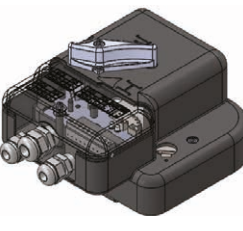
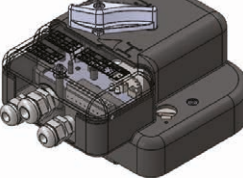
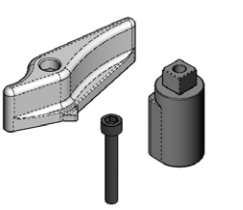
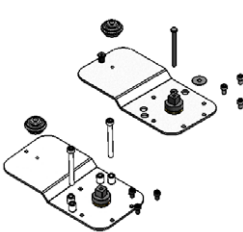
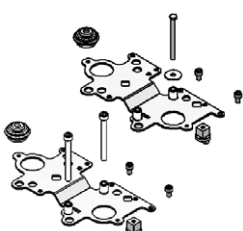
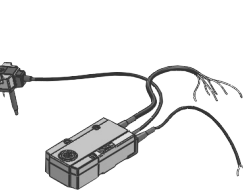
Correction for base different than 400 mm															
B in mm	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
$\Delta P \times \dots$	2	1,64	1,52	1,3	1,16	1,05	1	0,93	0,89	0,87	0,84	0,82	0,8	0,78	0,77
Lw + ...	-1,9	-1,6	-1,2	-0,9	-0,5	-0,3	0	0,3	0,5	0,7	0,9	1,1	1,3	1,4	1,5

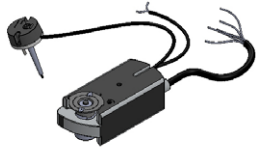
6.6. Correction used to estimate the octave band spectrum (Values to be added to the noise levels in dB(A))

V1 (m/s)	F (Hz)							
	63	125	250	500	1000	2000	4000	8000
2	25	9	2	-4	-9	-17	-32	-19
3	20	8	1	-4	-8	-14	-27	-22
4	15	6	1	-4	-7	-11	-22	-24
5	11	5	0	-4	-6	-8	-18	-26
6	9	4	-1	-4	-5	-7	-15	-25
7	8	4	-2	-5	-5	-7	-14	-22
8	7	4	-3	-5	-5	-6	-13	-21
9	7	4	-3	-6	-5	-6	-12	-20
10	7	3	-3	-6	-5	-6	-12	-19
11	7	3	-3	-6	-5	-6	-12	-19
12	6	2	-4	-7	-4	-5	-11	-18

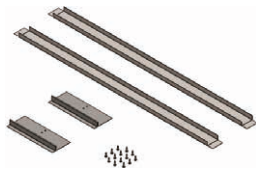
7. ACCESSORIES AND SPARE PARTS

	<p>4 x plasterboard shaped sealing panels for wall installation B X H B = base nominal length (Eg. 100) H = height nominal length (Eg. 200)</p>	<p>WKS25KIT[B][H]</p>
	<p>Kit microswitch S1-25-B board + 2 fixing screws, 25/23 series (compact manual)</p>	<p>WHKS125C</p>
	<p>Kit microswitch S1-25 board + 2 fixing screws, 25/23 series</p>	<p>WHKS125</p>
	<p>Kit microswitch S0-25 board + 2 fixing screws for manual magnetic control 25/23 series and magnet power supply 24 V DC or 48 V DC</p>	<p>WHKS025</p>
	<p>Kit power supply input magnet only + 2 screws for manual magnetic mechanism, 25/23 series</p>	<p>WHKMAG125</p>
	<p>Kit power supply interruption magnet only + 2 screws for manual magnetic mechanism 25/23 series</p>	<p>WHKMAGR25</p>
	<p>Red fuseholder group 25 series with fuse WK70 Red fuseholder group 25 series with fuse WK70 (compact manual) Blue fuseholder group 25 series with fuse WK70 Blue fuseholder group 25 series with fuse WK70 (compact manual) Red fuseholder group 25 series without fuse Red fuseholder group 25 series without fuse (compact manual) Blue fuseholder group 25 series without fuse Blue fuseholder group 25 series without fuse (compact manual)</p>	<p>WHKDISR WHKDISCR WHKDISB WHKDISCB 3WHKDISR FMWHK044 3WHKDISB FMWHK028</p>

	<p>Kit mechanism manual 25 series + carter + cam and lever + 2 fixing screws (without fuseholder group) WHK25MANB</p>
	<p>Kit mechanism manual 25 series + carter + cam and lever + elect. board S1-25 + 2 fixing screws (without fuseholder group) WHK25MANBS2</p>
	<p>Manual mechanism for 25 series + elect. board S0-25 + interr. magnet 24 V DC or 48 V DC+ carter and screws (without fuseholder group) WHK25MANMMR</p>
	<p>Manual mechanism for 25 series + elect. board S0-25 + input magnet 24 V DC or 48 V DC+ carter and screws (without fuseholder group) WHK25MANMMI</p>
	<p>Red reset lever for WH/WK25 (spare part for manual mechanism) WHK25PLSLEVA Blue reset lever for WH/WK25 (spare part for manual mechanism) WHK23PLSLEVA</p>
	<p>Motorized plate WK25/23 for Siemens GRA + fixing screws (motor not included) WK25MTS Motorized plate WK25/23 for Belimo BFL + fixing screws (motor not included) WK25SMB</p>
	<p>Motorized plate WK25/23 (compact) for Siemens GRA + fixing screws (motor not included) WK25CMTS Motorized plate WK25/23 (compact) for Belimo BFL + fixing screws (motor not included) WK25CSMB</p>
	<p>Belimo motor for dampers predisposed for use with BFL24T, 24 V AC/DC power supply, thermofuse 72 °C BFL24T Belimo motor for dampers predisposed for use with BFL24T-ST, 24 V AC/DC power supply, thermofuse 72 °C with connection plugs for control and monitoring systems BFL24T-ST Belimo motor Top Line series for dampers predisposed for use with BF24TLT-ST, 24 V AC/DC power supply, BF24TLT-ST thermofuse 72 °C with connection plugs for control and monitoring systems BF24TLT-ST Belimo motor for dampers predisposed for use with BFL230T, 230 V AC power supply, thermofuse 72 °C BFL230T</p>

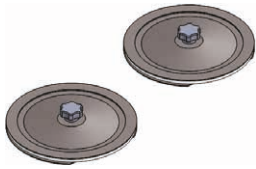


Siemens motor for dampers predisposed for use with GRA126, 24 V AC/DC power supply thermofuse 72 °C GRA126
 Siemens motor for dampers predisposed for use with GRA326, 230 V AC power supply, thermofuse 72 °C GRA326



Pairing mounting kit
 L = length to approach (Eg. 200) Made from two couples of metal profiles and 14 screws

WKSBA25[L]



Inspection opening side A
 Inspection opening side C
 Inspection opening side A+C

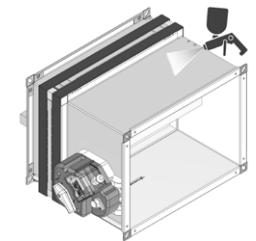
WKSPA
 WKSPC
 WKSPAC

(The stainless steel inspection opening is not available)
(Available only during fire damper order for nominal base dimensions 150 mm or higher)
(Refer to the section Components p. 4 for further information about inspection openings)



Copper mechanical thermofuse 70 °C for manual mechanism
 Copper mechanical thermofuse 95 °C for manual mechanism
 Thermofuse 72 °C for Belimo motor BFL and BFN (spare part)
 Thermofuse 95 °C for Belimo motor BFL and BFN (accessory)
 Thermofuse 72 °C for Siemens motors GRA, GNA and GGA (spare part)
 Thermofuse 95 °C for Siemens motors GRA, GNA and GGA (accessory)

WK70
 WK95
 WWEZBAT72
 WWEZBAT95
 MT-FUSASK79.4
 MT-FUSASK79.5



Matt black epoxy powder painting for WKS25 fire damper casing

- Corrosion resistance: Excellent
- Heat resistance: Very good
- Resistance direct impact: ≥2Kg 5cm ISO 6272
- Resistance reverse impact: ≥2Kg 5cm ISO 6272
- Resistance umidity chamber: after 500 hrs noy blistering ISO 6270
- Resistance salt spray test: after 500 hrs creeping at cross-cut <1mm ISO 9227

WK25PAINT[B][H]



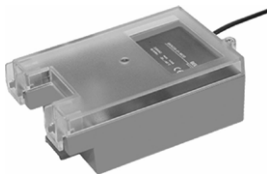
Communication and control unit BKS24-1B to control and monitor 1 fire damper with Belimo motor

WHBKS241B



Communication and control unit BKS24-9A to control and monitor up to 9 fire dampers with Belimo motor

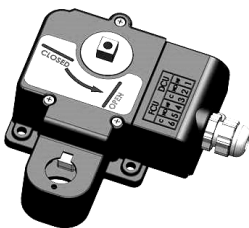
WHBKS249A



Communication and power supply unit: BKN230-24 for Belimo motors BFL24T-ST, BFN24T-ST e BF24T-ST WHKBKN23024
 Modbus Communication and power supply unit: BKN230-24MOD for Belimo motors BFL24T-ST, BFN24T-ST and BF24T-ST WHKBKN230-24MOD
 Communication and power supply unit MPBUS for BKS24-9A or gateways Belimo UK24MOD and UK24BAC: BKN230-24-C-MP for Belimo motors BFL24T-ST, BFN24T-ST and BF24T-ST WHKBKN230-24-C-MP
 Modbus Communication and power supply unit: BKN230MOD for Belimo motors BFL230T, BFN230T and BF230T WHKBKN230MOD



Gateway UK24BAC Belimo for BACnet communication WHKUK24BAC



Spare part blue manual compact mechanism (without fuseholder group, reset lever and fixing screws) FMWHK042V00
 Spare part grey manual compact mechanism (without fuseholder group, reset lever and fixing screws) FMWHK042V01
 Spare part red manual compact mechanism (without fuseholder group, reset lever and fixing screws) FMWHK042V02



Reset lever for WH/WK25 (spare part for manual compact mechanism) blue PL-PS-WHK25CLEVA
 Reset lever for WH/WK25 (spare part for manual compact mechanism) red PL-PS-WHK25CLEVAR

(1) Is recommended to install the position microswitches for the manual fire dampers with magnet.

8. HOW TO ORDER

8.1. Motorized fire dampers

Code		
Type	WKS	Rectangular fire damper wall fitted
Series	25	Blade thickness 25 mm - 500 Pa air sealing
Motor type	VSS	Siemens motor GRA126 (24V)
	DSS	Siemens motor GRA326 (230V)
	VSB	Belimo motor BFL24T (24V)
	DSB	Belimo motor BFL230T (230V)
	TSB	Belimo motor BFL24T-ST (24V) with connection plugs for integration in control and monitoring systems
Base	XYZ	Nominal base dimension (mm)
Height	XYZ	Nominal height dimension (mm)

8.2. Fire damper with manual control

Code		
Type	WKS	Rectangular fire damper wall fitted
Series	25	Blade thickness 25 mm - 500 Pa air sealing
Command type	B	Manual command
	C	Compact manual command
	M	Manual command with magnet
Position indication microswitches	S0	Without position microswitch
	S2	With two position microswitches (always for MR/MI versions)
Magnet	M0	Without magnet (only for command type "B")
	MR	With power supply interruption magnet through electric board 24 V DC or 48 V DC and with two position microswitches
	MI	With power supply input magnet through electric board 24 V DC or 48 V DC and with two position microswitches
Base	XYZ	Nominal base dimension (mm)
Height	XYZ	Nominal height dimension (mm)

Examples	Code
WKS25 fire damper with manual control, 350x250	WKS25B-S0-M0-350250
WKS25 fire damper with manual control and microswitches, 350x250	WKS25B-S2-M0-450300
WKS25 fire damper with manual control, power interruption magnet, 250x250	WKS25M-S2-MR-250250
WKS25 Siemens motorized 230V fire damper, 300x250	WKS25DSS-300250

8.3. Electric motor driven actuators

		Base														
Siemens		100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Height	600	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	550	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	500	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	450	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	400	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	350	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	300	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	250	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	200	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Belimo		100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Height	600	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	550	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	500	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	450	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	400	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	350	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	300	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	250	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	200	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Belimo					Siemens									
		24 V		230V			24 V		230V							
S		BFL24T		BFL230T			GRA126		GRA326							

9. SPECIFICATION TEXT

9.1. Series WKS25 compact rectangular fire damper

Description

WKS25 rectangular fire damper tested for fire resistance and smoke seal with 500 Pa depression as per EN 1366-2, classified according to EN 13501-3 and CE marked according to European Regulation UE 305/2011 and EN 15650 standard.

Allows maximum safety for fire protection inside buildings providing perfect heat insulation and cold and hot smokes tightness. Can be connected to fire protection alarm system or smokes detection to anticipate blade closure before fire, prevents indirect damages caused by smokes generated by combustion.

Technical characteristics

- Available sizes from 100x200 mm to 800x600 mm
- Bigger sizes achievable by pairing two fire dampers
- Case made from galvanized sheet steel, with a total length of 310 mm, with "thermal labyrinth" insulation system. Comes with flanges for duct connection 20 mm width with reinforced angle connections.
- Closing mechanism built according to UNI 10365, with thermal fuse certified to ISO 10294-4, a test button to check the correct working of the damper, a release system to block the damper in closed position and a visual signal "open/closed". The closing mechanism can be easily interchanged and substituted:
 - with mechanical release and manual rearming
 - with mechanical release and manual rearming, can be released remotely via a magnet and electric and signal
 - with electric release and rearming, via and integrated Siemens or Belimo system tested according to EN 15650, composed by an electric thermal fuse and remote controlled servomotor via an electrical signal
- Blade made from calcium silicate insulating material
- Blade axis made of steel, fixed on casing, with low friction bearings for high reliability in case of fire.
- EPDM lip gasket to cold smoke sealing according to EN 1366-2
- Thermal, expanding graphite gasket
- Thermal fuse with melting point certified ISO 10294-4 at 70 °C or 95 °C (version with mechanical release) or at 72 °C (version with servo motor)
- Absence of thermal bridge between the wall of installation and the ducts before and after
- Resistance to salt spray, tested with severity 2, according to EN 60068-2-52
- Casing leakage Class C according to EN 1751

Installation

- Installation within vertical rigid walls made from aerated concrete blocks, standard concrete or masonry with a minimum thickness of 100 mm and minimum density of 550 kg/m³ (EI 120 S)
- Installation within light plasterboard walls with minimum thickness of 100 mm (EI 60 S)
- Installation within plasterboard walls with minimum thickness of 100 mm (EI 120 S)

- Installation within light walls made with gypsum blocks 100 mm thick and minimum density 995 kg/m³ (EI 120 S) or minimum thickness of 70 mm and minimum density 995 kg/m³ (EI 90 S)
- EI 90 S Installation within vertical light wall (Shaft wall)
- Fire resistance characteristics independent from direction of the source of the fire according to EN 1366-2 article 6.2
- Installation possible with damper blade placed horizontally or vertically, with the mechanism placed in left/right or above/below
- Quick installation, no need to use concrete or filling materials, operating just on one side of the fire damper. For vertical walls installation it is possible to approach the fire damper to the side vertical wall, to the ceiling or to the floor, or install the fire damper in the corner.

Accessories

- Motorised version with 24 V or 230 V servomotor installed on the damper
- Set of microswitches with three NO/NC position detecting connectors for open and closed damper, as per standard UNI 10365
- Immission and Interruption magnet 24/48 V DC
- Power supply and communication unit MP-Bus, Modbus, Bacnet
- Inspection doors diameter 140 mm with air sealing gasket, no tools required for opening
- Plasterboard shaped sealing panels for wall installation precut on required sizes
- Fire damper pairing kit WKSBA25

10. REVISION INDEX

Revision n°	Date of issue	Description
14/00	2014/11	First issue
15/07	2015/07	<p>Added drawing: Fire dampers pairing for big ducts dimensions p. 5</p> <p>Added section: <ul style="list-style-type: none"> Blade rotation axis positioning p. 15 </p> <p>Added table: <ul style="list-style-type: none"> Revision Index p. 52 </p> <p>Updated section: <ul style="list-style-type: none"> Belimo motorized version p. 11 Specification Text p. 51 </p> <p>Updated table: <ul style="list-style-type: none"> Performances p. 9 Fire resistance classification according to EN 13501-3-2009 p. 9 Accessories and spare parts p. 45 Motorized fire dampers p. 49 </p> <p>General improvements</p>
16/04	2016/04	<p>Updated section: <ul style="list-style-type: none"> Technical data p. 13 Mechanism type p. 10 Minimum distances p. 18 Electrical connections p. 32 How to order p. 49 </p> <p>Updated table: <ul style="list-style-type: none"> Fire resistance classification according to EN 13501-3-2009 p. 9 Accessories and spare parts p. 45 </p> <p>General improvements</p>
16/10	2016/10	<p>Added section: <ul style="list-style-type: none"> Installation within vertical light wall (Shaft wall) p. 31 Positioning brackets before fixing p. 15 Indications for the correct duct suspension and for damper connection </p> <p>Updated section: <ul style="list-style-type: none"> Minimum distances p. 18 Fire resistance classification according to EN 13501-3-2009 p. 9 Construction supports characteristics p. 20 How to order p. 49 Mechanism type p. 10 Electrical connections p. 32 Fire dampers pairing p. 6 </p> <p>Updated table: <ul style="list-style-type: none"> Accessories and spare parts p. 45 </p> <p>General improvements</p>
17/04	2017/04	<p>Updated section: <ul style="list-style-type: none"> Electrical connections p. 32 How to order p. 49 </p> <p>Updated table: <ul style="list-style-type: none"> Accessories and spare parts p. 45 </p> <p>General improvements</p>
19/05	2019/05	<p>Added section: <ul style="list-style-type: none"> Installation of flexible connectors in order to balance out the ventilation ducts expansion p. 15 Transfer Application (application not connected to air ducts on one or both sides) p. 16 </p> <p>Updated section: <ul style="list-style-type: none"> Installation p. 15 Not allowed uses p. 15 Minimum distances p. 18 Light plasterboard vertical walls p. 20 Maintenance and inspections p. 35 </p> <p>General improvements</p>
20/10	2020/10	<p>Updated section: <ul style="list-style-type: none"> Installation of flexible connectors in order to balance out the ventilation ducts expansion p. 15 Not allowed uses p. 15 Transfer Application (application not connected to air ducts on one or both sides) p. 16 Mechanism type p. 10 Installation p. 15 Minimum distances p. 18 Periodic inspection and cleaning p. 35 Certifications and approvals p. 4 </p> <p>General improvements</p>

www.lindab.com - Fire dampers are manufactured by MP3 Srl www.mp3-italia.it

As the manufacturer is constantly improving its products, the aesthetic or dimensional features, the technical data, the equipment and accessories indicated could be subject to variations.



Good Thinking

At Lindab, good thinking is a philosophy that guides us in everything we do. We have made it our mission to create a healthy indoor climate – and to simplify the construction of sustainable buildings. We do that by designing innovative products and solutions that are easy to use, as well as offering efficient availability and logistics. We are also working on ways to reduce our impact on our environment and climate. We do that by developing methods to produce our solutions using a minimum of energy and natural resources, and by reducing negative effects on the environment. We use steel in our products. It's one of few materials that can be recycled an infinite number of times without losing any of its properties. That means less carbon emissions in nature and less energy wasted.

We simplify construction



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