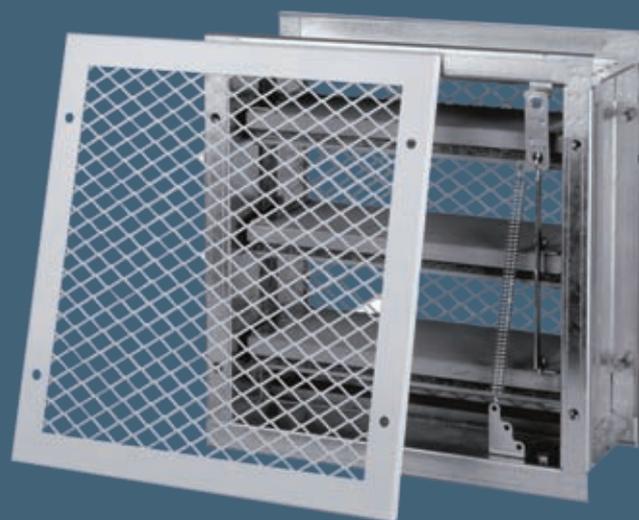


MANDÍK®

FIRE SHUTTER

PSUM-90



These technical specifications determinate a range of manufactured sizes and models of fire shutters (further only shutters) PSUM-90. It is valid for production, design, ordering, delivery, assembly and operation.

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II. GENERAL INFORMATION

1. Description

Fig. 1 Fire shutter PSUM



- 1.1. Fire shutters with cover grilles (grille is an integral part of the shutter) are shutters (without connection duct) for ventilation systems openings in fire rated separating construction, lift shafts and other shafts, cable channels and other channels. Fire shutters are designed to prevent spreading of heat and combustion products from / in ventilation system.

The air flow is closed after fuse meltdown or feeding (power) loss in case of electrical actuating. Thermal fuse will release closing of shutter blades automatically after loss of power. These blades are positioned into the mass that will expand with the temperature until the shutter is airtight.

Fire shutters are fire classified according to EN 13501-2, each installation variant in dependence on the individual installation case.

Declaration of Performance No. PM/PSUM_90/01/16/1

Table 1.3.1. Fire classification of shutters

Installation variant of PSUM-90 (wall gaps sealing)	Type and thickness of fire separating construction	Fire classification
Mortar, Concrete, Gypsum	Ceiling construction, min. thickness 150 mm	EI 90 DP1
Mortar, Concrete, Gypsum	Solid wall construction or plasterboard wall construction, min. thickness 100 mm	EI 90 DP1
Mineral wool (min. density 120 kg/m ³) coated with PROMASTOP-P min. thickness 1mm (Fig. 12)	Solid wall construction or plasterboard wall construction, min. thickness 100 mm	EI 90 DP1
Mineral wool (min. density 140 kg/m ³) with mastic HILTI CP 673 thickness of drylayer 0,7 mm (Fig. 13)	Solid wall construction, min. thickness 120 mm	EI 90 DP1
Installation on the plasterboards. The gaps are filled by mastic PROMASEAL-Mastic (Fig. 14)	Plasterboard wall construction, min. thickness 100 mm	EI 90 DP1
Fire resistant foam PROMAFOAM-C or HILTI CP 620, The foam can not be exposed to UV light and weather conditions (Fig. 15)	Solid wall construction, min. thickness 150 mm	EI 60 DP1
Fire resistant foam PROMAFOAM-C coated with PROMASTOP-P thickness of drylayer 1 mm (Fig. 16)	Solid wall construction or plasterboard wall construction, min. thickness 100 mm	EI 90 DP1
Mineral wool (min. density 40kg/m ³) with mastic PROMASEAL-Mastic in minimum depth of 20 mm (Fig. 17)	Solid wall construction or plasterboard wall construction, min. thickness 100 mm	EI 90 DP1
Mineral wool (min. density min.75kg/m ³) with mastic CP 601S in minimum depth of 10mm (Fig. 18)	Solid wall construction, min. thickness 120 mm	EI 90 DP1

1.2. Operational conditions

Shutters are designed for macroclimatic areas with mild climate according to EN 60 721-3-3 zm.A2.

Shutters are designed for fluids without abrasive, chemical and adhesive particles.

Fire shutters can be used for areas with potentially explosive atmospheres according to EN 13 463-1. The protection class and degree of protection II 2 G is listed on the surface of fire shutter.

2. Design

2.1. Design with mechanical control

Design .01

Design with mechanical control are supplied with thermal fuse which actuates the shutting device after the nominal temperature 72°C has been reached.

Design .11

Design .01 with mechanical control could be completed with a limit switch which signalised when the shutter blades is in position "CLOSE".

2.2. Design with actuating mechanism

Design .40

Design with actuating mechanism BLF 24-T or BLF 230-T with spring reverse operation 90°. A thermoelectric switching device BAE 72B-S, which contains three thermal fuses Tf1 and Tf2/Tf3, is a part of the actuating mechanism. These fuses are activated when temperature +72 °C has been exceeded. After the thermal fuse Tf1 or Tf2/Tf3 has been activated, the power supply is permanently and irreversibly cut off. The shutter blades are displaced to the position "CLOSED" by pre-stretched spring. Actuating mechanism is suitable for voltage 24V DC and 230V AC. Actuating mechanism is equipped by limit switches for position "OPEN-CLOSE"

Design .41

Design .40 with actuating mechanism could be completed with optical smoke detector MHG 231. The voltage must be AC 230 V or AC/DC 24 V. The design for voltage AC 230 V contains a communication and supply device BKN 230-24-MA and actuating mechanism BF24-T (BLF 24-T)

2.3. Design suitable to area with potentially explosive atmospheres

Provedení .02, .12

For areas with potentially explosive atmospheres is supplied shutter with the thermal fuse or shutter with the thermal fuse and a limit switch.

3. Dimensions and weight

3.1. Dimensions and weight

Fig. 2 Manual design

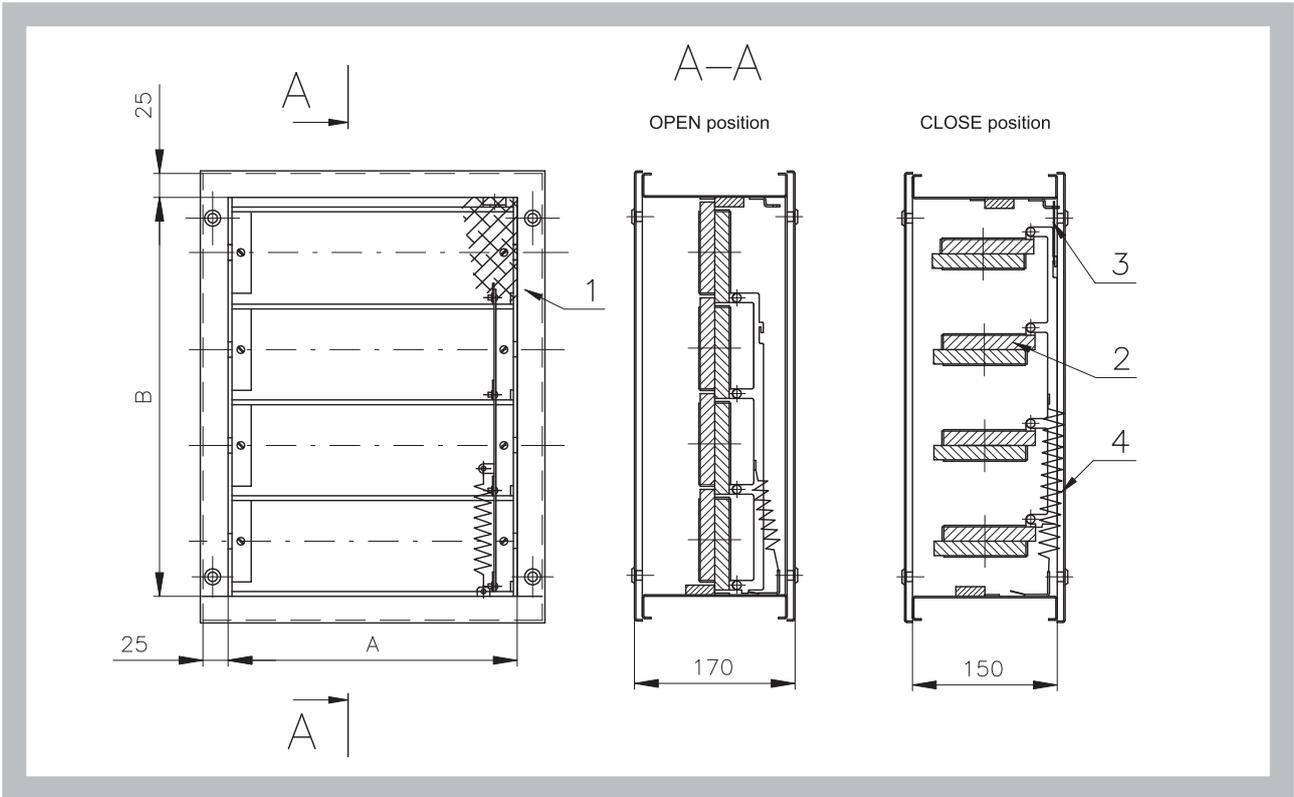
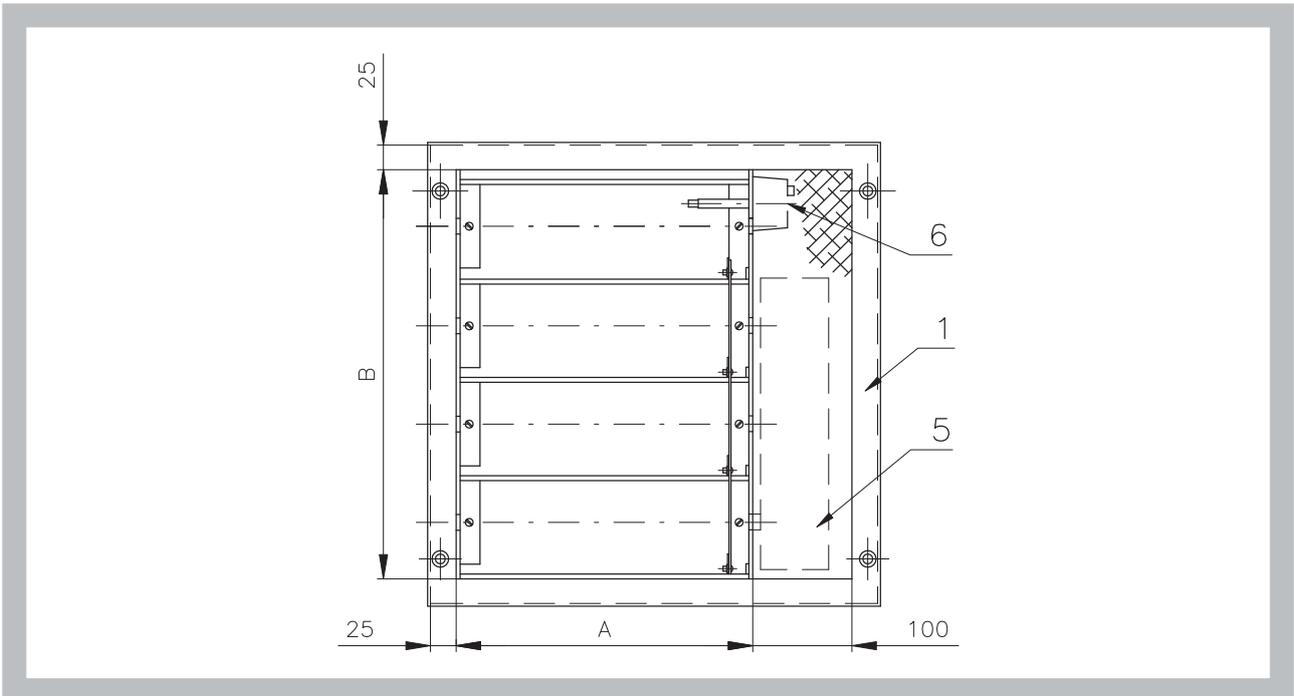


Fig. 3 Shutters with actuating mechanism



Position:

- 1. Frame
- 2. Blade
- 3. Thermal fuse
- 4. Closing spring
- 5. Actuating mechanism
- 6. Thermoelectric switching device

Table 3.1.1. Dimensions and weight

A x B	Weight		Actuating mechanism type	A x B	Weight		Actuating mechanism type
	Design				Design		
	Manual	Actuating mechanism			Manual	Actuating mechanism	
200x215	6,0	-	-	500 x 215	10,5	-	-
x315	8,0	11,5	BLF	x 315	14,0	17,5	BLF
x415	10,0	14,0	BLF	x 415	17,0	21,5	BLF
x515	12,0	16,5	BLF	x 515	20,0	24,5	BLF
x615	13,5	18,5	BLF	x 615	23,5	30,0	BF
x715	15,5	22,5	BF	x 715	26,5	33,5	BF
x815	17,5	24,5	BF	x 815	30,0	37,0	BF
300x215	7,5	-	-	600 x 215	12,0	-	-
x315	10,0	13,5	BLF	x 315	15,5	19,5	BLF
x415	12,0	16,5	BLF	x 415	19,5	23,5	BLF
x515	14,5	19,0	BLF	x 515	23,0	29,0	BF
x615	16,5	22,0	BLF	x 615	27,0	33,0	BF
x715	19,5	26,0	BF	x 715	30,5	37,0	BF
x815	22,0	29,0	BF	x 815	34,5	41,0	BF
400x215	9,0	-	-				
x315	12,0	15,5	BLF				
x415	14,5	19,0	BLF				
x515	17,5	22,0	BLF				
x615	20,0	25,0	BLF				
x715	23,0	30,0	BF				
x815	26,0	33,0	BF				

Notices:

- Non standard dimensions are not manufactured
- Dimension A x 215 is not manufactured for design with the actuating mechanism.
- The width (dimension A) of the shutter with actuating mechanism is A+100
- The effective area of shutters is 64 to 68%.

4. Installation and placement

4.1. Shutters can be installed into the solid wall constructions made of concrete, porous concrete, masonry and plasterboards construction with minimum thickness of 100 mm. Shutters can also be install into the solid ceiling construction made of concrete with minimum thickness 150 mm.

The temperature sensors, i.e. thermal fuse or thermoelectric switching mechanism should be located on the top of the shutter installed in the wall construction as recommended. Smoke optical detector must be located on the ceiling. The thermal fuse or thermoelectric switching device should be located on the bottom or on the top of the shutter.

Shutter blades must be in horizontal position after the shutter installation into the wall construction.

The distance between the fire shutter and the construction (wall, ceiling) must be minimum 75 mm. In case that two or more shutters are supposed to be installed in one fire separating construction, the distance between the adjacent dampers must be at least 200 mm.

Shutter assembly procedures must be done so as all load transfer from the wall or construction to the shutter frame is absolutely excluded.

The control mechanism has to be protected (covered) against damage and pollution during installation process. The shutter frame can not be deformed during installation process. After installation shutter blades should not grind on the shutter frame during opening or closing.

It is not recommended to store any subject on shutter grille, walking on the cover grille etc. during the shutter installation.

If is the shutter installed into the wall or ceiling construction with thickness more then 150 mm than the shutter side with the thermo fuse (thermoelectric activate device) has to be aligned with surface of the wall or the ceiling (floor). The opening on the other side should be permanently enclosed with the cover grille.

If is the shutter installed into the wall construction with thickness less then 150 mm, the shutter parts, which are not installed into the wall, must be garnished with fire resistance boards. If is the shutter installed into the plasterboard wall construction has to be used the reinforced profiles around installation opening.

4.2. Statement of installations

4.2.1. Recommended sizes for installation opening

Fig. 4 Recommended sizes for installation opening for solid wall (solid ceiling) constructions

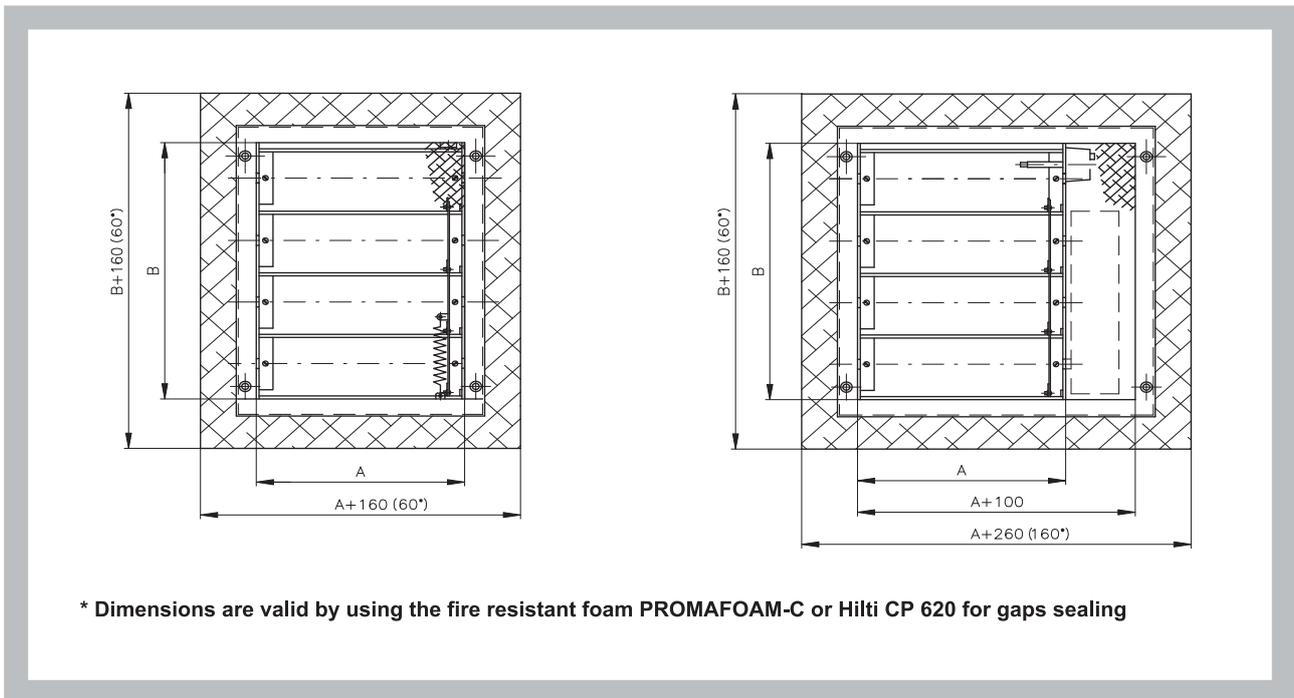
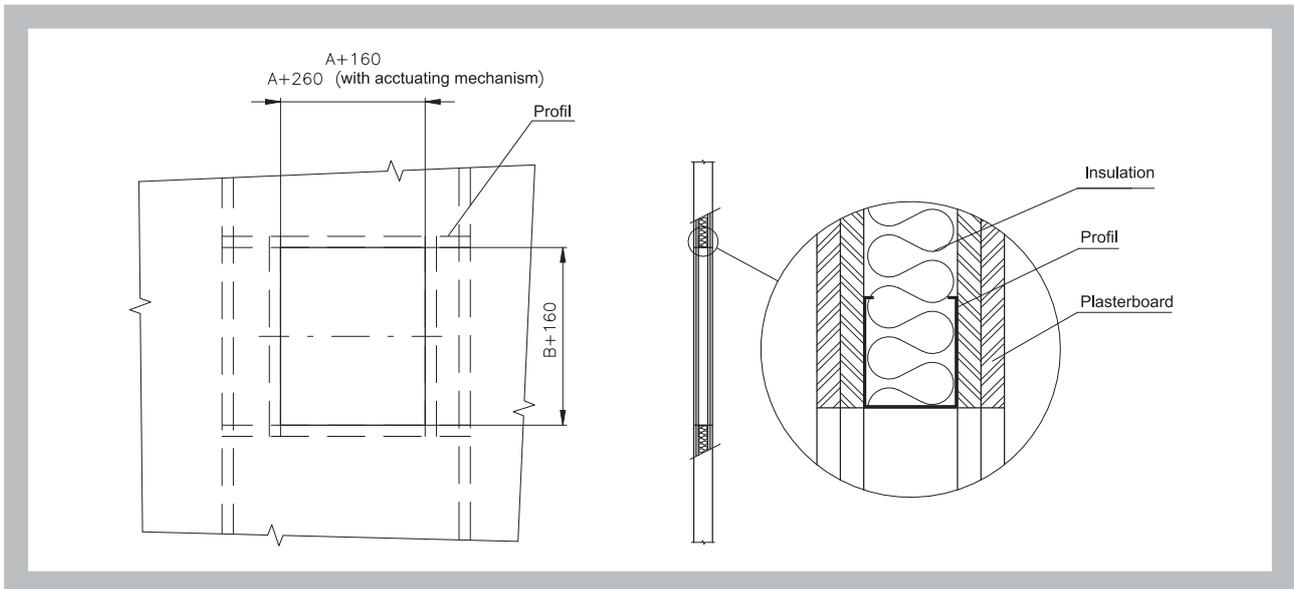


Fig. 5 Recommended installation opening for plasterboard wall construction



4.2.2. Gaps sealing

Mortar, concrete, plasterboard for ceiling constructions with min. thickness 150 mm (Fig. 6) and solid wall (Fig. 7) or plasterboard wall constructions (Fig. 8), min. thickness 100 mm. Recommended dimensions for installation opening are A+160 (A+260 for design with actuating mechanism) and B+160.

Fig. 6 Shutter installed into a ceiling construction, thickness 150 mm

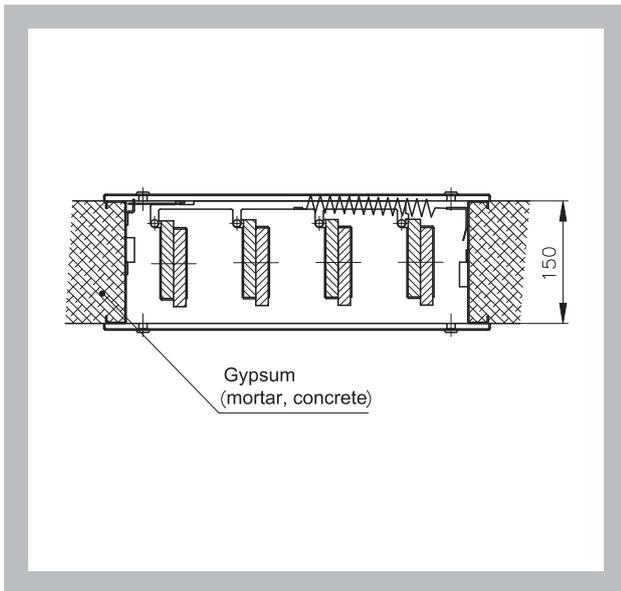


Fig. 7 Shutter installed into solid wall construction, wall thickness < 150 mm

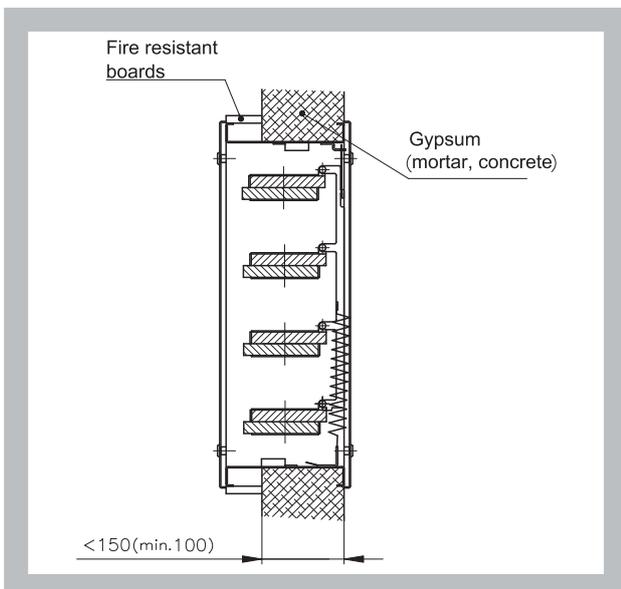
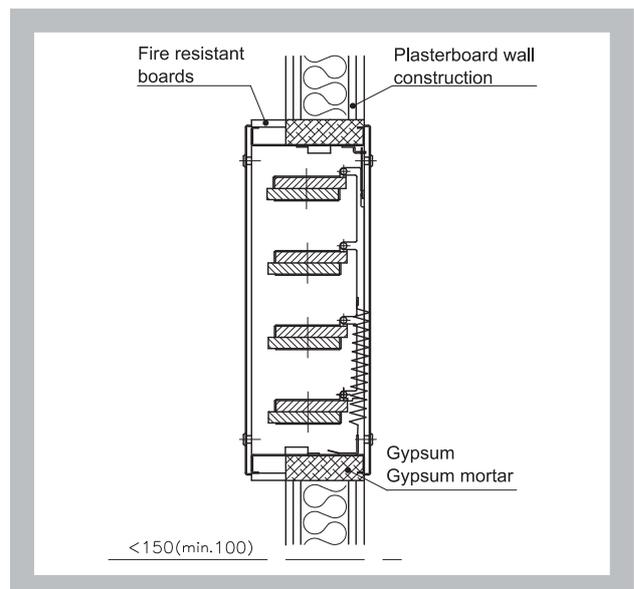


Fig. 8 Shutter installed into plasterboard construction, wall thickness < 150 mm

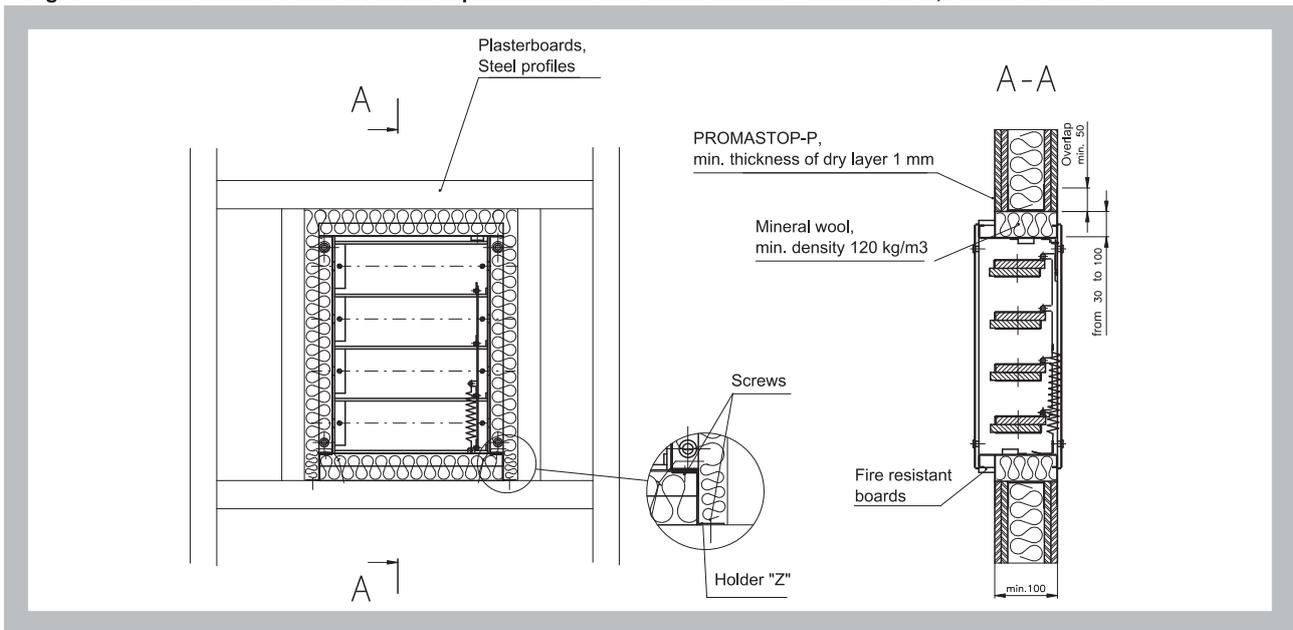


The mineral wool (minimum density 120 kg/m³) coated with PROMASTOP-P, thickness of a drylayer is 1mm for solid or plasterboard wall constructions with minimum thickness of 100 mm (Fig. 9).

Recommended dimensions for installation openings are A+160 (A+260 for design with actuating mechanism) and B+160.

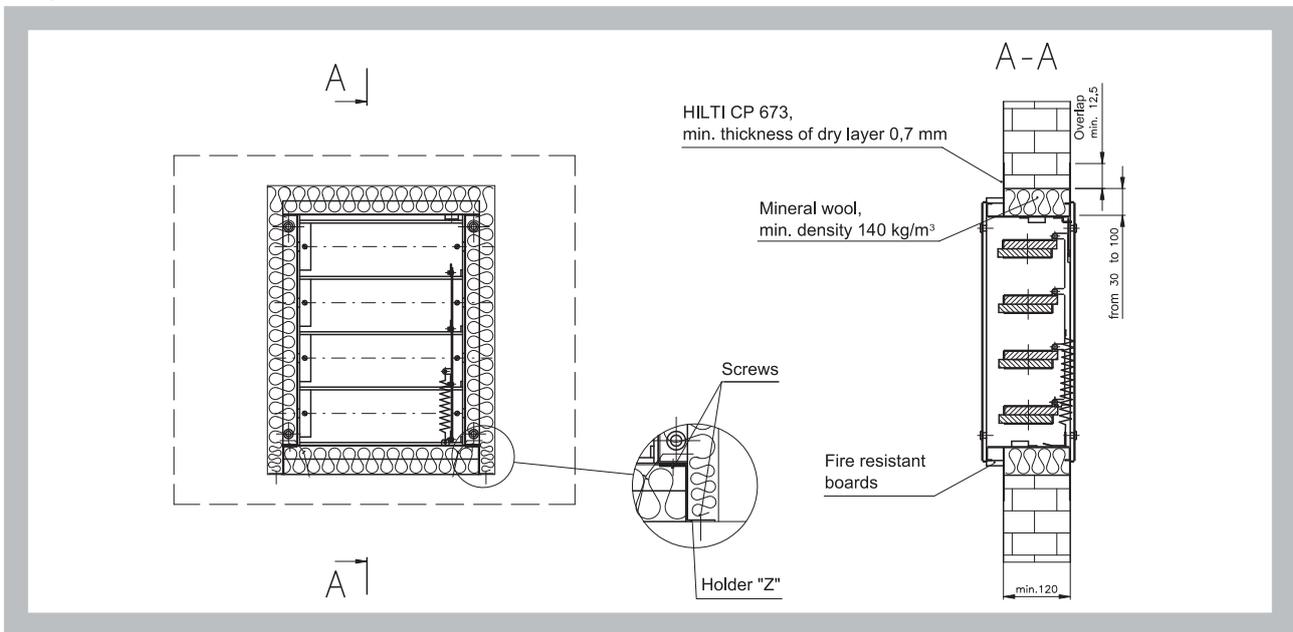
The shutter is fixed by "Z" holder on the bottom side of the installation opening (if it is necessary it could be used "Z" holder on the top side). The sealing has to be done in according to the PROMAT documentation.

Fig. 9 Shutter installed into the solid or plasterboard wall constructions - mineral wool, PROMASTOP-P



Mineral wool (min. density 140kg/m³) coated with HILTI CP 673, thickness of dry layer is 0,7 mm for solid wall construction with min. thickness 120 mm (Fig. 10)
 Recommended dimensions for installation openings are A+160 (A+260 for design with actuating mechanism), B+160.
 The shutter is fixed by "Z" holder on the bottom side of the installation opening (if it is necessary it could be used "Z" holder on the top side). The sealing has to be done in according to the HILTI documentation.

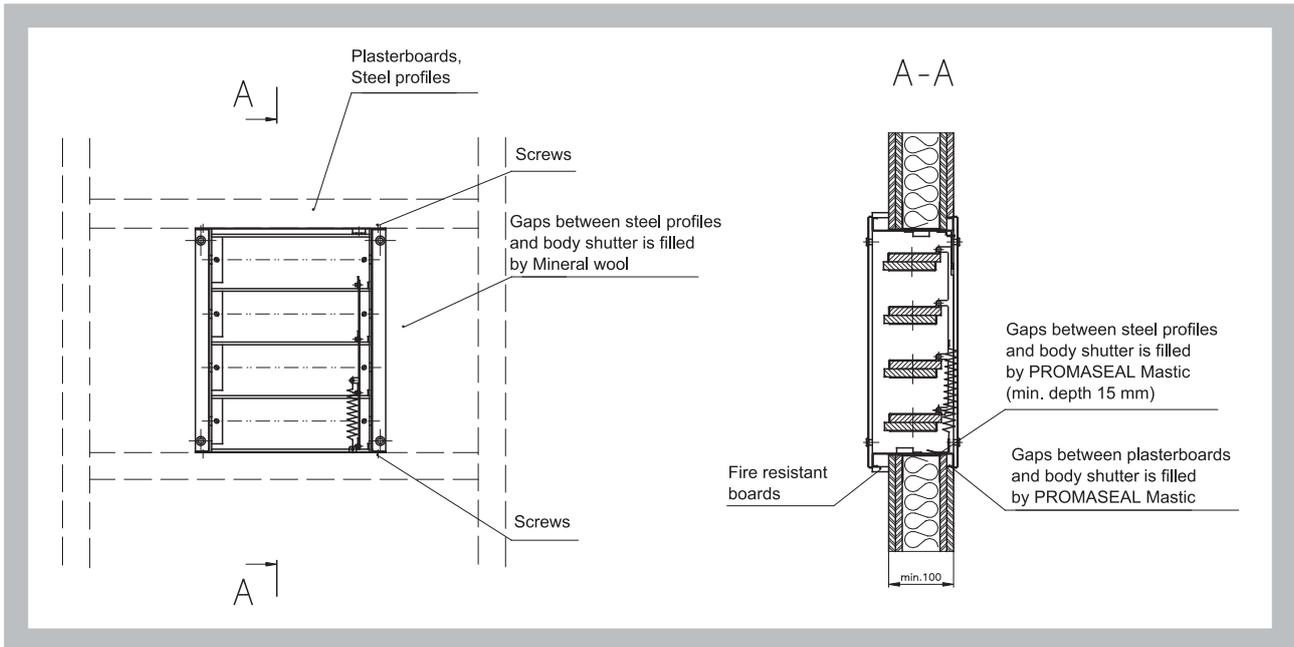
Fig. 10 Shutters installed into the solid wall construction - mineral wool, HILTI CP 673



Installation into the plasterboard wall construction and gaps filling with the mastic PROMASEAL-Mastic minimum thickness 100 mm (Fig.11).

The shutter is fixed with screws to the plasterboard on the bottom or on the top side. Gap between shutter and the plasterboard is filled by PROMASEAL-Mastic (2 mm) in minimum depth of 15 mm. Gap on the side are filled with the mineral wool. Plasterboard is tightened to the shutter frame and the gap between them is filled by PROMASEAL-Mastic. The sealing has to be done in according to PROMAT documentation.

Fig. 11 Shutter installed into plasterboard wall constructions - PROMASEAL-Mastic

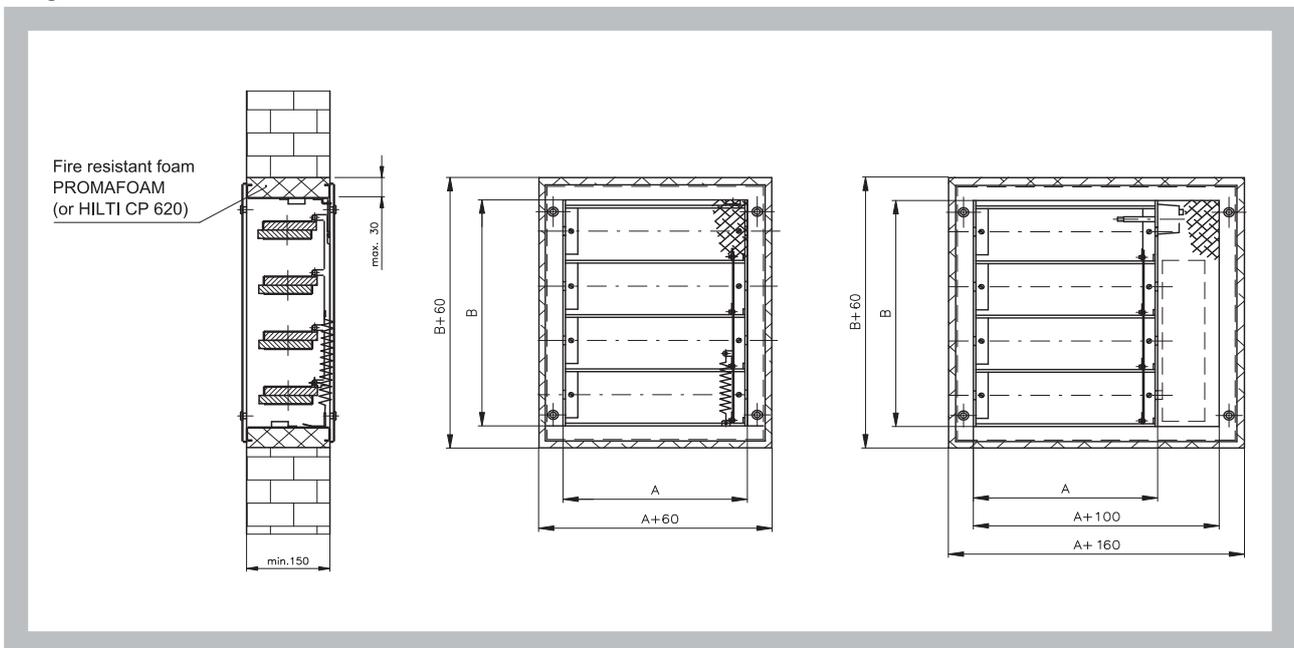


The fire resistant foam PROMAFOAM-C or HILTI CP 620 for solid wall constructions with minimum thickness 150 mm (Fig. 12).

Recommended dimensions for installation openings are $A+60$ ($A+160$ for design with actuating mechanism), $B+60$.

The shutter is fixed by "Z" holder on the bottom side of the installation opening (if it is necessary it could be used "Z" holder on the top side). The gaps (filled with foam) can not be exposed to UV light and weather conditions. The sealing has to be done in according to the PROMAT or HILTI documentation. The fire resistance is EI 60 DP1.

Fig. 12 Shutter install into solid wall constructions - fire resistant foam PROMAFOAM-C or HILTI CP 620

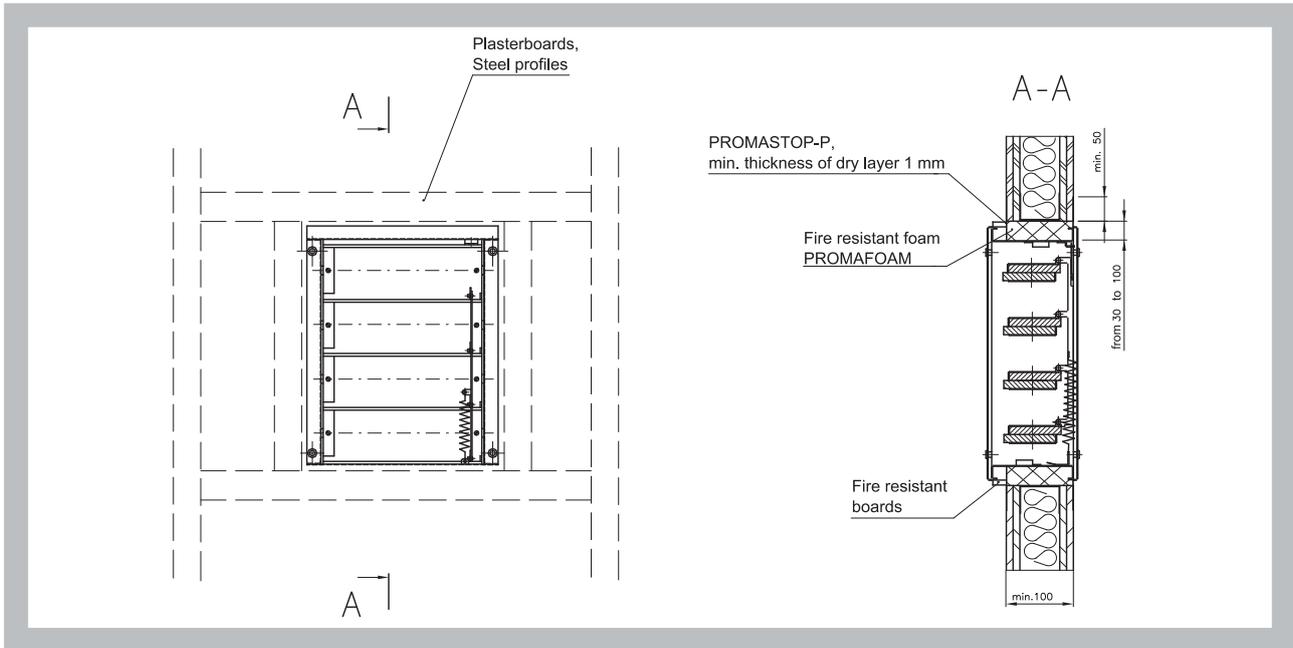


The fire resistant foam PROMAFOAM-C coated with PROMASTOP-P thickness of drylayer is 1mm for solid or plasterboard wall constructions with minimum thickness 100 mm (Fig. 13).

Recommended dimensions for installation openings are $A+160$ ($A+260$ - design with actuating mechanism), $B+160$.

The shutter is fixed by "Z" holder on the bottom side of the installation opening (if it is necessary it could be used "Z" holder on the top side). The sealing has to be done in according to the PROMAT documentation.

Fig. 13 Shutter installed into solid or plasterboard wall constructions - fire resistant foam PROMAFOAM-C coated with PROMASTOP-P

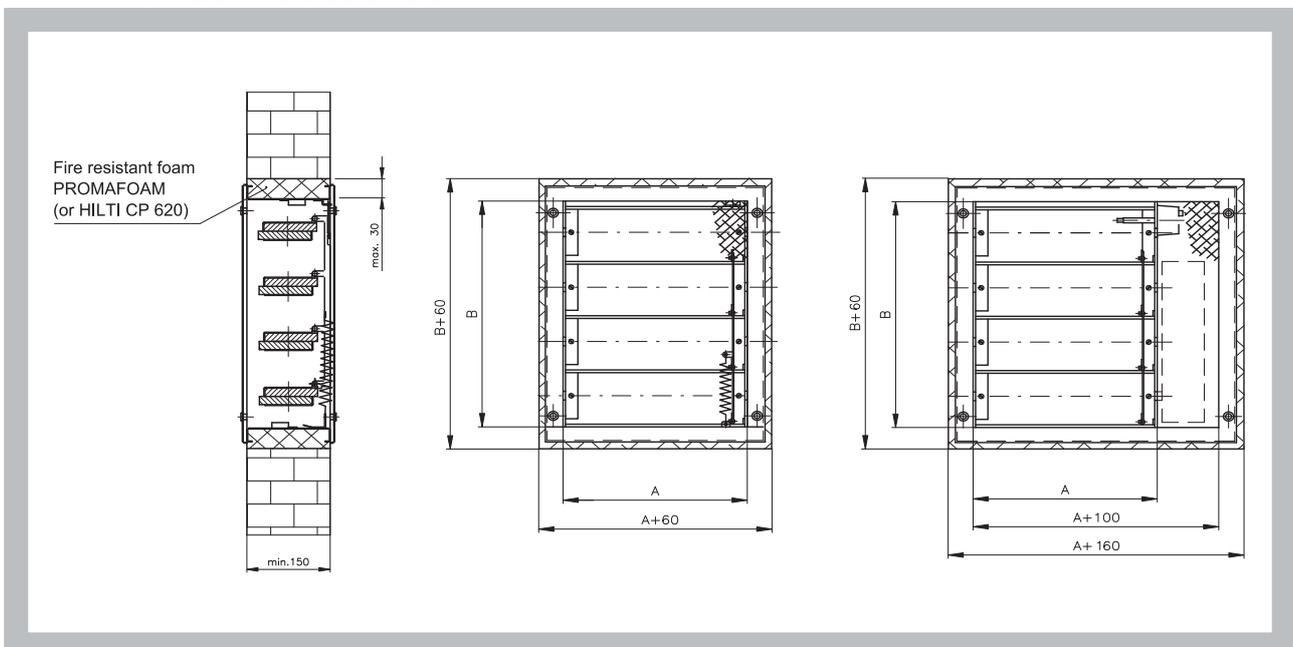


Mineral wool (min. density min. 40kg/m³) with mastic PROMASEAL-Mastic in minimum depth of 20 mm for solid or plasterboard wall constructions with minimum thickness of 100 mm (Fig. 14)

Recommended dimensions for installation openings are A+160 (A+260 - design with actuating mechanism), B+160.

The shutter is fixed by holder "Z" on the bottom side of the installation opening (for bigger dimensions also on the top side too). The sealing has to be done in according to the data sheet PROMAT.

Fig. 14 Shutter installed into solid or plasterboard wall constructions - mineral wool (minimum density 40 kg/m³) with mastic PROMASEAL-Mastic

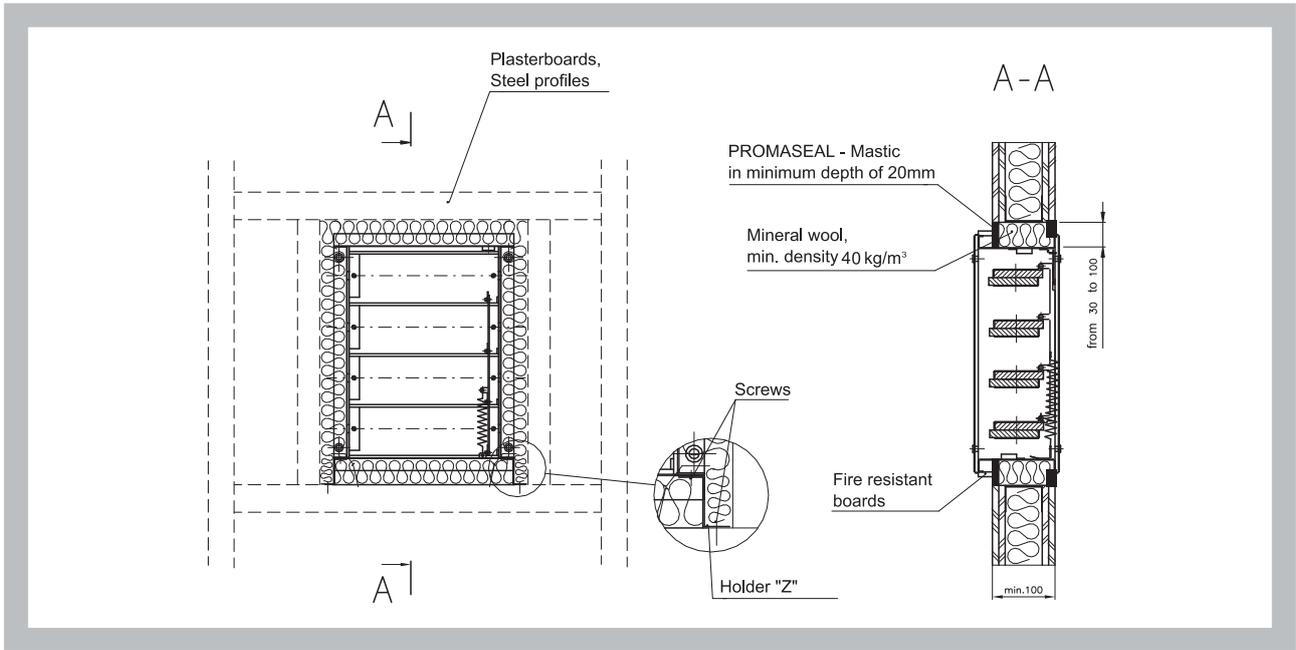


Mineral wool (min. density min.75kg/m³) with mastic HILTI CP 601S in minimum depth of 10 mm for solid wall constructions with minimum thickness 120 mm (Fig. 15)

Recommended dimensions for installation openings are A+160 (A+260 - design with actuating mechanism), B+160.

The shutter is fixed by "Z" holder on the bottom side of the installation opening (if it is necessary it could be used "Z" holder on the top side). The sealing has to be done in according to the HILTI documentation.

Fig. 15 Shutter installed into solid or plasterboard wall constructions - mineral wool (minimum density 75 kg/m³) with mastic HILTI CP 601S



4.2.3. Other examples of installation

Fig. 16 Solid wall construction, wall thickness 150 mm

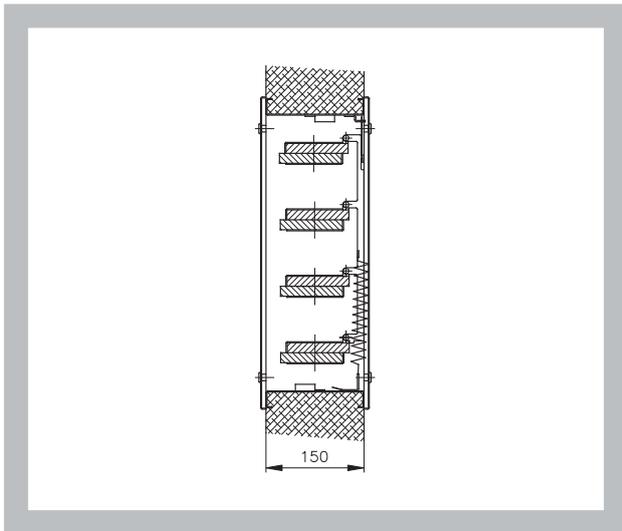


Fig. 17 Ceiling construction, thickness < 150 mm

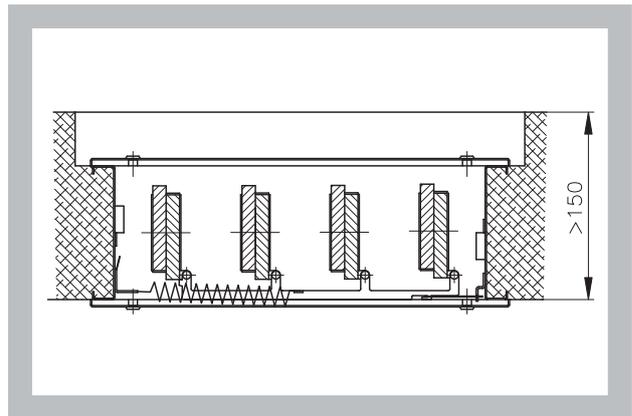
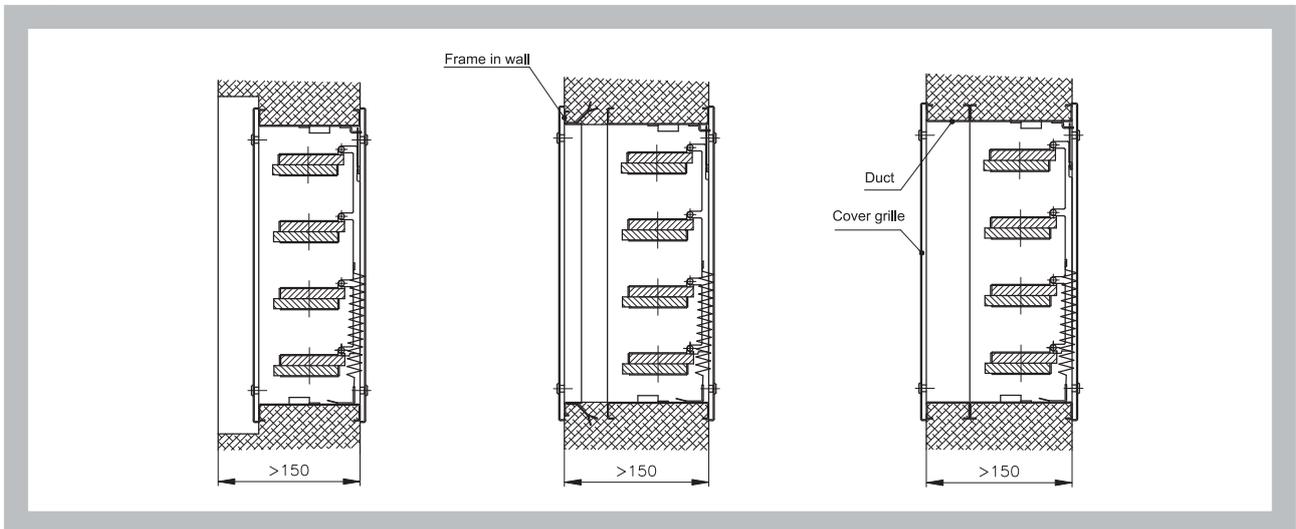
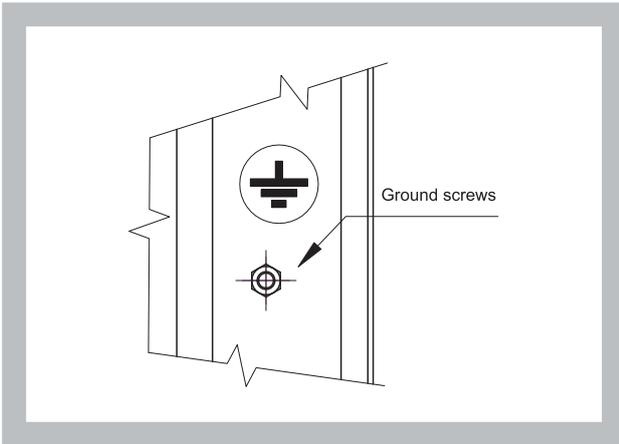


Fig. 18 Solid wall construction, wall thickness > 150 mm



4.2.4. The shutter body must be grounded.

Fig. 19 Shutters grounding



III. TECHNICAL DATA

5. Basic Parameters

5.1. The effective area of shutter is 64 - 68%.

6. Electrical Components, Connection Diagrams

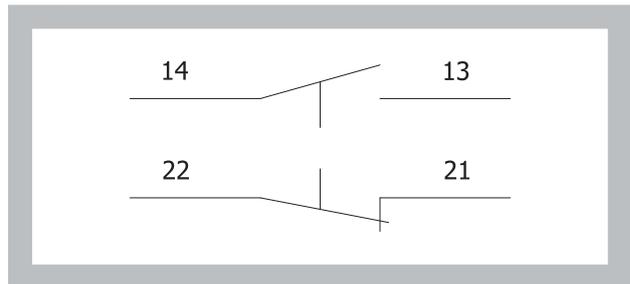
6.1. Limit switch

6.1.1. Limit switch for non explosive atmospheres

Tab. 6.1.1. Limit switch XCKN2118G-11

limit switch XCKN2118G-11	
Nominal voltage, electric current	AC 240 V; 3 A DC 250 V; 0,1 A
Degree of protection	IP 65
Ambient temperature	-15 °C ... +70 °C

Fig. 20 Limit switch XCKN2118G-11

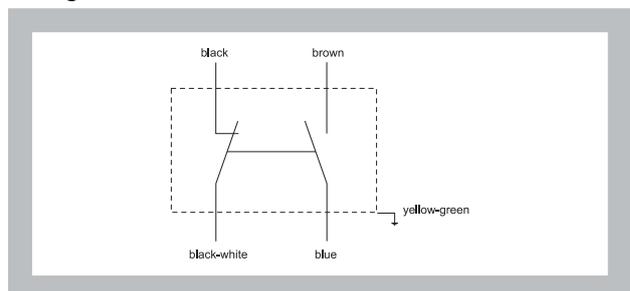


6.1.2. Limit switch for explosive atmospheres

Tab. 6.1.2. Limit switch XCW - A 115

Limit switch XCW - A 115	
Max. nominal voltage Max. electric current	AC 500 V 6 A
Non-explosive atmospheres	EE x d II c T6
Ambient temperature	-20 °C ... +40 °C

Fig. 21 Limit switch XCW - A 115



6.2. Actuating mechanism

Tab. 6.2.1. Actuating mechanism BELIMO BLF 24-T, BLF 230-T

Actuating mechanism BELIMO	BLF 24-T	BLF 230-T
Nominal voltage	AC 24 V 50/60 Hz DC 24 V	AC 230 V 50/60 Hz
Power consumption - motoring - holding	5 W 2,5 W	5 W 3 W
Dimensioning	7 VA (I _{max} 5,8 A @ 5 ms)	7 VA (I _{max} 150 mA @ 10 ms)
Degree of protection	III	II
Covering	IP 54	
Running time - motor - spring return	40..75 s ~ 20 s	
Ambient temperature -normal duty -safety duty -non-operating temperature	- 30 °C ... + 50 °C - 30 °C ... + 70 °C (The functionality is guaranteed for 24 hrs) - 40 °C ... + 50 °C	
Connecting - motor - auxiliary switch	cabel 1 m, 2 x 0,75 mm ² cabel 1 m, 6 x 0,75 mm ²	
Thermal trips	Tf1: duct outside temperature 72 °C Tf2/Tf3: duct inside temperature 72 °C	

Fig. 22 Actuating mechanism BELIMO BLF 24-T

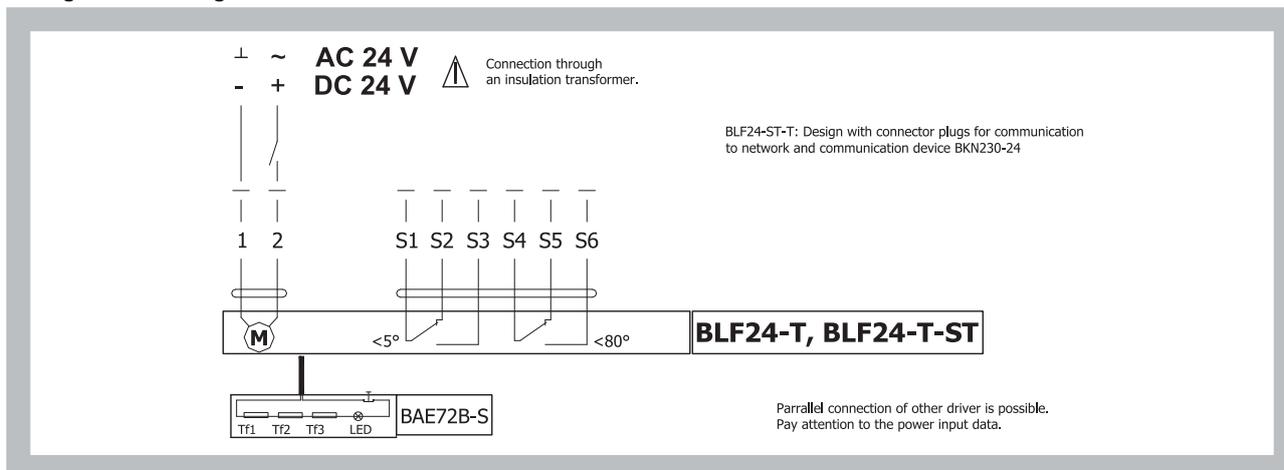


Fig. 23 Actuating mechanism BELIMO BLF 230-T

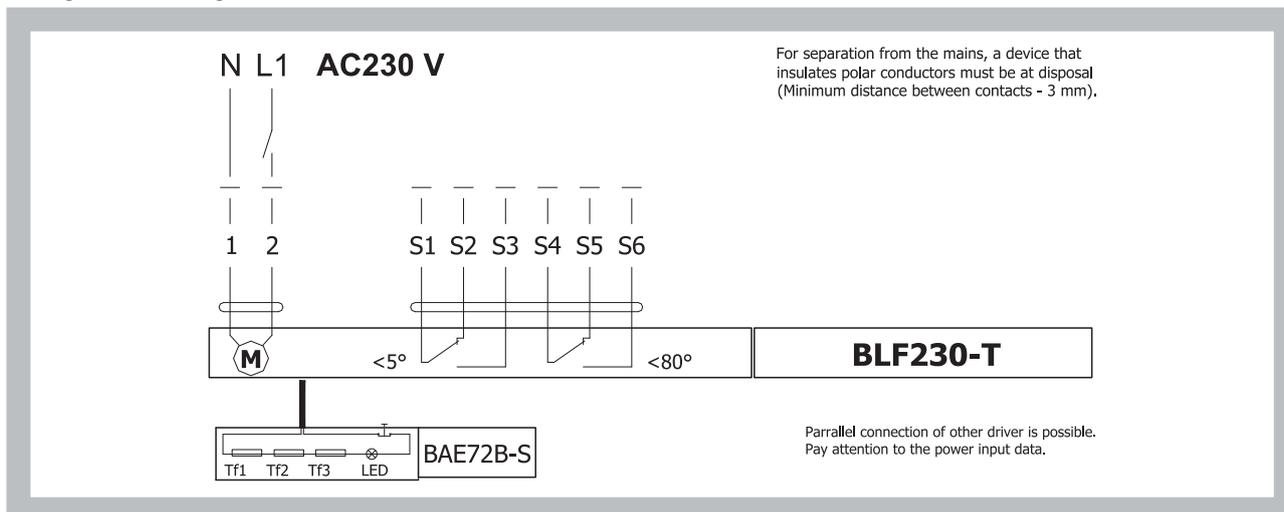
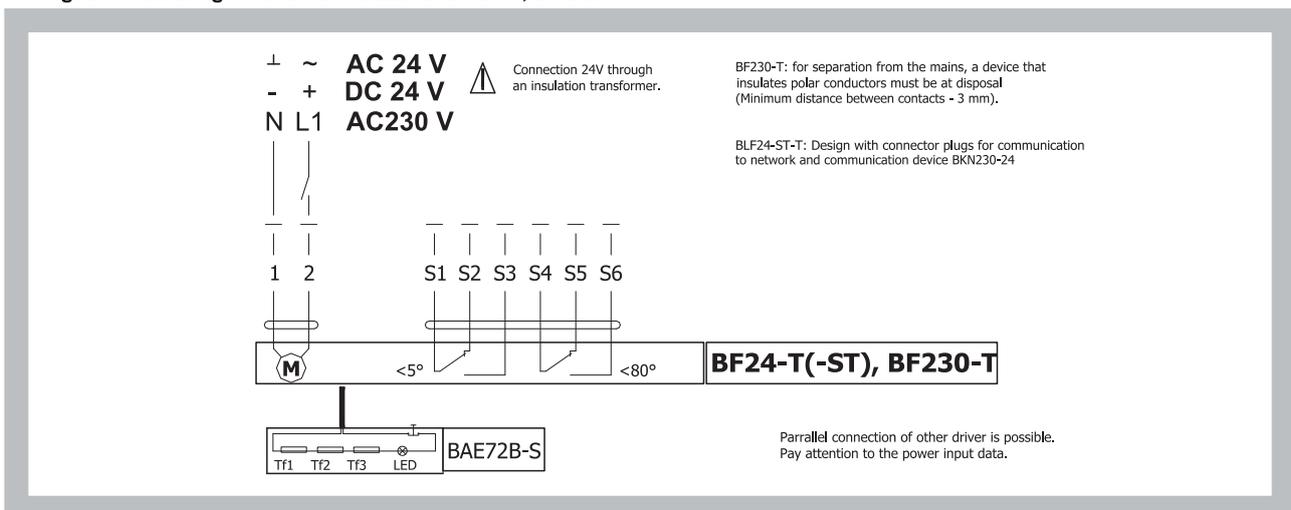


Table 6.2.2. Actuating mechanism BELIMO BF 24-T, BF 230-T

Actuating mechanism BELIMO	BF 24-T	BF 230-T
Nominal voltage	AC 24 V 50/60 Hz DC 24 V	AC 230 V 50/60 Hz
Power consumption - motoring - holding	7 W 2 W	8 W 3 W
Dimensioning	10 VA (Imax 8,3 A @ 5 ms)	12,5 VA (Imax 500 mA @ 5 ms)
Protection class	III	II
Degree of protection	IP 54	
Running time - motor -spring return	140 s ~ 16 s	
Ambient temperature -normal duty -safety duty -non-operating temperature	- 30 °C ... + 50 °C - 30 °C ... + 70 °C (The functionality is guaranteed for 24 hrs) - 40 °C ... + 50 °C	
Connecting - motor - auxiliary switch	cabel 1 m, 2 x 0,75 mm ² cabel 1 m, 6 x 0,75 mm ²	
Thermal trips	Tf1: duct outside temperature 72 °C Tf2/Tf3: duct inside temperature 72 °C	

Fig. 24 Actuating mechanism BELIMO BF 24-T, BF 230-T



6.3. Optical smoke detector

Tab. 6.3.1. Optical smoke detector MHG 231 with socket MHY 734.031

Optical smoke detector	MHG 231 with socket MHY 734.031
Power supply	AC/DC 24 V
Voltage range	AC 18 ... 28 V DC 24 ... 30 V
Power Consumption Socket (without actuating mechanism)	max. 50mA
Degree of protection	IP 30
Ambient temperature Storage temperature	- 25 °C ... + 70 °C - 5 °C ... + 40 °C
Connection -network -actuating mechanism (BF...-Top)	cable 1 m, connected to the limit board XT1 screw clamps on the limit board XT2

Fig. 25 Socket MHY 734.031

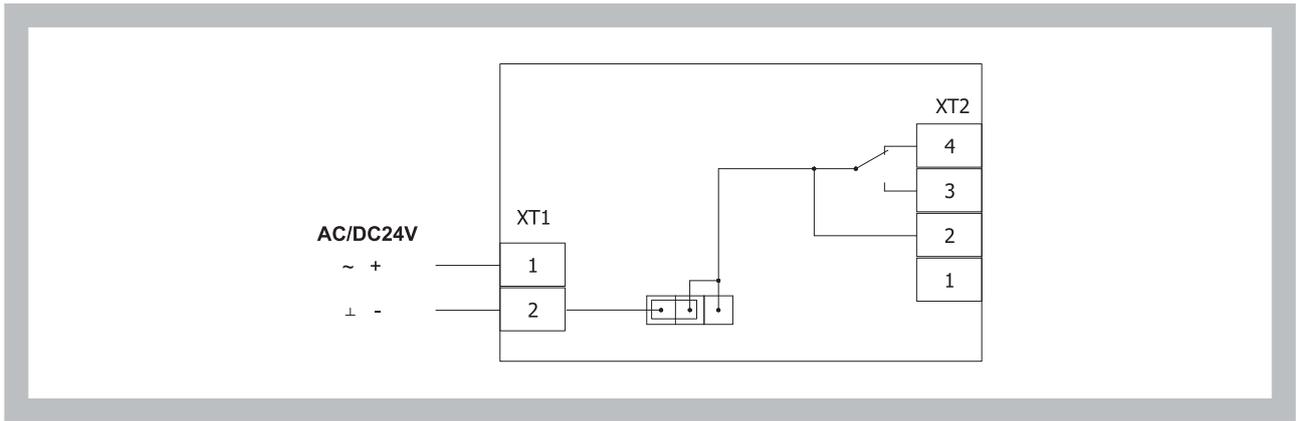


Fig. 26 Block diagram for PSUM-90 .41 - with actuating mechanism BLF 24 - T (BF 24 - T), smoke detector and communication and supply device

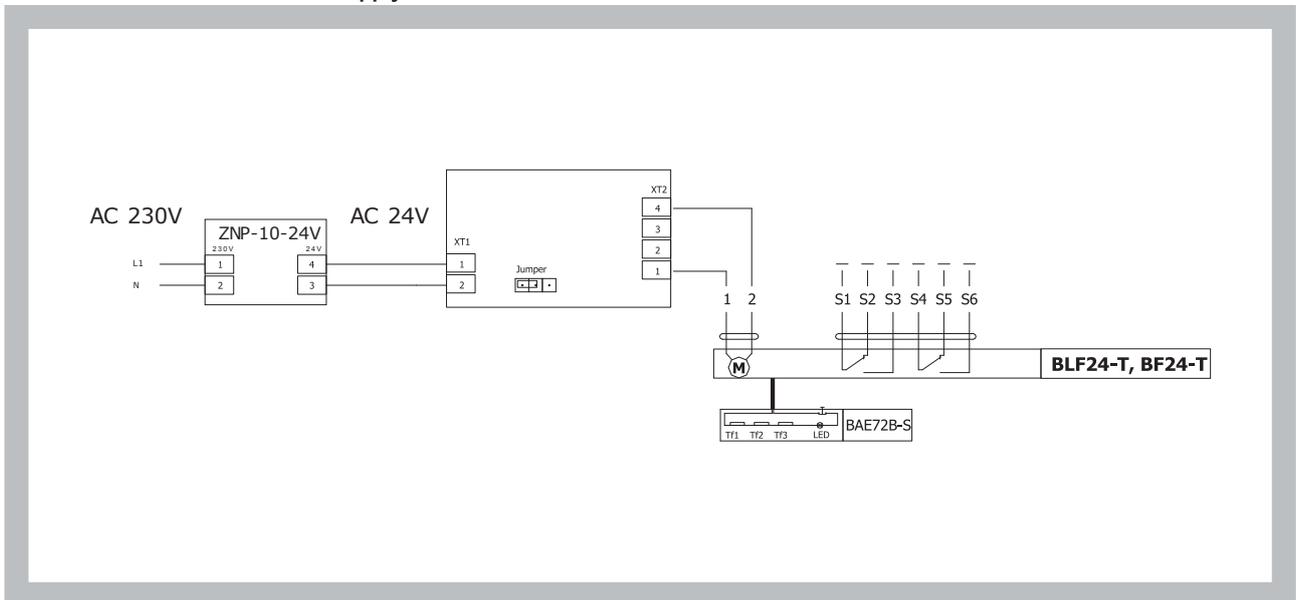
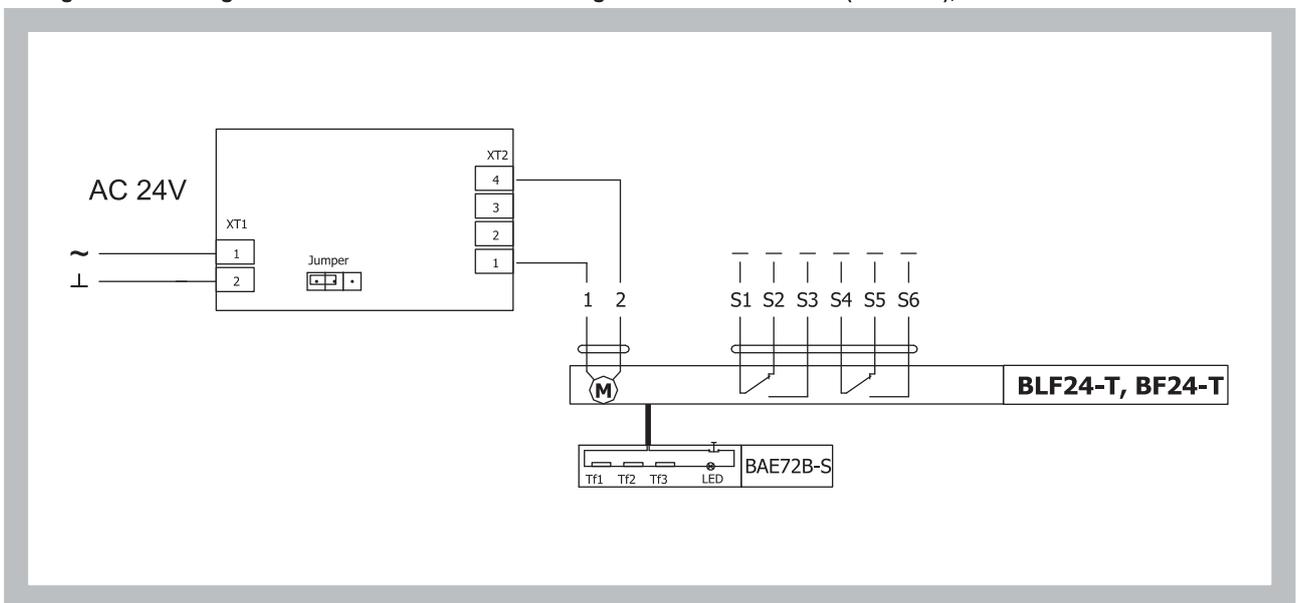


Fig. 27 Block diagram for PSUM-90 .51 - with actuating mechanism BLF 24 - T (BF 24 - T), smoke detector



Tab. 6.3.2. Power supply device ZNP-10-24V

Power supply device ZNP-10-24V	
Nominal voltage:	AC230 V/50-60Hz
Tolerance of Nominal voltage:	-15%;+10%
Idle power consumption (max):	6,5VA
Under load power consumption (max):	11VA
Output voltage:	AC24V
Ambient temperature - normal duty:	-20...+40°C
- non-operating temperature:	-20...+60°C
Degree of protection:	IP55

IV. MATERIAL, FINISHING

7. Material

7.1. Shutters frames are made of galvanized sheet.

Cover grilles are made of steel sheet and coated with baking paint in colour tone RAL 9010. Different colours and tones have to be discussed with the manufacturer before ordering.

The shutters blades are made of asbestos free fire resistant boards made of mineral fibres.

Closing mechanism is galvanized.

Thermal fuses are made from brass sheet.

Fasteners is galvanized.

V. INSPECTION, TESTING

8. Inspection, testing

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

VI. PACKING, TRANSPORT, STORAGE

9. Logistic data

9.1. The Shutters are transported by box freight vehicles without direct weather impact, there must not occur any sharp shocks and ambient temperature must not exceed +50 °C. Custom made packages are not returnable and their price is not included in total price.

9.2. The shutters have to be protected for mechanical damage during transporting and storage. The shutters have to be stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be un the range from -5°C to +40 °C and max. relative humidity must be 80 %.

10. Warranty

- 10.1.** Manufacturer provides a warranty for shutters for 24 months from date of shipment.

The manufacturer warranty for fire shutters PSUM-90 will terminate after any unskilled handling with shutter and control device, disassembling of electrical elements (limit switches), actuating mechanism, optical smoke detectors and Thermoelectric switching device. If the shutter is used for other purposes, other devices and working conditions as it is listed in these technical specification the warranty will also be terminated.

- 10.2.** If the shutter is damaged during transport, it is necessary to prepare a protocol with the carrier for possibility of later claiming.

VII. ASSEMBLY, HANDLING, MAINTENANCE AND REVISIONS CONTROL

11. Assembly

- 11.1.** All effective safety standards and directives must be observed during fire shutter assembly.
- 11.2.** To ensure reliable fire damper function it is necessary to avoid blocking the closing mechanism and bearing surface on the blades.

12. Commissioning and revisions

- 12.1.** Before entering the shutters into operation checks and functionality tests of all design including operation of the electrical components must be done. After entering into operation, these revisions must be done according to requirement set by national regulations.

In case that shutters are found unable to serve for any cause, it must be clearly marked. The operator is obligated to ensure so that the shutter is put in conditions in which it is able to function and meanwhile he is obligated to provide the fire protection another appropriate way.

Result of regular checks, imperfections found and all-important facts connected with the shutters function must be recorded in the "FIRE BOOK" and immediately reported to the operator.

- 12.2.** Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out for all design:

Visual inspection of proper shutter integration, thermal fuse, closing mechanism and bearing surface of the blades.

Check of blade displacement into the breakdown position "CLOSED" can be done after cutting off the actuating mechanism supply (e.g. by pressing the RESET button at the thermoelectric switching device BAE 72B-S or cutting off the supply from ELECTRICAL FIRE SIGNALIZATION). Check of blade displacement back into the "OPEN" position can be done after restoration of power supply (e.g. by releasing the RESET button or restoration of supply from ELECTRICAL FIRE SIGNALIZATION).

13. Spare parts

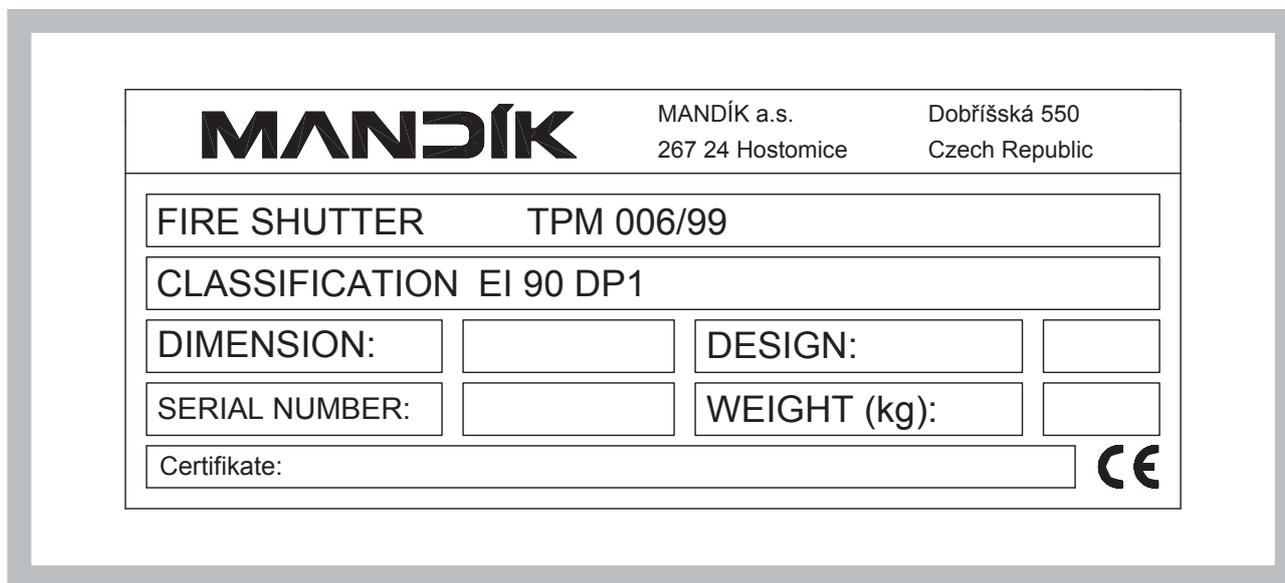
- 13.1.** Spare parts are supplied only on basis of an order.

VIII. DATA LABEL

14. Data label

14.1. Data label is placed on the shutter frame.

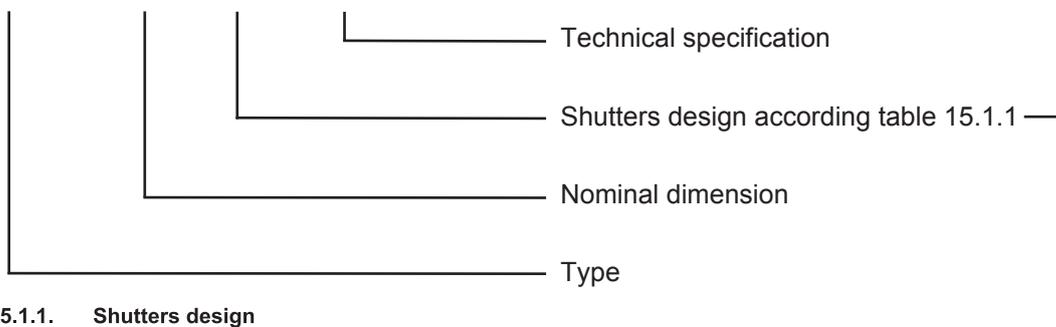
Obr. 28 Data label



IX. ORDERING KEY

15. Ordering key

PSUM - 90 300x415 - .40 TPM 006/99



Tab. 15.1.1. Shutters design

Shutters design	First and second additional number
Manual and thermal	.01
Manual and thermal - suitable for area with potentially explosive atmospheres - degree of protection II 2 G	.02
Manual and thermal with limit switch („CLOSE“)	.11
Manual and thermal with limit switch („CLOSE“) - suitable for area with potentially explosive atmospheres - degree of protection II 2 G	.12
With actuating mechanism BF 230-T (BLF 230-T) and Thermoelectric switching device	.40
With actuating mechanism BF 24-T (BLF 24-T), Thermoelectric switching device, optical smoke detector MHG 231 and communication and supply device BKN 230-24-MA (voltage AC 230V)	.41
With actuating mechanism BF 24-T (BLF 24-T) and Thermoelectric switching device	.50
With actuating mechanism BF 24-T (BLF 24-T), Thermoelectric switching device and optical smoke detector MHG 231 (voltage AC/DC 24 V)	.51

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