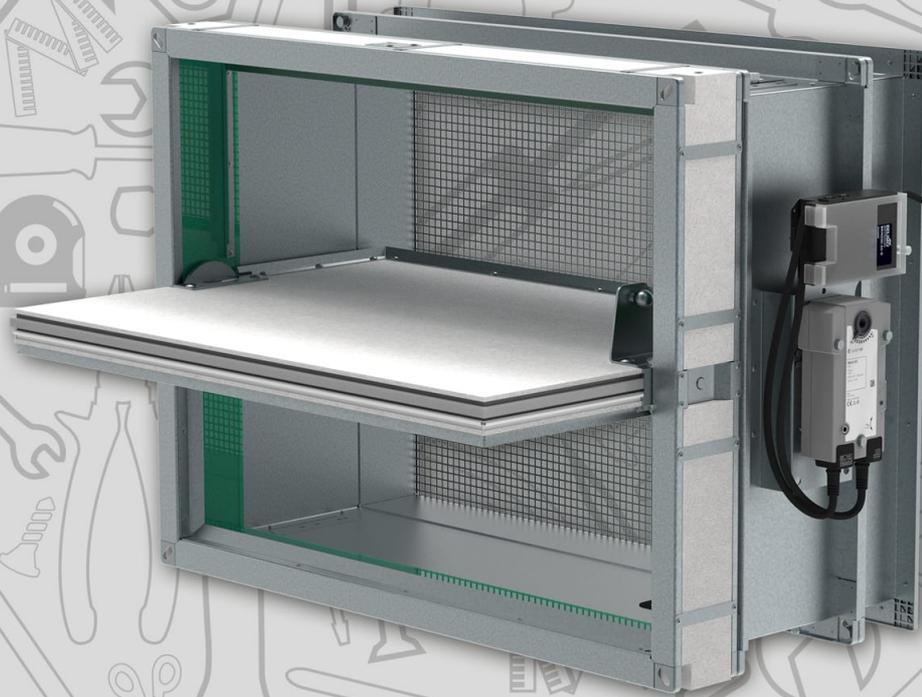


# S-SA2L

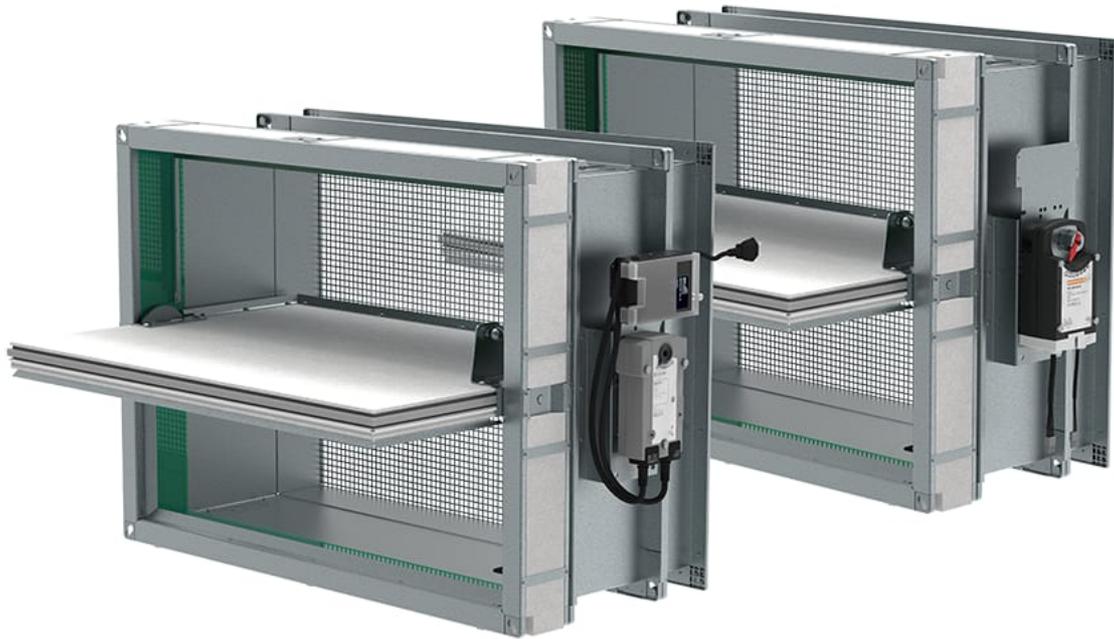
Smoke Control Damper - AAmulti

Handbook



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## Description

S-SA2L smoke control dampers operate with mechanical or natural smoke and heat extraction systems. They remove poisonous gases, smoke and fire and can also supply clean air to fire compartments.

S-SA2L dampers have an actuator without a spring. Thus, they have two safety positions: an "open" position and a "closed" position. Power is necessary for the smoke control dampers.

S-SA2L dampers are designed for on a duct installations ended with grille, not in the wall or ceiling. The "Installation Methods" section shows the types of installations that are permitted.

### Special Properties

- The pressure level is 3 (-1500 Pa ... 500 Pa).
- The blade leakage class 3 (compliant with EN 1751).
- The casing leakage class C (compliant with EN 1751).
- The S-SA2L dampers classified "multi" can also operate in compartments that are identified as "single".
- AA – automatic activation (sets the safety position within 60 seconds). No thermal insulation around the actuator needed.

### Fire Resistivity

S-SA2L smoke control dampers have a CE certification that meets the EU's Construction Products Regulation and complies with standard EN 12101-8:2011, EN 1366-10:2011, A1:2017, and EN 1366-2:2015 are the reference standards for the tests. EN 13501-4:2016 is the reference standard for product Classification. The smoke control damper and its installation counts as one unit for fire resistivity rating:

- Damper installed on a duct with horizontally oriented damper blade in closed position:  
EI 120 ( $h_{od} - i \leftrightarrow o$ ) S1500C<sub>mod</sub> AAmulti
- Damper installed on a duct with vertically oriented damper blade in closed position:  
EI 120 ( $v_{ed} - i \leftrightarrow o$ ) S1500C<sub>mod</sub> AAmulti

### Types of Activation

- **B230** - Activation mechanism with a Belimo actuator (230V AC) and auxiliary switches
- **G230** - Activation mechanism with a Gruner actuator (230V AC) and auxiliary switches
- **B24** - Activation mechanism with a Belimo actuator (24V AC/DC) and auxiliary switches
- **G24** - Activation mechanism with a Gruner actuator (24V AC/DC) and auxiliary switches
- **B24-W** - Activation mechanism with a Belimo actuator (24V AC/DC) and auxiliary switches, with provided cable connectors for the supply and communication unit (communication unit not part of the mechanism)
- **G24-W** - Activation mechanism with a Gruner actuator (24V AC/DC) and auxiliary switches, with provided cable connectors for the supply and communication unit (communication unit not part of the mechanism)
- **B24-SR** - Activation mechanism with a modulating Belimo actuator (24V AC/DC; 0(2) V...10 V DC) and auxiliary switches. Modulating actuators have the possibility to open the blade at a desired angle
- **GSTO** - Activation mechanism with a Gruner actuator (AC/DC 24 V) with a supply and communication unit (AC 24 V) FS-UFC24-2 (Modbus/BACnet)
- **BST1** - Activation mechanism with a Belimo actuator (AC/DC 24 V) with a supply and communication unit (SLC powered) BC24-G2 (THC)
- **BST10** - Activation mechanism with a Belimo actuator (AC/DC 24 V) with a supply and communication unit (AC 230 V) BKNE230-24-PL (Powerline)

### Accessories

Detailed information about accessories is available in [design.systemair.com](http://design.systemair.com)

- K1-S-SA2L: Kit for Sheet-Metal Duct Installation.
- LEAS: Damper Extension for Thick-wall Installations.

## Design

The casing of the S-SA2L is made of a galvanized sheet metal. Blades are made from calcium silicate boards. A foam seal, silicone rubber gasket with an intumescent seal prevent leaks of heat or smoke. The casing has flange on one side with holes for screws to attach to sheet-metal duct flanges. Casing is fitted with grille at one side. The casing also has a calcium silicate board circumfering the blade area for connection to board made duct. The damper casing has inspection openings. The mechanisms actuator of the S-SA2L is accesible from the outside.

### Composition of Materials

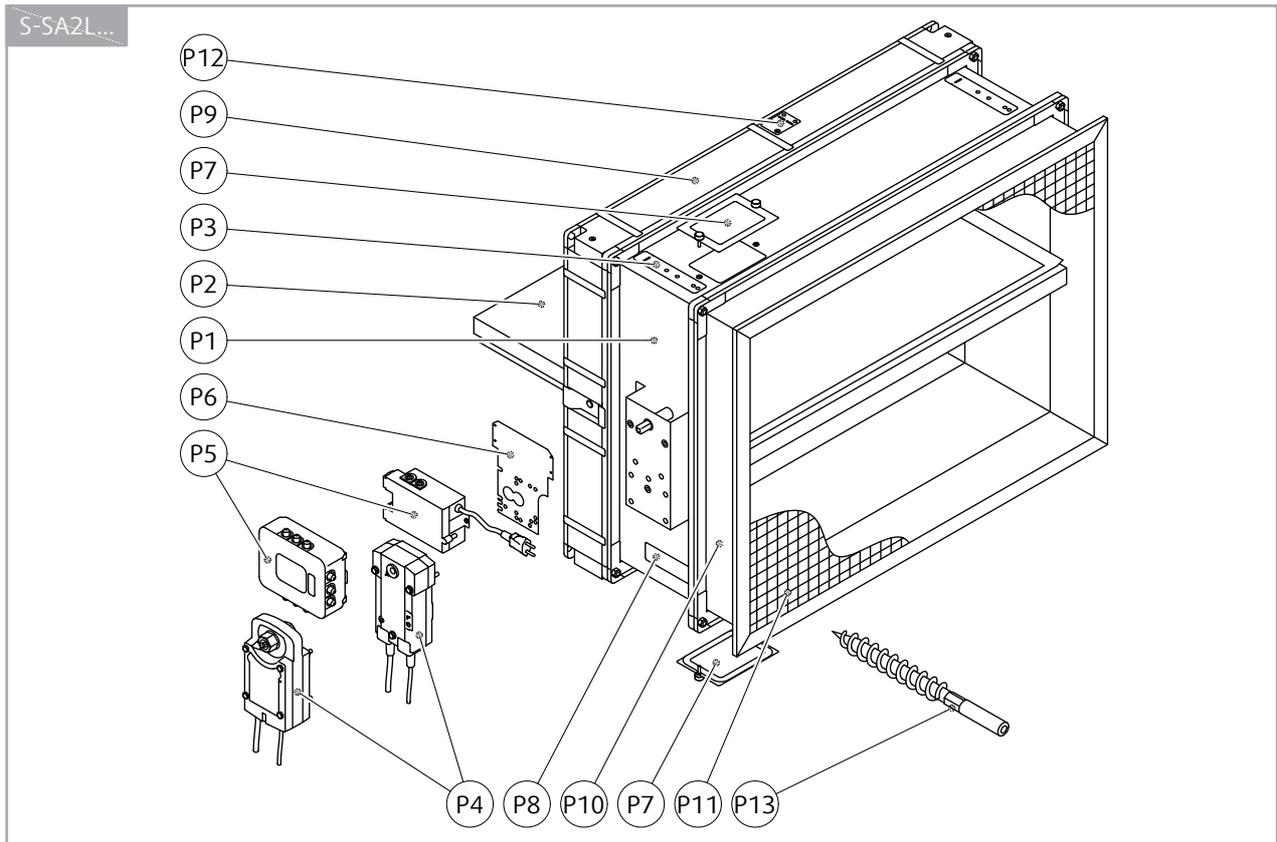
The product contains these materials:

- Galvanized sheet metal
- Calcium silicate board
- Fireproof carbon fiberglass
- Polyurethane foam
- Intumescent strips
- Bound silicone in extruded gasket
- Ethylene-propylene rubber
- PE tapes and foil
- Galvanized steel fasteners

- Acrylic sealant

The manufacturing processes of these materials agree with local regulations. The product does not contain dangerous materials. No silicone caulks are used in the manufacturing processes.

## Product Parts



## Legend

- P1** - Damper casing
- P2** - Damper blade
- P3** - Bendable hanger
- P4** - Actuator
- P5** - Supply and communication unit (only for GST0, BST1, BST10 activation type)
- P6** - Holder for communication unit (without unit installed only for B24-W activation type)
- P7** - Inspection lid
- P8** - Product label
- P9** - Calcium silicate frame
- P10** - Duct extension
- P11** - Sheet metal mesh
- P12** - Installation brace (for W>800)
- P13** - Kombi screw M8

# Technical Parameters

## Durability Test

- Test procedure with 10000 cycles and actuator control (rotation from 0° to 90°)
- Test procedure with 10000 cycles and actuator control for "mod" classification (rotation from 30° to 60°)
- No change of the necessary properties.
- No change of the necessary properties.

## Tested Pressures

Maximum underpressure	1500 Pa
Maximum overpressure	500 Pa

**Safe Position** Open or closed

**Possible Installations** Refer to the "Installation" section

**Direction of the Airflow** Both direction for supply or extract

**Permitted air Velocity During Blade Movement** 12 m/s

**Side with Fire Protection** Both sides: (i<->o) - symmetrical

**Closing and Opening Time** Motor running time: <60 s / 90°

**Closed or Open Status Indicator** Microswitches that are part of the mechanism actuator signal the closed or open status.

## Environmental Conditions for Operation

The temperatures must be:	-20 °C ... 50 °C
Relative humidity:	Less than 95% (3K21, EN 60721-3-3)
Product protected from:	Weather, rain and water from other sources
Condensation:	Cannot form on the product
Icing:	Cannot form on the product

## Access for Inspection

Through opening of inspection lid.

**Maintenance** Maintenance is not necessary. A dry-cleaning procedure can be mandatory in some countries or when needed.

## Inspections

Obey local laws for the minimum time between inspection procedures. When not specified the maximum interval between inspections is 6 months

**Tightness of the Blade** Class 3 of standard EN 1751 at 500 Pa

**Tightness of the Housing** Class C of standard EN 1751 at 500 Pa

## EC Directives

2006/42/EC Machinery Directive  
2014/35/EU Low Voltage Directive  
2014/30/EU Electromagnetic Compatibility Directive

## Driving Actuator Types

Belimo BEN..., BEE..., BE..., (BLE...)	...230; ...24; ...24-ST; ...24-SR
Gruner 342-..., 362-...	...230-15, -20, -40...; ...024-15, -20, -40...; ...024-15-ST01, -20-ST01, -40-ST01...

**Transportation and Storage** The temperature range must be: -30...50 °C

Make sure that the damper blade is in the closed position during transportation and protected from weather disruptions. The storage of the smoke control damper must be indoors.

# Assessed Performance

15 CE 1396

## Systemair Production a.s.

Hlavná 371, 900 43 Kalinkovo, Slovakia

1396-CPR-0147

S-SA2L

### EN 12101-8 : 2011

Smoke control damper

#### Nominal Activation Conditions/Sensitivity

Pass

#### Response Delay (Response Time)

Opening/closure time proven. Duration: &lt;60 s / 90°

#### Operational Reliability

 $C_{mod}$ : 20.000 cycles (modulated)

#### Fire Resistance:

installation: **EI 120** ( $v_{ed} - h_{od} - i \leftrightarrow o$ ) **S1500** $C_{mod}$  **AAmulti**

Resistivity depends on installation method and situation

• integrity

**E**

maintenance of the cross section

(under E)

mechanical stability

(under E)

• insulation

**I**

• smoke leakage

**S**

#### Durability of Response Delay

**AA** - Automatic Activation. Opening/closure time proven. Duration: <60 s / 90°

#### Durability of Operational Reliability

 $C_{mod}$ : 20.000 cycles. Cycle duration: <120 s

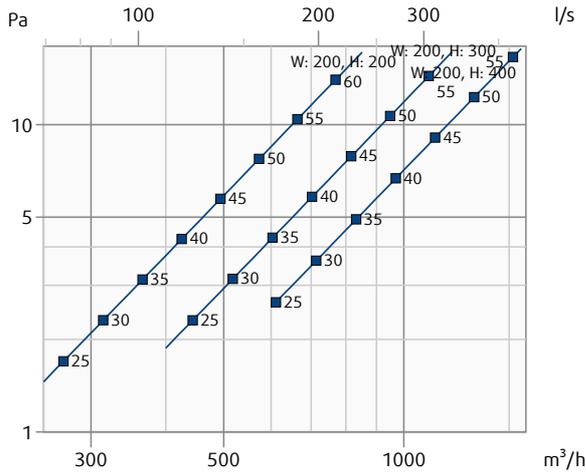
# Diagrams

The pressure drop, and A-weighted total discharged sound power level depend on the nominal width and height of the damper and air flow volume at different duct pressures. The type of activation does not influence the airflow parameter, therefore only one activation type is shown in the diagrams.

## Diagrams for Extract Air

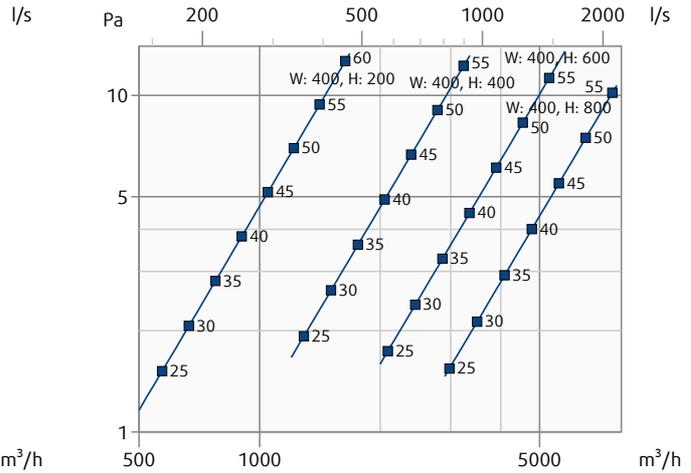
### S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



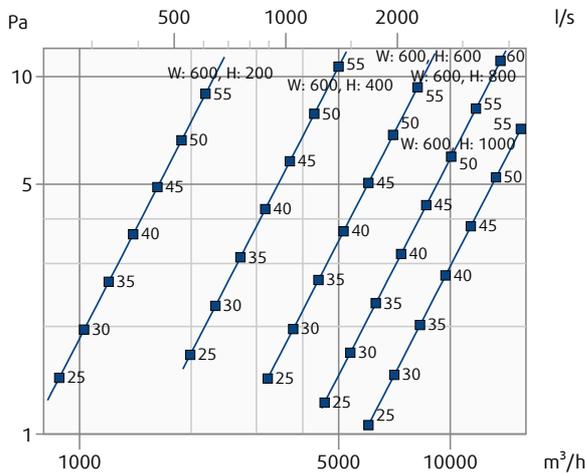
### S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



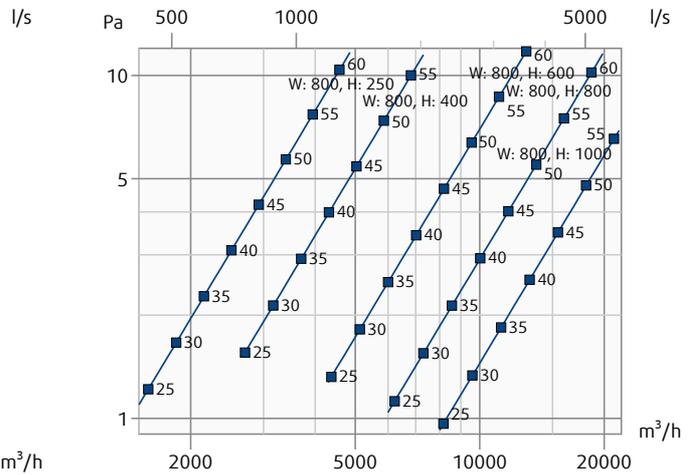
### S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



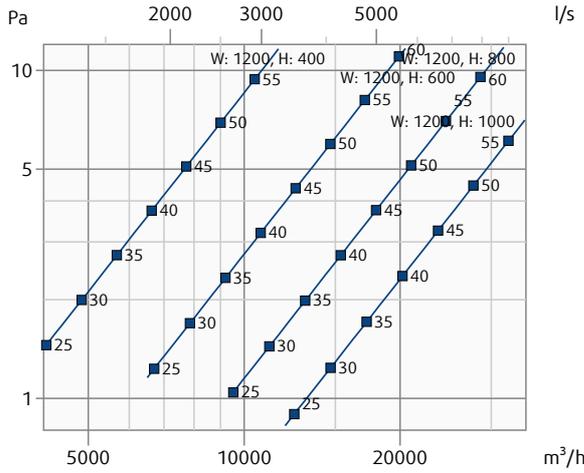
### S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



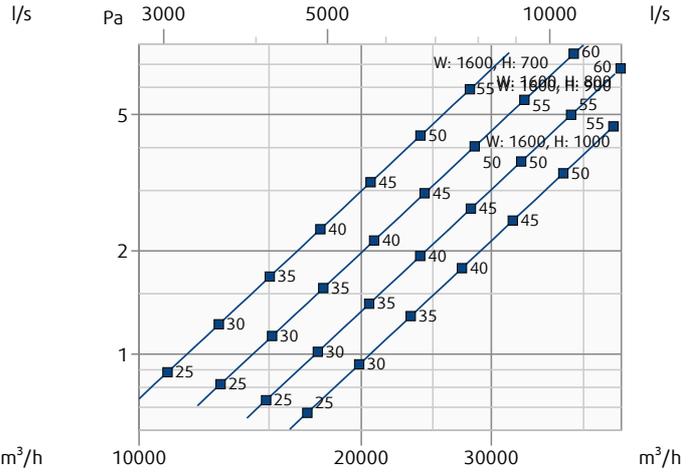
S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



S-SA2L-...-

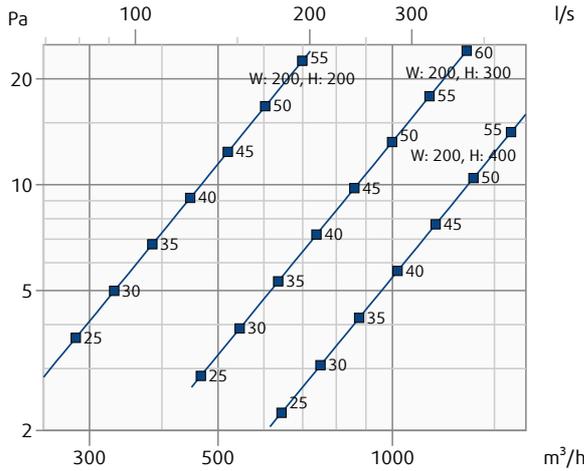
Pressure drop & A-weighted sound power level in dB(A)



Diagrams for Supply Air

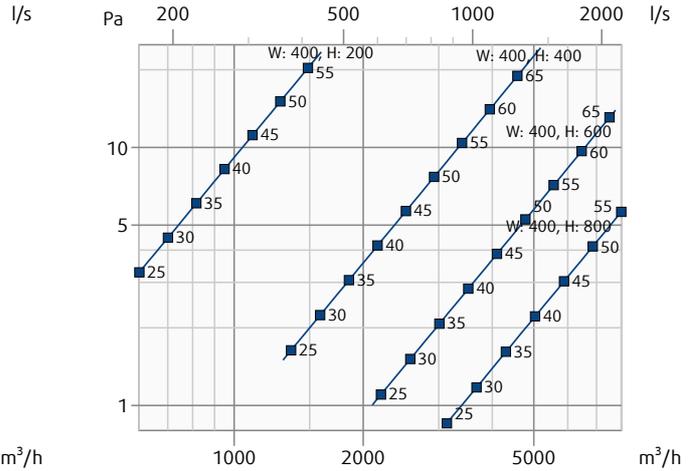
S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



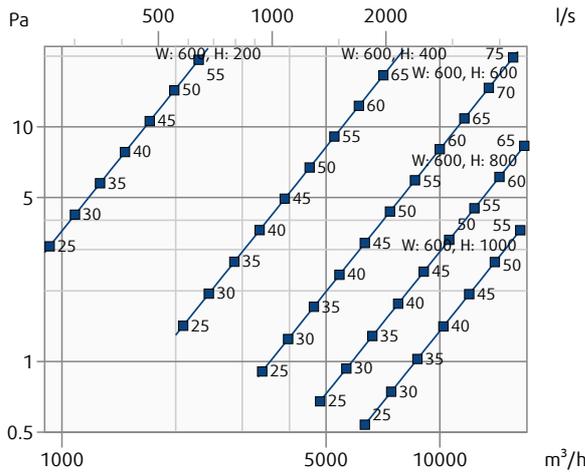
S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



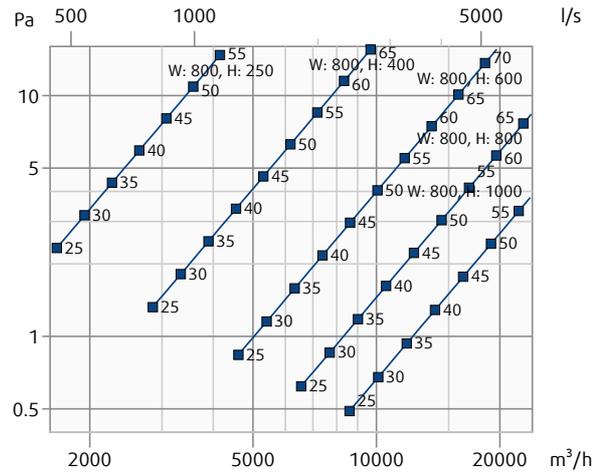
S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



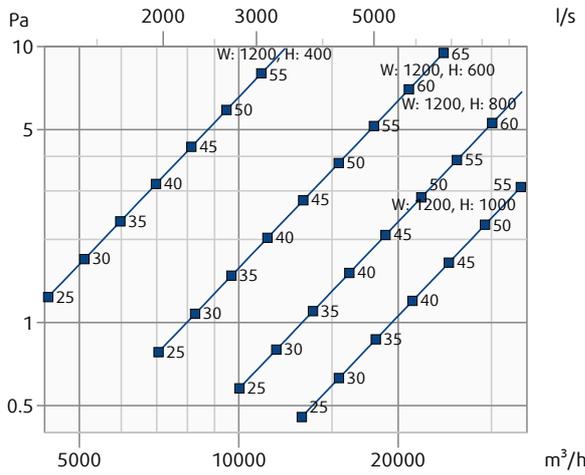
S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



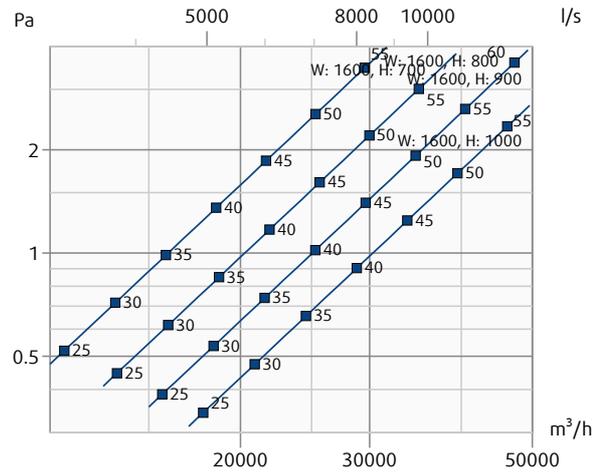
S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



S-SA2L-...-

Pressure drop & A-weighted sound power level in dB(A)



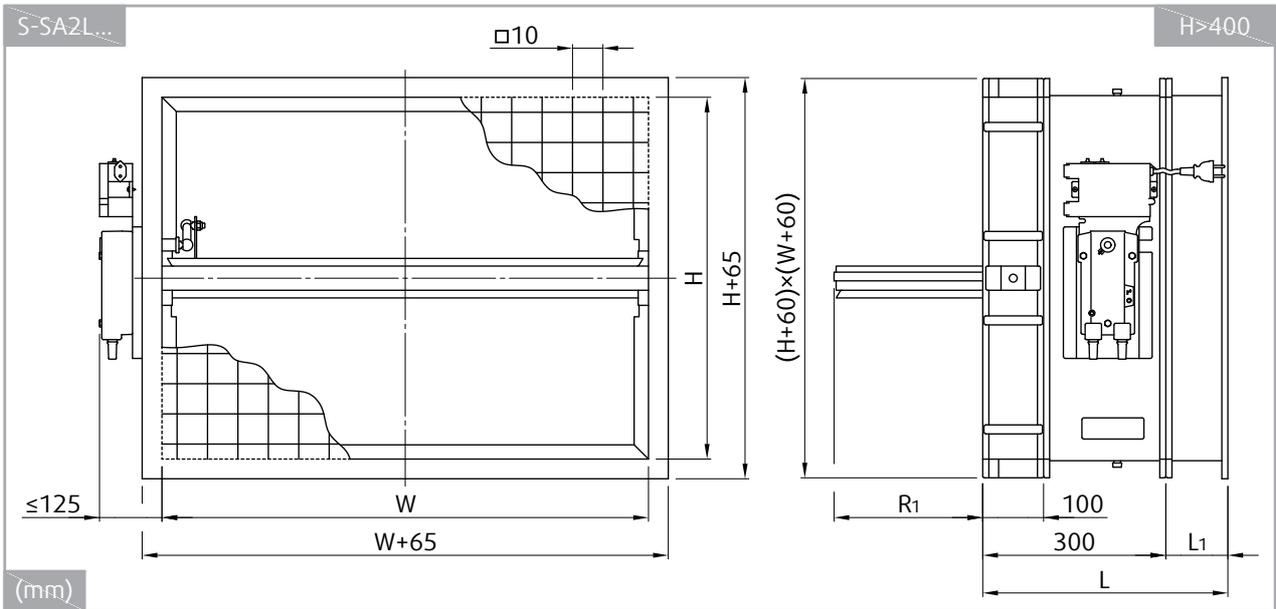
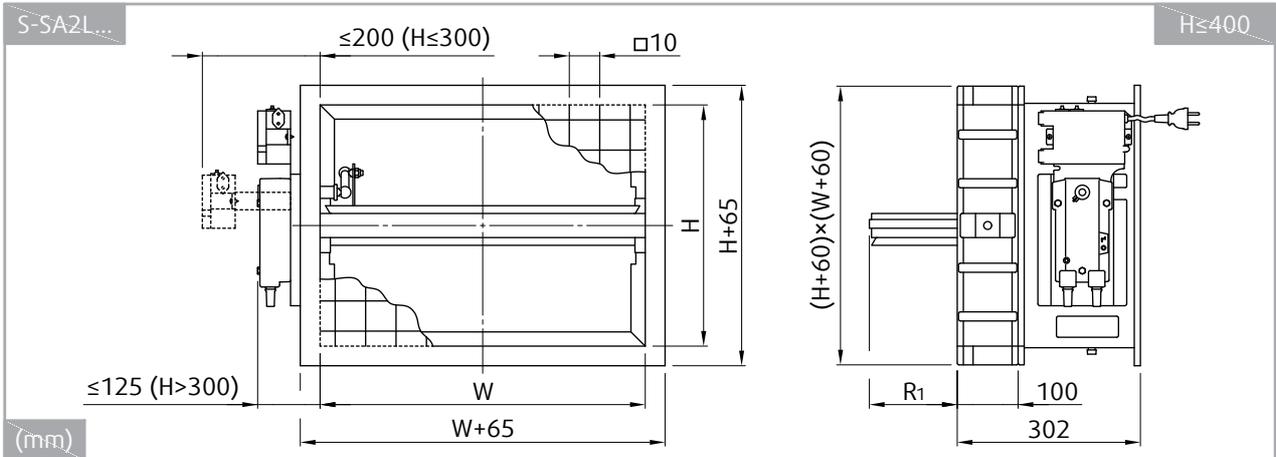
Legend:

**Pa** - Pressure drop ( $p_s$ )

**m³/h; l/s** - Air flow volume ( $q_v$ )

# Dimensions & Weights

## Dimensions



H (mm)	200	250	300	350	400	450	500	600	700	800	900	1000
R <sub>1</sub>	45	70	95	120	145	170	195	245	295	345	395	445
L <sub>1</sub>	-					100		200		300		

## Free Area

A <sub>v</sub> (m <sup>2</sup> )	W (mm)																		
	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	
H (mm)	200	0,025	0,031	0,037	0,044	0,050	0,057	0,063	0,076	0,089	-	-	-	-	-	-	-	-	
	250	0,034	0,043	0,052	0,060	0,069	0,078	0,086	0,104	0,121	0,138	-	-	-	-	-	-	-	
	300	0,041	0,052	0,062	0,072	0,083	0,093	0,104	0,124	0,145	0,166	0,186	-	-	-	-	-	-	
	350	0,048	0,060	0,072	0,085	0,097	0,109	0,121	0,145	0,169	0,193	0,217	0,242	-	-	-	-	-	
	400	0,055	0,069	0,083	0,097	0,110	0,124	0,138	0,166	0,193	0,221	0,248	0,276	0,304	0,331	-	-	-	
	450	-	0,078	0,093	0,109	0,124	0,140	0,155	0,186	0,217	0,248	0,279	0,311	0,342	0,373	0,404	-	-	
	500	-	0,086	0,104	0,121	0,138	0,155	0,173	0,207	0,242	0,276	0,311	0,345	0,380	0,414	0,449	0,483	-	
	600	-	-	0,124	0,145	0,166	0,186	0,207	0,248	0,290	0,331	0,373	0,414	0,455	0,497	0,538	0,580	0,621	
	700	-	-	-	0,169	0,193	0,217	0,242	0,290	0,338	0,386	0,435	0,483	0,531	0,580	0,628	0,676	0,725	0,773
	800	-	-	-	-	0,221	0,248	0,276	0,331	0,386	0,442	0,497	0,552	0,607	0,662	0,718	0,773	0,828	0,883
	900	-	-	-	-	-	0,279	0,311	0,373	0,435	0,497	0,559	0,621	0,683	0,745	0,807	0,869	0,932	0,994
	1000	-	-	-	-	-	-	0,345	0,414	0,483	0,552	0,621	0,690	0,759	0,828	0,897	0,966	1,035	1,104

## Weights

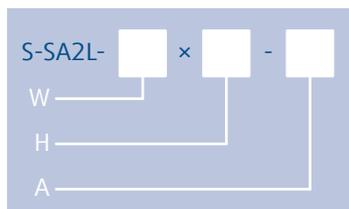
m (kg)	W (mm)																		
	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	
H (mm)	200	14,8	16,2	17,6	19,1	20,5	22,1	23,5	26,5	29,4	-	-	-	-	-	-	-	-	
	250	16,2	17,7	19,3	20,8	22,4	24,0	25,6	28,7	31,8	34,9	-	-	-	-	-	-	-	
	300	17,6	19,3	21,1	22,6	24,4	26,0	27,7	31,0	34,3	37,6	40,9	-	-	-	-	-	-	
	350	19,4	21,1	22,9	24,7	26,4	28,3	30,0	33,5	37,0	40,5	44,0	48,5	-	-	-	-	-	
	400	20,9	22,7	24,7	26,4	28,3	30,3	32,1	35,9	39,6	43,3	47,3	50,9	54,7	58,5	-	-	-	
	450	-	24,3	26,3	28,3	30,2	32,3	34,2	38,2	42,3	46,2	50,1	54,8	58,0	62,0	65,9	-	-	
	500	-	25,9	28,1	30,1	32,1	34,2	36,6	40,7	44,8	49,0	53,0	57,2	61,4	65,5	69,7	76,9	-	
	600	-	-	31,4	33,6	36,2	38,5	40,8	45,2	49,8	54,3	58,9	63,4	68,0	72,5	77,1	83,6	87,7	
	700	-	-	-	37,4	39,9	42,4	44,9	49,8	54,7	59,8	64,7	69,6	74,5	80,8	86,0	91,4	95,9	100,9
	800	-	-	-	-	43,6	46,4	49,1	54,4	59,8	65,1	70,7	76,0	82,6	88,0	93,4	99,3	104,1	109,4
	900	-	-	-	-	-	50,3	53,2	58,9	64,7	70,4	76,4	83,5	89,3	95,0	100,8	107,1	112,3	118,3
	1000	-	-	-	-	-	-	57,3	63,5	69,7	75,8	83,5	89,6	95,8	102,0	108,2	115,0	120,5	126,7

BST.../GST...	m +0,7 kg
---------------	-----------

## NOTE:

For activation types BST.../GST... add communication unit weight of 0,7 kg to the weight of S-SA2 (see table).

# Ordering Codes



## W - Width Dimension

200 mm, 250 mm, 300 mm, 350 mm, 400 mm, 450 mm, 500 mm, 600 mm, 700 mm, 800 mm, 900 mm, 1000 mm, 1100 mm, 1200 mm, 1300 mm, 1400 mm, 1500 mm, 1600 mm

## H - Height Dimensions

200 mm, 250 mm, 300 mm, 350 mm, 400 mm, 450 mm, 500 mm, 600 mm, 700 mm, 800 mm, 900 mm, 1000 mm

## A - Type of Activation

**B230** - 230 V AC Belimo actuator

**G230** - 230 V AC/DC Gruner Actuator

**B24** - 24 V AC/DC Belimo actuator

**G24** - 24 V AC/DC Gruner Actuator

**B24-W** - 24 V AC/DC Belimo actuator & wire connector for supply and communication unit

**G24-W** - 24 V AC/DC Gruner actuator & wire connector for supply and communication unit

**B24-SR** - 24 V AC/DC Belimo actuator, modulated (0)2 V ... 10 V

**GST0** - 24 V AC supply and communication unit FS-UFC24-2 (Modbus/BACnet) & 24 V AC/DC Belimo actuator

**BST1** - SLC powered supply and communication unit BC24-G2 (THC) & 24 V AC/DC Belimo actuator

**BST10** - 230 V AC supply and communication unit BKNE230-24-PL (Powerline) & 24 V AC/DC Belimo actuator

## Example of the Ordering Code

S-SA2L-800×450-B24-SR

Smoke control damper with width of 800 mm and height of 450 mm, with a grille on one side. Activated by a 24 V modulated Belimo actuator (0) 2 V ... 10 V.

# Product Handling

## Warning

Some damper parts can have sharp edges. To prevent injuries, use gloves when you install or move the damper. If you use or operate the damper incorrectly, there is a risk of:

- electric shock.
- fire.
- other damage.

Ensure that installation is performed by a trained person. The S-SA2L is made of boards and sheet metal. Thus considered fragile. Be careful when you move the smoke control damper. Two persons are necessary to move the dampers and put them onto the duct and/or hangers. It is necessary to move the bigger dampers with suitable lifting equipment (forklift, crane). Please follow both textual and graphic instructions.

### 1. Unpacking:

- Remove the packaging

### 2. Functionality check:

- Perform damper's functionality check (see "Operation Manual" section).

### 3. Placing the damper:

- Prepare the duct connection surfaces as per the desired installation type.
- Prepare the corner screws in the board duct connections.
- Fix the supports to the proper place as per chosen installation type.
- Carefully lift the smoke control damper with the forklift, crane or manually.
- Place the damper on the hangers and on duct connection surfaces.

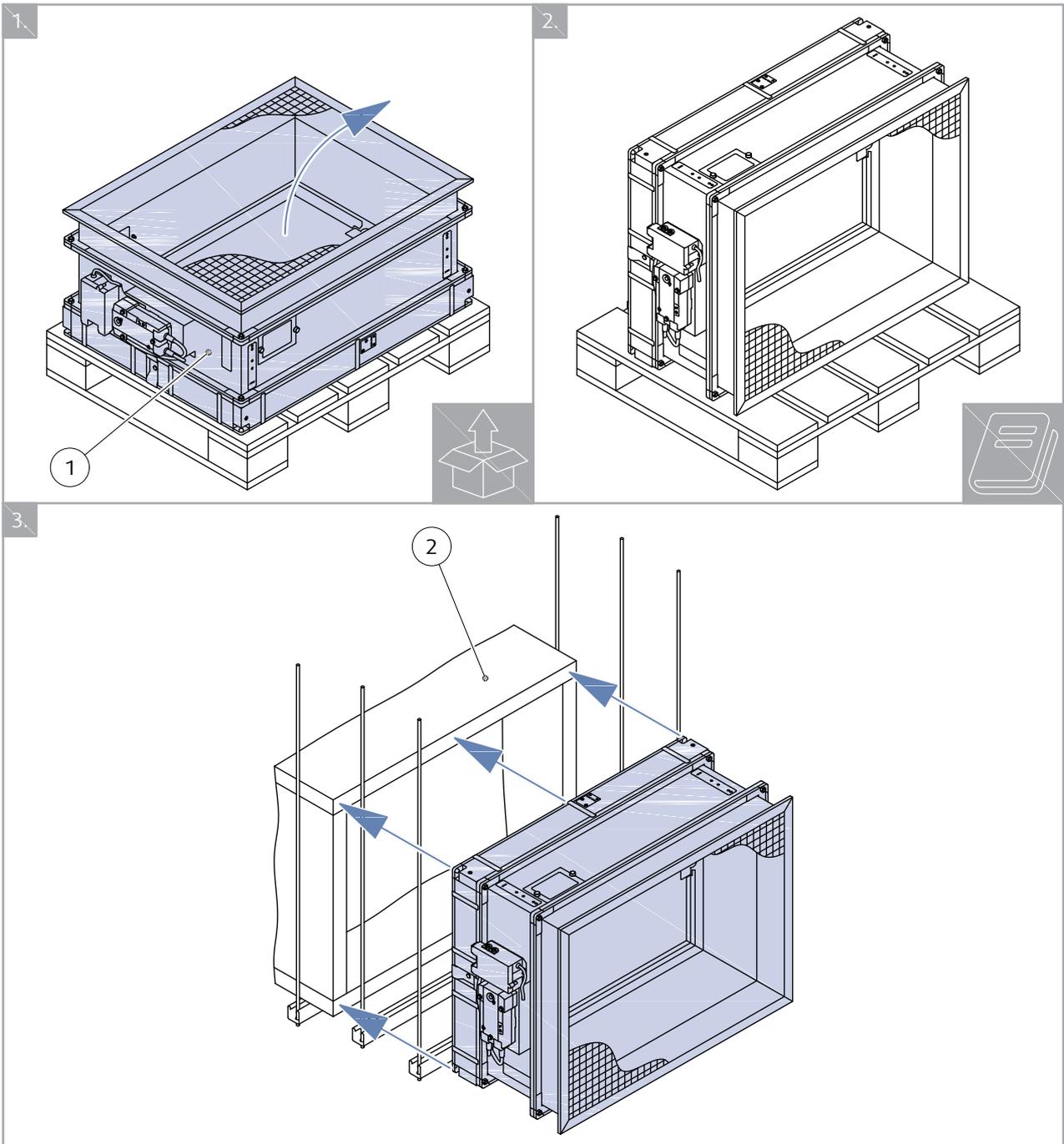
### 4. Fixing the damper:

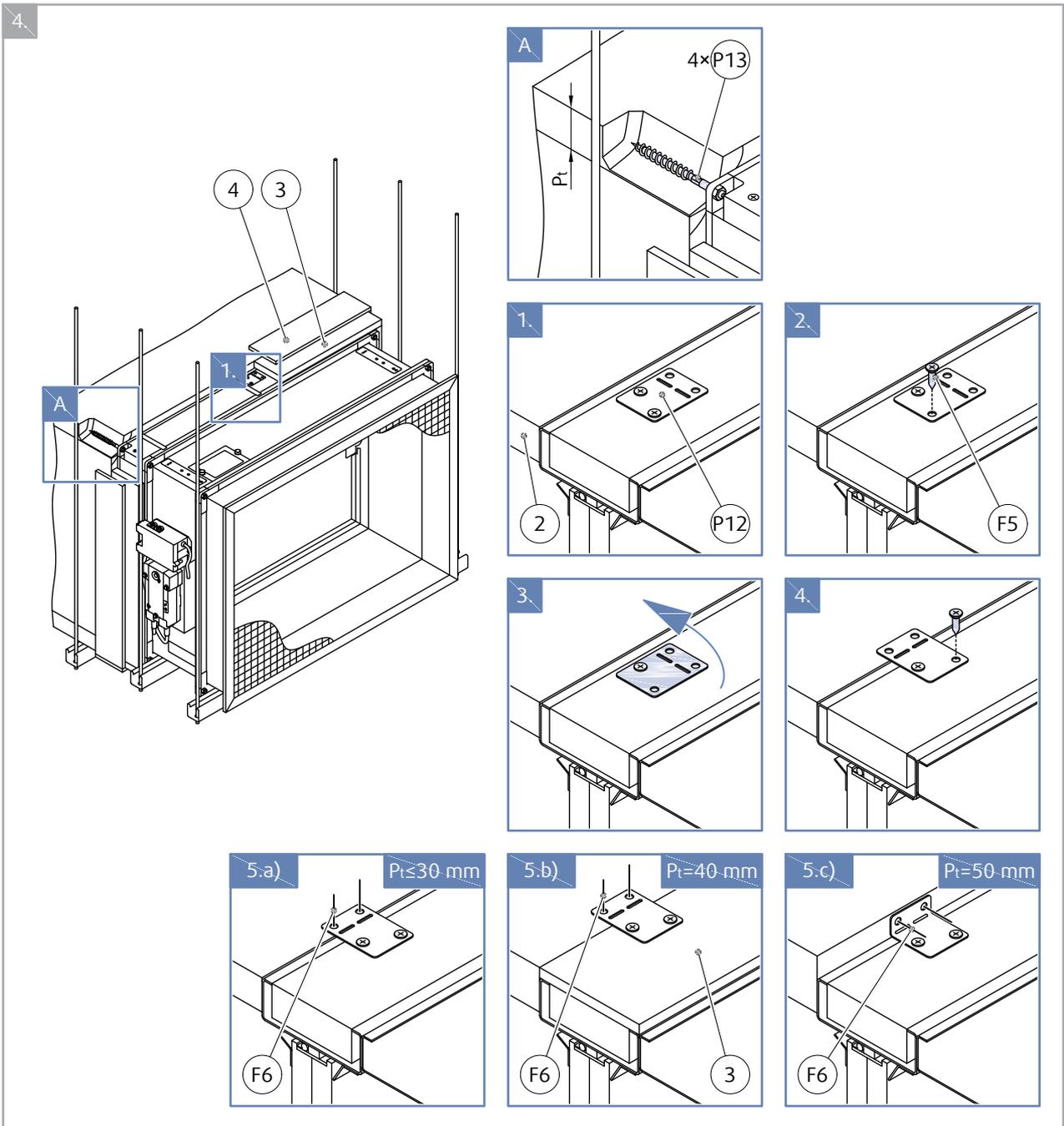
NOTE: Make sure to continually check the alignment of the damper against the duct connection when performing the next steps.

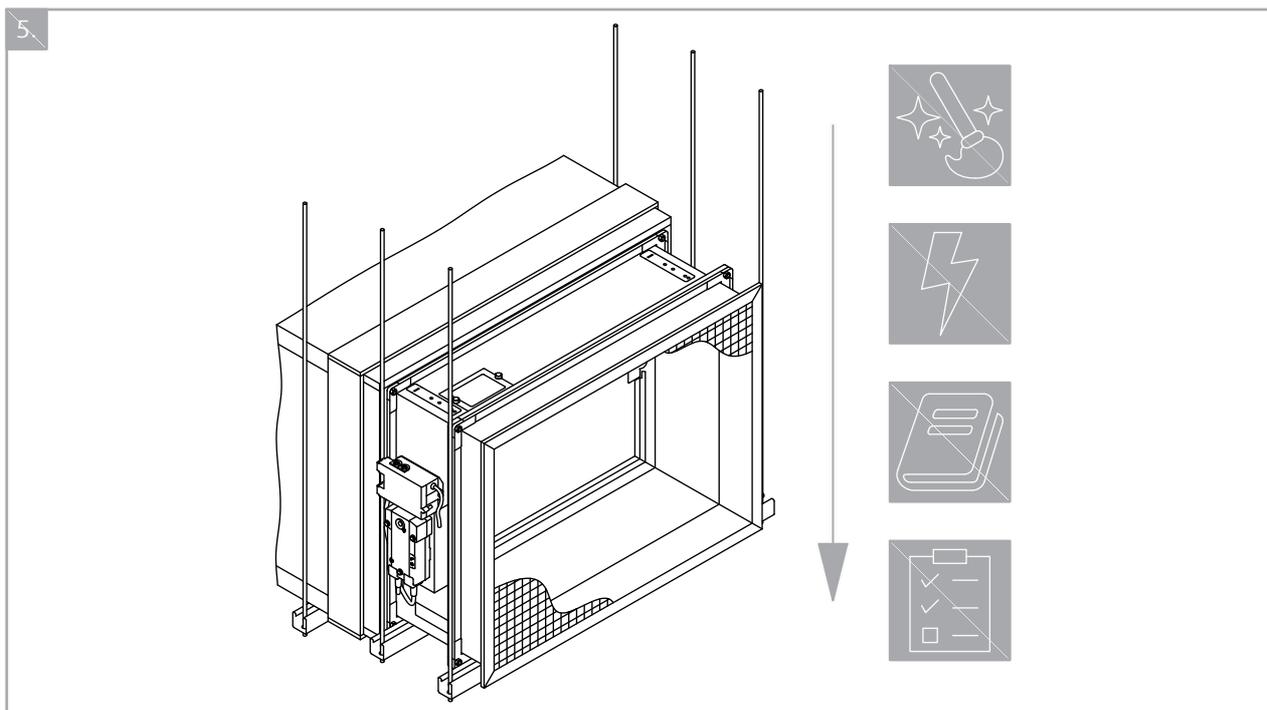
- Prepare the installation brace when installing to board ducts.
- Fix the damper with duct by using suitable screws through the flange corners and installation brace.
- Verify there is no skewing of the damper body by measuring diagonal dimensions of the blade area or the nominal dimension.
- As per chosen installation finish the connection surfaces with suitable caulck and overlapping boards.

### 5. Finishing:

- Clean the damper from the debris and excess material from the filling or insulation.
- Connect the dampers actuator as per activation type wiring diagram in the "electrical connection" section.
- Perform damper's functionality check (see "Operation Manual" section).
- Create and/or fill out the Operating Journal included with the smoke control damper (Operating Journal can be also downloaded at [design.systemair.com](http://design.systemair.com))







#### Legend for Product Handling

- 1** - Smoke control damper S-SA2L
- 2** - Connected ductwork tested according to EN 1366-9
- 3** - Board collar as per chosen installation
- 4** - Cover plates as per chosen installation
- F5** - Screw 4,8×16 mm DIN 7982 (delivered on the damper)
- F6** - Screw 4,8×16 mm DIN 7982
- P12** - Installation brace (for W>800 mm)
- P13** - Fixing Kombi screws

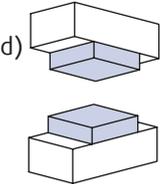
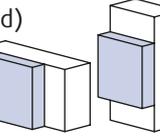
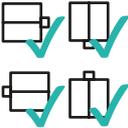
# Installation Methods

## Warning

- Suspension systems longer than 1,5 m require fire-resistant insulation.
- Obey the applicable regulations and standards of the country that this product will be installed in.
- Make sure that only approved personnel performs the installation.
- Obey the written instructions and the illustrations in selected installation method.

## Installation Rules

- The S-SA2L smoke damper can be installed on “single” (tested according to EN 1366-9) or “multi” (tested according to EN 1366-8) ductwork. If mounted on a duct classified with lower fire resistivity, the fire resistivity of the S-SA2L smoke damper will be decreased to the duct level.
- The duct connected to the smoke control damper must be supported or hung in such a way that the damper does not carry its weight. The damper must not support any part of the surrounding construction or wall which could cause damage and consequent damper failure.
- Smoke control dampers can be suspended from solid ceiling slabs using adequately sized threaded rods. When using anchors in the ceiling, use a fire-rated anchor (with suitable a fire rating certificate).
- Easy access to mechanism and internal parts during inspection must be considered during damper placement.
- The minimum distance between the smoke control damper bodies must be 200 mm (refer to Standard EN 1366-2).
- The minimum distance between the smoke control damper and the adjacent wall or ceiling must be 75 mm.
- If the grilles are not original accessories, there must be a minimum clearance between the damper blade in its open position and self-standing grille. The clearance between the damper blade and these components must be at least 200 mm (refer to EN 1366-10).
- Lists of all permitted installation methods are provided in Handbook.

  <b>L1H, L2H</b>	S-SA2L 200 × 200 ... ... 1600 × 1000	EI 120 ( $h_{od}$ i ↔ o) S1500 $C_{MOD}$ AA multi		EN 1366-9 EN 1366-8	
 <b>L1V, L2V</b>		EI 120 ( $v_{ed}$ i ↔ o) S1500 $C_{MOD}$ AA multi		EN 1366-9 EN 1366-8	

## NOTES:

**L1H** - Horizontally Oriented Damper (With Ledge)

**L2H** - Horizontally Oriented Damper (Directly)

**L1V** - Vertically Oriented Damper (With Ledge)

**L2V** - Vertically Oriented Damper (Directly)

**d)** - Duct per EN 1366-9 or EN 1366-8

$v_{ed}$  - Duct placement, vertically oriented damper

$h_{od}$  - Duct placement, horizontally oriented damper

# Installation L1H

## Horizontally Oriented Damper, Connected to Duct With Ledge

1. Prepare the duct connection and the damper hangers. The opening dimensions must be created according to the details of each type and thickness of the connected duct.

**NOTE:** The dimensions of the openings are the result of the nominal dimensions of the damper with added clearance. The dimensions of the connection will be  $W_1$  and  $H_1$ .

- a. Clean the connection surfaces. Make sure that the surfaces are even.

2. Apply a fire resistive coat (F1) to the connection surfaces.

**CAUTION:** The product label must remain clean and readable.

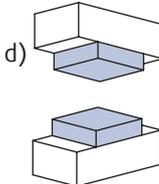
3. Obey the procedure in the "Product Handling" section to put the damper on its suspension system and against the connection surfaces.

**CAUTION:** Make sure the kombi screws are fixed to the board duct corners. If the width of the damper is more than 800 mm, use installation brace during the installation procedure.

4. Connect the damper's flange (on the blade side) to the duct.
5. From boards (F2, F3) create a collar overlapping the connection.
6. Fix the overlapping collar to the damper with screws (F4). Fix the collar to the duct by using screws as per instructions of duct system manufacturer.
7. Perform damper's functionality check (see "Operation Manual" section).

### IMPORTANT

- The suspension of the damper must be loaded only with the weight of the damper.
- Suspension rods longer than 1,5 m require fire-resistant insulation.
- The fire resistivity of the S-SA2L smoke damper must be decreased to the duct system performance.
- The maximum resistivity for L1H installation is EI120S with pressure level 3 (-1500 Pa ... 500 Pa).

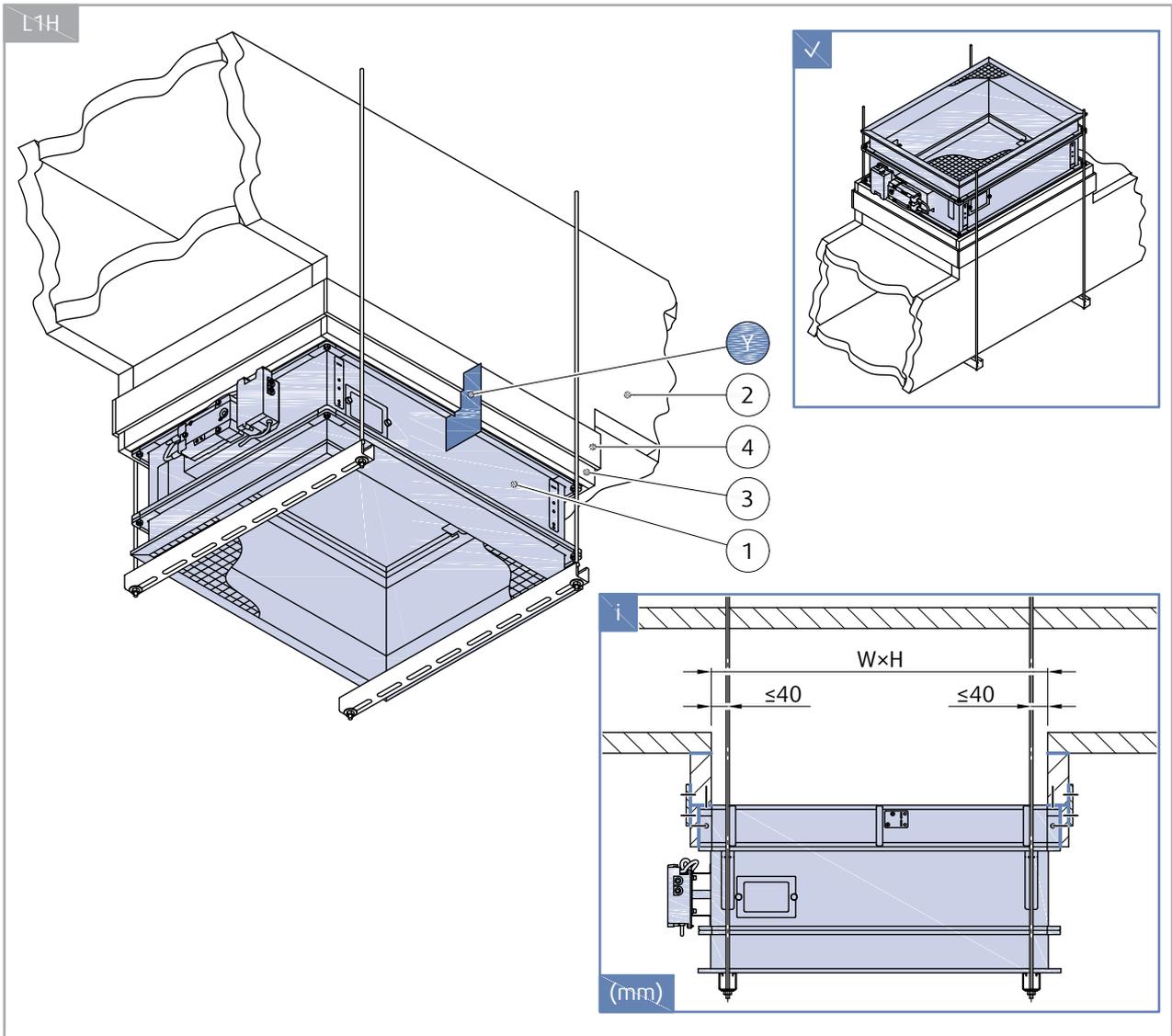
  <b>L1H, L2H</b>	<p>S-SA2L</p> <p>200 × 200 ... ... 1600 × 1000</p>	<p>EI 120 (<math>h_{od}</math> i ↔ o)</p> <p>S1500 <math>C_{MOD}</math> AA multi</p>		<p>EN 1366-9</p> <p>EN 1366-8</p>
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### NOTES:

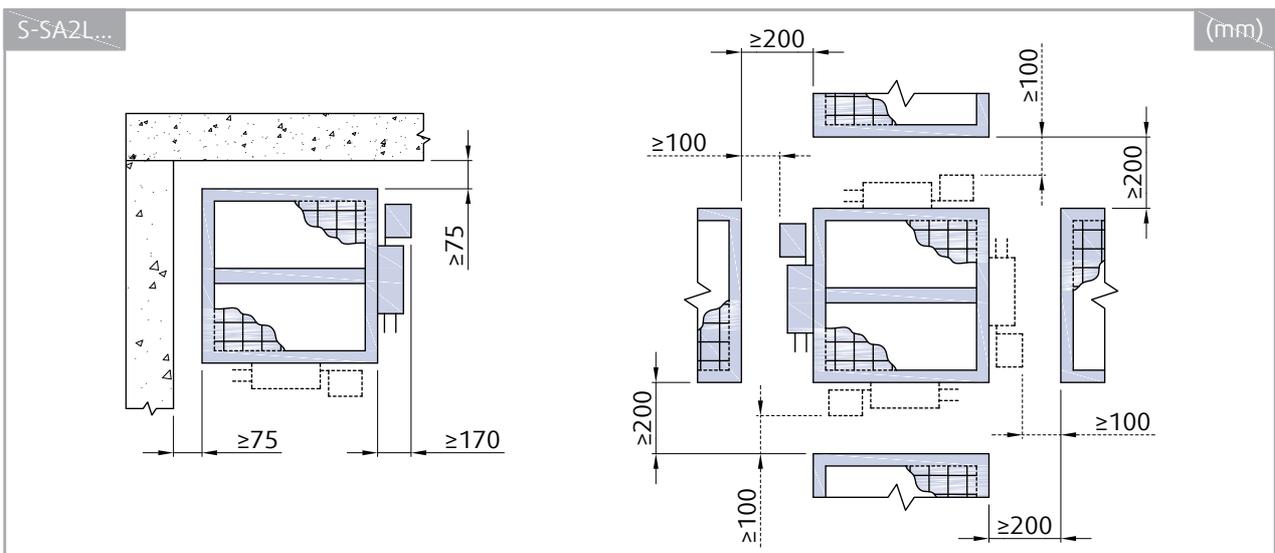
**L1H** - Horizontally Oriented Damper (With Ledge)

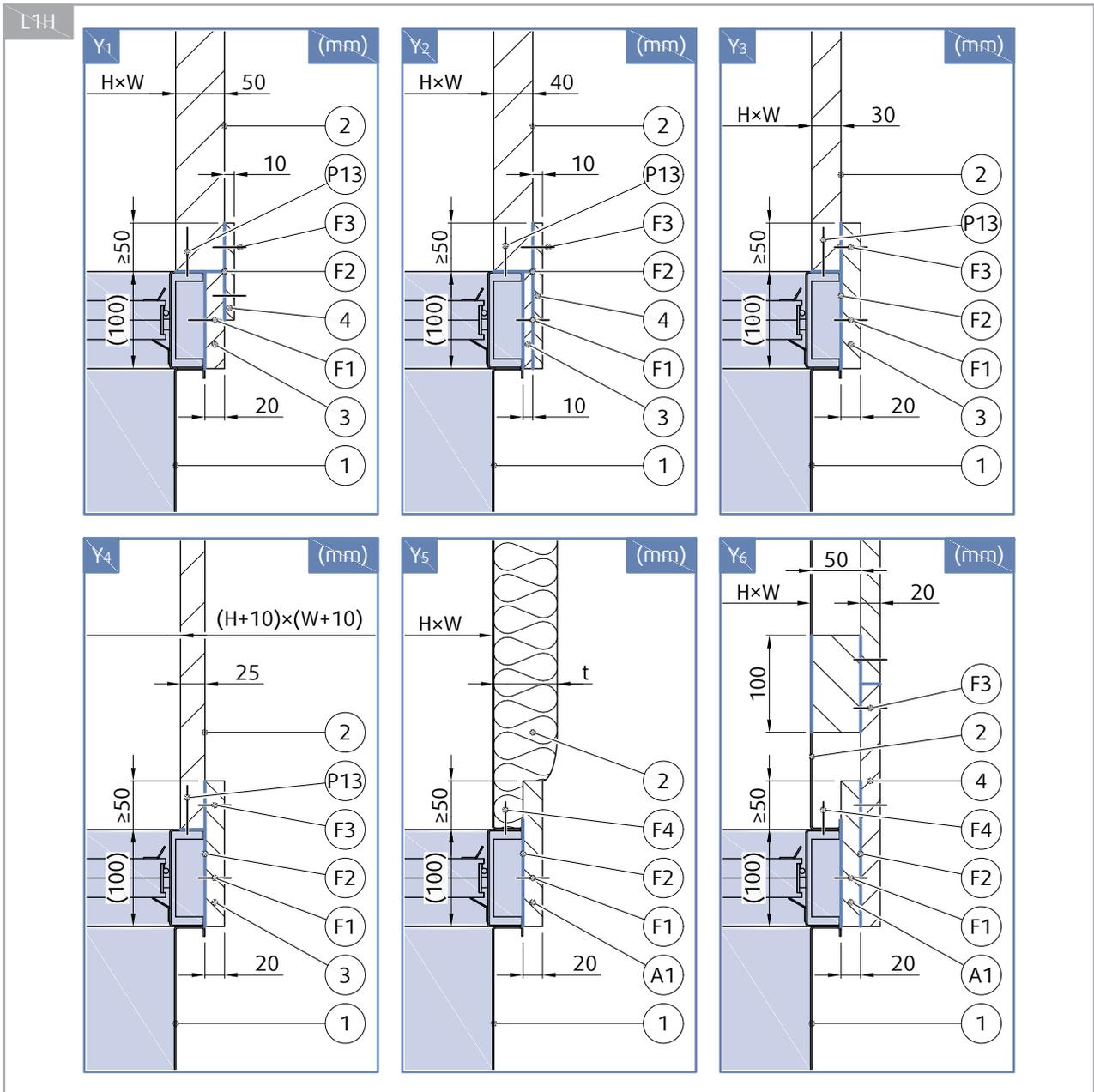
**d)** - Duct per EN 1366-9 or EN 1366-8

**$h_{od}$**  - Duct placement, horizontally oriented damper



**Damper Minimum Distances**





#### Legend for Installation L1H

- 1** - Smoke control damper S-SA2L
- 2** - Connected ductwork system tested according to EN 1366-9  
Thickness of boards (Pt) depends on the desired fire resistivity.
- 3** - Board collar of Promatect H (Promat) - thickness per detail
- 4** - Cover plates made of Promatect H (Promat) - thickness per detail
- F1** - Screw 5,5×40 mm (e.g. DIN 7981C)
- F2** - Fire resistive coating Promat K84 (Promat)
- F3** - Screws or pins as per duct system manufacturer instructions
- P13** - Kombi screw M8
- Y** - Cutting plane

# Installation L2H

## Horizontally Oriented Damper, Connected Directly to Duct

1. Prepare the duct connection and the damper hangers. The opening dimensions must be created according to the details of each type and thickness of the connected duct.

**NOTE:** The dimensions of the openings are the result of the nominal dimensions of the damper with added clearance. The dimensions of the connection will be  $W_1$  and  $H_1$ .

- a. Clean the connection surfaces. Make sure that the surfaces are even.

2. Apply a fire resistive coat (F1) to the connection surfaces.

**CAUTION:** The product label must remain clean and readable.

3. Obey the procedure in the "Product Handling" section to put the damper on its suspension system and against the connection surfaces.

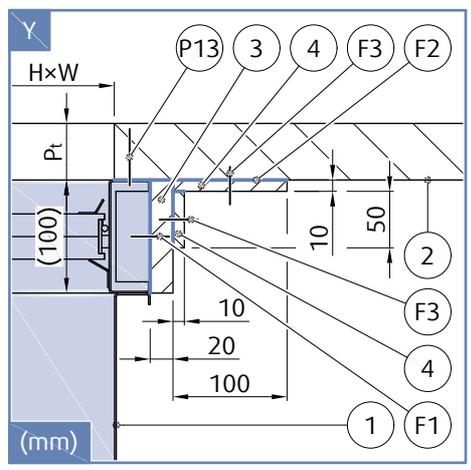
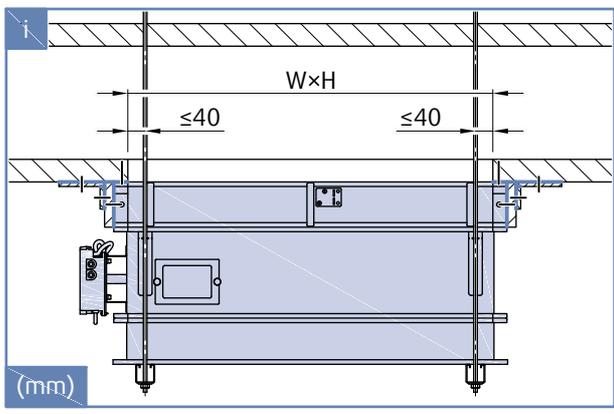
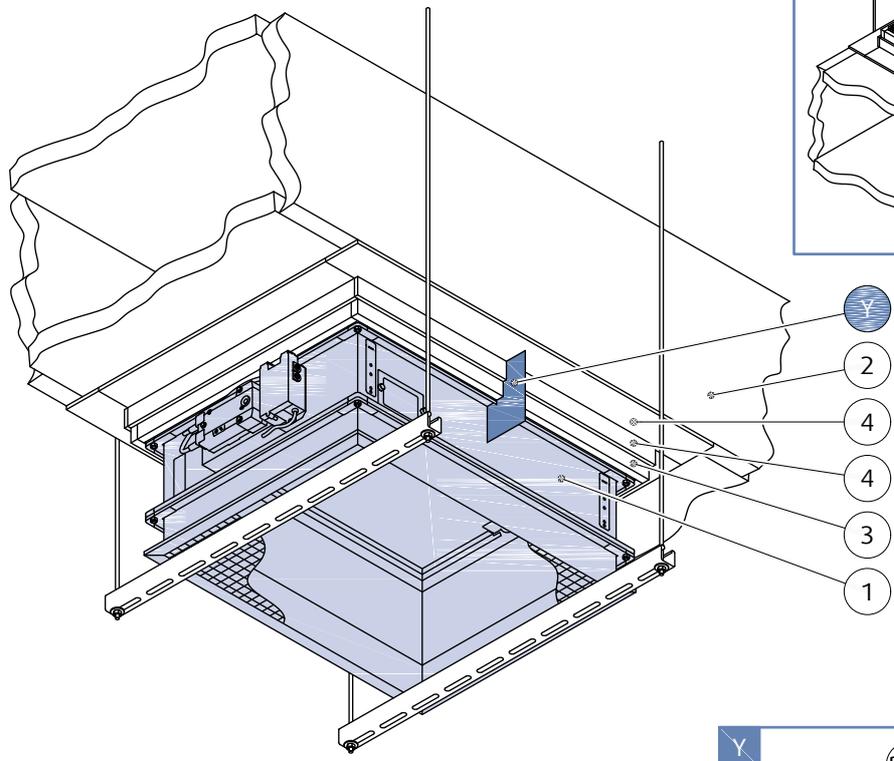
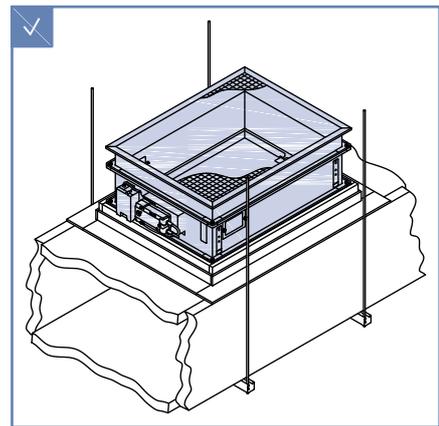
**CAUTION:** Make sure the kombi screws are fixed to the board duct corners. If the width of the damper is more than 800 mm, use installation brace during the installation procedure.

4. Connect the damper's flange (on the blade side) to the duct.
5. From boards (F2, F3) create a collar overlapping the connection.
6. Fix the overlapping collar to the damper with screws (F4). Fix the collar to the duct by using screws as per instructions of duct system manufacturer.
7. Perform damper's functionality check (see "Operation Manual" section).

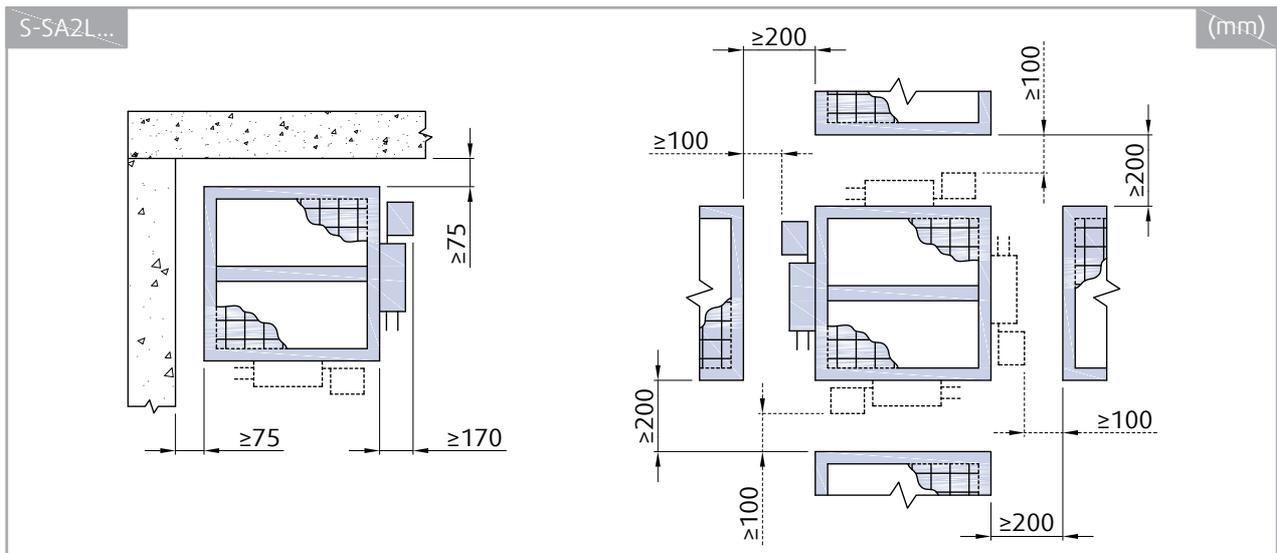
### IMPORTANT

- The suspension of the damper must be loaded only with the weight of the damper.
- Suspension rods longer than 1,5 m require fire-resistant insulation.
- The fire resistivity of the S-SA2L smoke damper must be decreased to the duct system performance.
- The maximum resistivity for L2H installation is EI120S with pressure level 3 (-1500 Pa ... 500 Pa).

L2H



## Damper Minimum Distances



### Legend for Installation L2H

- 1** - Smoke control damper S-SA2L
- 2** - Connected ductwork system tested according to EN 1366-9  
Thickness of boards (Pt) depends on the desired fire resistivity.  
Thickness of mineral wool (t) depends on the desired fire resistivity.
- 3** - Board collar of Promatect H (Promat) - thickness per detail
- 4** - Cover plates made of Promatect H (Promat) - thickness per detail
- A1** - Accessory K1-S-SA2L
- F1** - Screw 5,5×40 mm (e.g. DIN 7981C)
- F2** - Fire resistive coating Promat K84 (Promat)
- F3** - Screws or pins as per duct system manufacturer instructions
- F4** - Screw M8×16 mm, maximum fixing torque is 8 Nm ...12 Nm (e.g. DIN 933)
- P13** - Kombi screw M8
- Y** - Cutting plane

# Installation L1V

## Vertically Oriented Damper, Connected to Duct With Ledge

1. Prepare the duct connection and the damper hangers. The opening dimensions must be created according to the details of each type and thickness of the connected duct.

**NOTE:** The dimensions of the openings are the result of the nominal dimensions of the damper with added clearance. The dimensions of the connection will be  $W_1$  and  $H_1$ .

- a. Clean the connection surfaces. Make sure that the surfaces are even.

2. Apply a fire resistive coat (F1) to the connection surfaces.

**CAUTION:** The product label must remain clean and readable.

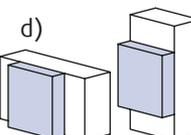
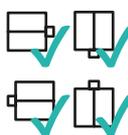
3. Obey the procedure in the "Product Handling" section to put the damper on its suspension system and against the connection surfaces.

**CAUTION:** Make sure the kombi screws are fixed to the board duct corners. If the width of the damper is more than 800 mm, use installation brace during the installation procedure.

4. Connect the damper's flange (on the blade side) to the duct.
5. From boards (F2, F3) create a collar overlapping the connection.
6. Fix the overlapping collar to the damper with screws (F4). Fix the collar to the duct by using screws as per instructions of duct system manufacturer.
7. Perform damper's functionality check (see "Operation Manual" section).

### IMPORTANT

- The suspension of the damper must be loaded only with the weight of the damper.
- Suspension rods longer than 1,5 m require fire-resistant insulation.
- The fire resistivity of the S-SA2L smoke damper must be decreased to the duct system performance.
- The maximum resistivity for L1V installation is EI120S with pressure level 3 (-1500 Pa ... 500 Pa).

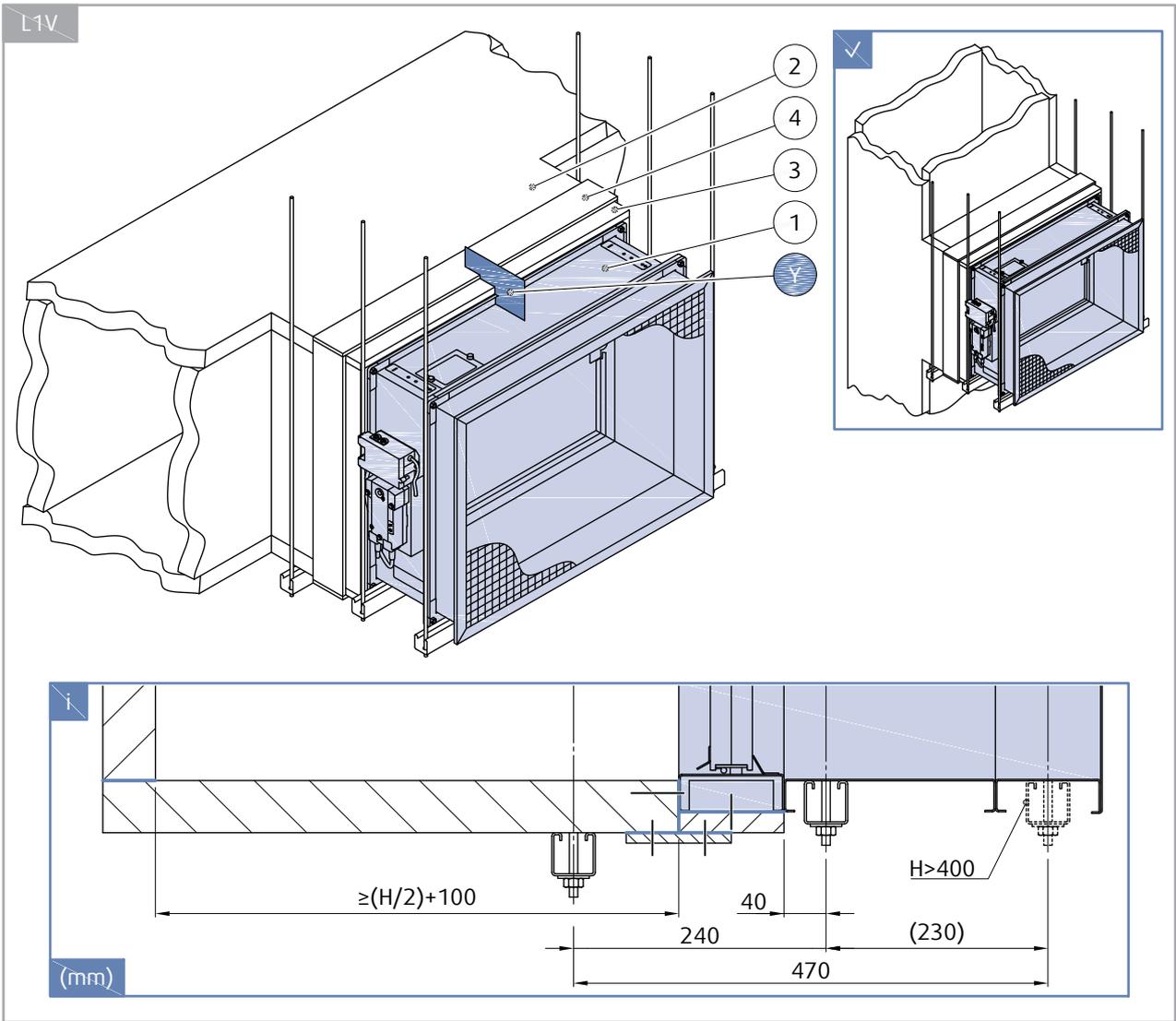
 <b>L1V, L2V</b>	S-SA2L 200 × 200 ... ... 1600 × 1000	EI 120 ( $v_{ed}$ i ↔ o) S1500 $C_{MOD}$ AAmulti	d) 	EN 1366-9 EN 1366-8	
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### NOTES:

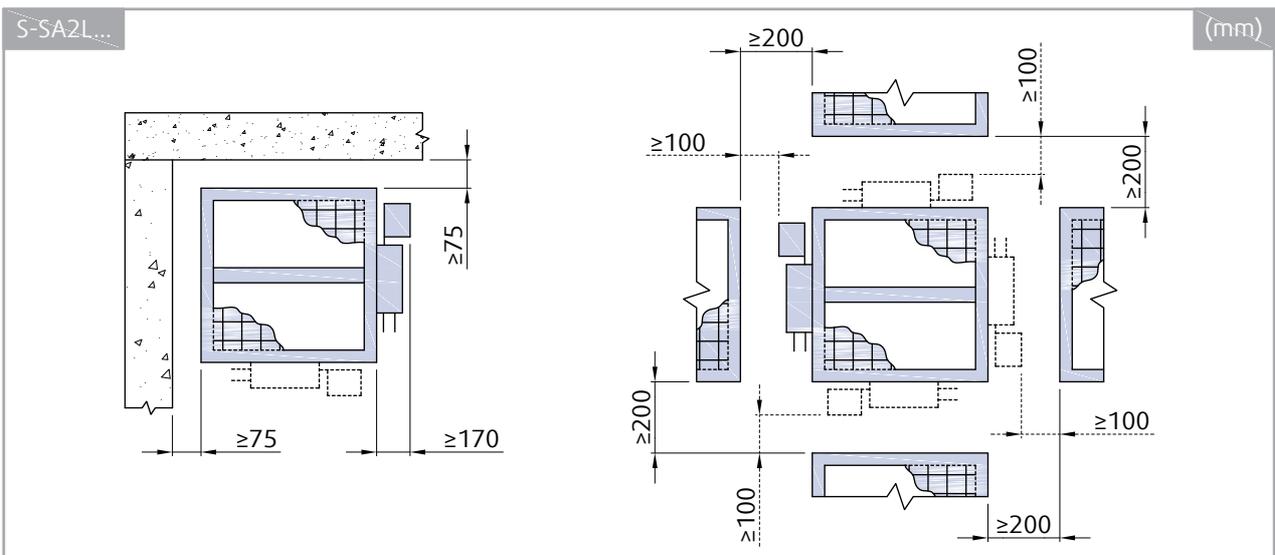
**L1V** - Vertically Oriented Damper (With Ledge)

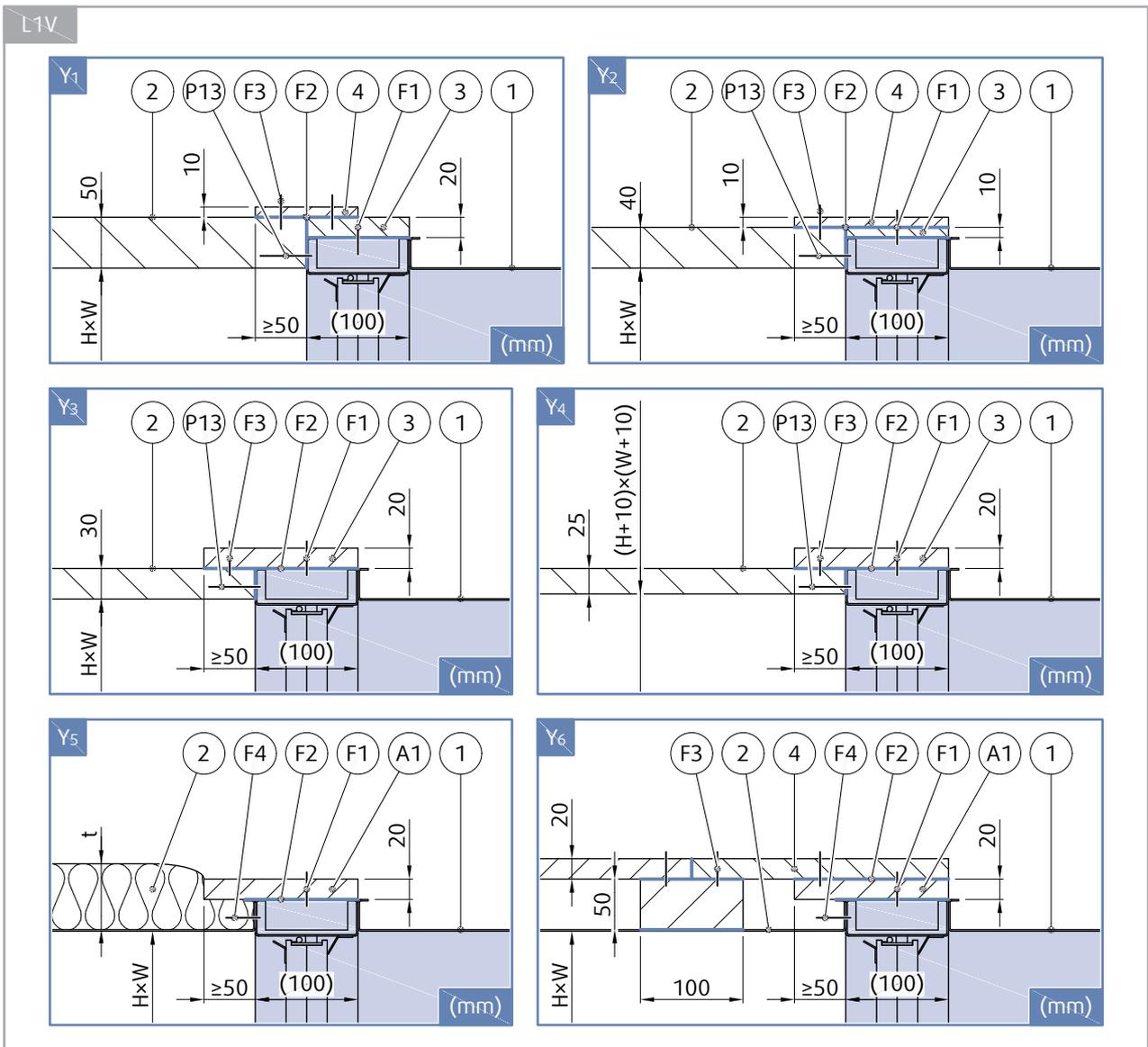
**d)** - Duct per EN 1366-9 or EN 1366-8

**$v_{ed}$**  - Duct placement, vertically oriented damper



**Damper Minimum Distances**





#### Legend for Installation L1V

- 1** - Smoke control damper S-SA2L
- 2** - Connected ductwork system tested according to EN 1366-9  
Thickness of boards (Pt) depends on the desired fire resistivity.
- 3** - Board collar of Promat H (Promat) - thickness per detail
- 4** - Cover plates made of Promat H (Promat) - thickness per detail
- F1** - Screw 5,5x40 mm (e.g. DIN 7981C)
- F2** - Fire resistive coating Promat K84 (Promat)
- F3** - Screws or pins as per duct system manufacturer instructions
- P13** - Kombi screw M8
- Y** - Cutting plane

# Installation L2V

## Vertically Oriented Damper, Connected Directly to Duct

1. Prepare the duct connection and the damper hangers. The opening dimensions must be created according to the details of each type and thickness of the connected duct.

**NOTE:** The dimensions of the openings are the result of the nominal dimensions of the damper with added clearance. The dimensions of the connection will be  $W_1$  and  $H_1$ .

- a. Clean the connection surfaces. Make sure that the surfaces are even.

2. Apply a fire resistive coat (F1) to the connection surfaces.

**CAUTION:** The product label must remain clean and readable.

3. Obey the procedure in the "Product Handling" section to put the damper on its suspension system and against the connection surfaces.

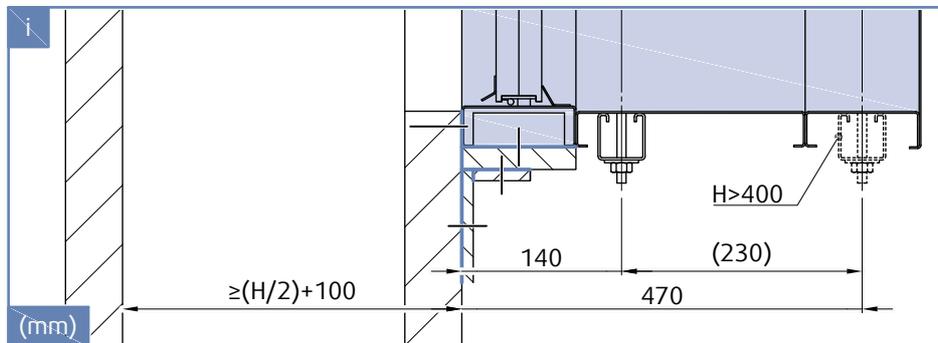
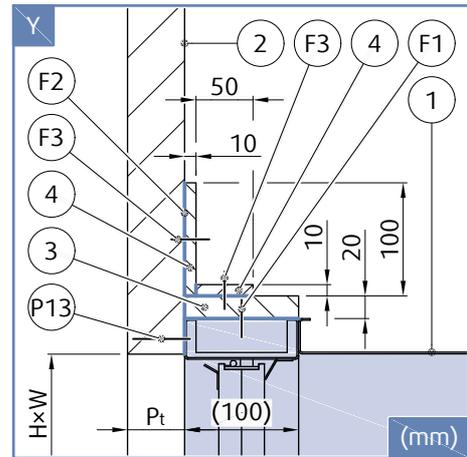
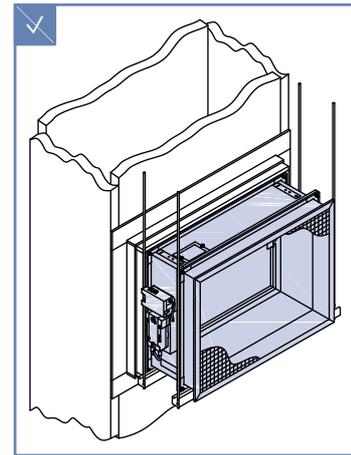
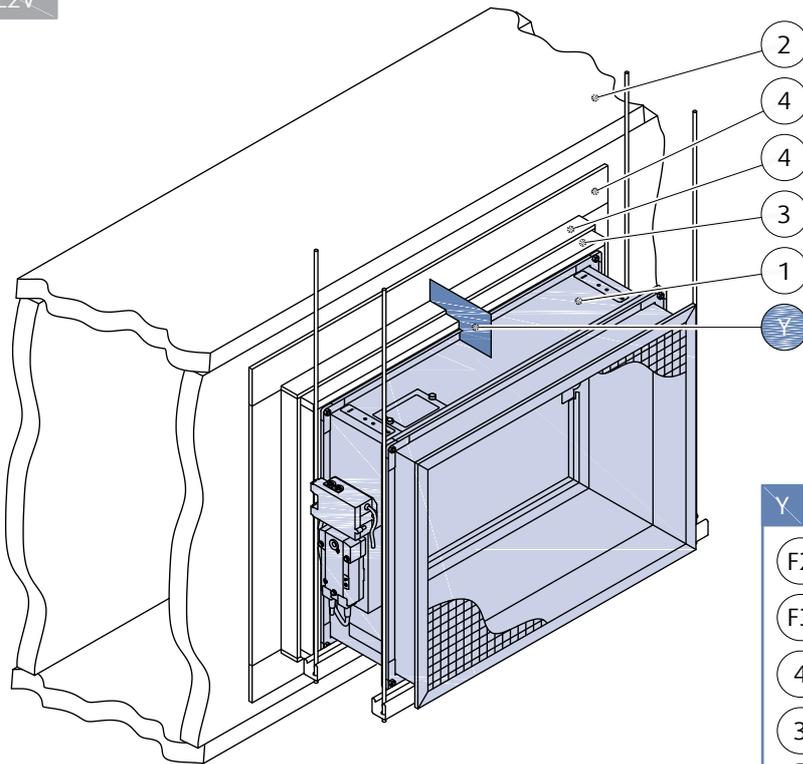
**CAUTION:** Make sure the kombi screws are fixed to the board duct corners. If the width of the damper is more than 800 mm, use installation brace during the installation procedure.

4. Connect the damper's flange (on the blade side) to the duct.
5. From boards (F2, F3) create a collar overlapping the connection.
6. Fix the overlapping collar to the damper with screws (F4). Fix the collar to the duct by using screws as per instructions of duct system manufacturer.
7. Perform damper's functionality check (see "Operation Manual" section).

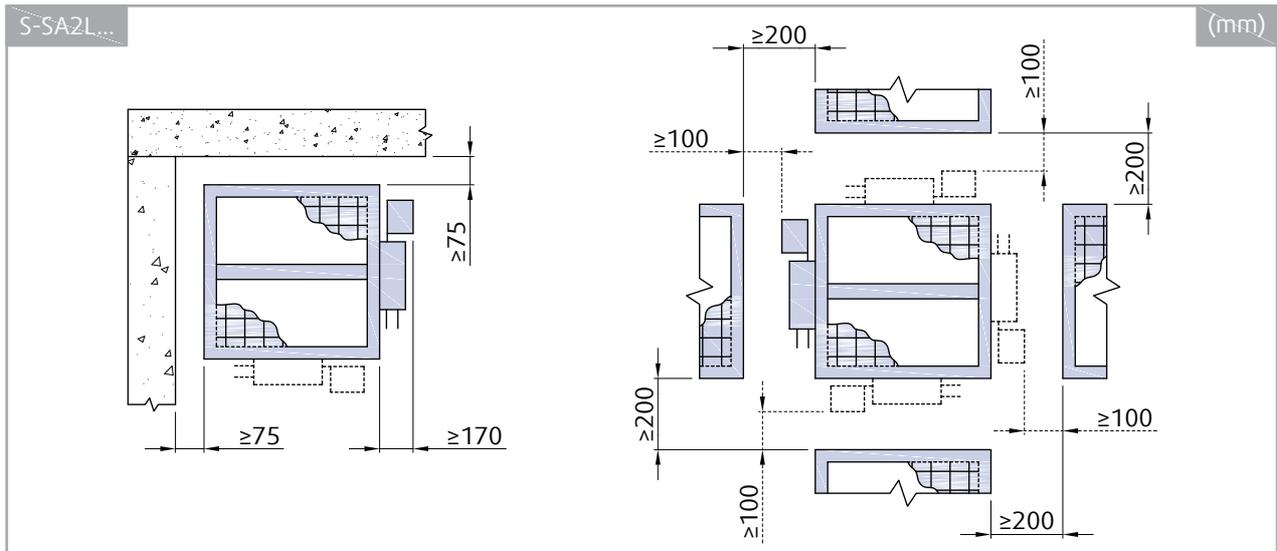
### IMPORTANT

- The suspension of the damper must be loaded only with the weight of the damper.
- Suspension rods longer than 1,5 m require fire-resistant insulation.
- The fire resistivity of the S-SA2L smoke damper must be decreased to the duct system performance.
- The maximum resistivity for L2V installation is EI120S with pressure level 3 (-1500 Pa ... 500 Pa).

L2V



## Damper Minimum Distances



### Legend for Installation L2V

- 1** - Smoke control damper S-SA2L
- 2** - Connected ductwork system tested according to EN 1366-9  
Thickness of boards (Pt) depends on the desired fire resistivity.  
Thickness of mineral wool (t) depends on the desired fire resistivity.
- 3** - Board collar of Promatect H (Promat) - thickness per detail
- 4** - Cover plates made of Promatect H (Promat) - thickness per detail
- A1** - Accessory K1-S-SA2L
- F1** - Screw 5,5×40 mm (e.g. DIN 7981C)
- F2** - Fire resistive coating Promat K84 (Promat)
- F3** - Screws or pins as per duct system manufacturer instructions
- F4** - Screw M8×16 mm, maximum fixing torque is 8 Nm ...12 Nm (e.g. DIN 933)
- P13** - Kombi screw M8
- Y** - Cutting plane

# Electrical Connections

## WARNING

- Risk of electric shock.
  - Stop the power supply before you do work on electrical equipment.
  - Only approved electricians can do work on the electrical system.
- To access the electrical parts of this product follow instructions in "Product Handling" section.

### Actuator Size Map of S-SA2L

		W (mm)																	
		200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
B	H (mm)																		
	200										-	-	-	-	-	-	-	-	-
	250										-	-	-	-	-	-	-	-	-
	300										-	-	-	-	-	-	-	-	-
	350											-	-	-	-	-	-	-	-
	400												-	-	-	-	-	-	-
	450	-											-	-	-	-	-	-	-
	500	-											-	-	-	-	-	-	-
	600	-	-										-	-	-	-	-	-	-
	700	-	-	-									-	-	-	-	-	-	-
	800	-	-	-	-								-	-	-	-	-	-	-
900	-	-	-	-	-							-	-	-	-	-	-	-	
1000	-	-	-	-	-	-						-	-	-	-	-	-	-	
		BEN... (15 Nm)																	
		BEE... (25 Nm)																	
		BE... (40 Nm)																	
G	H (mm)																		
	200										-	-	-	-	-	-	-	-	-
	250										-	-	-	-	-	-	-	-	-
	300										-	-	-	-	-	-	-	-	-
	350										-	-	-	-	-	-	-	-	-
	400											-	-	-	-	-	-	-	-
	450	-										-	-	-	-	-	-	-	-
	500	-										-	-	-	-	-	-	-	-
	600	-	-									-	-	-	-	-	-	-	-
	700	-	-	-								-	-	-	-	-	-	-	-
	800	-	-	-	-							-	-	-	-	-	-	-	-
900	-	-	-	-	-						-	-	-	-	-	-	-	-	
1000	-	-	-	-	-	-					-	-	-	-	-	-	-	-	
		342-...-15... (15 Nm)																	
		362-...-20... (25 Nm)																	
		362-...-40... (40 Nm)																	

## Electrical Parameters for Type of Activation and Actuator

AT	B	T (Nm)	NV (V)	F (Hz)	CO (W)	CR (W)	WS (VA)	WN
B230	BEN230	15	AC 230	50/60	4	0,4	7	I <sub>max</sub> 4 A @ 5 ms
	BEE230	25			3,5	0,4	6	I <sub>max</sub> 4 A @ 5 ms
	BE230	40			8	0,5	15	I <sub>max</sub> 7,9 A @ 5 ms
B24	BEN24	15	AC/DC 24	50/60	3	0,1	6	I <sub>max</sub> 8,2 A @ 5 ms
	BEE24	25			2,5	0,1	5	I <sub>max</sub> 8,2 A @ 5 ms
	BE24	40			12	0,5	18	I <sub>max</sub> 8,2 A @ 5 ms
B24-W	BEN24-ST	15	AC/DC 24	50/60	3	0,1	6	I <sub>max</sub> 8,2 A @ 5 ms
	BEE24-ST	25			2,5	0,1	5	I <sub>max</sub> 8,2 A @ 5 ms
	BE24-ST	40			12	0,5	18	I <sub>max</sub> 8,2 A @ 5 ms
B24-SR	BEN24-SR	15	AC/DC 24	50/60	3	0,3	6,5	I <sub>max</sub> 8,2 A @ 5 ms
	BEE24-SR	25			3	0,3	5,5	I <sub>max</sub> 8,2 A @ 5 ms
	-	-	-	-	-	-	-	-
BST1	BEN24-ST & BC24-G2 <sup>(a)</sup>	15	(SLC®)	-	3,5	0,5	12,5	-
	BEE24-ST & BC24-G2 <sup>(a)</sup>	25			3		12,5	-
	BE24-ST & BC24-G2 <sup>(a)</sup>	40			12,5		20	-
BST10	BEN24-ST & BKNE230-24-PL <sup>(a)</sup>	15	AC 230 (Powerline)	50/60	5	0,5	20	-
	BEE24-ST & BKNE230-24-PL <sup>(a)</sup>	25			4,5		20	-
	BE24-ST & BKNE230-24-PL <sup>(a)</sup>	40			14		20	-

AT	G	T (Nm)	NV (V)	F (Hz)	CO (W)	CR (W)	WS (VA)
G230	342-230-15-...	15	AC 230	50/60	7	1,5	12
	362-230-20-...	20			3	1,5	7
	362-230-40-...	40			8,5	1,5	14
G24	342-024-15-...	15	AC/DC 24	50/60	7,5	1,5	9
	362-024-20-...	20			4	1,5	5,5
	362-024-40-...	40			8	1,5	10
G24-W	342-024-15-.../ST03	15	AC/DC 24	50/60	7,5	1,5	9
	362-024-20-.../ST03	20			4	1,5	5,5
	362-024-40-.../ST03	40			8	1,5	10
GST0	342-024-15-.../ST03 & FS-UFC24-2 <sup>(a)</sup>	15	AC 24	50/60	9,5	3,5	11
	362-024-20-.../ST03 & FS-UFC24-2 <sup>(a)</sup>	20			6	3,5	7,5
	362-024-40-.../ST03 & FS-UFC24-2 <sup>(a)</sup>	40			10	3,5	12

### Legend for Electrical Parameters

**AT** - Activation type

**B** - Belimo actuator type

**(a)** - Supply and communication unit

**G** - Gruner actuator type

**T** - Torque

**NV** - Nominal voltage

**F** - Frequency

**CO** - Consumption in operation

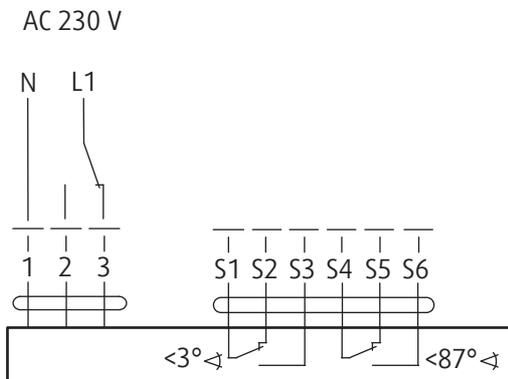
**CR** - Consumption in rest

**WS** - Wire sizing consumption

**WN** - Wire sizing consumption note

### Type of Activation B230

- The circuit switch between wires 2 and 3 is not part of the damper supply.
- When the power supply is connected to wires 1 and 3, the actuator moves to the CLOSED position.
- When the power supply is connected to wires 1 and 2, the actuator moves to the OPEN position.



#### CAUTION:

- Main power supply voltage! Danger of electric shock!
- Parallel connection of more actuators possible when the power consumption and switching threshold is observed!

#### Legend for Activation Type B230

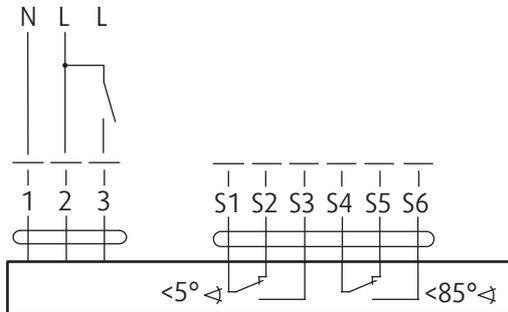
- 1** - Blue
- 2** - Brown
- 3** - White
- S1** - Violet
- S2** - Red
- S3** - White
- S4** - Orange
- S5** - Pink
- S6** - Grey

The Belimo BE230 actuator has wires without colours.

### Type of Activation G230

- Circuit switch for wire 3 is not part of the damper delivery.
- Connect power supply to wire 1+2, actuator drives to position OPEN (1). Is also wire 3 connected to the power supply, actuator drives to position CLOSED (0).

AC 230 V



#### CAUTION:

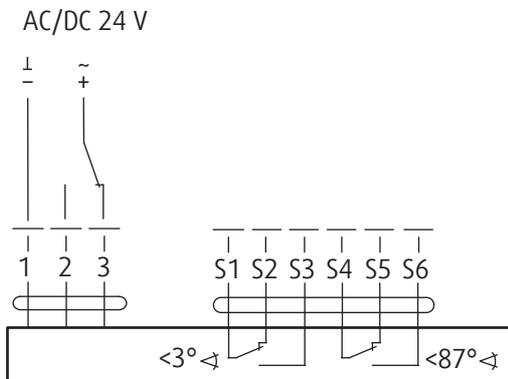
- Main power supply voltage! Danger of electric shock!
- Parallel connection of more actuators possible when the power consumption and switching threshold is observed!

#### Legend for Activation Type G230

- 1** - Blue
- 2** - Brown
- 3** - Black
- S1** - Violet
- S2** - Red
- S3** - White
- S4** - Orange
- S5** - Pink
- S6** - Grey

### Type of Activation B24

- The circuit switch between wires 2 and 3 is not part of the damper supply.
- When the power supply is connected to wires 1 and 3, the actuator moves to the CLOSED position.
- When the power supply is connected to wires 1 and 2, the actuator moves to the OPEN position.



#### CAUTION:

- Connect via safety isolation transformer!
- Parallel connection of more actuators possible when the power consumption and switching threshold is observed!

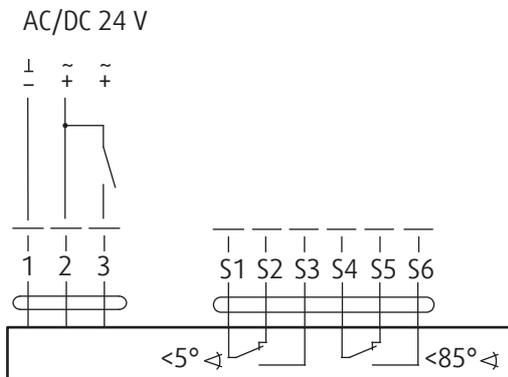
#### Legend for Activation Type B24

- 1** - Black
- 2** - Red
- 3** - White
- S1** - Violet
- S2** - Red
- S3** - White
- S4** - Orange
- S5** - Pink
- S6** - Grey

The Belimo BE24 actuator has wires without colours.

### Type of Activation G24

- Circuit switch for wire 3 is not part of the damper delivery.
- Connect power supply to wire 1+2, actuator drives to position OPEN (1). Is also wire 3 connected to the power supply, actuator drives to position CLOSED (0).



#### CAUTION:

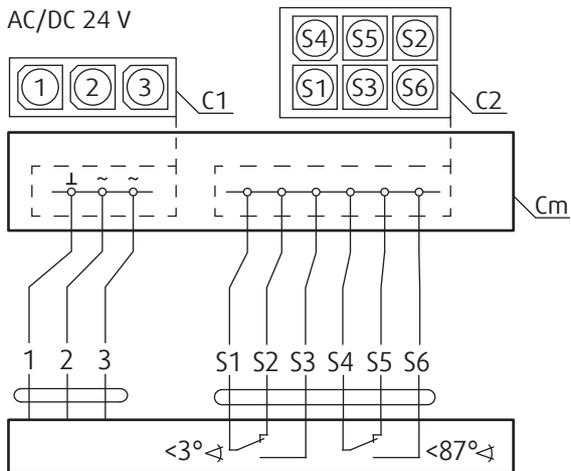
- Connect via safety isolation transformer!
- Parallel connection of more actuators possible when the power consumption and switching threshold is observed!

#### Legend for Activation Type G24

- 1** - Black
- 2** - Red
- 3** - White
- S1** - Violet
- S2** - Red
- S3** - White
- S4** - Orange
- S5** - Pink
- S6** - Grey

### Type of Activation B24-W

This type of activation has cable connectors (C1 and C2) for the supply and communication unit (the communication unit is not part of the mechanism).



#### CAUTION:

- Connect via safety isolation transformer!

#### Legend for Activation Type B24-W

The actuator has connection plugs C1 and C2.

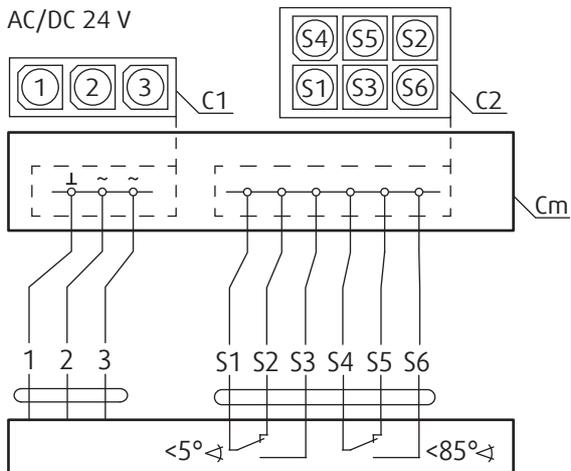
**Cm** - Communication Module - not part of the delivery

**C1** - Supply: 3-pole plug that is applicable, for example to BKNE... or fs-UFC...

**C2** - Auxiliary switch: 6-pole plug that is applicable, for example to BKNE... or fs-UFC...

### Type of Activation G24-W

This type of activation has cable connectors (C1 and C2) for the supply and communication unit (the communication unit is not part of the mechanism).



#### CAUTION:

- Connect via safety isolation transformer!

#### Legend for Activation Type G24-W

The actuator has connection plugs C1 and C2.

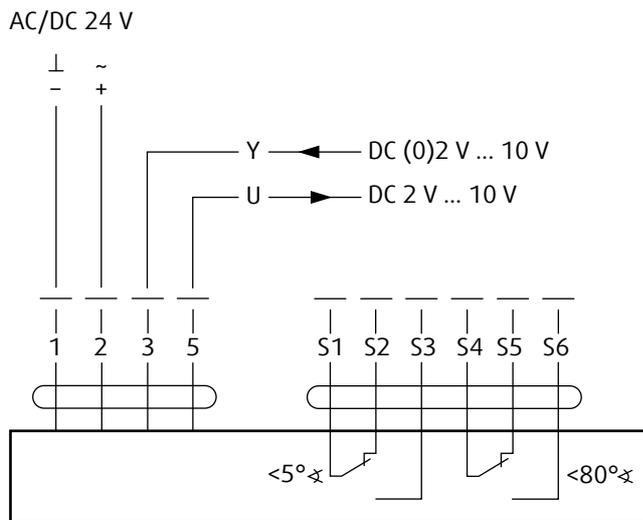
**Cm** - Communication Module - not part of the delivery

**C1** - Supply: 3-pole plug that is applicable, for example to BKNE... or fs-UFC...

**C2** - Auxiliary switch: 6-pole plug that is applicable, for example to BKNE... or fs-UFC...

### Type of Activation B24-SR

This type of activation has modulating actuator that can be used for balancing/air flow control.



#### CAUTION:

- Connect via safety isolation transformer!
- Parallel connection of other actuators possible. Observe the performance data and the switching thresholds.
- Combination of power supply voltage and safety extra-low voltage not permitted at the both auxiliary switches.

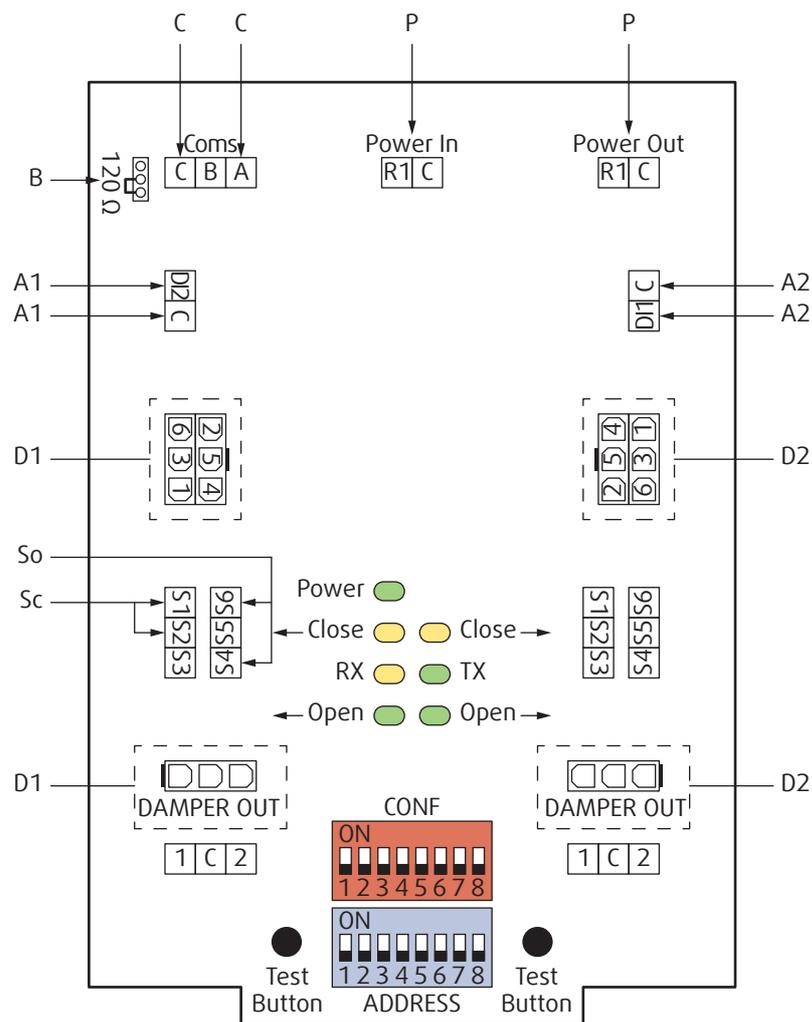
#### Legend for Activation Type B24-SR

- 1 - Black
- 2 - Red
- 3 - White
- 5 - Orange
- S1 - Violet
- S2 - Red
- S3 - White
- S4 - Orange
- S5 - Pink
- S6 - Grey

Modulating function not available for belimo BE24 actuator.

## Type of Activation GST0

- The actuator and the control module are factory wired.



### CAUTION:

- Main power supply voltage! Danger of electric shock!
- Parallel connection of more actuators possible when the power consumption and switching threshold is observed!

### Legend for Activation Type GST0

**A1, A2** - Analog Application; Digital input for manual override.

- Can be selected via bus as „Normally Open“ (= standard open) or „Normally Closed“ (= standard closed).
- Default: „Normally Open“

**B** - Position of line termination 120 ohm if FS-UFC24-2 is last Modbus or BACnet device in line

**C** - RS-485 Coms; Modbus RTU or BACnet MS/TP dip switch selectable

**D1, D2** - Damper 1, damper 2; Fire or smoke extraction application

**P** - Main power 24 V AC/DC; Daisy chain from and to other FS-UFC24-2

**So** - Contact open

**Sc** - Contact closed

## Type of activation BST1

**IMPORTANT:** Danger of electric shock! Parallel circuits, i.e. a smoke detector on multiple slave devices are not allowed!

Switch off the power supply before working on any electrical equipment.

Allow only qualified electricians to work on the electrical system.

Actuator power supply via fitted communication unit: DC 24 V.

**NOTE:** Connection scheme for fitted communication and supply unit BC24-G2 (THC).

## LEDs Status Indication (BST1)

### LED colour | LED state | Status

Green | ON | Damper open

Green | Blinks | Damper is opening

Yellow | ON | Damper closed

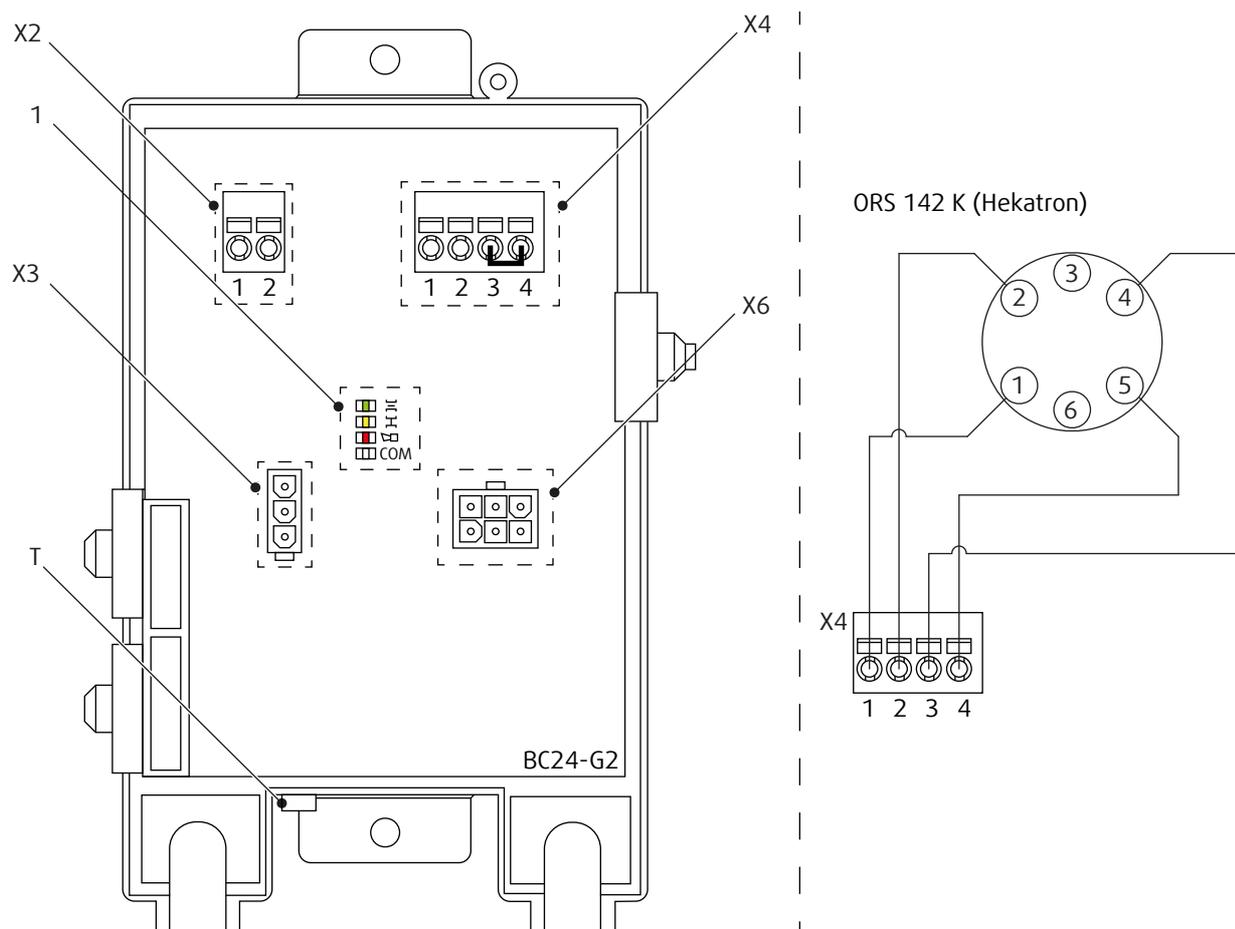
Yellow | Blinks | Damper is closing

White | Blinks | SLC-communication ok – control command „close damper“

White | Flashes | SLC-communication ok – control command „open damper“

Red | ON | Safety element triggered (at X4)

Red | Blinks | self-test active; error: communication loss; error: actuator not connected; error: thermoelectric tripping device of actuator triggered; runtime monitoring error; mechanical error triggered



## Legend for Activation Type BST1

**X2** - 2-pin spring terminal: 1/2 - connection for SLC two-wire line, wires interchangeable. Maximum cable lengths can be calculated with the SLC Planning Tool. Rule of thumb: 300m@1.5 mm<sup>2</sup>.

**X3** - 3-pin connector: damper actuator (motor DC 24 V).

**X4** - 4-pin spring terminal: Connection for smoke detector.

- 1- (+) DC 24 V / max. 30 mA.
- 2- GND.
- 3- IN1 (external relay contact 1).
- 4- IN2 (external relay contact 2).

**X6** - 6-pin connector: damper actuator (position limit switches).

## Type of Activation BST10

**IMPORTANT:** Danger of electric shock! The BKNE230-24-PL may only be used with a designated master (e.g. BKS64-PL).

Switch off the power supply before working on any electrical equipment.

Allow only qualified electricians to work on the electrical system.

Actuator power supply via fitted communication unit: DC 24 V

**NOTE:** Connection scheme for fitted communication and supply unit BKNE230-24-PL (Powerline) with example of connection with ORS 142 K from Hekatron (smoke detector not part of delivery).

## LEDs status indication (BST10)

### LED colour | LED state | Status

Green | ON | Damper open

Green | Blinks | Damper is opening

Yellow | ON | Damper closed

Yellow | Blinks | Damper is closing

White TX | ON | PL data sent

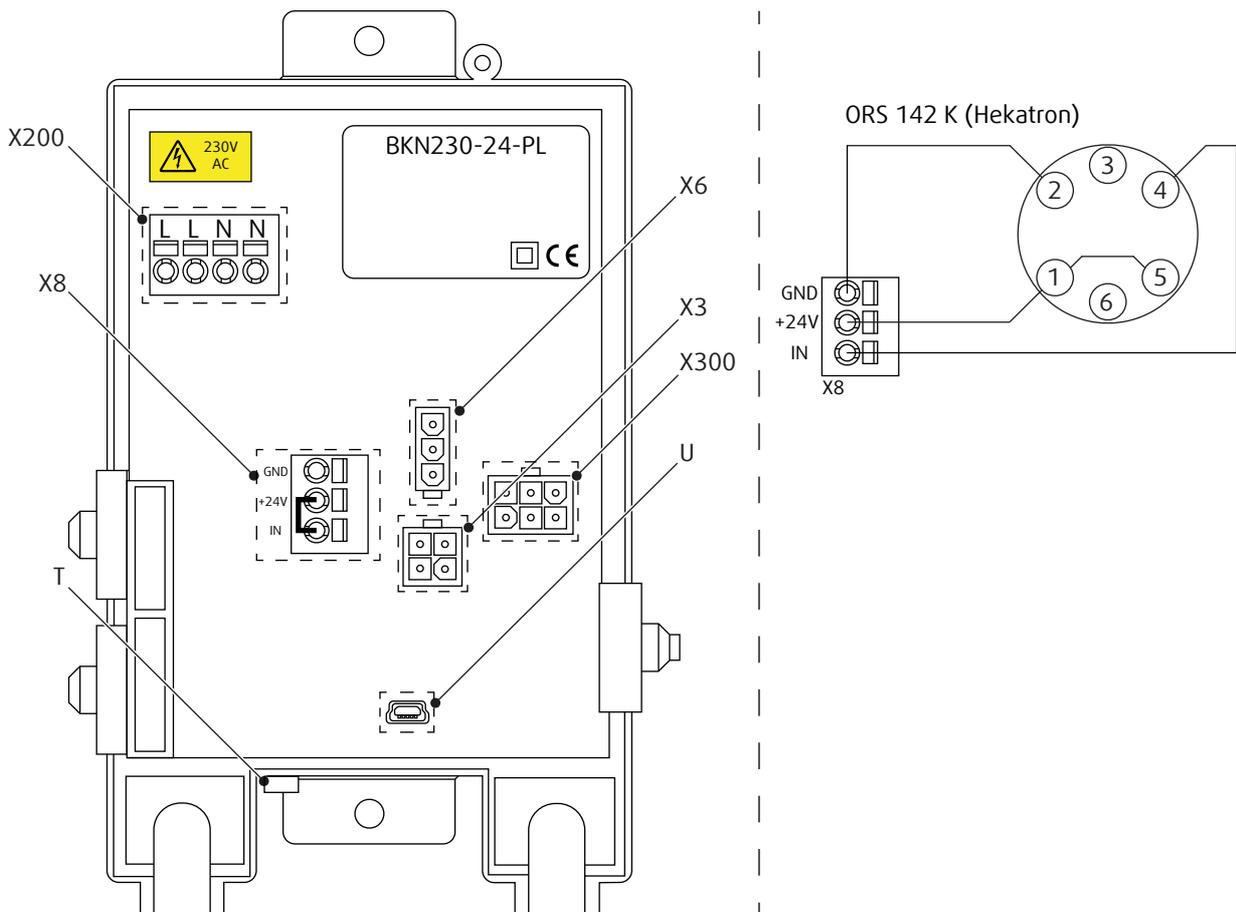
White RX | ON | PL data received

Red | ON | Error saved

Red | Blinks | Error present

Blue | ON | Device in Bootloader mode

Blue | Blinks | Identified by the master



### Legend for Activation Type BST10

X6 and X300 connector terminals are arranged so that only either a conventional actuator or a Belimo Top-Line actuator can be connected.

**X200** - 2+2-pin spring terminal: (50/60Hz) AC 230 V with Powerline signal

**X3** - 3-pin connector: damper actuator (motor DC 24 V)

**X4** - 4-pin spring terminal: connection for smoke detector

**X6** - 6-pin connector: damper actuator (position limit switches)

**X8** - 3-pin spring terminal: connection for smoke detector (without smoke detector: connect +24 V and IN)

- 1- GND
- 2- (+) DC 24 V
- 3- IN

**X300** - 4-pin connector: connection for belimo top-line actuator (not used)

# Operation Manual

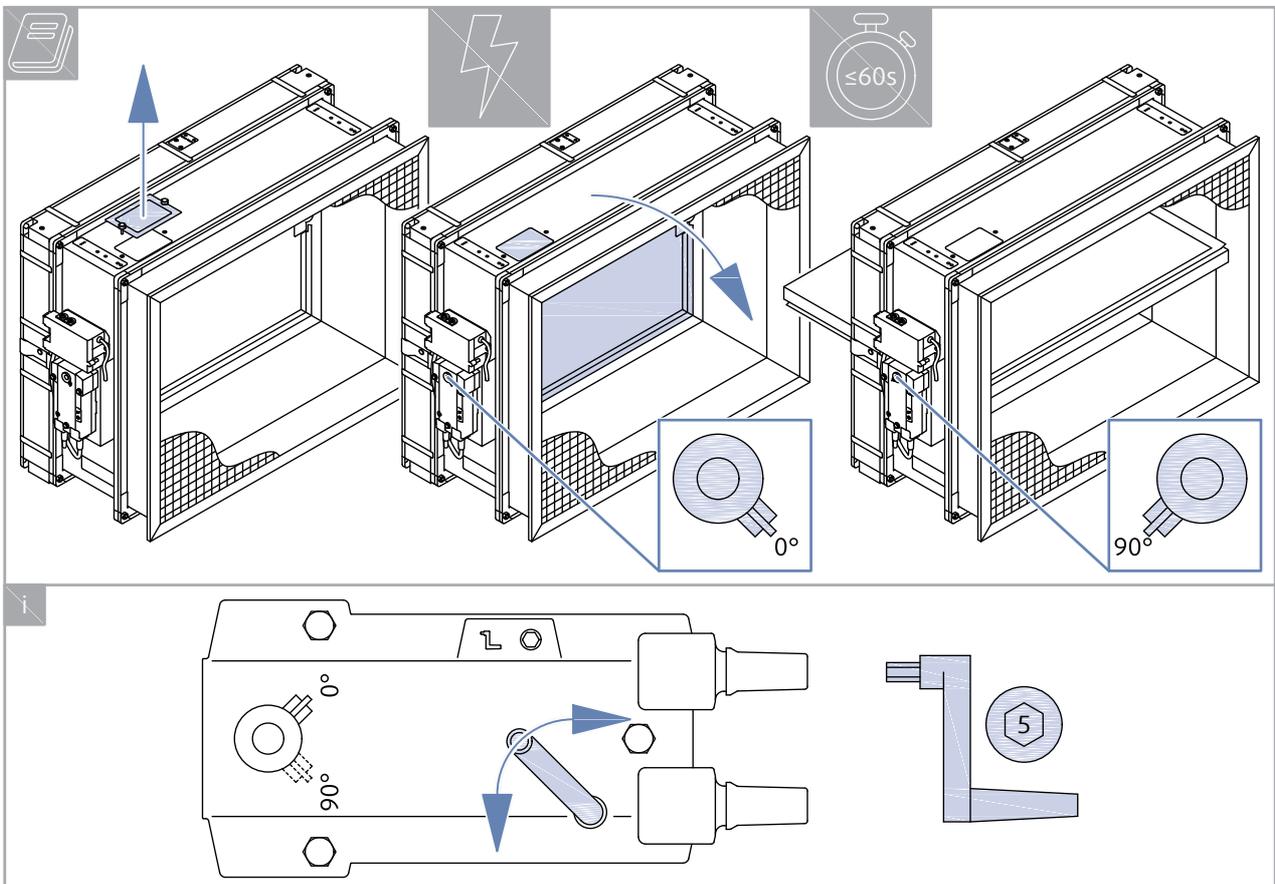
## Functionality Check

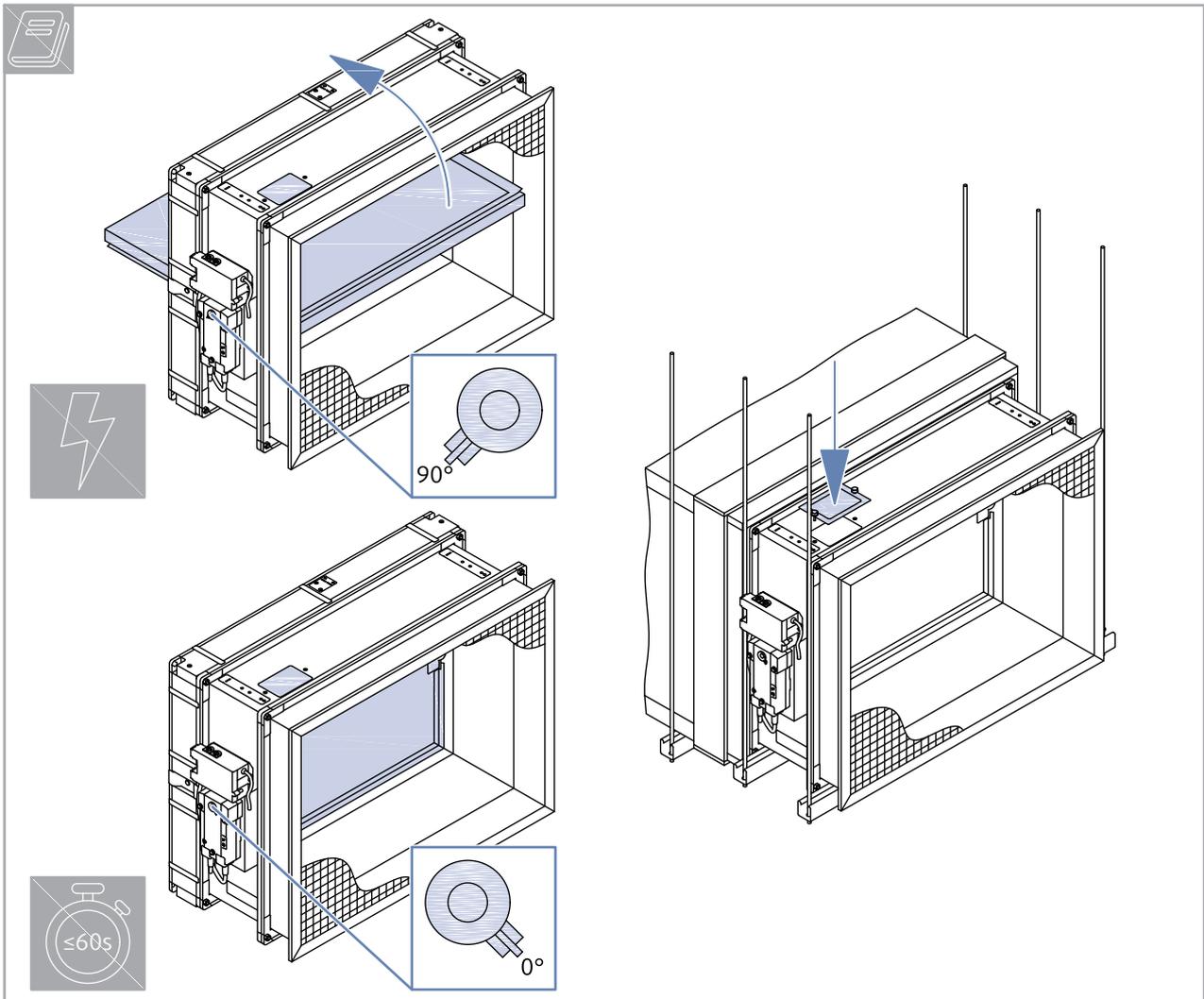
Before and after you install the damper, make sure that the damper's functionality is checked. The functionality is checked by:

1. Refer to the "Electrical connections" section to prepare the actuator connection.
2. Opening the damper:
  - Observe through grille or remove the grille and inspection opening lid by unscrewing two screws.
  - Depending on the activation type the opening follows based on the correct signal from e.g. BKSE24-6, correct voltage ( $Y = 10\text{ V}$ ) or by connecting supply wires as per wiring diagram, the actuator moves to the OPEN position.
  - The blade must move to the fully open position in 60 seconds or less. Then, the blade must stay locked.
  - After the blade is in its end position, the related signaling circuit sets to on. Make sure that you receive the open signal or wires S1 and S2 are connected.

**NOTE:** The actuator can be moved to open position with manual crank supplied with the actuator. Do not use drilling machine to turn the actuator.

3. Closing the damper:
  - Depending on the activation type the closing follows based on the correct signal from e.g. BKSE24-6, correct voltage ( $Y = 2\text{ V}$ ) or by connecting supply wires as per wiring diagram, the actuator moves to the CLOSED position.
  - The blade must move to the fully closed position in 60 seconds or less.
  - After the blade is in closed position, the related signaling circuit sets to on. Make sure that wires S4 and S6 are connected.
4. Put the damper into its operating position - "open" or "closed" based on the use of the product.
5. After the installation close the inspection opening with the removed lid with previously removed screws.





## Damper Inspection

**CAUTION:** Never perform inspection when there is air flowing in the duct connected to the smoke control damper.  
Do not change the dampers or their structure without the approval of the manufacturer.

The actuator keeps the dampers on stand-by during their life cycle. The operator obeys the applicable regulations and standards to do regular checks of the dampers. The recommended minimum interval for the inspection checks is 6 months. The manufacturer and/or government authorities must approve the inspecting person and/or process for this inspection. Operating Journal must be kept during the lifecycle of the smoke control damper. The damper's Operating Journal includes a copy of the approval/s of the inspecting person. If the inspecting person finds differences, the operator must write these differences in the Operating Journal. Then, he must recommend action to remove these differences.

After you install and start the damper, immediately do an initial check. This check obeys the same conditions as the six-month inspections.

Do a check of these elements of the external side of the damper:

- The damper housing
- The actuator movement.

**NOTE:** To do a visual check of the internal parts of the damper you may need to dismount the inspection lid or the grille. This will give you a better access to the internal parts.

Do a check of these items of the internal side of the damper:

- Make sure that there are no foreign objects or layers of contamination in the air distribution systems of the damper.
- The internal casing of the damper
- The sealings

- The foaming material
- The condition of the damper blade
- How accurately the damper blade closes when it is against the backstop in the closed position.

### Recommended Procedure for the Inspection Log (refer to EN 12101)

1. Find the identification of the damper.
2. Write the date of the inspection.
3. Examine the actuator wiring for damage.
4. Examine the wiring of the end switches for damage.
5. Make sure that the damper is clean. If necessary, clean the damper.
6. Do a check of the inspection lid and of the tightness of the cover.
7. Do a check of the blade and of the sealings. If necessary, correct the defects and record the results (where applicable).
8. Do a functional test of the damper (open and close) (refer to the "Smoke Damper Functionality Check" chapter).
9. Confirm the operation of the damper with the control system:
  - a. Monitor the physical performance of the damper
  - b. Monitor the signals of the end positions.
  - c. If necessary, correct and record the defect (where applicable).
10. The damper is part of the SHEVS (Smoke and Heat Exhaust Ventilation System). Thus, you must do a check of the full system (refer to the Operational and Maintenance Requirements).
11. Set the system to the operating position (refer to the "Operation Manual").
12. Record the result in the "Operating Journal" with the name and the signature of the Inspection Technician.

After the inspection, the inspecting person must write the data that follows in the "Operating Journal":

- Condition of the damper
- Date of the inspection
- Name, Surname and Signature of the employee that did the inspection (make sure that you can read this data).

## Supplement

Any deviations from the technical specifications contained on our website, handbook and the terms should be discussed with the manufacturer. We reserve the right to make any changes to the product without prior notice, provided that these changes do not affect the quality of the product and the required parameters. Current information on all products is available on [design.systemair.com](http://design.systemair.com).

