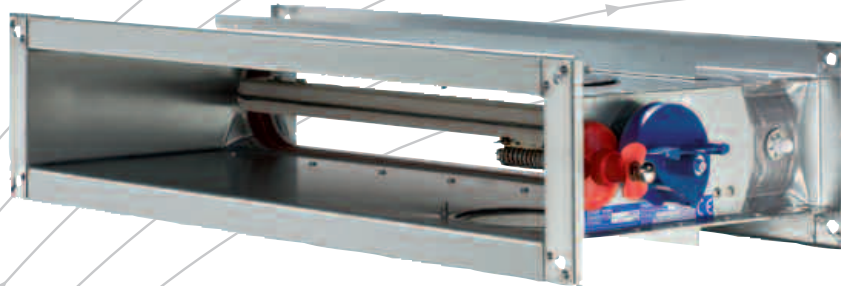


Fire dampers

- Type FKS-EU
- tested according to EN 1366-2
with general building inspectorate licence

Z-41.3-653



TROX[®] TECHNIK

The art of handling air

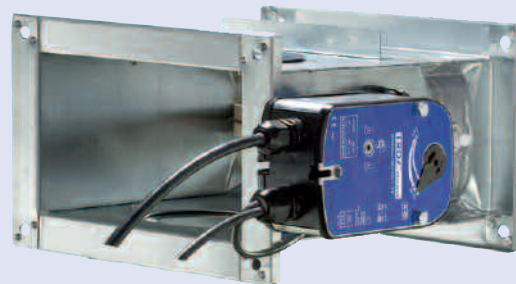
Contents · Description

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TROXNETCOM	10		

FKS-EU with fusible link



FKS-EU with spring return actuator



Fire dampers shut automatically to prevent the propagation of fire and smoke through ductwork to adjacent designated fire compartments. FKS-EU fire dampers are tested according to European standards. Local requirements and building inspectorate approvals are essential in the country where the units are to be installed.

Correct approved installation locations are solid walls, solid ceiling slabs, gypsum wallboards and lightweight partition walls. Installation orientation and air flow direction are not critical. Combustible ventilation ducting may be connected directly to the fire damper.

In the case of fire, the damper is triggered either by a fusible link at 72 °C or thermoelectrically with a spring return actuator. The release mechanism is accessible and can be tested from the outside.

The fire dampers have two inspection panels.

Fire dampers type FKS-EU comply with DIN 4102-6, fire resistance class K90 and with EN 1366-2, classification EI90 (ve, ho i ↔ o) S.

Special characteristics

- Tested for fire resistance properties according to EN 1366-2
- Approved for mortar based installation in lightweight partition walls
- Easy dry mortarless installation can be used with an installation block
- Integration into the centralised building management system (BMS) with TROXNETCOM

General building inspectorate licence: Z-41.3-653

Further, current information in particular licence and operating manual can be found on our website.

Our “Easy Product Finder” design programme is also available on the Internet for the design and selection of our products.

Fire dampers are products that require approval. The general and specific regulations of the general building inspectorate and the operating manual must be complied with. The general guidelines of DIN 31051 and EN 13306 are also applicable.

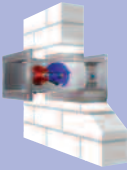
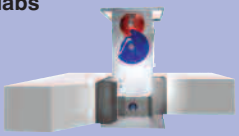
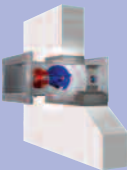
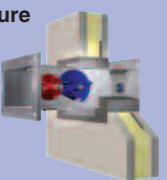
The functional reliability of fire dampers must be tested at least at six-monthly intervals. If two consecutive tests are successful, the next test can be conducted one year later.

In general, it is sufficient to close and reopen, fire dampers with spring return actuator, this can be by remote control.

Fire dampers must be included in the regular cleaning schedule of the ventilation system.

Design information

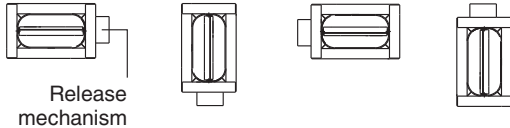
- The fire resistance class of FKS-EU for the following applications is K90.
 - This can only be achieved with ducts connected at both ends or with a duct on one end and a cover grille on the other end.
 - Installation of fire dampers must be carried out in compliance with provisions of federal state law and the generally recognised codes of practice.
 - Ducting must be installed in such a manner that it does not impose any loads on the fire damper in the case of a fire.
 - Flexible connectors must be used to connect solid ducting to the fire damper for installation in gypsum wallboards or lightweight partition walls.
- Flexible ducting may be connected directly to the fire damper.

Mounting location	Construction and building material	Minimum thickness in mm	Installation details Page	
			Mortar based installation	Dry mortarless installation
Solid walls 	Solid walls in concrete, aerated concrete or lightweight concrete	100	12 / 15	13 / 15
	Solid walls made of brickwork	115		
Ceiling slabs 	Ceiling slab of concrete	100	12	13
	Ceiling slab of aerated concrete	125		
Wallboards 	Gypsum wallboards to DIN 18163	100		
Lightweight partition walls with metal support structure 	Lightweight partition walls to DIN 4102-4, Table 48, with metal support structure and clad both sides	100	14 / 15	14

Construction · Dimensions

Characteristics

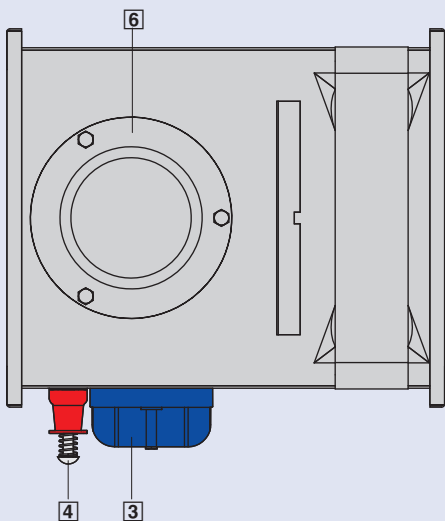
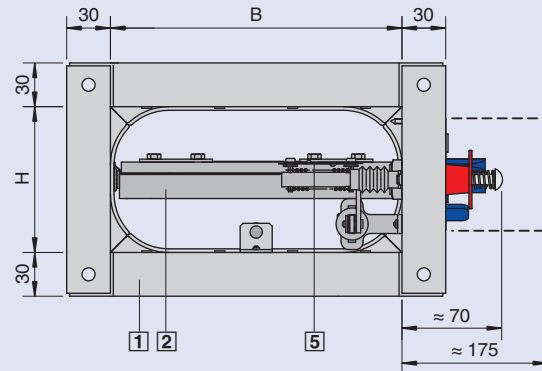
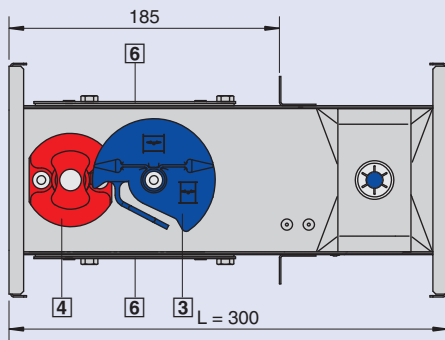
- Classification according to EN 13501-3, EI90 (ve, ho i ↔ o) S
- Fire resistance class according to DIN 4102-6, K90
- Combustible ventilation ducting may be connected directly
- Air flow in either direction
- Large free cross sectional area, therefore low differential pressure
- Release temperature 72 °C
- Installation orientation



Construction features

- Rectangular construction, rigid casing
- Connecting flanges both ends, suitable for duct connection with System 30 flanges (i.e. flange width 30 mm)
- Damper closed blade leakage complies with EN 1751, class 4 (meets DIN 1946-4)
- Casing air leakage complies with EN 1751, class A

FKS-EU with fusible link



----- Keep clear to provide access to release mechanism

- 1 Casing
- 2 Damper blade with perimeter seal
- 3 Handle with interlock and damper blade position indicator
- 4 Release mechanism
- 5 Fusible link
- 6 Inspection panel

Dimensions in mm / Weight in kg

H	B						
	200	300	400	500	600	700	800
100	3.3	4.1	4.9	5.7	6.5	7.4	8.2
125	3.6	4.5	5.3	6.2	7.0	7.8	8.6
150	3.7	4.7	5.6	6.6	7.5	8.4	9.2
160	3.8	4.8	5.7	6.7	7.7	8.6	9.4
200	4.1	5.3	6.5	7.5	8.4	9.4	10.3

On width B intermediate dimensions available in 50 mm increments.

Construction · Dimensions

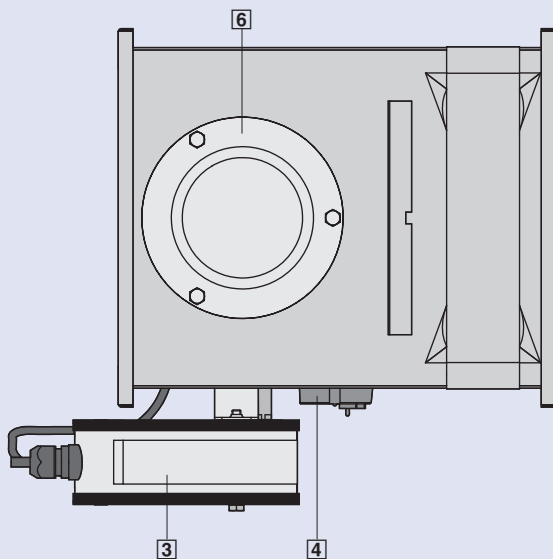
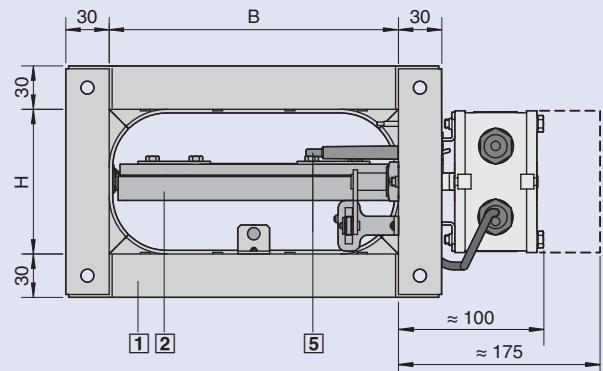
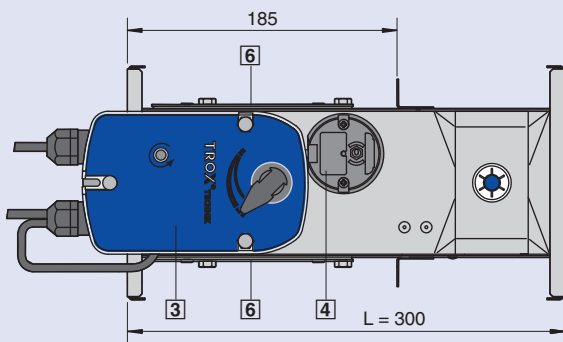
- The construction variants with stainless steel or powder-coated casing meet more critical requirements for corrosion protection.
- Detailed listing on request.

Construction variant		Order code
Casing	Fusible link	
Galvanised	72 °C	-
Powder-coated	72 °C	-1
Stainless steel	72 °C	-2

Materials

- Casing in galvanised sheet steel
- Casing with powder coating (RAL 7001)
- Casing of stainless steel 1.4301
- Damper blade from special insulation material
- Damper blade shaft in stainless steel
- Plastic bearings

FKS-EU with spring return actuator



----- Keep clear to provide access to spring return actuator

- 1 Casing
- 2 Damper blade with perimeter seal
- 3 Spring return actuator
- 4 Thermoelectric release mechanism
- 5 Temperature sensor
- 6 Inspection panel

Dimensions in mm / Weight in kg							
H	B						
	200	300	400	500	600	700	800
100	5.3	6.1	6.9	7.7	8.5	9.4	10.2
125	5.6	6.5	7.3	8.2	9.0	9.8	10.6
150	5.7	6.7	7.6	8.6	9.5	10.4	11.2
160	5.8	6.8	7.7	8.7	9.7	10.6	11.4
200	6.1	7.3	8.5	9.5	10.4	11.4	12.3

On width B intermediate dimensions available in 50 mm increments.

Installation block - Cover plate

Installation block

FKS-EU fire dampers with installation block are required for installation without mortar (dry installation).

Fire damper and installation block are assembled at the factory and form a unit. It is installed without a mortar-mix by simply inserting into the prepared installation opening. In case of fire the foaming seal closes the remaining gap.

Cover plate

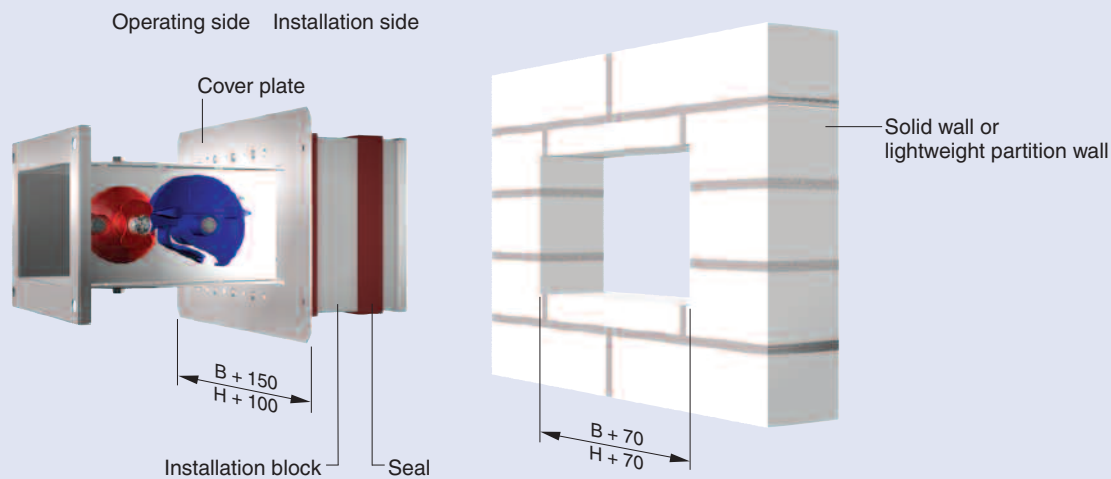
A cover plate simplifies the installation with perimeter mortar in fill (wet installation). It can be screw fixed to a solid wall and provides a stop for mortar back filling.

Installation block - Cover plate	Order code
Installation block with cover plate	E
Cover plate	B

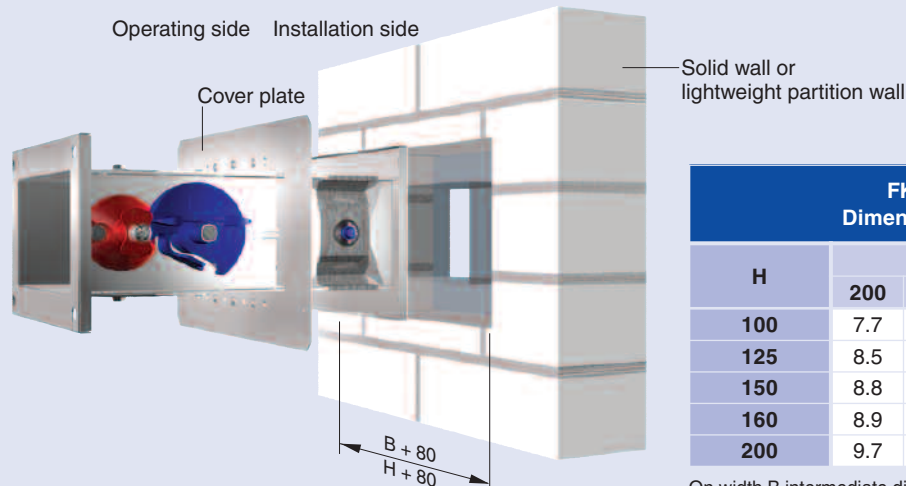
Materials

- Installation block is a special cast compound
- Cover plate and casing of installation block are galvanised sheet steel (when provided with basic powder coated or stainless steel dampers both are powder coated)

FKS-EU with installation block



FKS-EU with cover plate



FKS-EU with fusible link
Dimensions in mm / Weight in kg

H	B						
	200	300	400	500	600	700	800
100	7.7	9.7	11.6	13.7	15.8	17.8	19.8
125	8.5	10.5	12.4	14.4	16.4	18.5	20.6
150	8.8	10.9	12.9	15.1	17.3	19.4	21.4
160	8.9	11.0	13.1	15.4	17.7	19.7	21.7
200	9.7	12.1	14.5	16.6	18.7	21.0	23.2

On width B intermediate dimensions available in 50 mm increments.

FKS-EU with spring return actuator: weight + 2 kg.

Cover grille

If only one end is ducted on site, the other end must have a cover grille. Fire damper, cover grille and, if applicable, extension piece are assembled at the factory to form a unit. The free cross sectional area of the cover grille is approx. 65%. Cover grilles can also be supplied separately.

Flexible connectors

Ducting must be installed in such a manner that it does not impose any loads on the fire damper in the case of a fire. If fire dampers are installed in gypsum wallboards or in lightweight partition walls connection of rigid ducting can only be made with flexible connectors between the fire damper and the ducting. Flexible ducts may be directly connected to the fire damper. Flexible connectors can also be supplied separately.

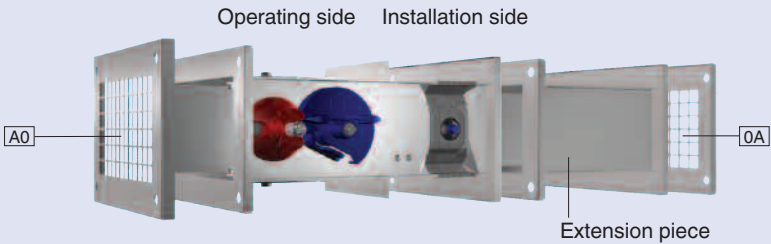
The fixing holes in the cover grille, extension piece and flexible connector match those in the FKS-EU flanges.

Attachments		Order code
Operating side	Installation side	
Flexible connectors	–	S0
–	Flexible connectors	0S
Flexible connectors	Flexible connectors	SS
Cover grille	–	A0
–	Cover grille	0A
Flexible connectors	Cover grille	SA
Cover grille	Flexible connectors	AS

Materials

- Cover grille in galvanised steel (it is also powder coated when used with basic powder coated and stainless steel dampers).
- Extension piece as casing variants
- Flexible connectors in galvanised steel and fibre-reinforced plastic

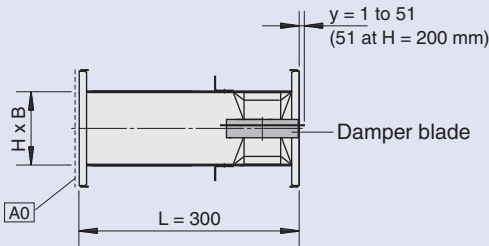
Cover grille



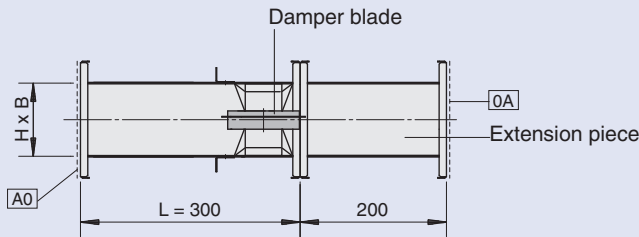
Important!

- Fire dampers are supplied with extension piece and/or cover grille factory installed.
- The minimum distance between the open damper blade edge and the cover grille or flexible connector should be 50 mm.

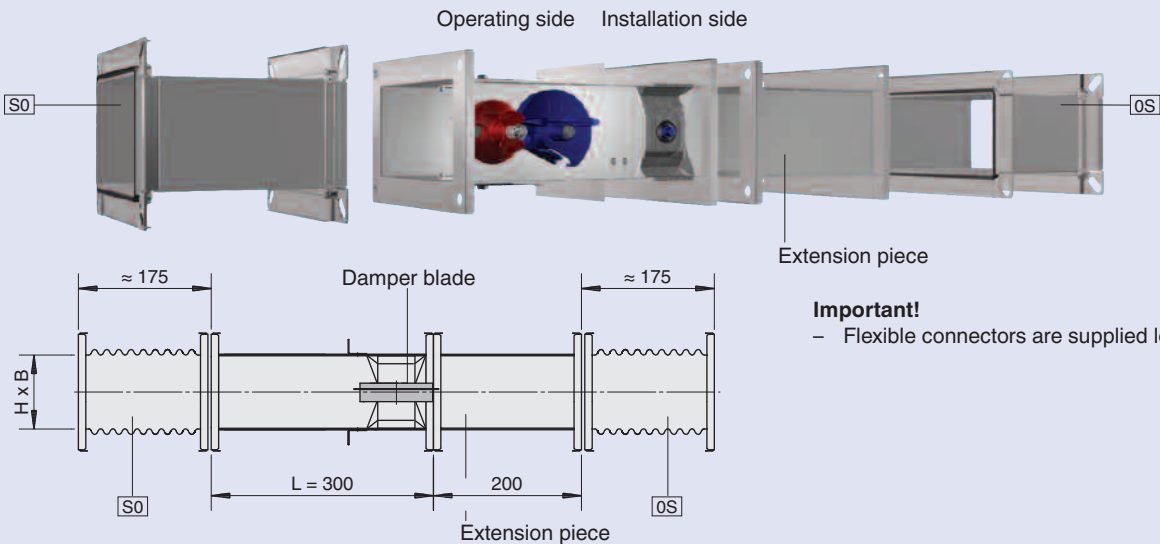
Without extension piece



With extension piece



Flexible connectors



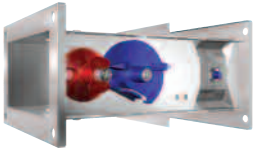
Important!

- Flexible connectors are supplied loose.

Accessories

Limit switch

FKS-EU with fusible link



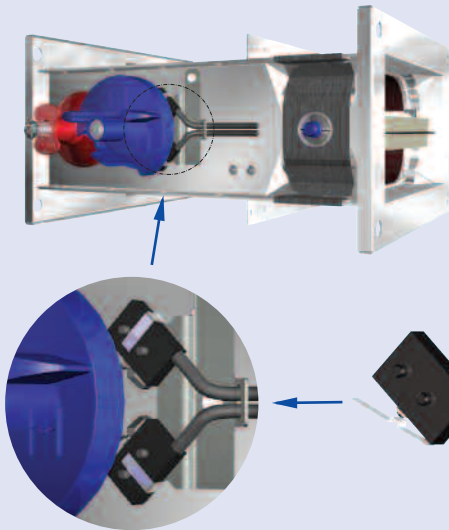
Limit switches with potential-free contacts enable the damper blade position indication. Within the range of the switch rating, relays or indication lights for fire alarm systems can be used. One limit switch each is required for damper blade positions OPEN and CLOSED.

Fire dampers with a fusible link can be supplied with one or two plug-in limit switches or they can be installed later.

Accessories	Order code
Limit switch damper blade position "CLOSED"	Z01
Limit switch damper blade position "OPEN"	Z02
Limit switches damper blade position "CLOSED" and "OPEN"	Z03

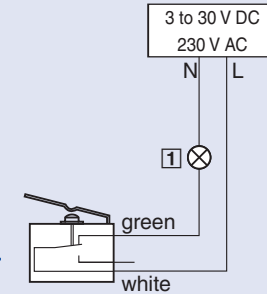
Limit switch	
Connecting cable length / cross section	1 m / 3 × 0.34 mm ²
Protection level	IP 66
Type of contact	1 change-over contact, galv. gold-plated
Max. switching current	0.5 A
Max. switching voltage	30 V DC, 250 V AC
Contact resistance	approx. 30 mΩ

Limit switch

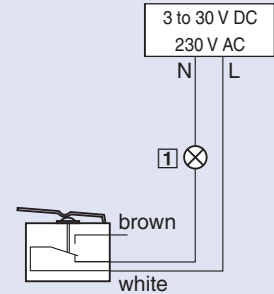


Wiring Examples

Limit switch not actuated

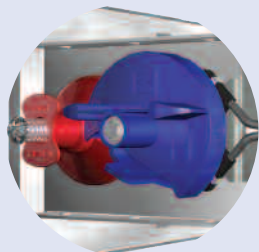


Limit switch actuated



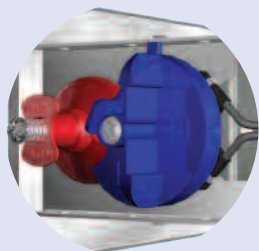
I indicator light or relay, provided by the customer

FKS-EU in OPEN position



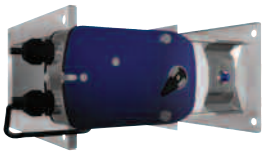
Damper blade position indicator	Limit switch
OPEN	actuated
CLOSED	non-actuated

FKS-EU in CLOSED position



Damper blade position indicator	Limit switch
OPEN	non-actuated
CLOSED	actuated

FKS-EU with spring return actuator



Operation of the fire damper with a spring return actuator allows remote control and/or release by a smoke detector. If the supply voltage fails or with thermoelectric release the damper closes (power off to close). Fire dampers with spring return actuators can be functionally checked OPEN/CLOSED/OPEN.

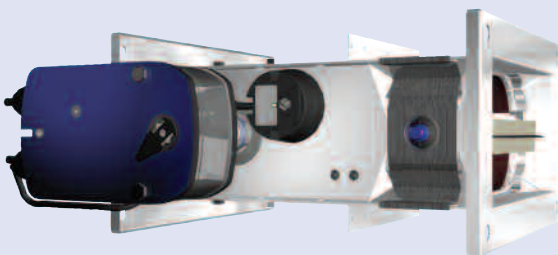
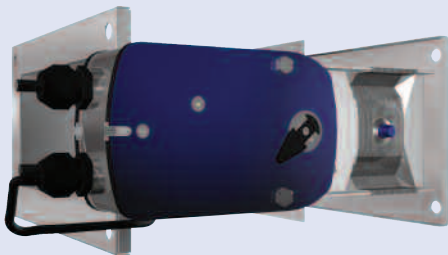
Two limit switches are integrated into the actuator. The connecting cables of the BLF24-T-ST TR are fitted with plugs. The connection to the TROX AS-i bus system can be quickly made.

A conversion kit is available for adding an actuator.

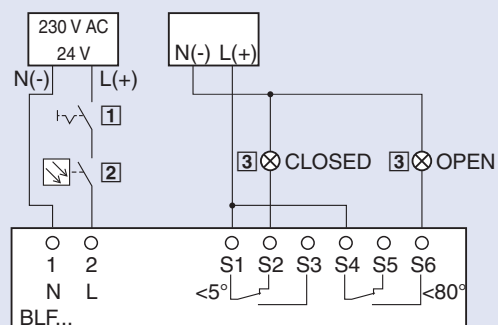
Accessories	Order code
BLF230-T TR	Z43
BLF24-T-ST TR	Z45

Spring return actuator type BLF		230-T TR	24-T-ST TR
Supply voltage		230 V AC $\pm 14\%$ 50/60 Hz	24 V AC $\pm 20\%$ 50/60 Hz or 24 V DC $-10\% / +20\%$
Power rating	Spring compression	6 W	5 W
	Hold position	3 W	2.5 W
	Rating	7 VA	
Run time		motor / spring return 40 to 75 s / 20 s	
Limit switch	Type of contact	2 change-over contacts	
	Max. switching voltage	30 V DC / 250 V AC	
	Max. switching current	0.5 A at DC / 3 A at AC	
	Contact resistance	< 100 m Ω	
IEC protection class		II	III
Protection level		IP54	
Connecting cable		Length / Cross section 1 m / 2 x 0.75 mm	

Spring return actuator



Wiring example CLOSED position

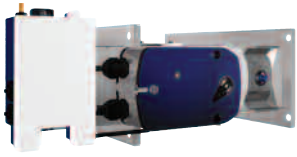


- 1 Switch for opening and closing, supplied by others
- 2 Optional release mechanism, e.g. TROX smoke detector Type RM-O-3-D or RM-O-VS-D
- 3 indicator light or relay, provided by the customer

Accessories

TROXNETCOM

FKS-EU with spring return actuator and TROXNETCOM



The fire dampers with spring return actuator BLF24-T-ST TR and the modules shown here as attached accessories form a functional unit ready for operation by an automatic fire damper controller. The components are factory-assembled and wired. Only the bus line and the supply voltage (LON only) are to be connected by the customer.

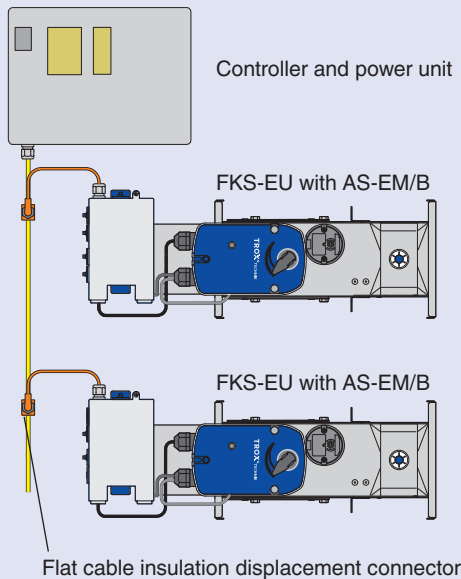
The AS interface is a world-standard bus system according to EN 50295 and IEC 62026-2. It enables the integration of different components (modules) in a network regardless of the manufacturer and the design. The modules control actuators and/or receive signals from sensors.

Accessories	Order code
AS-EM/B and BLF24-T-ST TR	ZA03

Accessories	Order code
LON-WA1/B2 and BLF24-T-ST TR	ZL06
LON-WA1/B2-AD and BLF24-T-ST TR	ZL07
LON-WA1/B2-AD230 and BLF24-T-ST TR	ZL08

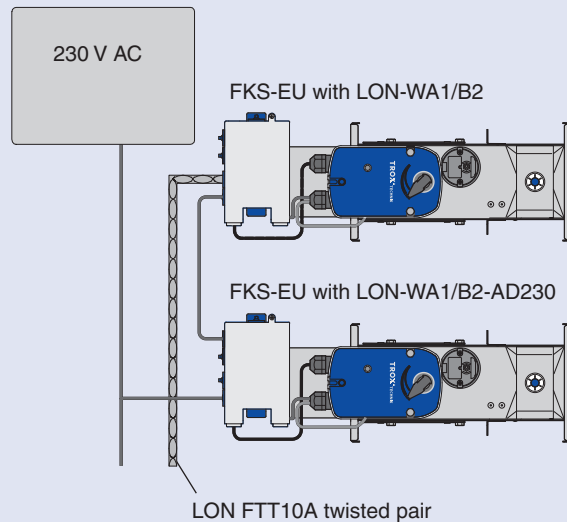
LON and LONMARK are a standardised local operating network system with manufacturer-independent communications. Data is transferred by a microprocessor supplied by Echelon Corporation using a unified protocol. Standards are defined in accordance with LONMARK to ensure that products are compatible.

AS-EM/B module



- The module sends the control signals between the spring return actuator and the controller and power unit. This enables the actuator to be controlled and the monitoring of run time during functional testing.
- The supply voltage (24 V DC) for the module and the actuator is transmitted using the AS-i flat cable.
- Function display:
 - operation
 - 4 inputs
 - 2 outputs

Module LON-WA1/...



- **LON-WA1/B2**
For the control of 1 to 2 fire dampers
- **LON-WA1/B2-AD**
Connection box for the second fire damper with 24 V AC supply voltage
- **LON-WA1/B2-AD230**
Connection box for the second fire damper with 230 V AC supply voltage

Further information can be found on our website.

Nomenclature

B	in mm	: Width
H	in mm	: Height
v_A	in m/s	: Air velocity based on B x H
Δp_t	in Pa	: Total pressure differential (duct installation)
ζ		: Resistance coefficient (fully ducted)
L_{WA}	in dB(A)	: Sound power level of the air-regenerated noise in the duct
L_{WNC}		: NC rating of the sound power level $L_{WNC} \approx L_{WA} - 5$
L_W	in dB	: Octave band sound power level $L_W = L_{WA} + \text{correction}$
f_m	in Hz	: Octave band centre frequency

All sound power levels are based on 1 pW.

All noise levels determined in a reverberation chamber.

The sound power data is determined and corrected according to EN ISO 5135, February 1999.

Example 1

Given: Fire damper FKS-EU
B = 600 mm, H = 100 mm, $v_A = 5$ m/s

Required: Δp_t , L_{WA} , L_{WNC} , L_W at 250 Hz, ζ

Result: $\Delta p_t = 16$ Pa
 $L_{WA} = 36$ dB(A) } from diagram
 $L_{WNC} = 36 - 5 = 31$
 $L_W = 36 + 1.5 = 37.5$ dB at 250 Hz
 $\zeta = 1.08$ from table 1

Example 2

Given: Fire damper FKS-EU
B = 400 mm, H = 100 mm, $v_A = 5$ m/s

Required: Δp_t , L_{WA} , L_{WNC} , L_W at 250 Hz, ζ

Result: $\Delta p_t = 16 \times 1.1 \approx 18$ Pa } from diagram: correction from table 2 for B = 400 mm
 $L_{WA} = 36 + 1 = 37$ dB(A)
 $L_{WNC} = 37 - 5 = 32$
 $L_W = 37 + 1.5 = 38.5$ dB at 250 Hz
 $\zeta = 1.08 \times 1.1 = 1.19$ from table 1 and correction factor from table 2 at B = 400 mm

Sound power level and differential pressure for width B = 600 mm

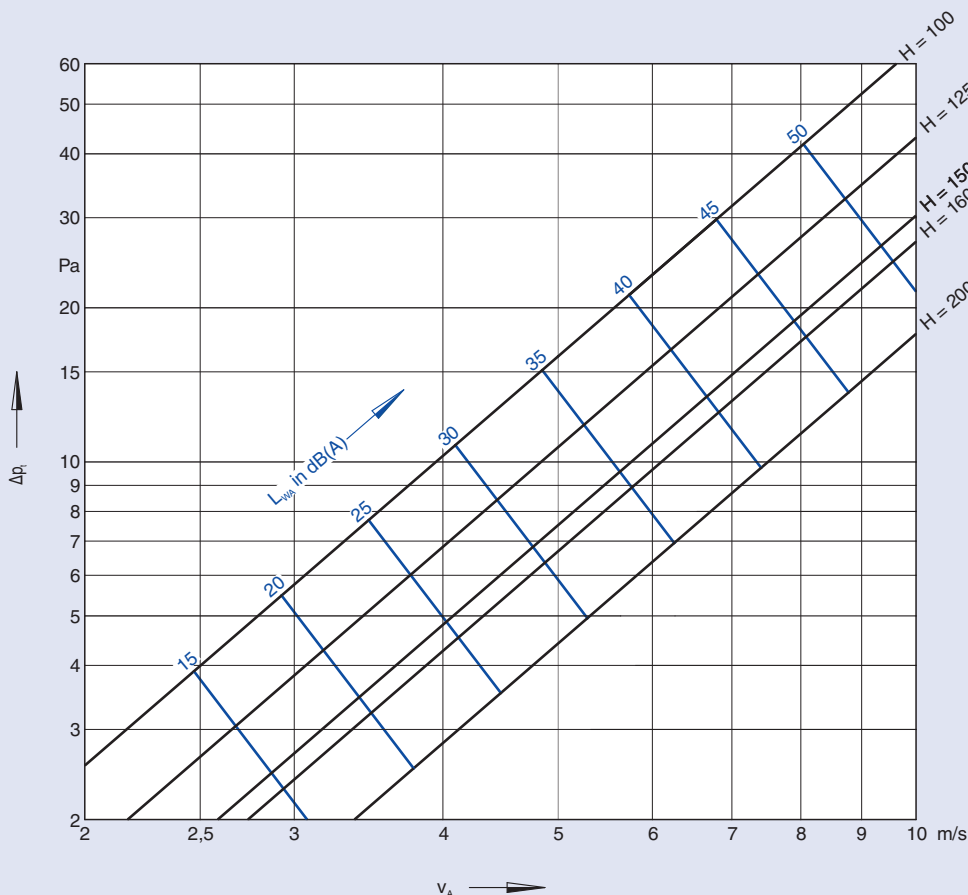


Table 1: Resistance coefficients for damper width B = 600 mm

H in mm	ζ
100	1.08
125	0.71
150	0.50
160	0.44
200	0.29

Table 2: Aerodynamic and acoustic corrections for other damper widths B

B in mm	$\Delta p_t \times \zeta \times$	$L_{WA} +$
200	1.41	2.6
300	1.20	1.7
400	1.10	1.0
500	1.04	0.4
600	1.00	0
700	0.97	-0.4
800	0.95	-0.7

Possible combinations of widths and heights see pages 4 and 5

Table 3: Correction values to obtain octave levels in dB/Oct.

v_A in m/s	f_m in Hz							
	63	125	250	500	1000	2000	4000	8000
2	22	4	0	-3	-9	-20	-25	-28
4	16	4	2	-3	-7	-16	-22	-26
6	16	5	1	-3	-7	-14	-17	-23
8	11	5	0	-3	-6	-9	-14	-21
10	9	4	-1	-5	-7	-9	-10	-16

Installation details

Solid walls, ceiling slabs and gypsum wallboards

Installation of the fire damper is approved in solid walls and ceiling slabs and also in gypsum wallboards with perimeter mortar in fill (wet installation) or without mortar (dry installation). Installation orientation and air flow direction are not critical.

In general note that:

- Minimum wall thickness:
100 mm concrete, aerated concrete, lightweight concrete or gypsum wallboards or 115 mm brickwork
- Minimum ceiling slab thickness:
100 mm concrete or 125 mm aerated concrete
- If the wall or ceiling is thicker than 100 mm, an extension piece (accessory or provided by customer) should be installed to simplify the connection to the duct.
- Minimum distance between two fire dampers: 150 mm

Rigid ducts must be connected with a flexible connector when installed in gypsum wallboards to DIN 18163.

Mortar based installation

An opening or a cut hole with a minimum $B + 80$ mm and $H + 80$ mm is required for installation of the fire damper in the wall or ceiling slab.

As an alternative the fire damper is concreted into the wall or ceiling slab during construction.

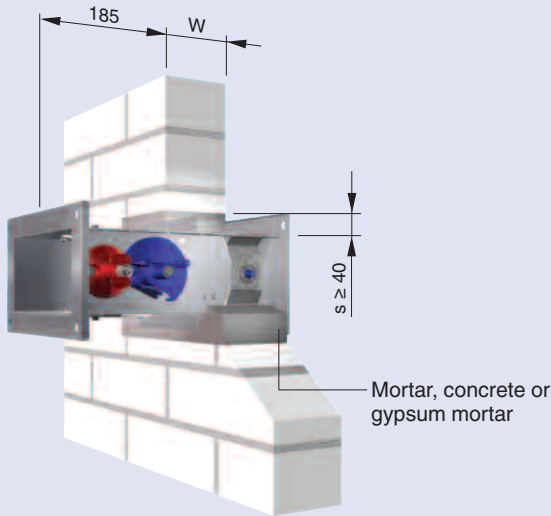
The perimeter gap »s« must be completely sealed with mortar. The mortar bed depth must not be less than 100 mm. Mortar that conforms to DIN 1053, Groups II or III, concrete or gypsum mortar are approved for use.

As an option a cover plate can be used to simplify installation, see page 6.

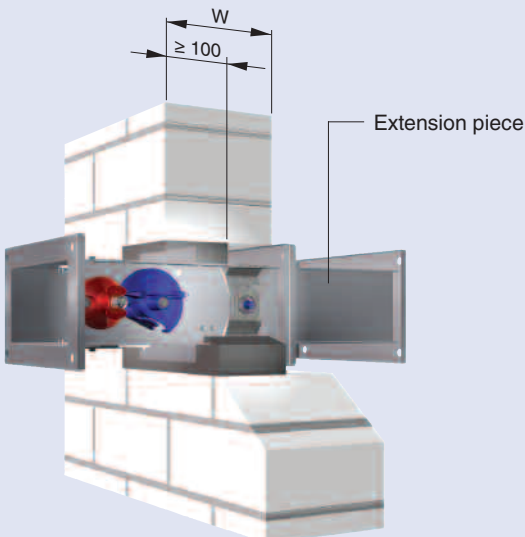
Installation opening dimensions in mm							
B	200	300	400	500	600	700	800
B + 80	280	380	480	580	680	780	880
H	100	125	150	160	200		
H + 80	180	205	230	240	280		

Wall installation

W: 100 to 115 mm

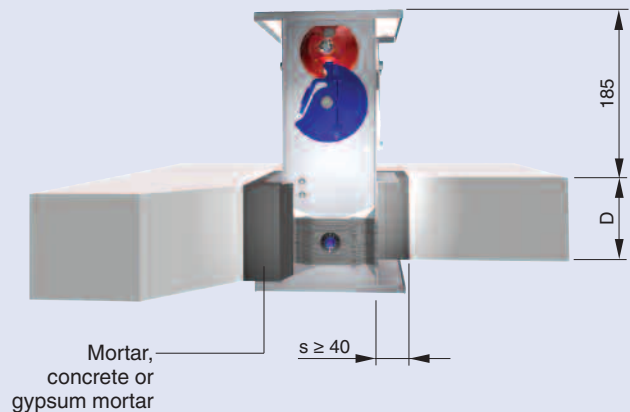


W > 115 mm



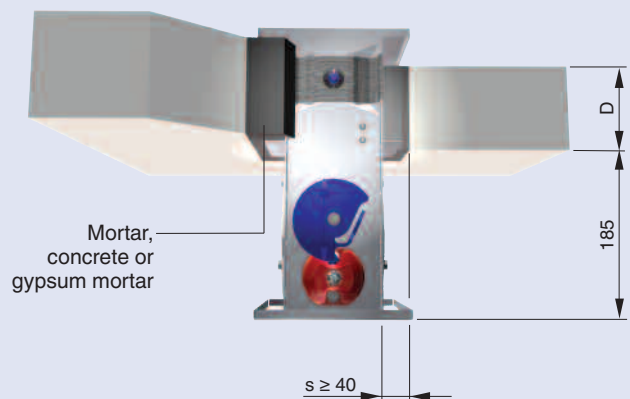
Ceiling slab installation, upright

D ≥ 100 mm



Ceiling slab installation, suspended

D ≥ 100 mm



Installation details

Solid walls, ceiling slabs and gypsum wallboards

Dry mortarless installation

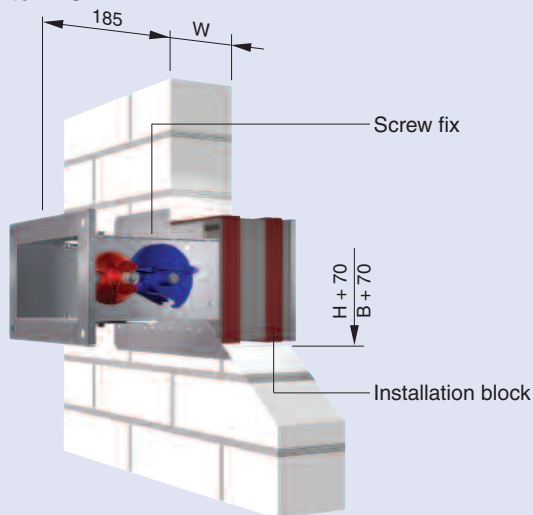
Fire dampers with installation blocks are used for installation without a perimeter mortar mix. The fire damper is pushed into the installation opening and the installation block fixed in position with suitable plugs and screws.

Rigid ducts must be connected with a flexible connector when installed in gypsum wallboards to DIN 18163.

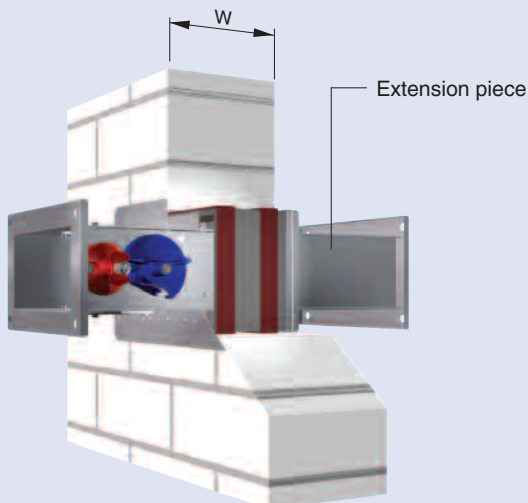
Installation opening dimensions in mm							
B	200	300	400	500	600	700	800
B + 70	270	370	470	570	670	770	870
H	100	125	150	160	200		
H + 70	170	195	220	230	270		

Wall installation

W: 100 to 115 mm

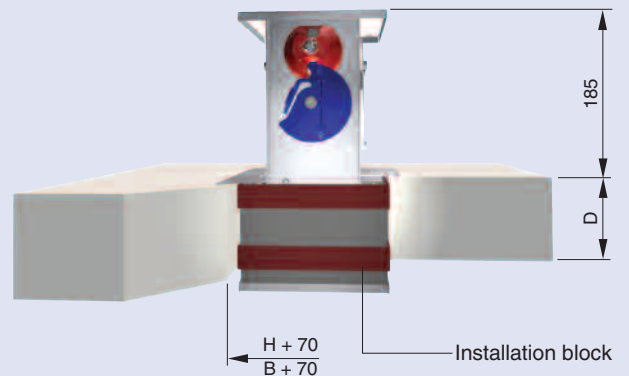


W > 115 mm



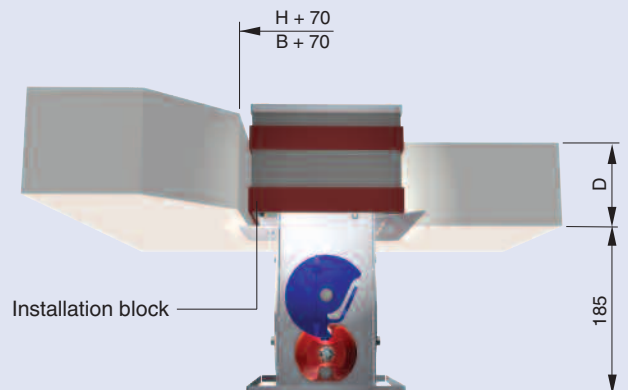
Ceiling slab installation, upright

D ≥ 100 mm



Ceiling slab installation, suspended

D ≥ 100 mm



Installation details

Lightweight partition walls

Installation of fire dampers in lightweight partition walls is approved using mortar based or dry installation methods. Installation orientation and air flow direction are not critical.

In general note that:

- Installation in lightweight partition walls with metal support and clad both sides to DIN 4102-4, Table 48
Minimum wall thickness: 100 mm
- If the lightweight partition wall is thicker than 100 mm, an extension piece (accessory or provided by customer) should be installed to simplify the connection to the duct.
- Minimum distance between two fire dampers: 150 mm

Rigid ducts must be connected with a flexible connector.

Mortar based installation

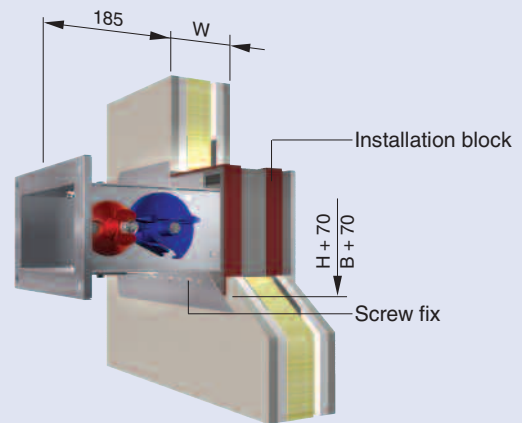
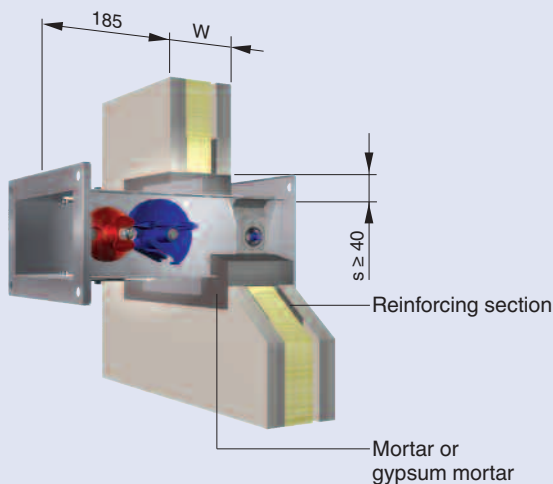
An opening or a cut hole with a minimum $B + 80$ mm and $H + 80$ mm is required for installation of the fire damper in the lightweight partition wall.

The perimeter gap »s« must be completely sealed with mortar. The depth of the mortar bed is the same as the wall thickness. Mortar that conforms to DIN 1053, Groups II or III, or gypsum mortar are approved for use.

Dry mortarless installation

Fire dampers with installation blocks are used for installation without a perimeter mortar mix. The fire damper is pushed into the installation opening and the installation block fixed in position with coarse thread screws.

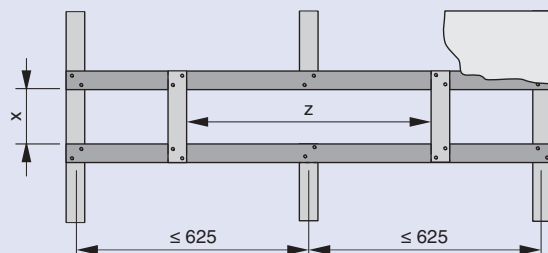
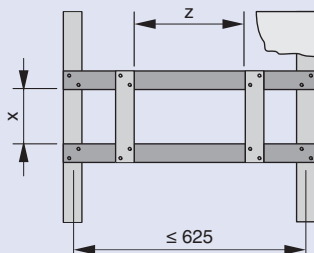
Lightweight partition wall with metal support



Metal support structure

for fire dampers up to $B = 400$ mm 1 cladding board

for fire dampers above $B > 400$ mm 2 cladding boards



Installation opening for wet installation:

$x = H + 80$ mm
 $z = B + 80$ mm

Installation opening for dry mortarless installation:

$x = H + 70$ mm
 $z = B + 70$ mm

Installation details

Non-load-bearing solid walls, lightweight partition walls

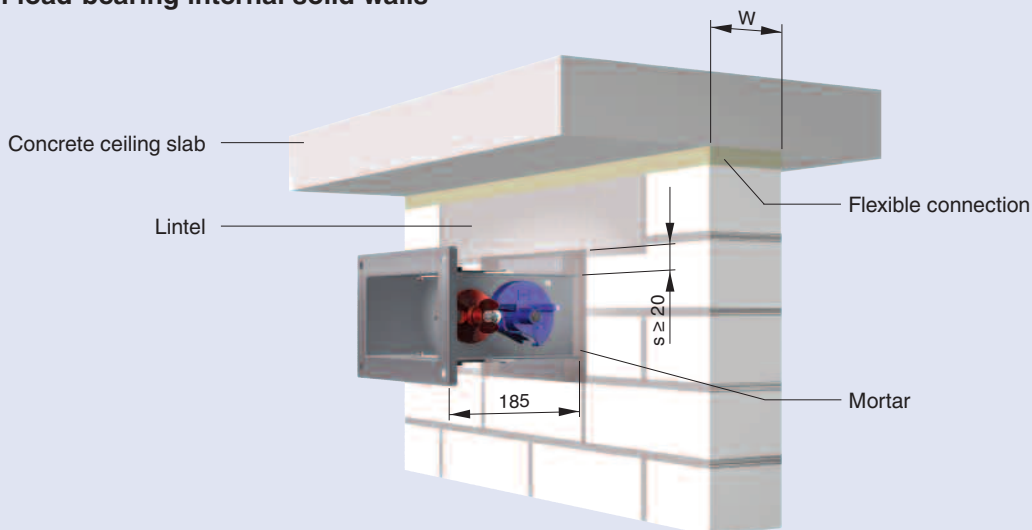
Non-load-bearing solid walls

Installation of fire dampers in internal non-load-bearing solid walls is approved using mortar based or dry installation methods. The gap between the wall and the ceiling is filled by a flexible connection. Over the top of the fire damper a concrete lintel is fitted.

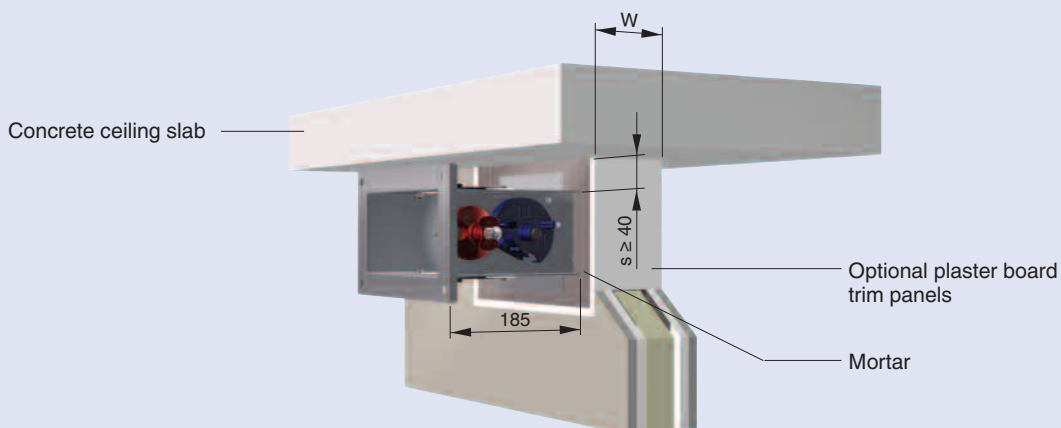
Non-load-bearing lightweight partition wall

Space saving installation directly underneath the ceiling in a non-load-bearing lightweight partition wall uses mortar based method. Therefore the installation opening is made directly underneath the ceiling and the top of partition channel support section is interrupted in this area. The installation opening may be trimmed with plaster board panels. The perimeter gap must be completely sealed with mortar.

Non-load-bearing internal solid walls



Lightweight partition wall directly underneath the ceiling



Order Details

Specification text *

Square or rectangular fire dampers in thirty-five nominal sizes for the isolation of duct penetrations between fire compartments.

Ready-for-operation unit contains a fire-resistant damper blade and a release mechanism. Fire resistance class: K90. Tested for fire resistance properties according to the European testing standard EN-1366-2, with general building inspectorate licence Z-41.3-653 of the "Deutsches Institut für Bautechnik", Berlin.

For dry mortarless installation and mortar-based installation in solid walls, ceiling slabs and lightweight partition walls. Connection of ducts made of combustible or non-combustible building materials approved.

Special characteristics:

- Tested for fire resistance properties according to EN 1366-2
- Approved for mortar based installation in lightweight partition walls
- Large free cross sectional area, therefore low differential pressure
- Integration into the centralised building management system (BMS) with TROXNETCOM

Damper closed blade leakage complies with EN 1751, class 4 (meets DIN 1946-4).

Casing air leakage complies with EN 1751, class A.

Fire damper model with:

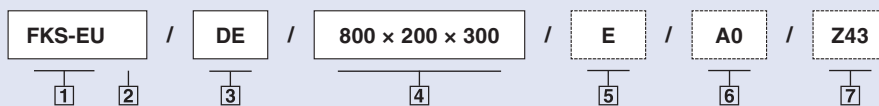
Spring return actuator with thermoelectric release mechanism. Two limit switches integrated into actuator for damper blade position indication "OPEN" and "CLOSED".

Casing made of galvanised sheet steel, damper blade made of special insulating material, blade mounting shaft of stainless steel, plastic plain bearings.

* Text for a FKS-EU with fusible link

Text for construction variants, installation block, attachments and accessories see design programme or our home page

Order code



1 Type

2 Construction variant

- 1 Powder-coated casing
- 2 Stainless steel casing

3 Country of destination

- DE Germany
- Other destination countries upon request

4 Nominal size

B x H x L

5 Installation block - Cover plate

- None, no entry required
- E With installation block and cover plate
- B With cover plate

6 Attachments

None, no entry required
S0 to AS

7 Accessories

None, no entry required
Z01 to ZL08

Order example FKS-EU with fusible link

Make: TROX
Type: FKS - EU / DE / 800 x 200 x 300

Order example FKS-EU, powder-coated, with installation block, operating side cover grille and spring return actuator 230 V AC

Make: TROX
Type: FKS - EU - 1 / DE / 800 x 200 x 300 / E / A0 / Z43