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OPERATION AND MAINTENANCE MANUAL

Type mcr PLD roof set of overpressure and bleed dampers



Gdańsk 06.12.2012. Version PLD 06.12.12

DEPARTMENT OF FIRE VENTILATION SYSTEMS

GDAŃSK 2012

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1. INTRODUCTION

The aim of this Operation and Maintenance Manual is to familiarise the user with device application, structure, operation method, correct assembly and use. This document contains additional information on use, maintenance as well as warranty terms and conditions.

This document describes the whole range of mcr PLD roof set of overpressure and bleed dampers. Observing the instructions included in this document shall ensure correct device operation and user safety.

2. SUBJECT OF DOCUMENTATION

The subject of this document is mcr PLD roof sets of overpressure and bleed dampers.

NOTE

All documents released before this Operation and Maintenance Manual are no longer valid. This Operation and Maintenance Manual does not apply to devices manufactured before this Operation and Maintenance Manual was released.

3. DEVICE APPLICATION

3.1. Application

Type mcr PLD damper sets are used in stairwell pressure release systems. These devices may also be used in any rooms which are to be protected against smoke by creating overpressure. The damper sets are designed to maintain a suitable pressure differential between the two sides of their stop barriers. They function as pressure relief valves by preventing pressure from rising (e.g. in a protected stairwell) above the set values. The devices conform to PN-EN 12101-6.

Type mcr PLD roof sets must not be used in installations which are affected by dust unless they are covered by a dedicated service and maintenance scheme.

3.2. Device types

The available types of mcr PLD roof sets are characterised by base dimensions.

- mcr PLD 800x800
- mcr PLD 1300x1300

The roof sets are equipped with a multi louvred shutter and an optional anti-icing system.

4. STRUCTURAL DESIGN AND OPERATION METHOD

4.1. Structural design

The structural design of mcr PLD roof set is shown in Fig. 1. The main components of the damper are: cut off barrier (Fig. 1, item 1), exhausts (Fig. 1, item 2), housing (Fig. 1, item 3), damper weights (Fig. 1, item 4).

Sets of roof dampers are manufactured in two nominal dimension types, that is 800x800 and 1300x1300.

The devices are equipped with multi louvred shutters which prevent the free flow of air while the devices are not in operation.

The devices may be optionally equipped with anti-icing systems.

Type mcr PLD roof damper sets are designed for fitting on dedicated pedestals or individually designed bases to suit various roof types. The device design and structure ensure reaction speed to PN-EN 12101-6.

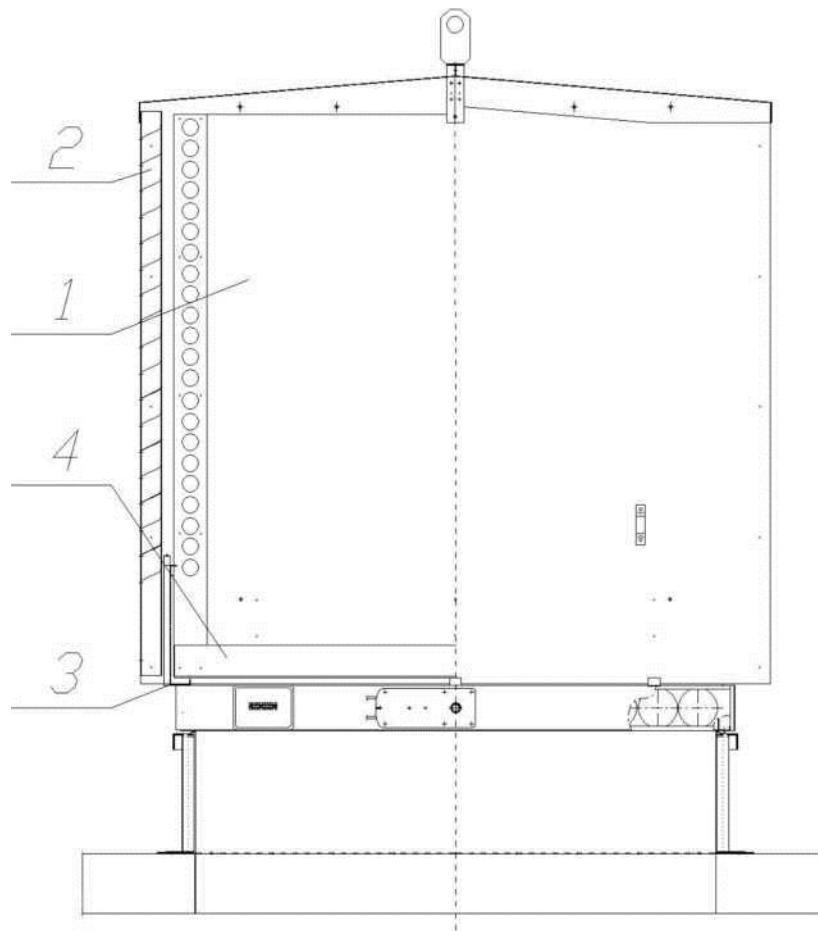


Figure 1. Design of type mcr PL1/D roof set of overpressure and bleed dampers.

4.2.Operation

Damper sets are devices which open to release pressure in a stairwell. When the pressure differential exceeds the threshold value of 50 Pa (this value is set when dampers are adjusted on site), damper's screens open rapidly to equalise the pressure. When pressure is equalised in the protected area, the screens are automatically closed by weights. The rapid reaction of the device to pressure differential ensures the suitable flow of air.

4.3.Power transmission and release systems

Power transmission of mcr PLD sets works by means of combining suitably selected steel weights, which are mounted on screens, and the force of gravity. Shutters are powered by Belimo type SF24 or SF230 actuators.

4.4. Dimensions

Table 1 shows dimensions for mcr PLD roof sets of overpressure and bleed dampers

Base measurement in opening	Dimensions	Shutter	Maximum flow rate	Weight
AxB [mm]	A1xB1xH [mm]	H1 [mm]	[m ³ /h]	[kg]
1300x1300	1580x1490x1550	125	22,000	315
800x800	1170x1080x1100	125	10,000	129

Table 1. Basic dimension options for mcr PLD damper sets.

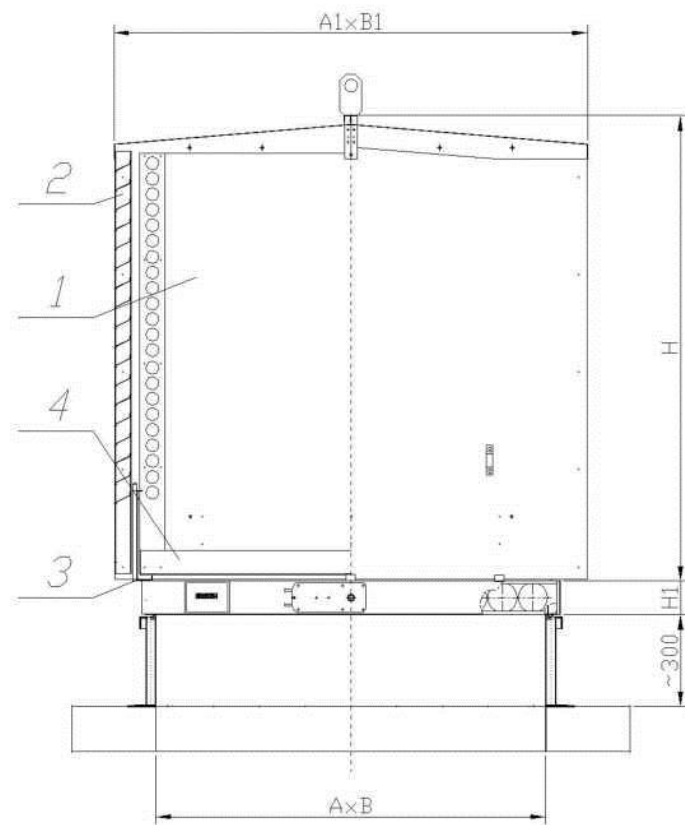
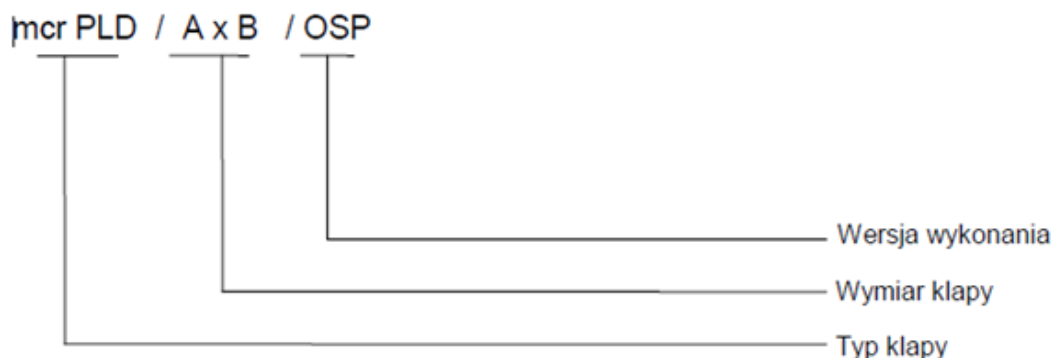


Fig. 2. Basic dimensions of PLD sets.

5. MARKS ON DAMPER SETS



Wersja wykonania: **Version**

Wymiar klapy: **Damper dimensions**

Typ klapy: **Damper type**

Type

mcr PLD roof overpressure and bleed damper

Dimensions

AxB: base dimensions - dimensions in opening (in mm)

Auxiliary devices

KI24 – damper's actuator voltage: 24V AC/DC

KI230 – damper's actuator voltage: 230V AC 50 Hz

SL – anti-icing system

PDP – for flat concrete roofs

H – base height (if height is not specified, the height of the base shall be 300mm)

300<H<500

PDS – for pitched concrete roofs with a specified slope angle

A – roof slope $0 < a < 20$

PDB – for roofs covered with metal roof sheets (to be designed and manufactured on request)

IT – thermal insulation to roof base

6. DEVICE INSTALLATION

6.1. Inspection prior to installation

All roof sets are checked by the manufacturer prior to packaging and shipping. After roof sets are unpacked it is necessary to visually check them against any deformation or damage which may have occurred in transport.

6.2. Pedestals

Type mcr PLD sets are to be fitted on pedestals, whose bases in the opening equal to AxB and are at least 300mm high. The width of the pedestal wall in the upper section should be at least 55mm (Fig.3). If a set includes pedestals, an opening must be made to measure AxB

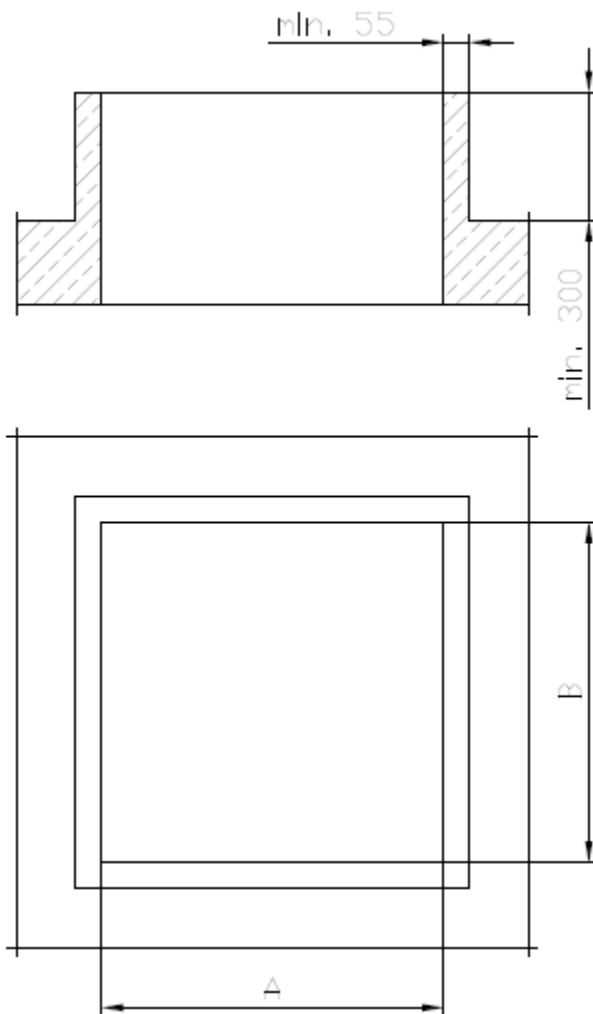


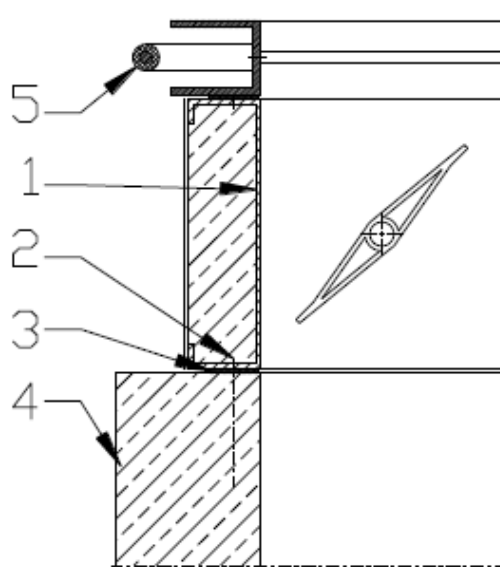
Fig. 3. Type mcr PLD set pedestal dimensions

6.3 Fitting of base

Roof sets of overpressure and bleed dampers may be fitted on pedestals provided by clients or on precast bases made by the manufacturer which are ordered individually to suit roof conditions.

6.3.1 Roof sets fitted on pedestals

Pedestals may be made from steel, concrete or wood. An additional support frame (Fig. 5, item 5) with heating cables is used in the sets which include the anti-icing systems



- 1) Multi louvered shutter
- 2) Connector
- 3) Vent seal
- 4) Pedestal
- 5) Frame with heating cable

Fig. 5. Fitting mcr PLD set on pedestal.

The gaps between damper, support frame and pedestal are to be secured by vent seals.

Depending on the pedestal material, suitable connectors (of at least 6mm diameter) must be used.

NOTE

Prior to roof work, pedestals must be checked for level. Make all necessary adjustments by using distance washers run through suitable connectors in the gap between the shutter and the pedestal

6.3.2. Roof sets fitted on bases

Place the manufacturer's base on structural roof elements such as purlins, trimmer beams, structural metal sheet or reinforced concrete pedestal.

The base has a ridge in its lower section. The ridge is used to fix the damper to its support structure. Depending on the material of the support structure, a suitable connector (of at least 6mm diameter) must be used.

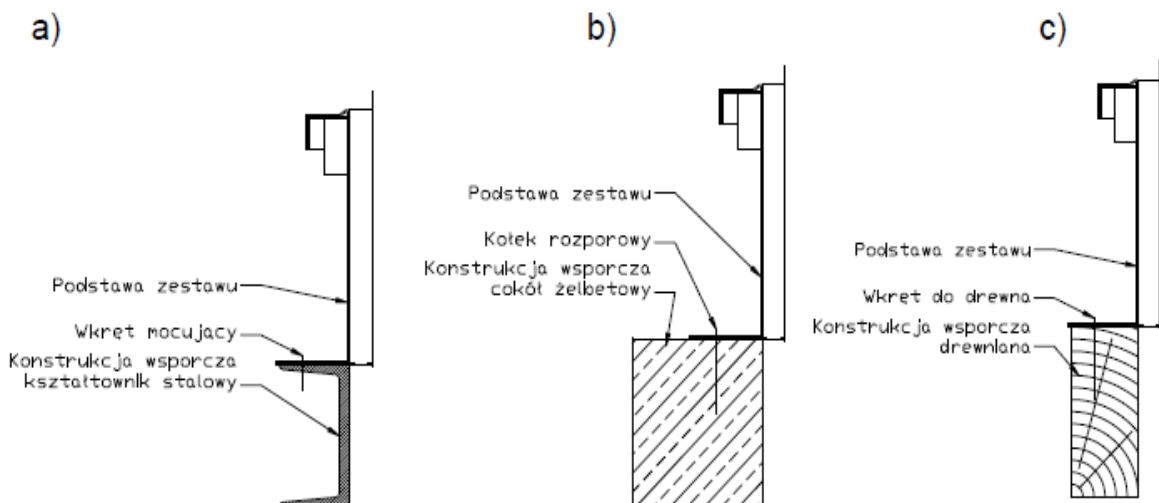


Figure 6. Fitting base of the set on: a) steel structure, b) reinforced concrete structure, c) wooden structure.

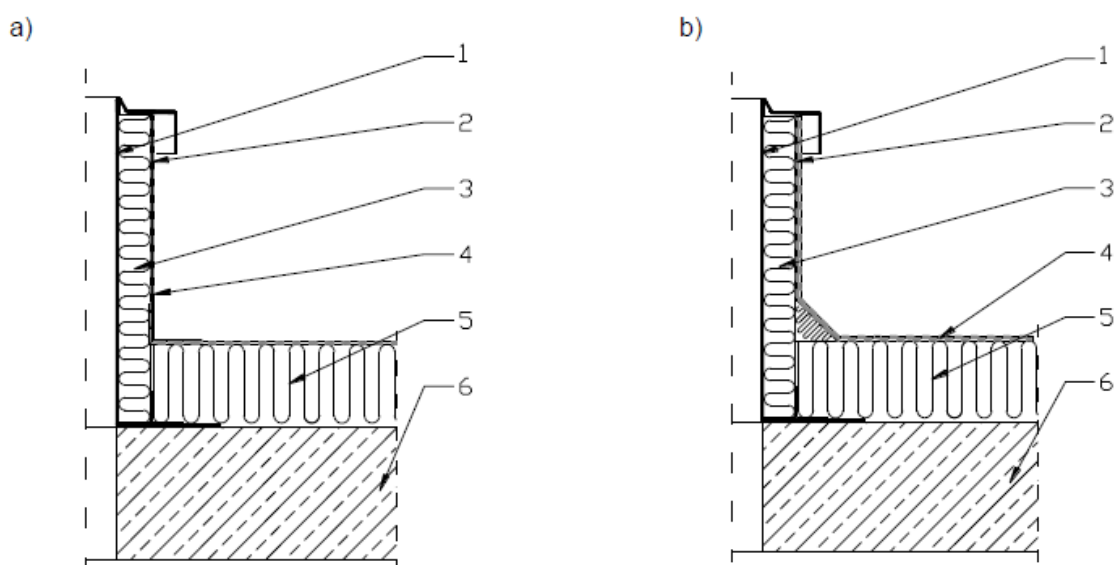
a) Set base – Fitting screw – Support structure (steel section)

b) Set base – Anchor – Support structure (reinforced concrete pedestal)

c) Set base – Wood screw – Support structure (wooden)

The base of the set is designed to roof flashings made of felt, PVC membrane or metal sheet.

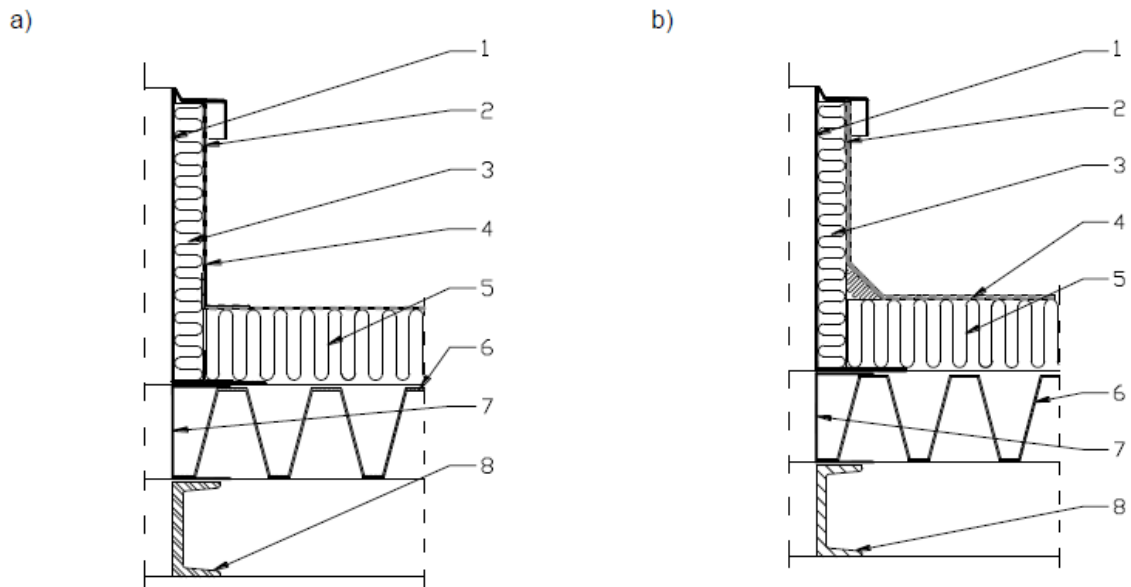
The upper section of the base set is finished with a stripe of galvanised metal sheet along its perimeter. This enables fitting the base with screws to existing roof structure. If a membrane is used, it is possible to replace the galvanised steel stripe with a PCV coated metal sheet (optional, for easy installation).



- 1) Steel damper base
- 2) Metal sheet stripe to fit membrane
- 3) Thermal insulation of base
- 4) Membrane flashings
- 5) Thermal insulation of roof
- 6) Reinforced concrete board

- 44752)** Steel damper base
- 44753)** Metal sheet stripe to fit felt
- 44754)** Thermal insulation of base
- 44755)** Felt flashings
- 44756)** Thermal insulation of roof
- 44757)** Reinforced concrete board

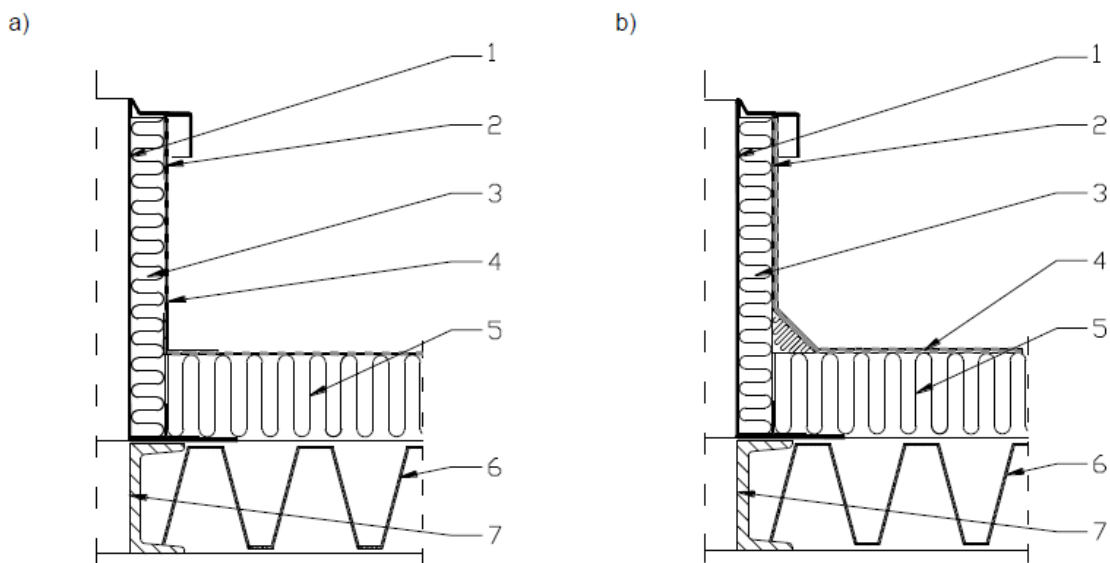
Figure 7. Steel base on reinforced concrete board: a) membrane flashings, b) felt flashings.



- 1) Steel damper base
- 2) Metal sheet stripe to fit membrane
- 3) Thermal insulation of base
- 4) Membrane flashings
- 5) Thermal insulation of roof
- 6) Trapezoidal metal sheet
- 7) Additional roof flashings
- 8) Support steel structure

- 1) Steel damper base
- 2) Metal sheet stripe to fit felt
- 3) Thermal insulation of base
- 4) Felt flashings
- 5) Thermal insulation of roof
- 6) Trapezoidal metal sheet
- 7) Additional roof flashings
- 8) Support steel structure

Fig. 8. Steel base on trapezoidal metal sheet: a) membrane flashings, b) felt flashings.



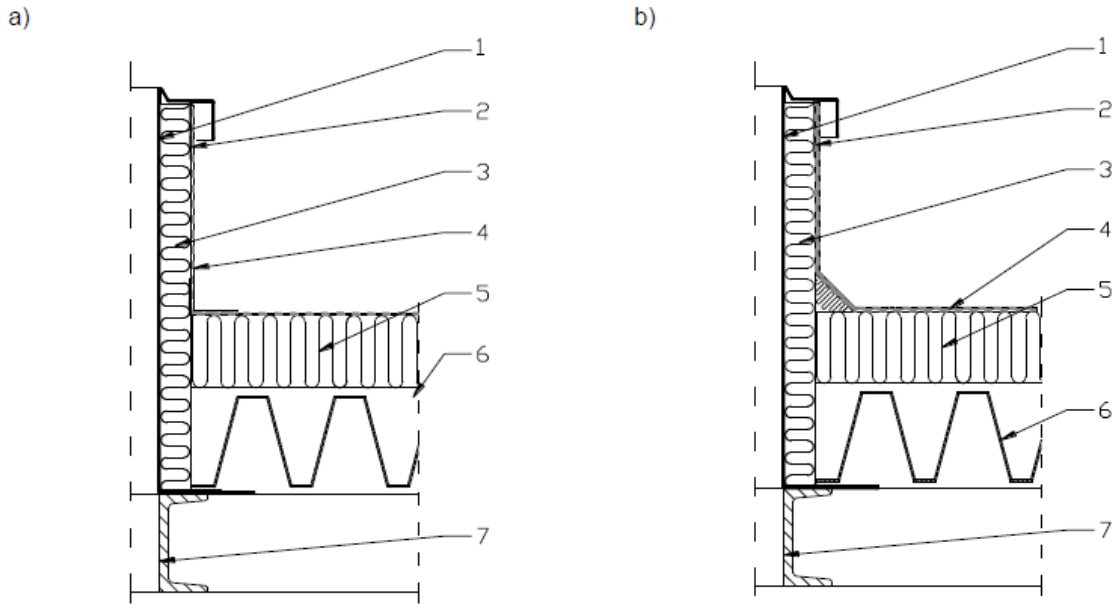
- 1) Steel damper base
- 2) Metal sheet stripe to fit membrane

- 1) Steel damper base
- 2) Metal sheet stripe to fit felt

- 3) Thermal insulation of base
- 4) Membrane flashings
- 5) Thermal insulation of roof
- 6) Trapezoidal metal sheet
- 7) Support steel structure

- 3) Thermal insulation of base
- 4) Felt flashings
- 5) Thermal insulation of roof
- 6) Trapezoidal metal sheet
- 7) Support steel structure

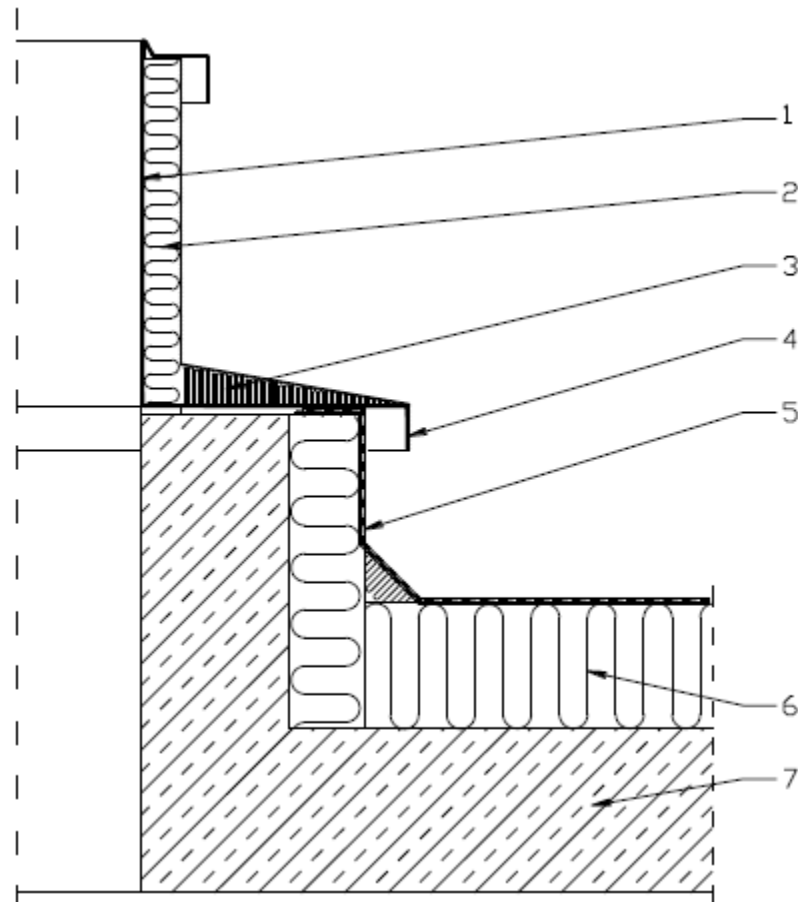
Figure 9. Steel base on steel support structure: a) membrane flashings, b) felt flashings



- 1) Steel damper base
- 2) Metal sheet stripe to fit membrane
- 3) Thermal insulation of base
- 4) Membrane flashings
- 5) Thermal insulation of roof
- 6) Trapezoidal metal sheet
- 7) Steel support structure

- 54496) Steel damper base
- 54497) Metal sheet stripe to fit felt
- 54498) Thermal insulation of base
- 54499) Felt flashings
- 54500) Thermal insulation of roof
- 54501) Trapezoidal metal sheet
- 54502) Steel support structure

Fig. 10. Steel base on steel structure with additional reinforcing trapezoidal metal sheet: a) membrane flashings b) felt flashings



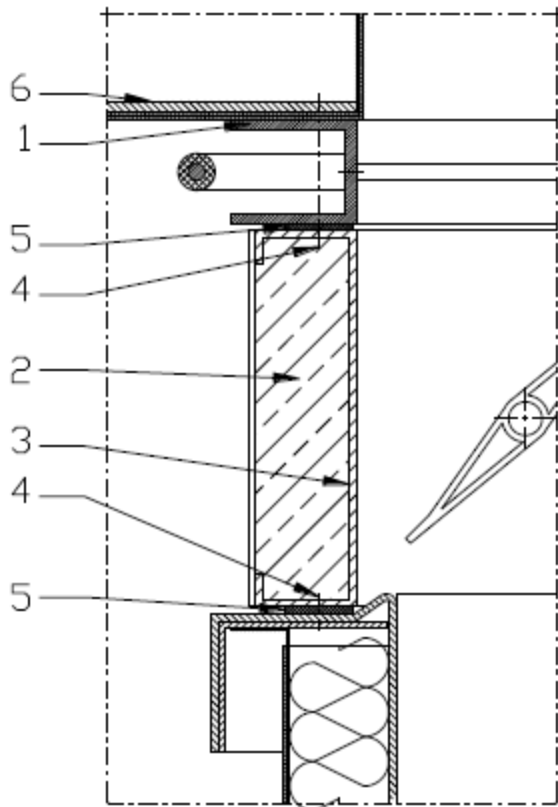
- 1) Steel damper base
- 2) Thermal insulation of base
- 3) Thermal insulation of cladding
- 4) Eave
- 5) Felt or membrane flashings
- 6) Thermal insulation of roof
- 7) Reinforced concrete board

Fig. 11. Steel base on steel, wooden or reinforced concrete pedestals.

6.4. Fitting of frame and anti-icing system _____

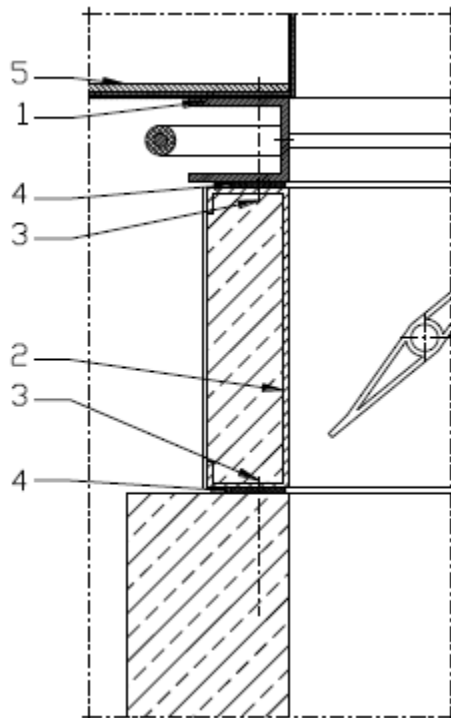
Anti-icing system consists of temperature adjuster and heating cable which is run on a frame made of channels.

If a type with frame and a heating cable is used, the structural elements may be run through openings in both frames (Fig. 12).



- 1) Frame with heating cable
- 2) Insulation
- 3) Multi louvered shutter
- 4) Connectors
- 5) Vent seal
- 6) Support metal sheet

Fig. 12. Fitting of frame with heating cable on shutter



- 1. Frame with heating cable
- 2. Insulation
- 3. Multi louvered shutter
- 4. Connectors
- 5. Support metal sheet

Fig. 13. Fitting of frame with heating cable on pedestal.

6.5. Fitting of PLD set

Damper design limits the impact of wind on the damper, however, when the damper position is set (exhaust direction), the impact of wind must be taken into account if possible.

The first element to be fitted directly on a suitably made pedestal is the vent shutter (Fig. 12 and 13). The shutter insulation is fitted after

the complete damper set is installed. It is important to observe the position of shutter actuator. The actuator should be on the other side of the damper, the one which has no exhaust, due to the fact that the actuator may prevent the shutter from being removed (as per Fig. 1). The next thing to be fitted is the frame with heating cable (in case of anti-icing systems).

It is important to level the shutter during installation. In order to level the shutter, make suitable distance adjustments (Fig. 1, item 3). The damper body is fitted to the shutter with e.g. 12 6.4x30 screws.

Connectors may be fitted from the side of the shutter as well as from the side of the grooves in the damper body (Fig. 1, item 3). The access to grooves is possible once the exhaust is removed (Fig. 1, item 2). The exhausts must be removed one at a time. Do not remove two exhausts at once.

PLD roof set is equipped with a balancer which consists of damper weights (Fig. 1, item 4).

After PLD damper set with shutter is fitted to the base, shutter insulation must be fitted. First, insert insulation pads on H sides (the sides without the actuator), then fit insulation boards with protective metal sheets on B sides (actuator must be removed). The insulation is fitted to shutter with metal screws.

6.6. Damper balancing

Damper balancing is performed by adding or removing weights. The access to this element of the damper is gained by removing damper exhaust. It is important to ensure that pressure measurements are taken when exhausts are fitted.

In the event that the pressure in a stairwell is too high (pressure aspect), more weights shall be used.

6.7. Power connection

Technical details presented below apply to mcr PLD damper sets with actuator-powered shutters and/or anti-icing systems.

6.7.1. Connecting actuators in shutters

By default the shutters are equipped with BELIMO SF24A S2 or SF230A S2 actuators.

		SF24A S2	SF230A S2
Nominal power supply voltage		AC 24 V, 50/60 Hz, DC 24 V	AC 230 V, 50/60 Hz
Power supply voltage range		AC/DC 19.2..28.8 V	AC 195... 264 V
Power consumption	In operation	5W in rated torque	6.5W in rated torque
	Idle	2.5W	3.5W
	Nominal power	7.5VA	18VA
Wiring - motor		Cable 1 m, 2 x 0.75 mm ²	
Torque (nominal)		20 Nm	
Rotation angle		Max. 95°, limited by movable bumpers on each side	
Noise level		max. 62 dB (A)	
Position indicator		mechanical	
Appliance class		III (safety low voltage)	II (double insulated)
Housing IP		IP 54	
Environment temperature range		-30 ... +50°C	
Storage temperature		-40 ... +80°C	
Humidity		To EN 60335-1	
Maintenance		Maintenance-free	
Weight		Approx. 2,300g	Approx. 2,300g

Table 2. BELIMO SF24A S2 and SF230A S2 technical details

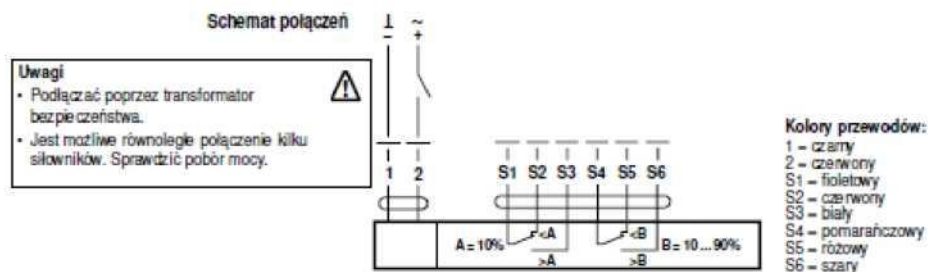


Fig. 16. BELIMO SF24 connection diagram.

Connection diagram

Note

- Connect through safety transformer
- It is possible to make parallel connections to include a few actuators. Check power intake.

Cable colours:

- 1 – black
- 2 – red
- S1 – violet
- S2 – red
- S3 – white
- S4 – orange
- S5 – pink
- S6 – grey

NOTE

In case of non-standard actuators, connection manual is provided with each set.

6.7.2. Connecting anti-icing system

The anti-icing system consists of the following electrical components: a temperature adjuster and a heating cable. By default, RT-821 temperature adjusters and VCD series heating cables are used.

RT-821 temperature adjuster technical details	
Power supply	230V AC
Operational current	<16A
Temperature adjustment range	-4-5 °C
Adjustable hysteresis	0.5-3°C
Temperature sensor	KTY 10-6
Probe and sensor length	Cable 2.5m
Power on indicator	LED (green)
Operation indicator	LED (red)
Power consumption	1.1W
Connection	2 modules (35mm)
Fitted on	Top hat rail TH35

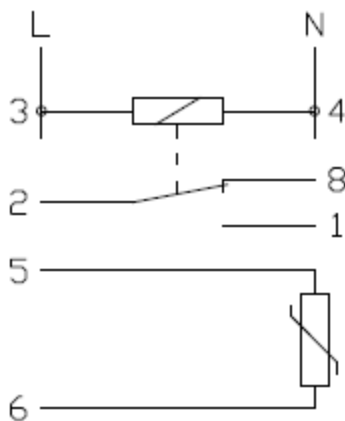


Fig. 18. Temperature adjuster connection diagram.

VCD series heating cable technical details		
Type of PLD set	Unit power 10 [W/ml]	
	Cable length [m]	Min. set power [W]
800x800	7	70
1300x1300	17	170

NOTE

In case of non-standard components, technical details and installation instructions are provided with the set

7. TRANSPORT AND STORAGE GUIDELINES

The damper sets are transported on pallets. The devices are protected against damage with plastic sheets or other protective material. Any transport means may be used as long as the devices are protected from the influence of weather conditions. The devices must be protected against position change during transport. A visual inspection of each set of devices must be carried out after transport. In case of actuator-powered shutter sets, it is prohibited to carry them by holding connection cables or to place them on control and release mechanisms. Do not drop or hit the sets. Use dedicated transport holders during transport and installation to avoid damage to devices.

If the devices are to be stored on a surface, they must be placed on supports which level the position of dampers (prevent deformation of damper housing) and keep them away from sources of moisture.

8. SERVICE AND MAINTENANCE

In order to ensure correct and continuous operation of roof sets of overpressure and bleed dampers, check and start the devices regularly. The manufacturer requires that technical inspections are performed every 6 months. Each technical inspection must be accompanied by a report and noted in the service book of the building. Technical inspections should be carried out by the manufacturer or a company which is authorised by the manufacturer to perform technical inspections and maintenance. The building administrator, who commissions maintenance or other service activities under warranty, is required to provide unrestricted access to all areas which are necessary to perform the said activities (e.g. easy access to control and release mechanisms, removing of thermal or other insulation from devices, removing of suspended ceilings and other installations which prevent easy access to damper set etc.).

9. WARRANTY TERMS AND CONDITIONS

1. The Manufacturer's guarantee covers the product for the period of 12 months of the date the invoice is issued unless it is stated otherwise in a separate agreement.
2. The defects revealed during warranty period, which prevent the devices from correct functioning, shall be repaired by the Manufacturer upon receiving a written notification in which the defects are described, and within the time stated by the Manufacturer after an on-site inspection of the devices has been performed. Repairs shall commence no later than within 4 business days of the date on which any such notification is received.
3. The requirement for repairing defects which are revealed during warranty period is that unrestricted access to all necessary areas is provided (e.g. easy access to control and release mechanisms, removing of thermal or other insulation from devices, removing of suspended ceilings and other installations which prevent easy access to damper set etc.).
4. This Warranty shall be extended to include the period from the date a defect notification is received until a warranty repair is completed.
5. In the event that any defects, which prevent the device from further correct operation, are detected, the Manufacturer shall replace the faulty product with an equivalent product without any financial consequences for the Buyer.
6. The warranty shall not cover any activities performed by the Buyer/User which are not specified in this Operation and Maintenance Manual.
7. The Manufacturer shall not be liable under this warranty in the event that:

- a) The product has been mechanically damaged as a result of:
 - Incorrect transport or unloading by the Buyer.
 - Incorrect installation (performed without observing this Operation and Maintenance Manual or the rules of good building practice) by the Buyer.
 - Incorrect product use or using the product against product application guidelines.
 - Using power supply which is different than the one specified on the nameplate placed on the control and release mechanism.
 - b) The defects arise as a result of incorrect product storage.
 - c) The Buyer/User has introduced structural changes (e.g. removed weights or tampered with power transmission of shutter sets).
 - d) Device installation has been performed by the Buyer without observing the guidelines of this Operation and Maintenance Manual.
 - e) The defects arise as a result of maintenance which has been performed without observing the guidelines of this Operation and Maintenance Manual.
 - f) The product nameplate is removed.
 - g) The warranty stickers are removed or damaged.
 - h) Periodical inspections have not been performed to schedule and Manufacturer's recommendations.
8. After a complaint is received, the Manufacturer shall deduct the cost of missing parts or the parts which were damaged by the Buyer/User. The replacement cost shall be borne by the Buyer/User.